Delaware River Joint Toll Bridge Commission

Pennsylvania Department of Transportation

U.S. Department of Transportation Federal Highway Administration

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

Environmental Assessment/Draft Section 4(f) Evaluation
Volume 1 – Environmental Assessment

October 2009

DRJTBC Contract C-393A DRJTBC Capital Project No. CP0301A

I-95/Scudder Falls Bridge Improvement Project
Bucks County, Pennsylvania and Mercer County, New Jersey

ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to 42 U.S.C. 4332 (2) (c) and 49 U.S.C. 303
by the
U.S. Department of Transportation, Federal Highway Administration
Pennsylvania Department of Transportation, New Jersey Department of Transportation and Delaware River Joint Toll Bridge Commission

Cooperating Agencies:
U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, National Marine Fisheries Service, and Pennsylvania Department of Environmental Protection

Approved by: _____ Date: 11/06/09
Frank G. McCartney, Executive Director
Delaware River Joint Toll Bridge Commission

Approved by: _____ Date: 11/25/09
Renee Sigel, Pennsylvania Division Administrator
Federal Highway Administration

Approved by: _____ Date: 11/24/09
Brian G. Thompson, P.E., Director, Bureau of Design
Pennsylvania Department of Transportation

Approved by: _____ Date: 11.12.09
Walter McGrosky, Director, Div. of Capital Program Support
New Jersey Department of Transportation

The following persons can be contacted for information regarding the project:

George G. Alexandridis, P.E., Chief Engineer, Delaware River Joint Toll Bridge Commission, 2492 River Road New Hope, PA 18938-9519 - Phone: (215) 862-7696, Fax: (215) 862-5284, e-mail: ggalexandridis@drjtbc.org

Ross A. Mantione, Pennsylvania Division Office, Federal Highway Administration, Federal Bldg. 228 Walnut Street Harrisburg, PA 17101-1720 – Phone: (717) 221-3465, Fax: (717) 221-3494, e-mail: ross.mantione@fhwa.dot.gov

The proposed action involves replacing the I-95/Scudder Falls Bridge over the Delaware River, improvements to 4.4 miles of adjoining sections of I-95 from PA Route 332 to Bear Tavern Road, improvements to the Taylorsville Road Interchange, and improvements to the NJ Route 29 Interchange. The purpose of the project is to improve safety and relieve congestion. A 14-foot inside shoulder will be provided to accommodate potential future Route 1 Bus Rapid Transit service. The EA evaluates other TSM/TDM measures and a pedestrian/bicycle connection across the Delaware River. A final decision regarding TSM/TDM and the pedestrian/bicycle facility will be made during final design.

This Environmental Assessment/Draft Section 4(f) Evaluation consists of three volumes:

Volume 1 is the Environmental Assessment (EA) and includes:

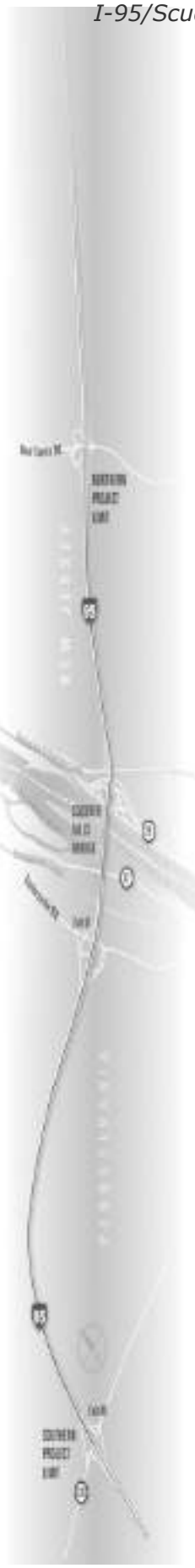
- Purpose of and Need for Action (Chapter I),
- Affected Environment (Chapter II),
- Alternatives Considered (Chapter III),
- Environmental Consequences (Chapter IV),
- Comments and Coordination (Chapter V), and
- Lists of References, Distribution List, and List of Preparers.

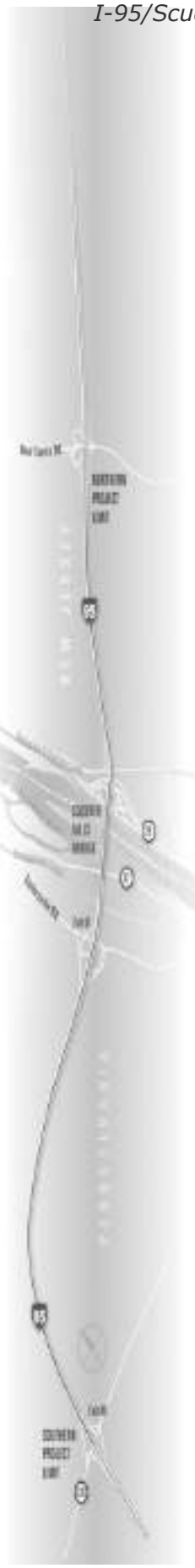
Volume 2 includes Attachments A through C of the Environmental Assessment:

- Agency Correspondence (Attachment A), including correspondence related to Section 7 of the U.S. Endangered Species Act and Section 106 of the National Historic Preservation Act
- Permitting Checklist/Consistency Determinations (Attachment B), and
- Technical Support Data Index (Attachment C).

Volume 3 is the Draft Section 4(f) Evaluation that documents potential impacts and mitigation measures for impacts on historic resources and public parklands protected under Section 4(f) of the U.S. Department of Transportation Act.

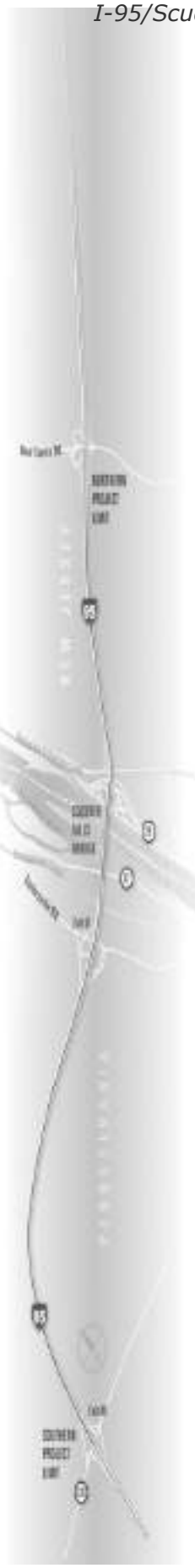
TABLE OF CONTENTS
VOLUME 1: ENVIRONMENTAL ASSESSMENT





LIST OF FIGURES

LIST OF TABLES



LIST OF ACRONYMS

AADT	—	Average Annual Daily Traffic
AASHTO	—	American Association of State Highway Transportation Officials
ADA	—	Americans with Disabilities Act
ALCAB	—	Agricultural Lands Condemnation Approval Board
ALPP	—	Agricultural Lands Preservation Policy
ACHP	—	Advisory Council on Historic Preservation
AMTRAK	—	National Railroad Passenger Corporation
APE	—	Area of Potential Effect
ASTM	—	American Society for Testing and Materials
BA	-	Biological Assessment
BO	-	Biological Opinion
BCGP	—	Bicycle Coalition of Greater Philadelphia
BMPs	—	Best Management Practices
BRT	—	Bus Rapid Transit
CERCLIS	—	Comprehensive Environmental Response, Compensation, and Liability Information Systems (also known as Superfund)
CD Roadway	—	Collector/Distributor Roadway
CFR	—	Code of Federal Regulations
cfs	—	Cubic Feet per Second
CJTF	—	Central Jersey Transportation Forum
CO	—	Carbon monoxide
dB	—	Decibel
dBA	—	A-weighted decibels
DRBC	—	Delaware River Basin Commission
DRGP	—	Delaware River Greenway Partnership

DRJTBC	—	Delaware River Joint Toll Bridge Commission
DVRPC	—	Delaware Valley Regional Planning Commission
EA	—	Environmental Assessment
EIS	—	Environmental Impact Statement
EJ	—	Environmental Justice
EJWG	—	Environmental Justice Working Group
EO	—	Executive Order
FEMA	—	Federal Emergency Management Agency
FHWA	—	Federal Highway Administration
FINDS	—	Facility Index System
FW1	—	Freshwater 1
FW2	—	Freshwater 2
FONSI	—	Finding of No Significant Impact
FPPA	—	Farmlands Protection Policy Act of 1981
gpd	—	Gallons Per Day
gpm	—	Gallons Per Minute
I-295	—	Interstate Route 295
I-95	—	Interstate Route 95
IAC	—	Interagency Advisory Committee
IM	—	Incident Management
ITS	—	Intelligent Transportation System
Leq (h)	—	Hourly equivalent noise level (typically the worst-case, peak hour noise level)
LMTFP	—	Lower Makefield Township Farmland Preservation
LOI	—	Letter of Interpretation
LOS	—	Level of Service
LUST	—	Leaking Underground Storage Tank

MPO	—	Metropolitan Planning Organization
MSA	—	Metropolitan Statistical Area
NAAQS	—	National Ambient Air Quality Standards
NAC	—	Noise Abatement Criteria
NEPA	—	National Environmental Policy Act of 1969
NFIP	—	National Flood Insurance Program
NJ	—	New Jersey
NJDA	—	New Jersey Department of Agriculture
NJ DEP	—	New Jersey Department of Environmental Protection
NJ DEP ENSP	—	New Jersey Department of Environmental Protection's Endangered and Non-Game Species Program
NJDOT	—	New Jersey Department of Transportation
NJDFW	—	New Jersey Division of Fish and Wildlife
NJHPO	—	New Jersey Historic Preservation Office
NJMTA	—	New Jersey Motor Truck Association
NJOSG	—	New Jersey Office of Smart Growth
NJ TRANSIT	—	New Jersey Transit Authority
NJWSA	—	New Jersey Water Supply Authority
NMFS	—	National Marine Fisheries Service
NPDES	—	National Pollutant Discharge Elimination System
NPS	—	National Park Service
NR	—	National Register of Historic Places
NRCS	—	Natural Resources Conservation Service
NSA	—	Noise Study Area
NWI	—	National Wetlands Inventory
OSHA	—	Occupational Safety and Health Administration

PA	—	Pennsylvania
PDA	—	Pennsylvania Department of Agriculture
PA DCED	—	Pennsylvania Department of Community and Economic Development
PA DCNR	—	Pennsylvania Department of Conservation and Natural Resources
PA DEP	—	Pennsylvania Department of Environmental Protection
PAWC	—	Pennsylvania American Water Company
PCSM	—	Post-Construction Stormwater Management
PennDOT	—	Pennsylvania Department of Transportation
PFBC	—	Pennsylvania Fish and Boat Commission
PGC	—	Pennsylvania Game Commission
PHMC	—	Pennsylvania Historical and Museum Commission
$PM_{2.5}$	—	Particulate Matter under 2.5 microns in size
PM_{10}	—	Particulate Matter under 10 microns in size
PNDI	—	Pennsylvania Natural Diversity Index
ppm	—	Parts per Million
RCRIS	—	Resource Conservation and Recovery Information System
SACM	—	Special Agency Coordination Meeting
SEPTA	—	Southeastern Pennsylvania Transportation Authority
SHPO	—	State Historic Preservation Officer
SIP	—	State Implementation Plan
SPCP	—	Spill Prevention Control and Countermeasure Plan
TDD	—	Transportation Development District
TDM	—	Transportation Demand Management
TIP	—	Transportation Improvement Program
TMA	—	Transportation Management Association
TNM	—	Traffic Noise Model (FHWA)

TSM	—	Transportation Systems Management
TIP	—	Transportation Improvement Program
U.S.	—	United States
USACOE	—	U.S. Army Corp of Engineers
USCG	—	U.S. Coast Guard
USDA	—	U.S. Department of Agriculture
USEPA	—	U.S. Environmental Protection Agency
USFWS	—	U.S. Fish and Wildlife Service
USGS	—	U.S. Geological Survey
UST	—	Underground Storage Tank
WET	—	Wetlands Evaluation Technique

SUMMARY

A. Introduction

The I-95/Scudder Falls Bridge, which was constructed in 1959, carries Interstate 95 (I-95) over the Delaware River between Lower Makefield Township in Bucks County, Pennsylvania (PA) and Ewing Township, a suburb of Trenton, in Mercer County, New Jersey (NJ) (Figures I-1 and I-2 in Chapter I). This segment of I-95 has not been substantially improved since it was constructed in 1959 and is operating well over available highway capacity during peak travel periods.

Detailed information on the need for the project is presented in Chapter I of this EA.

The Delaware River Joint Toll Bridge Commission (DRJTBC), in cooperation with the Federal Highway Administration (FHWA) – the lead federal agency, the Pennsylvania Department of Transportation (PennDOT), and the New Jersey Department of Transportation (NJDOT), is proposing improvements to the I-95/Scudder Falls Bridge and 4.4 miles of I-95. The project is included in DVRPC Long Range Transportation Improvement Program (TIP) and the New Jersey 2-Year TIP.

From west to east, I-95 in the project area consists of two lanes in each direction between PA Route 332 and NJ Route 29 and three lanes in each direction east of NJ Route 29 to Bear Tavern Road. This highway segment is operating over capacity during peak periods under existing conditions and is projected to operate well over capacity in 2030. The goal for the improvements in this segment of I-95 is to achieve a traffic level of service of LOS D, considered to represent an acceptable traffic operating level in an urban environment, in the future year 2030. The project involves adding a travel lane and adequate outside and inside shoulders in each direction with additional lanes to accommodate entry and exit from adjoining interchanges (auxiliary lanes) on the I-95/Scudder Falls Bridge. The project includes highway improvements necessary to transition to the existing six-lane section of I-95 extending approximately 1.5 miles east from NJ Route 29 to the Bear Tavern Road (County Route 579) Interchange.

The project includes improvements to the Taylorsville Road Interchange (PA Exit 51) in Pennsylvania and the NJ Route 29 Interchange (NJ Exit 2) in New Jersey to meet current highway and geometric design standards. Interchange improvements include reconfiguration, the addition/modification of acceleration and deceleration lanes and providing adequate spacing of ramp merges.

This EA also includes consideration of pedestrian/bicycle access across the Delaware River and incorporation of Transportation Systems Management (TSM)/Transportation Demand Management (TDM) measures.

B. Purpose of and Need for Action

The I-95 corridor is a major commuter route for employment destinations in or near the project area, as well as for commuters residing in bedroom communities along the route. The project area is within commuting distance to Philadelphia and major nearby employment centers in Bucks and Mercer Counties, the New Jersey state capital in the City of Trenton, and even New York City.

During the morning and evening peak hours, I-95 experiences frequent backups and delays related to commuter traffic, affecting the quality of life for area residents and commuters. Peak travel directions on I-95 are northbound in the A.M. peak and southbound in the P.M. peak, reflecting the fact that 13% of Bucks County residents work in Mercer County, compared to 4% of Mercer County residents that work in Bucks County.

1. I-95/Scudder Falls Bridge and I-95 Mainline Roadway

The existing I-95/Scudder Falls Bridge is approximately 50 years old and does not have the required structural capacities for the present and future traffic conditions. The existing bridge superstructure (the two main beams under the concrete deck) is of a non-redundant type. A non-redundant bridge generally has only two primary load-carrying members (beams), where the failure of one of these members results in catastrophic collapse of the bridge. The design of non-redundant structures is no longer permitted nationwide by the FHWA and state departments of transportation.

The two main beams and pinned hangers (four large steel pins supporting each suspended portion of the bridge) are fracture critical members, whose failure would result in collapse of the bridge. The two existing main beams of the bridge consist of steel plates and steel angles that are riveted together to make up the I-beam shape. This method (called riveted built-up) was used for large beams before advanced welding technology was developed after the 1960's. Riveted built-up construction offers limited opportunities to upgrade the beams to meet the current internal redundancy requirements. The DRJTBC installed redundancy hangers at all of the pinned hangers many years ago to prevent catastrophic collapse of the bridge from a pin failure.

The existing I-95/Scudder Falls Bridge consists of two travel lanes in each direction, separated by a concrete median barrier. The bridge lacks shoulders and breakdown lanes and does not meet current minimum highway geometric design standards. The current configuration does not provide adequate shoulder areas to provide refuge for drivers in the event of a breakdown, emergency, crash, or other incidents.

The existing I-95/Scudder Falls Bridge accommodated an average annual daily traffic (AADT) volume of 59,500 vehicles per day in 2003. By the year 2030, traffic is projected to grow by 29%, to an AADT of 76,500 vehicles per day. In 2003, traffic congestion during peak hours resulted in two hours of level of service E or F on the I-95/Scudder Falls Bridge during peak hours in the predominant traffic flow direction (northbound in the A.M. and southbound in the P.M.). In 2030, the projected future increase in traffic volumes will result in severe congestion in 2030 along an additional two miles of I-95 extending west of the bridge in the northbound direction during the A.M. peak and an additional five miles extending further west of the bridge in the southbound direction during the P.M. peak.

2. I-95 Interchanges

Congestion at the bridge is exacerbated not only by the narrow bridge configuration, but also by the proximity of the adjoining interchanges, with ramps merging onto the I-95 mainline close to the bridge. In particular, the NJ Route 29 Interchange adjoins the east bank of the Delaware River, and an interchange with Taylorsville Road is located within ½ mile to the west of the river on the Pennsylvania side.

Geometric deficiencies along the I-95 project area also include the configuration of adjoining interchanges. In particular, the NJ Route 29 Interchange adjoining the bridge, has a scissors

configuration, with multiple ramp merges and at-grade intersections, and is complex and confusing for drivers (Figure I-8 in Chapter I). The NJDOT *Final Step 1 Engineering Report for I-95/New Jersey Route 29/New Jersey Route 175 Interchange* (November 1995) indicated that the interchange includes nineteen ramp merges and seven at-grade intersections.

The lack of, or inadequate configuration of, deceleration and acceleration lanes from the adjoining interchanges, combined with inadequate spacing of interchange ramp merges, creates potentially unsafe weaving and merging/diverging patterns on the bridge. The NJ Route 29 Interchange also marks the transition on I-95 from three travel lanes in each direction to two lanes in each direction approaching the I-95/Scudder Falls Bridge. At the on-ramp from NJ Route 29 to I-95 southbound, the lack of an acceleration lane requires vehicles to come to a complete stop at a stop sign at the end of the ramp, before merging directly into mainline traffic operating at full speeds on the bridge itself.

C. Alternatives Considered

A broad range of alternatives for the I-95/Scudder Falls Bridge Improvement Project were considered to meet the project purpose and need. The alternatives that were considered for the project included different improvement options for the I-95/Scudder Falls Bridge crossing, the I-95 mainline, and the interchanges. A preferred option was selected for each project segment (See Figure S-1) for inclusion in the proposed action (see Table S-1).

> *Detailed information on the alternatives and design options considered and the alternatives evaluation process is presented in Chapter III of this EA.*

The alternatives considered were evaluated in consultation with Pennsylvania, New Jersey, regional and local officials, and the public. The means of coordinating with transportation, regulatory and resource agencies, and municipal officials included coordination through two forums: the Interagency Advisory Committee (IAC) and Special Agency Coordination Meetings (SACM). In addition, public open houses were held in both Lower Makefield and Ewing Townships to present concepts to the public and obtain input on alternatives under consideration. A series of separate coordination meetings were also held with environmental groups, transportation groups, including the Bucks County and Mercer County Transportation Management Associations, and Smart Growth agencies in both states.

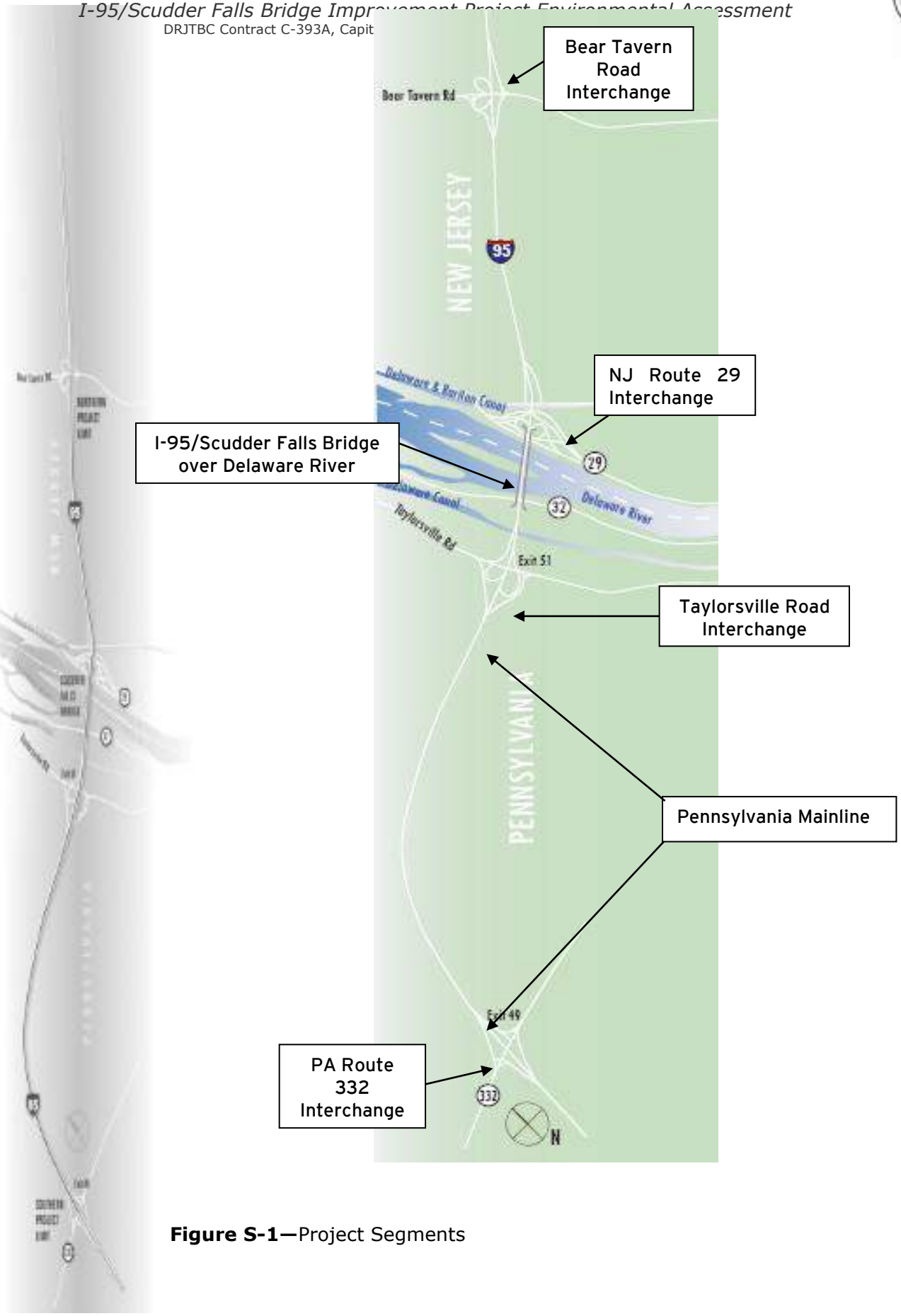


Figure S-1—Project Segments

Table S-1—Summary of I-95 Mainline, I-95/Scudder Falls Bridge, and Interchange Design Options

DESCRIPTION OF ALTERNATIVES AND DESIGN OPTIONS	PROPOSED ACTION
No Build	Considered in EA for comparison to Proposed Action
Transportation Systems Management/ Transportation Demand Management • Inside shoulders designed to carry Bus Rapid Transit • Coordination with Bucks County and Mercer County Transportation Management Associations • ITS and incident management recommendations	Part of Proposed Action, but, as a standalone measure, will not meet purpose and need
I-95/Scudder Falls Bridge Structural Options • Bridge rehabilitation (full and partial) with widening, • Bridge replacement	Bridge replacement
I-95/Scudder Falls Bridge Lane Configuration Options • Double-deck (two-level) bridge, • Contra-flow lane (reversible lane for use in peak flow directions), • Collector/distributor (CD) roadway (3-lane northbound CD roadway segregated from I-95 by 6-foot concrete divider) • Standard lane additions (5 lanes northbound/4 lanes southbound on the I-95/Scudder Falls Bridge)	Standard lane additions
I-95/Scudder Falls Bridge Alignment Options • New bridge on centerline alignment, • New bridge on downstream alignment, • New bridge on upstream alignment	New bridge on upstream alignment
Pennsylvania Mainline Options • Outside widening, • Inside widening	Inside widening
Interchange Design Options • Taylorsville Road Interchange o **Design Option 1:** Retains all existing interchange ramps o **Design Option 2.:** Eliminates eastern southbound off-ramp o **Design Option 3.:** Eliminates eastern northbound on-ramp o **Design Option 4.:** Eliminates eastern southbound off-ramp and northbound on-ramp • NJ Route 29 Interchange o **Design Option 1a:** Folded Diamond on NJ Route 29 Southbound (Western) Alignment without a Bypass for NJ Route 29 northbound o **Design Option 1b:** Folded Diamond on NJ Route 29 Southbound (Western) Alignment with a Bypass for NJ Route 29 northbound o **Design Option 1c (Modified):** Folded Diamond on NJ Route 29 Southbound (Western) Alignment with Roundabout Intersections and a Bypass for NJ Route 29 northbound o **Design Option 2:** Folded Diamond on NJ Route 29 Northbound (Eastern) Alignment	Taylorsville Road Interchange Option 2 NJ Route 29 Interchange Design Option 1c (Modified)
Pedestrian/Bicycle Facility Options • Pennsylvania landing with direct connection to Delaware Canal towpath • Pennsylvania landing with connection to canal towpath via sidewalk along Woodside Road • New Jersey landing connection to Delaware and Raritan Canal on west side of NJ 29 Interchange	Final decision on pedestrian/bicycle facility to be made in final design; Preferred design includes: Pennsylvania landing with connection to canal towpath via sidewalk along Woodside Road New Jersey landing connection to Delaware and Raritan Canal on west side of NJ29 Interchange

D. Proposed Action

As a result of this alternatives evaluation and screening process, the proposed action incorporates the following project elements:

- Standard Lane Additions – 5 lanes northbound/4 lanes southbound on the I-95/Scudder Falls Bridge
- New Bridge on Upstream Alignment
- Pennsylvania Mainline Inside Widening
- Taylorsville Road Interchange Option 2
- NJ Route 29 Interchange Option 1c (Modified)
- Pedestrian/bicycle facility – (an evaluation of the environmental consequences of this facility is included in Chapter IV, but a decision to include this facility as part of the proposed action will be made during final design)
- Transportation Systems Management/Transportation Demand Management.

The proposed action meets the project purpose and need and incorporates standard lane additions on the I-95/Scudder Falls Bridge and the preferred design options that were selected for each project segment. The environmental consequences of the proposed action are described in Chapter IV. The proposed action is illustrated on Figure III-22 in Chapter III.

Standard Lane Additions: Existing I-95 includes two travel lanes in each direction west of NJ Route 29, and three travel lanes in each direction east of NJ Route 29. The area immediately east of the I-95/Scudder Falls Bridge, which is two lanes in each direction, is a transition area from two lanes to three lanes in each direction.

Under the proposed action with standard lane additions, one travel lane in each direction will be added on the I-95/Scudder Falls Bridge. The project will also add two auxiliary lanes northbound between Taylorsville Road and NJ Route 29 and one auxiliary lane southbound to provide safer merges at these closely spaced interchanges, for a total of five lanes northbound and four lanes southbound on the I-95/Scudder Falls Bridge and approaches. One northbound auxiliary lane will be dropped at the NJ Route 29 Interchange, and the second auxiliary lane will be extended east to the Bear Tavern Road Interchange. Full width inside and outside shoulders will be provided in both directions of I-95. The inside shoulder of I-95 throughout the project area will be 14 feet wide to accommodate future planned Route 1 Bus Rapid Transit service during congested conditions.

New Bridge on Upstream Alignment: A new, wider bridge will be constructed upstream of, or north of, the existing I-95/Scudder Falls Bridge over the Delaware River, with the new bridge extending north from the southern edge of the existing bridge (see Figure III-12). This bridge will incorporate a single bridge structure.

Pennsylvania Mainline Inside Widening: Along the Pennsylvania mainline of I-95, one travel lane in each direction will be added within the existing median, i.e. on the left side of the existing travel lanes (See Figures III-13 and III-14 for a typical cross-section). West of Taylorsville Road, with the proposed improvements, I-95 will consist of three travel lanes in each direction, with full-width inside and outside shoulders. With the inside widening, the grassed median will be replaced by the additional pavement for the travel lanes and shoulders, a paved median and concrete median barrier.

Taylorsville Road Interchange: The eastern southbound off-ramp will be eliminated at the Taylorsville Road Interchange and combined with the western southbound off-ramp. The two northbound on-ramps at the interchange, the single northbound off-ramp, and single southbound on-ramp will be retained. Taylorsville Road will be widened to provide two travel lanes plus intersection turning lanes within the interchange. Woodside Road will be widened on the approaches and exit legs to its intersection with Taylorsville Road.

NJ Route 29 Interchange: The design for the NJ Route 29 Interchange will incorporate a folded diamond interchange with two roundabout intersections at the I-95 ramp termini. This design is preferred by NJDOT and viewed as the best option from safety and traffic operations perspectives. This design will retain the bypasses for NJ Route 29 northbound and southbound through traffic and will allow free-flow traffic through the interchange, as the preferred design does not include any traffic signals or stop sign-controlled intersections. The width of the NJ Route 29 northbound bypass will be reduced to one travel lane plus shoulders to reduce existing proximity effects on the Delaware and Raritan Canal. Option 1c (Modified) would eliminate the existing I-95 northbound on-ramp from NJ Route 175 (Upper River Road).

Pedestrian/Bicycle Facility: The proposed action may include a pedestrian/bicycle facility that would provide a connection across the Delaware River to the adjoining towpaths within the canal systems in Pennsylvania and New Jersey. This EA compares the impacts of the proposed action with and without the pedestrian/bicycle facility, because a final decision on incorporating pedestrian/bicycle access will be made during final design, when project costs are refined.

Transportation Systems Management/Transportation Demand Management (TSM/TDM): The following TSM/TDM measures have been considered as part of the proposed action in this Environmental Assessment:

- **Intelligent Transportation Systems/Incident Management:** Implementation of ITS and an Incident Management Plan will require coordination with PennDOT and NJDOT, which own the majority of the right-of-way.
- **Accommodations for Proposed Route 1 Bus Rapid Transit:** The improvements to the I-95 mainline will include a 14-foot inside shoulder along the entire project area to accommodate the proposed Route 1 Bus Rapid Transit service on the uncongested shoulder during periods of congestion on the I-95 travel lanes.
- **Other TSM/TDM Initiatives**: Other TSM/TDM initiatives, such as park and ride improvements will be considered in consultation with PennDOT, NJDOT, and the Bucks County and Mercer County Transportation Management Associations and large area employers.

Cost: Without the pedestrian/bicycle facility, the proposed action is estimated to cost approximately $282 million in 2012 dollars (mid-point of construction). With the pedestrian/bicycle facility, the project is estimated to cost approximately $300 million (2012 dollars).

The DRJTBC is currently evaluating various options for funding the project as part of its $950 million Capital Program which includes investments to Preserve, Manage, Enhance and Protect its capital infrastructure comprised of seven (7) toll bridges and thirteen (13) toll-supported bridges and their accompanying assets which span the Delaware River over a distance of 139 miles. As part of this process, and consistent with a Memorandum of Agreement by the Executive Director of the DRJTBC, the Pennsylvania Secretary of Transportation, and the New Jersey Commissioner of Transportation, the DRJTBC is consulting with representatives of the Governors of the State of New Jersey and the Commonwealth of Pennsylvania to assure sufficient funding to construct this very important enhancement of its capital infrastructure.

Construction: Construction of the project will occur over approximately 4 years. Construction of mainline I-95 work will occur in two phases, each maintaining the current number of travel lanes (two to three lanes in New Jersey and two lanes in Pennsylvania) of traffic in each direction during peak periods. Phase 1 will reconstruct the existing median and outside shoulders and Phase 2 will reconstruct the central portions of the northbound and southbound roadways.

This project will require two primary phases to construct the new I-95/Scudder Falls Bridge and demolish the existing bridge. The first construction phase will construct the upstream, or northern, side of the bridge. The second phase of bridge construction will demolish the existing bridge and construct the downstream, or southern side of the bridge. The construction of new bridge piers and demolition of existing piers within the Delaware River will occur within cofferdams to allow pier construction to occur in the dry. Seven of the nine existing bridge piers are located within the river, and five of the seven proposed bridge piers will be located within the river.

It is anticipated that construction access within the Delaware River will be provided by use of four stages (two stages for each phase) of temporary trestle causeways. Each causeway segment would extend across half of the river at a time, extending approximately 400 to 600 feet from either the Pennsylvania or New Jersey shore.

Alternatives to the proposed use of a trestle causeway that were considered included an earthen causeway, use of barges, staging construction from the existing bridge, and elimination of river piers with a long-span bridge. The latter three methods were determined to be infeasible. The earthen causeway would have greater impacts to the river bottom than the trestle causeway option, but would have been less expensive. The disadvantages to the earthen causeway involved greater impacts to and a greater footprint within the Delaware River for emplacement of temporary fill. The trestle will better maintain hydraulic flows during construction and will involve a lesser footprint on the Delaware River. For all intents and purposes, the trestle will be removed after completion of construction. The estimated cost of a trestle causeway is approximately $3,000,000. Additional information on the impacts of construction are provided in Chapter IV.

E. Summary of Impacts and Mitigation Measures

Table S-2 summarizes the environmental impacts associated with the project. These impacts and appropriate mitigation measures are addressed in Chapter IV of this EA.

Table S-2—Summary and Comparison of Impacts: No Build, Proposed Action, Pedestrian/Bicycle Facility and Construction

Impact Category	No Build	Proposed Action	Pedestrian/ Bicycle Facility	Construction
Traffic and Transportation	Level of Service (LOS) E to F for 2 hours (2003) for peak direction in peak periods on the I-95/ Scudder Falls Bridge. LOS F in 2030 with additional hours of congestion.	LOS A to C in 2030 on I-95/Scudder Falls Bridge. Accommodations for shoulder use by Bus Rapid Transit service.	Only crossing for pedestrians and bicycles within 12 miles of Delaware River between the New Hope-Lambertville Bridge and the Calhoun Street Bridge in Trenton.	Traffic staged to maintain two to three lanes in each direction in peak periods. Temporary causeway (four stages) across Delaware River with access from PA Route 32 and NJ Route 29.
Community and Economic Conditions	Severe traffic congestion would adversely affect economic development, local businesses, and quality of life for area residents.	Congestion relieved. Impact on 3.1 acres of public land and 3.8 acres of private land. One residence in PA displaced.	Additional impact to 0.2 acre of parkland within the Delaware and Raritan Canal State Park.	Temporary traffic disruption, but increase in construction jobs. Temporary easement for causeway required across privately owned Park Island.
Utilities and Infrastructure	None	Affected utilities will be relocated (fiber optic cable on the bridge), and no impacts to utility service.	None	Affected utilities will be relocated.
Parklands and Recreation Facilities	None	Impact on 0.4 acre of Delaware and Raritan Canal State Park	Impact on 0.2 additional acre of Delaware and Raritan Canal State Park.	Public access to the Delaware River Water Trail will be maintained. At any given time, about half of the river would be available for recreation use. Temporary, short-term closures of the canal towpaths during overhead bridge construction.

Table S-2—Summary and Comparison of Impacts: No Build, Proposed Action, Pedestrian/Bicycle Facility and Construction

Impact Category	No Build	Proposed Action	Pedestrian/ Bicycle Facility	Construction
Farmlands	None	Impact on 0.9 acre of preserved farmland, of which 0.08 acre is actively farmed.	None	Temporary impact to additional ½ acre of preserved farmland.
Aesthetic and Visual Characteristics	None	Views of a wider I-95 mainline, views from the bridge may be obstructed by safety/noise barriers. Additional shading of Delaware River and canals.	Increased width of the I-95/Scudder Falls Bridge.	Construction areas will be visible to drivers and residents.
Surface Waters	None	Permanent loss of 0.3 acre of Delaware River bottom and 0.04 acre along 3 streams. Increased shading of 2.8 acres for river and 0.7 acre for the canals.	Additional shading of 0.3 acre of the Delaware River.	Impact on 0.33 acres of river bottom for causeways and cofferdams. Siltation controls will be used.
Groundwater	None	Increase in impervious area (20 acres), but the stormwater system will be designed to maintain existing drainage patterns.	1.5 acre increase in impervious surfaces.	Dewatering will be directed to sediment basins, filter bags, and sediment traps.
Geology and Soils	None	Impact to 60 acres of erodible soils.	Minor additional impacts to erodible soils.	Erosion and Sedimentation Control Plan will be prepared to minimize siltation.

Table S-2—Summary and Comparison of Impacts: No Build, Proposed Action, Pedestrian/Bicycle Facility and Construction

Impact Category	No Build	Proposed Action	Pedestrian/ Bicycle Facility	Construction
Floodplains	None	Impacts to 2.17 acres of regulatory floodway and 10.3 acres of 100-year floodplain. Proposed bridge would be less of an obstruction to flooding and flood elevations would be 0.03 feet (1-year flood) to 0.07 feet lower (500-year flood) than existing	Impact to an additional 0.01 regulatory floodway and 0.12 acre of 100-year floodplain.	Causeway used over the 4-year construction period would result in a 0.51-foot rise in 1.4-year design storm, and overtopping of PA Route 32 in a 17-year storm.
Wetlands	None	Permanent impact to 0.88 acres of wetland	Pedestrian/bicycle facility would affect an additional 0.02 acre of wetland.	Temporary impact to 0.10 acre of wetland during construction.
Terrestrial and Aquatic Habitats	None	Clearing of 8 acres of forest and loss of 0.34 acre of river or stream bottom.	Additional clearing of 0.66 acre of forest.	Temporary impact to 0.33 acres of Delaware River bottom for causeway and cofferdams.
Threatened and Endangered Species	None	Loss of 0.03% of spawning habitat for shortnose sturgeon. Potential nesting for peregrine falcon. Habitats for Atlantic sturgeon (not spawning), listed mussels species and red-bellied turtle will be affected.	None	Temporary effect on 0.04% of the spawning habitat for the shortnose sturgeon, moratorium on in-river silt-producing work during sturgeon spawning season. A mitigation plan will be developed for protected mussel species.
Historic Resources	None	Adverse effect on the Delaware and Raritan Canal and an effect (not considered adverse) on the Delaware Canal.	Landings within historical boundaries of the canals.	Temporary impact within the historic canal districts.

Table S-2—Summary and Comparison of Impacts: No Build, Proposed Action, Pedestrian/Bicycle Facility and Construction

Impact Category	No Build	Proposed Action	Pedestrian/ Bicycle Facility	Construction
Archaeological Resources	None	Impact to several areas along Delaware River with high archaeological sensitivity. Additional study and recovery will be performed.	Additional impacts will be further evaluated during final design.	Potential impacts on archaeological resources may occur in areas of deep bridge foundations and for causeway construction across Park Island.
Air Quality	None	Future CO levels will be well below NAAQS in 2030, and particulate matter not be of concern.	None	Use of dust controls for temporary emissions.
Noise	In 2030, 0 to 3 dBA Leq(h) increase over existing conditions and 34 impacted receptors.	Increase of 1 to 5 dBA Leq(h) over existing conditions, 1 to 4 dBA Leq(h) over 2030 No Build, and 74 impacted receptors.	None	Temporary noise increases, but most of the construction will occur during daytime hours.
Hazardous Waste	None	Lead paint on existing bridge, and potential for asbestos will be determined	None	Lead paint abatement measures will be used
Secondary Development and Cumulative Impacts	None	Project supports planned economic development and access to designated growth centers within PA and NJ, but the project will not change well-established land use and development patterns	None	None

I. PURPOSE OF AND NEED FOR ACTION

A. Introduction

The I-95/Scudder Falls Bridge, which was constructed in 1959, carries Interstate 95 (I-95) over the Delaware River between Lower Makefield Township in Bucks County, Pennsylvania (PA) and Ewing Township, a suburb of Trenton, in Mercer County, New Jersey (NJ) (Figures I-1 and I-2). This segment of I-95 has not been substantially improved since it was constructed and is operating well over available highway capacity during peak travel periods.

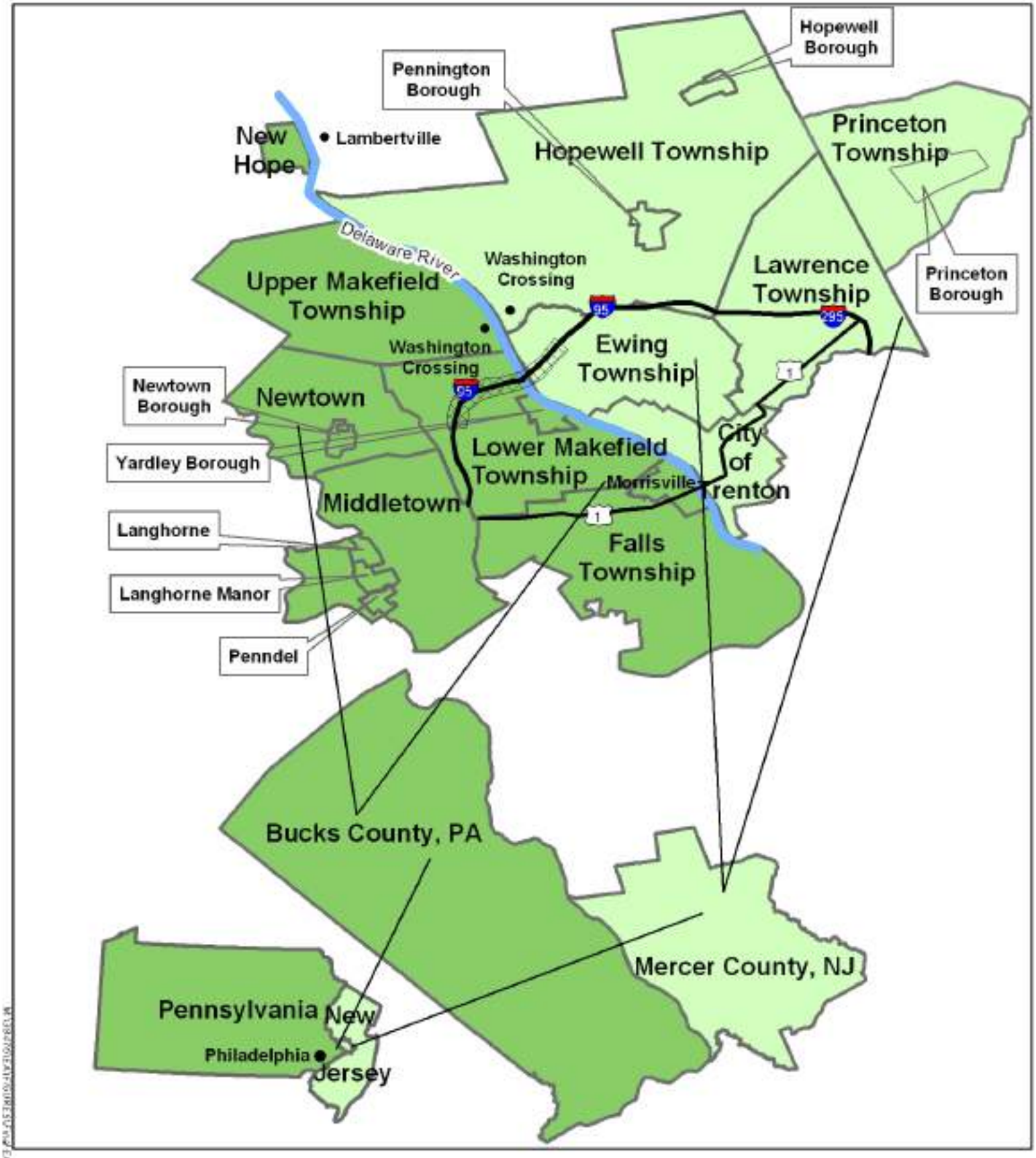
The Delaware River Joint Toll Bridge Commission (DRJTBC), in cooperation with the Federal Highway Administration (FHWA), the Pennsylvania Department of Transportation (PennDOT), and the New Jersey Department of Transportation (NJDOT), is proposing improvements to the I-95/Scudder Falls Bridge and 4.4 miles of I-95. This chapter describes the project history and the project purpose and need, and outlines the stakeholder goals for the project. The transportation factors that demonstrate the need for the project—existing and future traffic, capacity, and geometric deficiencies within the I-95 project area—are also documented.

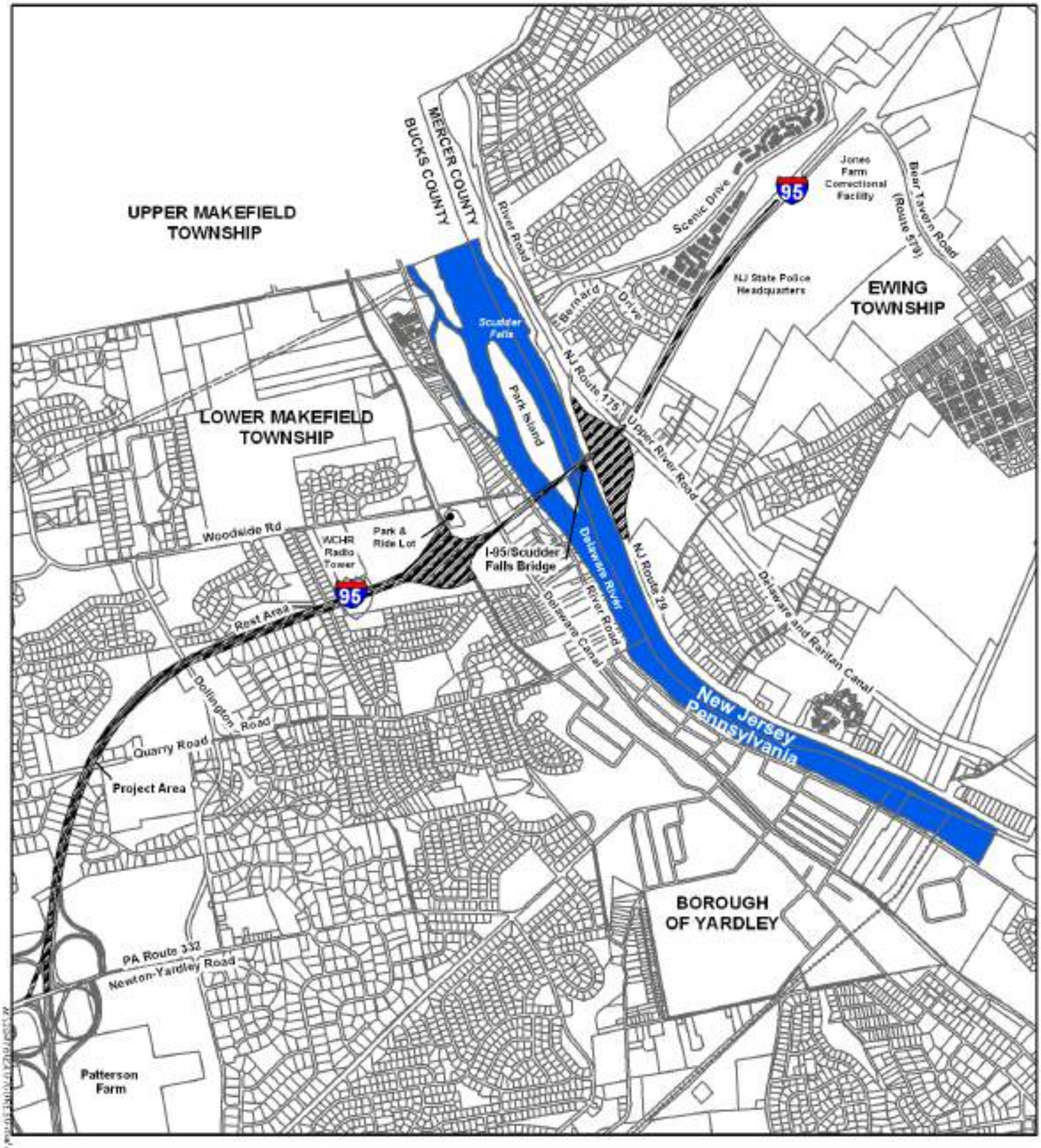
Detailed information on the results of baseline traffic and crash studies, forecasted traffic growth, and assessment of roadway geometric deficiencies are presented in Technical Memorandum No. 11, Needs Report. The Needs Report also documents regional population, employment, and growth and development factors contributing to the need for the project.

B. Project History

The DRJTBC is responsible for acquiring, constructing, administering, operating, and maintaining the eighteen vehicular bridges and two pedestrian bridges along the segment of the Delaware River extending from the New York border to the Philadelphia/Bucks County line. The need to reduce congestion and improve safety at the I-95/Scudder Falls Bridge was first identified by the DRJTBC in the *Traffic Study of Trenton-Morrisville Bridge Crossings over the Delaware River* (1990). In September 2000, the DRJTBC commissioned a transportation study to define transportation needs at four bridges within the 9-mile reach of the Delaware River around Trenton, including the I-95/Scudder Falls Bridge. In 2000, all four bridges within this area, known as the Southerly Crossings Corridor, were operating at unacceptable (LOS E) or (LOS F) traffic levels of service (LOS).

The *Southerly Crossings Corridor Study: Phase I Transportation Study* (August 2002) identified the I-95/Scudder Falls Bridge, which currently accommodates the highest traffic volumes of the four bridges studied, as a higher priority than the other bridge projects. The study recommended adding a travel lane in each direction to the I-95/Scudder Falls Bridge and the adjoining highway segments. These recommendations also defined the need for geometric and capacity improvements extending west to PA Route 332 in Pennsylvania and east of NJ Route 29 in New Jersey. The study recommended reconstruction of the NJ Route 29 Interchange and ramps, as well as a transition section to the existing six-lane cross-section of the I-95 mainline.


Hopewell Borough
Pennington Borough
New Hope
Lambertville
Hopewell Township
Princeton Township
Delaware River
Washington Crossing
Upper Makefield Township
Lawrence Township
Princeton Borough
Washington Crossing
Ewing Township
Newtown Borough
Newtown
Yardley Borough
Lower Makefield Township
City of Trenton
Morrisville
Middletown
Langhorne
Falls Township
Langhorne Manor
Penndel
Bucks County, PA
Mercer County, NJ
Pennsylvania
New Jersey
Philadelphia
Project Area
Not to Scale
I-95/Scudder Falls Bridge Improvement Project
Environmental Assessment
Location Map
Figure I-1



Project Area

Not to Scale

I-95/Scudder Falls Bridge Improvement Project Environmental Assessment

Vicinity Map

Figure I-2

This Environmental Assessment (EA) is the next step in implementing the findings and recommendations of the DRJTBC's Southerly Crossings Corridor Study. In January of 2003, the DRJTBC, PennDOT, and the NJDOT entered into a *Memorandum of Agreement to Alleviate Existing and Future Congestion along the I-95 Scudder Falls Bridge Corridor* (January 2003). In the Memorandum of Agreement (MOA), these transportation agencies agreed to jointly prepare environmental documentation to comply with the PennDOT Transportation Development Process. The Federal Highway Administration is the lead federal agency for preparation of this EA under the National Environmental Policy Act (NEPA). Pursuant to NEPA (40 CFR 1501.6), the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, the National Marine Fisheries Service, and the Pennsylvania Department of Environmental Protection are cooperating agencies. The project is included in DVRPC Long Range Transportation Improvement Program (TIP) and the New Jersey 2-Year TIP.

C. Project Purpose

The purpose of the project is to alleviate recurring current and future traffic congestion and upgrade safety and traffic operational conditions on the I-95/Scudder Falls Bridge and adjoining highway segments in Pennsylvania and New Jersey. The project area extends 4.4 miles between the PA Route 332 (Newtown-Yardley Road) Interchange (PA Exit 49) in Pennsylvania and the Bear Tavern Road (County Route 579) Interchange (NJ Exit 2) in New Jersey.

The overarching goal of the project is to improve mobility and to provide a safe and reliable river crossing for vehicles on this segment of I-95. The I-95/Scudder Falls Bridge provides critical access for community facilities and emergency services between Pennsylvania and New Jersey; it will support continued economic development and interstate commerce by accommodating the movement of people and goods.

From west to east, I-95 in the project area consists of two lanes in each direction between PA Route 332 and NJ Route 29 and three lanes in each direction east of NJ Route 29 to Bear Tavern Road. This highway segment is operating over capacity during peak periods under existing conditions and is projected to operate well over capacity in 2030. The goal for the improvements in this segment of I-95 is to achieve a traffic level of service of LOS D, considered to represent an acceptable traffic operating level in an urban environment, in the future year 2030. The project involves adding a travel lane and adequate outside and inside shoulders in each direction with additional lanes to accommodate entry and exit at adjoining interchanges (auxiliary lanes) on the I-95/Scudder Falls Bridge. The project includes highway improvements necessary to transition to the existing six-lane section of I-95 extending approximately 1.5 miles east from NJ Route 29 to the Bear Tavern Road (County Route 579) Interchange.

The project includes improvements to the Taylorsville Road Interchange (PA Exit 51) in Pennsylvania and the NJ Route 29 Interchange (NJ Exit 2) in New Jersey to meet current highway and geometric design standards. Interchange improvements include reconfiguration, the addition/modification of acceleration and deceleration lanes and providing adequate spacing of ramp merges.

This EA also includes consideration of pedestrian/bicycle access across the Delaware River and incorporation of Transportation Systems Management (TSM)/Transportation Demand Management (TDM) measures.

D. Project Needs

The existing I-95/Scudder Falls Bridge and the I-95 project area, extending over a total distance of 4.4 miles, are a vital link in the Interstate Highway System. I-95 is the easternmost Interstate Highway, extending roughly 1,900 miles from Florida to Maine. Congested conditions along this highway segment adversely affect critical mobility for through and regional travel between Pennsylvania and New Jersey.

Traffic information is presented in more detail in Technical Memorandum No. 11, Needs Report and in Technical Memorandum No. 28, Point of Access Study.

The I-95 corridor is a major commuter route for employment destinations in or near the project area, as well as for commuters residing in bedroom communities along the route. I-95 in this area provides access to the nearby Trenton-Mercer Airport and Southeastern Pennsylvania Transportation Authority (SEPTA) and New Jersey Transit Authority (NJ Transit) stations on either side of the river. The project area is within commuting distance to Philadelphia and major nearby employment centers in Bucks and Mercer Counties, the New Jersey state capital in the City of Trenton, and even New York City. Many of the towns proximate to the Delaware River have also become tourist destinations or second-home communities.

The project area also adjoins areas that have experienced considerable growth in recent years and are expected to experience continued growth. The I-95/I-295 Transportation Development District, which borders the project area to the east, is designated as a Regional Growth Area under the New Jersey Development and Redevelopment Plan. Recent developments at the Scotch Road Interchange (NJ Exit 3) on I-95 include 1.7 million square feet of office development for Merrill Lynch and related interchange improvements to accommodate this development. I-95 in Pennsylvania also provides accessibility to neighboring Newtown Township, designated for residential growth under a joint regional plan with neighboring townships, and Middletown Township, one of the fastest growing townships in the region. The trend of New Jersey workers residing in Pennsylvania is reflected in highly directional traffic flows on the I-95/Scudder Falls Bridge.

During the morning and evening peak hours, I-95 experiences frequent backups and delays related to commuter traffic, affecting the quality of life for area residents and commuters. Peak travel directions on I-95 are northbound in the A.M. peak and southbound in the P.M. peak, reflecting the fact that 13% of Bucks County residents work in Mercer County, compared to 4% of Mercer County residents that work in Bucks County. With projected growth in regional employment and population, delays on the I-95/Scudder Falls Bridge, which is already operating above capacity, are expected to increase in future years without improvements. Transportation conditions, including base (2003) and future (2030) traffic volumes and traffic capacity and safety, are characterized in the following sections.

Base and future traffic were characterized based on traffic modeling performed by the Delaware Valley Regional Planning Commission (DVRPC). The traffic forecasting methodology employed by the DVRPC considered the transportation demands and patterns over five Pennsylvania counties and four New Jersey counties in the DVRPC region. The results of the DVRPC traffic model form the basis for evaluation of existing and future transportation conditions within the I-95 project corridor.

A description of the specific need for the project is presented on the following pages.

1. I-95/Scudder Falls Bridge and I-95 Mainline Roadway

a) Project Need: The existing I-95/Scudder Falls Bridge is approximately 50 years old, has experienced structural deterioration, and does not meet current design criteria, which presents a future reliability and safety concern.

The existing I-95/Scudder Falls Bridge is approximately 50 years old and does not have the required structural capacities for the present and future traffic conditions. The existing bridge superstructure (the two main beams under the concrete deck) is of a non-redundant type. A non-redundant bridge generally has only two primary load-carrying members (beams), where the failure of one of these members results in catastrophic collapse of the bridge. The design of non-redundant structures is no longer permitted nationwide by the FHWA and state DOTs. Leakage from rain and de-icing salt through the deck joints has caused considerable deterioration to the structural steel and deck, resulting in vertical movement of the concrete deck under traffic. The movement of the deck is due to the severe corrosion and wear in the deck and steel framing.

The bridge also does not meet current American Association of State Highway and Transportation Officials (AASHTO), PennDOT and NJDOT design standards. The current live load capacity (loads from cars and trucks, wind and snow) of the structure is significantly less than the live load capacity that would be required to meet current PennDOT and NJDOT design criteria under a rehabilitation scenario. The structural life of a new bridge can be 75 years or more.

The two main beams and pinned hangers (four large steel pins supporting each suspended portion of the bridge) are fracture critical members, whose failure would result in collapse of the bridge. The two existing main beams of the bridge consist of steel plates and steel angles that are riveted together to make up the I-beam shape. This method (called riveted built-up) was used for large beams before advanced welding technology was developed after the 1960's. Riveted built-up construction offers limited opportunities to upgrade the beams to meet the current internal redundancy requirements. The DRJTBC installed redundancy hangers at all of the pinned hangers many years ago to prevent catastrophic collapse of the bridge from a pin failure.

b) Project Need: The existing I-95/Scudder Falls Bridge has inadequate inside shoulders and outside shoulders (breakdown lanes), which present safety concerns and contribute to congestion.

The existing I-95/Scudder Falls Bridge consists of two travel lanes in each direction, separated by a concrete median barrier. The bridge lacks shoulders and breakdown lanes and does not meet current minimum highway geometric design standards (Figure I-3). The current configuration does not provide adequate shoulder areas to provide refuge for drivers in the event of a breakdown, emergency, crash, or other incidents. The narrow bridge configuration, with no outside or inside shoulders, further reinforces driver perception of the difficulty in navigating this segment of I-95.

The I-95/Scudder Falls Bridge experienced the highest crash rates of the four project segments over the three-year period from 1999 to 2001. Any traffic incident on the I-95/Scudder Falls Bridge will result in a lane closure due to the lack of breakdown lanes. This will result in a 50% reduction in travel lanes leaving one available lane for traffic in the affected direction of traffic flow. This can create substantial traffic delays throughout the I-95 corridor extending far beyond the project area.

Figure I-3—View looking northbound showing lack of shoulders on I-95/Scudder Falls Bridge

c) Project Need: The existing acceleration and deceleration lanes and spacing of ramp merges at the adjoining NJ Route 29 and Taylorsville Road interchanges are inadequate, which present safety concerns and contribute to congestion.

Congestion at the bridge is exacerbated not only by the narrow bridge configuration, but also by the proximity of the adjoining interchanges, with ramps merging onto the I-95 mainline close to the bridge. In particular, the NJ Route 29 Interchange adjoins the east bank of the Delaware River, and an interchange with Taylorsville Road is located within ½ mile to the west of the river on the Pennsylvania side.

The lack of, or inadequate configuration of, deceleration and acceleration lanes from the adjoining interchanges, combined with inadequate spacing of interchange ramp merges, creates potentially unsafe weaving and merging/diverging patterns on the bridge (Figure I-4). The NJ Route 29 Interchange also marks the transition on I-95 from three travel lanes in each direction to two lanes in each direction approaching the I-95/Scudder Falls Bridge. At the on-ramp from NJ Route 29 to I-95 southbound, the lack of an acceleration lane requires vehicles to come to a complete stop at a stop sign at the end of the ramp, before merging directly into mainline traffic operating at full speeds on the bridge itself (Figure I-5). This configuration, combined with heavy traffic volumes, particularly in the P.M. peak hour, makes it difficult for drivers to find an adequate gap in I-95 traffic, accelerate into high-speed traffic from a stopped position, and safely merge onto I-95 southbound from NJ Route 29.

Figure I-4—Aerial view looking south showing lack of adequate acceleration/deceleration lanes where the NJ Route 29 ramps merge/diverge at the I-95/Scudder Falls Bridge

Figure I-5—View looking south at NJ Route 29 on-ramp entry onto the I-95/Scudder Falls Bridge southbound, showing stop sign necessary due to inadequate acceleration lane

d) Project Need: Roadway capacity is inadequate to provide acceptable existing and future (2030) traffic operations during peak travel periods (defined as level of service D in urban areas).

The geometric deficiencies on the I-95/Scudder Falls Bridge and adjoining interchange ramps, combined with heavy traffic demand in the I-95 corridor, result in substantial delays during peak periods. The bridge and adjoining sections of I-95 experience severe congestion during peak hours and are currently operating at levels well over available highway capacity (Figure I-6).

Figure I-6—View looking east at traffic queues approaching the I-95/Scudder Falls Bridge at the I-95 northbound and Taylorsville Road ramp merge

Two-way average annual daily traffic (AADT) on I-95 in the study area ranged from 53,900 vehicles per day to 63,300 vehicles per day in 2003. Heavy vehicle traffic comprises approximately 6% of total vehicular traffic. Table I-1 summarizes these AADT volumes for each mainline segment in the study area and also includes future year 2030 AADT without any improvements (No Build) for comparison. The highest volume segment is the segment west of the PA Route 332 Interchange, which is immediately west of the project area. At 59,500 vehicles per day, the I-95/Scudder Falls Bridge has the highest AADT in the project area.

Table I-1—I-95 Mainline Traffic Volumes: 2003 and 2030 No Build Average Annual Daily Traffic

I-95 Mainline	Limits	Base 2003 AADT (vpd)	2030 No Build AADT (vpd)	% Change
I-95 west of project area	US 1 (Exit 46) to PA 332 (Exit 49)	63,300	77,400	22.3%
I-95	PA 332 (Exit 49) to Taylorsville Road (Exit 51)	53,900	68,100	26.3%
I-95/ Scudder Falls Bridge	Taylorsville Road (Exit 51) to NJ 29 (Exit 1)	59,500	76,500	28.6%
I-95	NJ 29 (Exit 1) to Bear Tavern Road (Exit 2)	57,100	76,000	33.1%
I-95 east of project area	Bear Tavern Road (Exit 2) to Scotch Road (Exit 3)	57,500	76,900	33.7%

Future traffic projections for the year 2030 were developed by the DVRPC, based on projected regional growth and county-wide development. In 2030, with no improvements to I-95, two-way AADT on I-95 in the study area are projected to range from 68,100 vehicles per day to 77,400 vehicles per day (Table I-1). Growth in AADT volumes from 2003 to 2030, under the No Build condition, are forecasted to range from 22% to 34% along the I-95 mainline, with the higher growth rates occurring in the eastern sections of the study area. At 76,500 vehicles per day, the I-95/Scudder Falls Bridge is projected to continue to have the highest AADT in the project area under the 2030 No Build condition. The adjoining segments east and west of the project area are projected to have even higher AADT volumes under the 2030 No Build.

The I-95/Scudder Falls Bridge accommodates high volumes of traffic that are highly directional during peak traffic periods. Peak flow directions are northbound in the A.M. peak and southbound in the P.M. peak, reflecting the predominant commuting pattern of Bucks County or Pennsylvania residents traveling to employment destinations in Mercer County or New Jersey. Northbound traffic in the 2003 A.M. peak period accounts for 67% to 79% of the total I-95 traffic, and 68% to 74% of the P.M. peak traffic is heading southbound.

The directionality of peak hour traffic flows on I-95 is projected to continue in future years, but it will be somewhat less pronounced. Northbound traffic flows in the 2030 A.M. peak are projected to range from 61% to 71% of the total two-way traffic. The 2030 P.M. southbound peak flows are projected to comprise 62% to 65% of total two-way traffic on I-95. This reduced directionality in future years may reflect capacity constraints in the peak flow directions. Traffic growth in peak flow directions from 2003 to 2030 is estimated to range from 12% to 29%, compared to 47% to 77% traffic growth in the non-peak flow directions (Table I-2).

Table I-2—I-95 Mainline Traffic Volumes: 2003 and 2030 No Build Peak Hour

I-95 Mainline Direction		Location	2003 Base		2030 No Build		% Change 2003 to 2030	
			A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
I-95 west of project area	NB	US 1 (Exit 46) to PA 332 (Exit 49)	2,834	2,265	3,500	2,910	23.5%	28.5%
	SB		2,440	3,523	3,150	3,940	29.1%	11.8%
Total			**5,274**	**5,788**	**6,650**	**6,850**	26.1%	18.4%
I-95 NB		PA 332 (Exit 49) to Taylorsville Road (Exit 51)	3,191	1,594	3,750	2,350	17.5%	47.4%
I-95 SB			1,540	3,402	2,440	3,920	58.4%	15.2%
Total			**4,731**	**4,996**	**6,190**	**6,270**	30.8%	25.5%
I-95/ Scudder Falls Bridge	NB	Taylorsville Road (Exit 51) to NJ 29 (Exit 1)	5,111	1,570	5,810	2,500	13.7%	59.2%
	SB		1,394	4,183	2,460	4,970	76.5%	18.8%
Total			**6,505**	**5,753**	**8,270**	**7,470**	27.1%	29.9%
I-95 NB		NJ 29 (Exit 1) to Bear Tavern Road (Exit 2)	4,744	1,419	5,540	2,460	16.8%	73.4%
I-95 SB			1,405	4,074	2,480	4,930	76.5%	21.0%
Total			**6,149**	**5,493**	**8,020**	**7,390**	30.4%	34.5%
I-95 east of project area	NB	Bear Tavern Road (Exit 2) to Scotch Road (Exit 3)	4,500	1,745	5,300	2,740	17.8%	57.0%
	SB		1,578	3,605	2,580	4,500	63.5%	24.8%
Total			**6,078**	**5,350**	**7,880**	**7,240**	29.7%	35.3%

A license plate matching survey conducted on December 16, 2003 during peak hours demonstrated that the predominant movements on the I-95/Scudder Falls Bridge are through trips (trips made from and to points outside the study area) or regional movements (trips made between points within the study area and points outside the study area). Through and regional trips account for 90.2% of northbound A.M. peak trips and 94.2 % of P.M. peak southbound traffic.

The I-95/Scudder Falls Bridge also accommodates the highest peak hour traffic volumes in the project area, as shown in Table I-2. For comparison, Table I-2 also includes future year 2030 peak hour traffic volumes without any improvements (No Build).

Traffic operations are evaluated according to traffic levels of service (LOS), on a scale ranging from LOS A (free flow traffic with little or no delays) to LOS F (severe congestion with considerable delays) (see Table I-3). In 2003, traffic congestion during peak hours resulted in two hours of level of service E or F on the I-95/Scudder Falls Bridge during peak hours in the predominant traffic flow direction (northbound in the A.M. and southbound in the P.M.).

Table I-3—Definition of Traffic Levels of Service

LOS		Definition	Typ. Illustration
Acceptable	A	Represents a free-flow operation. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	
	B	Represents reasonably free-flow operation. The ability to maneuver within the traffic stream is slightly restricted.	
	C	Represents a traffic flow with speeds near or at free-flow speed of the freeway. Ability to maneuver within the traffic stream is noticeably restricted.	
	D	Represents speeds that begin to decline with increased density. Ability to maneuver within the traffic stream is noticeably limited.	
Unacceptable	E	Represents operation at its capacity. Vehicles are closely spaced within the traffic stream and there are virtually no useable gaps to maneuver.	
	F	Represents a breakdown of vehicle flow. This condition exists within queues forming behind the breakdown points.	

While base (2003) operating conditions are undesirable on two project segments that coincide with the I-95/Scudder Falls Bridge, design year (2030) operating conditions are projected to be undesirable on five segments of I-95 in or adjoining the project area (Table I-4). The projected future increase in traffic volumes will result in severe congestion in 2030 along an additional two

miles of I-95 extending west of the bridge in the northbound direction during the A.M. peak and an additional five miles extending further west of the bridge in the southbound direction during the P.M. peak. Severe traffic congestion (LOS E or F) is projected to extend west to PA Route 332 in the northbound direction during the A.M. peak and will extend west to U.S. Route 1 in the southbound direction in the P.M. peak. Although the duration of congestion has not been estimated for the design year, the duration of severe congestion peak hours can also be expected to lengthen from the current duration of two hours of LOS E or F during the morning and evening peak.

Table I-4—I-95 Mainline Levels of Service: 2003 and 2030 No Build Peak Hours

Location	Direction	2003 Base		2030 No Build	
		A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
Between Exit 46 (Route 1 Interchange) & 49 (PA Route 332 Interchange)	NB	C	C	D	C
	SB	C	D	D	E
Between Exit 49 & 51 (Taylorsville Road Interchange)	NB	D	B	E	C
	SB	B	D	C	E
Between Exit 51 & 1 (NJ Route 29 Interchange)—I-95/Scudder Falls Bridge	NB	F	B	F	C
	SB	B	E	C	F
Between Exit 1 & 2 (Bear Tavern Road Interchange)	NB	C	A	D	B
	SB	A	C	B	D
Between Exit 2 & 3 (Scotch Road Interchange)	NB	C	A	D	B
	SB	A	C	B	C

= Acceptable LOS, A-D

= Undesirable LOS, E, F

With higher traffic volumes and no improvements to existing geometric deficiencies on the I-95/Scudder Falls Bridge and adjoining closely spaced ramp merges at NJ Route 29 and Taylorsville Road, the number of traffic incidents on the bridge can be expected to increase in future years. Existing deficiencies contribute to a crash rate that is higher than adjacent segments of the I-95 mainline. A crash analysis was performed using crash records for I-95 from 1999 to 2001 that were obtained from the Pennsylvania Department of Transportation (PennDOT), the Delaware River Joint Toll Bridge Commission (DRJTBC), and the New Jersey Department of Transportation (NJDOT). The I-95 segments analyzed experienced a total of 314 crashes over the 3-year period from 1999 to 2001, or an average of roughly 105 crashes per year. Crash clusters for this 3-year period along I-95 are shown on Figure I-7.

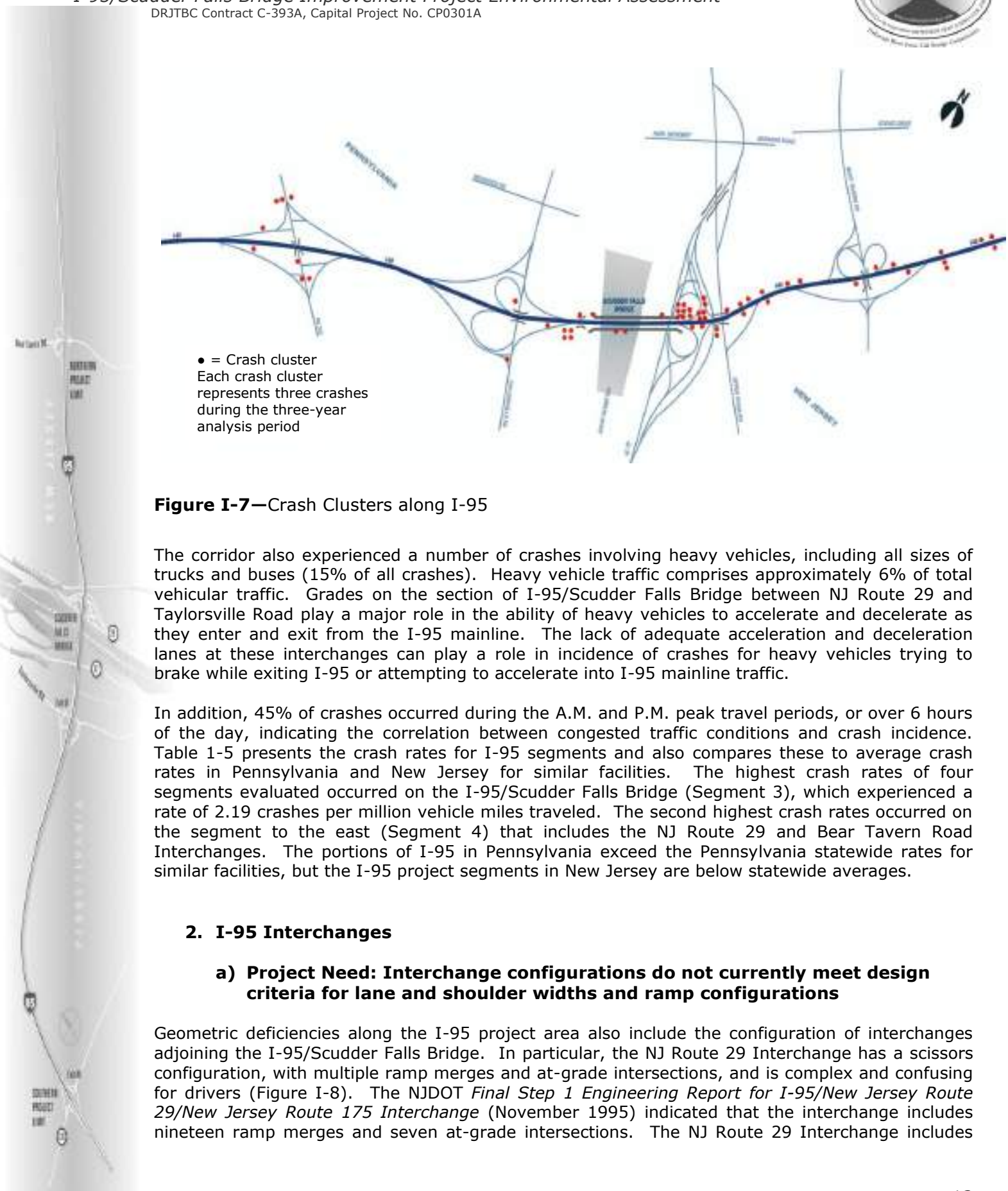


Figure I-7—Crash Clusters along I-95

The corridor also experienced a number of crashes involving heavy vehicles, including all sizes of trucks and buses (15% of all crashes). Heavy vehicle traffic comprises approximately 6% of total vehicular traffic. Grades on the section of I-95/Scudder Falls Bridge between NJ Route 29 and Taylorsville Road play a major role in the ability of heavy vehicles to accelerate and decelerate as they enter and exit from the I-95 mainline. The lack of adequate acceleration and deceleration lanes at these interchanges can play a role in incidence of crashes for heavy vehicles trying to brake while exiting I-95 or attempting to accelerate into I-95 mainline traffic.

In addition, 45% of crashes occurred during the A.M. and P.M. peak travel periods, or over 6 hours of the day, indicating the correlation between congested traffic conditions and crash incidence. Table 1-5 presents the crash rates for I-95 segments and also compares these to average crash rates in Pennsylvania and New Jersey for similar facilities. The highest crash rates of four segments evaluated occurred on the I-95/Scudder Falls Bridge (Segment 3), which experienced a rate of 2.19 crashes per million vehicle miles traveled. The second highest crash rates occurred on the segment to the east (Segment 4) that includes the NJ Route 29 and Bear Tavern Road Interchanges. The portions of I-95 in Pennsylvania exceed the Pennsylvania statewide rates for similar facilities, but the I-95 project segments in New Jersey are below statewide averages.

2. I-95 Interchanges

a) Project Need: Interchange configurations do not currently meet design criteria for lane and shoulder widths and ramp configurations

Geometric deficiencies along the I-95 project area also include the configuration of interchanges adjoining the I-95/Scudder Falls Bridge. In particular, the NJ Route 29 Interchange has a scissors configuration, with multiple ramp merges and at-grade intersections, and is complex and confusing for drivers (Figure I-8). The NJDOT *Final Step 1 Engineering Report for I-95/New Jersey Route 29/New Jersey Route 175 Interchange* (November 1995) indicated that the interchange includes nineteen ramp merges and seven at-grade intersections. The NJ Route 29 Interchange includes

closely adjoined intersections with River Road, NJ Route 175 (Upper River Road), and Park Driveway, which provides access to the Scudder Falls Recreation Area along the Delaware River and the Delaware and Raritan Canal State Park.

Table I-5—I-95 Project Area Crash Analysis

Segment	Starting Point	Ending Point	Distance (Miles)	Crashes Per Year	Crashes Per Million Vehicle Miles Traveled	PA Statewide Rate	NJ Statewide Rate	Above/ Below State Rate
Extending from northbound off-ramp west of PA Route 332 to Dolington Road								
1	Northbound Exit Ramp for PA 332 (PA)	Dolington Road (PA)	1.5	16.33	0.63	0.47	N/A	Above
Dolington Road to Taylorsville Road Interchange								
2	Dolington Road (PA)	Southern end of Scudder Falls Bridge (PA)	1.12	15.00	0.78	0.47	N/A	Above
I-95/Scudder Falls Bridge								
3*	Southern end of I-95/ Scudder Falls Bridge (PA)	Northern end of I-95/ Scudder Falls Bridge (NJ)	0.227	10.00	2.19	0.47	N/A	Above
						N/A	3.76	Below
NJ Route 29 Interchange to roughly 1.5 miles beyond Bear Tavern Road Interchange								
4	Northern end of I-95/ Scudder Falls Bridge (NJ)	1.5 miles North of Bear Tavern Road (NJ)	3.03	63.33	1.13	N/A	1.66	Below

Sources: PENNDOT Crash Information Systems and Analysis Division, NJDOT Crash database published on NJDOT Official Website

- Segment 3 (I-95/Scudder Falls Bridge Segment) connects Pennsylvania and New Jersey. Thus, the crash rate for the Segment 3 has been compared with average statewide rates for both the states.

The configurations of the bridge and adjoining interchange merges do not meet current design standards. The NJ Route 29 Interchange experienced the highest number of crashes of the locations in the project area for the three-year period from 1999 to 2001.

Figure I-8—Aerial view looking west showing scissors configuration and intersecting interchange ramps at the existing NJ Route 29 Interchange

Examination of crash data for this time period for the entire project area indicated that 58% of the crashes occurred at interchanges, and 78% of crashes within the DRJTBC's jurisdiction also occurred at interchanges. The majority of the crashes at interchanges involved rear-end collisions, which points to the importance of adequate acceleration and deceleration lanes for vehicles that are queuing, exiting, and entering the interchanges from the mainline.

The majority of crashes at the NJ Route 29 Interchange occurred at the stop-sign controlled I-95 southbound on-ramp, which also had the highest crash incidence of the locations along the project corridor (see Figure I-7). From 1999 to 2001, there were an average of 28 crashes per year at the NJ Route 29 Interchange. Over this time period, there was an average of 12 crashes per year at the Taylorsville Road Interchange. The majority of crashes at the Taylorsville Road Interchange occurred at the I-95 northbound on-ramp from Taylorsville Road westbound.

These 1999 to 2001 crash rates for interchanges adjoining the bridge compare to 13 crashes per year at the PA Route 332 Interchange and 8 crashes per year at the Bear Tavern Road Interchange. The crash data also point to the importance of adequate acceleration lane lengths, with vehicles tending to accelerate prematurely when other vehicles are in front of them.

3. Stakeholder Goals

A public participation program (See Chapter V) has been implemented for this project to obtain input from federal, state, regional, and local officials in Pennsylvania and New Jersey, and the general public. In addition to regularly scheduled agency coordination meetings and meetings held with Lower Makefield Township and Ewing Township officials, local residents, and the public, two rounds of meetings with stakeholders and interested groups have been held. The following transportation-related objectives include stakeholder interests that have been articulated through the public participation program.

a) Promote continued access for recreation and tourism, facilitating flow of visitors traveling to historic attractions and sites along the Delaware River, and the Delaware canals in New Jersey and Pennsylvania

This segment of I-95 accommodates travel to popular tourist destinations along both sides of the Delaware River in Bucks and Mercer Counties, including the nearby Washington Crossing State Parks in Pennsylvania and New Jersey. The Taylorsville Road and NJ Route 29 Interchanges adjoining the I-95/Scudder Falls Bridge also provide access to boat launches along the Delaware River, the Delaware Canal State Park in Pennsylvania and the Delaware and Raritan Canal State Park in New Jersey. Retaining and enhancing interstate highway accessibility for these facilities is important to their viability.

b) Evaluate and address, if practicable, means of incorporating pedestrian and bicycle river crossing into a new or expanded bridge over the Delaware River

This Environmental Assessment includes consideration of a potential pedestrian/bicycle path along the I-95/Scudder Falls Bridge and ramps on either side of the bridge to provide connections to the adjoining towpaths along the Delaware Canal in Pennsylvania and the Delaware and Raritan Canal in New Jersey.

c) Evaluate and address, if practicable, improvements to TSM/TDM measures and park-and-ride activities in the project area and consider how improvements on the I-95/Scudder Falls Bridge and in the project area will support transit initiatives being planned by others

The need to support ongoing transit and TSM/TDM initiatives was identified during outreach with transportation agencies, the public, and the Bucks County and Mercer County Transportation Management Associations.

d) Promote access to community facilities and provide mobility for emergency vehicles traveling through the I-95 corridor

The I-95/Scudder Falls Bridge provides the only interstate highway crossing in this reach of the Delaware River. A closure of the bridge would require a circuitous route for vehicles that would normally use I-95. The next closest river crossings are located roughly 3 miles to the north (Washington Crossing) and 4.5 miles to the south (downtown Trenton). Reliable access across the river is needed for emergency services and to provide access to community facilities on both sides of the river.

II. AFFECTED ENVIRONMENT

A. Introduction

This chapter provides an overview of the socioeconomic environment and cultural and natural resources potentially affected by the project. More detailed descriptions of the socioeconomic environment and the natural and cultural resources potentially affected by the project are presented in Chapter IV, Environmental Consequences. A summary of the resources present in the project area is summarized in Table II-1.

Additional information on the affected environment is presented in Chapter IV, Environmental Consequences

B. Regional Setting

The project is located entirely within the limits of Lower Makefield Township, Pennsylvania and Ewing Township, New Jersey (see Figure I-1). The I-95/Scudder Falls Bridge Improvement project area is situated within commuting distance of major metropolitan areas: approximately 20 miles from Center City Philadelphia; within 2 miles of the City of Trenton, which is the New Jersey state capital; and within roughly 50 miles of the Newark-New York City metropolitan area.

I-95 provides access to residential and employment centers in Pennsylvania and New Jersey that have experienced considerable growth in recent years and are expected to continue to grow in future years. I-95 is the only interstate highway extending between Bucks and Mercer Counties.

Lower Makefield Township and Bucks County are included in the Philadelphia-Camden-Wilmington, Pennsylvania-New Jersey-Delaware-Maryland Metropolitan Statistical Area (MSA). The federal government defines Metropolitan Statistical Areas (or MSAs) as areas containing a recognized population nucleus and adjacent communities that have a high degree of integration with that nucleus. The Metropolitan Area concept has been used as a statistical representation of social and economic linkages between urban cores and outlying integrated areas. Adjacent Metropolitan Statistical Areas may, in turn, be part of a larger Combined Statistical Area, representing multiple MSAs that have a moderate degree of employment interchange.

Lower Makefield Township evolved as an agricultural community, originally settled in the late 17th century, surrounding Yardley Borough, south of I-95, which functions as a "town center" for the surrounding township. I-95 Interchanges at PA Route 332 (Newtown-Yardley Road, Exit 49) and Taylorsville Road (Exit 51) provide access to Yardley Borough, as well as other historic and cultural "town center" destinations in Newtown Borough, Washington Crossing, and New Hope to the north.

Ewing Township, situated at the outskirts of the City of Trenton, evolved as a suburb to this major metropolitan area. Ewing Township and Mercer County are part of the newly defined Trenton-Ewing, New Jersey MSA and are also part of the larger New York-Newark-Bridgeport Combined Statistical Area that also includes portions of upstate New York and Connecticut. The NJ Route 29 Interchange (Exit 1) with I-95 provides access to Trenton to the south and tourist destinations to the north such as Washington Crossing and Lambertville. Bear Tavern Road (County Route 579, Exit 2) at the easterly limit of the project provides access to West Trenton and is also the primary access to the Trenton-Mercer Airport, located ½ mile to the east of the interchange with I-95.

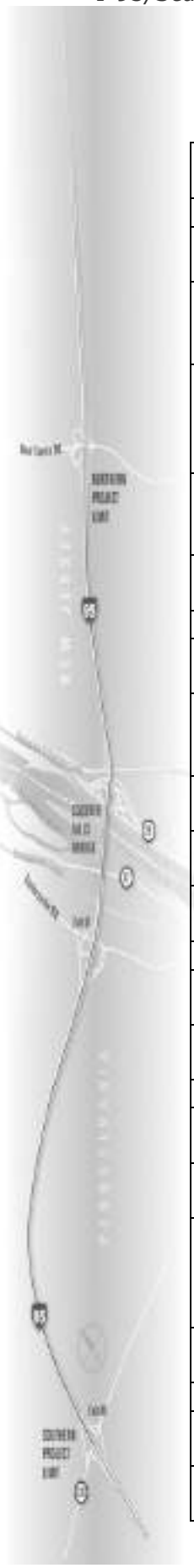


Table II-1—Scoping Table

Resource	Present	Not Present	Method of Identification
COMMUNITY RESOURCES			
Residences, Businesses, or Farms	☒	☐	Field reconnaissance, municipal plans and maps
Public Facilities and Services	☒	☐	Field reconnaissance, DVRPC, NJ TRANSIT, SEPTA NJWSA, New Jersey State Police, municipal plans and maps
Visually Sensitive Areas	☒	☐	Field reconnaissance, NPS, Delaware and Lehigh National Heritage Corridor Commission, PA DCNR, Delaware Canal State Park, NJ DEP Delaware and Raritan Canal Commission
Low-income or Minority Population Areas	☒	☐	Field reconnaissance, U.S. Census data, DVRPC
Major Utilities	☒	☐	Field reconnaissance, USGS topographic mapping, municipal plans and maps
CULTURAL RESOURCES			
National Historic Landmarks	☒	☐	NPS, National Register of Historic Places, PHMC, NJHPO
National Register Listed or Eligible Sites/Districts	☒	☐	Field studies, NPS, National Register of Historic Places, PHMC, NJHPO, county and municipal plans
Potentially Eligible Sites/Districts	☒	☐	Field studies, PHMC, NJHPO
Known Archaeological Sites	☒	☐	PHMC, NJHPO
High Probability Archaeological Sites	☒	☐	Field studies, PHMC, NJHPO
SAFETY AND MOBILITY			
Signalized intersections	☒	☐	Field reconnaissance and traffic surveys
Pedestrian Crosswalks/Overpasses	☒	☐	Field reconnaissance, municipal plans and maps
Railroad crossings	☐	☒	Field reconnaissance, USGS topographic mapping
Access Issues	☒	☐	Field reconnaissance and traffic surveys, New Jersey State Police, Delaware and Raritan Canal Commission
Mass Transit Facilities/ Operations	☐	☒	Field reconnaissance, NJ TRANSIT, SEPTA, DVRPC
Hiking Trails/Scenic Walkways	☒	☐	Field reconnaissance, NPS, Delaware and Lehigh National Heritage Corridor Commission, Delaware Canal State Park, Delaware and Raritan Canal Commission, municipal plans and maps
Bikeways	☒	☐	DVRPC, PennDOT, NJDOT, county and municipal plans and maps
AIR, NOISE AND VIBRATION			
Sensitive Air Quality Receptors	☒	☐	Field reconnaissance, municipal plans and maps
Sensitive Noise Receptors	☒	☐	Field reconnaissance, municipal plans and maps

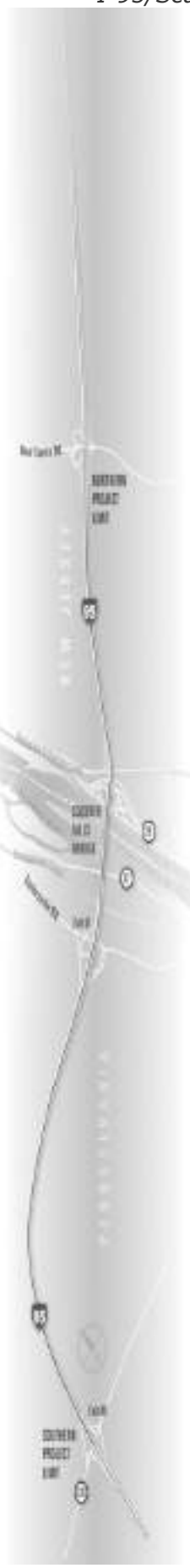


Table II-1—Scoping Table

Resource	Present	Not Present	Method of Identification
Sensitive Vibration Receptors	☐	☒	Field reconnaissance, municipal plans and maps
NATURAL RESOURCES			
Wetlands	☒	☐	National Wetlands Inventory Maps, Bucks County and Mercer County soil surveys, field studies and delineation
Streams, Rivers, and Other Surface Waters (i.e., lakes, ponds, reservoirs, etc.)	☒	☐	Field reconnaissance, USGS topographic mapping, DRBC, PA DCNR, NJWSA, NJ DEP
High Quality/ Exceptional Value Streams/Watersheds	☐	☒	PA DEP, NJ DEP
Wild or Stocked Trout Streams	☒	☐	PA DEP, PFBC, NJ DEP, NJDFW
Coastal Zones	☐	☒	Coastal Zone Management mapping, PA DEP, NJ DEP
Groundwater Resources (i.e., wells, water supplies)	☒	☐	USEPA, Pennsylvania Geological Survey, New Jersey Geological Survey, municipal plans and maps
Floodplains/Floodways	☒	☐	FEMA mapping
Navigable Waterways	☐	☒	U.S. Coast Guard, U.S. Army Corps of Engineers
National/State Wild & Scenic Rivers and Streams	☐	☒	NPS, PA DCNR, NJ DEP
Threatened or Endangered Species	☒	☐	USFWS, NMFS, PA DCNR, PFBC, PGC, NJ DEP, NJDFW, Field reconnaissance and species surveys
Unique Geological Resources	☐	☒	Field reconnaissance, USGS topographic mapping, Pennsylvania Geological Survey, New Jersey Geological Survey geologic mapping
Wildlife and Habitat	☒	☐	Field reconnaissance, PGC, NJDFW
Sanctuaries/Refuges	☐	☒	USFWS, PGC, NJDFW, USGS topographic mapping
Agricultural Resources	☒	☐	NRCS, PDA, New Jersey State Agriculture Development Committee, Bucks County Agricultural Land Preservation Board, Lower Makefield Farmlands Preservation Corporation, Ewing Township Zoning Official
National Natural Landmarks	☐	☒	Field reconnaissance, NPS, PA DCNR, NJ DEP
National and State Game Lands, Forest, or Parks	☒	☐	NPS, Delaware and Lehigh National Heritage Corridor Commission, PA DCNR-Delaware Canal State Park, New Jersey Division of Parks and Forestry, Green Acres Program, Delaware and Raritan Canal Commission

The I-95/Scudder Falls Bridge spans the Delaware River, which forms the state boundary (see Figures I-1 and I-2). I-95 in the project area spans over the Delaware Canal in Pennsylvania east of Taylorsville Road. East of NJ Route 29, I-95 extends over the Delaware and Raritan Canal in New Jersey, which parallels the west side of NJ Route 175. PA Route 32 (River Road), a Pennsylvania designated Scenic Road, extends along the west bank of the Delaware River. NJ Route 29 is a state-designated Scenic Byway, also known as the Delaware River Scenic Byway, and extends along the east bank of the Delaware River.

C. Land Use and Socioeconomic Conditions

1. Socioeconomic Conditions

The I-95/Scudder Falls Bridge extends through rural to suburban areas of Bucks County (Lower Makefield Township) in Pennsylvania and Mercer County (Ewing Township) in New Jersey. Accessibility provided by I-95 and regional rail lines in Pennsylvania and New Jersey has accommodated residential and economic growth along the corridor and has transformed a rural agricultural landscape into an increasingly suburban corridor. Nonetheless, the area retains its rural agricultural character.

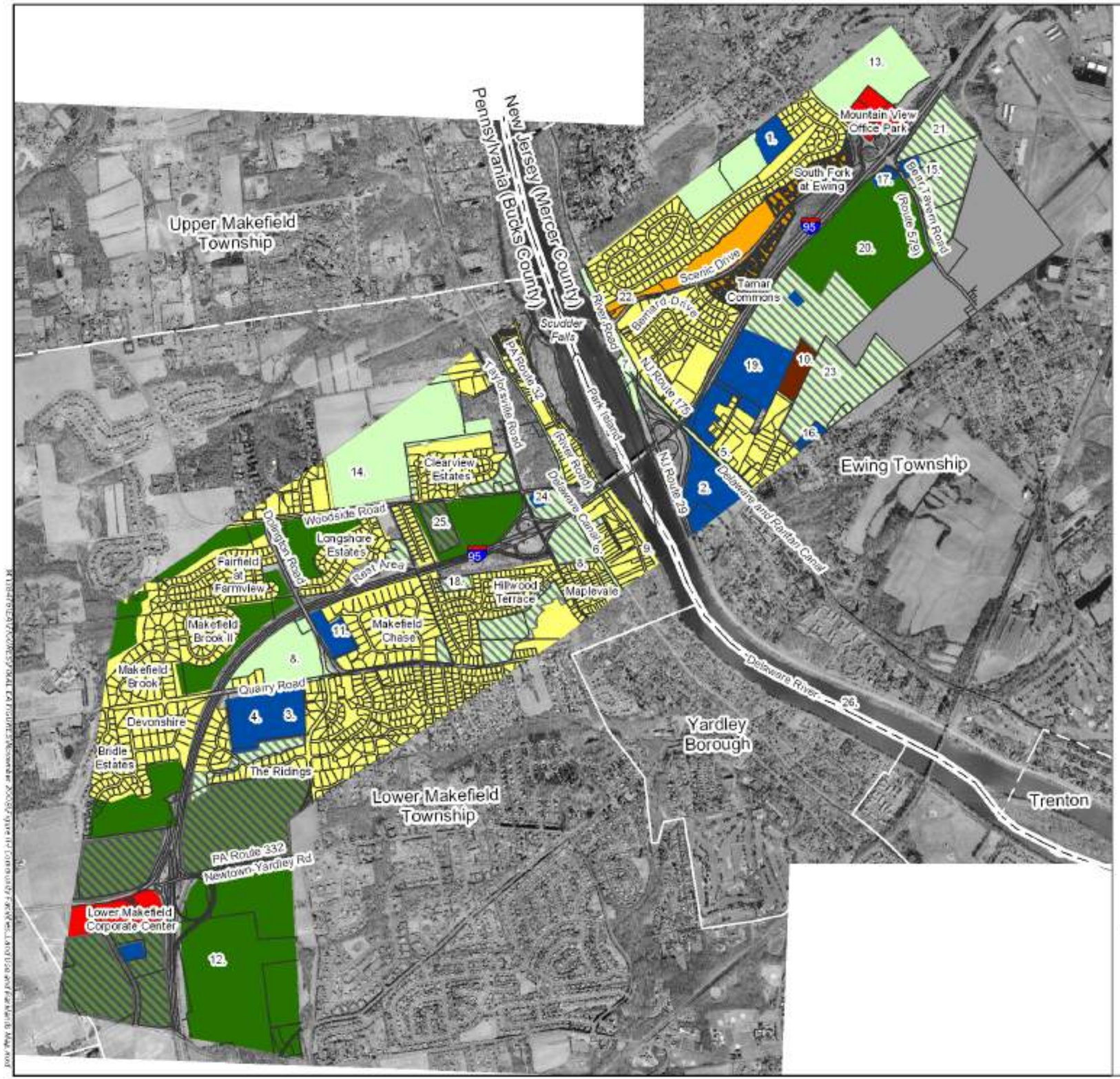
Proximity to I-95 and a SEPTA rail line providing service into Philadelphia has made Lower Makefield Township attractive to commuters, with more than half of all housing and many of the roughly 150 subdivisions in the township constructed within the last 25 years. Development patterns have followed population growth trends, with a number of residential subdivisions constructed along the I-95 corridor in the last seven years. According to the Delaware Valley Regional Planning Commission, the expansion in population that Lower Makefield Township has experienced in the past is projected to continue into the year 2025 (see Section IV.B.1).

Ewing Township has also grown rapidly as a suburb of Trenton, with the construction of I-95, and presence of National Railroad Passenger Corporation (AMTRAK) rail line and NJ Transit and SEPTA stations, providing easy access to New York and Philadelphia. This suburbanization has resulted in the construction of subdivision developments over most of the township. Surrounding areas in the New Jersey portion of the I-95 corridor consist predominantly of densely developed residential areas to the north, with state property occupying most of the areas to the south. Much of Ewing Township is built-out, which is reflected in DVRPC projections that forecast little or no growth in the township's population and employment in 2025. The township envisions future growth as consisting primarily of redevelopment of existing underutilized or developed parcels for commercial or industrial use.

2. Land Use

As shown on Figure II-1, existing land use in the project area is mixed and includes residential, farmland, institutional, and commercial uses. The Pennsylvania segment of I-95 adjoins largely suburban development, consisting primarily of residential subdivisions, and public and privately owned farmlands. In accordance with the Lower Makefield Township zoning ordinances, many of these developments incorporated visual buffers, including berms and landscaping, that shield I-95 from most of the adjoining neighborhoods.

In New Jersey, the north (southbound) side of I-95 primarily adjoins single-family homes or attached multi-family residential complexes. Many of these residential properties are screened from view from I-95 by fencing, a 4,000-foot noise barrier along the southbound travel lanes, or



Land Use

- Single Family Residential
- Single Family Attached Complex
- Medium Density Residential
- Commercial
- Institutional
- Privately Owned Farmland
- Publicly Owned Farmland
- Public Land
- Public Recreation
- Trenton Mercer Airport Parcel
- Private Recreation

Community Facilities and Parklands

Schools:

1. Lore Elementary School
2. Villa Victoria Academy
3. Quarry Hill Elementary School
4. Afton Elementary School

Multipurpose Bicycle/Pedestrian Path:

5. Delaware and Raritan Canal State Park/Towpath
6. Delaware Canal State Park/Towpath

Recreation Areas:

7. Scudder Falls Recreation Area
8. Snipes Tract Lower Makefield Township Proposed Recreation Facility
9. Yardley Boat Launch
10. Ravine Swim Club
26. Delaware River Water Trail

Public Cultural Resources/Open Space:

11. Elm Lowne
12. Patterson Farm

Golf Courses:

13. Mountain View Golf Club
14. Makefield Highlands Golf Club

Administrative Offices:

15. New Jersey Water Supply Authority Delaware & Raritan Canal Office
16. Delaware River Basin Commission

Water Supply:

17. City of Trenton Water Tower
18. Pennsylvania American Water Company Well

Other Public Facilities and Infrastructure:

19. New Jersey State Police Headquarters
20. Jones Farm Correctional Facility
21. NJDOT Maintenance Facility
22. Ewing-Lawrence Sewerage Authority Pump Station
23. New Jersey Department of Agriculture Laboratory
24. PennDOT Park & Ride Lot
25. WCHR Radio Tower

Feet

0 1,250 2,500 5,000 7,500 10,000

I-95/Scudder Falls Bridge Improvement Project Environmental Assessment Land Use, Community Facilities and Parklands Map Figure II-I

landscaping. An undeveloped parcel of land adjoining the north side of I-95 and west side of Bear Tavern Road is proposed to be developed as an age-restricted residential complex. The south side of I-95 consists largely of public lands.

Commercial development along the I-95 project area is limited to the Lower Makefield Corporate Center at the PA Route 332 Interchange, at the westerly limit of the project, and the Mountain View Office Park at the Bear Tavern Road Interchange at the easterly limit of the project.

3. Community Facilities and Services

Other publicly owned parcels include several Lower Makefield Township properties south of I-95 on Dolington Road and Quarry Road (Figure II-1). The Afton Elementary School and Quarry Hill Elementary School are situated on Quarry Road, and recreational fields on the former Snipes Tract and the adjacent Elm Lowne historic property are located on Dolington Road. The Snipes Tract is the site of a planned fire station, and the Elm Lowne property is used for events.

In New Jersey, the south (northbound) side of I-95 adjoins a private school, the Villa Victoria Academy, at the NJ Route 29 Interchange and NJ Route 175 (Upper River Road). The state property south of I-95, between NJ Route 175 and Bear Tavern Road includes the New Jersey State Police Headquarters and the New Jersey Department of Corrections Jones Farm. The Bear Tavern Road Interchange adjoins a City of Trenton water tank and the NJDOT Maintenance Facility. A New Jersey Water Supply Authority field office is located further to the south, and the Trenton-Mercer Airport is an approximately 1 mile drive from the Bear Tavern Road Interchange.

4. Parklands and Recreational Facilities

The Delaware River and the historic canals and adjacent towpaths in both states offer recreational opportunities, with access provided off I-95 interchanges at Taylorsville Road and NJ Route 29 (Figure II-1). The Delaware River from Hancock, New York to Trenton, New Jersey was designated a public recreation water trail in 2007. In Pennsylvania, recreational uses along the Delaware River and the Delaware Canal State Park are accessible from Taylorsville Road via Woodside Road and PA Route 32 (River Road). A boat launch on PA Route 32 is located along the Delaware River south of I-95. NJ Route 29 provides access to the Delaware and Raritan Canal State Park and the Scudder Falls Recreation Area, situated approximately 0.4 mile north of I-95. This recreation area provides a put-in area for whitewater recreation uses at the Scudder Falls Recreation Area, along a section of the Delaware River north of the bridge, as well as access to the adjoining canal and towpath within the Delaware and Raritan Canal State Park.

The Snipes Tract, adjoining the south side of I-95, includes soccer fields and is the planned site for a proposed recreational complex for Lower Makefield Township. In Ewing Township, the Mercer County Golf Course is also situated off Bear Tavern Road north of I-95.

5. Farmlands

Adjacent to I-95 in the project area are several actively farmed parcels owned by the Lower Makefield Farmland Preservation Corporation. The Lower Makefield Township Farmland Preservation Program has been formed to conserve undeveloped farmlands or open space in conjunction with a number of subdivision developments constructed along the I-95 corridor. The Lower Makefield Township zoning ordinance provides for a Farmland Preservation Cluster option that allows for the preservation of farmland in the northern agricultural area of the township (R-1 District) bisected by I-95. The option is available to developers who may cluster housing on half the land and set aside the remaining half for farmland. During the 1980s, the Lower Makefield Farmland Preservation Corporation was formed to receive the farmland and manage it.

Under the Pennsylvania Agricultural Land Preservation Policy (ALPP), prime agricultural lands are those lands that have been actively farmed for the preceding three years and fall into one of five prioritized categories. Prime agricultural land prioritized categories under ALPP are (in order of priority): preserved farmland, Agricultural Security Areas, preferential tax enrollments (Acts 319 and 515), agricultural zoning, and soils classified as unique or with land capability classes I to IV. The productive agricultural lands and the ALPP Prime agricultural land protection categories are displayed in Figure II-2. Preserved farmlands include Clearview Farm, Makefield Brook Farm, and Bridle Estates Farm that have been deeded to the Lower Makefield Farmland Preservation Corporation. These preserved farmlands are also part of an Agricultural Security Area (ASA) in the township established pursuant to the Pennsylvania Agricultural Area Security Law (Act 43), which also includes privately owned farms Torbert Farm and Wright Farm (see Figure II-2). The privately owned farms within the study area are also enrolled in Act 319 (Clean and Green) preferential tax assessments. The option for a farmland protection cluster under the Lower Makefield Township R-1 zoning district, has allowed for farmlands preservation in conjunction with subdivision development in the project area, although an exclusive agricultural zoning district has not been defined in Lower Makefield Township. Most of the study area is underlain by soils defined by the NRCS as having land capability classes I to IV.

In New Jersey, the state-owned Jones Farm occupies almost half of the south side of I-95 in the project area, west of Bear Tavern Road. The Jones Farm is a working farm and dairy that is operated by the New Jersey Department of Corrections. New Jersey farmland preservation initiatives have included transfer of the development rights to Jones Farm to the State Agriculture Development Committee, which administers the state's Farmland Preservation Program.

Additional information on farmlands, including crops, is included in Chapter IV.E.

D. Natural Resources

1. Water Resources

The project is located within the Delaware River Valley and the Piedmont Physiographic Province, and topography in the project area is flat to gently rolling. Major water resources along the project include the Delaware River, the Delaware Canal in Pennsylvania, the Delaware and Raritan Canal in New Jersey, and their tributaries (Figure II-3). Other waterways in the project area include unnamed tributaries and Reeders Creek in New Jersey. These waterways and their adjoining floodplains and wetlands provide a variety of functions that include drinking water supply, recreation, flood control, and habitat for aquatic species and wildlife.

Detailed information on natural resources is presented in the Application for Freshwater Wetlands Letter of Interpretation (from NJDEP), the Request for U.S. Army Corps of Engineers Jurisdictional Determination (PA), and the Biological Assessment prepared under Section 7 of the U.S. Endangered Species Act. Additional documentation is provided in Technical Memorandum No. 15 on Wetlands, Technical Memorandum No. 16 on Surface Waters, Technical Memorandum No. 17 on Groundwater Resources, and Technical Memorandum No. 18 on Terrestrial Habitat.

The I-95/Scudder Falls Bridge crosses the Delaware River upstream of the head of tide in Trenton. In the project area, the Delaware River is a freshwater, non-tidal river that does not accommodate deep draft commercial vessels due to its shallow depths. The U.S. Coast Guard (USCG) has jurisdiction over navigable waterways that accommodate interstate commerce under the U.S.

Legend:

- NJ Publicly Owned Farmland
- PA Productive Agricultural Land

Prime Farmland Under PA ALPP

- PA Preserved Farmland
- PA Agricultural Security Area
- PA Preferential Tax Assessment
- PA Agricultural Zoning (None)
- Agricultural Land Capability Classes I, II, III, or IV

Farms:

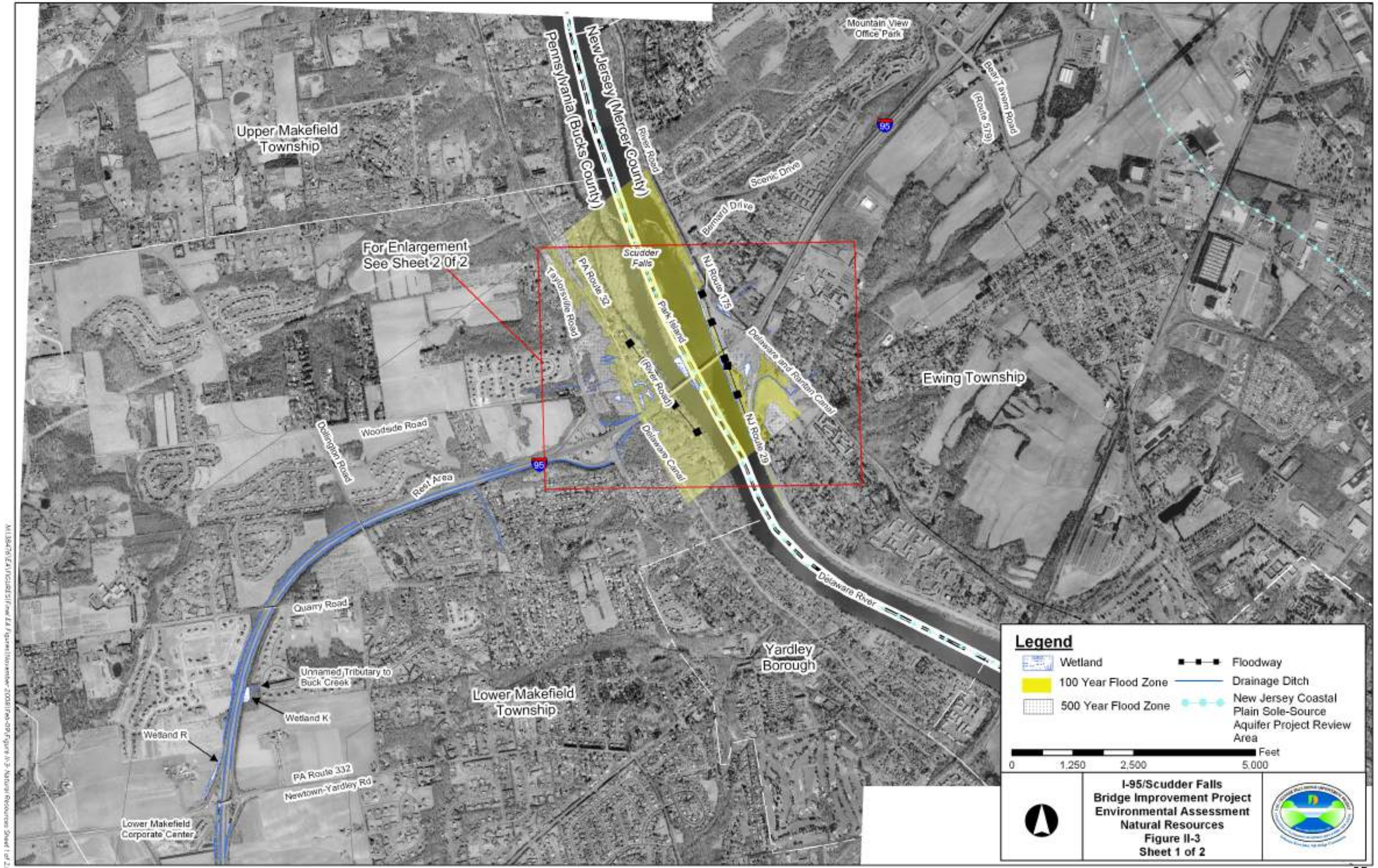
1. Jones Farm Correctional Facility
2. Clearview Farm
3. Makefield Brook Farm
4. Torbert Farm
5. Bridle Estates Farm
6. Wright Farm (Breezyvale Farms)

Note: Only farms that directly abut the project are shown.

0 1,250 2,500 5,000 7,500 10,000 Feet

I-95/Scudder Falls Bridge Improvement Project Environmental Assessment

Farmlands Map Figure II-2



M:\38476\EA\Incl\ES\Final EA Figures\November 2008\Feb-09\Figure II-3- Natural Resources Sheet 1 of 2.mxd

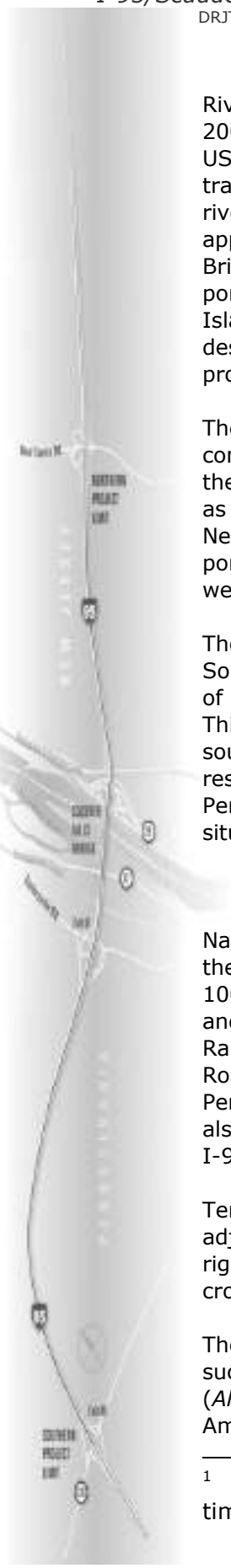
Scudder Falls
River Road
PA Route 32
Taylorsville Road
Wetland A
NJ Route 175
New Jersey (Mercer County)
Pennsylvania (Bucks County)
Park Island
Wetland B
Wetland G
Wetland C
Wetland I
Delaware and Raritan Canal
Wetland F
Unamed Tributary #3
To Delaware Canal
(River Road)
Wetland E
Wetland O
Wetland S
NJ State
Open Waters
Wetland H
Wetland M
Readers Creek
Wetland L
Unamed Tributary #2
To Delaware Canal
Wetland N
NJ Route 29
Delaware River
Wetland P
Delaware Canal
Unamed Tributary #1
To Delaware Canal

Legend

- Wetland
- 100 Year Flood Zone
- 500 Year Flood Zone
- Floodway
- Drainage Ditch
- New Jersey Coastal Plain Sole-Source Aquifer Project Review Area

Feet
0 375 750 1,500

I-95/Scudder Falls
Bridge Improvement Project
Environmental Assessment
Natural Resources
Figure II-3
Sheet 2 of 2



Rivers and Harbors Act, including the Delaware River. The USCG, in correspondence of March 3, 2004, indicated that the U.S. Coast Guard Authorization Act of 1982 exempts bridge projects from USCG bridge permits in non-tidal waters that are not used or susceptible to use as a means to transport interstate commerce. Therefore, the project will not require a USCG bridge permit. The river accommodates smaller craft, canoes, and recreational navigation, including whitewater uses approximately 2,000 feet upstream at the Scudder Falls Recreation Area. The I-95/Scudder Falls Bridge spans the Delaware River and a privately owned island, located within the Pennsylvania portion of the river, known as Park Island or generally referred to as part of the Scudder Falls Islands. North of the project area, at Washington Crossing, the Lower Delaware River is designated as a National Wild and Scenic River, but this designation does not extend south to the project area.

The Delaware River serves as a primary source of drinking water supply for project area communities, and the Delaware and Raritan Canal is also operated as a drinking water supply by the New Jersey Water Supply Authority (NJWSA). The groundwater in the project area also serves as a source of drinking water supply. The project area is underlain by the Lockatong Argillite (in New Jersey) and the Stockton Formation, comprised of arkoses and shales. The secondary porosity in these bedrock formations provides a source of groundwater supply for drinking water wells.

The project area is located within the Project Review Area of the New Jersey Coastal Plain Sole Source Aquifer, a special area within the Streamflow Source Zone. Although the project is outside of the New Jersey Coastal Plain Sole Source Aquifer, it is located within the Project Review Area. This review zone mandates that federally funded projects[1] that could affect groundwater in the sole source aquifer are subject to review by the U.S. Environmental Protection Agency. Groundwater resources in the project area include a number of private wells. The closest public well is the Pennsylvania American Water Supply Company water well (servicing Lower Makefield Township), situated within 500 feet south of I-95 and west of Taylorsville Road.

2. Aquatic and Terrestrial Habitats

Natural resources in the study area include the wetlands and floodplains that have developed along these waterways and other drainages (Figure II-3). The areas that would be inundated by the 100-year flood include the area generally extending between the Delaware Canal in Pennsylvania and the NJ Route 29 interchange in New Jersey, with some areas extending to the Delaware and Raritan Canal. The floodway of the Delaware River generally extends between PA Route 32 (River Road) and NJ Route 29. Wetlands identified along the I-95 corridor include nine wetlands in Pennsylvania and eight wetlands in New Jersey. A number of highway drainages (14 in total) were also delineated in accordance with the USACOE methodology along the Pennsylvania portion of the I-95 right-of-way.

Terrestrial habitats in the project area include adjoining forestlands and maintained fields within or adjacent to the I-95 right-of-way. Cover types that provide wildlife habitat within or along the I-95 right-of-way include deciduous forestland, mixed forestland, and maintained fields, including croplands and other open fields.

The Delaware River is a passageway for both anadromous species that migrate upstream to spawn, such as the American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and striped bass (*Morone saxatilis*), and catadromous species of fish, such as the American eel (*Anguilla rostrata*) that migrates downstream to spawn in the ocean. Other migratory

[1] A determination of federal funding assistance for this project has not been made at this time.

species that may be present include the federally endangered shortnose sturgeon (*Acipenser brevirostrum*) and the Atlantic sturgeon (*Acipenser oxyrhynchus*), a federal candidate and Pennsylvania-endangered species. The river hosts both warmwater and coolwater assemblages of fish. The Delaware River is also a migratory passageway for avian species as a component of the Atlantic flyway and also provides habitat for waterfowl and other resident species of birds.

The river also supports yellow lampmussel (*Lampsilis cariosa*), which is considered threatened in New Jersey and rare in Pennsylvania. Other protected species that have either been documented as occurring in the project area or for which suitable habitat is available include the PA- and NJ-endangered peregrine falcon (*Falco peregrinus*) and Pennsylvania-threatened red-bellied turtle (*Pseudemys rubriventris*).

The Delaware Canal and Delaware and Raritan Canal sustain warmwater fisheries and are annually stocked with trout.

E. Cultural Resources

Detailed information on Cultural Resources are documented in Technical Memorandum No. 32, Archaeology Phase I Technical Memorandum; Technical Memorandum No. 24, Historic Resources Survey and Determination of Eligibility Report, Bucks County, Pennsylvania; Technical Memorandum No.34 Determination of Effect Report, Bucks County, Pennsylvania; and Technical Memorandum No. 25, Historic Resources Survey, Determination of Eligibility, and Determination of Effect Report, Ewing Township, Mercer County, New Jersey.

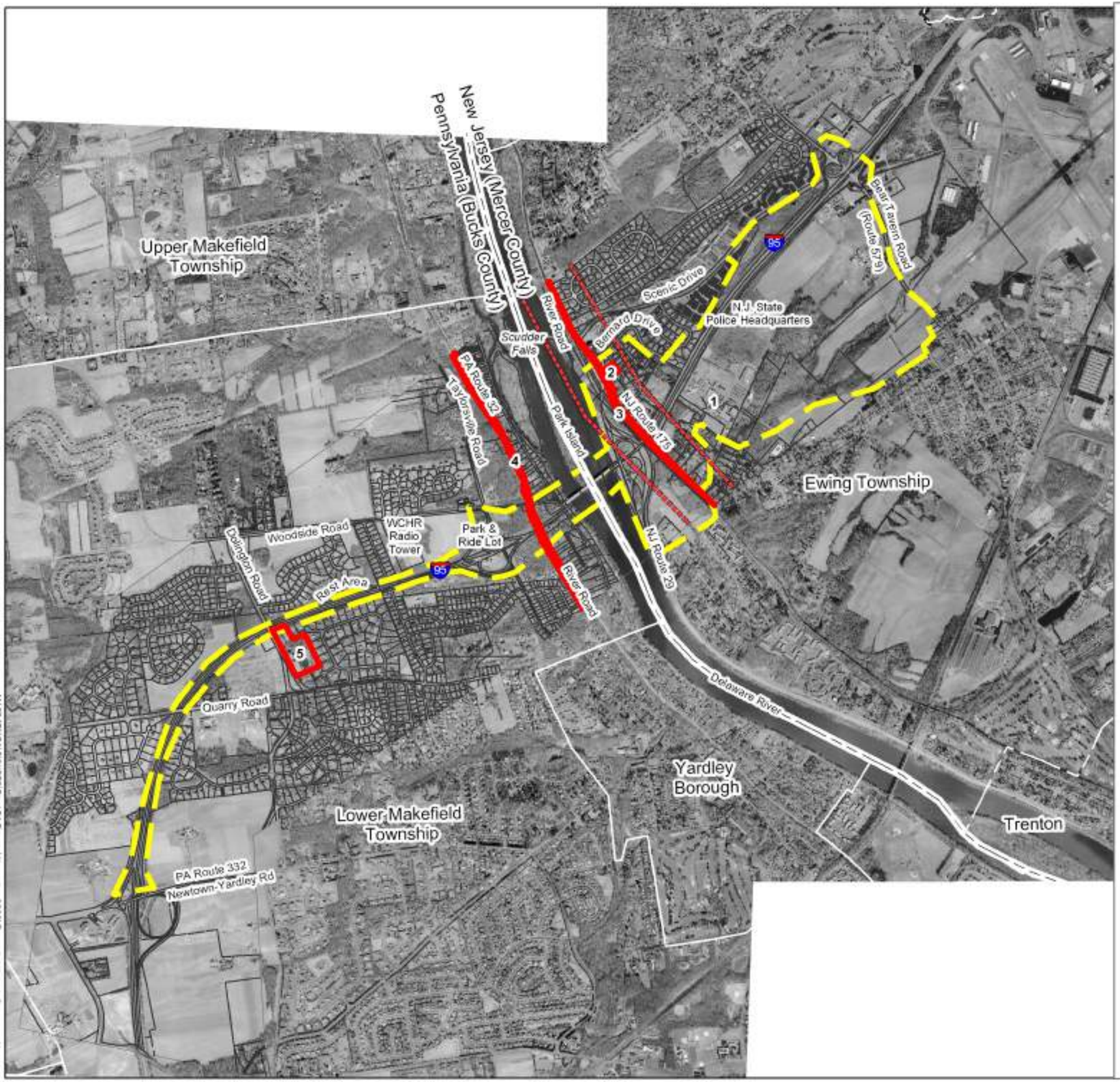
Cultural resources include precontact period resources and historic properties that date back to Revolutionary War era. The Delaware Canal was designated as a National Historic Landmark on December 8, 1976, and the Delaware and Raritan Canal Historic District was listed on the National Register of Historic Places on May 11, 1973.

1. Historic Resources

For the historic evaluations, the Area of Potential Effect (APE) was presented in reports reviewed by the State Historic Preservation Officers in each state at the Pennsylvania Historical and Museum Commission (PHMC) and the New Jersey Historic Preservation Office (NJHPO). In addition to the Delaware Canal and Delaware and Raritan Canal, four properties have been identified within the APE that are listed on or eligible for listing on the National Register of Historic Places (Figure II-4). The Pennsylvania property determined to be eligible for the National Register is the Elm Lowne House at 1324 Dolington Road. In New Jersey, the Charles S. Maddock House (1076 River Road) and the New Jersey State Police Headquarters (River Road) were determined to be eligible for National Register listing. Those properties that are National Register eligible and within the Area of Potential Effect for the project are described in more detail in Chapter IV.N.

2. Archaeological Resources

A Phase I investigation was performed to characterize potential for archaeological sensitivity. This investigation included subsurface investigations along the I-95 mainline and along the Delaware River. Areas along the I-95 mainline are generally expected to have low potential for archaeological sensitivity, with the exception of crossings of the Delaware River, the canals, and Reeders Creek in New Jersey. Potentially significant archaeological resources are anticipated to be encountered along the Delaware River, where a series of terraces (i.e., relict floodplains) or relatively level landforms occupy the broad area between the Delaware River and Taylorsville Road in Pennsylvania and the more compressed area in New Jersey extending from the river to the Delaware and Raritan Canal and NJ Route 175 (Upper River Road).



Legend

- Area of Potential Effect (APE)
- National Register of Historic Places Listed or Eligible Historic Resources
- Delaware and Raritan Canal District

1. N.J. State Police Headquarters
2. Charles S. Maddock House
3. Delaware and Raritan Canal
4. Delaware Canal
5. Elm Lowne House

Feet
0 1,250 2,500 5,000 7,500 10,000

I-95/Scudder Falls Bridge Improvement Project Environmental Assessment Historic Resources Map Figure II-4

III. ALTERNATIVES CONSIDERED

A. Introduction

A broad range of alternatives for the I-95/Scudder Falls Bridge Improvement Project was considered to meet the project purpose and need. This chapter reviews the various Build and non-build options considered, presents the options that were considered and dismissed, and describes the proposed action. The last section of this chapter addresses the construction of the project, including proposed construction methods and alternative methods considered.

Detailed information on the alternatives and design options considered and the alternatives evaluation process is presented in Technical Memorandum No. 26, Alternatives Screening Report.

For the Build alternatives, several configurations were evaluated for the four project segments: (1) the I-95/Scudder Falls Bridge and approaches, (2) Pennsylvania mainline, (3) the Taylorsville Road Interchange, and (4) the NJ Route 29 Interchange. The project segments are shown in Figure III-1 and the options considered (and proposed) for these project segments are summarized in Table III-1. These design options were developed to provide the number of lanes and shoulders required to provide level of service D in the design year 2030 and to meet current design criteria. A preferred option was selected for each project segment for inclusion in the proposed action.

Logical terminii for the project were established based on the capacity and safety needs of the corridor and to have independent utility. Although configurations and design options for each project segment were initially developed separately, improvements to none of these segments would have independent utility.

In addition to the Build options considered, the No Build alternative and strategies for managing transportation demand and increasing the safety and efficiency of the existing transportation system (Transportation Systems Management/Transportation Demand Management) were also evaluated. However, the No Build and Transportation Systems Management/Transportation Demand Management (TSM/TDM) alternatives, as stand alone solutions, do not provide sufficient congestion relief or safety improvements to meet the project need. The No Build alternative will be carried through this Environmental Assessment as a baseline for comparison to the Build alternatives. In addition, planning for appropriate TSM/TDM measures will continue in conjunction with the proposed action.

The alternatives considered were evaluated in consultation with Pennsylvania, New Jersey, regional and local officials, and the public (see Chapter V). The means of coordinating with transportation, regulatory and resource agencies, and municipal officials included coordination through two forums: the Interagency Advisory Committee (IAC) and Special Agency Coordination Meetings (SACM). In addition, public open houses were held in both Lower Makefield and Ewing Townships to present concepts to the public and obtain input on alternatives under consideration. A series of separate coordination meetings were also held with environmental groups, transportation groups, including the Bucks County and Mercer County Transportation Management Associations, and Smart Growth agencies in both states.

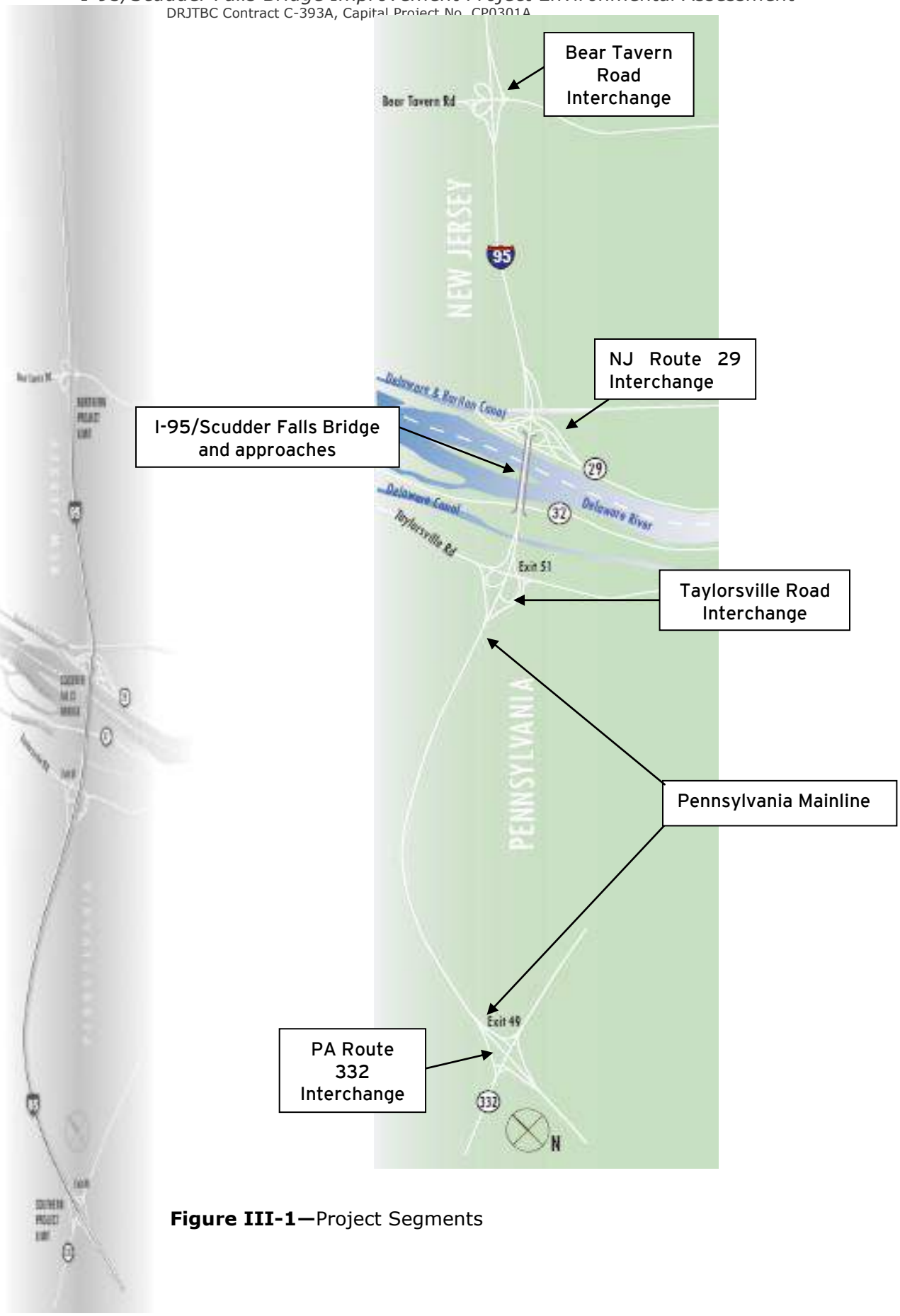


Figure III-1—Project Segments

Table III-1—Summary of I-95 Mainline, I-95/Scudder Falls Bridge, and Interchange Design Options

DESCRIPTION OF ALTERNATIVES AND DESIGN OPTIONS	PROPOSED ACTION
No Build	Considered in EA for comparison to Proposed Action
Transportation Systems Management/ Transportation Demand Management • Inside shoulders designed to carry Bus Rapid Transit • Coordination with Bucks County and Mercer County Transportation Management Associations • ITS and incident management recommendations	Part of Proposed Action, but, as a standalone measure, will not meet purpose and need
I-95/Scudder Falls Bridge Structural Options • Bridge rehabilitation (full and partial) with widening, • Bridge replacement	Bridge replacement
I-95/Scudder Falls Bridge Lane Configuration Options • Double-deck (two-level) bridge, • Contra-flow lane (reversible lane for use in peak flow directions), • Collector/distributor (CD) roadway (3-lane northbound CD roadway segregated from I-95 by 6-foot concrete divider) • Standard lane additions (5 lanes northbound/4 lanes southbound on the I-95/Scudder Falls Bridge)	Standard lane additions
I-95/Scudder Falls Bridge Alignment Options • New bridge on centerline alignment, • New bridge on downstream alignment, • New bridge on upstream alignment	New bridge on upstream alignment
Pennsylvania Mainline Options • Outside widening, • Inside widening	Inside widening
Interchange Design Options • Taylorsville Road Interchange o **Design Option 1:** Retains all existing interchange ramps o **Design Option 2.:** Eliminates eastern southbound off-ramp o **Design Option 3.:** Eliminates eastern northbound on-ramp o **Design Option 4.:** Eliminates eastern southbound off-ramp and northbound on-ramp • NJ Route 29 Interchange o **Design Option 1a:** Folded Diamond on NJ Route 29 Southbound (Western) Alignment without a Bypass for NJ Route 29 northbound o **Design Option 1b:** Folded Diamond on NJ Route 29 Southbound (Western) Alignment with a Bypass for NJ Route 29 northbound o **Design Option 1c (Modified):** Folded Diamond on NJ Route 29 Southbound (Western) Alignment with Roundabout Intersections and a Bypass for NJ Route 29 northbound o **Design Option 2:** Folded Diamond on NJ Route 29 Northbound (Eastern) Alignment	Taylorsville Road Interchange Option 2 NJ Route 29 Interchange Design Option 1c (Modified)
Pedestrian/Bicycle Facility Options • Pennsylvania landing with direct connection to Delaware Canal towpath • Pennsylvania landing with connection to canal towpath via sidewalk along Woodside Road • New Jersey landing connection to Delaware and Raritan Canal on west side of NJ 29 Interchange	Final decision on pedestrian/bicycle facility to be made in final design; Preferred design includes: Pennsylvania landing with connection to canal towpath via sidewalk along Woodside Road New Jersey landing connection to Delaware and Raritan Canal on west side of NJ29 Interchange

As a result of this alternatives evaluation and screening process, the proposed action incorporates the following (as described in Section III.C):

- Standard lane additions on a new bridge on an upstream alignment,
- Inside widening along the Pennsylvania mainline,
- Taylorsville Road Interchange Option 2, and
- NJ Route 29 Interchange Option 1c (Modified).

A final decision on the pedestrian/bicycle facility considered in this EA will be made during final design.

B. Alternatives Considered But Dismissed

Those design options that were not carried forward, and the reasons for dismissing these from further consideration, are described below. In addition to the design options considered for the I-95/Scudder Falls Bridge, highway, and interchanges, options for providing pedestrian/bicycle access across the I-95/Scudder Falls Bridge were also considered.

1. Transportation Systems Management/ Transportation Demand Management

Transportation Systems Management (TSM) measures are strategies designed to increase the safety, capacity, and efficiency of the existing transportation system and include measures such as facility design, high-occupancy vehicle lanes, intelligent transportation systems (ITS), and incident management. Transportation Demand Management (TDM) measures are strategies to focus on travel demand and changing driver behaviors and include measures such as ridesharing, increased use of transit, and bike/walk incentives. Under the TSM/TDM alternative, the measures that were considered as part of this Environmental Assessment include:

Detailed information on the ITS/Incident Management planning for the project area is contained in the Technical Memorandum No. 4, Draft Conceptual ITS Study. Existing transit and bus services are described in Technical Memorandum No. 11, Needs Report.

- **Intelligent Transportation Systems/Incident Management:** A Conceptual Intelligent Transportation System (ITS) Study was prepared that includes recommendations for ITS implementation and an Incident Management (IM) Plan. Implementation of these ITS/incident management initiatives will require coordination with PennDOT and NJDOT, which own the majority of highway right-of-way in the project area. This study identifies initiatives that are planned or underway in Pennsylvania and New Jersey.
- **Park and Ride Facilities:** The Taylorsville Road Interchange area includes a park and ride facility off Woodside Road that is owned by PennDOT and maintained by the DRJTBC. Coordination with the Bucks and Mercer County Transportation Management Associations and large local employers has been performed during the project development process and will continue.
- **Accommodations for Proposed Route 1 Bus Rapid Transit:** The proposed NJDOT Bus Rapid Transit project involves a bus feeder system that would service the Route 1 corridor. A potential bus feeder route has been identified that would include a stop at the Taylorsville Road park and ride lot. Incorporation of 14-foot inside shoulders along I-95 in the project area for possible future use as bus lanes by the proposed Route 1 Bus Rapid Transit is proposed to allow buses to bypass congestion on I-95.
- **Pedestrian/Bicycle Access:** Provision of pedestrian/bicycle access in part is a TDM strategy and is addressed further in the *Pedestrian/Bicycle Facility* section, Section III-C.6.

The TSM/TDM alternative would not provide sufficient traffic relief to ameliorate severe traffic congestion that occurs during peak hours and is projected to worsen in 2030. This alternative also would not address structural and geometric deficiencies of the I-95/Scudder Falls Bridge and adjoining interchanges. The TSM/TDM strategies would not satisfy the purpose and need as a standalone alternative. However, the TSM/TDM measures deemed appropriate will be incorporated as part of the proposed action.

2. I-95/Scudder Falls Bridge Design Options

An array of Build alternatives and design options were evaluated for the I-95/Scudder Falls Bridge and approaches, including structural options, options involving variations in the number of lanes for the bridge and the approaches, and alignment options for the river crossing. The I-95/Scudder Falls Bridge in the southbound direction would require three travel lanes and one auxiliary lane between the NJ Route 29 and Taylorsville Road Interchanges in order to achieve LOS D for design year peak hour traffic. In the northbound direction the traffic analysis indicated that three travel lanes would be required for through traffic, and two auxiliary lanes would be required for entering and exiting traffic at the interchanges to achieve LOS D during design year peak periods. All of the options evaluated provided this minimum cross-section for the I-95/Scudder Falls Bridge and the approaches.

The structural options regarding rehabilitation of the existing bridge are discussed in the following section and are presented in Table III-2. The options that were considered for the configuration and alignment of the I-95/Scudder Falls Bridge are described in this chapter and are presented in Table III-3.

a) Structural Options: Bridge Rehabilitation with Widening

Both full and partial rehabilitation options that would also involve widening of the structure to meet the project purpose and need were considered for the existing I-95/Scudder Falls Bridge. The construction and service life costs that include life cycle costs (including maintenance costs) are presented in Table III-2. However, full or partial bridge rehabilitation to meet current AASHTO, PennDOT, and NJDOT criteria would result in costs that approach (or even exceed) those for bridge replacement. Under the PennDOT policies and guidelines, if service life costs (including life cycle costs) for bridge rehabilitation are within 30% of the service life costs for bridge replacement, bridge replacement is recommended. Moreover, although the bridge can be strengthened, rehabilitation does not eliminate concerns associated with the age and previous loading history of the bridge (currently exceeding 48 years in service and expected to remain in service for at least 75 more years) and its non-redundant configuration.

Detailed information on the evaluation of bridge rehabilitation and replacement options is presented in the Technical Memorandum No. 13, I-95/Scudder Falls Bridge Rehabilitation vs. Replacement Evaluation.

In addition, complete bridge replacement would allow greater flexibility and efficiency and longer spans, thus reducing the number of piers in the Delaware River. The two options evaluated for rehabilitation of the I-95/Scudder Falls Bridge are not considered fiscally prudent and were dismissed from further consideration. All project alternatives carried forward for further consideration include complete replacement of the I-95/Scudder Falls Bridge, and a single bridge structure for this river crossing is assumed as part of the proposed action.

Table III-2—Comparison of Bridge Rehabilitation and Replacement Options

Parameters	Bridge Rehabilitation Options		Bridge Replacement (Proposed Action)
	Partial Rehabilitation	Complete Bridge Rehabilitation	
Meets Purpose and Need	No	No	Yes
Description	Deck replacement and strengthening of the existing bridge superstructure (two main beams under the concrete deck) and construction of a new parallel bridge to meet the proposed number of lanes and shoulders	Total replacement of the existing bridge superstructure (two main beams under the concrete deck) and construction of a new parallel bridge to meet the proposed number of lanes and shoulders	Total bridge replacement
Service Life Costs for Bridge (2005 dollars)	$67 million	$76.5 million	$71 million
Construction Costs (2005 dollars)	$58.3 million	$51.6 million	$62.9 million

Source: Technical Memorandum No. 26, Alternatives Screening Report, February 2007.

Notes:
1). Service life costs include life cycle costs, such as maintenance.
2). Costs are presented in 2005 dollars, as documented in Technical Memorandum No. 26, Alternative Screening Report. Each design option's and alternative's cost escalation to future years is expected to be fairly uniform and thus would not alter the relative cost differences of the alternatives and design options.

b) Lane Configuration Options

(1) Double-Deck Bridge

A double-deck bridge across the Delaware River was considered that would carry local traffic from the adjoining interchanges on a lower level and I-95 through traffic on an upper level (see Table III-3 and Figure III-2). This option would cost approximately $18 million (in 2005 dollars) more than the Standard Lane Addition Design Option. Approach structures would extend 800 feet beyond the bridge, requiring substantially greater displacements of adjoining properties and environmental impacts. A double-deck bridge would pose a higher security risk than a single level bridge. In addition, a double-deck bridge would be more visually intrusive in the environment, as well as to bridge users, than a single level bridge due to its height. For these reasons, the option for a double-deck I-95/Scudder Falls Bridge was dismissed from further consideration.

Table III-3—Comparison of I-95/Scudder Falls Bridge Configuration and Alignment Alternatives

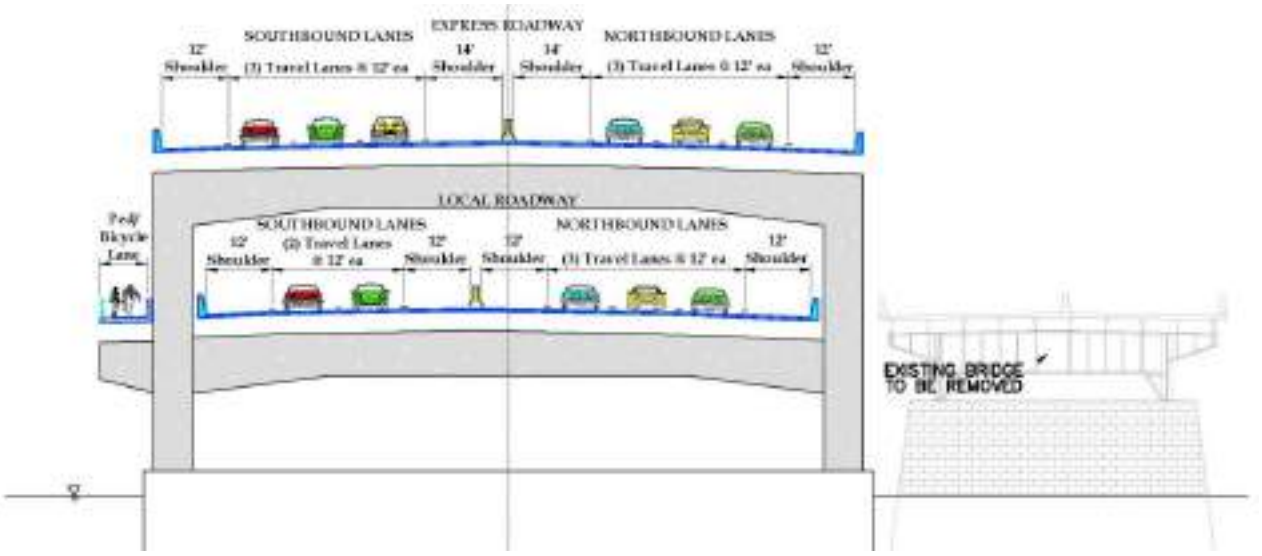
Parameters	Double-Deck Bridge	Contra-Flow Lane	Collector/ Distributor Roadway Option	Standard Lane Additions/Bridge Replacement		
				Upstream (Proposed Action)	Centerline	Downstream
Description	Two-level bridge, with lower level carrying three lanes of local traffic in each direction and upper level carrying three lanes of through traffic in each direction	A movable barrier would be used to provide five lanes in the peak direction and three lanes in the off-peak direction. The movable barrier system would extend over the length of the bridge and about 1,500 feet on each of the approaches to the bridge.	A collector/distributor roadway would segregate northbound I-95 mainline traffic from traffic entering and exiting at Taylorsville Road or at NJ Route 29. The northbound I-95 travel lanes and the CD Roadway would be separated by a 6-foot wide raised divider and the roadway cross-section would be 20 to 28 feet wider than the standard lane additions.	The configuration of would consist of five lanes northbound and four lanes southbound on the I-95/Scudder Falls Bridge, but the new, wider bridge would extend further upstream of the existing bridge	The configuration of would consist of five lanes northbound and four lanes southbound on the I-95/Scudder Falls Bridge, but the new, wider bridge would be centered on the centerline of the existing bridge	The configuration of would consist of five lanes northbound and four lanes southbound on the I-95/Scudder Falls Bridge, but the new, wider bridge would be extend further downstream of the existing bridge
Meets Purpose and Need	Yes	Yes	Yes	Yes	Yes	Yes
Construction Costs (2005 dollars)	Project-wide cost of $197 million	Project-wide cost of $188 million which includes $12 million additional operation costs	Project-wide cost of $192 million	Project-wide cost of $179 million	Project-wide cost of $179 million	Project-wide cost of $179 million
2030 Peak Hour Traffic Operations	LOS D	LOS D	LOS C northbound LOS D southbound Introduces undesirable weave after two-lane entrance	LOS C northbound LOS D southbound	LOS C northbound LOS D southbound	LOS C northbound LOS D southbound
Property Displacements	New construction would be entirely upstream or downstream of existing bridge, resulting in extensive property and environmental impacts on the approaches. Approach work would extend 800 feet beyond the existing bridge abutments, and impacts would be greater than for standard lane additions	This option would be eight lanes wide (instead of nine lanes for the standard lane additions), so property and environmental impacts would generally be less than for the standard lane additions.	2 residences	1 residence	2 residences	2 residences
Public Property Acquisitions			5 acres, including 2 acres of State Police property and Villa Victoria Academy	2 acres	3 acres	3 acres
Private Property Takings			2 acres, including portions of 12 residential properties	1 acre, including portions of 7 residential properties	1 acre, including portions of 7 residential properties	2 acres, including portions of 9 residential properties
Wetlands			1 acre	1 acre	1 acre	1 acre
Floodplains			Fill within floodway and 11 acres of 100-year floodplain	Fill within floodway and 10 acres of 100-year floodplain	Fill within floodway and 11 acres of 100-year floodplain	Fill within floodway and 11 acres of 100-year floodplain
Increase in Shading on Delaware River			4 acres more than existing bridge	3 acres more than existing bridge	3 acres more than existing bridge	3 acres more than existing bridge
Streams			3 streams (1/3 acre)	3 streams (0.2 acre)	3 streams (0.2 acre)	3 streams (0.3 acre)
Ditches			13 ditches (3 acres)	10 ditches (2 acres)	11 ditches (2 acres)	11 ditches (2 acres)
Preserved Farmlands			1 ½ acres	1 ½ acres	1 ½ acres	1 ½ acres
Historic Resources			4 sites	4 sites	4 sites	4 sites
Increase in Shading on Canals			1/5 acre	1/5 acre	1/5 acre	1/5 acre

Table III-3—Comparison of I-95/Scudder Falls Bridge Configuration and Alignment Alternatives

Parameters	Double-Deck Bridge	Contra-Flow Lane	Collector/ Distributor Roadway Option	Standard Lane Additions/Bridge Replacement		
				Upstream (Proposed Action)	Centerline	Downstream
Archaeological Resources			5 sites	5 sites	5 sites	5 sites
Construction	Construction of a new parallel bridge would require construction of a temporary causeway across the Delaware River	Construction of a new parallel bridge would require construction of a temporary causeway across the Delaware River.	Construction of a new parallel bridge would require construction of a temporary causeway across the Delaware River.	Construction of a new parallel bridge would require construction of a temporary causeway across the Delaware River	Construction of a new parallel bridge would require construction of a temporary causeway across the Delaware River	Construction of a new parallel bridge would require construction of a temporary causeway across the Delaware River
Reasons for Dismissal	Additional costs and impacts (including greater visual intrusion and greater approach work) when compared with the standard lane additions	Safety concerns at transition areas. Operational costs and difficulties with moving the contra-flow barriers four times a day.	Increased costs and environmental impacts, without substantial additional operating benefits, when compared with the standard lane additions	Carried forward for further consideration	Increased impacts and difficulty with construction staging, when compared to the upstream alignment	Increased impacts when compared to the upstream alignment

Source: Technical Memorandum No. 26, Alternatives Screening Report, February 2007.

Notes:
1). Information for all alternatives, as presented above, was based on conceptual design. Design of the proposed action has been further refined based on preliminary design, as described in Chapter III.C and Chapter IV of this EA.
2). Costs are presented in 2005 dollars, as documented in Technical Memorandum No. 26, Alternative Screening Report. Each design option's and alternative's cost escalation to future years is expected to be fairly uniform and thus would not alter the relative cost differences of the alternatives and design options.

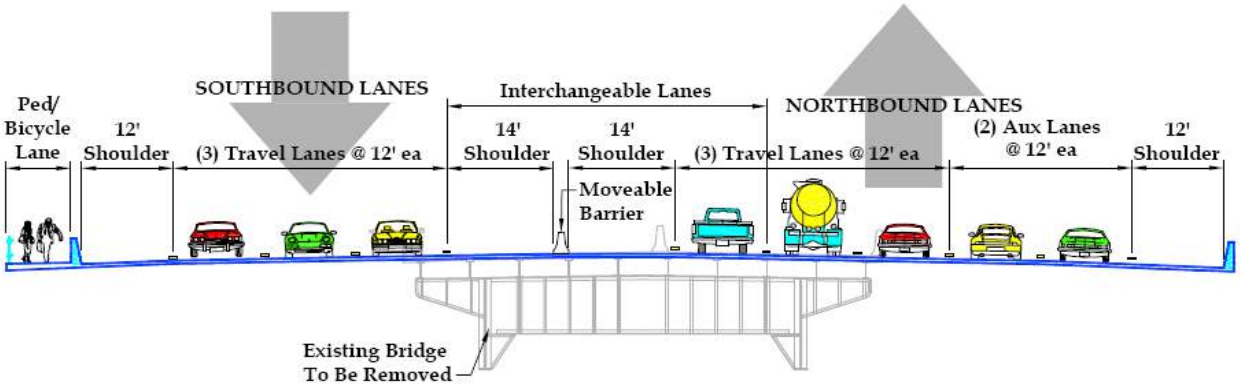


Optional Pedestrian/Bicycle Lane Shown

Figure III-2—Typical Cross-section of Double-deck Bridge Option

(2) Contra-Flow Lane

Incorporation of a contra-flow lane on I-95 would employ a movable barrier, which would provide an additional lane in the peak flow direction (five lanes) and one less travel lane in the non-peak flow direction (three lanes). Use of a contra-flow lane would allow one less travel lane to be constructed on the I-95/Scudder Falls Bridge (see Table III-3 and Figure III-3). A movable barrier operating system would require barrier machines, operators, lane delineation system, spare barriers, shelter for the machine and other miscellaneous items.



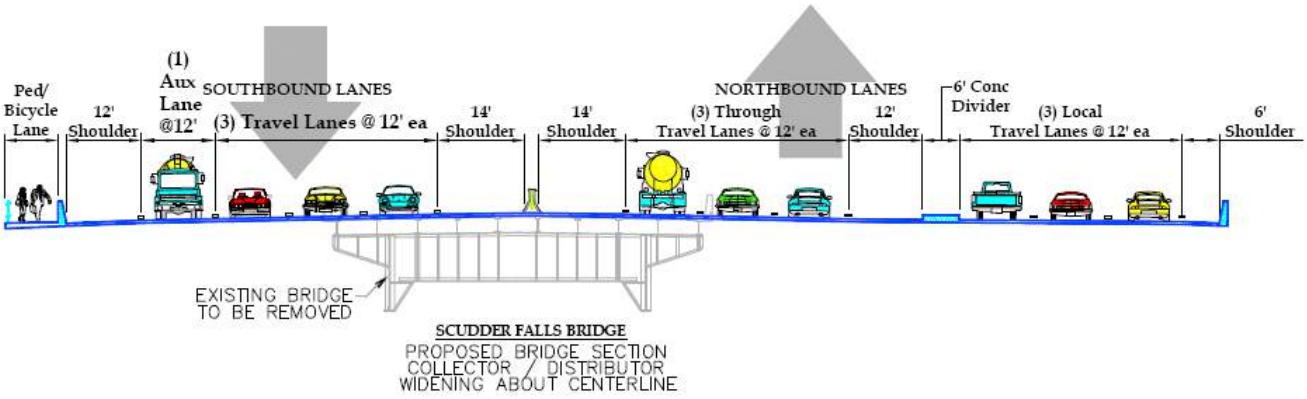
Optional Pedestrian/Bicycle Lane Shown 14 ft. Inside Shoulders for NJ Transit BRT Vehicles

Figure III-3—Typical Cross-section of Contra-Flow Lane Option (A.M. peak)

Table III-3 presents the service life and construction costs for the contra-flow bridge, which is estimated to cost an additional $9,000,000 (in 2005 dollars) over bridge replacement with standard lane additions. Service life costs, which sum to approximately $12 million, include initial purchase of the machines that relocate the movable barriers between the morning and afternoon peak hours, the additional costs associated with the movable barriers, replacement of damaged movable barrier segments over the service life, cost of the machine operators, service and maintenance of the machines, and electronic signing for lane delineations. In addition to the cost differential, a contra-flow lane over such a short length of roadway would not be efficient. Safety would be at issue at the end treatments of the moveable barrier and in the transition areas into and out of the contra-flow lane. For these reasons, the contra-flow lane option was dismissed from further consideration.

(3) Collector/Distributor Roadway

This collector/distributor (CD) roadway would only be provided in the northbound direction over a total length of about 2.4 miles and would segregate northbound mainline traffic from traffic entering and exiting at Taylorsville Road and NJ Route 29. The cross-section for the CD roadway would be wider (20 to 28 feet) than for standard lane additions (see Table III-3 and Figure III-4). The northbound CD roadway ramp would begin, on its western end, approximately 0.8 mile west of Taylorsville Road (across from the rest area in Pennsylvania) and would merge back into the I-95 mainline roughly 1.5 miles east of NJ Route 29 (at the western edge of the Jones Farm property). The physical changes to I-95 with a CD roadway option would extend considerable distances along I-95 beyond the immediate area of the I-95/Scudder Falls Bridge. Therefore, the costs, impacts, and discussion presented for the CD roadway alternative in Table III-3 reflect the entire project limits.



Optional Pedestrian/Bicycle Lane Shown 14 ft. Inside Shoulders for NJ Transit BRT Vehicles

Figure III-4—Typical Cross-section of Collector/Distributor Roadway at I-95/Scudder Falls Bridge

The drawbacks of the CD roadway are related to cost and additional impacts from a wider highway cross-section, as described in Table III-3. The CD roadway alternative is estimated to cost

approximately $13 million (in 2005 dollars) more than the standard lane additions. The I-95/Scudder Falls Bridge would be 24 feet wider with the CD roadway alternative (186 feet) than it would be with standard lane additions (162 feet).

In addition to greater impacts on the New Jersey State Police property (2 acres), the CD roadway would affect ½ acre more of Commonwealth/Township property surrounding the park and ride lot and would affect 2 more acres of private property, including land within the Villa Victoria Academy. The CD roadway alternative would also span a greater area of the Delaware Canal in Pennsylvania (increase of 400 square feet) and the Delaware and Raritan Canal in New Jersey (increase of 800 square feet) than standard lane additions.

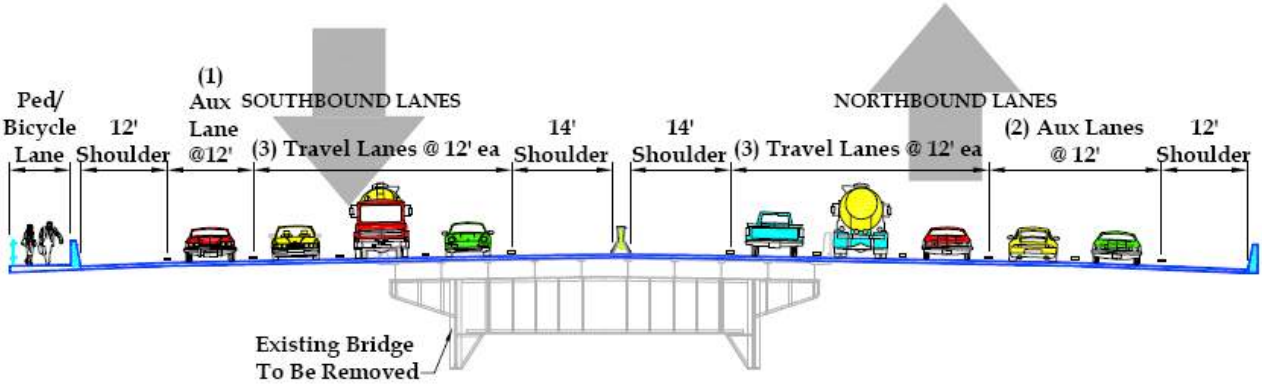
The levels of service associated with both alternatives are comparable and acceptable, but the CD roadway alternative does not present sufficient additional operational benefits to justify the increase in cost ($13 million more) and property/environmental impacts, when compared with the standard lane additions alternative. For these reasons, the CD roadway alternative was dismissed from further consideration.

Based on the above analysis, the standard lane additions alternative, which is described in Section III.C.1 and illustrated on Figure III-22, was advanced as the preferred lane configuration over the Double-Deck Bridge, Contra-Flow Lanes and CD roadway lane configuration alternatives.

c) Alignment Options

(1) New Bridge on Centerline Alignment

Under this alignment option, the new highway with standard lane additions (five lanes northbound and four lanes southbound on the I-95/Scudder Falls Bridge) would be centered on the centerline of the existing bridge (see Table III-3 and Figure III-5). Compared to the proposed action (upstream alignment), the centerline alignment would involve greater property and environmental impacts and would affect the USACOE flood control structure, without presenting any clear advantages over other alignment options. From a constructability standpoint, the centerline alignment would be the least favorable, as it would involve the greatest overlap with the existing bridge. For these reasons, this option was dismissed from further consideration.

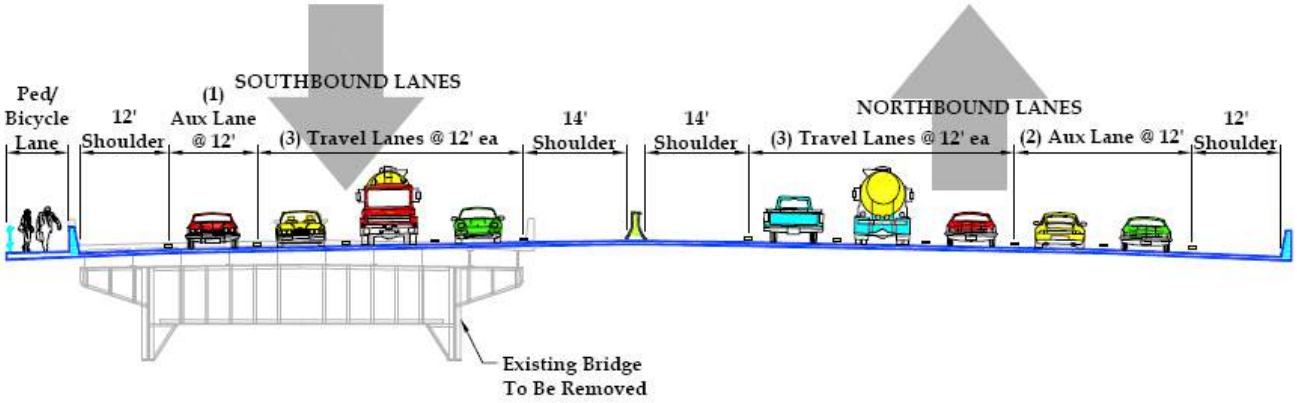


Optional Pedestrian/Bicycle Lane Shown 14 ft. Inside Shoulders for NJ Transit BRT Vehicles

Figure III-5—Typical Cross-Section of I-95/Scudder Falls Bridge on Centerline Alignment

(2) New Bridge on Downstream Alignment

Under the downstream alignment option, the bridge alignment over the Delaware River and the mainline approaches would be shifted downstream, with the new bridge partially overlapping the footprint of the existing bridge (see Table III-3 and Figure III-6). From a constructability standpoint, the downstream alignment option would provide more travel lanes and flexibility than the centerline alignment during the various phases of construction because a large portion of the new bridge's width could be constructed parallel to the existing bridge without interfering with traffic flow on the existing bridge.



Optional Pedestrian/Bicycle Lane Shown 14 ft. Inside Shoulders for NJ Transit BRT Vehicles

Figure III-6—Typical Cross-section of I-95/Scudder Falls Bridge on Downstream Alignment

The downstream alignment option would involve the greatest property impacts of the three alignment options, affecting approximately three acres of public land and roughly two acres of private property. The downstream alignment would involve the greatest impacts on streams and would also have the greatest impact on the USACOE flood overflow structure on the canal south of I-95. Overall, project impacts were deemed to be greater with the downstream alignment, and this option did not present any clear benefits over the other options. For these reasons, the downstream alignment was dismissed from further consideration, and a new bridge on an upstream alignment was selected as part of the proposed action (see Section III.C.2 and Figure III-22).

3. Pennsylvania Mainline Options: Outside Widening

On the west end of the project area, the existing I-95 mainline in Pennsylvania includes a wide median that is approximately 60 feet in width and consists of grassed areas and paved inside shoulders. The median narrows to the east approaching Taylorsville Road, where the median consists of paved inside shoulders and also incorporates a median barrier. This highway segment between PA Route 332 and Taylorsville Road consists of two 12-foot travel lanes in each direction, with inside and outside shoulders. The right (outside) paved shoulder is 12 feet in width in this highway segment, providing adequate space to accommodate disabled vehicles. The left (inside) paved shoulder is approximately 4 feet in width. The highway right-of-way is approximately 300 feet in width, extending roughly 75 to 90 feet out from the existing edge of pavement.

Under the outside widening option, lane additions would extend to the right side of the existing travel lanes, outside of the existing pavement but within the highway right-of-way (see Table III-4 and Figure III-7). This option was compared to an inside widening option that would add travel lanes and inside shoulders entirely within the existing grassed median area. Under both design options, a wider inside shoulder (14 feet) would be provided to accommodate potential use of the shoulder as part of the Route 1 Bus Rapid Transit project to allow buses to bypass I-95 congestion.

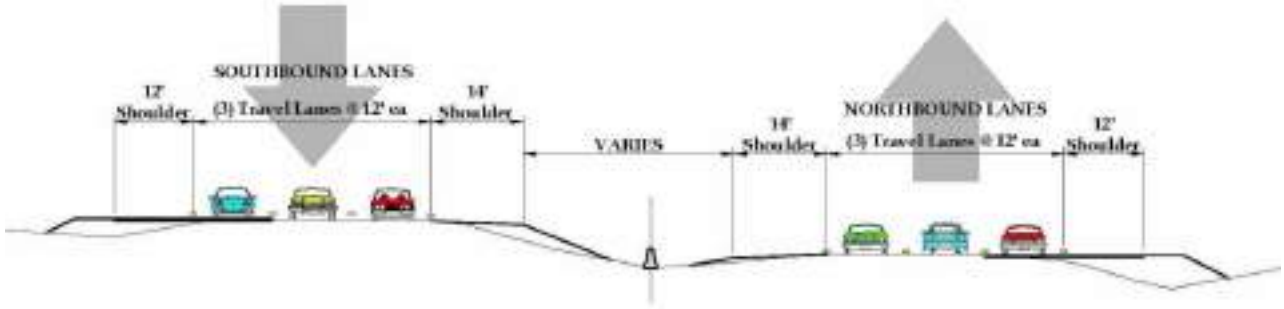


Figure III-7—Typical Cross-section of Pennsylvania Mainline Outside Widening Option

The outside widening option would cost approximately $1 million (in 2005 dollars) less than the inside widening option. Outside widening would also involve less increase in impervious areas and would provide opportunities to accommodate stormwater management within the median.

However, the outside widening option would generally involve greater environmental impacts. Widening outside the existing travel lanes would require more clearing of roadside forested vegetation and would involve slightly greater impact on natural resources. The outside widening option would involve additional impacts to wetlands tributary to Buck Creek, an unnamed tributary stream to the Delaware Canal, and highway drainage ditches. Space for noise barriers would also be more available along the roadside and within the existing right-of-way under the inside widening option.

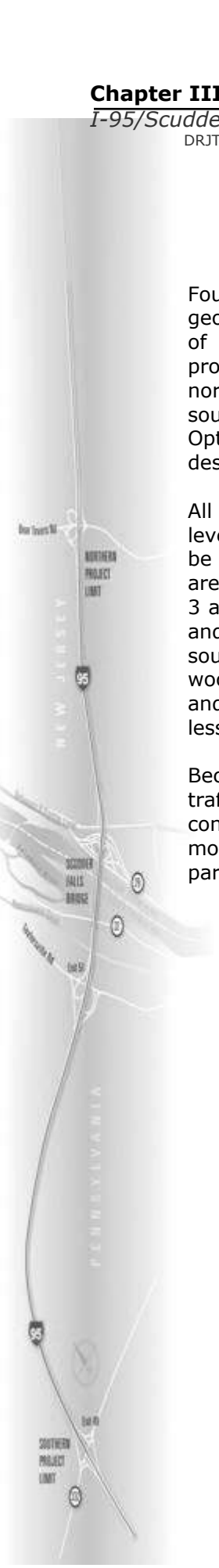
Moreover, Lower Makefield Township has indicated opposition to the outside widening option, and this option was not advanced for the Pennsylvania I-95 mainline project segment. The proposed action incorporates inside widening along the I-95 Pennsylvania mainline (see Section III.C.3 and Figure III-22).

Table III-4—Comparison of Pennsylvania I-95 Mainline Segment Design Options

Parameters	Inside Widening (Proposed Action)	Outside Widening
Description	West of Taylorsville Road, with the proposed improvements, I-95 would consist of three travel lanes in each direction, with full-width inside and outside shoulders.	
	Median areas would be replaced with the additional travel lanes and inside shoulders.	Lane additions would extend to the right side of the existing travel lanes, outside of the existing pavement but within the highway right-of-way
Level of Service Mainline I-95	LOS C	LOS C
Median Width	36 feet	60 feet
Estimated Construction and Design Engineering Cost (2005$)	$21 million	$20 million
Impact to Public Property	No direct impacts	0.1 acre
Other Property Acquisitions	0	0.02 acre at 2 residences.
2030 Noise Increase over existing/No Build	2 to 4 dBA higher than existing conditions and approximately 1 to 3 dBA higher than future No-Build conditions. Differences between inside and outside widening would not be perceptible (0 to 1 dBA)	
Potential for Impacts on Visually Sensitive Areas	Lesser changes to roadside vegetation.	Forest clearing required along and within a substantial portion of the right-of-way
Historic Sites	0	0
Archaeological Sites	0	0
Wetlands	None	1 wetland (0.1 acre)
Streams	None	1 stream (0.01 acre)
Ditches	7 ditches (1 ½ acres)	9 ditches (2 acres)
Increase in Impervious Area over Existing	7.5 acres	5.7 acres

Source: Technical Memorandum No. 26, Alternatives Screening Report, February 2007.

Notes:
1). Information for all options, as presented above, was based on conceptual design. Design of the proposed action has been further refined based on preliminary design, as described in Chapter III.C and Chapter IV of this EA.
2). Costs are presented in 2005 dollars, as documented in Technical Memorandum No. 26, Alternative Screening Report. Each design option's and alternative's cost escalation to future years is expected to be fairly uniform and thus would not alter the relative cost differences of the alternatives and design options.



4. Taylorsville Road Interchange Options

Four different design options for the Taylorsville Road Interchange were developed to address geometric deficiencies and improve traffic operations. The interchange options differ in the number of on- and off-ramps retained from the existing partial cloverleaf interchange, which currently provides six ramps (see Table III-5). Access to and from I-95 is currently provided via two northbound on-ramps and one northbound off-ramp, and two southbound off-ramps and one southbound on-ramp. The three options considered and dismissed are shown in Figures III-8. Option 2 was selected as the preferred option for the Taylorsville Road Interchange and is described in Section III.C.

All options would provide acceptable levels of service on the I-95/Scudder Falls Bridge. However, levels of service would be better (LOS C) for Option 4 and Option 2 (proposed action), and would be LOS D under Options 1 and 3. Options 1 and 3 would involve a greater increase in impervious area. Options 3 and 4 would involve greater property impacts, displacing two residences. Options 3 and 4 would also result in undesirable traffic weaving on I-95 southbound between the I-95 on- and off-ramps and would introduce an undesirable two-lane right-turn from Taylorsville Road southbound onto I-95 northbound. Options 1 and 2 would involve slightly larger impacts on wooded Lower Makefield Township property (additional 0.1 acre of impact) surrounding the park and ride lot along Woodside Road, whereby removing a ramp under Options 3 or 4 would involve lesser impacts on this property

Because Options 1, 3, and 4 either involve greater property impact or do not provide improved traffic operations and enhancements to traffic safety, these options were dismissed from further consideration. Moreover, these options would cost between approximately $200,000 and $700,000 more (in 2005 dollars) than the preferred interchange option (Option 2), which is incorporated as part of the proposed action (see Section III.C.4 and Figure III-22).

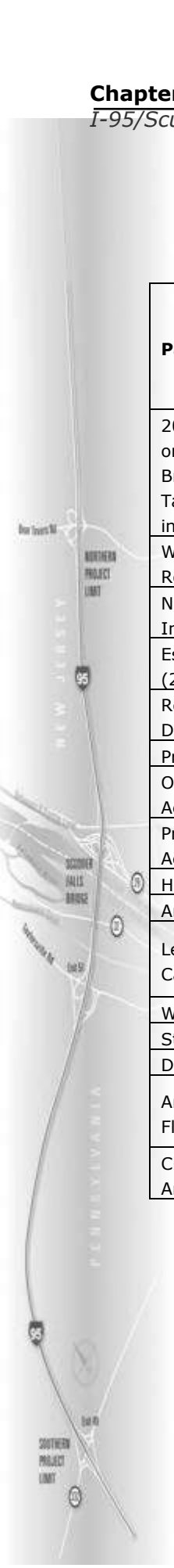


Table III-5—Comparison of Taylorsville Road Interchange Design Options

Parameters	Design Option 1 – Retains all Existing Ramps	Design Option 2 – One SB Off-Ramp and Two NB On-ramps (Proposed Action)	Design Option 3 – One NB On-Ramp and Two SB Off-ramps	Design Option 4 – One SB Off-Ramp; One NB On-Ramp
2030 Peak Hour Traffic on I-95/Scudder Falls Bridge and at Taylorsville Road intersections	I-95: LOS D TVR: LOS B/C	I-95: LOS C TVR: LOS B/C	I-95/SFB: LOS D TVR: LOS C/D	I-95/SFB: LOS C TVR: LOS C/D
Weave on Taylorsville Road	N of I-95: Yes S of I-95: No	N of I-95: No S of I-95: No	N of I-95: Yes S of I-95: Yes	N of I-95: No S of I-95: Yes
No. of New Signalized Intersections	1	2	1	2
Estimated Costs (2005$)	$10.4 million	$10.2 million	$10.9 million	$10.7 million
Residential Displacements	0	0	2	2
Preserved Farmlands	1.4 acres	1.4 acres	1.4 acres	1.4 acres
Other Public Property Acquisitions	0.7 acre	0.7 acre	0.6 acre	0.6 acre
Private Property Acquisition	0.5 acre, including 3 residential properties	0.5 acre, including 3 residential properties	0.4 acre, including 2 residential properties	0.4 acre, including 2 residential properties
Historic Sites	2	2	2	2
Archaeological Sites	2	2	2	2
Length of Widened Canal Crossings	+177 feet (existing bridge = 83 feet)	+168 feet (existing bridge = 83 feet)	+170 feet (existing bridge = 83 feet)	+155 feet (existing bridge = 83 feet)
Wetlands	0	0	0	0
Streams	2 streams (0.2 acre)	2 streams (0.2 acre)	2 streams (0.1 acre)	2 streams (0.1 acre)
Ditches	5 ditches (0.4 acre)	5 ditches (0.3 acre)	4 ditches (0.4 acre)	4 ditches (0.3 acre)
Area of 100-year Floodplains Affected	0.1 acre	0.1 acre	0.1 acre	0.1 acre
Change in Impervious Area	3.2 acre increase	2.6 acre increase	3.3 acre increase	2.7 acre increase

Source: Technical Memorandum No. 26, Alternatives Screening Report, February 2007.

Notes:
1). Information for all design options, as presented above, was based on conceptual design. Design of the proposed action has been further refined based on preliminary design, as described in Chapter III.C and Chapter IV of this EA.
2). Costs are presented in 2005 dollars, as documented in Technical Memorandum No. 26, Alternative Screening Report. Each design option's and alternative's cost escalation to future years is expected to be fairly uniform and thus would not alter the relative cost differences of the alternatives and design options.

Figure III-8—Taylorsville Road Interchange Options 1, 3, and 4

5. NJ Route 29 Interchange Options

Four different design options were evaluated to improve the interchange geometrics and eliminate the existing criss-crossing intersection configurations at the NJ Route 29 Interchange (see Table III-6). The existing interchange configuration currently provides connections to NJ Route 175 (Upper River Road) and provides bypasses around the interchange for NJ Route 29 northbound and southbound traffic. These interchange improvements would eliminate the stop-sign control at the southbound I-95 on-ramp and would provide adequate acceleration/deceleration lanes on I-95. The three interchange options that were considered and dismissed are shown in Figures III-9. Option 1c Modified was selected as the preferred option for the NJ Route 29 Interchange. It is described in Section III.C.5 and illustrated on Figure III-22.

Traffic level of service analysis shows that all key locations within the interchange would operate at LOS C or better under all design options. In 2005 dollars, Option 1a's costs ($18.5 million dollars) are the lowest. Options 1b and 2 are the most costly design options, with costs of $31.5 million and $32 million, respectively.

Option 2 would involve greater costs and property and environmental impacts than the other options considered, as shown in Table III-6. Option 2 would involve the greatest impact at the edges of the Villa Victoria Academy property, a private school, with the limit of disturbance affecting approximately ¾ acre adjacent to a recreation field. Impacts to natural resources and property associated with Options 1a and 1b and the preferred option (Option 1c Modified) are generally comparable, and none of the options would result in property displacements.

Under Option 2, the NJ Route 29 ramps crossing the canal would be more consolidated with the I-95 mainline, spanning less area of the canal (by 800 square feet) and resulting in less intrusion outside of the existing highway right-of-way. However, there would be less spacing between the ramps and the mainline, which has the potential to create a greater obstruction to light on the canal and towpath below. Elimination of the existing NJ Route 29 bypass under Option 1a would reduce existing proximity impacts to the canal. Option 1a would result in a roughly 1.5-acre decrease in existing impervious area, with removal of the bypass for NJ Route 29.

Options 1a, 1b, and 2 would introduce traffic signals, which were viewed as undesirable by NJDOT from operations, safety, and energy perspectives. NJDOT's preference is to implement roundabout intersections where appropriate and feasible, particularly along NJ Route 29. Based on input from NJDOT, Options 1a, 1b, and 2 were viewed as having less favorable traffic and safety operations and were therefore dismissed from further consideration. For these reasons, Option 1c (Modified), which replaces signalized intersections with roundabouts, allows free-flow traffic operation, and retains the bypass, was incorporated as part of the proposed action.

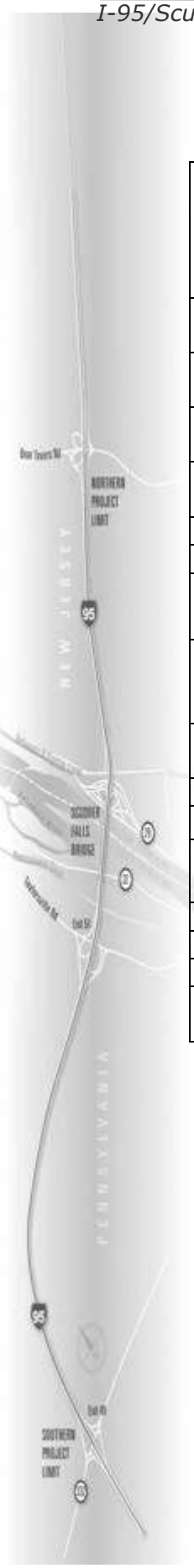


Table III-6—Comparison of NJ Route 29 Interchange Design Options

Parameters	Design Option 1a Folded Diamond without a Bypass	Design Option 1b Folded Diamond with a Bypass	Design Option 1c & 1c Modified Folded Diamond with Roundabouts (Proposed Action)	Design Option 2 Folded Diamond on NB Alignment
2030 Peak Hour Traffic North of I-95	LOS A	LOS A	LOS A	LOS C
2030 Peak Hour Traffic South of I-95	LOS B	LOS B	LOS A	LOS A
Number of Signalized Intersections	2	2	0	1
Reconstruction of NJ Route 29 Canal Bridge	No	Yes	Yes	No
Estimated Costs (2005$)	$18.5 million	$31.5 million	$24.5 million	$32 million
Displacements	0	0	0	0
Canal Area Spanned	Widened I-95 and two new ramps over canal park	Widened I-95 and two new ramps over canal park	Widened I-95 and two new ramps over canal park	Widened I-95 and two new ramps over canal park
Public Property Acquisitions	0	0	0	0.8 acre
Private Property Takings	0.1 acre at 3 residences	0.1 acre at 3 residences	0.1 acre at 3 residences	0.1 acre at 3 residences
Historic Sites	2	2	2	2
Archaeological Sites	2	2	2	2
Increase in canal area spanned	0.1 acre	0.1 acre	0.1 acre	0.1 acre
Wetlands	0.8 acre	0.8 acre	0.8 acre	0.9 acre
Streams	0	0	0	1 stream (0.1 acre)
Floodplains	8 acres	7 acres	7 acres	9 acres
Change in Impervious Area vs. Existing	1.5 acre decrease	1 acre increase	1.3 acre increase	0.5 acre increase

Source: Technical Memorandum No. 26, Alternatives Screening Report, February 2007.

Notes:
1). Information for all design options, as presented above, was based on conceptual design. Design of the proposed action has been further refined based on preliminary design, as described in Chapter III.C and Chapter IV of this EA.
2). Costs are presented in 2005 dollars, as documented in Technical Memorandum No. 26, Alternative Screening Report. Each design option's and alternative's cost escalation to future years is expected to be fairly uniform and thus would not alter the relative cost differences of the alternatives and design options.
3). Impacts are reported for Design Option 1c. Impacts of Design Option 1c Modified are the same except that Design Option 1c Modified would have slightly lesser impacts to wetlands and would create slightly less new impervious areas.

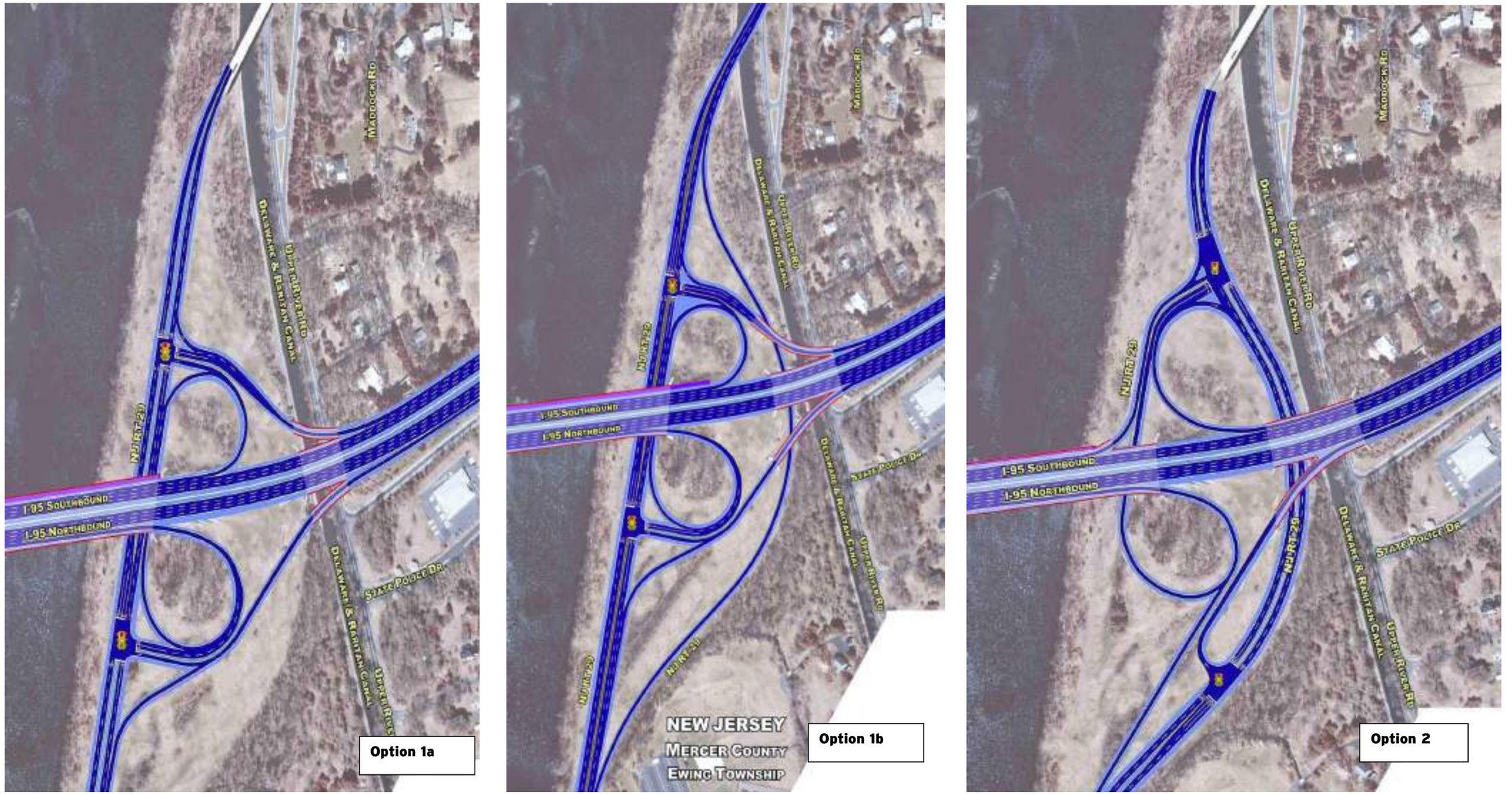


Figure III-9—NJ Route 29 Interchange Options 1a, 1b, and 2

6. Pedestrian/Bicycle Facility

The pedestrian/bicycle facility and design options considered are presented in more detail in Technical Memorandum No. 14, Bicycle and Pedestrian Facility Feasibility Assessment.

Opportunities to provide a connection across the Delaware River between the towpaths within the Delaware Canal State Park and the Delaware and Raritan Canal State Park were evaluated as part of this project. If implemented, a pedestrian/bicycle facility would be provided on the north side of a new I-95/Scudder Falls Bridge over the Delaware River. Landings at each end of the bridge would be constructed to provide access down to the Delaware Canal towpath in Pennsylvania and the Delaware and Raritan Canal towpath in New Jersey. Design options for providing pedestrian/bicycle access were evaluated that differed primarily in the location of the landings on either side of the river.

On the Pennsylvania side, a design option that would involve a landing tying directly into the canal towpath (see Figure III-10) was considered, but dismissed on the basis of greater property impacts, greater impacts to the canal towpath and an adjoining historic wall, and higher costs ($1 million more than the preferred option). The preferred design option that was advanced for further consideration would provide a switchback and landing extending through DRJTBC property, with a 5-foot sidewalk provided along Woodside Road to provide a connection to the Delaware Canal towpath (see discussion under proposed action, Section III.C.6, and Figure III-17).

Due to conflicts with required highway ramping and NJ Route 29, and the limited space within the interchange area in which to construct the pedestrian/bicycle facility ramping from the grade of its crossing over the river to the grade at the Delaware and Raritan Canal towpath, design studies yielded one feasible option on the New Jersey side. The preferred design option that was advanced for further consideration would extend along the west side of the NJ Route 29 Interchange to connect to the Delaware and Raritan Canal towpath at the Scudder Falls Recreation Area (see discussion under proposed action, Section III.C.6, and Figure III-18)

A pedestrian/bicycle facility, incorporating the preferred design options is evaluated as part of the proposed action in this Environmental Assessment. A final decision on inclusion of this facility in the project will be made during final design when total project costs are refined.

Figure III-10—Option Considered (and Dismissed) for Pedestrian/Bicycle Landing in Pennsylvania

C. No Build Alternative

Under the No Build alternative, the configuration of I-95 would remain unchanged, with two travel lanes in each direction continuing east in the project area from PA Route 332 across the I-95/Scudder Falls Bridge and three travel lanes in each direction extending east of the NJ Route 29 Interchange. This alternative would not address the structural condition and the substandard lane and shoulder conditions of the existing I-95/Scudder Falls Bridge. The bridge is approximately 50 years old, has experienced structural

deterioration, and is non-redundant. A non-redundant bridge generally has only two primary load-carrying members, where the failure of one of these members results in catastrophic collapse of the bridge. The design of non-redundant structures is no longer permitted nationwide by the FHWA and state DOTs. The two main beams and pinned hangers (four large steel pins supporting each suspended portion of the bridge) are fracture critical elements, whose failure would result in collapse of the bridge. Redundancy hangers have been installed at all pinned hangers to prevent catastrophic collapse should a hanger fail.

Geometric deficiencies on the bridge include the lack of adequate inside and outside shoulders, with no refuge for drivers to pull over in the event of a vehicle breakdown or other incident. The proximity to the adjoining NJ Route 29 and Taylorsville Road Interchanges and lack of adequate acceleration/deceleration lanes at the I-95 merges contributes to crash rates that are higher than adjoining segments of I-95. At the on-ramp from NJ Route 29 to I-95 southbound, the lack of an acceleration lane requires vehicles to come to a complete stop at a stop sign at the end of the ramp, before merging directly into mainline traffic operating at full speeds on the bridge itself. The geometrics at the adjoining interchanges are substandard, particularly at the NJ Route 29 Interchange. This interchange has a scissors configuration and includes nineteen ramp merges and seven at-grade intersections, and is complex and confusing for drivers. The configuration contributes to a crash incidence at the NJ Route 29 Interchange which is the highest of any single location within the project area.

Moreover, severe congestion (LOS E or F) that currently spans two hours in each peak period in the peak direction on the I-95/Scudder Falls Bridge would worsen (LOS F) in the future year 2030 under the No Build alternative. In 2030, the undesirable operating conditions (LOS E or F) would extend further west along I-95 to the PA Route 332 in Pennsylvania in the northbound A.M. peak hour and would continue to the west of the PA Route 332 Interchange in the southbound P.M. peak.

None of the project needs or stakeholder goals described in Chapter I would be satisfied by the No Build alternative. The No Build alternative is carried forward in this Environmental Assessment as a basis for comparison with the proposed action.

D. Proposed Action

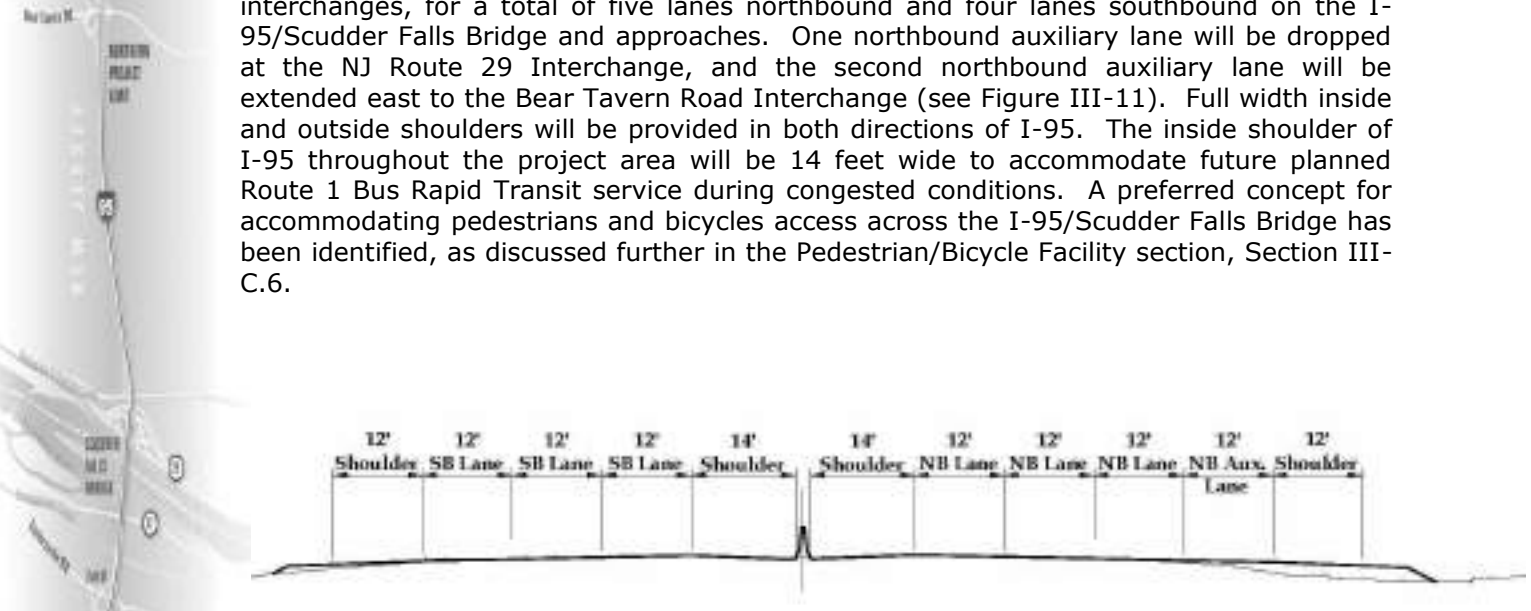
The proposed action that has been developed to meet the project purpose and need incorporates the preferred design options that were selected for each project segment. The environmental consequences of the proposed action are described in Chapter IV. The proposed action is illustrated on Figure III-22 at the end of this chapter and incorporates the following project elements:

- Standard Lane Additions – 5 lanes northbound/4 lanes southbound on the I-95/Scudder Falls Bridge
- New Bridge on Upstream Alignment
- Pennsylvania Mainline Inside Widening
- Taylorsville Road Interchange Option 2
- NJ Route 29 Interchange Option 1c (Modified)
- Pedestrian/bicycle facility – (an evaluation of the environmental consequences of this facility is included in Chapter IV, but a decision to include this facility as part of the proposed action will be made during final design)
- Transportation Systems Management/Transportation Demand Management measures.

1. Standard Lane Additions

Existing I-95 includes two travel lanes in each direction west of NJ Route 29, and three travel lanes in each direction east of NJ Route 29. The area immediately east of the I-95/Scudder Falls Bridge, which is two lanes in each direction, is a transition area from two lanes to three lanes in each direction.

Under the proposed action with standard lane additions, one travel lane in each direction will be added on the I-95/Scudder Falls Bridge. The project will also add two auxiliary lanes northbound between Taylorsville Road and NJ Route 29 and one auxiliary lane southbound to provide safer and more efficient entry and exit at these closely spaced interchanges, for a total of five lanes northbound and four lanes southbound on the I-95/Scudder Falls Bridge and approaches. One northbound auxiliary lane will be dropped at the NJ Route 29 Interchange, and the second northbound auxiliary lane will be extended east to the Bear Tavern Road Interchange (see Figure III-11). Full width inside and outside shoulders will be provided in both directions of I-95. The inside shoulder of I-95 throughout the project area will be 14 feet wide to accommodate future planned Route 1 Bus Rapid Transit service during congested conditions. A preferred concept for accommodating pedestrians and bicycles access across the I-95/Scudder Falls Bridge has been identified, as discussed further in the Pedestrian/Bicycle Facility section, Section III-C.6.

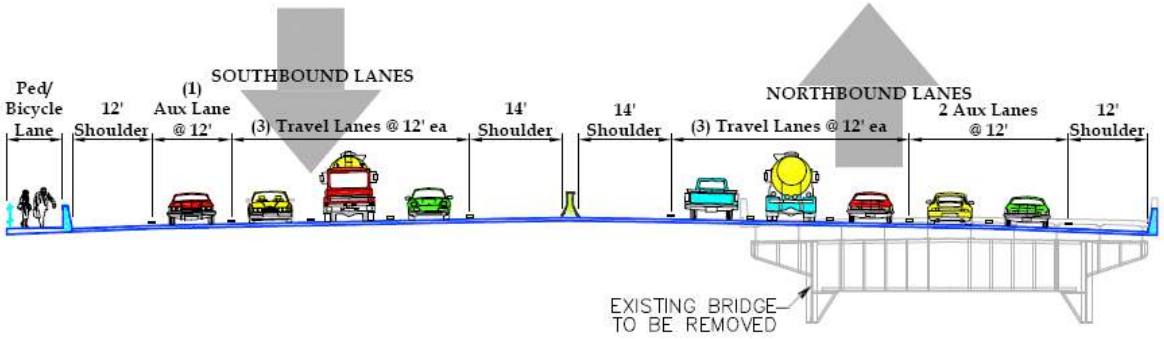


14 ft. Inside Shoulders for NJ Transit BRT Vehicles

Figure III-11—Typical Cross-Section of Standard Lane Additions in New Jersey

2. New Bridge on Upstream Alignment

A new, wider bridge will be constructed upstream of, or north of, the existing I-95/Scudder Falls Bridge over the Delaware River, with the new bridge extending north from the southern edge of the existing bridge (see Figure III-12). This bridge will incorporate a single bridge structure.

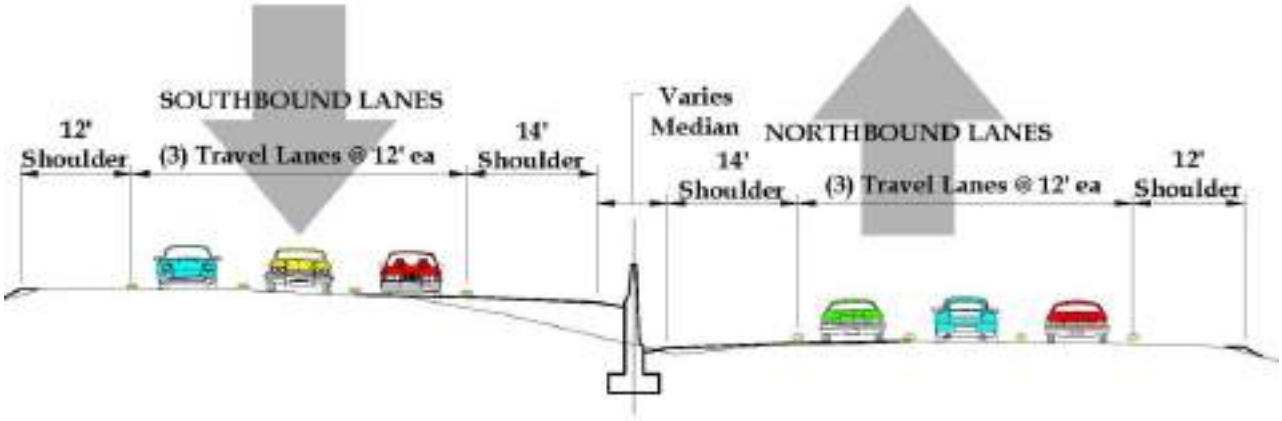


Optional Pedestrian/Bicycle Lane Shown 14 ft. Inside Shoulders for NJ Transit BRT Vehicles

Figure III-12—Typical Cross-section of Proposed I-95/Scudder Falls Bridge on Upstream Alignment

3. Pennsylvania Mainline Inside Widening

Along the Pennsylvania mainline of I-95, one travel lane in each direction will be added within the existing median, i.e. on the left side of the existing travel lanes (See Figures III-13 and III-14 for a typical cross-section). West of Taylorsville Road, with the proposed improvements, I-95 will consist of three travel lanes in each direction, with full-width inside and outside shoulders. With the inside widening, the grassed median will be replaced by the additional pavement for the travel lanes and shoulders, a paved median and concrete median barrier. Total pavement width will be increased by 52 feet for the inside widening. With the inside widening, an acceptable (per AASHTO design criteria) 36-foot median, with concrete barrier, between the northbound and southbound travel lanes in wide median areas will be provided.



14 ft. Inside Shoulders for NJ Transit BRT Vehicles

Figure III-13—Typical Cross-section of Pennsylvania Mainline Inside Widening

Figure III-14—Views of Pennsylvania Mainline Before (Top) and After (Bottom) Inside Widening

4. Taylorsville Road Interchange Option 2

The eastern southbound off-ramp will be eliminated at the Taylorsville Road Interchange and combined with the western southbound off-ramp (see Figure III-15). The two northbound on-ramps at the interchange, the single northbound off-ramp, and single southbound on-ramp will be retained. Elimination of this southbound off-ramp will remove the undesirable traffic weave that currently exists along Taylorsville Road between this ramp and Woodside Road. Retaining the two northbound on-ramps onto I-95 will ease northbound Taylorsville Road traffic congestion by reducing queuing lengths at I-95 ramp approaches. Taylorsville Road will be widened to provide two travel lanes plus intersection turning lanes within the interchange. Woodside Road will be widened on the approaches and exit legs to its intersection with Taylorsville Road.

Figure III-15—Taylorsville Road Interchange Option 2

5. NJ Route 29 Interchange Option 1c (Modified)

The design for the NJ Route 29 Interchange will incorporate a folded diamond interchange with two roundabout intersections at the I-95 ramp termini (see Figure III-16). This design is preferred by NJDOT and viewed as the best option from safety and traffic operations perspectives. This design will retain the bypasses for NJ Route 29 northbound and southbound through traffic and will allow free-flow traffic through the interchange, as the preferred design does not include any traffic signals or stop sign-controlled intersections. The width of the NJ Route 29 northbound bypass will be reduced to one travel lane plus shoulders to reduce the existing effects on the Delaware and Raritan Canal. The preferred option, Option 1c (Modified) is a variation of the original roundabout option, Option 1c, in that minor design refinements were made to the

Figure III-16—NJ Route 29 Interchange Option 1c Modified

configurations of the roundabouts and the reduction by one lane of the travel way for the northbound NJ Route 29 bypass.

Option 1c (Modified) would eliminate the existing I-95 northbound on-ramp from NJ Route 175 (Upper River Road). This movement would be accommodated within the NJ Route 29 interchange. This discontinued northbound on-ramp currently provides direct access to I-95 northbound from the adjoining NJ State Police facility. State Police emergency access would be retained via an exclusive-use northbound on-ramp along the same general alignment as the existing northbound on-ramp from NJ Route 175.

6. New Jersey Mainline Widening

Because of the inadequate median width available, the widening of I-95 in New Jersey between the NJ Route 29 and Bear Tavern Road interchanges will be implemented on the outside (right side) of the existing lanes. There is adequate NJDOT right-of-way to accomplish the necessary widening. The existing median will be used for the proposed wider left shoulder in each direction of I-95. A concrete glare screen median barrier will be installed between the northbound and southbound directions.

7. Pedestrian/Bicycle Facility

The proposed action may include a pedestrian/bicycle facility that would provide a connection across the Delaware River to the adjoining towpaths within the canal systems in Pennsylvania and New Jersey. This EA compares the impacts of the proposed action with and without the pedestrian/bicycle facility, because a final decision on incorporating pedestrian/bicycle access will be made during final design, when project costs are refined.

A preferred design concept for accommodating pedestrians and bicycles on the I-95/Scudder Falls Bridge has been identified. This facility would include an ten- to twelve-foot wide path across the I-95/Scudder Falls Bridge, leading to a switchback structure that would bring the path down to ground elevation. The Pennsylvania landing would connect to Woodside Road on DRJTBC property, and a 5-foot sidewalk would be provided along Woodside Road to connect the landing and the Delaware Canal towpath (see Figure III-17). The New Jersey landing would adjoin the west side of the NJ Route 29 Interchange and would connect to the Scudder Falls Recreation Area (see Figure III-18).

Figure III-17—Pedestrian/Bicycle Facility Landing in Pennsylvania

Figure III-18—Pedestrian/Bicycle Facility Landing in New Jersey

8. Transportation Systems Management/Transportation Demand Management

The following TSM/TDM measures have been considered as part of the proposed action in this Environmental Assessment:

- **Intelligent Transportation Systems/Incident Management:** Implementation of ITS and an Incident Management Plan will require coordination with PennDOT and NJDOT, which own the majority of the right-of-way. Measures to be considered during final design include:
    - Dynamic Message Signs,
    - Closed Circuit Television Cameras,
    - Incident Detection System,
    - Highway Advisory Radio
    - Roadway Weather Information System,
    - Freeway Service Patrols
    - Installation of fiber optic conduit and cable within the project area
- **Accommodations for Proposed Route 1 Bus Rapid Transit:** The improvements to the I-95 mainline will include a 14-foot inside shoulder along the entire project area to accommodate the proposed Route 1 Bus Rapid Transit service on the uncongested shoulder during periods of congestion on the I-95 travel lanes.
- **Other TSM/TDM Initiatives**: Other TSM/TDM initiatives, such as park and ride improvements will be considered in consultation with PennDOT, NJDOT, and the

Bucks County and Mercer County Transportation Management Associations and large area employers.

9. Cost

Without the pedestrian/bicycle facility, the proposed action is estimated to cost approximately $282 million in 2012 dollars (mid-point of construction). With the pedestrian/bicycle facility, the project is estimated to cost approximately $300 million (2012 dollars).

The DRJTBC is currently evaluating various options for funding the project as part of its $950 million Capital Program which includes investments to Preserve, Manage, Enhance and Protect its capital infrastructure comprised of seven (7) toll bridges and thirteen (13) toll-supported bridges and their accompanying assets which span the Delaware River over a distance of 139 miles. As part of this process, and consistent with a Memorandum of Agreement by the Executive Director of the DRJTBC, the Pennsylvania Secretary of Transportation, and the New Jersey Commissioner of Transportation, the DRJTBC is consulting with representatives of the Governors of the State of New Jersey and the Commonwealth of Pennsylvania to assure sufficient funding to construct this very important enhancement of its capital infrastructure.

E. Construction

Construction of the project is anticipated to occur over approximately four years. The proposed action will involve typical roadway and bridge construction activities including:

- excavation,
- placement of fill,
- grading,
- paving,
- erection of structural members such as beams and columns,
- pouring of concrete,
- installation of temporary and permanent erosion control devices, and
- installation of highway appurtenances such as signing, guide rail, traffic signals, and pavement markings.

The following sections review the anticipated construction phasing for the I-95 mainline and for construction within the Delaware River. The following addresses proposed construction methods for work within the river and reviews alternative methods considered.

1. I-95 Mainline Construction Staging

Construction of mainline I-95 work will occur in two phases, each maintaining the current number of travel lanes (three lanes in New Jersey and two lanes in Pennsylvania of traffic in each direction during peak periods. Phase 1 will reconstruct the existing median and outside shoulders and Phase 2 will reconstruct the central portions of the northbound and southbound roadways.

- **Phase 1: Reconstruct Median and Outside Shoulders**
  - Install traffic control measures along mainline for Phase 1. Maintain traffic along active lanes.
  - Install erosion and sedimentation control measures.

- Reconstruct ditches, install new drainage features, install noise barriers and guiderail.
- Reconstruct outside shoulders and median.
- Construct new pavement and bridges.
- Remove traffic control measures for Phase 1.

- **Phase 2: Reconstruct Central Portions of I-95 Northbound and Southbound Roadways**
  - Install traffic control measures along mainline for Phase 2. Maintain traffic along newly constructed median and on outside lanes and shoulders.
  - Maintain erosion and sedimentation control measures.
  - Install new drainage features.
  - Reconstruct traffic lanes and bridges.
  - Construct new pavement and bridges.
  - Remove traffic control measures for Phase 2.

- **Reconstruction of Taylorsville Road, Woodside Road, NJ Route 29, and Other Project Roadways:**
  - Install traffic control measures. Maintain traffic flow.
  - Install erosion and sedimentation control measures.
  - Complete earthwork
  - Reconstruct ditches, install new drainage features, install noise barriers and guiderail.
  - Construct new pavement and bridges.
  - Install final signing, pavement striping, and traffic signals.
  - Remove traffic control measures.

Temporary construction access for construction activities along affected project roadways, such as I-95, Taylorsville Road, Woodside Road, and NJ Route 29 will be performed from these roadways. Temporary access through private properties is not anticipated. Staging areas will be located within the I-95 right-of-way and within DRJTBC, PennDOT, and NJDOT property to the greatest extent practicable.

2. I-95/Scudder Falls Bridge Construction

A variety of construction equipment is anticipated to be used in the construction of the bridge foundations, including but not limited to bulldozers, pile drivers, augers for possible drilled shaft construction, excavators, cranes, dump trucks, hydraulic rams, and dewatering pumps and hoses. The following reviews the construction methods and staging proposed and reviews alternative methods considered.

a) Proposed Causeway and Bridge Construction Staging

This project will require two primary phases to construct the new I-95/Scudder Falls Bridge and demolish the existing bridge. The construction of new bridge piers and demolition of existing piers within the Delaware River will occur within cofferdams to allow pier construction to occur in the dry. Seven of the nine existing bridge piers are located within the river, while five of the seven proposed bridge piers will be located within the river.

The first construction phase would construct the upstream, or northern, side of the bridge. The second phase of bridge construction would demolish the existing bridge and

construct the downstream, or southern side of the bridge. It is anticipated that construction access within the Delaware River will be provided by use of four stages (two stages for each primary construction phase) of temporary causeways. Each causeway segment would extend across half of the river at a time, extending approximately 400 to 600 feet from either the Pennsylvania or New Jersey shore. To reduce the overall effects on the substrate, river flow, and fish passage, a trestle causeway will be used. Construction from a temporary trestle causeway will involve construction of short spans of approximately 25 feet with pile bents (row of piles connected by pile caps at top to support a load) and progressive construction from shoreline.

Figure III-19 shows the four stages of causeway construction.

- Stage I would extend 550 feet along the upstream side of the bridge and across Park Island from the Pennsylvania side.
- Stage II would extend approximately 500 feet along the upstream side of the bridge from the New Jersey side.
- Stage III would extend approximately 550 feet along the downstream side of the bridge and across Park Island from the Pennsylvania side.
- Stage IV would extend approximately 500 feet along the downstream side of the bridge from the New Jersey side.

Each causeway segment would have a working width of approximately 30 feet (see Figure III-19). In order to access each proposed bridge pier location, perpendicular extensions (causeway fingers) from the main causeway would be used. The causeway fingers also would be used to access the existing piers for demolition, in cases where the proposed piers do not overlap with the existing piers. Construction of the trestle fingers to reach the bridge pier location will be accomplished from the completed trestle spans

Each of the two construction phases for bridge construction would maintain a minimum of two lanes of traffic in each direction during peak periods. At the end of Phase 1 (Stages I and II), all traffic would be moved to the newly constructed portion of the new bridge. At the conclusion of Phase 2, and when all approach roadway work is completed, traffic would be moved onto its permanent northbound and southbound sections of the bridge.

- **Phase 1: Construct Northern (Upstream) Portion of Bridge**
  - Install traffic control measures along I-95 for Phase 1. Maintain traffic flow along the existing bridge.
  - Install erosion and sedimentation control measures in river and on land.
  - Erect temporary causeway (Stages I and II) for construction of the new bridge from the causeway.
  - Construct bridge piers from the causeway by dewatering pier area using cofferdam method.
  - Remove cofferdam and stabilize river area in the vicinity of the newly constructed piers.
  - Erect bridge superstructure (beams below the concrete deck) from causeway.
  - Remove causeway, stabilize river area and restore to pre-construction condition.
  - Complete bridge deck, paving, and finish work from the newly constructed bridge.
  - Remove traffic control measures for Phase 1.

  Each causeway stage would be erected separately and removed so that only one causeway Stage is in place at any time.

- **Phase 2: Demolish Existing Bridge and Construct Southern (Downstream) Portion of Bridge**
  - Install traffic control measures along I-95 for Phase 2. Maintain traffic flow along the existing bridge.
  - Maintain erosion and sedimentation control measures in river and on land.
  - Erect temporary causeway (Stages III and IV) for demolition of the existing bridge and construction of the new bridge from the causeway.
  - Begin demolition of existing bridge from the causeway and transport unsuitable material to an approved offsite location.
  - Construct bridge piers from the causeway by dewatering pier area using cofferdam method.
  - Remove cofferdam and stabilize river area in the vicinity of the newly constructed piers.
  - Erect bridge superstructure (beams below the concrete deck) from causeway.
  - Complete bridge deck, paving, and finish work from the newly constructed bridge.
  - Remove traffic control measures for Phase 2.

  Each causeway stage would be erected separately and removed so that only one causeway stage is in place at any time.

b) Alternative Methods Considered for Bridge Construction

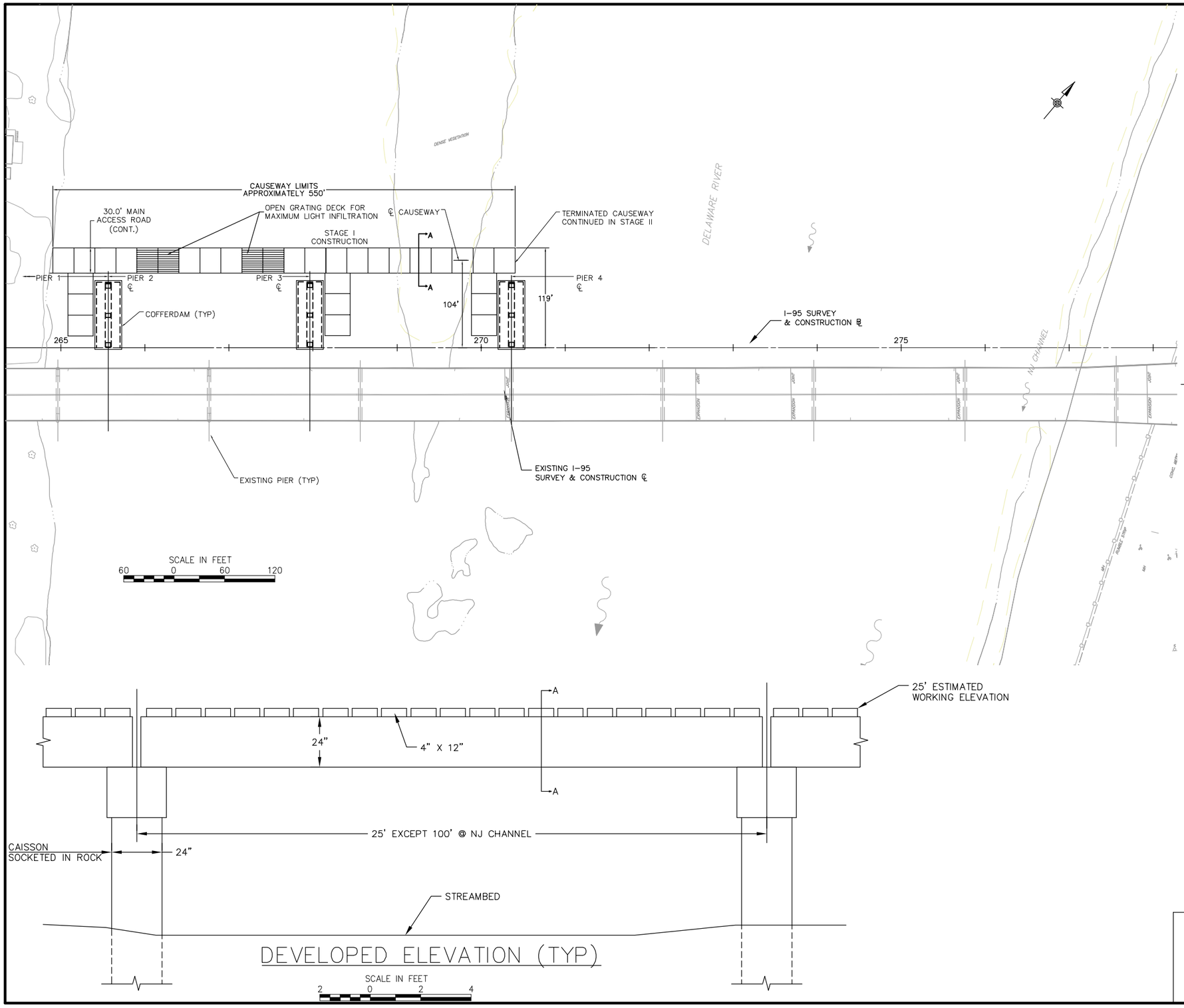
Construction of the new I-95/Scudder Falls Bridge over the Delaware River will require access to the river for construction of bridge foundations and piers and structural members. Five alternative access methods were evaluated for the purpose of identifying the most practicable, cost-effective, and environmentally acceptable option for work in the Delaware River. The alternatives considered to reduce work in the river were as follows:

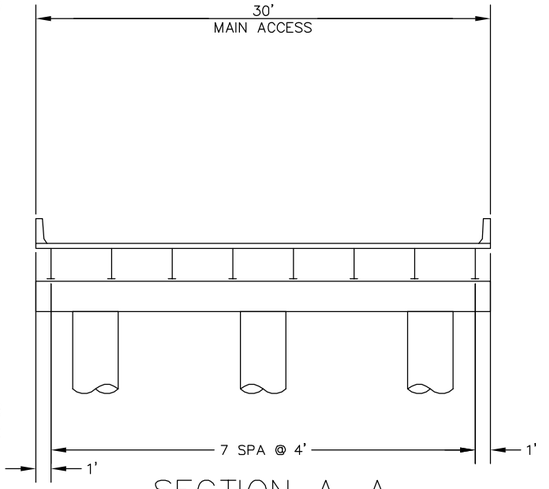
(1) Use of Barges

Construction from shallow barges was considered and dismissed as not feasible due to the limited water depth available and due to the variation in the river bottom at the site of the bridge. Normal water depth can be as shallow as four feet deep on the Pennsylvania side, and seven feet on the New Jersey side according to normal water elevations recorded at the bridge. Barges, which would be weighed down with crane equipment as well as other materials required for the construction of bridge piers, foundations and erection of structural members, would require a minimum draft of five feet. The limited normal water depths render the shallow barge method infeasible.

(2) Construction Staged from Existing I-95/Scudder Falls Bridge

- "Topside" construction, meaning construction from the existing bridge, was considered and dismissed as not feasible because the limited width of the existing bridge must be used to maintain traffic flow and there would be no available space for work areas and construction equipment. There are no existing shoulders for use, and closing lanes during peak periods would result in severe congestion. In addition, the width of the proposed bridge would require an extended reach that would preclude effective use of cranes from the existing bridge.





SECTION A–A
TYPICAL SECTION

SCALE IN FEET
5 0 5 10

DEVELOPED ELEVATION (TYP)

SCALE IN FEET
2 0 2 4

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT
ENVIRONMENTAL ASSESSMENT

TRESTLE CAUSEWAY
FIGURE III-19
SHEET 1 OF 4

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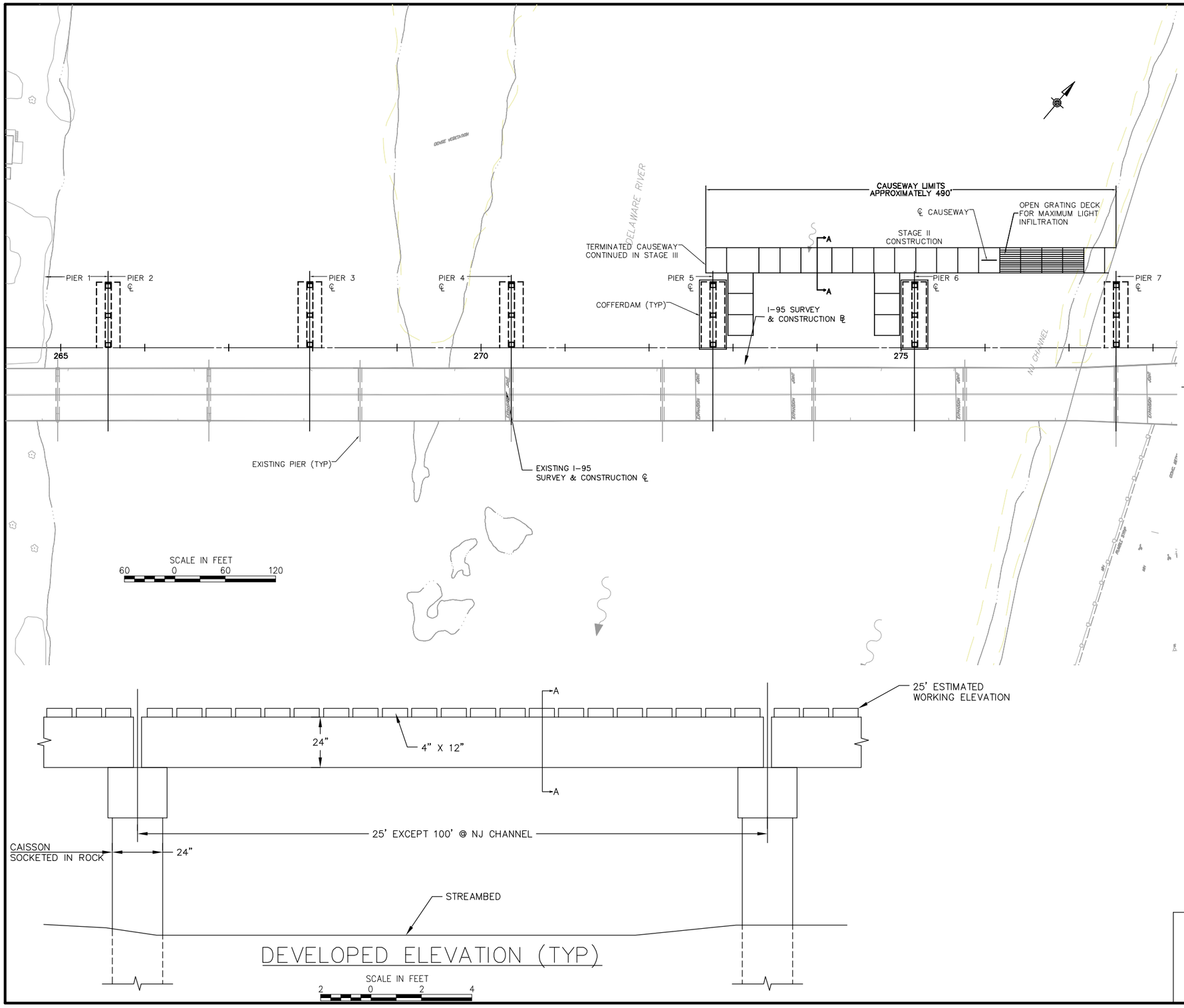

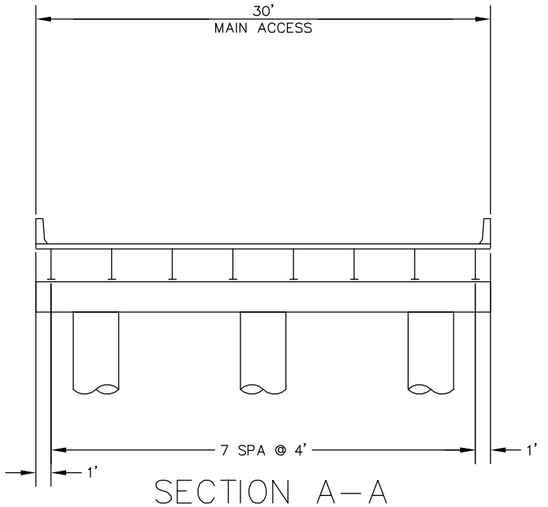

SECTION A–A
TYPICAL SECTION

SCALE IN FEET
5 0 5 10

DEVELOPED ELEVATION (TYP)

SCALE IN FEET
2 0 2 4

I-95/SCUDDER FALLS BRIDGE
IMPROVEMENT PROJECT
ENVIRONMENTAL ASSESSMENT

TRESTLE CAUSEWAY
FIGURE III-19
SHEET 2 OF 4

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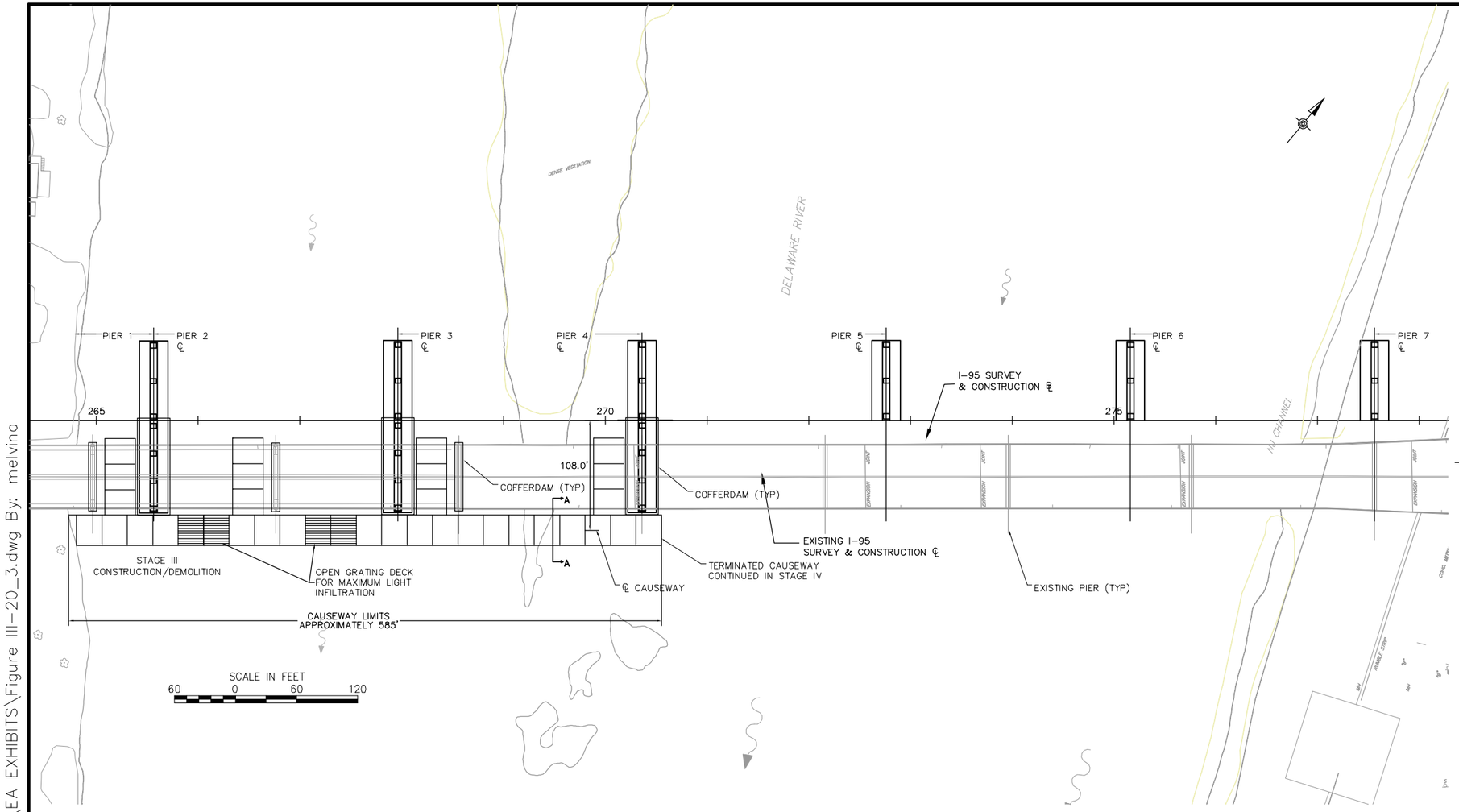
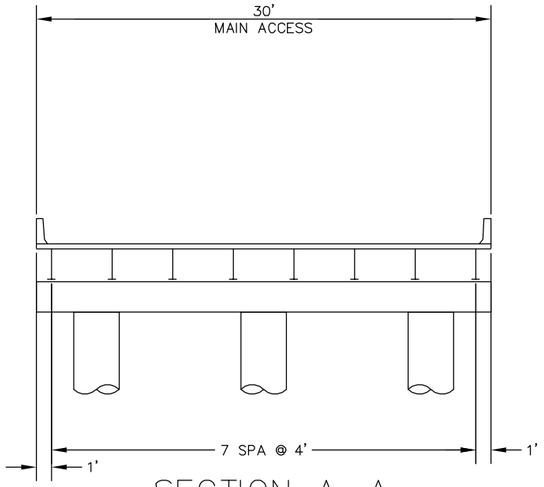
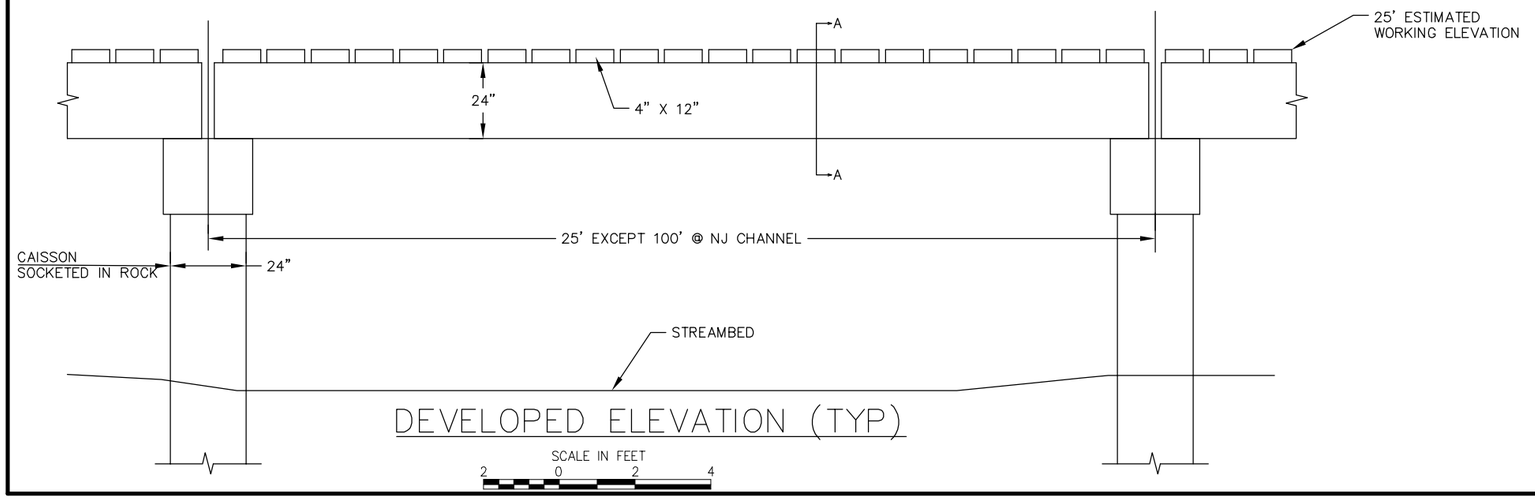




SECTION A-A
TYPICAL SECTION

SCALE IN FEET
5 0 5 10



DEVELOPED ELEVATION (TYP)

SCALE IN FEET
2 0 2 4

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT
ENVIRONMENTAL ASSESSMENT

TRESTLE CAUSEWAY
FIGURE III-19
SHEET 3 OF 4

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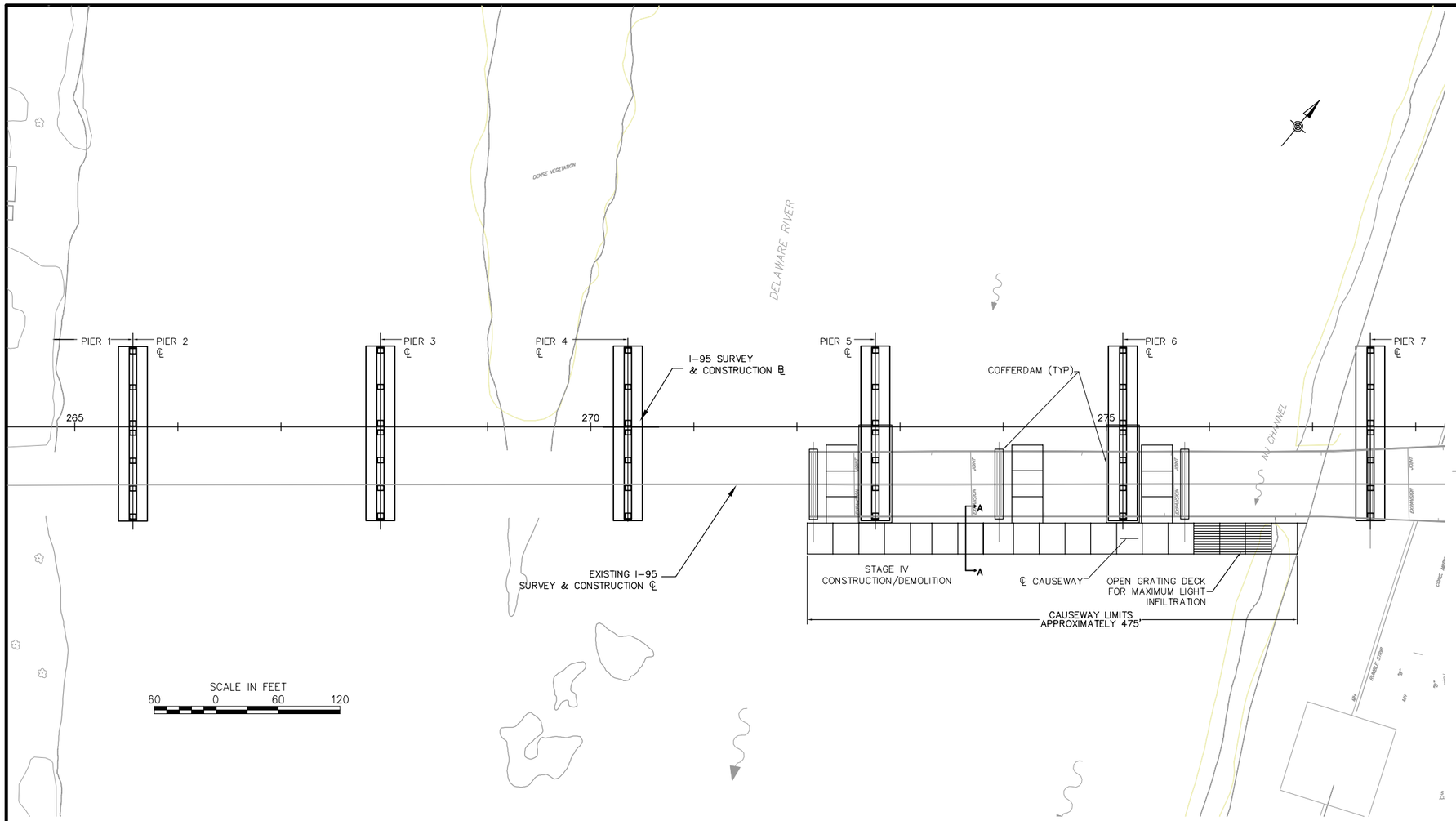
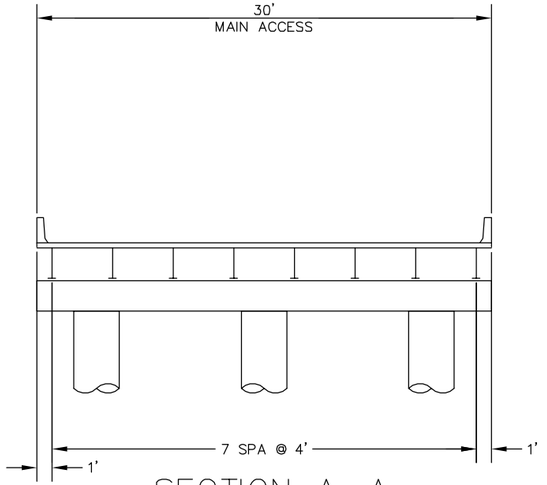
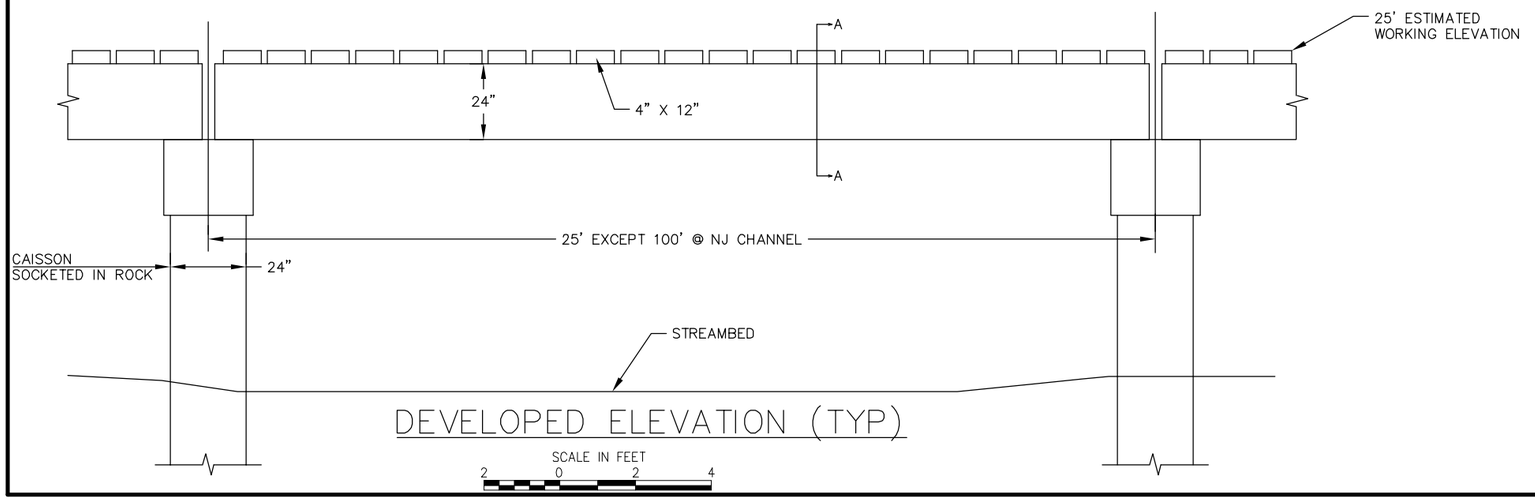




SECTION A–A
TYPICAL SECTION

SCALE IN FEET
5 0 5 10



DEVELOPED ELEVATION (TYP)

SCALE IN FEET
2 0 2 4

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT
ENVIRONMENTAL ASSESSMENT

TRESTLE CAUSEWAY
FIGURE III-19
SHEET 4 OF 4

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(3) Elimination of River Piers

The feasibility of a long-span bridge type which could possibly eliminate all of the river piers was studied. The long-span bridge types studied included truss, concrete segmental, deep steel girders, suspension, and cable stayed. The limiting factors for the long-span bridge types for this project are the following:

- The close proximity of NJ Route 29 and Taylorsville Road Interchanges to the bridge which would not allow for proper transition of the on- and off-ramps
- Some of the long-span bridge types, such as the truss, suspension, and cable-stayed bridges, cannot be constructed in stages, which would mean the entire width of the new bridge will have to be constructed upstream. This would have a much greater footprint impact on the two canals, and the residences in New Jersey and Pennsylvania.
- Some of the long-span bridge types, namely concrete segmental and deep steel girders, will have a much deeper superstructure depth and will have more impact on the hydraulics of the river cross section by intruding into the 100-year flood elevation.

Therefore, the option of a long-span bridge (without river piers) was determined to not be feasible for this project.

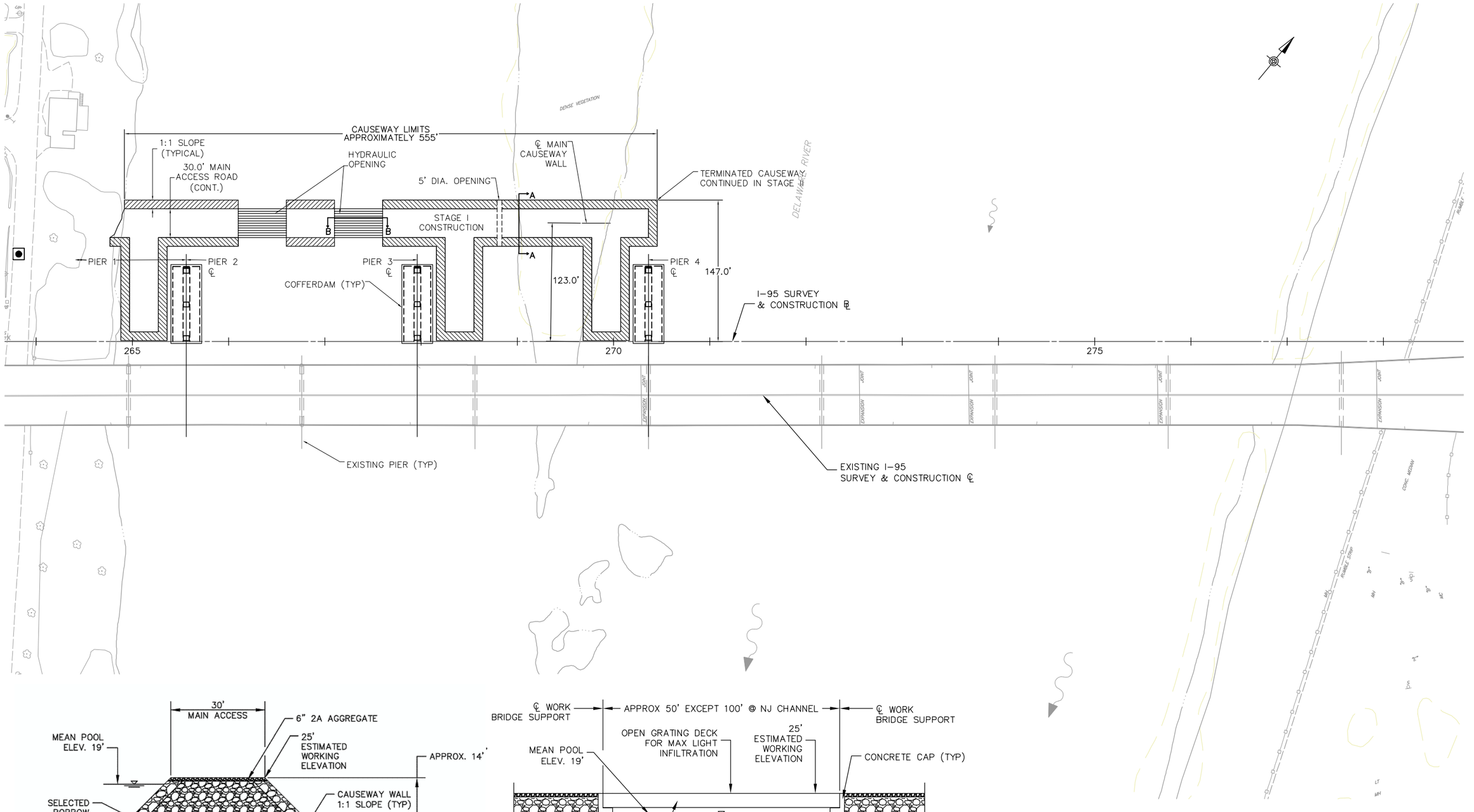
(4) Use of an Earthen Causeway

Therefore, it was concluded that construction via a causeway would be the only viable means. Two types of causeways were considered: a trestle causeway and an earthen (rock) causeway. The earthen causeway would be constructed of variously sized clean rocks (36 inch average size for outer sections and 6 inch average size for inner section of causeway). A conceptual plan view and elevation of the temporary earthen causeway is shown on Figure III-20.

The earthen causeway would be constructed in four stages, as previously described in Section III.D.2. Each causeway segment would have a working width of approximately 30 feet with sideslopes shaped by back hoes at approximately a 1:1 ratio (see Figure III-20). Each causeway stage would have a width of approximately 58 feet at the base of the causeway. The causeways would be constructed of clean rock, with an average size of 6 inches (R-4 rock), dumped from the riverbank and spread by bulldozers to create the causeway. Backhoes would be used to shape the causeway sideslopes. The surface of the causeway would be armored with stone with an average size of 36 inches (R-7 rock). Once the finished causeway elevation is reached, a 6-inch layer of 2-inch diameter stone would be added to form a working platform for equipment, deliveries, and storage of materials.

The temporary disturbance to river bottom for each of the four causeway stages would range from approximately 0.8 to 1 acre. A total of approximately 4.25 acres of river bottom will be temporarily occupied by the four causeways, which accounts for a 20% spillover of rock beyond the typical 58 foot footprint, during causeway construction. Upon removal of each causeway stage, the river bottom would be restored to its pre-construction condition.

To reduce the overall effects on the substrate and reduce river flow elevation during high volume storm events, additional hydraulic openings (temporary bridges) and pipes would be provided through each causeway to provide additional flow of water and to provide for fish passage. In each of the four stages of construction, either two 50-foot temporary



SECTION A–A
TYPICAL CAUSEWAY WALL SECTION

SECTION B–B
HYDRAULIC OPENING
(TYP)

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT
ENVIRONMENTAL ASSESSMENT

EARTHEN CAUSEWAY
FIGURE III-20
SHEET 1 OF 4

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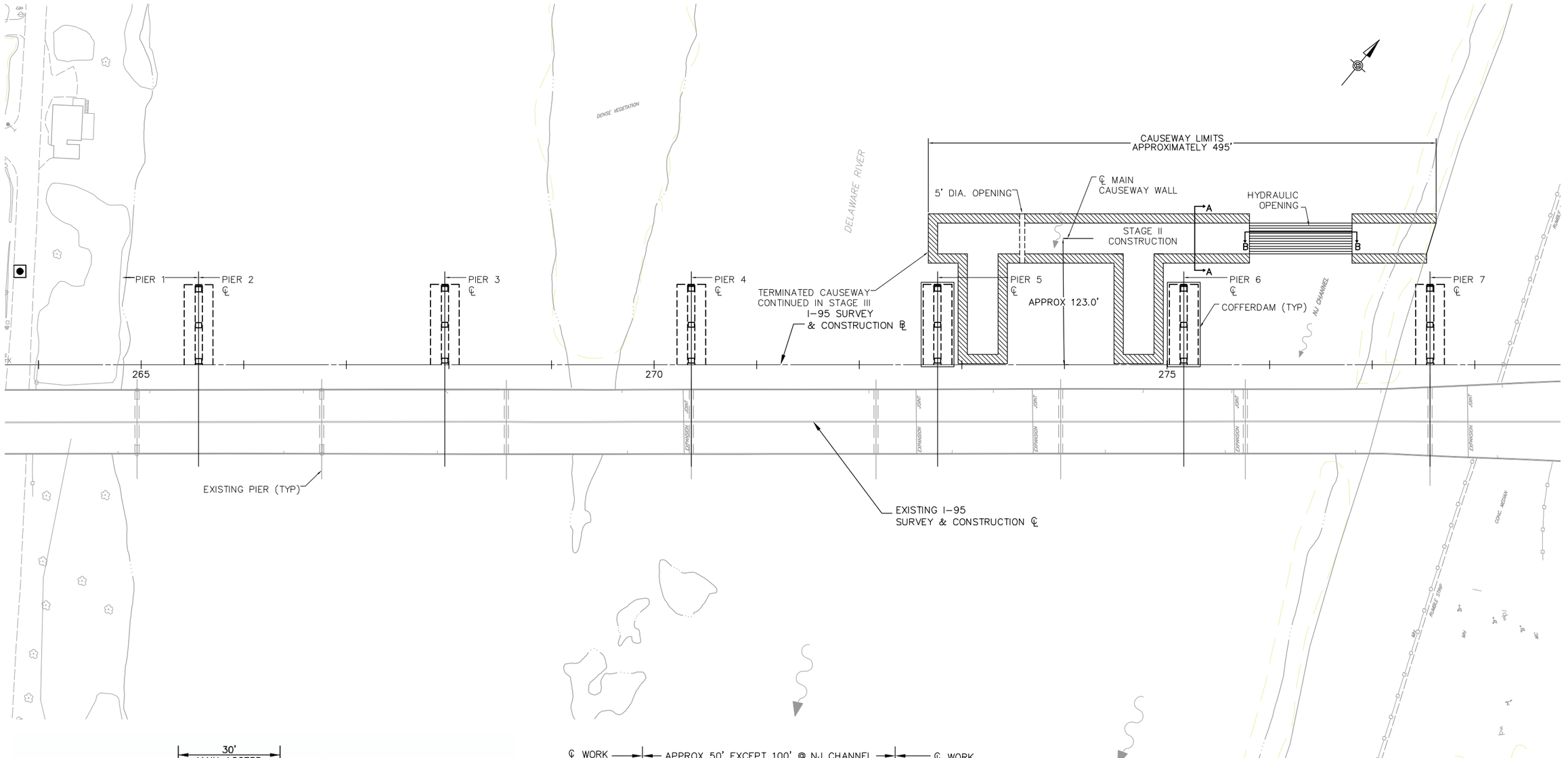
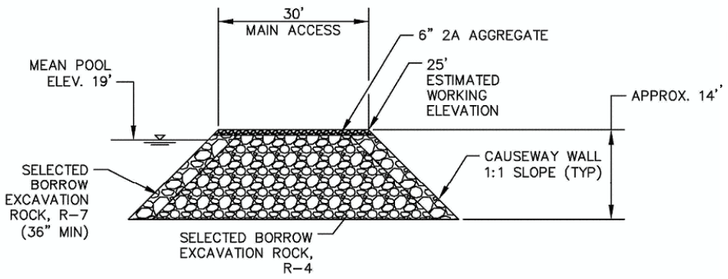
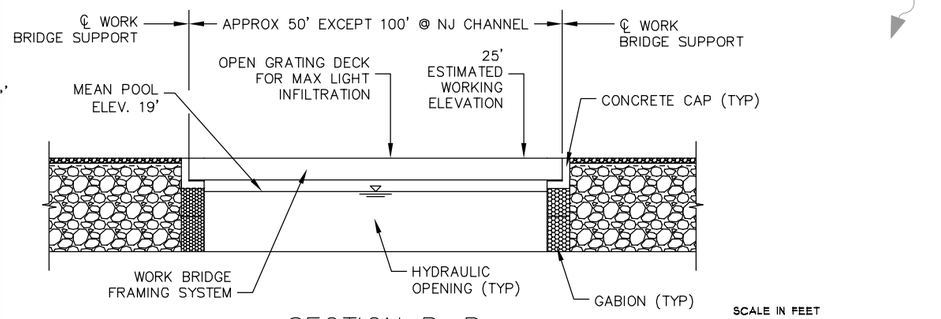


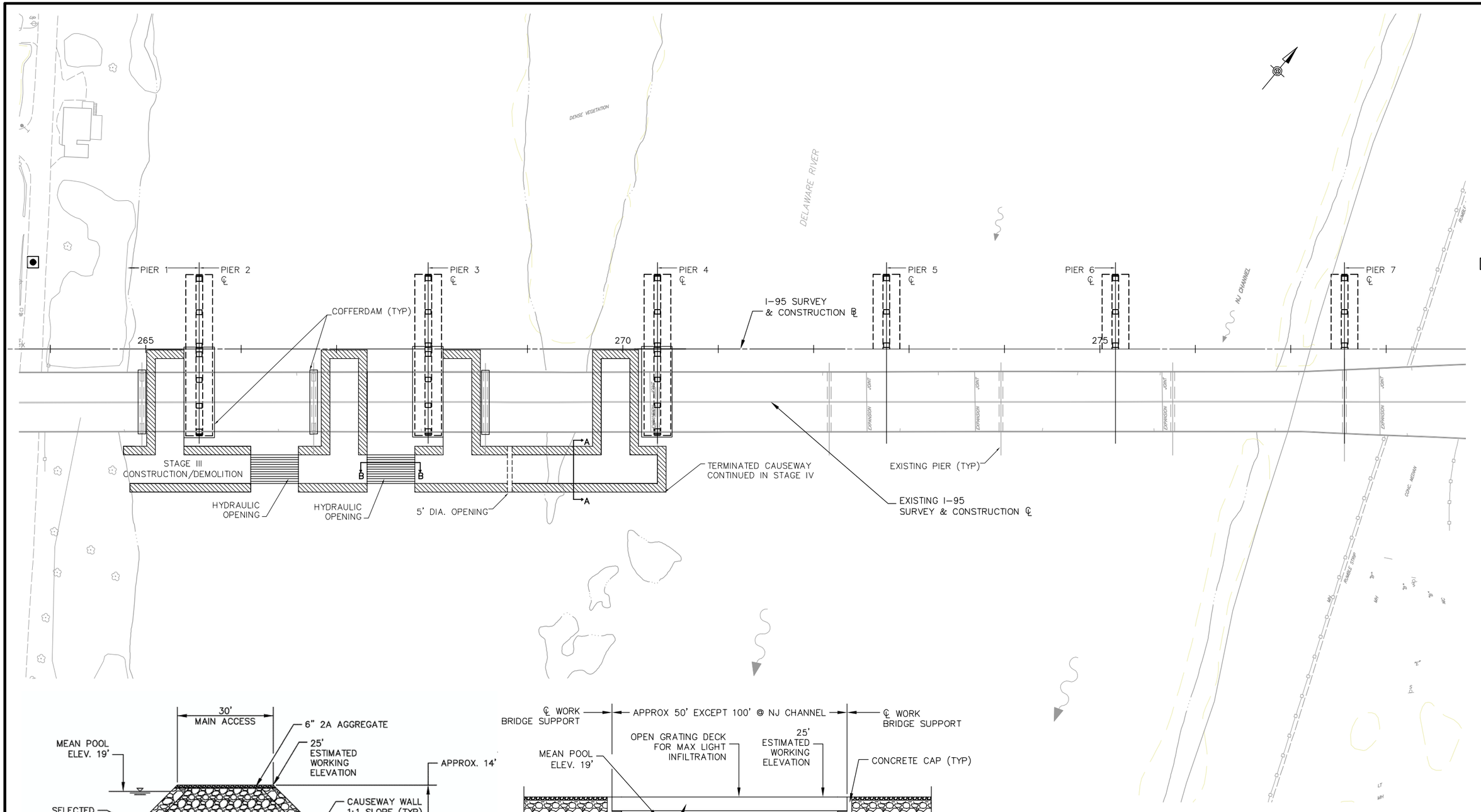


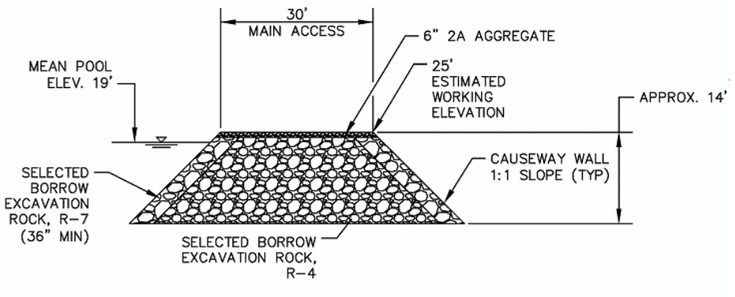
SECTION A-A
TYPICAL CAUSEWAY WALL SECTION



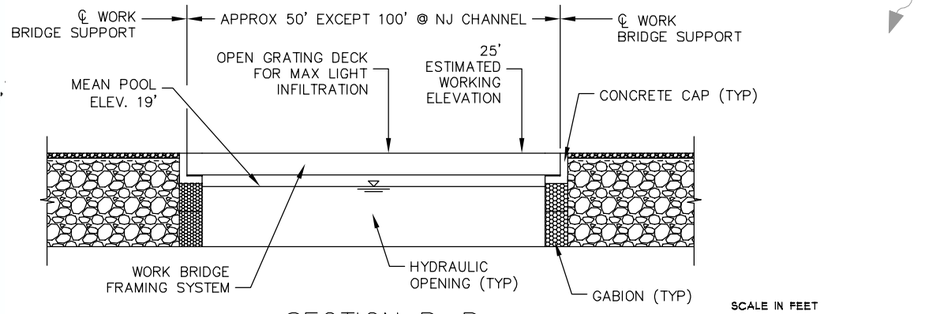
SECTION B-B
HYDRAULIC OPENING
(TYP)

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT
ENVIRONMENTAL ASSESSMENT
EARTHEN CAUSEWAY
FIGURE III-20
SHEET 2 OF 4





SECTION A–A
TYPICAL CAUSEWAY WALL SECTION

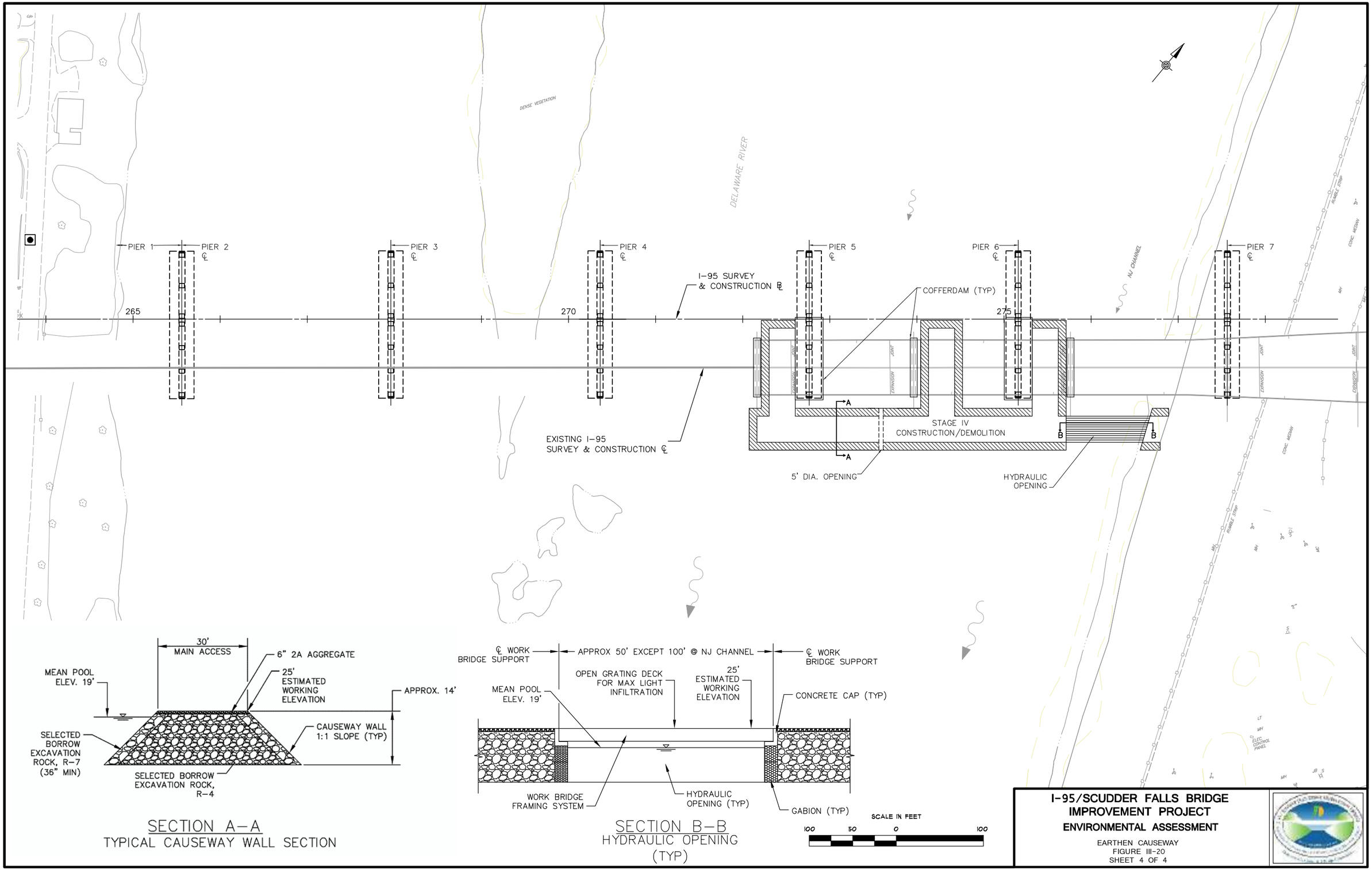


SECTION B–B
HYDRAULIC OPENING
(TYP)

SCALE IN FEET
100 50 0 100

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT
ENVIRONMENTAL ASSESSMENT

EARTHEN CAUSEWAY
FIGURE III-20
SHEET 3 OF 4



SECTION A-A
TYPICAL CAUSEWAY WALL SECTION

SECTION B-B
HYDRAULIC OPENING
(TYP)

SCALE IN FEET
100 50 0 100

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT
ENVIRONMENTAL ASSESSMENT

EARTHEN CAUSEWAY
FIGURE III-20
SHEET 4 OF 4

bridges or one 100-foot temporary bridge would be provided to provide additional hydraulic openings.

The rise in water elevation under the 1.4-year storm event would be greater with an earthen causeway than with the proposed trestle causeway: the increase for a 1.4-year storm event would be 2.08 feet (1.57 feet more than a trestle causeway). However, this rise in water elevation under the earthen causeway option would still be below the top of river banks and would not affect flooding of adjacent properties.

The estimated cost of an earthen causeway would be approximately $1 million, approximately $2 million less than for a trestle causeway. However, the earthen causeway would result in a greater footprint in the Delaware River, would have a greater effect on hydraulic flow, and would involve greater flooding impacts. For these reasons, the earthen causeway was dismissed as more environmentally damaging, and the trestle causeway was selected as the most practicable alternative.

c) Proposed Construction Methods

The proposed construction will involve use of a temporary trestle causeway for staging and access to the river during construction, and cofferdams to demolish the existing bridge and construct the new bridge piers.

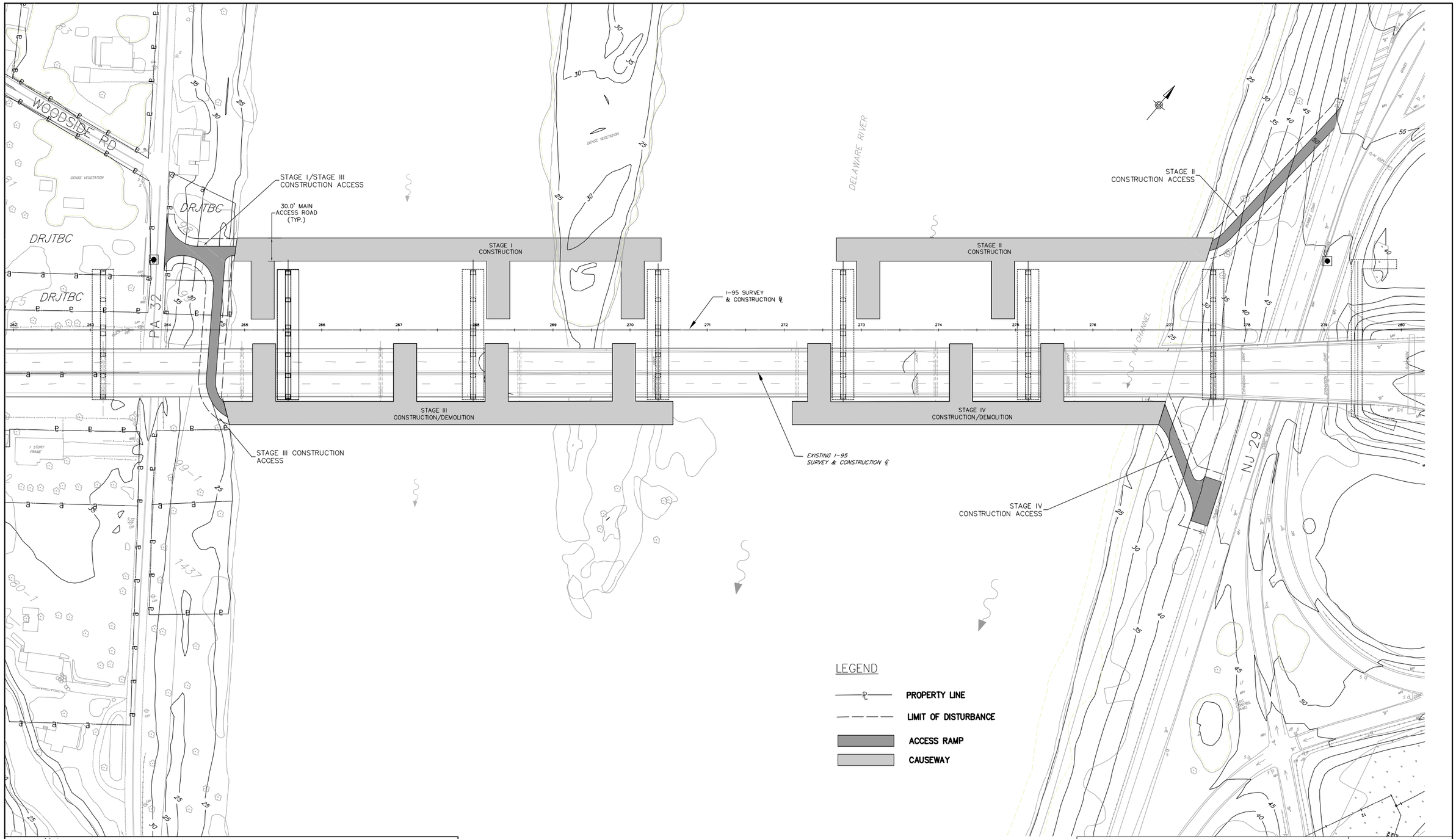
The complete hydrology and hydraulic assessment is presented in Technical Memorandum No. 31, Hydrology and Hydraulics Analysis.

Construction of the new bridge is estimated to be completed in approximately four years, with each stage of causeway construction expected to last approximately one year. Each cofferdam used to construct the proposed five river piers and demolish the existing seven river piers, will be used over a period of about 4 months. It would take three to four weeks to construct each cofferdam. Each cofferdam used to build the proposed bridge piers will be approximately 26 feet by 166 feet in size, and the bridge footings will be emplaced 10 to 15 feet below the existing riverbed in competent sand and gravel or rock.

Approximately 22 to 36 pile bents would be required for each causeway stage. Each pile bent would be driven into the river bottom, and would disturb approximately 10 square feet of river bottom. The 22 to 36 bents installed for each causeway stage correspond to approximately 210 to 340 square feet of river bottom disturbance at any one time. Upon removal of each trestle causeway stage, the bents would be removed to a depth of 3 feet below the river bottom, and the river bottom will be restored to its pre-construction condition. The estimated cost of a trestle causeway will be in excess of $3 million.
Access to each causeway from land would be via temporary access roads from PA Route 32 (River Road) on the Pennsylvania side of the river, and from NJ Route 29 on the New Jersey side of the river. These temporary access roads are shown on Figure III-21.

The construction sequence of the trestle would be as follows:

- Construct the access roadway to reach the river shoreline,
- Construct a temporary abutment for the first span of the trestle,
- Drive the piles for the first trestle bent and install bent cap,
- Erect the beams and construct the deck for first span,
- Move pile driving equipment to the constructed first span,



Notes:
1. 12ft wide gravel Access Ramp (typ.)
2. 10% - 15% max vertical grade
3. Minimum turning radius for Design Vehicle WB-40
4. Provide 1½:1 sideslopes for a maximum of 10 feet, shore as necessary.
5. For causeway details, refer to Exhibits III-19 and III-20.

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

CAUSEWAY CONSTRUCTION ACCESS
FIGURE III-21
SHEET 1 OF 1

Oct, 31 2008 11:07 am G:\5969.06\Exhibits\EA EXHIBITS\Figure III-21_1.dwg By: Melvina

- Drive the pile for second trestle bent and install cap,
- Erect beams and construct the deck for second span,
- Move pile driving equipment to second span and continue as before until the appropriate length of the trestle is completed.

The new bridge construction will be constructed from the causeway and causeway fingers. It is anticipated that once the causeways and cofferdams are completed, all work can be accomplished throughout the year from the causeway, inside the cofferdams, and from the partially constructed bridge. For example, once the cofferdams are constructed, all pier construction can be accomplished inside the cofferdams and from the causeway. The steel erection for the bridge superstructure will be performed by delivering the beams via the existing I-95 bridge (there will be partial closure of the bridge at night) with the cranes placed on the causeway. Once the steel beams are erected, the remaining portions of the bridge, such as the deck, can be constructed from the new structure.

Once the piers have been constructed and the steel beams have been erected, the cofferdams will be removed either by pulling the sheets out of the river bed or by removing the portion of the sheets above the river bed. The causeway can then be removed in a retreating manner.

Demolition of the existing bridge piers also will be accomplished from the causeway and causeway fingers. It is anticipated that the existing bridge will be demolished using various methods. As a first step, timber shielding will be placed between the existing girders, beams, and the edges to protect the workers and prevent debris from falling into the river.

The bridge deck will then be removed by saw cutting the concrete into manageable pieces for loading onto dump trucks. The deck will be removed from the existing bridge in a retreating manner. The beams and girders will be cut into pieces and loaded onto trucks with cranes placed on the existing bridge and on the causeway. The steel will be trucked off to a recycling center.

For the demolition of the existing piers, cofferdams will be installed and demolition will occur from within. These cofferdams will be approximately 15 feet wide by 70 feet long. Access to the existing piers will be via the causeways as shown on Figure III-19. The existing piers are clad with stones with a reinforced concrete core. So, the stones will have to be removed first. The concrete core will be demolished by hydraulic ram equipment, which creates a pulsing sensation that causes the existing concrete to crumble. The larger sections will be broken into smaller pieces and perhaps recycled on-site for use by the contractor for embankment and/or backfill material. The existing pier stems will be removed to a depth of two to three feet below the river bed elevation.

The trestle causeway would involve impacts to the river bottom at the footprint of the pile bents, but these would be temporary. For all intents and purposes, the trestle causeway can be completely removed, with the pile bents removed to a depth of 3 feet and the river bottom restored. It is anticipated that natural riverbed sediments will naturally infill this area over time, and the river bottom would be restored to its pre-construction condition.

Additional information on the impacts of construction is provided in Chapter IV.

BREEZYVALE FARMS

LOWER MAKEFIELD CORPORATE CENTER

NEWTOWN-YARDLEY ROAD PA ROUTE 332 (NEWTOWN-YARDLEY ROAD)

APPROX. LIMIT OF PROJECT/ MEET EXISTING PAVEMENT

PROPOSED EDGE OF PAVEMENT (TYP.)

PATTERSON LANE

DITCH D

DITCH E

DITCH F

DITCH O

WETLAND R

DITCH M

INTERSTATE 95

SOUTHBOUND

NORTHBOUND

DITCH Q

DITCH Q

DITCH Q

DITCH B

APPROX. LIMIT OF PROJECT/ MEET EXISTING PAVEMENT

LOWER MAKEFIELD TOWNSHIP PATTERSON FARM

NEWTOWN-YARDLEY RD PA 332

MATCHLINE: SEE SHEET 2 OF 11

LEGEND

- PROPERTY LINE
- LOD — LIMIT OF DISTURBANCE
- C/F — CUT/FILL LINE
- x — FENCE LINE
- WETLAND
- DITCH

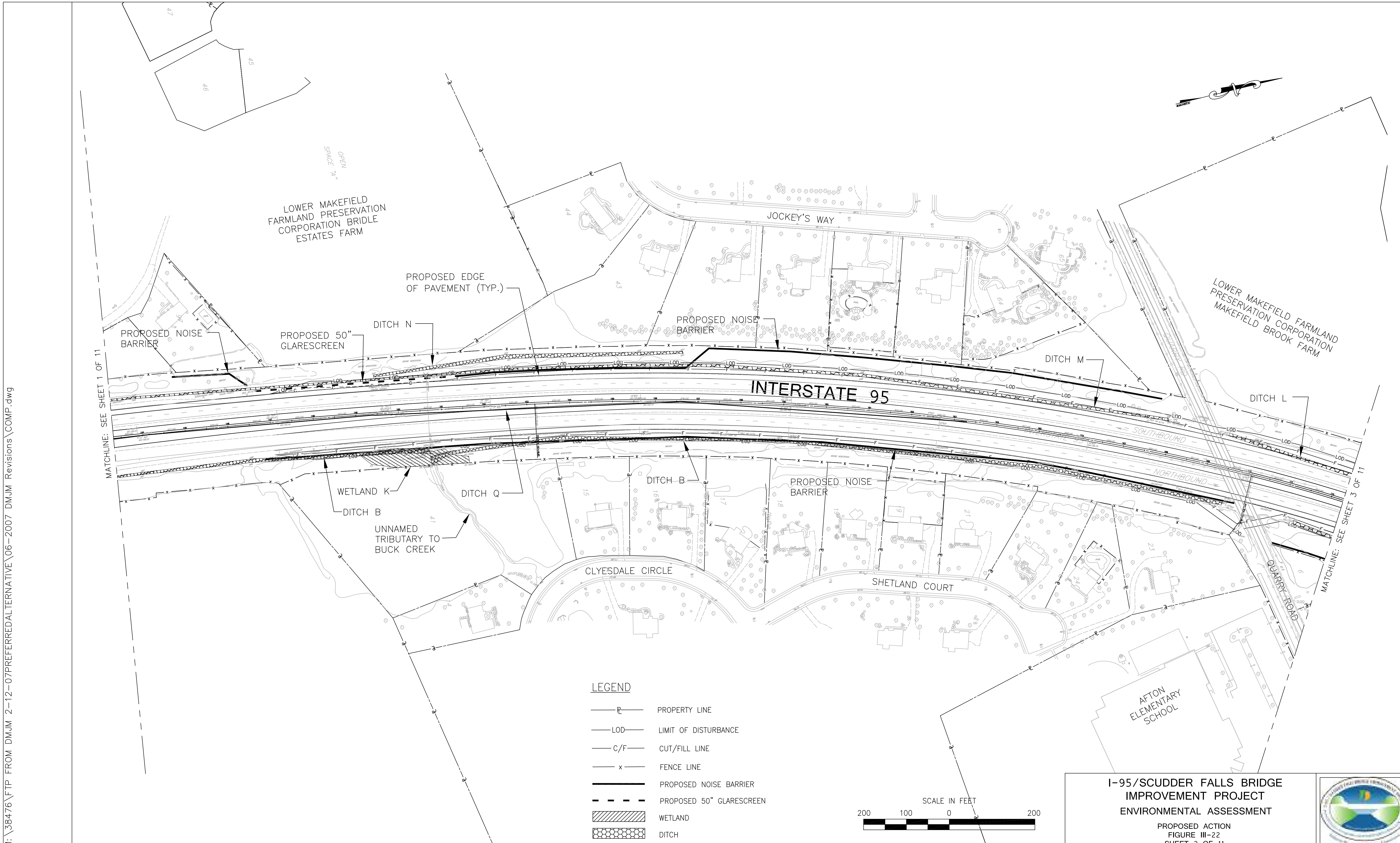
SCALE IN FEET

200 100 0 200

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 1 OF 11



I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT
ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 2 OF 11

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BRENTWOOD ROAD

LOWER MAKEFIELD FARMLAND
PRESERVATION CORPORATION
MAKEFIELD BROOK FARM

20-7-52 (FARMLAND)

LOWER MAKEFIELD FARMLAND
PRESERVATION CORPORATION
MAKEFIELD BROOK FARM

PROPOSED EDGE
OF PAVEMENT (TYP.)

DITCH L

INTERSTATE 95

DITCH Q

DITCH G

PROPOSED NOISE
BARRIER

LOWER MAKEFIELD TOWNSHIP
RECREATION FIELDS

MATCHLINE: SEE SHEET 2 OF 11

QUARRY ROAD

DOLINGTON ROAD

POWNAL DRIVE

PROPOSED NOISE
BARRIER

DITCH H

NATIONAL
REGISTER
ELIGIBLE
ELM LOWNE
HOUSE

PROPOSED NOISE
BARRIER

MATCHLINE: SEE SHEET 4 OF 11

LEGEND

- PL — PROPERTY LINE
- LOD — LIMIT OF DISTURBANCE
- C/F — CUT/FILL LINE
- x — FENCE LINE
- PROPOSED NOISE BARRIER
- DITCH

SCALE IN FEET
200 100 0 200

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 3 OF 11

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POWNAL DRIVE

PROPOSED NOISE BARRIER

REST AREA

PROPOSED EDGE OF PAVEMENT (TYP.)

REST STOP

INTERSTATE 95 SOUTHBOUND

INTERSTATE 95

INTERSTATE 95 NORTHBOUND

MATCHLINE: SEE SHEET 3 OF 11

UPPER HILLTOP ROAD

WCHR RADIO TOWER

DITCH K

OPEN SPACE LOT

DITCH H

DITCH Q

PROPOSED NOISE BARRIER

DITCH I

DITCH Q

LOWER HILLTOP ROAD

MILLER PLACE

HELLER DRIVE

UNNAMED TRIBUTARY #1 TO DELAWARE CANAL

MATCHLINE: SEE SHEET 5 OF 11

LEGEND

- PROPERTY LINE
- LOD — LIMIT OF DISTURBANCE
- C/F — CUT/FILL LINE
- x — FENCE LINE
- PROPOSED NOISE BARRIER
- DITCH

SCALE IN FEET

200 100 0 200

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 4 OF 11

MATCHLINE: SHEET 6 OF 11

LOWER MAKEFIELD FARMLAND PRESERVATION CORPORATION CLEARVIEW FARM

PROPOSED EDGE OF PAVEMENT (TYP.)

DITCH R

DITCH S

100 YEAR FLOOD LIMIT

WETLAND N

PROPOSED NOISE BARRIER

PROPOSED 50" GLARESCREEN

INTERSTATE 95 SOUTHBOUND

INTERSTATE 95

INTERSTATE 95

PROPOSED NOISE BARRIER

100 YEAR FLOOD LIMIT

DITCH J

DITCH P

WETLAND P

MATCHLINE: SEE SHEET 7 OF 11

MATCHLINE: SEE SHEET 4 OF 11

PROPOSED NOISE BARRIER

DELAWARE CANAL HISTORIC BOUNDARY

CONCORD LANE

UNNAMED TRIBUTARY #1 TO DELAWARE CANAL

TAYLORSVILLE ROAD

APPROX. LIMIT OF PROJECT/ MEET EXISTING PAVEMENT

LEGEND

PROPERTY LINE	PROPOSED 50" GLARESCREEN
LIMIT OF DISTURBANCE	WETLAND
CUT/FILL LINE	WETLAND IMPACT
FENCE LINE	PROPERTY IMPACT
PROPOSED NOISE BARRIER	DITCH

SCALE IN FEET

200 100 0 200

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 5 OF 11

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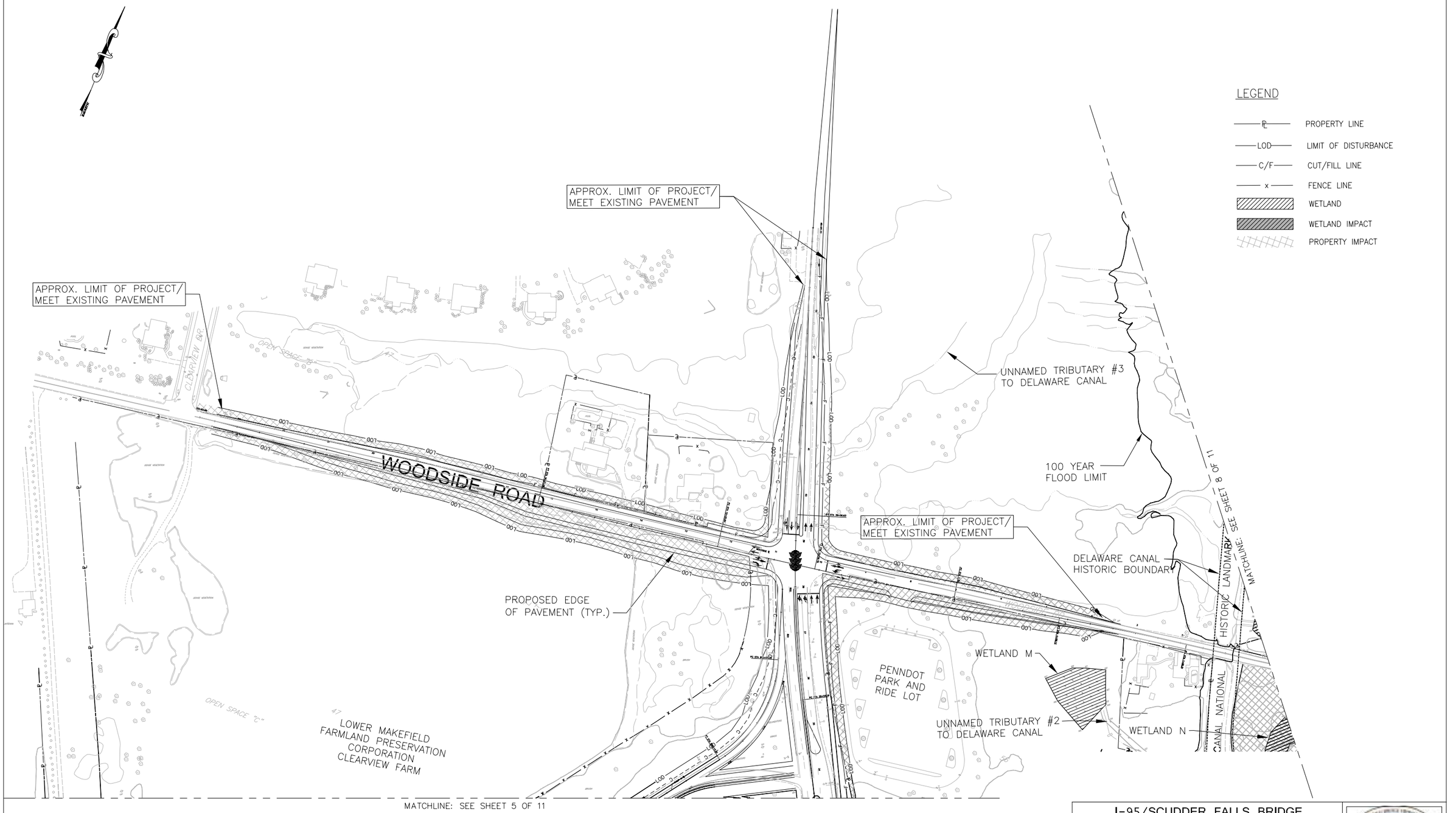

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 6 OF 11

MATCHLINE: SEE SHEET 8 OF 11

MATCHLINE: SEE SHEET 8 OF 11

WETLAND L

PROPOSED NOISE BARRIER

WETLAND S

PROPOSED 50" GLARESCREEN

INTERSTATE 95

I-95/ SCUDDER FALLS BRIDGE

SOUTHBOUND

NORTHBOUND

SCUDDER FALLS BRIDGE

PROPOSED 50" GLARESCREEN

PROPOSED EDGE OF PAVEMENT (TYP.)

WETLAND S

DELAWARE RIVER

WETLAND G

ORDINARY HIGH WATER MARK ELEV. 26.0

PROPOSED NOISE BARRIER

ORDINARY HIGH WATER MARK ELEV. 26.0

DELAWARE RIVER

PENNSYLVANIA (BUCKS COUNTY) / NEW JERSEY (MERCER COUNTY)

ROBINSON PLACE

N. RIVER RD (PA 32)

NJ STATE OPEN WATERS

WETLAND C

NJ STATE OPEN WATERS

BARRIER

WETLAND F

WETLAND I

TROOPER DRIVE

DELAWARE AND RARITAN CANAL

(UPPER RIVER ROAD)

NJ ROUTE 175

WETLAND E

RIVER ROAD

WETLAND H

100 YEAR FLOOD LIMIT

REEDERS CREEK

D & R CANAL HISTORIC BOUNDARY

NJ ROUTE 29

ABNER SCUDDER HOUSE

VILLA VICTORIA ACADEMY

APPROX. LIMIT OF PROJECT/ MEET EXISTING PAVEMENT APPROX. 200' SOUTH ON NJ ROUTE 29

MATCHLINE: SEE SHEET 5 OF 11

MATCHLINE: SEE SHEET 9 OF 11

LEGEND

PL	PROPERTY LINE
LOD	LIMIT OF DISTURBANCE
C/F	CUT/FILL LINE
x	FENCE LINE
	PROPOSED NOISE BARRIER
	PROPOSED 50" GLARESCREEN
	FLOODWAY
	WETLAND
	WETLAND IMPACT
	NJ STATE OPEN WATER
	NJ STATE OPEN WATER IMPACT
	PROPERTY IMPACT

SCALE IN FEET

200 100 0 200

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 7 OF 11

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LEGEND

PROPERTY LINE	FLOODWAY
LIMIT OF DISTURBANCE	WETLAND
CUT/FILL LINE	WETLAND IMPACT
FENCE LINE	PROPERTY IMPACT

MATCHLINE: SEE SHEET 6 OF 11

DELAWARE CANAL HISTORIC BOUNDARY

ORDINARY HIGH WATER MARK ELEV. 26.0

WETLAND O

WETLAND N

WOODSIDE ROAD

PA ROUTE 32 (RIVER ROAD)

WETLAND L

WETLAND S

PARK ISLAND

BUCKS COUNTY

PENNSYLVANIA (BUCKS COUNTY) / NEW JERSEY (MERCER COUNTY)

DELAWARE RIVER

MATCHLINE: SEE SHEET 7 OF 11

BERNARD DRIVE

SCUDDER FALLS RECREATION AREA

ORDINARY HIGH WATER MARK ELEV. 26.0

D & R CANAL HISTORIC BOUNDARY

NATIONAL REGISTER ELIGIBLE CHARLES S. MADDOCK HOUSE

WETLAND A

100 YEAR FLOOD LIMIT

NJ ROUTE 29 (RIVER ROAD)

APPROX. LIMIT OF PROJECT/ MEET EXISTING PAVEMENT

WETLAND G

WETLAND B

PROPOSED EDGE OF PAVEMENT (TYP.)

DELAWARE AND RARITAN CANAL

MATCHLINE: SEE SHEET 7 OF 11

MATCHLINE: SEE SHEET 9 OF 11

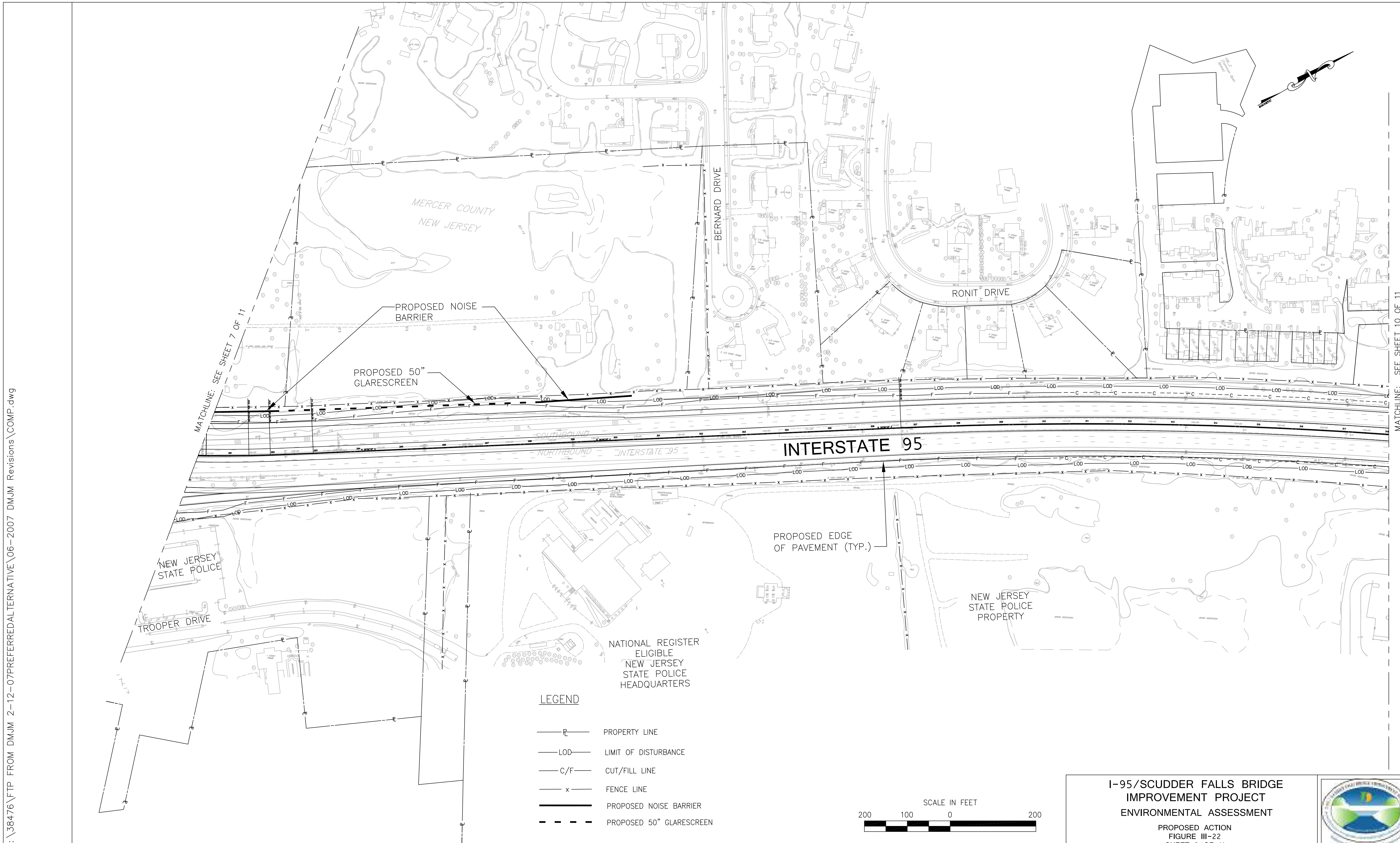
SCALE IN FEET

200 100 0 200

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 8 OF 11



I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 9 OF 11

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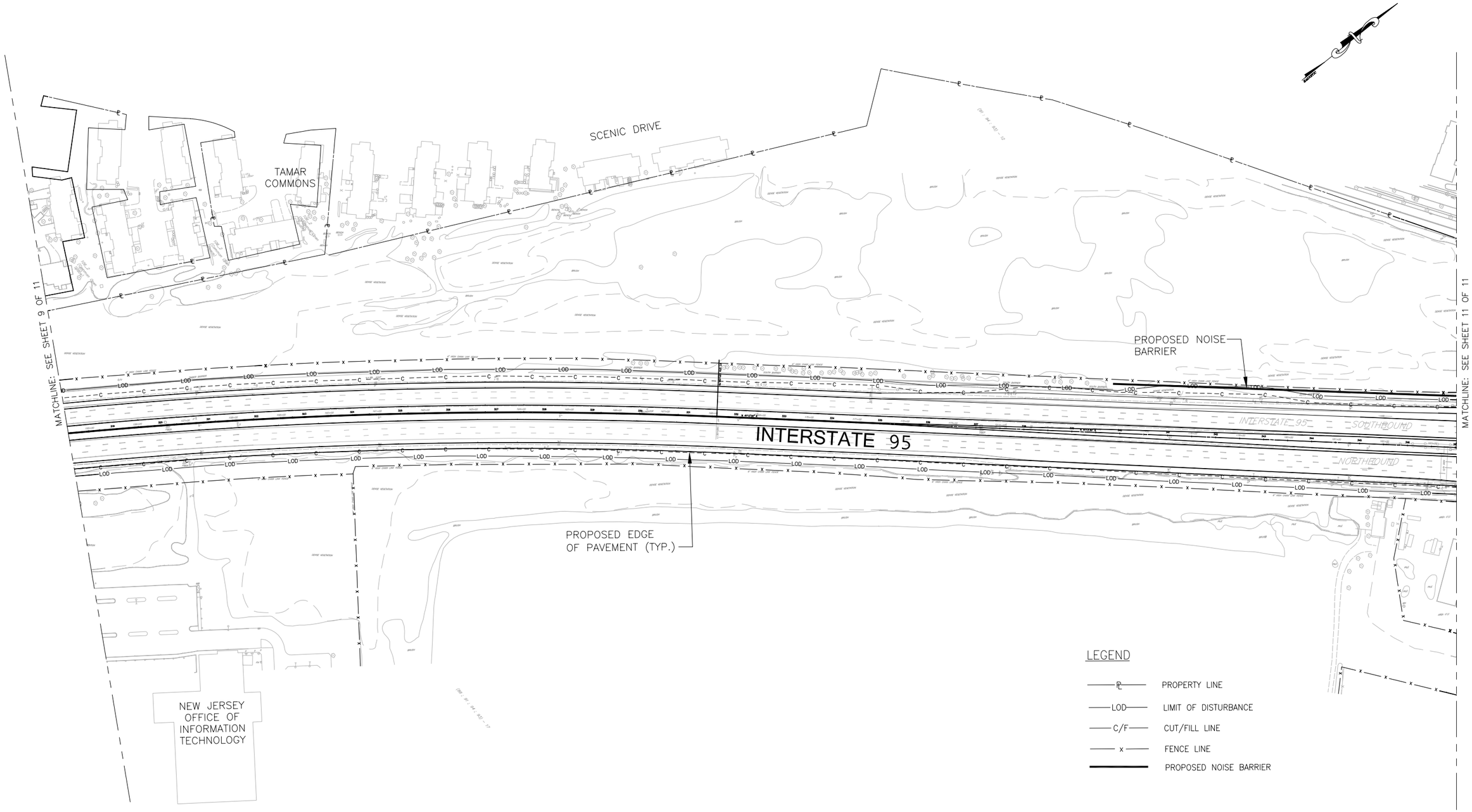

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 10 OF 11

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MATCHLINE: SEE SHEET 10 OF 11

LEGEND

- PROPERTY LINE
- LOD — LIMIT OF DISTURBANCE
- C/F — CUT/FILL LINE
- x — FENCE LINE
- PROPOSED NOISE BARRIER

SCENIC DRIVE

PROPOSED NOISE BARRIER

BEAR TAVERN ROAD

MOUNTAIN VIEW OFFICE PARK

APPROX. LIMIT OF PROJECT/ MEET EXISTING PAVEMENT

INTERSTATE 95

NEW JERSEY JONES FARM CORRECTIONAL FACILITY

PROPOSED EDGE OF PAVEMENT (TYP.)

CITY OF TRENTON WATER TANK

NJDOT MAINTENANCE FACILITY

SCALE IN FEET

200 100 0 200

I-95/SCUDDER FALLS BRIDGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

PROPOSED ACTION
FIGURE III-22
SHEET 11 OF 11

IV. ENVIRONMENTAL CONSEQUENCES

This chapter presents the environmental impacts of the proposed action on traffic and transportation, land use, community and economic conditions, and natural and cultural resources. For comparison purposes, the No Build alternative is compared with the proposed action in assessing project impacts. The proposed action is described in Section III.C and is illustrated on Figure III-22. This chapter also presents the incremental impacts associated with the pedestrian/bicycle facility should it be determined later during final design that the pedestrian/bicycle facility will be implemented as part of the proposed action. In addition, this chapter evaluates temporary construction impacts, including those associated with the causeway to be used during construction. Impacts associated with future traffic, air quality, and noise conditions are assessed for the future year 2030. Table II-1 summarizes the resources present in the project area that are addressed in this chapter.

A. Traffic and Transportation

1. Proposed Traffic Operations

a) I-95 Mainline

The proposed improvements have been designed to meet the project purpose of relieving chronic peak period traffic congestion and improving mobility in the I-95 project area. This improvement is reflected in traffic volumes and level of service operations, shown in Tables IV-1 and IV-2. Existing traffic delays and future projected increases in congestion without the proposed improvements are described in Section I.D.1. Table IV-1 compares the average annual daily traffic (AADT) volumes under the future 2030 Build conditions with base 2003 and 2030 No Build traffic. The DVRPC forecasting was used to develop these traffic projections and assumed that development proposals in the region, including the proposed improvements to the Pennsylvania Turnpike/I-95 Interchange, would be in place by 2030. As shown in Table IV-1 and IV-2, the I-95/Scudder Falls Bridge Improvements are anticipated to result in an increase in AADT of approximately 8% to 12%, while providing an acceptable level of service (LOS D or better) within all project segments.

The proposed action will result in operational improvements on I-95 within the project area during peak travel periods, with most segments experiencing LOS A to C. Roadway segments to the west of PA Route 332 would experience slight degradation in LOS in peak travel directions, compared to the No Build condition due to the higher traffic forecasted for the proposed action. The proposed travel lanes, auxiliary lanes, and acceleration/deceleration lanes across the I-95/Scudder Falls Bridge will improve traffic flow to LOS A to C, compared to the No Build condition traffic flow of LOS C to F.

Table IV-1—I-95 Mainline Traffic Volumes: 2003 and 2030 Average Annual Daily Traffic

I-95 Mainline	Limits	Average Annual Daily Traffic (vehicles per day)		
		Base 2003	2030 No Build	2030 Build
I-95	US 1 (Exit 46) to PA 332 (Exit 49)	63,300	77,400	84,800
I-95	PA 332 (Exit 49) to Taylorsville Road (Exit 51)	53,900	68,100	75,900
I-95/ Scudder Falls Bridge	Taylorsville Road (Exit 51) to NJ 29 (Exit 1)	59,500	76,500	85,000
I-95	NJ 29 (Exit 1) to Bear Tavern Road (Exit 2)	57,100	76,000	83,400
I-95	Bear Tavern Road (Exit 2) to Scotch Road (Exit 3)	57,500	76,900	83,800

Table IV-2—I-95 Mainline Levels of Service: 2003 and 2030 Peak Hours

Location	Direction	2003 Base		2030 No Build		2030 Build	
		A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak	AM Peak	PM Peak
Between Exit 46 (Route 1 Interchange) & 49 (PA Route 332 Interchange)	NB	C	C	D	C	E[1]	D[1]
	SB	C	D	D	E	D	F[1]
Between Exit 49 & 51 (Taylorsville Road Interchange)	NB	D	B	E	C	C	B
	SB	B	D	C	E	B	C
Between Exit 51 & 1 (NJ Route 29 Interchange)— I-95/Scudder Falls Bridge	NB	F	B	F	C	C	A
	SB	B	E	C	F	B	C
Between Exit 1 & 2 (Bear Tavern Road Interchange)	NB	C	A	D	B	C	B
	SB	A	C	B	D	B	D
Between Exit 2 & 3 (Scotch Road Interchange)	NB	C	A	D	B	D	B
	SB	A	C	B	C	B	D[1]

	= Acceptable LOS, A-D
	= Undesirable LOS, E, F
1	= No change to I-95 mainline geometry, but increased volume causes LOS to deteriorate. These segments of I-95 are outside the project limits.

The proposed improvements for the mainline I-95 include three through travel lanes plus auxiliary lanes to facilitate the smooth flow of traffic onto and off of I-95 at the Taylorsville Road and NJ Route 29 Interchanges. Heading southbound, the auxiliary lane that will begin as an on-ramp from NJ Route 29 will become the off-ramp to Taylorsville Road on the west side of the bridge. The auxiliary lane length is designed to be approximately 3,400 feet. Traffic flow in this section will operate at an acceptable LOS C in the higher volume P.M. peak hour.

Heading northbound, there will be two northbound on-ramps from Taylorsville Road. The on-ramp (loop ramp) from eastbound Taylorsville Road will be an add lane followed by an auxiliary lane for the westbound Taylorsville Road on-ramp. This auxiliary lane will become the off-ramp to NJ Route 29 on the east side of the bridge. This will create a five-lane section northbound across the I-95/Scudder Falls Bridge. The auxiliary lane length is designed to be approximately 2,530 feet. Traffic flow in this section will operate at an acceptable LOS C in the higher volume A.M. peak hour.

The fourth lane will merge into the mainline I-95 prior to the NJ Route 29 northbound on-ramp auxiliary lane. The NJ Route 29 northbound on-ramp auxiliary lane will become the off-ramp to Bear Tavern Road. The auxiliary lane length is designed to be approximately 5,750 feet.

b) Taylorsville Road Interchange

The proposed action will add two signalized intersections, for a total of three signalized intersections along Taylorsville Road. This includes the two on/off ramp T-intersections and the four-leg Woodside Road intersection. All three intersections will operate at acceptable level of service during both the A.M. and P.M. peak hours under the proposed action.

c) NJ Route 29 Interchange

The proposed action at the NJ Route 29 Interchange includes two roundabouts—one for the northbound on/off ramps and one for the southbound on/off ramps. Both of these roundabouts will operate at acceptable levels of service during both the A.M. and P.M. peak hours.

The proposed action will provide for all movements to and from I-95 northbound and southbound, and to and from NJ Route 29. The I-95 northbound on-ramp from NJ Route 175 (Upper River Road) will be eliminated in the proposed action because the design criteria for distance between two successive on-ramps would not be met. The traffic from this on-ramp will be redistributed to the I-95 northbound on-ramp from NJ Route 29. The local roads and the NJ Route 29 Interchange will operate at acceptable levels of service.

The NJ Route 175 (Upper River Road) northbound I-95 ramp is adjacent to the access for the New Jersey State Police facility. This facility operates the State's emergency and Homeland Security operations from the new Emergency Operations Center. Access to I-95 for immediate response to emergency and/or Homeland Security operations is critical. Coordination with the New Jersey State Police has been performed in developing the proposed interchange design, and provisions will be made for an emergency gated access to I-95 northbound for use only under emergency response.

2. Safety

The proposed action is designed to improve traffic operational conditions and safety conditions on the I-95 mainline and adjoining ramps. Provision of auxiliary lanes and adequate acceleration and deceleration lanes on the I-95/Scudder Falls Bridge will contribute to safe entry and exit from adjoining interchanges. The proposed addition of full width inside and outside shoulders on the bridge, which currently lacks adequate breakdown lanes, will allow adequate pullover areas for motorists in the event of an accident, breakdown, or other incident. The interchange operations at the Taylorsville Road and NJ Route 29 Interchanges will be safer with improved interchange and ramp geometrics that have been designed to meet applicable American Association of State Highway Transportation Officials (AASHTO), PennDOT, and NJDOT design criteria.

3. Alternative Transportation Modes

The project has been designed to incorporate alternative transportation modes. The project will incorporate a 14-foot inside shoulder to accommodate potential future Route 1 Bus Rapid Transit. The wider shoulders could be used as bus lanes, to allow buses to bypass congestion.

The project also will include consideration of a pedestrian/bicycle facility during final design. If implemented as part of the proposed action, the pedestrian and bicycle facility would provide an additional safe crossing of the Delaware River for pedestrian/bicycle access and another regional connection between the Delaware Canal State Park in Pennsylvania and the Delaware and Raritan Canal State Park in New Jersey. This would be the only pedestrian/bicycle crossing within the 12-mile section of the Delaware River between the New Hope-Lambertville Bridge, 8 miles to the north, and the Calhoun Street Bridge, 4 miles to the south in Trenton. This facility could be used by New Jersey commuters for access to the park and ride lot in Pennsylvania, SEPTA stations, and by Pennsylvania commuters to access employment destinations and NJ TRANSIT stations in New Jersey.

Although these measures will provide an alternative means of transportation for commuters, they will not result in traffic relief sufficient to obviate the need for the project. These improvements alone will not meet the project purpose of providing acceptable level of service (LOS D) on I-95 and the need for the proposed improvements will remain even with their implementation.

4. Temporary Construction Impacts

The construction of the project is expected to be completed in approximately 4 years. The construction will be staged to maintain the number of travel lanes currently provided during peak hours, with two lanes of traffic maintained on the I-95/Scudder Falls Bridge and in Pennsylvania and two to three lanes in each direction in New Jersey.

The proposed I-95/Scudder Falls Bridge will be partially constructed upstream of the existing bridge, allowing traffic flow to be maintained on the existing bridge. Two lanes of traffic will be maintained in each direction during peak hours. Warning signs, speed restrictions, and work zone safety measures will be implemented throughout the construction period. Single lane closures will be required at times, but these will be scheduled during non-peak hours. Even though the existing number of travel lanes will be maintained during peak periods, traffic delays may increase due to reduced speeds, the presence of construction activities nearby, and within transition zones.

Staging areas will be located within the I-95 right-of-way or DRJTBC, PennDOT, and NJDOT property. Construction work, access, and staging will occur from the roadway rights-of-way.

Temporary construction access roads across private property are not anticipated for construction of the replacement bridge.

One primary construction access point to each causeway stage on the Delaware River will be provided from either Pennsylvania or New Jersey. Access will be provided from one construction entrance from PA Route 32 (River Road) for the first and third stages of construction, as shown on Figure III-21. The entrance and access roads will extend across DRJTBC property for both stages of construction. Access during the second and fourth stages of construction will be from NJ Route 29, via two separate entrances north and south of I-95, respectively (see Figure III-21).

B. Community and Economic Conditions

1. Existing Conditions

a) Regional Employment and Designated Growth Areas

I-95 provides access to residential and employment centers in Pennsylvania and New Jersey that have experienced considerable growth, and growth in the I-95 corridor is expected to continue in future years. I-95 in the project area provides access to designated growth areas in Pennsylvania and New Jersey. Newtown Township, on the west, has been designated as the residential growth center under the joint regional plan with Upper Makefield, and Wrightstown Townships. Middletown Township, on the southwest, is one of the fastest growing residential and employment centers in the region. In New Jersey, Mercer County has designated the areas along I-95 that include the Merrill Lynch site at the next northerly I-95 exit (Scotch Road) and portions of Ewing, Hopewell, and Lawrence Townships as a Regional Growth Area, as part of the I-95/I-295 Transportation Development District.

Large employment centers in New Jersey are a major source of employment for Pennsylvania residents, contributing to peak hour travel on the I-95/Scudder Falls Bridge. The State of New Jersey is a major employer in the area. State facilities adjoining the south side of I-95 include the State Police Headquarters and the Jones Farm Correctional Facility. The City of Trenton, the state capital, is located to the south. Large employers in the area include Merrill Lynch, Janssen Pharmaceutica, and Bristol-Myers Squibb in neighboring Hopewell Township, and New Jersey Manufacturers Insurance Company and Educational Testing Services in Ewing Township. In the project area, the Bear Tavern Road Interchange provides access to the adjoining Mountain View Office Park, the nearby Trenton-Mercer Airport, and surrounding industrial and commercial uses. In addition, the Ewing Township Master Plan (Draft February 2006) identifies the areas south of I-95 and areas that surround the Bear Tavern Road Interchange, including the Trenton-Mercer Airport, as areas that will be subject to intense development pressures and that contain either developable land or areas available for redevelopment opportunities. Large employment centers in the Pennsylvania portion of the project area include the Lower Makefield Corporate Center at the PA Route 332 Interchange in Newtown.

This segment of I-95 also accommodates travel to popular tourist destinations along both sides of the Delaware River in Bucks and Mercer Counties, including historic Washington Crossing State Parks in Pennsylvania and New Jersey and the shopping/cultural destinations in New Hope, Lambertville, Newtown, and Yardley.

Overall, Bucks County is forecasted to experience employment growth of 24% by 2025, compared to 14% growth in Mercer County (see Table IV-3). An influx of 66,500 and 33,300 new jobs is

expected in Bucks and Mercer Counties, respectively, over this time period. Total employment levels are higher in Ewing Township (32,550 employees compared to 3,550 in Lower Makefield Township), which reflects a greater industrialized base. Employment increases in future year 2025 are anticipated to be higher in Lower Makefield Township (15%), due to the built up nature of Ewing Township (5%). Table IV-36 presents an overview of unemployment and income statistics.

b) Population Characteristics and Proposed Development Areas

Table IV-3 presents population, housing, and income characteristics for the study area communities, compared to the state and county as a whole. Overall, Bucks County is forecasted to experience population growth of 24% by 2025, compared to 15% growth in Mercer County (see Table IV-3). From 2000 to 2025, the populations of Bucks and Mercer Counties are forecasted to grow by over 140,000 persons and 50,000 persons, respectively. Population growth (29%) is forecasted by DVRPC to be highest in Lower Makefield Township in 2025, continuing the population expansion that has occurred in the past. Population growth in Ewing Township is expected to grow at lower levels (8.43% increase in 2025), due in part to the built-up nature of the township and the expectation of the township that future development will consist largely of commercial or industrial development.

Because the areas north of I-95 are largely occupied by residential development, the Ewing Township Master Plan anticipates that future redevelopment activity in the project area is expected to occur in areas surrounding the Bear Tavern Road Interchange and areas south of I-95. Proposed development areas in Ewing Township include a plan for age-restricted housing adjoining the north side of I-95 and the west side of Bear Tavern Road. Other development proposals include a proposal for a New Jersey Public Health, Environmental, and Agriculture Laboratory Facilities on the New Jersey State Police property, which is scheduled to begin construction in the near future.

c) Title VI/Environmental Justice

Title VI of the Civil Rights Act of 1964 and related statutes assure that individuals are not excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance[2] on the basis of race, color, national origin, age, sex, or disability. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations", and the U.S. Department of Transportation Order on Environmental Justice (DOT Order 5610.2) set forth policies to ensure that federal actions do not disproportionately affect minority or low-income populations in the U.S.

Demographic data on environmental justice populations was collected for the smallest geographic unit for which data was available from the 2000 U.S. Census, census block groups (see Table IV-4 and Figure IV-1). In general, the environmental justice statistics for the census block groups in the study area are largely similar to or lower than that for the state or county as a whole. In both states, the exceptions were for statistics for elderly and disabled for several census block groups.

In Pennsylvania, although the statistics for all three block groups for persons in poverty were lower or similar to that for the county and state, these statistics were higher than that for Lower Makefield Township as a whole. Statistics for non-whites in the Pennsylvania block groups,

[2] A determination of federal funding assistance for this project has not been made at this time.

Table IV-3—Population and Employment Characteristics

	Pennsylvania	Bucks County	Lower Makefield Twp	New Jersey	Mercer County	Ewing Township
1990-2025 POPULATION AND EMPLOYMENT TRENDS						
	Population/ Employment	Population/ Employment	Population/ Employment	Population/ Employment	Population/ Employment	Population/ Employment
1990	11,881,643/ 9,392,816	541,230/ 245,360	25,080/ 3,080	7,730,188/ 6,129,923	325,824/ 220,592	34,185/ 32,234
2000	12,281,054/ 9,693,040	605,560/ 271,890	33,000/ 3,550	8,414,350/ 6,546,155	339,650/ 236,650	35,707/ 32,550
% Change 1990-2000	3.36%/ 3.20%	11.89%/ 10.81%	31.58%/ 15.26%	8.85%/ 6.79%	4.24%/ 7.28%	4.5/ 0.98%
2025	—	748,080/ 338,360	42,520/ 4,090	—	390,800/ 269,900	38,717/ 34,417
% Change 2000-2025	—	23.54%/ 24.45%	28.85%/ 15.21%	—	15.06%/ 14.05%	8.43%/ 5.74%
OTHER EMPLOYMENT AND POPULATION CHARACTERISTICS						
Educational Attainment (high school degree)	81.9%	88.6%	96.1%	82.1%	81.8%	84.1%
Educational Attainment (college degree)	22.4%	31.2%	61.2%	29.8%	34.0%	29.1%
Persons per Household (2000)	2.48	2.69	2.77	2.68	2.62	2.45
% Unemployment (1999)	4.28%	5.1%	----	4.52%	3.9%	4.6 (2000)
Median Housing Value (2000)	$97,000	$163,200	$243,100	$170,800	$147,400	$136,700
Median Household Income (1999)	$40,106	$59,727	$98,090	$55,146	$56,613	$57,274
Per Capita Income (1999)	$20,880	$27.430	$43,983	$27,006	$27,914	$24,268

Source: U.S. Census Bureau, 1990, 2000; DVRPC Year 2025 County and Municipal Population and Employment Forecasts; NJ/PA Department of Labor Unemployment Statistics, April 2004; Bureau of Labor Statistics, 1999.

although below the statewide average, was higher for all three block groups than that for Bucks County and Lower Makefield Township. Employment disabilities for those 16 to 64 years of age (11.8%) and disability status for those 5 years of age or older (18.8%) were slightly higher than the state, county, and township as a whole for Census Tract 1055.01, Block Group 1, which adjoins the portion of I-95 east of Dolington Road in Lower Makefield Township.

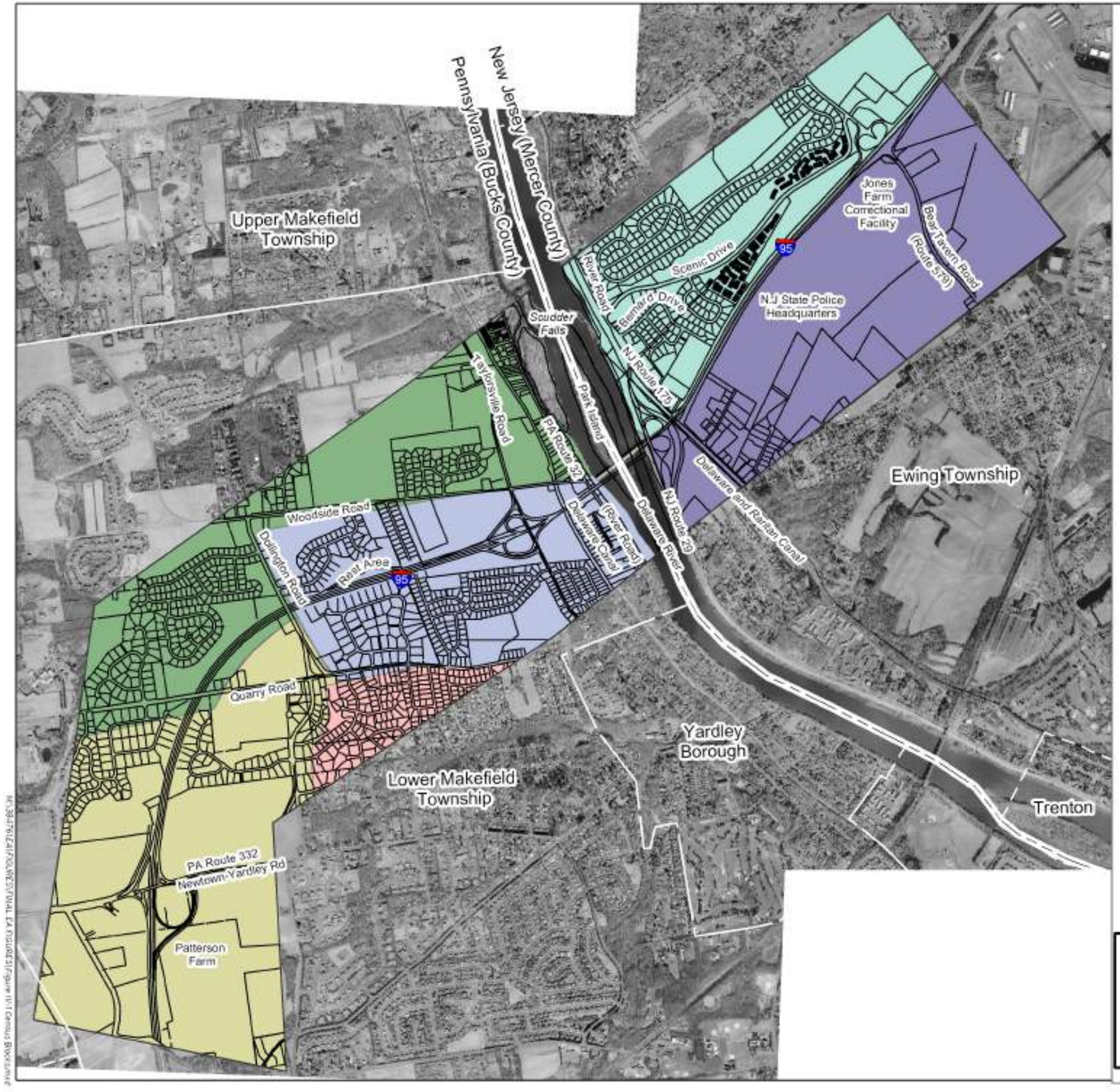
In Ewing Township, the percentage of persons in poverty (6.4%) for Census Tract 37.06, Block Group 2 (north of I-95), although lower than that for the state and county as a whole, was higher than that for Ewing Township as a whole. The percentage of non-whites for this block group, at 27.3%, although higher than the adjoining block group south of I-95 (12.2%), is lower than that for the state, county and township as a whole. The disability status for persons 5 years or older, at 21%, was also higher than the state, county, and township as a whole for Census Tract 37.06, Block Group 2 in Ewing Township, which is north of I-95. Most of this area is protected by a noise barrier north of, and along the southbound lanes of, I-95.

At 18.9%, the percentage of persons over 65 years of age was slightly higher in Census Tract 37.05, Block Group 3 in Ewing Township than for the state, county, and township as a whole. The portion of this block group that adjoins the south side of I-95 is largely occupied by the Villa Victoria Academy and state property and does not include many residential properties.

Table IV-4—Title VI/Environmental Justice Characteristics

Demographic Categories	PA	Bucks County	Lower Makefield Township	Census Tract 1055.01			NJ	Mercer County	Ewing Township	Census Tract 37.06	Census Tract 37.05
				Block Group 1	Block Group 2	Block Group 3				Block Group 2	Block Group 3
Total Population	See Table IV-3		33,000	1,262	1,331	3,664	See Table IV-3		34,400	2,561	1,207
% Persons in Poverty (1999)	11%	4.4%	2.6%	3.5%	2.8%	4.4%	8.5%	8.1%	5.5%	6.4%	0.8%
% Non-Whites	14.63 %	8.0%	6.9%	8.5%	12.8%	8.6%	27.45%	34.6%	31.6%	27.3%	12.2%
% Over 65	15.6%	12.4%	10.3%	11.1%	5.4%	5.0%	13.2%	12.6%	15.7%	9.2%	18.9%
% Persons with 1 or More Disabilities Items Imputed (5 yrs. of age or older)	18.6%	12.8%	10.68%	18.8%	10.9%	8.9%	18%	17.42%	15.36%	21.0%	13.7%
% Employment Disabilities Imputed (16 to 64 years of age)	9.93%	8.4%	6.61%	11.8%	6.4%	4.4%	10.75%	13.37%	9.72%	10.6%	12.7%

Source: U.S. Census Bureau, 2000.



Legend:

Pennsylvania
Census Track 1055.01

- Census Block Group 1
- Census Block Group 2
- Census Block Group 3
- Census Block Group 4

New Jersey
Census Track 37.06

- Census Block Group 2

New Jersey
Census Track 37.05

- Census Block Group 3

Feet

0 1,250 2,500 5,000 7,500 10,000

I-95/Scudder Falls Bridge Improvement Project Environmental Assessment

Census Block Groups
Figure IV-1

Research was performed to determine if the two states had developed policies and criteria for defining Environmental Justice communities in their states. Interviews with municipal officials were also conducted to aid in identifying the locations of environmental justice populations.

In Pennsylvania, Environmental Justice has been addressed through formation of an Office of Environmental Advocate, Environmental Justice Advisory Board, and an Environmental Justice Working Group (EJWG) under the PA DEP. Based on the 2001 Final Report of the EJWG, PA DEP has developed a definition for an Environmental Justice (EJ) Community and has developed a policy of incorporating enhanced public involvement in EJ communities during the permitting process. This definition is based: "upon a minimum of 30 percent for a minority community designation and a minimum of 20 percent for a low-income community. Thus, a minority community is any U.S. Census tract with a 30 percent or greater minority population and a low-income community is any census tract with 20 percent or more of its population at or below the poverty level, as defined by the U.S. Census Bureau. In addition, any minority or low-income group within a tract, whose interest is not protected by the majority population of the community, can upon appropriate showing be considered a minority community."

There are no areas within the Pennsylvania portion of the study area that meet the numerically based PA DEP definition of Environmental Justice Community. No additional information was available from Lower Makefield Township Manager's office on the location of EJ populations within the study area, beyond the information obtained from the U.S. Census Bureau.

In New Jersey, Executive Order 96 established an EJ Task Force and EJ Advisory Council within NJDEP and also established a petition process for designating EJ communities. Ewing has not been designated an EJ Community. The Ewing Township planning official was consulted regarding disadvantaged populations in the study area, and the following populations were identified:

- The proposal for an age restricted residential housing development along the north side of I-95 at the Bear Tavern Road Interchange, north of I-95, is currently on hold.
- A multi-story apartment complex along the north side of Scenic Drive (which is north of I-95) was identified as generally low to moderate housing with a large minority base. This area is at least 500 feet north of I-95.
- The only EJ population noted south of I-95 is outside and south of the project by approximately 1 mile.

The one area identified by the Ewing Township planning official as an area of potential concern, the multi-story apartment complex on Scenic Drive, is located in an area long I-95 that is protected from traffic noise by an existing noise barrier.

d) Land Use

(1) Lower Makefield Township

The majority of the I-95 right-of-way in Lower Makefield Township between PA Route 332 and Taylorsville Road adjoins single-family residences, located largely within residential subdivisions, and farmland (see Figure II-1). The eight residential subdivisions along I-95 are, from west to east: Bridle Estates, The Ridings, Devonshire, Makefield Brook (I and II), Fairfield at Farmview, Longshore Estates, Makefield Chase, Hillwood Terrace, Clearview Estates, and Maplevale. Under the Lower Makefield Township Farmland Preservation Program, construction of a number of these

residential subdivisions has resulted in preservation of adjacent farmlands or open space, particularly in the areas that are less densely developed on the west end of the study area and north of I-95.

The majority of these subdivisions were more recently constructed, with older, more established homes and neighborhoods along Quarry Road and in the eastern portion of the corridor, along Upper and Lower Hilltop Roads and PA Route 32 (River Road). Commercial land uses along I-95 in Lower Makefield Township consist of the Lower Makefield Corporate Center southwest of the PA Route 332 Interchange. This business center includes a hotel, financial services, and a number of other businesses that occupy office space.

Areas east of Taylorsville Road include residential uses, undeveloped lands, and recreational open space along the Delaware Canal State Park.

(2) Ewing Township

Land uses in Ewing Township consist primarily of single-family or multi-family residential developments, institutional lands, and farmlands or open space. In the vicinity of the NJ Route 29 Interchange, the Villa Victoria Academy adjoins I-95 to the south, and single-family homes occupy areas adjoining River Road to the north. Recreational open space consists of the Delaware and Raritan Canal State Park along NJ Route 29.

Areas east of NJ Route 29 and north of I-95 include neighborhoods of single-family homes and multi-family developments. The north side of I-95 adjoins single-family homes within neighborhoods along or near Upper River Road (NJ Route 175). East of NJ Route 29, I-95 adjoins single-family attached residential complexes, including Tamar Commons and South Fork at Ewing, along Scenic Drive, north of, and parallel to I-95. Delaware Heights, an apartment complex, is situated on the opposite side of Scenic Drive from Tamar Commons. A private developer is proposing to construct an age-restricted development that was approved for 124 units. This site would adjoin the north side of I-95 at Bear Tavern Road. With the exception of this site, the north side of I-95 in the project area is largely built-out.

The south side of I-95, east of the NJ Route 175 (Upper River Road) includes the New Jersey State Police Headquarters property, which accommodates other state and government facilities. To the east of the New Jersey State Police headquarters, the Jones Farm Correctional Facility occupies the remainder of this 300-acre state-owned property south of I-95. This is a working farm and dairy operation, as well as a medium-security correctional facility.

The only commercial land use adjoining I-95 in the New Jersey portion of the project area in Ewing Township is the Mountain View Office Park, situated at the Bear Tavern Road Interchange. This office park houses a number of businesses, as well as government offices. Other institutional uses at the Bear Tavern Road Interchange include the NJDOT maintenance facility and the City of Trenton water tower east of Bear Tavern Road.

e) Community Facilities and Services

Community facilities in the project area, including schools, hospitals and emergency medical services, fire protection, and other public facilities, are described in this section and are shown in Figure II-1.

(1) Schools

Lower Makefield Township is part of the Pennsbury School District. There are two public schools in Lower Makefield Township that are in the project area: Alton Elementary School and the Quarry Hill Elementary School which are both located south of I-95 on Quarry Road.

Ewing Township operates its own school district, the Ewing Township Public School District. There is one public school located in the project area in Ewing Township, the Francis Lore Elementary School, which is situated approximately within ½ mile north of I-95.

The Villa Victoria Academy in Ewing Township adjoins the southeast side of the NJ Route 29 Interchange. Villa Victoria Academy is a private, Roman Catholic elementary and high school, enrolling students from grades K through 12.

(2) Hospitals and Emergency Medical Services

There are no hospitals in either Lower Makefield Township or Ewing Township. The Yardley-Makefield Emergency and Medical Services Unit provides emergency or ambulance service from its headquarters next to the township administration building, which is outside the project area. Ambulance service in Ewing Township is provided by the Ewing Township Medical Services, through a contract with Capital Health Systems.

(3) Fire Protection

Fire protection for Lower Makefield Township is provided primarily by the Yardley-Makefield Fire Company, which has two fire stations, which are both located outside the project area. The Yardley-Makefield Fire Company had planned to construct a third fire station on the Snipes Tract, a township-owned parcel adjoining the south side of I-95 between Quarry and Dolington Roads. According to discussions with Lower Makefield Township in June 2004, plans for the fire station were on hold pending resolution of funding issues.

Fire protection in Ewing Township is provided by three fire stations. The closest fire stations to the project area are located in West Trenton and in the southern part of Ewing Township. Both of these are outside the project area.

(4) Other Public Facilities

Publicly owned facilities in the project area include the Elm Lowne House (Figure II-1) on Dolington Road, a historic estate eligible for listing on the National Register which was purchased by Lower Makefield Township in 1999. This parcel, situated on 12 acres of land south of I-95, is available to the public for rental use for weddings and other functions. The *Master Plan for the Barn at Elm Lowne* prepared for Lower Makefield Township evaluated adaptive reuse options, such as a performing arts center.

The Patterson Farm property (Figure II-1), at the PA Route 332 Interchange was purchased by Lower Makefield Township as open space in 1998. The *Patterson Farm Strategic Vision, Final*

Report, prepared August 28, 2007 by the Heritage Conservancy for the township provides a framework for future decision-making on the use of the property.

The New Jersey State Police Headquarters (Figure II-1) adjoins the south side of I-95, east of the NJ Route 29 Interchange and NJ Route 175 (Upper River Road). This property occupies roughly 100 acres northeast of NJ Route 175 and south of I-95. The property houses approximately 2,000 staff members and includes the State Police Museum. Construction has recently been completed on an Emergency Operations Center. This property also includes the New Jersey Office of Information Technology center, south of I-95. According to the New Jersey State Police, the New Jersey Department of Health and Senior Services is also planning a new laboratory on the campus, which is in the design development stage.

To the north of the State Police headquarters, the Jones Farm Correctional Facility, a working farm with dairy operation and medium-security correctional facility, occupies the remainder of this 300-acre parcel.

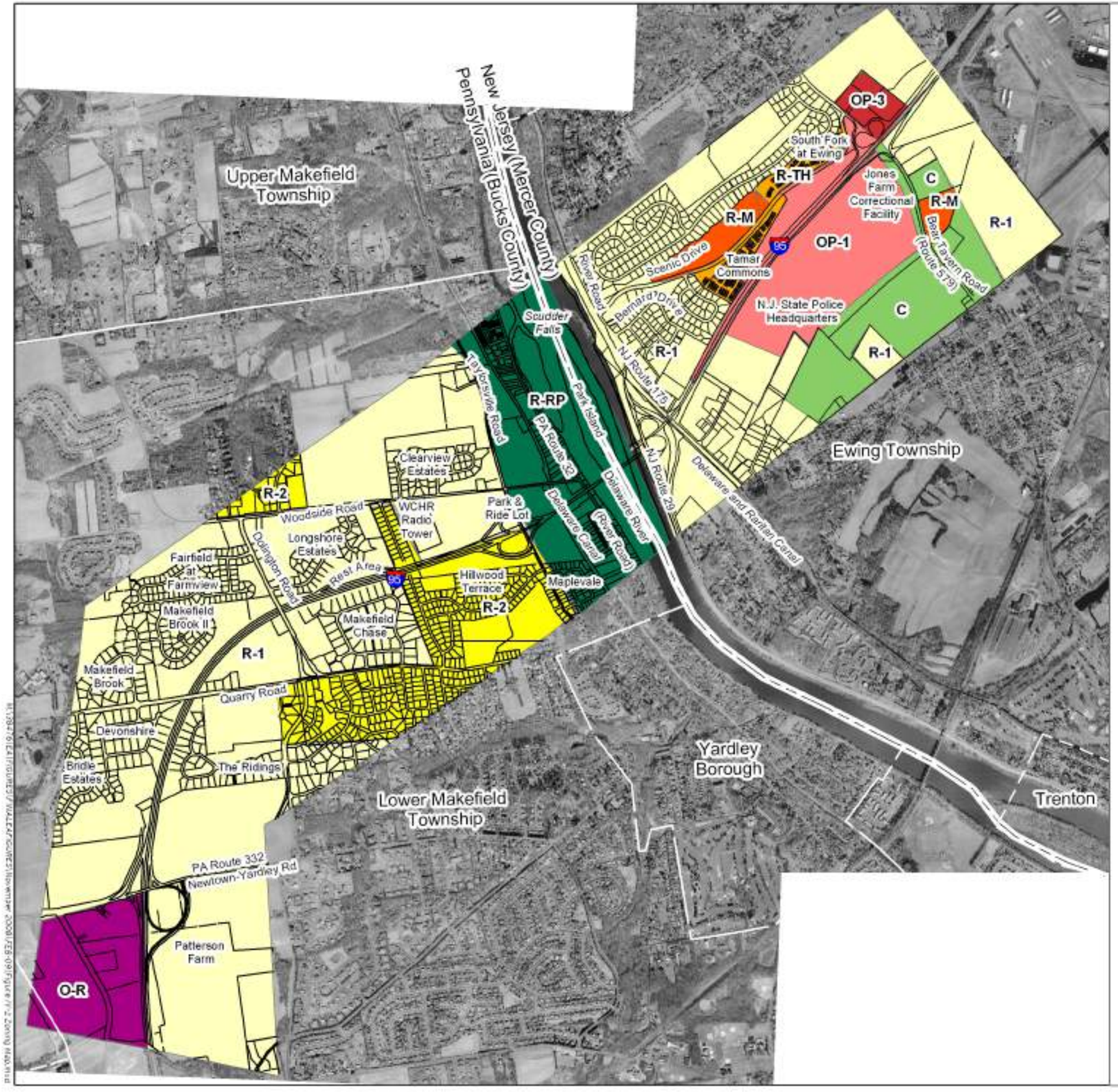
f) Zoning and Master Plans

The Comprehensive and Master Plans developed by the counties (Bucks and Mercer County Planning Commissions) and local municipalities (Lower Makefield and Ewing Townships) were reviewed to determine the project's consistency with these plans. Zoning for Lower Makefield Township and Ewing Township is shown on Figure IV-2. The Pennsylvania and New Jersey statewide planning initiatives to encourage Smart Growth were also reviewed.

(1) Pennsylvania/Bucks County/Lower Makefield Township Plans

The Commonwealth of Pennsylvania has developed programs to implement Smart Growth strategies as part of its Growing Greener program administered by the Pennsylvania Department of Community and Economic Development. Smart growth is defined as future efficient land development and redevelopment that exploits past and current investments in infrastructure (sewers, water supply, transportation, parks, schools, etc), provides housing and travel choices, and creates community and a sense of place by guiding growth into mixed-use, walkable, dense centers.

The Infrastructure and Transportation Element of the Bucks County Comprehensive Plan (1993) includes as a goal enhancement of personal mobility and goods movement. The plan identifies I-95 as a regional corridor and includes the following highway policies: "*Develop, maintain, and promote an open and cooperative process for the future improvement of…regional and critical corridors in the county,...Develop for use by municipalities new methods and refine existing means of ensuring the future capacity and safety of the highway network.*"



Legend:

Lower Makefield Township, PA

- R-RP - Residential-Resource Protection District
- R-1 - Residential Low-Density
- R-2 - Residential Medium-Density
- O-R Office Research

Ewing Township, NJ

- R-1 - Residential District-Single Family Detached
- OP-1 - Office Park District
- OP-3 - Office Park Zone
- C - Conservation
- R-M - Residential Multi Family Apartments
- R-TH - Residential Single Family Attached Townhouse

0 1,250 2,500 5,000 7,500 10,000 Feet

I-95/Scudder Falls Bridge Improvement Project Environmental Assessment

Zoning Map Figure IV-2

The Lower Makefield Township Comprehensive Master Plan Update (2003) identifies the following community goals and policies: "*Develop a complete and coordinated transportation system that facilitates the safe, convenient and efficient movement of people and goods throughout the township*." On plans for the I-95/Scudder Falls Bridge, the Lower Makefield Township Comprehensive Master Plan Update states that: *"Any widening of the bridge and Interstate 95 would have an impact on the township. The township should continue to monitor any potential improvements to I-95 and/or the Scudder Falls Bridge, and support those that will alleviate access or circulation problems at Taylorsville Road and elsewhere in Lower Makefield."* The design plans have been developed to improve access and circulation at the Taylorsville Road Interchange, and several meetings with the township and the public have been held to review and obtain input into design plans, as discussed in Chapter V.

(2) State of New Jersey/Mercer County/Ewing Township Plans

Smart Growth, as defined by the New Jersey Office of Smart Growth, is defined as well-planned, well-managed growth that adds new homes and creates new jobs, while preserving open space, farmlands, and environmental resources. In New Jersey, planning at the statewide level is accomplished through the New Jersey State Development and Redevelopment Plan. Under the State Plan, the majority of the project area west of Bear Tavern Road is designated as Suburban Planning Area (Planning Area 2), and areas east of Bear Tavern Road are within the Metropolitan Planning Area (Planning Area 1). These planning areas are identified in the State Plan as the areas where development or redevelopment should occur in the state. The exception to this zoning is the designation of the Mountain View Golf Course as park or natural area (Planning Area 5).

Additional regional or subarea planning is available through the designation of TDD. The New Jersey Transportation Development District Act of 1989 provides for the development of district-wide transportation investment plans as the basis for the assessment of fees for off-tract transportation improvements in high-growth areas. These districts allow public/private partnership in funding and implementing transportation improvements necessitated by growth.

In Mercer County, the TDD that has been designated for the I-95/I-295 corridor encompasses the three I-95 interchanges to the east of the project area: Scotch Road, Route 31, and the Federal City Road Interchanges. The 1986 Mercer County Growth Management Plan designated the I-95/I-295 TDD area for growth. The western portion of this area that includes the Merrill Lynch site, at the Scotch Road Interchange just east of the project area, was identified as a Regional Growth Area, while the residential eastern portion was identified as a Suburban Growth Area. Furthermore, under the New Jersey Development and Redevelopment Plan, the area along Scotch Road is identified as a potential Planned Regional Center. The planned improvements under the I-95/Scudder Falls Bridge Improvement Project would accommodate traffic flows emanating from and destined to this designated high-growth region along I-95/I-295. The Mercer County Growth Management Plan, amended January 12, 2000, states that: "*Clearly, the capacity of our County highway network is becoming increasingly inadequate to accommodate the demands being placed upon it...*" The Mercer County Highway Master Plan targets a Level of Service D during the peak hours as the minimum level of service to provide. The proposed action has been designed to provide LOS D during peak hours on I-95.

The Ewing Township Master Plan (Draft February 2006) states that: "*Some critical transportation investments could strategically enhance mobility and accessibility for residents and a reasonable level of development consistent with the land use plan...The township supports improving capacity of the [I-95/Scudder Falls] bridge, remedying interchange safety improvements and considering park and ride locations to reduce traffic in the area (there is a park and ride across the Delaware River on the Pennsylvania side).*"

2. Impacts

a) No Build

Under the No Build alternative, recurring traffic congestion would adversely affect access to major employment centers, which will have an indirect adverse effect on economic development. Recurring traffic congestion may indirectly affect land use by making the area less attractive to both businesses and residents. Continuing severe congestion on the I-95/Scudder Falls Bridge will also affect quality of life for area residents and commuters. Delays due to traffic congestion could be expected to adversely affect existing businesses and employers in the area. Under the No Build alternative, emergency access and access to community facilities would continue to be impaired by severe and chronic traffic congestion that occurs during peak hours and is projected to worsen.

b) Proposed Action

(1) Socioeconomic Impacts

The proposed action will improve the transportation infrastructure to accommodate planned future residential growth and economic expansion that is occurring along the I-95 corridor in the project area and in outlying areas. The trend of high residential growth in Pennsylvania communities and expansion of large area employers, particularly in the state- and county-designated growth area within the I-95/I-295 Transportation Development District (TDD) in New Jersey immediately to the east of the project area, is expected to continue in future years. These development trends were factored into the DVRPC travel demand forecasting model, which indicated the need for the proposed highway improvements to alleviate chronic peak-hour congestion and improve operational and safety conditions. The proposed capacity and safety improvements support planned development.

The project will improve highway mobility within the project area for all populations and will improve quality of life for residences and commuters.

The proposed action will displace one residence on Woodside Road in Pennsylvania. No businesses will be displaced, and no significant direct effect on population or employment will occur. Partial acquisitions at eight additional private properties that are residential or undeveloped are required. There will be no direct effects on existing and proposed development areas, since the proposed action is largely contained within the I-95 right-of-way. The project will involve no direct effect on the proposed age-restricted housing development in Ewing Township.

(2) Title VI/Environmental Justice

The proposed action will be performed largely within the existing right-of-way, and no disproportionate effects on environmental justice populations are anticipated as a result of the project. In Pennsylvania, all the private property acquisitions are located within the Taylorsville Road Interchange area or on Woodside Road, to the north. This census block group (Block Group 1 in Census Tract 1055.01), similar to all the other Pennsylvania census block groups in the study area, had lower statistics for non-whites and poverty than for the county and state, although these statistics were higher than Lower Makefield Township as a whole. Disability statistics for this census block group were slightly higher than for the county, state, and township. This census block group does not meet the PA DEP definition of an Environmental Justice Community, which is used by PA DEP in identifying the need for enhanced public involvement during the permitting process. Lower Makefield Township officials were consulted and did not have information on

disadvantaged populations, beyond the information available from the U.S. Census Bureau. Most of this block group, which extends along both sides of I95 from Dolington Road to the Delaware River, will be protected by proposed noise barriers, with the exception of the northwest quadrant of Taylorsville Road, where the interchange is adjoined by farmlands.

Poverty and disability statistics were also higher relative to the township as a whole for one of the census block group in Ewing north of I-95 (Block Group 2 within Census Tract 37.06), which is largely shielded from I-95 and protected by a noise barrier. The percentage of non-whites for this census block group was also higher than for other census block groups in the study area. Consultation with local officials indicate that one apartment complex, north of Scenic Road, which is at least 500 feet north of I-95, is considered to be an area of concern housing low-income or minority residents. This area is also shielded from I-95 by the existing noise barrier, and the project is not expected to have an impact on this population. The project will not involve direct property impacts at this location, and the noise barrier is expected to shield this property from any visual effects. The project will reduce traffic delays at the interchanges and on I-95 for motorists, including the residents of this apartment complex. Reduced congestion and delays will improve emergency vehicle access and improve accessibility to employment and services. The percentage of persons over 65 years of age was also slightly higher for the Ewing census block group that adjoins the south side of I-95. However, this area is largely occupied by the Villa Victoria Academy and state property and does not include many residential properties. Ewing Township has not been designated as an Environmental Justice Community in New Jersey. There is no indication that the proposed action would disproportionately affect minority, low-income, disabled, or elderly populations.

(3) Land Use and Property Impacts

The proposed action will not change access, so no changes in land use patterns are expected as a result of the project. Land use patterns in the project area are well established, and the corridor is largely built up, with the exception of preserved areas of farmland or parkland.

Direct property impacts associated with the project will affect a total of approximately 6.9 acres, including approximately 3.1 acres of publicly owned land and 3.8 acres of private land. A summary of property acquisitions required is shown in Table IV-5, and affected parcels are shown on Figure III-22.

Table IV-5—Summary of Public and Private Property Acquisitions

Land Use Type	Number of Affected Properties			Area Affected (in acres)			Displacements		
	PA	NJ	Total	PA	NJ	Total	PA	NJ	Total
Public	4	1	5	2.7	0.4-0.6[1]	3.1-3.3	0	0	0
Residential	5	1	6	3.1	0.1	3.2	1	0	1
Undeveloped	3	0	3	0.6	0	0.6	0	0	0
Businesses	0	0	0	0	0	0	0	0	0

[1] / Construction of the pedestrian/bicycle facility will affect an additional 0.2 acre of NJDEP parkland within the Delaware and Raritan Canal State Park.

Note: Refer to Figure III-22 for locations of affected parcels.

As described in Table IV-5, four publicly owned parcels in Pennsylvania will be affected. Widening along Woodside Road at and west of the intersection with Taylorsville Road will affect approximately 0.3 acre of Lower Makefield Township open space (or 7% of the total parcel) north of Woodside Road. On the opposite (south) side of Woodside Road, approximately 1.3 acres (or 5% of the total parcel) within the property owned by the Lower Makefield Farmland Preservation Corporation (LMFPC) will be affected. Both of these parcels were deeded in conjunction with the adjoining Clearview Estates residential development. The open space parcel adjoins Clearview Estates and includes a grassed drainage basin and forested buffer bordering Woodside Road, but is not used for public recreation. The majority of property affected within the LMFPC property consists of the forested buffer along Woodside Road that adjoins agricultural fields.

East of Taylorsville Road, the widening at the intersection with Woodside Road and widening along I-95 will affect approximately 1 acre (or 10% of the total parcel) of Lower Makefield Township property that surrounds and includes the PennDOT park and ride lot. This taking will not affect the use of the park and ride lot or the surrounding land, which is heavily forested and otherwise unused.

The proposed improvements will not affect the primary use of these publicly owned parcels adjoining Woodside Road. These parcels do not accommodate public or passive recreation uses.

The widening along I-95 will also affect approximately 0.03 acre of Commonwealth of Pennsylvania land surrounding the flood control structure on the Delaware Canal that discharges to an adjoining stream channel under I-95. The proposed improvements will not affect the flood control structure or its discharge point into the adjoining stream, although the northern portion of this stream channel will be affected where it extends under I-95.

The construction of the on- and off-ramps for the new NJ Route 29 Interchange will require the acquisition of approximately 0.4 acre within NJDEP Delaware and Raritan Canal State Park. The widened I-95 and new ramps will largely span over the canal and its adjoining towpath and park and will not affect the public recreation uses in this location in the long term.

Property impacts are summarized in Table IV-5. The proposed improvements will displace one residence located in close proximity to the north side of I-95 off Woodside Road in Pennsylvania. The widening along I-95, Taylorsville Road, and Woodside Road will require acquisition of portions of four other residential properties in Pennsylvania and one residential property in New Jersey, but will not displace these residences. Most of these residential acquisitions will affect between 5% and 34% of the property, with the exception of the one residential displacement. One undeveloped parcel adjoining the north side of I-95 will be acquired in total, and portions of three other undeveloped parcels will be acquired. No businesses will be acquired.

(4) Community Facilities

The proposed action will reduce congestion and therefore improve mobility for emergency services and accessibility. No direct long-term adverse impacts to community facilities, services, and institutions will occur as a result of the project. Currently, access to I-95 from the New Jersey State Police facility is via the northbound I-95 on-ramp from NJ Route 175 (Upper River Road). This ramp access will be discontinued for general use, and the access to I-95 northbound from this facility will be via NJ Route 175 south to NJ Route 29 northbound. However, a gated ramp and

exclusive emergency entrance onto I-95 northbound will be provided from the New Jersey State Police facility in the same general location as the existing northbound I-95 on ramp from NJ Route 175.

Access to other community facilities will not be adversely affected. Other community facilities adjoining the project area, including the Jones Farm Correctional Facility and the Villa Victoria Academy, may experience minimal increases in noise as a result of the project. These impacts are addressed in Section IV.P.2.

(5) Master Plan Consistency

The proposed I-95/Scudder Falls Bridge improvements are consistent with the goals and policies of Bucks County and Lower Makefield Township Comprehensive Plans and the Mercer County and Ewing Township Master Plans, as the project will promote traffic safety and allow for continued movement of people and goods through the I-95 corridor and the region. The project addresses the regional goals of promoting access both to the I-95/I-295 TDD and accessibility to the Trenton-Mercer Airport and continued economic development. The planned improvements are needed to address traffic congestion related to both existing and future planned development in the region. Moreover, the proposed action evaluated in this EA includes potential implementation of the pedestrian/bicycle facility, which is consistent with local plans for trail linkages, and TSM/TDM measures, such as accommodations for Route 1 Bus Rapid Transit.

c) Incremental Impacts of Pedestrian/Bicycle Facility

If implemented as part of the proposed action, the pedestrian/bicycle facility will affect an additional 0.2 acre of parkland within the NJDEP Delaware and Raritan Canal State Park, although portions of the pedestrian/bicycle facility itself could be deeded to the state park. In Pennsylvania, the pedestrian/bicycle facility will affect the property on Woodside Road that would be displaced under the proposed action and would involve construction within property already owned by the DRJTBC. The pedestrian/bicycle facility will not involve adverse impacts on community facilities or access to community facilities. The provision of a pedestrian/bicycle facility will link existing canal recreational paths and will provide an alternative travel mode for commuters and residents, thereby enhancing access in both states to businesses and community resources and facilities.

d) Temporary Construction Impacts

The construction of the project may have detrimental short-term impacts to local residents and businesses, because of traffic delays. However, the project can be expected to benefit the economy with the increase in construction jobs.

Construction staging areas will be located within DRJTBC property or the existing highway right-of-way. In the vicinity of the causeway over the Delaware River, temporary easements will be required on Park Island, which is privately owned. The affected parcels are vacant and will be restored upon completion of construction, and no long-term property effects are anticipated.

3. Mitigation

The federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 provides protections and assistance for people affected by federally funded projects[3]. The Act guarantees that affected parties are treated fairly and equitably and receive assistance in relocating. The DRJTBC will follow the policies of the State DOTs and will work with the displaced property owner to provide assistance in finding suitable housing in the area and will work with all affected property owners to provide compensation for property to be acquired.

Coordination with affected stakeholders will continue during final design and construction. The environmental justice requirements include providing opportunities for potentially affected communities to participate in the transportation decision-making process. Public outreach to area residents included publishing project meeting notices and information in local newspapers and the project website. Meetings were also well-publicized through local newspaper articles and notices that were also posted on township websites. Two sets of public open houses were held in Lower Makefield Township and Ewing Township in June 2004 and May of 2005 that were advertised in advance and well attended by area residents. These forums, held in Americans with Disabilities Act (ADA) accessible locations, provided an opportunity for public comment regarding residents' preferences regarding potential bridge and mainline improvements. In addition, project representatives presented information at Township meetings held in Lower Makefield Township in February of 2004, February of 2005 and May of 2007 and in Ewing Township in March of 2004, January of 2005 and May of 2007. This public outreach to affected populations will continue throughout the remainder of final design.

Given slightly higher statistics for disabled and elderly persons, targeted outreach to these groups will be incorporated into public outreach efforts. In addition, should the pedestrian/bicycle facility be advanced for further consideration, accommodations for access by elderly and disabled persons will be made, in accordance with Title VI/environmental justice requirements.

C. Utilities and Infrastructure

1. Existing Conditions

Other infrastructure and major utilities include a rest area along southbound I-95 and the WCHR radio tower north of the rest area and west of Taylorsville Road. A Pennsylvania American Water Company (PAWC) water tower and public water supply well is also situated south of I-95 and west of Taylorsville Road. A PennDOT park and ride lot is situated along Taylorsville Road, north of I-95 and south of Woodside Road.

North of I-95 in Ewing Township, the Ewing-Lawrence Sewerage Authority has a pumping station, east of the NJ Route 29 Interchange at the intersection with Scenic Drive. A TransGas transmission pipeline and facility is located approximately 300 feet to the north of the pumping station off NJ Route 29 (River Road).

At the Bear Tavern Road Interchange, the City of Trenton water tower adjoins I-95. Further south of I-95, the New Jersey Water Supply Authority (NJWSA) Delaware and Raritan Canal office are

[3] A determination of federal funding assistance for this project has not been made at this time.

situated along Bear Tavern Road. The Bear Tavern Road Interchange also provides access to the Trenton-Mercer Airport, to the east.

Other existing utilities in the vicinity of the project include underground fiber optic cables, gas and water mains, electric and telephone lines, as well as aerial telephone and electric cables.

2. Impacts

a) No Build

The No Build alternative would not impact existing utilities and infrastructure.

b) Proposed Action

The proposed action will not impact the major utilities. Because of the similarity in profiles between the existing and proposed conditions, it is not anticipated that underground utilities will need to be relocated. Some aerial utilities and utility features will require relocation, in particular an existing fiber optic cable that is currently attached to the deck of the I-95/Scudder Falls Bridge. A new fiber optic cable will replace the existing cable and will be installed on the new bridge. This work will be done in stages so as not to interrupt service. Other utility features that will require relocation include poles along Woodside Road and Taylorsville Road in Pennsylvania. Additional coordination with affected utility companies will be undertaken during the final design of the project.

c) Incremental Impacts of Pedestrian/Bicycle Facility

The pedestrian/bicycle facility is not expected to incur additional utility impacts.

d) Temporary Construction Impacts

Service for the affected utilities will be maintained during construction, and no service interruptions will occur as a result of construction. If required, the fiber optic cable on the bridge will be permanently relocated to the northern, upstream portion of the bridge that will be constructed under the first phase of construction.

D. Parklands and Recreation Facilities

Information on existing publicly owned parks and recreational areas subject to protection under Section 4(f) of the U.S. Department of Transportation Act is presented in the Draft Section 4(f) Evaluation.

1. Existing Conditions

Existing parklands and recreation facilities include the Delaware River, state parks in PA and NJ, and Lower Makefield Township and Mercer County recreational facilities, which are described below and are shown on Figure II-1.

a) Delaware River Water Trail

The Delaware River from Hancock, New York to Trenton, New Jersey was designated a public recreation water trail in 2007. A water trail is a public recreational boat route suitable for

canoes, kayaks, and small motorized watercraft. The Delaware River Water Trail corridor is divided into three parts: Upper, Middle, and Lower Delaware. The project is located in the Lower Delaware River section, which runs approximately 76 miles just south of the Delaware Water Gap area to Trenton, New Jersey and Morrisville, Pennsylvania. The Delaware River Water Trail within the project area is generally bounded by the top of the river bank and is approximately 1,300 feet in width. Recreational uses on the lower Delaware River Water Trail include tubing, kayaks, canoes, personal watercrafts, and fishing. Recreational activity is heavy during the summer months, and the section of the river upstream of the bridge, on the New Jersey side, includes a whitewater recreation area, known as Scudder Falls.

The Delaware River is a jointly managed by the Pennsylvania Fish and Boat Commission and the New Jersey Department of Environmental Protection. The National Park Service, the Delaware River Basin Commission, the Pennsylvania Department of Conservation and Natural Resources, and the Delaware and Raritan Canal Commission are also involved with various planning, programs, and regulatory aspects for the Delaware River. The Delaware River Greenway Partnership comprised of private and public entities was formed to sponsor development and implement programs and projects for the recreation corridor.

The Pennsylvania Fish and Boat Commission (PFBC) also maintains a boat launch on PA Route 32 (River Road), approximately 0.3 mile south of I-95. According to the Delaware and Lehigh National Heritage Corridor Commission, this boat launch is used for canoes and other small boats for portaging between the river and the Delaware Canal.

b) Delaware Canal State Park

The Delaware Canal State Park in Pennsylvania extends approximately 60 miles between Easton and Bristol, of which four miles extend through Lower Makefield Township. The canal towpath is used by walkers, joggers, bicyclists, cross-country skiers, and bird watchers, and the canal is also used for recreational boating and fishing. I-95 extends over the canal and towpath on a concrete bridge overpass structure.

The Delaware Canal State Park is owned and maintained by the Pennsylvania Department of Conservation and Natural Resources (PA DCNR). The Delaware Canal connects to the Lehigh Canal in Easton and is part of the Delaware and Lehigh National Heritage Corridor, which is also a State Heritage Park. The Delaware Canal towpath is a National Heritage hiking trail. Management of the Delaware and Lehigh National Heritage Corridor is provided by the Delaware and Lehigh National Heritage Corridor Commission, in partnership with the National Park Service and PA DCNR.

c) Delaware and Raritan Canal State Park and Scudder Falls Recreation Area

The Delaware and Raritan Canal State Park in New Jersey extends over a total distance of 66 miles from Frenchtown to New Brunswick. The only linkages between the Delaware Canal State Park and the Delaware and Raritan Canal over the 30 miles that they both parallel the Delaware River are provided by six existing bridge crossings outside the project area. These crossings are noted by signs posted on both sides of the river. Recreational uses of the canal park include hiking, biking, fishing, and canoeing. The park's trail system was designated a National Recreation Trail in 1992.

The Delaware and Raritan Canal extends a distance of roughly four miles through Ewing Township. The Delaware and Raritan Canal extends under I-95 at the NJ Route 29 Interchange, where it also adjoins and extends parallel to NJ Route 175 (Upper River Road). The Scudder Falls Recreation Area along the Delaware River is also situated north of the NJ Route 29 Interchange along and west of the canal park. The Delaware and Raritan Canal State Park includes parking facilities at the

Scudder Falls Recreation Area, which is an access point to the river and a put-in/take-out area for whitewater canoers and kayakers seeking access to Scudder Falls on the Delaware River.

The canal is maintained by the NJDEP, Division of State Parks and is operated and maintained as a water supply by the NJWSA. The Delaware and Raritan Canal Commission has jurisdiction over activities potentially affecting the canal park within a 1,000-foot review zone on both sides of the canal. The need for additional parking at the Scudder Falls Recreation Area is included as an element of the park Master Plan prepared by the Commission.

d) Lower Makefield Township

Recreational areas in Lower Makefield Township include the Snipes Tract, a 34-acre township-owned property, located south of I-95 between Quarry and Dolington Roads. A portion of the property fronting Dolington Road is used as soccer fields by Yardley-Makefield Soccer, which sponsors year-round youth soccer programs for boys and girls (ages 5 through 19), as well as adult leagues for men and women. According to the Lower Makefield Township Parks and Recreation Department, plans are being developed for a recreational soccer complex on the Snipes Tract. The preliminary plan that was developed by the township (as of March 5, 2007) provides ten soccer fields and 352 parking spaces, including a parking lot fronting along I-95.

Public recreational lands in Lower Makefield Township include the ballfields at the Afton Elementary School and the Quarry Hills Elementary School, on Quarry Road.

The township has also constructed walking paths and trails along a number of roads in and around the project area. Trail improvements are often funded by developers undertaking projects in the township. According to Lower Makefield Township officials, a Woodside Road trail connector to Taylorsville Road is planned using this funding mechanism, depending on the extent of project improvements in this area. Additional trail connections along Quarry Road and Dolington Road over I-95 are planned to possibly be constructed in conjunction with the Snipes Soccer Complex project.

e) Ewing Township

Public recreational facilities within the project area include the Mountain View Golf Course, which is located northwest of the Bear Tavern Road Interchange (Exit 3 off I 95), with access provided off Bear Tavern Road to the north. This is a county recreational facility that includes an 18-hole public golf course, with amenities such as a club house and food service.

2. Impacts

a) No Build

Under the No Build alternative, there would be no impact on public parks or recreation areas, other than difficulty accessing the parks during congested traffic peak periods.

b) Proposed Action

The existing I-95/Scudder Falls Bridge has seven existing piers in the Delaware River, and the new bridge will have five piers located in the river. Fewer piers in the water will result in less obstruction to recreational navigation along the Delaware River Water Trail, which will represent an improvement over existing conditions.

The project will span a greater portion of the Delaware Canal State Park in Pennsylvania, the Delaware River, and the Delaware and Raritan Canal State Park in New Jersey. The width of the bridge over the Delaware Canal State Park will increase by approximately 85 feet. The span width of the I-95 bridge over the Delaware and Raritan Canal will be similar to existing, but two new ramp bridges, each of approximately 40 feet in width will be constructed over the canal. The new I-95/Scudder Falls bridge over the Delaware River will be approximately 100 feet wider than the existing bridge. This would result in an increase in the area spanned of approximately 2.8 acres over the Delaware River, approximately 0.3 acre over the Delaware Canal, and approximately 0.4 acre over the Delaware and Raritan Canal.

Improvements in traffic operations on I-95 would improve access to public parklands in Pennsylvania and New Jersey, particularly the canal parks in both states. The project will not permanently adversely affect recreational usage of the towpaths and canals within these state parks. The project impacts largely involve greater shading, although this is not considered to represent a substantial impact on park or recreational users since the portions of the towpaths and canals spanned by the bridges are a very small portion of the entire system.

The project will also affect 0.4 acres of state parkland within the Delaware and Raritan Canal State Park in New Jersey for construction of new bridge piers outside of the highway right-of-way. The area where this work is proposed is along the back slope of the Delaware and Raritan Canal immediately adjacent to NJ Route 175 (Upper River Road) and in the general location of the existing bridge pier. The area is on the opposite canal bank from the canal towpath, and is not used by recreation users because it is generally inaccessible due to vegetation and its location immediately adjacent to NJ Route 175.

Approval from the New Jersey Green Acres Program and the Delaware and Raritan Canal Commission will be required for the impacts on the Delaware and Raritan Canal State Park. Coordination will also continue with the National Park Service, the Delaware and Lehigh National Heritage Corridor Commission, and the Delaware Canal State Park manager regarding the proposed Delaware Canal crossing.

c) Incremental Impacts of Pedestrian/Bicycle Facility

If implemented as part of the proposed action, provision of a pedestrian/bicycle facility across the Delaware River would interconnect the recreational facilities on each side of the Delaware River and the two canal parks and would provide a regional pedestrian/bicycle connection. At the two closest river crossings (the New Hope-Lambertville Bridge, 8 miles to the north, and the Calhoun Street Bridge, 4 miles to the south in Trenton), cyclists are required to dismount and walk bicycles across the bridges. Provision of a pedestrian/bicycle facility on I-95 is considered to represent recreational benefits to park users. A final decision on the pedestrian/bicycle facility will be made during final design.

The proposed pedestrian/bicycle facility is not expected to result in additional impacts to the Delaware River, beyond additional shading of the river below. The additional width of the I-95/Scudder Falls Bridge would result in shading of an additional 0.3 acres of the Delaware River, which is expected to have a nominal impact on recreational users.

The proposed pedestrian/bicycle facility will not result in impacts on the Delaware Canal or permanent right-of-way acquisition within the canal state park. The proposed pedestrian/bicycle facility ramp would be placed outside the state park boundary of the Delaware Canal, but would transition to the existing towpath at the Woodside Road crossing. A temporary easement for grading would be required within the state park boundary to transition the pedestrian/bicycle lane

to the existing towpath (multi-use trail).

The proposed pedestrian/bicycle facility will be constructed within the legal right-of-way and on lands owned by New Jersey Department of Environmental Protection within the canal state park. The proposed construction of the pedestrian/bicycle lane on the I-95/Scudder Falls Bridge and ramp would affect an additional 0.2 acre of parkland within the Delaware and Raritan Canal, for a total of approximately 0.6 acre of park impact. This property could be acquired from the state park or temporary easements could be obtained for construction and portions of the pedestrian/bicycle facility within the legal highway right-of-way deeded to the state park. Also, the construction of the pedestrian/bicycle lane and ramp would require temporary easements for construction to build the ramp and retaining wall adjacent to the canal towpath.

d) Temporary Construction Impacts

The I-95 Scudder Falls Bridge Improvement Project will require temporary occupancy of the Delaware River Water Trail during construction. Construction will involve the placement of the new bridge upstream but adjacent to the existing bridge and the demolition of the existing bridge. The construction of the new bridge piers and the demolition of the existing piers within the Delaware River will occur within cofferdams thus allowing pier and foundation construction to occur in the dry.

Construction access to existing and proposed bridge piers will be provided by the use of temporary causeways. A trestle type causeway will be used during construction. The causeway limit for each stage will be approximately 400 to 600 feet in length from the river shoreline. The trestle causeway is, in effect, a narrow temporary bridge that will occupy approximately half of the river at a time. The trestle will be constructed in four stages. The trestle causeway construction, and conceptual plan views and elevations of the temporary trestle causeway are presented in Section III.E., "Construction."

Public use of the Delaware River Water Trail will be maintained during construction with some restrictions. For safety reasons during construction, recreation users will be restricted from work areas; i.e., areas where causeways are in place and construction is occurring. At any given time during the various construction activities for the I-95/Scudder Falls Bridge, about one half of the river will be available for recreational use. As part of the mitigation, warning signs mounted on buoys will be installed upstream and downstream of the bridge location delineating the construction activities and the closed portion of the river to recreational users. Shielding and other common methods will be used to protect the workers and prevent debris from falling into the river. The durations for the different types of construction activities are described below:

- **Causeway Construction:** Each stage of the causeway construction, use, and removal will take only about one half of the river. This work will take two to three months for each stage. The other half of the river will be available for recreational use.
- **Pier Construction:** Similar to the causeway, construction of the new piers and removal of the existing pier will only occur within one half of the river at a time. This work will take two to three months for each pier. The other half of the river will be available for recreational use.
- **Bridge Superstructure Construction:** The superstructure construction will include erection of the girders and construction of the new deck. Shielding will be placed between the erected girders before the start of deck construction to prevent debris from falling into the river. This work will take up to one year. These activities will only occur within one half of the river at any given time. The other half of the river will be available for recreational use.

- **Existing Bridge Superstructure Removal:** The superstructure removal will include demolition of the deck and removal of the girders. Shielding will be placed between the girders before the start of deck demolition to prevent debris from falling into the river. This work will take six months to one year. These activities will only occur within one half of the river at any given time. The other half of the river will be available for recreational use.

Work activities in the area of the canals would occur over the construction period. The majority of work near the canals will be scheduled during daytime hours, and thus will be noticeable to towpath users, both visually and audibly. This impact is considered minor in that the construction area represents only a small portion of the total canal experience, and this area is already adjacent to transportation uses. Limited construction operations may be necessary during nighttime hours, which should not affect users.

For safety reasons during construction, there may be a need to temporarily close the towpaths during overhead bridge construction and divert users away from the construction area. This would occur during erection of bridge girders for the I-95 Bridge and the NJ Route 29 ramp bridges over the canals. These will be short duration closures, which could be scheduled at night, when towpath usage is minimal.

Temporary encroachment into a portion of the towpaths may be necessary for pouring and curing of concrete foundations prior to backfilling for a period of up to approximately 30 days. However, during these activities, the towpath will be open and available for use. Otherwise, full use of the towpaths will be maintained during construction. Construction areas for bridge piers and abutments near the towpaths would be positively separated for the safety of the towpath users. This would be a temporary effect and scheduled closings will be coordinated with the canal agencies.

3. Mitigation

The project will continue coordination with the PAFBC, NJDEP, and the Delaware River Greenway Partnership on project actions regarding the public recreational activities on the Delaware River Water Trail. In addition to the PADEP Chapter 105 and US ACE Section 404 permits, the project will require the PFBC "Permit to Install Floating Structures and Private Aids to Navigation".

The proposed project has been designed to minimize the number of piers in the Delaware River. This will reduce the number of bridge structural features, thereby providing more river trail open space. Moreover, the proposed use of a trestle causeway will involve minimal footprint and obstructions to flow in the river. Additional Best Management Practices to minimize siltation during construction are described in Section IV.G.

Impacts on the Delaware and Raritan Canal State Park will be ameliorated by minimizing the footprint of the proposed bridge piers and abutments within the state park to the extent practicable. Existing piers adjacent to the Delaware and Raritan Canal will be relocated further outside of the canal in the design of the new I-95 Bridge at NJ Route 29. The existing bridge piers within or adjoining the Delaware and Raritan Canal may be cut off at or above the embankment or canal bottom, in accordance with the preferences of the Delaware and Raritan Canal Commission, to minimize excavation within the canal. To preserve openness and improve aesthetics along the Delaware and Raritan Canal under the bridges, the piers will be designed to let light in to the maximum extent allowed by engineering design. Aesthetic treatments to be incorporated into the design, as requested by the canal agencies, are discussed under Section IV.F.3, "Aesthetic and

Visual Characteristics." To minimize audible effects on the Delaware and Raritan Canal, the existing ramp from River Road (NJ Route 175) to I-95, northbound will be gated and restricted for use by emergency vehicles only.

In coordination with agencies that have jurisdiction over the canals, a construction protection plan will be prepared for work along the Delaware Canal in Pennsylvania and the Delaware and Raritan Canal in New Jersey. The plan will set forth specific measures that will protect the canal prisms, towpaths, and any related features during the construction period. The construction protection plan will include measures to protect the dry-laid stone wall along the eastern side of the Delaware Canal prism and towpath, immediately north of the existing I-95/Scudder Falls Bridge. The protection plan will provide measures for minimizing direct impacts to the canal prisms and towpaths during the removal of the piers of the existing I-95/Scudder Falls Bridge. In addition, to the extent possible, the plan will indicate that construction areas will be located outside the canal prism and towpath features and will be separated for the safety of towpath users.

Coordination will continue with officials having jurisdiction over the canal state parks in formulating project designs, plans for temporary construction work, and identifying mitigation measures. This agency coordination effort will include the PA DCNR, Delaware Canal State Park, and Delaware and Lehigh National Heritage Corridor Commission in Pennsylvania and the NJDEP Delaware and Raritan Canal Commission, and the NJDEP Green Acres Program in New Jersey.

E. Farmlands

1. Federal and State Protections

Farmlands preservation is mandated under the U.S. Farmland Protection Policy Act (FPPA) and under Pennsylvania and New Jersey state requirements. The FPPA protects areas mapped as important farmland soils by the U.S. Department of Agriculture (USDA). The FPPA applies only to federally-funded[4] projects and specifically exempts areas mapped as farmland soils that are already in or committed to urban development. The project area is designated as urban by the U.S. Census Bureau and is therefore exempt from the requirements of the Farmland Protection Policy Act.

Pennsylvania farmland protection is mandated under:

- Pennsylvania Act 1976-100, the Administrative Code of 1929 (Act 100),
- Pennsylvania Act 1981-43, the Agricultural Area Security Law (Act 43), and
- Pennsylvania Agricultural Land Preservation Policy (4 PA Code Chapter 7, §7.301 et seq., Executive Order 2003-2 (March 20, 2003)).

Productive agricultural lands under Act 100 and Act 43 are defined as lands used for commercial agricultural production (crops, livestock, and livestock products). Act 43 established Agricultural Security Areas (ASAs) and Agricultural Conservation Easements. An Agricultural Security Area must encompass a minimum of 250 acres and can enroll noncontiguous, individually owned parcels. Farm properties must have either a minimum size of 10 acres or an anticipated yearly gross income of at least $2,000 from agricultural production to be eligible for inclusion in an approved ASA. Act 43 agricultural conservation easements, protecting a property from non-agricultural development, can only be obtained by the government or qualified private conservation organizations for properties within an established ASA.

[4] A determination of federal funding assistance for this project has not been made at this time.

Act 100 established the Agricultural Lands Condemnation Approval Board (ALCAB), a six-member independent administrative board with authority to make decisions over condemnations of productive agricultural land for certain types of transportation projects. Evaluations mandated under Act 100/Act 43 of productive agricultural land impacts include preparation of a Farmland Assessment Report for review by ALCAB. Improvements to existing highways are exempt from the provisions of Act 100 and Act 43 and from ALCAB jurisdiction under these laws.

All transportation projects must adhere to the Pennsylvania Agricultural Land Preservation Policy (ALPP). Under the ALPP, prime agricultural land is defined as land devoted to active agricultural use (not including growing of timber) for the preceding three years that falls under one of the ALPP priority categories. Prime agricultural lands are classified according to the highest and best use, which are listed below in order of priority:

- Preserved farmland, including deed restriction or permanent agricultural conservation easement;
- Agricultural Security Areas (ASAs);
- Farmland enrolled for preferential tax assessments, including Act 319 (Clean and Green);
- Farmland preserved through effective agricultural zoning, and
- Farmland classified as unique or as land capability class I, II, III, or IV farmland by the Natural Resources Conservation Service (NRCS).

Under the Agricultural Land Preservation Policy, PennDOT cannot convert prime agricultural uses to nonagricultural uses if other feasible alternatives to the conversion are available.

In New Jersey, the Agriculture Retention and Development Act provides the framework for the New Jersey Farmlands Preservation Program. The State Agriculture Development Committee, administers the state farmland preservation program, and County Agriculture Development Boards assist in the implementation and coordination of the program in each county. The County Agriculture Development Boards have the authority to establish Agricultural Development Areas, or areas where agriculture is determined to be the preferred use of the lands.

2. Existing Farmlands

The project area adjoins preserved farmlands in Lower Makefield Township and Ewing Township, as well as private farms in Pennsylvania. These agricultural uses adjoining I-95 in the project area are described in more detail in the following section and are shown on Figure II-2.

a) Lower Makefield Township

Under the LMTFP program and ordinance, the Lower Makefield Farmland Preservation Corporation (LMFPC) has preserved at least 338 acres of farmlands that are under its ownership and control. The township has also established, under the Pennsylvania Agricultural Security Areas Act (Act 43), an Agricultural Security Area that includes enrolled private farmlands and LMFPC and township-owned farmlands. Figure II-2 displays productive agricultural lands adjoining I-95 in the project area and presents information on all of the ALPP prime agricultural land priority categories. Table IV-6 presents the approximate acreage at the highest applicable ALPP category of prime agricultural lands adjoining I-95 in the project area. These farmlands along I-95 are described below, from east to west:

- **Clearview Farm northwest of the Taylorsville Road Interchange:** This 25-acre farm was deeded to the Lower Makefield Farmland Preservation Corporation as part of the development

of the Clearview Estates residential complex and was formerly known as the "Black Farm". According to the Lower Makefield Farmland Preservation Corporation, a farmer is cultivating vegetable crops (corn) on the property for sale under a 5-year lease. This property is being farmed by the Charlann Farms farmer, who has been growing corn and soybeans on the property in alternating years. The property includes a tree buffer where it adjoins Woodside Road, I-95, and an adjoining property.

- **Makefield Brook Farm north of I-95 between Quarry and Dolington Roads:** This 32-acre property was deeded to the Lower Makefield Farmland Preservation Corporation as part of the Makefield Brook residential development to the north. This property includes farmfields and tree buffer along I-95 and Dolington Road. This agricultural land was leased by the Breezyvale Farms operation until 1999-2000, and is currently farmed by the Charlann Farms farmer. The farmer is growing soybeans and corn on the property.

- **Torbert Farm northeast of the PA Route 332 Interchange:** This 109-acre privately owned farm adjoining I-95 and PA Route 332 has been operating since the 1930s and includes a commercial horse livery. This livery is operated by the owner to board horses and give riding lessons. The property is enrolled in the Agricultural Security Area. Approximately 80 acres of the farm are leased to the Charlann Farms operation. This farmer is growing corn, soybeans, timothy (hay), wheat, barley, pumpkins, and vegetables on the fields that are commercially sold. The property also has an Act 319 (Clean and Green) preferential tax assessment.

- **Bridle Estates Farm adjoining north side of I-95, south of Bridle Estates:** This 39-acre farm, which was deeded by the Bridle Estates subdivision developer, is owned by the Lower Makefield Farmland Preservation Corporation. These farmlands adjoin the north side of Breezyvale Farms and have been leased to the Breezyvale Farm operation for the past 12 years. As described below, the farmer grows crops that are used for cow feed (corn, alfalfa, oats).

- **Wright Farm (Breezyvale Farms, Inc.) northwest of the PA Route 332 Interchange:** This 51-acre private commercial farm on the west side of I-95 at PA Route 332 has been operating since 1926. This farm operation is enrolled in the Agricultural Security Area. The Breezyvale Farms operation is contracted to raise cows from when they are young to when they are ready to be sent off when they are of milking age. The property includes approximately 3 acres for the farm buildings and lawn, 15 acres for pasture, and on the remainder they are growing crops to be used as cow feed (corn, alfalfa for hay, oats). The property has an Act 319 (Clean and Green) preferential tax assessment.

Table IV-6—Pennsylvania Productive Agricultural Land and Prime Agricultural Land under the Agricultural Land Protection Policy (ALPP) adjoining I-95 in the Project Area

Property	Size (Acres)	Productive Agricultural Land	Prime Agricultural Land (Highest Applicable Category) under ALPP (acres)				
			Preserved Farmland	Act 43 ASA	Act 319 Preferential Tax Assessment	Zoning	Unique Soils/ Land Capability Classes I-IV
Clearview Farm	25	√	25				
Makefield Brook Farm	32	√	32				
Torbert Farm	109	√		109			
Bridle Estates Farm	39	√	39				
Wright Farm (Breezyvale Farms)	51	√		51			

b) Ewing Township

The only agricultural use in the project area in Ewing is the New Jersey Department of Corrections Jones Farm that adjoins approximately 1,000 feet of the south side of I-95, west of Bear Tavern Road. This property is a working farm operated by inmates at this state correctional facility and includes a dairy operation further south on Bear Tavern Road.

There are no other agricultural uses or Agricultural Development Areas that have been identified along the I-95 project area in New Jersey. According to the New Jersey State Agricultural Development Committee, the development rights for the 300-acre state property that includes both Jones Farm and the New Jersey State Police Headquarters were deeded to the New Jersey Department of Agriculture in 1999. This would have restricted future development on the entire south side of I-95 to agricultural uses only, with the exception of improvements needed to ensure or improve public safety. However, the original deed has since been amended to unrestrict 100 acres encompassing the police property to accommodate potential facility expansion.

3. Impacts

a) No Build

Under the No Build alternative, there would be no impacts on farmlands.

b) Proposed Action

Where I-95 borders active agricultural operations in Pennsylvania and New Jersey, the improvements will be limited to the I-95 right-of-way, and the I-95 mainline improvements will not affect areas of actively cultivated farmland. However, the improvements at the Taylorsville Road intersection with Woodside Road include widening along Woodside Road, north of I-95.

The Clearview Farm property is considered to be prime agricultural land (land currently in agricultural use, which has been devoted to agricultural use for the preceding three years) under the Pennsylvania Agricultural Land Preservation Policy (ALPP). Under the ALPP, the property is subject to protection as preserved farmland (highest and best use under the ALPP). Although the property is considered to be productive agricultural land under Acts 100 and 43 (land used for agricultural production for commercial purposes), the project may be considered exempt from ALCAB jurisdiction as an improvement to an existing highway. Formal determinations regarding ALPP and ALCAB jurisdiction will be obtained during final design. This farm, similar to other LMFPC preserved farm parcels, is part of the Agricultural Security Area within Lower Makefield Township. Because the project area is classified as urban by the U.S. Census Bureau, the project is exempt from FPPA.

The project impacts would occur along the northern edge of the Clearview Farm property where it adjoins Woodside Road and where a forested buffer extends along the property. Permanent right-of-way acquisition would be required of 0.9 acre, of which 0.08 acre will consist of active farmlands.

c) Incremental Impacts of Pedestrian/Bicycle Facility

The pedestrian/bicycle facility would not affect additional farmlands at Clearview Farm. Impacts of the facility would be confined to the area between Taylorsville Road and NJ Route 29, and there are no farmlands in this area adjoining I-95.

d) Temporary Construction Impacts

Temporary grading may affect an additional half acre of farmlands. Affected areas will be regraded and restored upon completion of construction and would be available for farmlands use.

4. Mitigation

Several design alternatives were considered to minimize farmland impacts.

- **Retaining wall:** The installation of a retaining wall along the proposed edge of shoulder could reduce the area of right-of-way acquisition within Clearview Farm to 0.5 acre, with practically no impact to the active farmland).
- **Use of Narrower Lanes and Shoulders:** To further minimize impacts to the property, the use of minimum design criteria was investigated (use of 10-foot travel lanes and six-foot shoulders with a retaining wall). The corresponding right-of-way impact for this minimum design is approximately 0.28 acre with no impact to the active farmland.
- **Maintain One-Lane Approach:** To avoid any impact to this property, the existing roadway cross-section would need to remain intact (one 12-foot travel lane in each direction with no shoulders), however, this is not recommended due to projected traffic volumes and required local road design criteria. Under the worst case traffic peak hour (A.M. peak), the Woodside

Road and Taylorsville Road intersection is projected to operate at a failing grade (LOS E) in 2030 if no capacity improvements are made at this intersection.

The proposed design of Woodside Road currently utilizes desirable 12-foot travel lanes (with a two-lane approach at Woodside Road) and shoulder widths of 10 feet, with 2:1 sideslopes. The use of alternative designs, as described above, to minimize or avoid farmland impacts will be further evaluated and considered during final design. During final design, coordination with the Lower Makefield Farmland Preservation Corporation will be performed regarding impacts to Clearview Farm and appropriate use of minimization and/or mitigation measures.

F. Aesthetic and Visual Characteristics

1. Existing Conditions

a) Views from the I-95/Scudder Falls Bridge and I-95 Mainline

At approximately 1,150 feet across, the Delaware River is relatively wide at the I-95/Scudder Falls Bridge, which affords scenic vistas of several miles of the river and its forested banks upstream and downstream of I-95. Park Island is visible as an area of forested vegetation adjoining the upstream side of the bridge, and several other islands in the river can be seen from the bridge (see Figure IV-3). The visual elements on the bridge include the narrow northbound and southbound roadways on the bridge, which lack inside and outside shoulders and are closely bracketed on either side by the concrete median barrier and the low outer bridge railing (see Figure IV-3).

Figure IV-3—Views from I-95/Scudder Falls Bridge, looking north (upstream) at Delaware River (left photo) and looking east at the bridge (right photo)

On the Pennsylvania side of the river, the I-95 roadside is heavily forested, which shields and buffers many of the adjoining land uses from view (Figures IV-4 and IV-5). Views of adjoining land uses along the I-95 mainline consist primarily of adjoining residential developments and farmlands. Many of the residences adjoining I-95 are buffered by landscaping, berms, fencing, or a combination of these.

Figure IV-4—View looking east from Dolington Road Overpass, towards rest area (along southbound lanes) (northbound lanes are at the right of the photo)

Figure IV-5—Views looking east from I-95 mainline at Dolington Road overpass (left photo) and at I-95 west of Taylorsville Road, where it crosses the Delaware Canal (right photo)

At the PA Route 332 Interchange, the views are predominantly of the adjoining agricultural operations and fields and also include views of the hotel and commercial buildings within the Lower Makefield Corporate Center. Dense forest vegetation dominates the adjoining I-95 roadside areas. The I-95 right-of-way is wider west of Taylorsville Road and includes views of a grassed median (separating two travel lanes on each side). Heading northbound towards the Taylorsville Road Interchange, views along I-95 include those of overpassing roadways at Quarry Road and Dolington Road, and the rest area along the southbound lanes.

Where I-95 extends over Taylorsville Road, the area opens up, and the underpassing roadway and adjoining interchange ramps are visible from the I-95 overpass. At the Delaware Canal, the views of the canal are partially obscured by vegetation, and the canal park is not highly visible. At the bridge over PA Route 32, a Pennsylvania scenic road, views from I-95 are partially obscured by vegetation.

On the New Jersey side, the views within the NJ Route 29 Interchange are dominated by the underpassing highways and adjoining ramps (Figure IV-6). NJ Route 29 is a designated New Jersey State Scenic Byway, known as the Delaware River Scenic Byway. The Delaware and Raritan Canal is more visible from surrounding roadways, due to its location within the open interchange area, than the canal crossing on the Pennsylvania side.

Figure IV-6—Aerial view of I-95 at the NJ Route 29 Interchange, looking north

East of the NJ Route 29 Interchange, residential subdivision and apartment complexes are visible immediately north of the interchange, but are screened from view to some extent by fencing, trees, and berms (Figure IV-7). The views from the southbound lanes along the remainder of the I-95 mainline in New Jersey are dominated by a noise barrier that obstructs views of the adjoining residential subdivisions. Along the I-95 northbound lanes, the fencing and vegetation partially obscures views of facilities within the New Jersey State Police facility and, approaching the Bear Tavern Road Interchange, the buildings and cultivated fields within Jones Farm Correctional Facility (Figure IV-7). The views of the I-95 roadway are of a wider roadway (three travel lanes in each direction) than in Pennsylvania, bisected by a narrow median that is concrete to the south and grassed to the north, with the roadside areas dominated by berms, vegetation, fencing, and the noise barrier. Approaching Bear Tavern Road, the I-95 mainline is in a rock cut, and views are primarily of rock ledge approaching the interchange. At the interchange, buildings within the Mountain View Office Park, the City of Trenton water tower, and the NJDOT maintenance facility are visible.

Figure IV-7—Views of I-95 Mainline east of NJ Route 29 looking east

b) Views of the I-95/Scudder Falls Bridge and I-95 Mainline

Where it is not obscured by vegetation, the I-95/Scudder Falls Bridge is highly visible from the shoreline of the Delaware River both upstream and downstream of the bridge, (Figure IV-8). It is the most prominent visual element on the river in this section of the Delaware River. Both sides of the river are flanked by state-designated scenic roads that are proximal to the historic canals in each state. PA Route 32, a Pennsylvania designated scenic road, extends along the west bank of the Delaware River. The I-95/Scudder Falls Bridge spans over PA Route 32 (see Figure IV-9). At the crossing of the Delaware Canal, I-95 is visible from both sides of the canal where it extends over the canal and towpath on a single-span bridge structure (Figure IV-9).

Figure IV-8—Aerial view looking southeast at I-95/Scudder Falls Bridge

Figure IV-9—Views looking south at I-95/Scudder Falls Bridge over PA Route 32 (left photo) and I-95 crossing over Delaware Canal (right photo)

The east (New Jersey) river bank is occupied by NJ Route 29, also known as the Delaware River Scenic Byway (Figure IV-10). At NJ Route 29, the open interchange area includes the elevated structures for I-95 and NJ Route 29 and nineteen ramp merges and seven at-grade intersections (Figure IV-10). From the Delaware and Raritan Canal within the NJ Route 29 Interchange area, the overpassing bridges for I-95 and NJ Route 29, which include piers within and adjoining the canal, are highly visible from the towpath (Figure IV-10). From the Delaware and Raritan Canal towpath, views within the interchange are dominated by roadways and interchange ramps that closely border the canal, and the canal runs adjacent to the (riprapped) slope for NJ Route 175 roadway along its length in the project area (Figure IV-10).

Figure IV-10—Views looking south at I-95 Bridges from NJ Route 29 (left photo) and from Delaware and Raritan Canal towpath (right photo), where it adjoins NJ Route 175

From residential areas in Pennsylvania and New Jersey, much of the I-95 mainline in Pennsylvania and New Jersey is shielded by vegetation, fencing, and berms (Figures IV-4, IV-5, IV-7, and IV-11). The noise barrier along the southbound lanes of I-95 in New Jersey also blocks views of the highway, and, where I-95 is in a cut approaching the Bear Tavern Road Interchange, the highway is not readily visible from adjoining areas.

Figure IV-11—Views looking towards I-95 from abutting neighborhoods: from Lower Hilltop Road in Lower Makefield Township, looking north (left photo) and from Ronit Drive in Ewing Township, looking south (right photo)

2. Impacts

a) No Build

Under the No Build Alternative, the views from, and of, I-95 would not change.

b) Proposed Action

The new I-95/Scudder Falls Bridge would be a more prominent landscape feature, with its wider cross-section. The new I-95/Scudder Falls Bridge will be similar in appearance to the existing bridge structure, although there will be fewer piers within the Delaware River. The view from the bridge will be obstructed by high (4-feet, 2-inches) outer crash barriers and a 200-foot to 300-foot-long noise barrier, 14 feet in height, along the southbound side of the bridge adjoining Pennsylvania.

The views of the I-95 roadway for drivers will be of a wider highway on the bridge and on the mainline. On the I-95 mainline in Pennsylvania and New Jersey, existing grassed median areas will be paved, and a concrete median barrier will be installed. Where proposed, noise barriers will dominate views of the roadside.

At the crossing of PA Route 32, I-95 would span a larger section of this state-designated scenic road, which would create a greater tunnel effect for drivers. However, this is considered to be a localized effect at the I-95 underpass, and the additional shading is not considered a substantial aesthetic impact. At the Delaware Canal crossing, a larger section of the canal will be spanned, which will create additional shading.

The views of the adjoining Taylorsville Road Interchange will include a widened Taylorsville Road and Woodside Road, although one southbound I-95 off-ramp would be removed. The existing approaches at the Taylorsville Road/Woodside Road would be widened, which will remove forested buffer area adjoining the intersection and also some areas of actively cultivated fields. With the clearing of this forested buffer, the adjoining agricultural field should be more visible from Woodside Road.

At the Delaware and Raritan Canal crossing, I-95 and adjoining ramps will span a larger section of the canal, and there will be two new bridges for overpassing ramps. However, the NJ Route 29 Interchange would be bisected by fewer roadways, and the highway approaches would be more consolidated. This consolidation of ramps and approaches would provide larger areas of grassed areas within the interchange, than the existing interchange configuration.

The views of the I-95 mainline from adjoining areas will not substantially change, as the highway is largely screened and buffered by vegetation. Clearing of roadside vegetation is minimized by selection of the inside widening for the Pennsylvania mainline as part of the proposed action. The exception to this is in areas where noise barriers are proposed, requiring additional clearing of roadside vegetation. Ranging in height from 10 to 18 feet, the noise barriers will be new, visible features in views from adjacent properties. The noise barriers will also shield I-95 from view from adjoining properties.

c) Incremental Impacts of Pedestrian/Bicycle Facility

If implemented as part of the proposed action, the provision of a pedestrian/bicycle facility would result in a wider I-95/Scudder Falls Bridge and the users would be visible to drivers. The proposed pedestrian/bicycle facility will result in approximately twelve feet of additional width on the

I-95/Scudder Falls Bridge, a seven percent increase in the proposed bridge's width. The proposed pedestrian/bicycle facility will be physically separated from the I-95 travel lanes, but will not introduce a new separate structure across the Delaware River. The views along the Delaware River and surrounding area will not be obstructed. Safety barriers along the pedestrian/bicycle facility would not obstruct views of the Delaware River and surrounding area by bicyclists and pedestrians. The pedestrian/bicycle facility will not have an adverse impact on the viewshed along the Delaware River. Users of the pedestrian/bicycle facility will have views of the Delaware River on the I-95/Scudder Falls Bridge and at the landing adjoining the south (river) side of the NJ Route 29 Interchange.

The Pennsylvania landing proposed on the DRJTBC property will provide views of the Delaware Canal and Woodside Road, which will be widened to provide a trail connection to the canal. The proposed pedestrian/bicycle lane will not cross over the Delaware Canal. A ramp would need to be constructed to provide access from the proposed bridge to the Delaware Canal towpath (multi-use trail). This ramp would transition to the existing towpath at the Woodside Road crossing. Due to elevation differences the ramp switchback will be on structure while the remaining section of the ramp (pathway) will be on fill. The proposed pedestrian/bicycle facility will not result in an adverse impact on the viewshed area of the Delaware Canal and surrounding area. Some vegetation will be removed to construct the proposed pedestrian/bicycle facility ramp and pathway.

Except where it will join the canal towpath, the proposed pedestrian/bicycle facility would be located several hundred feet away from the Delaware and Raritan Canal and will not encroach on the views. The canal towpath users will have a view of the proposed ramp and retaining walls in the immediate area of the junction of the two paths. The ramp in this area will be constructed on contained fill with retaining walls on both sides to transition to the existing towpath elevation. The retaining walls will be a new visual feature to Delaware and Raritan Canal users over a distance of approximately 200 to 400 feet. The proposed pedestrian/bicycle lane on the I-95/Scudder Falls Bridge will not have an adverse impact on the viewshed area of the Delaware and Raritan Canal and surrounding area. The location of the ramp would enhance views of the Delaware River by the users. The design of the safety barriers will need to be evaluated during final design to provide a design that meets safety criteria but also does not obstruct views of the users.

d) Temporary Construction Impacts

Construction of the project may involve temporary aesthetic impacts within the area of the I-95/Scudder Falls Bridge construction, at interchanges, and within the I-95 mainline. The equipment and materials within staging and storage areas and the temporary causeways within the river may be visible, particularly to drivers. Because many areas of I-95 are shielded from adjoining properties by berms, vegetation, or the noise barrier, most of the I-95 construction will not be visible from areas adjoining the highway. The causeway construction within the Delaware River may be visible from sections of NJ Route 29 and PA Route 32, although vegetation along the river bank may screen these views to some extent. However, this is a temporary effect during the 4-year construction period, because the causeways will be removed after completion of construction.

3. Mitigation

Aesthetic treatments will be provided at the Delaware River and canal crossings. The bridge piers and abutments immediately adjacent to the Delaware Canal and Delaware and Raritan Canal and retaining walls at the canals will be faced in stone, as requested by the Delaware and Raritan Canal Commission, or treated to replicate a stone-faced abutment, and landscaping will be used to

enhance visual quality for park users. Consultation with the canal agencies will be performed in developing the design plans and treatments for the bridge piers and abutments.

G. Surface Waters

1. Existing Conditions

Surface Waters in the project area include the Delaware River, the Delaware Canal in Pennsylvania, and the Delaware and Raritan Canal and Reeder's Creek in New Jersey, and their tributaries (see Figure III-22).

a) Delaware River

The section of the Delaware River at the I-95/Scudder Falls Bridge is approximately seven miles above the head of tide, which is located south at the Trenton-Morrisville Bridge, and is considered a freshwater river in the project area. The Delaware River is a source of potable water supply for nearly 15 million people and is used for many recreational uses, including fishing and boating.

Detailed information on surface waters is presented in Technical Memorandum No. 16, Surface Waters—Existing Conditions.

At the I-95/Scudder Falls Bridge location, the river is approximately 1,150 feet wide and is relatively shallow. According to normal water elevations recorded at the bridge, normal water depth can be as shallow as four feet in Pennsylvania and seven feet in New Jersey. The existing bridge crosses the Delaware River at the downstream end of Park Island (also known as Scudder Falls Island) and a complex of smaller islands is located immediately downstream. The I-95/Scudder Falls Bridge is supported by nine bridge piers, seven of which are located in the water, one is on the New Jersey bank, and one is landward of River Road in Pennsylvania.

Due to the shallow depths of the river, navigation in this section of the river is restricted to canoeing and small craft boating. Due to the shallow river depths, the U.S. Coast Guard (USCG) has determined that a USCG bridge permit for the project is not required. The USCG has jurisdiction over navigable waterways, including the Delaware River, that accommodate interstate commerce under the U.S. Rivers and Harbors Act. However, under the U.S. Coast Guard Authorization Act of 1982, USCG bridge permits are not required for construction of bridges in non-tidal waters not presently used as, or susceptible to use as, a means to transport interstate commerce.

The project is not within the area of the Lower Delaware River which is designated as a National Wild and Scenic River. The designation ends approximately six miles upstream (north) of the project area at Washington Crossing. Water from the Delaware River is diverted to supply the Delaware Canal in New Hope, Pennsylvania and to supply the Delaware and Raritan Canal in Stockton, New Jersey.

Pennsylvania surface water quality standards (PA Code Title 25-Chapter 93) classify the Delaware River as a warmwater fishery and migratory fishway waterway. According to the Delaware River Basin Commission and the New Jersey Department of Environmental Protection's N.J.A.C. 7:9B—Surface Water Quality Standards, the Delaware River within the project area is classified as Zone 1E. This zone has many designated uses, including agricultural water supplies, industrial water supplies after reasonable treatment, maintenance and propagation of resident game fish and other

aquatic life, public water supplies after reasonable treatment, recreation, spawning and nursery habitat for anadromous fish and wildlife uses.

b) Delaware Canal

The Delaware Canal in Pennsylvania is a 60-mile long and 60-foot wide linear park that begins in Easton and terminates in Bristol. The headwaters for the canal are supplied by the Lehigh River in Easton. The canal has 24 locks that, at one time, raised and lowered the water level 165 feet. Today, the canal's depth varies from five feet to less than one foot. In the summer months, when water levels drop in the Delaware River, the flow supplying the canal diminishes, and the water levels in the canal also drop. A waste gate, located on the east side of the canal just north of Woodside Road, is available to regulate flow and discharges to a small tributary that discharges into the Delaware River. I-95 crosses over the Delaware Canal on a single-span bridge structure that is approximately 80 feet wide and 60 feet long. South of I-95 on the east side of the canal, a USACOE concrete overflow structure has been built. The Delaware Canal and State Park is managed by the PA Department of Conservation and Natural Resources and is used for many recreational purposes, including canoeing and fishing. The Pennsylvania surface water standards classify the Delaware Canal as a trout-stocked fishery.

c) Delaware and Raritan Canal

The Delaware and Raritan Canal in New Jersey is part of the 30-mile feeder canal that diverts water from the Delaware River at Bull's Island near Stockton to supply the main canal at Trenton. The canal serves as a public water supply transmission system and is fed by a 100 million gallon per day non-drought diversion entitlement from the Delaware River, as well as by natural streams and storm drains. The water levels in the canal are monitored by NJWSA, who controls operating gates and flood gates to protect the canal during heavy rainfall.

The New Jersey surface water quality standards (N.J.A.C. 7:9B) classify the Delaware and Raritan Canal as FW2-NT, which is defined as fresh waters that are not designated FW1 or Pinelands Waters and are non-trout waters.

Both I-95 and NJ Route 29 cross over the canal on structure in the project area, although no work is proposed at the NJ Route 29 Bridge. I-95 crosses the canal on a bridge, with a variable width ranging from 95 to 120 feet and a length of approximately 100 feet. There are two sets of piers at or adjacent to the canal.

d) Other Waterways

There are no waterways in the project area classified as High Quality Waters or Exceptional Value Waters under Pennsylvania surface water quality standards (Title 25, Chapter 93 of the Pennsylvania Code) or classified by NJDEP as Category One, Special Protection Waters.

In Pennsylvania, an unnamed tributary to the Delaware Canal, 1.85 miles in length, traverses the project area and discharges into the Delaware Canal just south of I-95. This tributary is classified under PA Code Title 25-Chapter 93 as a trout stocked fishery. Another tributary to the Delaware Canal is located south of Woodside Road between the park and ride facility and the canal. The source of this intermittent stream, which flows from west to east, is a small wetland. A third unnamed tributary to the Delaware Canal is located north of Woodside Road and flows from west to east beneath Taylorsville Road. An unnamed tributary to Buck Creek flows through the western portion of the project area, approximately 1,000 yards east of the PA Route 332 Interchange. Buck Creek is classified under the Pennsylvania surface water quality standards as a warmwater fishery.

In New Jersey, two streams discharge into the Delaware and Raritan Canal and flow northeast to southwest. These two tributary streams to the Delaware and Raritan Canal are classified under New Jersey surface water quality standards as FW2-NT streams, which are defined as freshwaters that are not designated as FW1 or Pinelands Waters and are non-trout waters.

Reeders Creek, which is approximately 1.4 miles in length, is a direct tributary to the Delaware River, although only a small portion passes through the project area at the NJ Route 29 Interchange area. Reeders Creek is classified under New Jersey surface water quality standards as FW2-NT.

In addition to these smaller tributary streams, there are nine drainage ditches along the I-95 mainline in Pennsylvania, four drainage ditches adjacent to the Taylorsville Road Interchange, and one drainage ditch along Woodside Road in Pennsylvania.

e) Water Supplies

The Delaware River is used as a potable water supply for residents on both sides of the river in the project area. In Lower Makefield Township, other than for a very small area of the township adjacent to Morrisville, potable water is supplied by the PAWC, which uses the Delaware River as a primary water supply source. The company's surface water intake is located adjacent to the Yardley railroad bridge, downstream of the project area. According to the *Township of Lower Makefield, Bucks County, Pennsylvania Act 537 Sewage Facilities Plan Update* (adapted February 1, 1999), approximately 1.8 million gallons per day (gpd) of surface water was supplied to the township by the PAWC in 1996.

The Trenton Water Works, located on NJ Route 29 in Trenton, treats up to 50 million gallons per day from its surface intake at Calhoun Street and supplies more than 200,000 residents in the City of Trenton and in Ewing, Hamilton, Lawrence Townships with treated water from the Delaware River.

The Delaware and Raritan Canal is operated as a public water supply transmission system by the NJWSA. The NJWSA does not monitor the water quality of the canal and does not provide treatment. Those functions are the responsibility of the individual water purveyors or users.

2. Impacts

a) No Build

Under the No Build alternative, there would be no impact on water resources.

b) Proposed Action

Construction of the project will involve work within or over the Delaware River, the canals in both states, and smaller tributaries and drainage ditches in the project area. Permanent impacts in the Delaware River are associated with emplacement of the proposed bridge piers. Of the seven bridge piers, five will be directly founded within the river bed. The proposed action will result in five new bridge piers within the Delaware River, permanently affecting approximately 0.4 acre of river bottom, based on the preliminary design completed for this EA. The existing pier stems will be removed to a depth of two to three feet below the river bed elevation. The existing bridge has seven piers in the river. The removal of the existing seven piers will restore approximately 0.1 acre of river bottom, which would partially offset the loss of river bottom for the new bridge piers,

resulting in a net permanent loss of approximately 0.3 acre of river bottom. The proposed action will result in a wider bridge over the Delaware River, with an increase in bridge width of approximately 100 feet and an increase in shading of approximately 2.8 acres. During final design, the bridge and pier design will be refined.

Two types of bridge foundations within the river are being considered, and it is anticipated that spread footings would be used on the riverbed. An alternative foundation system for the I-95/Scudder Falls Bridge which may be employed would consist of drilled shafts foundations. This would entail six-foot diameter drilled shafts supporting a pile cap. The drilled shaft option is generally utilized in areas where spread footings do not provide adequate strength for the bridge. The pier stems for both options would be similar. The impacts to the riverbed were based on the use of spread footings, and the area of river bottom affected by drilled shaft foundations would not exceed the impacts of the spread footing foundations.

Table IV-7 summarizes impacts to both the Delaware River and the canals in both states. Impacts on protected species within the Delaware River are addressed under Section IV.M.2.

Indirect project effects are related to discharges to project area waterways. Modifications to the bridge drainage system will affect discharges to the Delaware River. The existing bridge currently discharges highway runoff through scuppers directly to the river below. This is a standard practice for long bridges over waterways.

A survey of treatment of water runoff on long bridges was conducted to assess the current best practices in the United States. The bridge runoff is typically discharged directly to the waterways via bridge scuppers. To carry all surface runoff on long bridges off the bridge and into the stormwater system is not feasible because of the following reasons:

- Carrying bridge surface runoff will require a large pipe size. Further, the drainage pipe slope for long distance will result in the pipe extending below the bottom of bridge beams which is not a desirable condition as it would protrude into the vertical clearance of the bridge.
- The bridge drainage systems with pipes often clog up because of the intrusion of debris. Long runs of bridge drainage pipe will further worsen the clogging condition and creates a major maintenance problem. Clogged bridge drainage would result in water ponding on the roadway travel lanes which is dangerous to motorists. In addition, ponding water could freeze in the winter further exacerbating the condition.

The current proposal is to carry the bridge surface run off for the outer thirds of its lengths via closed piping off of the bridge for discharge in the overall project drainage system. The runoff from middle third of the bridge will fall directly into the river. The bridge deck area will be more than double the existing as the proposed typical section will be comprised of nine lanes versus the existing bridge carrying four lanes. However, the runoff from the outer two-thirds of the deck area of the bridge will be captured by scuppers on the bridge and piped back to the abutments where they will be connected to stormwater facilities off the bridge

However, in the next phase of the project, when the exact details of the bridge superstructure and project drainage system is finalized, a further evaluation of the bridge drainage system will be performed to identify Best Management Practices appropriate to comply with federal and state stormwater regulations.

Table IV-7—Summary of Delaware River and Canal Impacts

Waterway	Permanent River Bottom Impacts			Increase in Shading (acres)	Increase in Shading Pedestrian/Bike (acres)	Causeways and Cofferdams (acres)
	New Bridge Piers (acres)	Removal of Existing Bridge Piers (acres)	Net Total (acres)			
Delaware River	0.4	-0.1	0.3	2.8	0.3	0.33
Delaware Canal	0	0	0	0.3	0	0
Delaware and Raritan Canal	0	0.02*	-0.02*	0.4	0	0*

*/ This estimate assumes pier removal, but the extent of impacts will depend on the design of the proposed embankment area and construction techniques used, and would be determined in consultation with canal and park agencies during final design.

The project will create 20 acres of additional impervious surface in Pennsylvania and New Jersey due to the addition of one lane and a wider left shoulder in each direction of I-95 and due to modifications at the Taylorsville Road interchange in PA and the NJ Route 29 interchange in NJ. The impervious areas are the existing grass median on I-95 which will be converted to impervious areas to accommodate the necessary lanes and wider shoulders. The existing stormwater facilities will be modified as required to accommodate the additional runoffs. For the most part, the stormwater system will be within the existing highway right-of-way. Where needed the ditches, pipes, and culverts will be increased in size to accommodate runoff from the new roadway configurations. The following section (Subsection *3. Mitigation*) describes in detail the stormwater mitigation plan.

The project will also involve work within the Delaware and Raritan Canal for removal of one set of existing I-95 bridge piers that are located at the edge of the canal and along the riprapped backslope of the canal prism. Work adjacent to the Delaware and Raritan Canal and within the canal prism will involve removal of existing bridge piers. Existing bridge piers will be cut off at grade to avoid disturbance of the canal's clay liner unless the existing piers conflict with the location of proposed piers. Approximately 1,100 square feet (0.02 acre) of temporary disturbance of the canal back slope will result from removal of the existing bridge piers.

There will also be two new crossings over the Delaware and Raritan Canal for the on- and off-ramps at the NJ Route 29 Interchange. The new I-95 Bridge piers will be relocated outside of the Delaware and Raritan Canal. The Delaware and Raritan Canal Commission and other New Jersey park agencies have also requested that the remaining earthen embankment along NJ Route 175 (Upper River Road) that extends into the canal be faced with stone to reduce erosion. This work may involve temporary disturbance to the canal and, depending on the design of the embankment, some loss of natural canal bank, but would result in water quality improvements.

The project will also affect three tributary streams in Pennsylvania. The impacts to these tributaries, totaling approximately 0.04 acre, are summarized in Table IV-8.

Table IV-8—Summary of Tributary Stream Impacts

Tributary Stream Affected	Length (linear feet)	Area in Square feet (acre)
Tributary to Delaware River, PA	30	900 (0.02)
Tributary #1 to the Delaware Canal, PA	50	350 (0.01)
Tributary #3 to the Delaware Canal, PA	30	600 (0.01)
TOTAL	110	1,850 (0.04)

A retaining wall along I-95 will be constructed to avoid permanent impacts to an existing rock-lined tributary drainage ditch that outfalls into the Delaware Canal south of I-95. However, the project will reline the drainage ditch with rocks to prevent erosion.

The project will also affect approximately 2.7 acres within twelve drainage ditches in Pennsylvania.

c) Incremental Impacts of Pedestrian/Bicycle Facility

With the pedestrian/bicycle facility, there would be increase in the width of the bridge of up to 12 feet, with shading of an additional 0.3 acre on the Delaware River. The increase in shading, under the proposed action with the pedestrian/bicycle facility, would total approximately 3.1 acres. The addition of a pedestrian/bicycle facility would have minimal effect on the size of bridge piers, so no other waterway impacts are anticipated as a result of the additional bridge width provided on I-95.

d) Temporary Construction Impacts

Because of the shallow depth of the Delaware River, bridge construction from barges is not feasible. Therefore, a temporary trestle causeway (as described in Section III.D.2, "I-95/Scudder Falls Bridge Construction") on the Delaware River will be used for access to the river. The construction of the causeway will occur in four stages, with each stage removed before the next stage is placed to minimize impacts on the river at any one time, and to maintain flow on the remainder of the river. The timing of causeway and cofferdam emplacement is also addressed in Section III.D.2.

The temporary disturbance to river bottom for each of the four causeway stages would range from approximately 210 to 340 square feet. Upon removal of each causeway stage, the pile bents for the trestle causeway will be removed to a depth of 3 feet. It is anticipated that natural riverbed sediments will naturally infill this area over time, and the river bottom would be restored to its pre-construction condition. A total of approximately 0.03 acres of river bottom will be temporarily occupied by the four causeways. The causeway will be a trestle structure, which will minimize the footprint and impact on the Delaware River .

Construction of five new bridge piers and demolition of seven existing piers will be accomplished within cofferdams. The use of cofferdams for removal of existing bridge piers and construction of new piers will temporary affect an additional area of approximately 0.3 acre of river bottom. The total area of river bottom temporarily affected during construction would total approximately 0.33 acres.

Bridge abutment construction will have a temporary impact on the canal streambanks, as cofferdams are needed to construct the new foundations. The canal streambanks will be restored to their original condition upon completion of the construction.

Construction within the Delaware and Raritan Canal, if required for work proposed, would be closely coordinated with the Delaware and Raritan Canal Commission, the New Jersey Water Supply Authority, and NJDEP to minimize water quality and water resource impacts.

Work adjacent to the Delaware Canal, but outside the canal prism will include temporary disturbance of approximately 2,250 square feet (0.05 acre) to remove the existing bridge abutments. No work will be performed within the Delaware Canal.

3. Mitigation

The project has been designed to minimize the number of piers within the Delaware River and the canals. Because the river bed in the project area consists of clean coarse and granular type material, significant turbidity problems are not expected. However, the contract documents will incorporate use of turbidity barriers to mitigate this potential issue. Prior to placement of the causeway and cofferdams, turbidity screens will be installed to contain siltation. These will be maintained until the causeway and cofferdams are in place, at which time they will be removed. Once the silt fence barrier is placed along river banks and embankment toe of slopes, the causeway construction activities will begin.

The use of a trestle causeway was selected over an earthen causeway to avoid and minimize effects on the Delaware River to the greatest extent practicable. The trestle causeway will maintain river flows with little or no effect on hydraulic flow. The trestle will be disassembled and removed upon completion of each stage of the construction.

Individual pier construction and the removal of the existing piers will be accessed from the causeway, but all dewatering will occur within localized cofferdams. Groundwater that may seep into the cofferdams will be dewatered through pumps and hoses. The hoses will outlet into sediment filter bags and traps before reentering the river environment.

The bridge spread footings will be topped with large rock (30-inch diameter nominal) for scour protection, and if the drilled shaft option is employed instead, it would also require scour protection similar to that for the spread footings.

Erosion and sedimentation control devices will be used to minimize siltation in the canals. Dewatering basins will be utilized, as well as pollutant removal filter bags. The Delaware and Raritan Canal Commission also requested that the earthen embankment along NJ Route 175 (Upper River Road) that extends into the canal be faced with stone to reduce erosion. To minimize impacts to the earthen embankment adjacent to the Delaware and Raritan Canal along NJ Route 175 (Upper River Road) beneath the proposed I-95/Scudder Falls Bridge, the design of the project will consider methods to reduce erosion of the embankment. The design of the drainage system for the new roadways will divert water flow away from the canal prism to the maximum extent possible.

During final design, an Erosion and Sedimentation Control Plan, as well as a National Pollutant Discharge Elimination System (NPDES) Post-Construction Stormwater Management Plan, will be prepared for the project outlining Best Management Practices to be implemented during and after construction. During final design, a Spill Prevention Control and Countermeasure Plan (SPCP) will also be developed to prevent spills from entering the river during construction. Additionally, an SPCP will be prepared to address spills from vehicles using the bridge when construction is completed.

The development of the Post-Construction Stormwater Management Plan will consider the Act 167 Watershed Management Plan requirements for the area. The design of stormwater controls will employ the latest PA DEP Pennsylvania Stormwater Best Management Practices Manual and New Jersey Stormwater Best Management Practices Manual. The stormwater design will comply to the greatest extent practicable with the PennDOT Strike-off Letter 432-07-07 (December 2007) and applicable NJDOT guidance. PennDOT Strike-off letter 432-07-07 identifies target peak runoff regulations commensurate with the level of roadway reconstruction (Levels 1 through 4) and sensitivity of resources in the area.

The nature of the proposed roadway reconstruction and bridge replacement are consistent with a PennDOT PCSM Level 3 project. However, the presence of threatened and endangered species (as described in Section IV.M), would elevate the project to PCSM Level 4 project. PCSM Level 4 project areas are required to:

- Reduce the post-construction runoff volume to pre-construction volumes in accordance with PennDOT Strike off letter 432-07-07, specifically compliance with a 2-year 24 hour storm event or smaller,
- reduce the peak runoff rate increases for the 1-year through 100-year storms to pre-construction levels, and
- comply with the PA Code Chapter 93 water quality requirements.

The required peak runoff volume and rate mitigation will be achieved through the use of dry extended detention basins and bioretention facilities. The infields of the interchange areas have been identified as probable locations for these facilities. Currently, stormwater runoff from the mainline and interchange areas is collected through swales and cross pipes and directed to the canals and Delaware River. The proposed plan will utilize the infields to mitigate the runoff prior to discharge into the Delaware River or Canals.

As this project involves pavement reconstruction and widening of the facility by one lane each way, water quality will be an important issue as highway pollution loads may increase along the roadway and across the bridge. For this reconstruction project, the majority of disturbed areas are anticipated to be controlled by a Best Management Practice (BMP). Water quality will be achieved through a series of accepted BMP measures such as vegetated swales, bioslopes, vegetated buffer strips, infiltration areas and bioretention facilities prior to being discharged to surface waters. During final design, percolation tests will be conducted along the corridor to determine soil permeability and capability for infiltration. In addition to the above mentioned structural BMPs, catch basins with depressed bottoms will be installed along the drainage systems to capture debris and fine sediments.

A combination of stone and grass lined ditches will flank the majority of the mainline in Pennsylvania to promote water quality and infiltration. During construction, sediment basins are proposed for the interchange infield areas in both states, and will be converted to permanent bio-

retention facilities to control additional stormwater runoff generated by the project. Straw bales will prevent sedimentation from entering the existing and proposed stormwater collection system along the mainline in New Jersey, and anywhere inlets may collect construction runoff. Additional mitigation measures developed for protected species are addressed under Section IV.M.3.

H. Groundwater

1. Existing Conditions

The project area is located within the Project Review Area of the New Jersey Coastal Plain Sole Source Aquifer, a special area within the Streamflow Source Zone. Sole source aquifers are those aquifers that contribute more than 50% of the drinking water to a specific area, and for which replacement would be impossible if the aquifer were to become contaminated. Under the U.S. Safe Drinking Water Act of 1974, the U.S. Environmental Protection Agency (USEPA) has review authority over federally funded[5] projects that could affect groundwater in a sole source aquifer. The project may, therefore, be subject to review by the USEPA. The project area is not physically located above the Coastal Plain Sole Source Aquifer, although it is located within the aquifer's stream flow source zone.

Detailed information on groundwaters is presented in Technical Memorandum No. 17, Groundwater—Existing Conditions.

Secondary porosity features control groundwater flow and storage in the Stockton Formation in Pennsylvania. The sandstones and conglomerates of the lower part of the Stockton Formation are poorly cemented and easily fractured, generally resulting in high well yields. A search of the Pennsylvania Groundwater Inventory System, Water Well Data Base identified 11 domestic wells in the Stockton Formation in the project area. The average yield for these wells was approximately 31 gallons per minute (gpm).

Although the primary source of water supply for the Pennsylvania American Water Company (PAWC) is the Delaware River, the PAWC also uses six groundwater supply wells. One of these wells (Well No. 7), as well as a booster station and standpipe, is located approximately 500 feet south of I-95, west of Taylorsville Road. According to the *Township of Lower Makefield, Bucks County, Pennsylvania Act 537 Sewage Facilities Plan Update* (adapted February 1, 1999), Well No. 7 is 265 feet deep and has a pump capacity of 420 gpm. The other five wells are located in the Borough of Yardley, which is further south in the township. In addition to these wells, an inactive well (Well No. 10) is located south of I-95 and approximately 700 feet northeast of Well No. 7. According to the Pennsylvania American Water Company, this well was last used three years ago, but does not function properly. According to the Pennsylvania American Water Company, the Zone II wellhead protection areas for Well Nos. 7 and 10 extends ½ mile around each of the wells.

According to the *Geology of the Ground Water Resources of Mercer* County, Geologic Report Series No. 7 (1965), most of the industrial wells in Ewing Township also draw from cracks and fissures in the Stockton Formation. Well information for those wells completed in the Lockatong Formation and located proximate to the project area, in the area bounded by the Delaware River, Mountain View Road, Bear Tavern Road, and West Upper Ferry Road, was compiled. This well information indicates an average yield of 7 to 8 gpm for sixteen domestic wells and approximately 24 gpm for three industrial wells. According to the Ewing Township Division of Health, some of the older

[5] A determination of federal funding assistance for this project has not been made at this time.

single-family residences off River Road in the NJ Route 29 Interchange area, specifically on State Police Drive and on Lamberts Lane, still rely on domestic wells for water supply.

According to the New Jersey Geological Survey, there are no wellhead protection areas in the project area. The closest public well is located more than a mile from the project area on the northeast side of the Trenton-Mercer Airport.

2. Impacts

a) No Build

Under the No Build alternative, there would be no impact on groundwater.

b) Proposed Action

The proposed action will not directly affect any private or public groundwater wells. The project will result in an increase of approximately 20 acres in impervious area, with the proposed addition of travel lanes and shoulders. The increased runoff from the highway would be directed into the stormwater drainage system, which will be designed to accommodate the increase in runoff. This increase in impervious surface is not anticipated to have a substantial effect on groundwater recharge.

The proposed improvements will involve work within the wellhead protection zones for Well 7, which is active, and Well 10, which is inactive. This area of the northbound travel lanes is currently adjoined by a drainage ditch that will remain in place after completion of construction. The project will also install a noise barrier behind the drainage ditch that will separate the northbound I-95 travel lanes and the wells. This noise barrier is also expected to serve as a barrier to surface highway runoff. It is expected that flow from the I-95 northbound lanes would continue to drain into the stormwater drainage system for the highway that carries runoff away from the wellhead protection area and into adjoining waterways.

In addition, the drainage on the bridge deck will be modified so that stormwater runoff from the outer two-thirds of the deck area of the bridge will be captured by scuppers on the bridge and piped back to the bridge abutments. These stormwater flows from the bridge deck will be directed to proposed stormwater retention and treatment facilities off the bridge, and no substantial groundwater impacts are anticipated as a result of the project.

Because of the location of the project within the project review zone of the New Jersey Coastal Plain Sole Source Aquifer, the project will be submitted for review to the USEPA, if federal funding is received.

c) Incremental Impacts of Pedestrian/Bicycle Facility

If the pedestrian/bicycle facility is implemented as part of the proposed action, there would be an increase in impervious area of 1.5 acres.

d) Temporary Construction Impacts

Groundwater seeping into the cofferdams used in the I-95/Scudder Falls Bridge construction will be discharged into filter bags and sediment traps, prior to discharge into the river. Use of Best Management Practices, as described in the following section, would prevent groundwater contamination during the construction period, and no groundwater impacts are expected to occur.

3. Mitigation

Provision of stormwater retention areas along I-95 will provide water quality treatment for stormwater runoff. An Erosion and Sedimentation Control Plan as well as an National Pollutant Discharge Elimination System (NPDES) Post-Construction Stormwater Management Plan will be prepared for the project outlining Best Management Practices to be implemented during and after construction. As described in Section IV.G.3, the development of the Post-Construction Stormwater Management Plan will employ the latest PA DEP Pennsylvania Stormwater Best Management Practices Manual and New Jersey Stormwater Best Management Practices Manual. The stormwater design will comply to the greatest extent practicable with the PennDOT Strike-off Letter 432-07-07 (December 2007) and applicable NJDOT guidance. PennDOT Strike-off letter 432-07-07 identifies target peak runoff regulations commensurate with the level of roadway reconstruction (Levels 1 through 4) and sensitivity of resources in the area.

The project would be classified as a PennDOT PCSM Level 4 project and, as such, would be required to reduce the post-construction runoff volume to pre-construction volumes for the 1-year and 2-year storms. These projects are also required to reduce the peak runoff rate increases for the 1-year through 100-year storms to pre-construction levels and comply with the PA Code Chapter 93 water quality requirements.

A combination of stone and grassed line ditches will flank the majority of the mainline in Pennsylvania to promote water quality and infiltration. Sediment basins are proposed for the interchange infield areas in both states, and will be converted to permanent detention facilities to control additional stormwater runoff generated by the project. Straw bales will prohibit sedimentation from entering the existing and proposed stormwater collection system along the mainline in New Jersey, and anywhere inlets may collect construction runoff.

During final design, a Spill Prevention Control and Countermeasure Plan (SPCP) will be developed to prevent spills from entering the river during construction. Additionally, an SPCP will be prepared to address spills from vehicles using the bridge when construction is completed.

I. Geology and Soils

1. Existing Conditions

The project area in Lower Makefield Township is located in the Gettysburg-Newark Lowland Section of the Piedmont Physiographic Province. To the west of the Delaware Canal, the project area is underlain by the Triassic-aged Stockton Formation and consists of red, grey, and brown shales and arkoses, with local arkosic conglomerates. To the east of the canal, Quaternary-aged Wisconsin Alluvium, consisting of unconsolidated sand, gravel, and clay deposits, is located along the river terrace and floodplain.

Detailed information on groundwaters is presented in Technical Memorandum No. 17, Ground Water—Existing Conditions.

The project area in Ewing Township is located in the Piedmont Physiographic Province and is underlain by the Triassic Lockatong Argillite and Stockton Formations. The Lockatong Formation is comprised of red, dense sedimentary rocks of the Newark Group. Within Mercer County, Lockatong Argillite is approximately 2,900 feet thick and forms one of the highest terrains in the county, reaching elevations of approximately 200 feet. The formation outcrops in the Delaware River at

Scudder Falls and on I-95 near the Bear Tavern Road Interchange The Stockton Formation consists of red, grey, and brown shales and arkoses, with local arkosic conglomerates. In New Jersey, only the area containing the southern portion of the NJ Route 29 Interchange is underlain by the Stockton Formation.

The soils in the project area are shown in Table IV-9. Of the 29 soils in the project area, 19 are considered to be erodible soils, as listed in Table IV-9.

2. Impacts

a) No Build

The No Build alternative will not affect erodible soils.

b) Proposed Action

The proposed action will impact approximately 60 acres of erodible soils. The majority of the erodible soils impact is in Pennsylvania, with a large portion, approximately 28 acres at the Taylorsville Road Interchange. The erodible soils impact was determined by calculating the area from the existing edge of pavement to the propose limit of disturbance line on both the east and west sides of I-95 mainline in Pennsylvania and New Jersey along with the median area in Pennsylvania. The entire interchange for Taylorsville Road was included; the NJ Route 29 Interchange does not contain erodible soils.

The project will create approximately 20 acres of additional impervious surface, as described in Section IV.G.

Table IV-9—Erodible Soils

Erodible Soils within Project Area	Symbol	State
Bedington Channery Silt Loam, 3 to 8 percent slopes	BeB	PA
Duncannon Silt Loam, 3 to 8 percent slopes	DuB	PA
Fountainville Silt Loam, 3 to 8 percent slopes	FoB	PA
Lansdale Loam, 3 to 8 Percent slopes	LgB	PA
Penn-Lansdale Complex, 3 to 8 percent slopes	PnB	PA
Penn-Lansdale Complex, 8 to 15 percent slopes	PnC	PA
Readington Silt Loam, 3 to 8 percent slopes	ReB	PA
Udorthents, shale and sandstone	UdB	PA
Urban Land-Lansdale Complex, 0 to 8 percent slopes	UrB	PA
Urban Land-Lansdale Complex, 8 to 15 percent slopes	UrC	PA
Urban Land-Penn Complex, 0 to 8 percent slopes	UxB	PA
Urban Land-Penn Complex, 8 to 25 percent slopes	UxD	PA
Birdsboro, sandy subsoil variants, 2 to 6 percent slopes	BnB	NJ
Bucks Silt Loam, 2 to 6 percent slopes	BuB	NJ
Quakertown Silt Loam, 3 to 8 percent slopes, eroded	QkB2 or QukB2	NJ
Quakertown Silt Loam, 6 to 12 percents slopes	QkC2	NJ
Quakertown Silt Loam, 3 to 8 percent slopes	QkB or QukB	NJ
Birdsboro Loam, 6 to 12 percent slopes	BnC	NJ
Birdsboro, sandy subsoil variants, 6 to 12 percent slopes	BnC	NJ

c) Incremental Impacts of Pedestrian/Bicycle Facility

The pedestrian/bicycle facility would involve minor additional impacts to erodible soils.

d) Temporary Construction Impacts

Construction will involve temporary soil disturbance, but the soils will be both temporarily and permanently stabilized. Sedimentation controls will be used at the perimeter of the work areas upgradient of sensitive areas.

3. Mitigation

An Erosion and Sedimentation Control Plan prepared for the project will identify means for both temporary and permanent stabilization of disturbed soil areas. Temporarily disturbed soils will be stabilized with mulch. Disturbed soils will be permanently stabilized with geo-reinforcement/geo-grids, grasses and plantings. Construction site entrances will be stabilized with appropriate means to minimizing tracking of sediments.

J. Floodplains

1. Existing Conditions

Floodplains are protected under federal Executive Order (EO) 11988, Floodplain Management, issued May 24, 1977, which emphasizes the importance of minimizing impacts on floodplains and reducing the impact of floods on human safety, health, and welfare. EO 11988 directs federal agencies to consider alternatives to avoid adverse effects and incompatible development in floodplains and design or modify actions in order to minimize potential harm to or within the floodplains.

The Federal Emergency Management Agency (FEMA) is the federal agency with primary responsibility for mapping and regulating areas subject to flooding under the National Flood Insurance Program (NFIP). The 100-year flood is the standard used by most federal and state agencies and is used by the National Flood Insurance Program as the standard for floodplain management. This is the flood elevation that has a one percent chance of being equaled or exceeded each year.

FEMA regulations prohibit alterations to the regulatory floodway that would increase base flood (100-year flood) elevations by one foot or more. Under these regulations, the regulatory floodway is defined as: "that portion of the floodplain which is effective in carrying flow, within which this carrying capacity must be preserved and where the flood hazard is generally highest, i.e., where water depths and velocities are the greatest. It is that area which provides for the discharge of the base flood so the cumulative increase in water surface elevation is no more than one foot."

The regulatory floodway along the Delaware River is shown on Figures II-2 and III-22 and extends approximately 100 feet inland to PA Route 32 (River Road) in Pennsylvania. In New Jersey, the regulatory floodway is somewhat narrower and generally extends to the edge of NJ Route 29 (River Road).

In Pennsylvania, the 100-year floodplain generally extends from the regulatory floodway to encompass the Delaware Canal. In New Jersey, the 100-year floodplain generally extends along

the Delaware and Raritan Canal and borders on, or overlaps portions of, the NJ Route 29 Interchange area.

2. Impacts

a) No Build

Under the No Build alternative, there would be no impact on the regulatory floodway or floodplains.

b) Proposed Action

The proposed action will permanently fill approximately 10.3 acres within the 100-year floodplain and 2.17 acres of the regulatory floodway. Of this total, approximately 4.5 acres of 100-year floodplain impact would occur in Pennsylvania and 5.8 acres of floodplain impact would occur in New Jersey. Approximately 1.01 acre of floodway impact would occur in Pennsylvania and 1.16 acres of floodway impact would occur in New Jersey.

Detailed information on the hydrologic and hydraulic assessment is presented in Technical Memorandum No. 31, Hydrology and Hydraulics Analysis.

However, the proposed bridge is designed to be less of an obstruction than the existing bridge, since it will have fewer piers in the river (five bridge piers compared to seven piers for the existing bridge). A hydrologic analysis performed for the project showed that flood elevations under storm events ranging from the 1-year to 500-year storm would be lower (by 0.03 to 0.07 feet) with the proposed bridge than existing bridge. The upstream alignment that is proposed would avoid impacts to the flood control structure on the Delaware Canal, south of I-95.

c) Incremental Impacts of Pedestrian/Bicycle Facility

The pedestrian/bicycle facility would involve permanent impacts to an additional 0.12 acre of 100-year floodplain and 0.01 acre of the regulatory floodway (including the floodway of the unnamed tributary to the Delaware River), all of which occur in Pennsylvania.

d) Temporary Construction Impacts

The construction of a trestle causeway to be used to construct the I-95/Scudder Falls Bridge, as described in "I-95/Scudder Falls Bridge Construction," Section III.D.2, will involve temporary impacts on flooding characteristics within the Delaware River. This is a temporary effect over the 4-year construction period.

The causeway will be constructed in four stages: two stages upstream (Stages I and II) and two downstream (Stages III and IV). The preliminary hydrological and hydraulic studies analyzed Stage III as the worst case condition, since it creates the most constriction in channel flow. This is because the Stage I new bridge piers will have been completed, the existing bridge will remain in place, and the Stage III causeway will be constructed across half of the river. Based on the hydrologic/hydraulic modeling, a 1.4-year design storm was used to design the causeway. A more detailed analysis will be performed during the final design to fine tune the causeway elevation once the exact shapes of the piers are established. In selecting 1.4-year design storm, the following key issues were studied:

- Delaware River flow volumes for past 10 years,

- Lowest causeway height that would provide the highest practical number of working days during the year without overtopping,
- Highest causeway height that would create the lowest practical backwater elevation increase.

The 1.4-year design storm event would result in a modest 0.51-foot increase in elevation immediately upstream, which gradually reduces to no impact approximately 1,500 feet upstream. With this elevation rise, the water elevation remains below PA Route 32 (River Road) and NJ Route 29 and does not impact structures.

In order to provide a comparison and general order of magnitude of potential flooding impacts, the causeway was modeled for several flood events. It should be noted that the 1.4-year design storm event yields flows of approximately 62,000 cubic feet per second (cfs) for the entire river. This is fairly conservative when compared to the mean annual high flow of the Delaware River between 1997 and 2006 which was calculated as 25,000 cfs from a USGS gage located at Trenton, just downstream of the Scudder Falls Bridge.

In addition, a hydrologic and hydraulic analysis of the trestle causeway Stage III was performed to assess the flooding of the PA Route 32 roadway which serves as the natural buffer to the adjoining, upstream properties and serves as an upper boundary of flood conditions outside of the larger storm events. With the Stage III trestle causeway in place, the storm event which causes the overtopping of PA Route 32 corresponds to 183,000 cfs or nearly three times the causeway design event. The probability of this occurring over a two-year construction window is approximately 12% or a 17-year flood frequency. Moreover, with this specific causeway stage and condition expected to be in place for no more than one year, the probability is reduced even further.

In summary, the causeway has been designed and developed to strike a reasonable balance of providing a working platform in the 'dry' for the maximum duration during the construction season against the overtopping of PA 32 and the potential for flooding of adjoining, upstream properties.

As with any work in and around the river environment, severe flood events can adversely affect the construction area. Although the Delaware River has experienced severe flooding events in the past several years, the mean annual high flow from 1997 to 2006, as calculated from the USGS gage at Trenton, is significantly lower than causeway design flow. The preliminary causeway elevation has been set for a 1.4-year storm event as a balanced approach. A more robust causeway size would result in unacceptable backwater elevation increase. The area north of the bridge along the river is low and flat and excessive backwater elevation increase would impact the properties beyond an acceptable level.

3. Mitigation

During final design and permitting, additional hydrologic and hydraulics analysis will be done and compensatory storage will be developed consistent with the degree of impact determined in final design, when detailed bridge design is undertaken.

K. Wetlands

1. Existing Conditions

Wetlands are areas that are inundated by water for a substantial portion of the growing season and that support wetland indicators, such as hydrophytic vegetation, hydrology, and hydric soils. Wetlands are subject to protection under federal Executive Order 11990, which directs federal agencies to take actions to minimize the loss and destruction of wetlands.

Detailed information on wetlands is presented in Technical Memorandum No. 15, Wetlands—Existing Conditions Request for Department of the Army Jurisdictional Determination for Pennsylvania wetlands and an Application for Freshwater Wetlands Letter of Interpretation for New Jersey wetlands.

Prior to conducting a field investigation to identify and delineate wetlands, research was conducted that included review of the Natural Resources Conservation Service Mercer and Bucks County soil surveys, U.S. Fish and Wildlife Service National Wetlands Inventory Mapping, and NJDEP freshwater wetland mapping.

Wetlands in the project area were delineated according to the accepted methodologies in each state. In Pennsylvania, wetlands were delineated in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* using the Routine Onsite Determination Method. The island in the Delaware River was delineated according to the 1987 *Corps of Engineers Wetlands Delineation Manual* using the Routine Offsite Determination Method. Wetlands in New Jersey were delineated in accordance with the 1989 *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* using the Routine Onsite Determination Method.

Field views were held with the USACOE and the NJDEP, and a *Request for Department of the Army Jurisdictional Determination* (June 2005) and an *Application for Freshwater Wetlands Letter of Interpretation* (June 2005) were submitted for review by these agencies. Agency concurrence on jurisdictional wetlands was sought to finalize wetland boundaries. The NJDEP issued its approval of the Letter of Interpretation (LOI) application on December 12, 2005, and the decision from the USACOE is pending.

A function and value assessment was performed in accordance with the Wetland Evaluation Technique (WET) for the wetlands in the project area. The following functions and values were assessed:

- groundwater recharge
- groundwater discharge
- floodflow alteration
- sediment stabilization
- sediment/toxicant reduction
- nutrient removal/transformation
- production export
- aquatic diversity/abundance
- wildlife diversity/abundance

A total of eight wetlands in Pennsylvania (Wetlands K through P, R, and S) and eight wetlands in New Jersey (Wetlands A through C and E through I) were delineated. Wetlands adjoin the Delaware River (Wetland G) and canals and adjoining tributaries in the vicinity of the I-95/Scudder Falls Bridge and the Taylorsville Road and NJ Route 29 Interchanges. The majority of wetlands

mapped were located in the vicinity of these waterbodies, two other wetland areas were delineated at the PA Route 332 Interchange and along a tributary to Buck Creek in Pennsylvania. These wetland areas are shown in Figure III-22 in Chapter III.

The NJDEP Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A-2.4) defines Exceptional Value wetlands based on the presence of threatened or endangered species or discharge to Freshwater 1 (FW1) or Freshwater 2 (FW2) trout production waters. Exceptional value wetlands have not been identified within the project area.

2. Impacts

a) No Build

The No Build will not involve wetlands fill or alterations.

b) Proposed Action

The proposed action will result in permanent or temporary impacts to a total of approximately 0.98 acres of wetlands at five wetlands in New Jersey (Wetlands C, E, F, G and H) and four wetlands in Pennsylvania (Wetlands K, L, N, and S). Work will also occur within the 50-foot transition area for Wetland B in New Jersey. Of the 0.98 acres of impact, approximately 0.88 acre at four wetlands in New Jersey and three wetlands in Pennsylvania will be permanent impact. Approximately 0.1 acre will be temporary impact. The total sizes and areas of each wetland affected and the functions provided by the affected wetland are shown in Table IV-10.

c) Incremental Impacts of the Pedestrian/Bicycle Facility

The pedestrian/bicycle facility will involve an additional impact to Wetland L in Pennsylvania of 0.02 acres. This is a very small increase in wetland impacts for addition of the pedestrian/bicycle facility, and would increase the total area of temporary and permanent wetland impact to approximately 1.00 acre.

d) Temporary Construction Impacts

Construction activities will involve temporary impacts to approximately 0.1 acre at three wetlands (Wetlands E and F in New Jersey and at Wetland K in Pennsylvania). In addition, the trestle causeway will affect a nominal area of wetlands (approx. 100 square feet each) at wetland Wetland G in New Jersey and Wetland S (Park Island) in Pennsylvania.

Table IV-10—Wetland Impacts by Area

Wetland/ Drawing Reference	Description	Total Size (Acres)	Acres Impacted (Acres Permanent/ Temporary)		Functions and Values
Wetland B, NJ Fig. III-22, Sheet 8	Forested wetland located between the Delaware and Raritan Canal and the NJ Route 29 Interchange	0.35	0	Work within 50 foot transition area	Low value for groundwater recharge, floodflow alteration, sediment stabilization, sediment/toxicant reduction, aquatic diversity/abundance, wildlife diversity/abundance
Wetland C, NJ Fig. III-22, Sheet 7	Open water with forest vegetation within NJ Route 29 Interchange	0.02	0.02	0	Low value for groundwater recharge, floodflow alteration, aquatic diversity/abundance
Wetland E, NJ Fig. III-22, Sheet 7	Shrub and forested wetland within the NJ Route 29 Interchange	0.56	0.47	0.08	Low value for groundwater recharge, floodflow alteration, sediment stabilization, production export, aquatic diversity/abundance, wildlife diversity/abundance
Wetland F, NJ Fig. III-22, Sheet 7	Forested wetland within the NJ Route 29 Interchange	0.04	0.03	0.01	Low value for groundwater recharge and wildlife diversity/abundance
Wetland G, NJ Fig. III-22, Sheet 7	Forested wetland along the Delaware River west of NJ Route 29	1.54	0	nominal – less than 100 square feet	High value for production export and wildlife diversity/abundance. Some or low value for groundwater recharge, floodflow alteration, sediment stabilization, aquatic diversity/abundance
Wetland H, NJ Fig. III-22, Sheet 7	Shrub and forested and open water within the NJ Route 29 Interchange	0.12	0.12	0	Low value for groundwater recharge, floodflow alteration, sediment stabilization, production export, aquatic diversity/abundance, wildlife diversity/abundance
Wetland K, PA Fig. III-22, Sheet 2	Forested wetland along tributary to Buck Creek along I-95 Pennsylvania mainline	0.13	0.01	0.01	Moderate value for groundwater recharge, floodflow alteration, production export, and wildlife diversity/abundance. Low value for sediment stabilization, sediment/toxicant reduction, nutrient removal/transformation, and aquatic diversity/abundance

Table IV-10—Wetland Impacts by Area

Wetland/ Drawing Reference	Description	Total Size (Acres)	Acres Impacted (Acres Permanent/ Temporary)		Functions and Values
Wetland L, PA Fig. III-22, Sheet 7	Forested wetland between Woodside Road and I-95 and between PA Route 32 (River Road) and the Delaware Canal	0.36	0.12	0	Low value for groundwater recharge, floodflow alteration, sediment stabilization, production export, aquatic diversity/abundance, wildlife diversity/abundance
Wetland N, PA Fig. III-22, Sheets 5 & 6	Forested wetland between PA Route 32 (River Road) and the Delaware Canal and between Woodside Road and I-95	0.32	0.11	0	Moderate value for groundwater recharge and production export. Low value for floodflow alteration, sediment stabilization, nutrient removal/transformation, aquatic diversity/abundance, and wildlife diversity/abundance
Wetland S, PA Fig. III-22, Sheets 7 & 8	Park Island forested wetland	5.52	0	nominal – less than 100 square feet	The functions and values of this wetland were not assessed due to access issues. The ACOE will take jurisdiction over the area below mean high water mark.
TOTAL		8.96	0.88	0.10	

3. Mitigation

Mitigation measures for wetland impacts will consist of providing wetland replication areas at suitable locations at either a mitigation bank, through an in-lieu fee program, or on-site. Wetlands impacted by the proposed action will be replaced at a ratio of 2:1 for forested wetlands, 1.5:1 for scrub/shrub wetlands, and 1:1 for emergent wetlands. A wetland mitigation plan for review and concurrence by the regulatory agencies will be developed during the final design and permitting phase of the project. Potential mitigation locations in Pennsylvania include areas adjacent to existing wetlands on properties being purchased by the DRJTBC. Potential mitigation locations in New Jersey include areas within proposed interchanges.

Temporary impacts to the wetland resources will be minimized through the use of Best Management Practices. An Erosion and Sedimentation Control Plan will be prepared during final design and utilized by the contractor that will describe the Best Management Practices to be employed during construction to minimize erosion and siltation from the construction areas. Temporarily disturbed soils will be stabilized and perimeter controls will be established down gradient of the construction site and up gradient of adjoining waterbodies and wetlands. Temporary disturbance to surface waters, wetlands, and terrestrial and aquatic habits will be limited to areas shown on the project drawings (Figure III-22) within the limit of disturbance lines.

L. Terrestrial and Aquatic Habitats

1. Existing Conditions

The project area contains a variety of land cover types that provide cover and foraging habitat for terrestrial and aquatic species. These are described below. The areas of these habitat types within 1,000 feet of both sides of I-95 are also presented and considered as the project area for the purpose of this evaluation.

Additional information on terrestrial and aquatic habitats is presented in Technical Memorandum No. 18, Terrestrial and Aquatic Habitat—Existing Conditions.

- **Urban, Developed Lands:** Urban developed lands include residential, commercial, and institutional developments that include landscaped grass lawns and ornamental vegetation. Urban land includes approximately 640 acres in the project area. Developed areas along the I-95 mainline right-of-way include the grassed median and roadside areas and the soccer fields within the Lower Makefield Township Snipes tract. Opportunistic species that typically inhabit these types of urban environments include house mice, grey squirrels, raccoons, striped skunks, bluejays, pigeons, sparrows, and starlings.

- **Cropland and Pasture:** The agricultural fields in the project area encompass approximately 170 acres. The typical species known to inhabit grassland or farmland areas within the project area include woodchucks, striped skunks, voles, mice, moles, and white-tailed deer. The more obscure species that are known to inhabit this area include red foxes and coyotes.

- **Deciduous Forest Land:** Deciduous forestland includes all forested areas having a predominance of hardwood vegetation, such as oak, maple, or hickory, and this cover type encompasses approximately 100 acres in the project area. Portions of I-95 adjoin wooded buffers, and in Pennsylvania, two deciduous forested areas exist: one along I-95 near Dolington Road and the other between the Taylorsville Road Interchange and the Delaware River. The dominant overstory species observed in field visits include box elder, red maple, tree-of-heaven, and red oak. Understory species consist of crown vetch, fox grape vines, garlic mustard, Japanese honeysuckle vines, multi-flora rose bushes, stinging nettle, and white snake root. Typical fauna species known to occur in forestland within the project area consist of raccoons, rabbits, striped skunks, grey squirrels, chipmunks, and white-tailed deer. The more obscure species that are known to inhabit forestland on occasion include bats (e.g., little brown bat), red foxes, and coyotes.

- **Mixed Forest Land:** Mixed forest includes both evergreen and deciduous vegetation where neither predominates, encompassing approximately 80 acres in the project area. In New Jersey, this cover type includes the area north of I-95 near the Bear Tavern Road Interchange that is proposed to be developed as a retirement community. Typical flora within the overstory include slash pine, spruces, hemlock, Douglas fir, red maple, tree of heaven, red oak, box elder, sycamore, tulip poplar, locust, silver maple, dogwood, and sweet gum. Dominant understory species include poison ivy and multi-flora rose. Typical species known to occur in this cover type include flying squirrels, black bears, and mice.

- **Palustrine Wetlands:** This cover type includes all non-riverine wetlands in the project area that cover approximately 20 acres in the project area. According to the *Natural Areas Inventory of Delaware and Lehigh Navigation Canal National Heritage Corridor, Pennsylvania* (1992), the Scudder Falls Islands are a potential natural area, with priority three (county-wide of local importance and small or somewhat degraded population of state-listed rare species).

The river islands are forested with mature riparian trees, such as silver maple, river birch, and sycamore. There are also nine wetland areas in New Jersey and eleven wetlands in Pennsylvania. Dominant overstory species consist of box elder, red maple, pin oak, sycamore and understory includes multi-flora rose, poison ivy vines, spicebush, marsh pennywort, sensitive fern, and skunk cabbage. The typical fauna include opossums, turtles, snakes, frogs, toads, salamanders, lizards, and beavers.

- **Riverine Upper Perennial and Lower Perennial Aquatic Habitats:** Upper perennial streams flow all year with high gradient and velocity and include the Delaware River. Lower perennial streams flow all year with a low gradient and velocity, and include the Delaware Canal, the Delaware and Raritan Canal, and other project area tributaries. These aquatic habitats cover approximately 60 acres in the project area.

The Delaware River supports a variety and an abundant amount of fish. The New Jersey Division of Fish and Wildlife indicated in its November 17, 2003 letter that fisheries in this freshwater river reach are quite diverse, with more than 50 species present. The river supports anadromous fish that spend most of their lives in saltwater and return to freshwaters to spawn. The anadromous species present include American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and striped bass (*Morone saxatillis*). Another migratory species, the catadromous American eel (*Anguilla rostrata*) uses the river for its freshwater component of its life and migrates to the saltwater to spawn. According to the National Marine Fisheries Service (NMFS), the Delaware River in the project area does not include Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act. The Delaware River also supports warmwater fisheries that include largemouth bass (*Micropterus salmoides*) and crappie (*Pomoxis sp.*). The coolwater fish that exist in the Delaware River include smallmouth bass (*Micropterus dolomeiu*) and walleye (*Stizostediam vitreum*). According to the NJDFW, waterfowl associated with the upper perennial habitats include Canada geese, mallards, wood ducks, mergansers, black ducks, goldeneyes, buffleheads, and great blue heron. The Delaware River also acts as a barrier to migratory birds and concentrates them at water's edge, with several hundred species of birds in both states that may pass through the area as transients.

The Delaware Canal is a trout stocked fishery and supports a wide variety of game fish. The Delaware and Raritan Canal is also a trout stocked fishery and contains a warmwater fishery composed primarily of bass, sunfish, and catfish. Both canals are stocked annually with rainbow and brook trout in the spring. The NJDFW has indicated that restrictions for construction work in the canal extend from March 15th to June 15th in order to avoid the stocking/trout season and spawning for warmwater species. The moratorium for in-stream work for the Delaware Canal is February 15th through July 31st. Typical fauna known to inhabit lower perennial streams include frogs, turtles, toads, salamanders, snakes, lizards, and beavers.

2. Impacts

a) No Build

The No Build alternative would not involve impacts on aquatic or terrestrial habitats.

b) Proposed Action

The proposed action will involve work located predominantly within the existing highway right-of-way. In Pennsylvania, the lane additions within the median will minimize the amount of roadside clearing of vegetation. The proposed action will result in clearing of approximately eight acres of forested lands. This includes approximately two acres in Pennsylvania and six acres in New Jersey, mostly within the NJ Route 29 Interchange. Widening of Woodside Road will also involve clearing of forested buffer areas

The work within aquatic habitats includes the construction of five new bridge piers and demolition of seven existing piers within the Delaware River. This work will result in a net loss of 0.3 acres of river bottom.

Existing I-95 bridge piers along the edge of the Delaware and Raritan Canal will be removed that would affect approximately 0.02 acre of the canal back slope. The project will also affect 0.04 acres of smaller tributary streams. These impacts are not considered to result in a substantial loss of aquatic habitat. Additional shading of 2.8 acres of the Delaware River and 0.3 to 0.4 acres of the Delaware Canal and Delaware and Raritan Canal is also not considered to represent a substantial aquatic impact. This work within project area waterways is discussed under in Section IV.G.2, "Surface Waters," and specific impacts on federally and state-protected species are addressed in more detail in the following section (Section IV.M.2), "Threatened and Endangered Species."

c) Incremental Impacts of Pedestrian/Bicycle Facility

The pedestrian/bicycle facility will not involve additional impacts on aquatic habitats, but approximately 2/3 acre of additional forest clearing would be associated with the added width on the bridge and landings in both Pennsylvania and New Jersey. Of this, approximately 0.4 acre of additional forest clearing would occur in Pennsylvania and 0.3 acre of forest clearing would occur in New Jersey.

d) Temporary Construction Impacts

During construction, temporary causeways will be used to construct the bridge within the Delaware River, and bridge piers will be constructed and demolished within cofferdams. The causeway construction will be divided into four stages to minimize the amount of river affected at any one time, and the causeways and cofferdams will be removed at the completion of the 4-year construction period. The causeways and cofferdams used during construction will affect 0.33 acre of river bottom.

3. Mitigation

For work within the Delaware River, mitigation measures are addressed in more detail under Section IV.G.3, "Surface Waters." Mitigation to be employed during construction includes use of a trestle causeway.

Permanent and temporary stormwater management measures will be identified in an Erosion and Sedimentation Control Plan and a Post-Construction Stormwater Management Plan. Prevention of pollution will be addressed in Spill Prevention Control and Countermeasure Plans to be prepared for the project for both the construction period and in the long-term.

The mitigation measures to be specified in the contract documents will incorporate use of turbidity barriers to minimize siltation within the Delaware River. Prior to placement of the causeway and cofferdams, turbidity screens will be installed to contain siltation. The work within the Delaware River will be restricted to avoid critical spawning periods.

In-river construction and removal of the four causeways and cofferdams will be scheduled outside the period March 15 through June 30 in order to prevent disruption of spawning for federally endangered migratory species (as described in the following section). A determination will be made during the final design phase of the feasibility of extending this moratorium to July 15 to protect river herring (alewife and blueback herring), which are important as prey for predatory fish species, during the end of their spawning period.

To the extent practicable, work within the Delaware and Raritan Canal for removal of the existing bridge piers will be scheduled outside of the March 15th to June 15th period, to accommodate trout stocking and in accordance with NJDEP requirements. No in-stream work is proposed within the Delaware Canal that would affect the trout stocking that occurs upstream of the project area.

M. Threatened and Endangered Species

1. Existing Conditions

The following rare species were identified by federal and state resource agencies:

Detailed information on threatened and endangered species is presented in Technical Memorandum No. 18, Terrestrial and Aquatic Habitat—Existing Conditions.

- Federally endangered shortnose sturgeon (*Acipenser brevirostrum*)
- Federal candidate species and Pennsylvania endangered Atlantic sturgeon (*Acipenser oxyrhynchus*)
- Federally threatened bog turtle (*Clemmys mulhenberii*)
- State-endangered (Pennsylvania and New Jersey) peregrine falcon (*Falco peregrinus*)
- State-endangered and threatened (Pennsylvania and New Jersey) bald eagle (*Haliaeetus leucocephalus*)
- Pennsylvania threatened red-bellied turtle (*Pseudemys rubriventris*)
- New-Jersey-threatened yellow lampmussel (*Lampsilis cariosa*), tidewater mucket (*Leptodea ochracea*), and triangle floater (*Alasmidonta undulata*).

The potential occurrences of these federally and state-protected species is addressed below and is summarized in Table IV-11.

a) Federal Listed or Candidate Species

Two species of sturgeon in the Delaware River are listed or being recommended for listing on the federal endangered species, and the potential for bog turtle habitat was assessed in Pennsylvania wetlands.

- **Shortnose sturgeon (*Acipenser brevirostrum*):** Spawning habitat within the Delaware River for this federally endangered and state endangered species (in Pennsylvania and New Jersey) was cited in correspondence received from the NMFS, USFWS, NJDEP, and the PFBC. The shortnose sturgeon spends the greatest part of its life downstream of the project area in the tidal Delaware River estuary, and this migratory (amphidromous) species moves into the non-tidal Delaware River to spawn. Pre-spawning adult fish overwinter in 13 miles of tidal freshwater below Trenton; the upper end of this reach is eight miles downstream of the I-95/Scudder Falls Bridge. The principal spawning grounds for the sturgeon includes the 7-mile stretch in the vicinity of the I-95/Scudder Falls Bridge. The river bottom that is suitable spawning habitat in this area is dominated by clean-swept, hard-bottom substrate materials (i.e., gravel, cobbles, boulders, and bedrock), with the exception of a small band of silt and sand along the east shoreline of Park Island. It should be noted that the extent of shortnose sturgeon spawning within the immediate vicinity of the I-95/Scudder Falls Bridge is uncertain, according to a researcher who has studied this species in the Delaware River for over 20 years. This researcher is studying early life stages of shortnose sturgeon in 7 miles of the lower non-tidal reach of the Delaware River under a NMFS grant through the NJDFW Endangered and Non-Game Species Program. Although the final results are not available, it is clear from the preliminary findings that adult shortnose sturgeon were present in the lower non-tidal reach of the Delaware River, which includes the I-95/Scudder Falls Bridge, during the spawning season in 2007 and 2008. Secondly, eggs and larvae were present near the I-95/Scudder Falls Bridge, but apparently in small numbers.

- **Atlantic sturgeon (*Acipenser oxyrhynchus*):** This species is a candidate for federal listing and is a state endangered species in Pennsylvania. A review of the status of this species under the U.S. Endangered Species Act prepared in 2007 recommended that three of the five distinct population segments be listed as threatened, including the New York Bight (and the Delaware River) population,. Within the project area, the occasional adult Atlantic sturgeon may move through the Scudder Falls reach of the Delaware River. The Atlantic sturgeon is found in greatest numbers in tidal waters of the Delaware River, and the juveniles are unlikely to be present in the Scudder Falls reach because they remain in tidal waters. Recent work suggests that spawning may occur downriver of the project area, extending as far upstream as near the head of tide at Trenton, New Jersey.

- **Bog turtle (*Clemmys mulhenberii*):** Potentially suitable habitat for this federally threatened and state-endangered species (in Pennsylvania and New Jersey) within wetlands in Pennsylvania was of concern to the USFWS. Bog turtles live in highly humid environments, such as open swamps and marshes with lush, emergent vegetation, rich mucky soils, and shallow slow-flowing clean water. The USFWS, USACE, and PA DEP have developed a screening process to identify potential bog turtle habitat. A Phase I field survey and habitat evaluations performed, in accordance with this screening process, of all seven Pennsylvania wetlands concluded that only four wetlands (Wetlands L, N, O, and P) contained potential

Table IV-11—Federally and State-Listed Species

Species (English/ Scientific name)	Listing Status*	Habitat Areas	Impact	Mitigation
Shortnose sturgeon (*Acipenser brevirostrum)*	FE	Delaware River spawning and passage	Construction of causeway and cofferdams over 4 years, with four phases	Timing restrictions (see Mitigation section)
Atlantic sturgeon (*Acipenser oxyrhynchus*)	FC	Delaware River passage	Construction of causeway and cofferdams over 4 years with four phases	Timing restrictions (see Mitigation section)
Peregrine falcon (*Haliaeetus leucocephalus*)	PA-E, NJ-E	Observed nesting on I-95/ Scudder Falls Bridge	Bridge demolition	Consultation with PA Game Commission on appropriate protective measures
Bald eagle (*Haliaeetus leucocephalus*)		No nesting habitats for the bald eagle have been identified within two miles of the bridge.	No impact on nesting areas	Not required
Bog turtle(*Clemmys mulhenberii*)	FT, PA-T, NJ-T	PA habitat evaluations indicated four wetlands (L, N, O, and P) contained potential habitat that was only marginal and unlikely to support bog turtles,	USFWS concluded that the project will not affect the bog turtle.	Not required
Red-bellied turtle (*Pseudemys rubriventris*)	PA-T	Field survey indicated only the Delaware River and the Delaware Canal were determined to provide potential red-bellied turtle habitat.	Causeway construction	Consultation with the PFBC on appropriate protective measures
Yellow lampmussel (*Lampsilis cariosa*)	FSC, NJ-T, PA R	Delaware River survey indicated 64 in all search areas	Causeway and cofferdam construction	Mitigation plan to be developed (see Mitigation for options)
Tidewater mucket (*Leptodea ochracea*)	NJ-T	Delaware River survey indicated no live or spent shells	Causeway and cofferdam construction	Mitigation plan to be developed (see Mitigation for options)
Triangle floater (*Alasmidonta undulata*)	NJ-T	Delaware River survey identified one live individual and one spent shell	Causeway and cofferdam construction	Mitigation plan to be developed (see Mitigation for options)

*/ F=Federally, PA=Pennsylvania, NJ=New Jersey, E=Endangered, T=Threatened, C=Candidate, SC=Special Concern, R=Rare

habitat for bog turtle, and this habitat was only marginal. It was determined that these wetlands are unlikely to support bog turtles, because the vegetation, soils, and hydrology are limiting. Although Wetlands N, O, and P had some mucky soils, there were all completely forested and within the flood zone of the Delaware River, making them unsuitable for bog turtles. The USFWS concluded that the project will not affect the bog turtle or its habitat.

b) State-Protected Species

The potential occurrences of two state-protected avian species that nest along the Delaware River was assessed, along with habitat for the red-bellied turtle in Pennsylvania and several New Jersey-protected mussel species in the Delaware River.

- **Peregrine falcon (*Falco peregrinus*):** The peregrine falcon was federally delisted in 1999, but is state endangered in both Pennsylvania and New Jersey. The Pennsylvania Game Commission (PGC) reported sightings of a pair or peregrine falcons on the I-95/Scudder Falls Bridge and confirmed nesting on the I-95/Scudder Falls Bridge in the spring/early summer of 2008. A protocol and training for bridge maintenance workers was developed by DRJTBC to avoid disturbance to the nest. The PGC banded the one young chick that hatched. In 2008, there were 27 nesting pairs in Pennsylvania reported by the PGC.

- **Bald eagle (*Haliaeetus leucocephalus*):** The potential occurrence of this species within forestlands within two miles of the Delaware River was cited in correspondence received from the USFWS and NJDEP. This species was formerly federally threatened and was delisted in 2007. The species is listed as threatened in Pennsylvania. In New Jersey, the non-breeding population is listed as threatened and the breeding population is listed as endangered. Bald eagles thrive around large bodies of open water, such as rivers, where there are plenty of fish and stands of undisturbed tall trees for nesting and roosting. The NJDEP Landscape Project was reviewed, and no bald eagle nesting, foraging, or buffer areas were identified within the project area. Field observations, research, and agency coordination have indicated that there are currently no nesting habitats for the bald eagle within two miles of the I-95/Scudder Falls Bridge.

- **Red-bellied turtle (*Pseudemys rubriventris*):** According to the Pennsylvania Fish and Boat Commission, this Pennsylvania threatened species inhabits relatively large, deep streams, rivers, ponds, lakes, and marshes with permanent water and ample basking sites in south-central and southeastern Pennsylvania. In October 2004, an assessment of potential habitat for the Pennsylvania threatened red-bellied turtle habitat was performed throughout the Pennsylvania portion of the project area. Based on these evaluations, only the Delaware River and the Delaware Canal were determined to provide potential red-bellied turtle habitat. Both of these waterbodies provide permanent or semi-permanent water, opportunities for foraging and basking, and potential nesting habitat in adjoining uplands. Marginal potentially suitable nesting habitat is provided along the edges of the canal and shoreline of the river, due to shading. Potential suitable nesting habitat is located on Park Island.

- **Yellow lampmussel (*Lampsilis cariosa*):** Although the yellow lampmussel is a federally-listed Species of Concern and is listed as threatened in New Jersey and considered rare in Pennsylvania, it has been documented as often fairly abundant where it occurs. Yellow lampmussel can be considered fairly abundant and was widely distributed in the bridge survey reach where it represented 76% of the live mussels encountered in a mussel survey performed in October 2004. The preferred substrate, a clean-swept mixture of sand and gravel, is

abundant among the cobbles and boulders in this part of the Delaware River. Sixty four live yellow lampmussels were found in the survey that extended 500 feet upstream and 800 feet downstream of the bridge, with individuals found in nearly every search area. Hundreds of spent yellow lampmussel shells were observed in the search areas.

- **Tidewater mucket (*Leptodea ochracea*) and triangle floater (*Alasmidonta undulata*):** According to the NJDEP, this portion of the Delaware River may be utilized by several New Jersey-threatened mussel species. No live tidewater mucket or spent shell of this species was encountered in the mussel survey. This was not unexpected because the preferred habitat, quiet water with a substrate of silt and mud, comprised only a very small part of the survey reach. The mussel survey also recorded one live individual and one spent shell of the New Jersey-threatened triangle floater (*Alasmidonta undulata*). Triangle floater inhabits slow and fast-moving water in large creeks and small rivers and sometimes lakes. One individual and four spent shells for the creeper (*Strophitus undulatus*) were also recorded in the survey of this species, which prefers slow-moving water. This is listed as a Species of Concern by New Jersey. None of these species are listed in Pennsylvania.

2. Impacts

a) No Build

The No Build alternative would not involve impacts on threatened or endangered species. However, bridge inspection, maintenance, and repair activities will require coordination with the Pennsylvania Game Commission regarding the peregrine falcon, which was observed nesting on the bridge in 2008.

Detailed information on the impacts on threatened and endangered species is presented in the Biological Assessment prepared under Section 7 of the U.S. Endangered Species Act for review by the National Marine Fisheries Service.

b) Proposed Action

A Biological Assessment (BA) has been prepared in accordance with Section 7 of the U.S. Endangered Species Act to address the project's effects on the federally endangered shortnose sturgeon, and formal consultation with the NMFS has been initiated by FHWA regarding the project's effects. In addition, the Biological Assessment addresses potential effects on the Atlantic sturgeon, a federal candidate species, and conferencing with NMFS has begun on potential project effects in the event that this species is listed in the future.

Potential impacts on the federally protected shortnose sturgeon, Atlantic sturgeon, and state-protected species with confirmed habitats, namely the state-endangered peregrine falcon, Pennsylvania-threatened red-bellied turtle, and New Jersey-threatened mussel species, are addressed in the following sections. The USFWS concluded that the project will not affect the federally threatened bog turtle, and no nesting habitats for the state-protected bald eagle were identified within two miles of the bridge.

(1) Shortnose Sturgeon

The Biological Assessment presents a detailed review of the life cycle and habitat requirements and anticipated project impacts on shortnose sturgeon. Adult shortnose sturgeon are expected to be in the project area only during the spawning season, which typically lasts from late March into mid-May. Shortnose sturgeon spawn over gravel, rubble (cobble), and boulder substrate in rapidly flowing and turbulent water, and most of the substrate in the study area is considered suitable

habitat for shortnose sturgeon. It should be expected that sturgeon eggs and larvae may be present in the I-95/Scudder Falls Bridge area for as long as 28 days after spawning is expected to end (from late April through mid-June).

In order to determine what percentage of the bottom in the seven mile long river reach extending from the head of tide to Scudder Falls might be permanently lost to replacement of the seven smaller existing piers with five larger proposed piers, the area of this river reach was computed using an average river width of 1,000 feet. This area is approximately 848.5 acres. The river bottom areas permanently lost are small compared to total spawning habitat available. The permanent loss (for piers) is 0.03% of total available spawning habitat.

This project may affect, and it is likely to adversely affect, the shortnose sturgeon due to loss of potential spawning habitat. The BA concludes that although the proposed action represents permanent loss of spawning and nursery habitat, the loss should not be considered significant, because it will represent only a minute percentage of the seven miles of river in which shortnose sturgeon are expected to spawn. The National Marine Fisheries Service's Biological Opinion is pending.

(2) Atlantic Sturgeon

Although the Delaware River spawning grounds of Atlantic sturgeon are largely unknown, spawning occurs in tidal waters, perhaps as far upstream as the head of tide. Juvenile Atlantic sturgeon remain in tidal waters. Therefore, the project will not affect spawning adults, eggs, larvae, or juveniles. The Atlantic sturgeon is found in greatest numbers in tidal waters of the Delaware River and upper Bay, but has been recorded as far upstream as Port Jervis, New York. Therefore, the occasional adult Atlantic sturgeon may move upstream through the project area after spawning in June and downstream to tidal waters in the fall.

Direct effects to Atlantic sturgeon, which are bottom feeders, include permanent loss of feeding habitat in the footprint of new bridge piers. This project may affect, and it is likely to adversely affect, Atlantic sturgeon because river bottom habitat will be permanently lost. However, as addressed above, the effect to the Atlantic sturgeon species should be considered insignificant because the losses will be only a very small percentage of the habitat that is available to them.

(3) State-Protected Species

State agencies in Pennsylvania and New Jersey have been contacted regarding potential project impacts of confirmed habitats for state-listed species. Coordination has been performed and will continue with the Pennsylvania Game Commission regarding potential impacts on the peregrine falcon, and the Pennsylvania Fish and Boat Commission has been consulted regarding the red-bellied turtle and the yellow lampmussel. The NJDEP has also been consulted regarding the New Jersey-threatened mussel species, particularly the yellow lampmussel.

- **Peregrine falcon:** The project when completed will not have an adverse impact on the state-endangered peregrine falcon. The proposed bridge structure will be larger, which may provide additional opportunities and areas in which the peregrine falcon may roost within the bridge itself. To help offset the loss of habitat from demolition of the nest currently located on the bridge, the Pennsylvania Game Commission has requested that a new nesting platform be constructed. During final design, coordination will be conducted with the Pennsylvania Game Commission to determine an appropriate design and location for a new nesting platform.

- **Red-bellied Turtle:** The project, once completed, is not expected to result in permanent loss or habitat impacts to red-bellied turtle habitat. No loss of habitat within the Delaware River banks or Park Island will occur in the long term. During final design, coordination with the Pennsylvania Fish and Boat Commission will be conducted to determine conservation measures needed to protect the red-bellied turtle from impacts associated with construction activities. This will likely involve a pre-construction survey by a qualified biologist to identify potential nesting areas, placement of super silt fencing around nesting areas to act as habitat exclusion fencing, and placement of orange safety fencing around potential nesting areas to provide a visible barrier for construction equipment.

- **Yellow lampmussel and Other Mussel Species:** The change in bridge pier configuration is not expected to result in permanent effects on the yellow lampmussel and other mussel species. As discussed earlier, the loss of available habitat with the change in piers will represent a small percentage of total habitat available to these species. Therefore, the permanent impacts of the proposed action is expected to be minimal.

c) Incremental Impacts of Pedestrian/Bicycle Facility

The addition of a pedestrian/bicycle facility will not result in an increase of impacts of the proposed action to federally and state-protected species. This facility would not require changes to the proposed bridge pier footprints within the Delaware River and therefore would not affect the availability of suitable habitat for protected species.

d) Temporary Construction Impacts

(1)Shortnose Sturgeon

Temporary impacts to the shortnose sturgeon are primarily related to causeway and cofferdam construction within the Delaware River and indirect impacts on river flow. Construction of the causeway and cofferdams will be scheduled outside of the spring periods for shortnose sturgeon spawning and migration. Once in place, work staged from the causeway or within cofferdams will occur throughout the year.

Each causeway will extend only approximately one-half of the width of the river, and a trestle causeway is proposed which would minimize obstructions to river flow, fish passage, and substrate impacts. Installation of pile bents for the trestle causeway will be vibrated into place, or driven, which could have temporary noise impacts, but this work would occur outside of the moratorium for fish migration and spawning.

Because the cofferdam steel sheeting will be driven to bedrock and all joints will be tightly sealed, it is anticipated that shortnose sturgeon eggs and larvae will not enter the enclosed cofferdam areas. Blasting operations are not anticipated in the placement of the cofferdams or the footings. In areas where the rock is shallow, the upper weathered layers of the rock will be removed with excavating type equipment.

Other direct effects of the project include noise, vibration, and sedimentation. Noise will be generated by heavy and other equipment used in bridge construction and demolition. Vibration will be generated by steel sheet vibrated or driven into the riverbed as part of cofferdam construction, and from the hydraulic ram during demolition of the existing bridge. Vibration may also be expected from drilling for construction of drilled shaft pier foundations if river bottom subsurface conditions do not favor spread-footing pier foundations. Since construction will occur within the

cofferdams and causeways during the moratorium, noise and vibration effects may occur during that time.

The BA concludes that the project construction may affect, and it is likely to adversely affect, shortnose sturgeon, but this effect is considered insignificant because the temporary habitat losses will be only a very small percentage of the habitat that is available to them. The area of the seven mile long river reach between head of tide to Scudder Falls where spawning occurs was computed (using an average river width of 1,000 feet) to be approximately 848.5 acres. The proposed causeways and cofferdams would incur temporary impacts to 0.04% of the total available spawning habitat within the 7-mile reach where spawning occurs on the Delaware River. This represents a very small percentage of the total available spawning habitat.

(2) Atlantic Sturgeon

The project area is not a known spawning habitat for Atlantic sturgeon, although the occasional adult may pass through the area. Direct effects to Atlantic sturgeon, which are bottom feeders, include temporary loss of feeding habitat in the footprint of causeways and cofferdams used in bridge construction. The amount of river bottom affected by these project components and their timing is described above. Other direct effects of the project include noise, vibration, and sedimentation, as described above.

The only indirect effects to Atlantic sturgeon that are anticipated from the project are related to cofferdam and causeway impacts. Each causeway will extend only approximately one-half of the width of the river, and a trestle causeway will minimize impacts on fish passage and substrate.

The construction of the project may affect Atlantic sturgeon because river bottom habitat will be temporarily lost, but the effect to this species should be considered insignificant because the losses will be only a very small percentage of the habitat that is available to them.

(3) State-Protected Species

Construction effects on other state-protected species are addressed below:

- **Peregrine Falcon:** The peregrine falcon nests from late February to late April, and feeding of young extends to early June to late July. Prior to the start of construction activities, the PGC will be consulted regarding the status of nesting at or near the bridge and measures to deter nesting on the bridge prior to the start of construction activities. The feasibility of establishing alternative nearby nesting sites will be assessed, in consultation with the PGC.

- **Red-bellied turtle:** Prior to the start of construction, a certified biologist will survey the project area, and will identify potential red-bellied turtle nesting areas. Habitat exclusion fencing (i.e. super silt fence) will be erected to keep red-bellied turtles out of construction areas, and equipment out of nesting areas. Therefore, it is not anticipated that red-bellied turtles will be impacted by the project.

- **Yellow lampmussel and Other Mussel Species:** The New Jersey-threatened and Pennsylvania-rare yellow lampmussel is present in the work zones for causeways and cofferdams. To minimize impact to the yellow lampmussel, those within the work zones will be permanently relocated outside the work zones. It is expected that the areas will be recolonized upon completion of construction, based on PennDOT post-construction monitoring of other bridge projects where causeways were constructed. Studies of other bridge projects on the

Allegheny River and French Creek indicate that mussels recolonize the areas within two to three years after construction.

3. Mitigation

Mitigation measures for protected species within the Delaware River include the following:

- In-river construction and removal of the four causeways and cofferdams will be scheduled outside the period March 15 through June 30 in order to prevent disruption of shortnose sturgeon spawning and effects on this species' eggs and larvae. A determination will be made during the final design phase of the feasibility of extending this moratorium to July 15 to protect river herring (alewife and blueback herring), which are important as prey for predatory fish species, during the end of their spawning period.
- The causeways will be constructed as a temporary trestle to minimize the affected footprint and impacts to fish passage and substrate within the Delaware River.
- The piles for the trestle will be vibrated into place, where feasible. Otherwise, they must be driven.
- Prior to heavy pile driving, each pile will be tapped with the hammer to encourage nearby fish to move out of the area.
- The steel sheeting that will be used to construct the cofferdams will be vibrated into the river bottom where physical conditions allow. Otherwise, it must be driven.
- Five cofferdams will allow construction of the new bridge piers "in the dry". Similarly, seven cofferdams will allow demolition of the existing bridge piers "in the dry". This will prevent any fish, including shortnose and Atlantic sturgeon, and their eggs and larvae from entering river bottom areas where they may be injured or killed.
- Turbidity barriers and other erosion/sedimentation controls will reduce in-river sedimentation.
- Water quality will be monitored downstream of the causeways and cofferdams during their construction and removal to measure sedimentation.
- Some bridge drainage scuppers will be eliminated in construction of the new bridge, with the majority of the stormwater directed to land-based passive treatment. This will be an improvement from the existing bridge drainage system.
- A Spill Prevention Control and Countermeasures Plan (SPCP) will be developed to prevent spills from entering the river during construction. Additionally, an SPCP will be prepared to address spills from vehicles using the bridge when construction is completed.
- The riverbed in the project area will be monitored to ensure timely removal of all construction debris.
- A mitigation plan for yellow lampmussel, triangle floater, and tidewater mucket will be developed and coordinated with NJDFW. Mitigation options under consideration include pre-construction surveys, relocation to an upstream reach, collection of additional species survey data, or habitat enhancements. Determination of the mitigation option will be made through further consultation with NJDFW.

- The project will also incorporate as mitigation proactive measures to promote the recovery of the shortnose sturgeon. An acoustic receiver will be provided to researchers for use in the project area to record the possible presence of acoustically-tagged shortnose sturgeon.

Mitigation measures for the red-bellied turtle include:

- Prior to the start of construction, a certified biologist will survey the project area (including Park Island), and will identify potential red-bellied turtle nesting areas. Habitat exclusion fencing (i.e. super silt fence) will be erected to keep red-bellied turtles out of construction areas, and equipment out of nesting areas.

Mitigation measures for the peregrine falcon include:

- Consultation with PGC and monitoring of peregrine falcon activities at the bridge site will continue, and appropriate mitigation measures will be developed with input from PGC to protect nesting habitat for this species.

- Consideration will be given to establishing alternative nesting sites to discourage nesting on the bridge, as well as provision of permanent nesting platforms at suitable locations.

N. Cultural Resources

1. Existing Conditions

Section 106 of the National Historic Preservation Act requires that federal undertakings and permit approvals provide for protection to historic properties that are found to be significant in American history, architecture, archaeology, engineering, and culture. The Act defines a historic property as any "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register [of Historic Places], including artifacts, records, and material remains related to such a property or resource."

The Act also provides for designation of those properties deemed to have national historic significance as National Historic Landmarks. Federal oversight of the National Historic Landmark program is provided by the National Park Service.

Cultural resources in the project area include precontact and buried deposits along the Delaware River, the historic canals in Pennsylvania and New Jersey, and historic buildings and properties that date back to as early as the first quarter of the eighteenth century. The historic and archaeological resources in the project area are described in the following sections.

a) Historic Resources

For the purposes of historic assessments, an Area of Potential Effect (APE) was defined as the area that may be either directly or indirectly affected by the project.

The historic properties within the APE include the canals in both states. The Delaware Canal in

Historic resources are characterized in Technical Memorandum No. 24, Historic Resources Survey and Determination of Eligibility Report, Bucks County, Pennsylvania; Technical Memorandum No.34 Determination of Effect Report, Bucks County, Pennsylvania; Technical Memorandum No. 25, Historic Resources Survey, Determination of Eligibility, and Determination of Effect Report, Ewing Township, Mercer County, New Jersey; and Section 4(f) Evaluation.

Pennsylvania is listed in the National Register of Historic Places (National Register) and the National Historic Landmarks Survey. The Delaware and Raritan Canal in New Jersey is listed in the National Register. Within the APE, all buildings over 50 years of age were evaluated as part of the study to identify potentially historically significant architectural resources. A total of 20 properties or structures in Pennsylvania and 27 properties in New Jersey were surveyed. As a result of this survey, one additional historic resource in Pennsylvania and three historic resources in New Jersey within the APE were determined to be eligible for National Register listing.

To be eligible for inclusion in the National Register, a historic property must possess the quality of significance in American history, architecture, archeology, engineering, and culture [that] is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) that are associated with the lives of persons significant in our past; or

(c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) that have yielded, or may be likely to yield, information important to prehistory of history. (36 CFR 60.4)

The historic resources that have been identified within the APE, as shown in Table IV-12 and on Figure II-4 are as follows:

- **Delaware Canal (also known as the Delaware Division of the Pennsylvania Canal):** The Delaware Canal operated for more than a century. The Delaware Canal is the only remaining continuously intact canal of the great towpath canal building era of the early and mid-19th century. In the mid 1820s, Pennsylvania, following the surge in canal building in New York, planned a route for the Pennsylvania Canal that would extend from Easton to Bristol. The entire length of the Delaware Division of the entire length was opened to boat traffic by 1832. Throughout the nineteenth century, the canal became an important means of transporting coal, through its connection with the Lehigh Canal, from the upper Lehigh Valley to southern markets in Philadelphia, New York, and the eastern seaboard. The canal operated until October 1931, and was acquired by the Commonwealth in 1940, when it became a state park. The canal is significant for its historic contributions to transportation, commerce and recreation and for its engineering design. The period of significance extends from 1827 to 1956.

  Project coordination with officials with jurisdiction over the canal has included discussions with the National Park Service and the Delaware and Lehigh National Heritage Corridor Commission. A field walkover on October 20, 2005 was attended by the Delaware Canal State Park manager, the PA DCNR, the PHMC, FHWA, PennDOT, and DRJTBC. Features of the Delaware Canal identified in the project area include a stone retaining wall that was constructed on the north (back) side of the towpath embankment (see Figures IV-12 and IV-13). Reconstruction using stone originally excavated during canal construction was common after the initial canal construction to reinforce the towpath embankments that were subject to washouts during flood events.

Table IV-12—Historic Resources in the Area of Potential Effect

Property Name	Description	National Register (NR) Eligibility Status	NR Listing Criteria
Delaware Canal, Lower Makefield Township	Construction began in 1827. Longest lived canal in country. Includes prism, towpath, retaining wall in APE.	NR Listed in 1974, National Historic Landmark designation in 1976, Delaware and Lehigh National Heritage Corridor established in 1988, Period of Significance extended to include State Park era in 2006	A and C
Delaware and Raritan Canal, Ewing Township	Construction began in 1830. Includes Belvedere & Delaware Railroad along former towpath.	NR Listed in 1973	A and C
Elm Lowne, 1324 Dolington Road, Lower Makefield Township	Late eighteenth to early nineteenth-century Colonial stone farmhouse and early nineteenth-century outbuildings	Determined NR eligible on July 12, 2008	C
Charles S. Maddock House, 1076 River Road, Ewing Township	Circa-1830 dwelling with Queen Anne style detailing	Determined NR eligible on December 10, 2008	C
New Jersey State Police Headquarters, Ewing Township	Constructed beginning in 1924	Determined NR eligible on December 10, 2008	A, B. C

Figure IV-12—View, looking east, of I-95 Bridge over Delaware Canal

During its initial construction, the canal dimensions were set at forty-three feet on the water line, twenty-five feet at bottom, and with six feet depth of water. The standard park boundary for the canal used by PA DCNR includes minimum standard dimensions of twelve feet for the towpath and eight feet for the berm bank alongside the opposite edge of the canal, plus whatever outer slopes may have been constructed to elevate the banks of the canal. In a letter dated August 27, 2004, the PHMC concurred that the National Historic Landmark boundary of the canal follows along the boundaries of the Delaware Canal State Park and includes the prism, towpath, and related features. Thus, in the APE, the park boundary is interpreted as the historic boundary and is approximately 72 feet in width, with the exception of the area of the stone retaining wall, where the width is approximately 90 feet. It has been determined by PennDOT that the I-95 legal right-of-way extends through the area of the canal crossing.

Figure IV-13—Views of the stone retaining wall along the Delaware Canal towpath, looking southeast (left photo) and west (right photo)

- **Delaware and Raritan Canal:** The Delaware and Raritan Canal opened in 1834 and is significant in the areas of commerce, engineering, and transportation. The canal was constructed to transport freight between Philadelphia and New York across the "waist" of New Jersey and accommodated coal shipments. The portion of the Delaware and Raritan Canal extending north of Trenton and within the APE is known as the feeder canal. The feeder canal was constructed 22 miles from Bull's Island near Stockton and Frenchtown to supply the main canal in Trenton with water from the Delaware River. The planned dimensions of the feeder canal were 60 feet at the water line, 50 feet at the canal bottom, and 6 feet deep (Figure 12-14). Movement of coal was also facilitated by construction in 1849 of the Belvedere and Delaware Railroad on the present location of the canal towpath. The railroad was operational by 1855, and the railroad company assumed control of the railroad and canal through a lease in 1871. The canal closed in 1932 to 1933, when it was abandoned by the railroad company. The State took over management of the property in 1934 and assumed ownership in 1937, and the state park was designated in 1974. The period of significance is 1830 to 1933. The historic boundary for the National Register historic district extends 300 feet on either side of the centerline of the canal.

The Belvedere-Delaware (B&D) Railroad was determined to not be individually eligible for the National Register, but is a contributing element to the Delaware and Raritan Canal Historic District under Criterion A.

Coordination with state officials included a site walkover on May 24, 2005 that was attended by the NJHPO, the New Jersey Division of Parks and Forestry, the Delaware and Raritan Canal Commission, the NJWSA, and NJDOT. The project area includes the proposed I-95 and NJ Route 29 crossings of the canal; each includes a set of piers located within or adjoining the water although the NJ Route 29 bridge is not affected by this project.

According to NJDOT General Property Parcel Map for Route 29, dated July 1958, the proposed highway right-of-way for the Route 129 Freeway (now I-95) is 225 feet wide and centered on the Route 129 (I-95) centerline at its crossing of the Delaware and Raritan Canal.

Figure IV-14—View looking north at I-95 crossing (left photo) and NJ Route 29 crossing (right photo) of the Delaware and Raritan Canal

- **Elm Lowne House, Pennsylvania:** The Elm Lowne House property includes 10 acres that adjoin the south side of I-95, east of Dolington Road (Figure II-4), a dwelling, barn, and associated outbuildings. Elm Lowne House is eligible for its architectural significance. The property is owned by Lower Makefield Township, and the dwelling is used for social functions.

- **Charles S. Maddock House, New Jersey:** The Charles Maddock House, a 1.64-acre parcel, is located at the north end of the NJ Route 29 Interchange (Figure II-4). The Charles S. Maddock house is significant as a notable example of the Free Classic subtype of the Queen Anne Style. The property is also eligible for its association with Charles S. Maddock. Charles S. Maddock garnered a modest amount of wealth with the success of his Trenton-based serving ware business during the late nineteenth and early twentieth centuries. The period of significance for this resource dates from its purchase by Maddock in 1902 until his death in 1933.

- **New Jersey State Police Headquarters (NJSPHQ):** The historic portion of the complex consists of twelve buildings located approximately 500 feet south of I-95 (Figure II-4). Eight of the buildings located around a central courtyard date back to the initial construction in the mid-1920s. During the 1930s, the dormitory, gymnasium, and Bureau of Identification were added.

Later construction on the site dates to the late 1940s and early 1950s. The NJSPHQ is significant as a unique collection of structures that remain in their original location and continue to reflect the developing organization, needs, and capabilities of the NJ State Police during the twentieth century. The boundary for the NJSPHQ encompasses an area of land that contains all buildings from the period of significance (1924-1958).

b) Archaeological Resources

(1) Phase IA Investigation

Archaeological resources are characterized in Technical Memorandum No. 32, Draft Archaeology Phase I Report.

A Phase IA Investigation included background research and review of prior regional studies. Phase IA also included geoarchaeology investigations to characterize landforms in the project area, which focused on the landforms and terraces adjoining the Delaware River. The Phase 1A geoarchaeology investigations were performed in January 2004 to characterize the relative integrity, extent, and ages of soils within the terraces adjoining the Delaware River, specifically the older, higher river terraces that are considered to have a higher potential for archaeological sensitivity. Eight geoprobes were taken as part of the Phase 1A study in areas proximal to the Delaware River.

The landforms in the project area, as confirmed by Phase 1A geoarchaeology investigations, generally include:

- **Park Island:** Situated at elevations of 20 to 25 feet above sea level, the geologic age of the island is uncertain, but the island appears on the earliest historic maps. The lower (downstream) end of the island may have accumulated as recently as the nineteenth century.

- **T1 Terrace and Floodplain:** Defined as the active floodplain and lower river terraces adjoining either side of the Delaware River, the T1 terrace extends between 20 to 30 feet above sea level. The T1 terrace is considered to have low potential for archaeological sensitivity, and the geologic age of the lowest terrace is comparatively recent, as confirmed by Phase I investigations. In the early nineteenth century, a channel along the New Jersey side of the river was constructed to supply industrial uses in Trenton (Trenton Water Power Channel) at the present location of the T1 terrace. This channel was visible during the I-95/Scudder Falls Bridge construction, but was filled in by highway construction.

- **Slope to Older T2 Terrace:** The slope to the T2 terrace extends between 30 to 36 feet above sea level.

- **Older T2 Terrace:** The older, higher T2 terrace extends 36 to 40 feet above sea level. The T2 Terrace in Pennsylvania is considered to have a high potential for archaeological sensitivity. The T2 terrace is wide in Pennsylvania, extending from PA Route 32 (River Road) across the nineteenth century Delaware Canal to the base of the upland slope at the Taylorsville Road Interchange with I-95. At least three generations of soil were excavated at depths at one site, with an intact soil horizon dating back to 4,100 to 4,400 years before present. The high terraces (T2 and/or T3) in New Jersey offer some archaeological potential, but the narrower T2 terrace in New Jersey was impacted in the project area by the original construction of the NJ Route 29 Interchange. However, those portions of the T2 terrace that remained undisturbed during construction would be expected to have an archaeological sensitivity comparable to that in Pennsylvania. The Delaware and Raritan Canal was constructed along the transition between

the T2 and a higher (older) terrace or upland formation. The T3 terrace, west of the Delaware and Raritan Canal, is the highest terrace above the T2 terrace extending to 60 feet above sea level, yielding evidence of precontact occupation

- **Uplands:** The uplands extend west to the PA Route 332 Interchange in Pennsylvania and east to the Bear Tavern Road Interchange in New Jersey. The earliest historic occupation near the project area was located on the higher elevation uplands.

(2) Phase IB Investigation

Phase IB investigations included further investigation in May to June 2004 of the T2 terrace west of PA Route 32 that was identified in Phase IA as a high potential for archaeological sensitivity and the high terraces (T2/T3) in New Jersey. This work included test pitting and excavating a deep test unit to confirm the degree of intact buried deposits with potential for archaeological sensitivity, as shown in Table IV-13. Additional Phase IB investigations were performed in winter/spring 2005 and fall 2005 at areas potentially affected by the project in the area along I-95 extending west to Taylorsville Road and east to Bear Tavern Road Interchange.

Since widening along the Pennsylvania mainline west of Taylorsville Road would involve lane additions within the median, this area was considered to have low potential for undisturbed intact soils, and was not investigated. The T1 terrace along the Delaware River was also not tested, as it was determined to be relatively recent in age and to have little or no potential for precontact period resources. The results of this testing are summarized in Table IV-13.

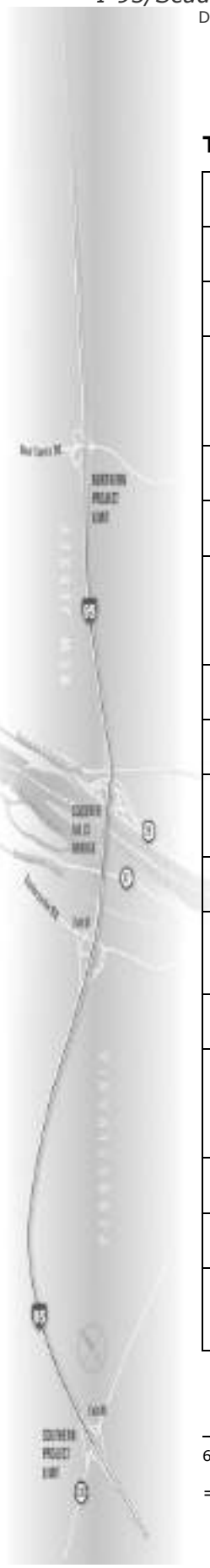


Table IV-13—Summary of Phase I Archaeological Investigations

Property	Location/ Landform	Phase I Study[6]	Archaeological Results	Project Impact	Further Study
Park Island	Delaware River	Research	No testing	Causeway proposed	Phase I needed
T1 terrace, PA-NJ	low terrace	Geoarch.	Recent deposits	Causeway proposed	None
36BU379, PA	T2 terrace	Geoarch. 20 STP deep TU	National Register eligible	Adverse effect from bridge piers & abutment	Phase III data recovery via PA
36BU378, PA	T2 terrace	None	Not National Register eligible	No or minimal impact	None
East of Delaware Canal, PA	T2 terrace adjoining I-95	None	No testing, but some potential	None proposed	None
Delaware Canal, PA	rear of T2 terrace	Research	National Historic Landmark	Potential pedestrian/bicycle facility connection to towpath	Study if impacted
Area PA 30	Woodside Road	5 STP	No artifacts	Road widening	No further study
Area PA 40	I-95 roadside	7 STP	2 precontact flakes	Road widening	No further study
Area PA 50 Pfaff Farm	I-95 roadside	6 STP	2 precontact flakes, historic farm demolished in 1950s	Road widening	No further study
Area PA 60 Pfaff Farm	Taylorsville Interchange	2 STP	1 flake, historic farm demolished in1950s	Ramps, basins in interchange	No further study
I-95 in PA	upland	None	No testing eroded slopes	Noise barriers	No further study
Trenton Water Power Channel	T1 terrace in NJ	Research	No testing	Pier proposed nearby	Record if impacted
Delaware & Raritan Canal NJ	T2/3 terrace	Research Geoarch.	National Register District	Potential pedestrian/bicycle facility connection to towpath	Study if impacted
Belvidere & Delaware RR	T2/3 along D & R Canal	Research	No testing; rail bed noted in past	None proposed	Record if impacted
NJ 29 Interchange	T2/T3 terrace adjoining I-95	Research	Disturbed but deep potential	Retention basins	Phase I in south loop
28Me360 West, NJ	NJ 29 Interchange T2 terrace	1 TU	19th century and precontact period resources	NJ Route 29 Interchange	Phase III recovery

[6] Various Phase I studies were undertaken: geoarch. = Phase IA geoarchaeology, research = Phase IA research, STP = Phase IB shovel test pits, TU = Phase IB test unit.

Property	Location/ Landform	Phase I Study[6]	Archaeological Results	Project Impact	Further Study
28Me360 Center, NJ	NJ 29 Interchange T2 terrace	1 TU	19th century and precontact period resources	NJ Route 29 Interchange	Phase II if impacted
28Me360 North, NJ	T2 terrace east of NJ 29	21 STP 1 TU	Farmed soils, historic and precontact period resources	None proposed	No further study
Area NJ 40	I-95 roadside	4 STP	Disturbed	In right-of-way	Not required
Area NJ 80 near DeGrave	I-95 roadside	5 STP	Disturbed; 20th Century artifacts	In right-of-way	Not required
Area NJ 30	I-95 roadside	5 STP	Farmed soils	In right-of-way	Not required
Area NJ 50	I-95 roadside	5 STP	No artifacts	In right-of-way	Not required
Area NJ 70	I-95 roadside	5 STP	No artifacts	In right-of-way	Not required
Area NJ 90	I-95 roadside	5 STP	No artifacts	In right-of-way	Not required
Area NJ 110	I-95 roadside	5 STP	Disturbed	In right-of-way	Not required

2. Impacts

a) No Build

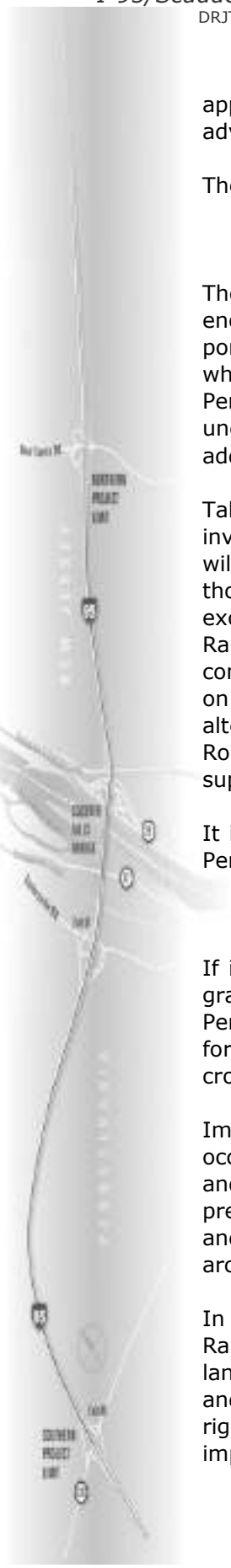
The No Build Alternative will not involve impacts on historic or archaeological resources.

b) Proposed Action

(1) Historic Resources

The proposed action will involve work at the Delaware Canal and the Delaware and Raritan Canal for replacement of overpassing bridges. The new I-95 Bridge over the Delaware Canal will increase the width of I-95 over the Delaware Canal by approximately 85 to 90 feet and will be constructed to span over, and not disturb, the historic canal retaining wall. The towpath and associated features, such as the stone retaining wall on the east side of the canal, are integral elements of the Delaware Canal National Historic Landmark. No permanent impacts to the canal, towpath, or stone retaining wall are planned, and the project will not result in changes to the historic characteristics of the canal and towpath. This work is considered to have an effect. The PHMC concurred that the proposed project will have No Adverse Effect on the Delaware Canal.

At the NJ Route 29 Interchange, the proposed action will result in a smaller interchange within the footprint of the existing interchange. The proposed design would also move the I-95 Bridge piers, which are currently situated at the edge of the canal, outside of the canal area. The I-95 Bridge will be widened at the canal crossing by approximately 35 to 40 feet, and two additional bridges for the adjoining ramps would be constructed over the canal. Each of these bridges would be



approximately 40 feet wide and 120 feet long over the canal. This work is determined to have an adverse effect on the Delaware and Raritan Canal.

The project will have no effect on other historic properties.

(2) Archaeological Resources

The proposed action will involve work in several areas considered to have a high potential for encountering archaeological resources. Areas where excavations are proposed within intact portions of the historic Delaware River terraces will require further archaeological investigations, which is restricted to areas between the Delaware Canal in Pennsylvania and PA Route 32 in Pennsylvania and the southern portions of the NJ Route 29 Interchange that may have been undisturbed by prior highway construction. Project impacts anticipated at each location are addressed in Table IV-13.

Table IV-13 summarizes the archaeological resources in the project area, the status of investigations, and anticipated impacts to these areas. The design of the project and limits of work will be refined during final design, and additional archaeological investigations will be required for those areas that will be affected by project construction, as shown in Table IV-13. Phase I excavations will occur at a site at the Trenton Water Power Channel and Belvidere and Delaware Railroad bed in New Jersey and 1479 North River Road in Pennsylvania if project design and construction plans will impact these locations. Additional investigations may need to be performed on Park Island to inventory resources potentially affected by causeway construction. Design alternatives under consideration for noise barriers in Pennsylvania and retention basins in the NJ Route 29 Interchange near the Delaware Canal and Delaware and Raritan Canal may require supplemental archaeological investigation.

It is anticipated that Phase III archaeological data recovery will be required at three sites, one in Pennsylvania and two in the area of the NJ Route 29 Interchange in New Jersey.

c) Incremental Impacts of Pedestrian/Bicycle Facility

If implemented as part of the proposed action, the pedestrian/bicycle facility would require minor grading where the pedestrian/bicycle path would join the existing canal towpaths at grade. The Pennsylvania landing would require a ramp that would be located outside of the historical boundary for the Delaware Canal, but would transition to the existing towpath at the Woodside Road crossing.

Impacts to the National Register-eligible and high probability archaeological site at 36BU379 will occur. These impacts would arise from deep footings for the ramp between the unnamed stream and PA Route 32 (River Road) to the east and also from the surface pathway since the latest precontact component is shallow (i.e., less than one foot beneath the ground surface). The nature and depth of foundation piers to support the ramps are important factors in assessing the archaeological impact, which will be determined during final design.

In addition, a retaining wall would be required adjacent to the west side of the Delaware and Raritan Canal towpath for a distance of approximately 200 feet. The proposed construction of the landing for the pedestrian/bicycle facility will occur within the historical boundary of the Delaware and Raritan Canal. However, the proposed ramp will be constructed within the legal NJ Route 29 right-of-way. The aerial crossing of the pedestrian/bicycle facility and ramp would not result in impacts on the Delaware and Raritan Canal.

The path returns to ground level on the towpath of the Delaware and Raritan Canal National Historic District just south of the parking area for the Delaware and Raritan Canal State Park. Impacts may occur at the pedestrian/bicycle facility landing on the west side of the canal near the Scudder Falls Recreation Area parking at the north end of the project area. Phase I geoarchaeological investigations indicate approximately six feet of considerable historic fill deposits, probably relating to canal construction, and more recent deposits above soil horizons of sufficient age to hold evidence of precontact occupation. Archaeological investigations may be required on or adjacent to the towpath of the canal, depending on the design and location of the pedestrian/bicycle facility. The nature and depth of any supporting piers would need to be evaluated to more fully assess impacts to historic and potential precontact deposits, when plans are more developed during final design. The design of the pedestrian/bicycle facility and retaining wall will be developed in coordination with the consulting parties.

No impact adjacent to the Delaware River at the location of the buried Trenton Water Power Channel is anticipated, since the path will be supported by an extension of the bridge deck girders.

d) Temporary Construction Impacts

Temporary construction activities will occur within the historical boundaries for the Delaware Canal and the Delaware and Raritan Canal, but affected areas within the canal historic districts will be restored upon completion of construction.

Two types of impacts from project construction are anticipated at the area evaluated as containing archaeological resources that are potentially eligible for the National Register, the T2 terrace in New Jersey and Pennsylvania. Shallow impacts (less than about 3.3 feet) may arise from general construction activities, construction equipment, and permanent or temporary utility installation. In addition, deep (more than 3.3 feet) impacts would be confined to pier and abutment locations and any deeply buried drainage or utility structures.

Park Island was not investigated for archaeological sensitivity due to difficulty accessing the island and because no new bridge piers are proposed on the island. A pier for the existing bridge is located on the island, and this will be removed as part of the project. The construction of the proposed causeway will require additional Phase I investigations of Park Island, and additional investigations may also be required for the Trenton Water Power Channel if a new bridge pier or other action will impact the buried remnants of the channel.

3. Mitigation

a) Historic Resources

The concrete surfaces of the noise barriers, new bridge abutment walls or piers at both the Delaware Canal and the Delaware and Raritan Canal will be treated with an aesthetic finish to be agreed upon in coordination with the consulting parties during the final design of the project. In New Jersey, the mitigation will include the removal of existing bridge piers from their current location on the back slope of the Delaware and Raritan Canal, and piers for the new bridge will be located further back from the canal. Further consideration will also be given, during final design, to minimize the footprint of the proposed bridge pier type. Coordination with historic resource and canal agencies will continue during final design. Mitigation measures for aboveground historic resources in NJ have been stipulated in the Programmatic Agreement in accordance with Section 106 requirements. The Programmatic Agreement is included in the EA as Attachment F.

The removal of the piers from the Delaware and Raritan Canal will also be staged to minimize impacts and will be carried out in a manner that is sensitive to the materials and design of the earthen ditch and towpath. If it is determined that there may be stone walls that reinforce the prism or towpath present within the area of construction impacts, measures to protect the walls from heavy equipment will be undertaken during construction. To mitigate for the loss of integrity of the Delaware and Raritan Canal, the DRJTBC will make a donation to foster and support the interpretation of historic resources along the Delaware and Raritan Canal. Potential measures to minimize and mitigate for adverse effects have been outlined in the Programmatic Agreement.

Procedures and processes for further consultation/coordination with both PHMC and NJHPO and for mitigation for archaeological resources in Pennsylvania and New Jersey and above ground resources in New Jersey will be described in the Programmatic Agreement. Changes or refinements in design may necessitate the need to adjust the Area of Potential Effect (APE) in the future. Should the APE be adjusted or be modified, in consultation with PHMC, NJHPO and consulting parties, preparation of supplemental documentation on eligibility and effects assessments may be necessary.

b) Archaeological Resources

A Programmatic Agreement has been developed, outlining provisions for areas potentially affected by the project where archaeological sensitivity is considered to be high. Phase III archaeological data recovery and documentation and additional Phase I and Phase II archaeological investigations for impacted areas will be performed under a Programmatic Agreement.

O. Air Quality

1. Existing Conditions

The U.S. Clean Air Act Amendments of 1990 established National Ambient Air Quality Standards (NAAQS) for criteria pollutants to protect public health and welfare. The six criteria pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

Detailed information on the air quality analysis is presented in Technical Memorandum No. 30, Preliminary Engineering Air Quality Analysis.

Motor vehicles emit air quality pollutants that generally consist of carbon monoxide (CO), nitrogen oxides (NO_x), and hydrocarbons. Hydrocarbons react with nitrogen oxides in the presence of sunlight to form ground-level ozone (O_3), or smog. For highway projects, carbon monoxide impacts are analyzed as an accepted indicator of vehicle-generated air pollution.

Diesel buses and trucks are also generators of particulate matter. NAAQS standards have been established for particulate matter under 2.5 microns in size ($PM_{2.5}$) and particulate matter under 10 microns in size (PM_{10}).

Bucks and Mercer Counties have been designated by the USEPA as moderate non-attainment areas for ozone. Therefore, transportation projects undertaken in these counties must demonstrate conformity with the State Implementation Plan (SIP) developed to comply with the provisions of the U.S. Clean Air Act. The proposed project is included in the DVRPC Long Range Transportation Improvement Program (TIP) and the New Jersey 3-Year TIP (fiscal years 2010-2013). As

an element of the State TIP, the project conforms with the SIP, and a mesoscale analysis of regional CO emissions is not required for the project.

Background CO concentrations in Pennsylvania were estimated using USEPA monitoring data from Bristol in Bucks County, Pennsylvania and Burlington in Burlington County, New Jersey. Background concentrations from these monitoring stations are as shown in Table IV-14. A microscale analysis was performed to model the effects of localized CO emissions generated by the project.

Table IV-14--Background Carbon Monoxide

Location	One-hour CO concentration (ppm)	Eight-hour CO concentration (ppm)
Pennsylvania	2.9	2.1
New Jersey	3.5	1.8

Source: USEPA AirData, USEPA *Air Quality Statistics by County, 2006*

2. Impacts

Localized project effects on traffic CO emissions were predicted by performing a microscale analysis for the one-hour and eight-hour averaging periods during future peak A.M. and P.M. traffic periods. The USEPA CAL3QHC dispersion model was used to predict CO concentrations at sensitive receptors in the year 2030. Carbon monoxide emission factors were estimated using the USEPA MOBILE 6.2 model. The results of the air quality modeling predicted emissions generated by the project, which were added to background concentrations (shown in Table IV-15) to determine total CO emissions.

a) No Build

The predicted concentrations under the 2030 No Build would be marginally lower than those predicted under the 2030 Build condition. As shown in Table IV-15, the future maximum predicted CO concentrations would be well below the NAAQS under the 2030 No Build condition.

Table IV-15—2030 Maximum Predicted CO Concentrations

	NAAQS	2030 No Build	2030 Build
One-hour concentration (ppm)	35	5.7	6.3
Eight-hour concentration (ppm)	9	2.9	3.8

b) Proposed Action

(1) CO Microscale Analysis

As shown in Table IV-15, the future maximum predicted CO concentrations would be well below the NAAQS under the 2030 Build conditions, and no violations of the NAAQS will occur as a result of the project.

(2) PM2.5/PM10 Hot Spot Screening Analysis

USEPA/FHWA and PennDOT have established screening parameters to determine if a project is of air quality concern for particulate matter, requiring further hot spot analysis. The new federal regulations (40 CFR 93.123(b)(1)(i-v) define projects that are not of air quality concern for particulate matter ($PM_{2.5}$/PM_{10}) emissions. Projects that are not of air quality concern include any new or expanded highway facilities that primarily service gasoline-fueled vehicle traffic and do not involve substantial increases in diesel traffic.

Under federal rules, projects are defined as an air quality concern for particulate matter if the forecasted total Build traffic is equal to or greater than 125,000 average annual daily traffic and 8% or more of this traffic (or 10,000 vehicles) consists of diesel trucks. PennDOT screening criteria are more stringent: 87,500 vehicles AADT and 7,000 heavy trucks per day. According to FHWA and PennDOT guidance, the project is not considered to be of air quality concern for particulate matter, since the predicted 2030 Build traffic is approximately 85,000 vehicles per day and heavy truck traffic is forecasted to total 5,100 vehicles per day, which are less than PennDOT criteria.

c) Incremental Impacts of Pedestrian/Bicycle Facility

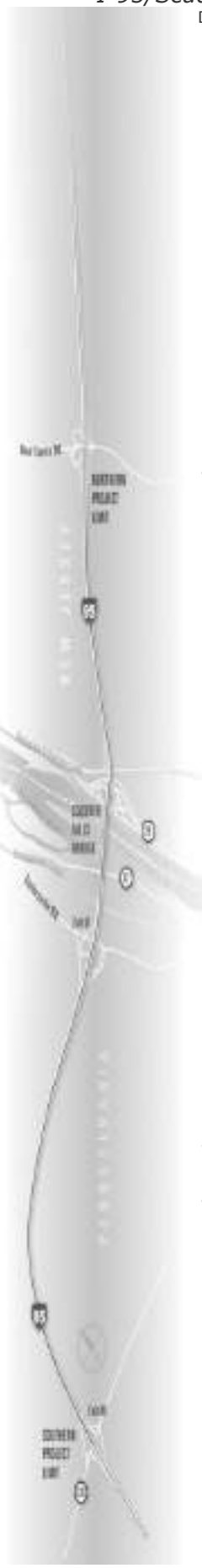
A carbon monoxide screening analysis of potential air quality impacts was performed for receptors along the proposed pedestrian/bicycle facility and results are consistent with Table IV-15. Based on this screening analysis, the highest concentrations of CO in the area of the proposed pedestrian/bicycle facility are predicted to occur at a receptor on I-95 approaching the NJ Route 29 Interchange during A.M. periods and a receptor site on the west side of NJ Route 29 during P.M. periods. However, these levels do not exceed the NAAQS. Therefore, no air quality impacts are expected to occur as a result of the proposed pedestrian/bicycle and facility.

d) Temporary Construction Impacts

During project construction, dust control measures, such as equipment washing and use of water sprays, will be used to minimize emissions of particulate matter from the construction site.

3. Mitigation

There are no long-term air quality impacts anticipated as a result of the project that will require implementation of mitigation measures.



P. Noise

1. Existing Conditions

Detailed information on the noise analysis is presented in Technical Memorandum No. 29, Preliminary Engineering Noise Analysis.

Sound pressure is measured in terms of decibels (dB). On the logarithmic decibel scale, 0 decibels cannot be heard, and 120 decibels is uncomfortably loud and painful to human hearing. Increases of less than 3 decibels are barely perceptible, increases of 5 decibels are noticeable, and increases of 10 decibels represent a doubling of sound energy.

The human response to hearing for different frequencies is approximated by use of an A-weighted sound pressure level or decibel (dBA). The noise level descriptor used for this project is the hourly equivalent sound level (Leq(h)). The Leq(h) (dBA) is the steady state, A-weighted sound level, which contains the same amount of acoustic energy as the actual time-varying A-weighted sound level over a one-hour period.

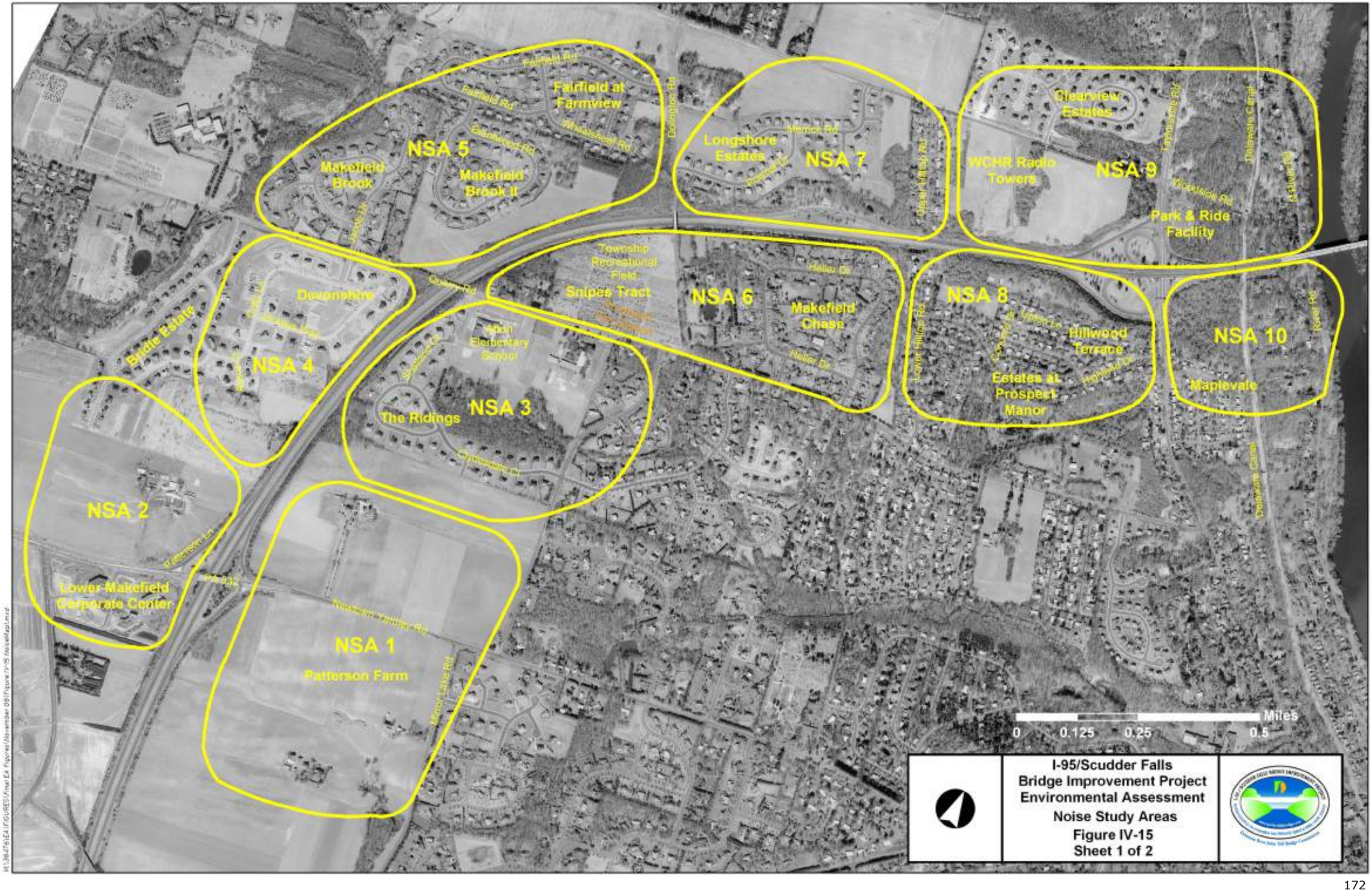
Ambient 24-hour noise monitoring at six sites in the project area was performed to define fluctuations of noise throughout the day. This monitoring was used to identify the noisiest periods of the day, which were found to generally coincide with peak traffic periods. For this project, the noise metric used is the Leq(h) for the peak traffic hour.

Short-term noise measurements were taken at 51 sensitive noise receptor sites identified along the project area. The results of the noise monitoring were used to calibrate the FHWA Traffic Noise Model (FHWA TNM), Version 2.5 (April 2004). In instances where traffic speeds were found to be impeded by high traffic volumes in existing and future peak hours, lower traffic volumes were used in the noise model to provide a conservative, worst case estimate of traffic noise and to simulate free-flowing traffic conditions.

FHWA, PennDOT, and NJDOT have established noise abatement criteria for five categories of land uses or activities, as shown in Table IV-16. The majority of land uses in the project area consist of Category B land uses (residential and institutional), with some Category C (other developed land such as commercial or industrial uses) and Category D (undeveloped lands) uses.

Under FHWA criteria, a noise impact occurs when traffic noise levels approach or exceed the noise abatement criteria shown in Table IV-16. Both PennDOT and NJDOT interpret a noise level "approaching" the criteria as a noise level that is 1 dBA less than the criteria level,

The project area was divided into fourteen separate Noise Study Areas (NSAs) for analysis purposes (see Figures IV-15). Within these NSAs, the noise model was used to predict existing and future traffic noise at sensitive receptors. The existing and predicted noise levels within these noise study areas are shown in Table IV-17.


NSA 1
Patterson Farm
NSA 2
Lower Makefield Corporate Center
NSA 3
The Ridings
Upper Elementary School
NSA 4
Devonshire
Birdie Estate
NSA 5
Makefield Brook
Makefield Brook II
Fairfield at Farmview
NSA 6
Township Recreational Field
Snipes Tract
Makefield Chase
NSA 7
Longshore Estates
NSA 8
Estates at Prospect Manor
Hillwood Terrace
NSA 9
WCHR Radio Towers
Park & Ride Facility
Clearview Estates
NSA 10
Maplevale
Dolington Rd
Queen Rd
Taylorsville Rd
Delaware Canal
Miles
0
0.125
0.25
0.5
I-95/Scudder Falls
Bridge Improvement Project
Environmental Assessment
Noise Study Areas
Figure IV-15
Sheet 1 of 2

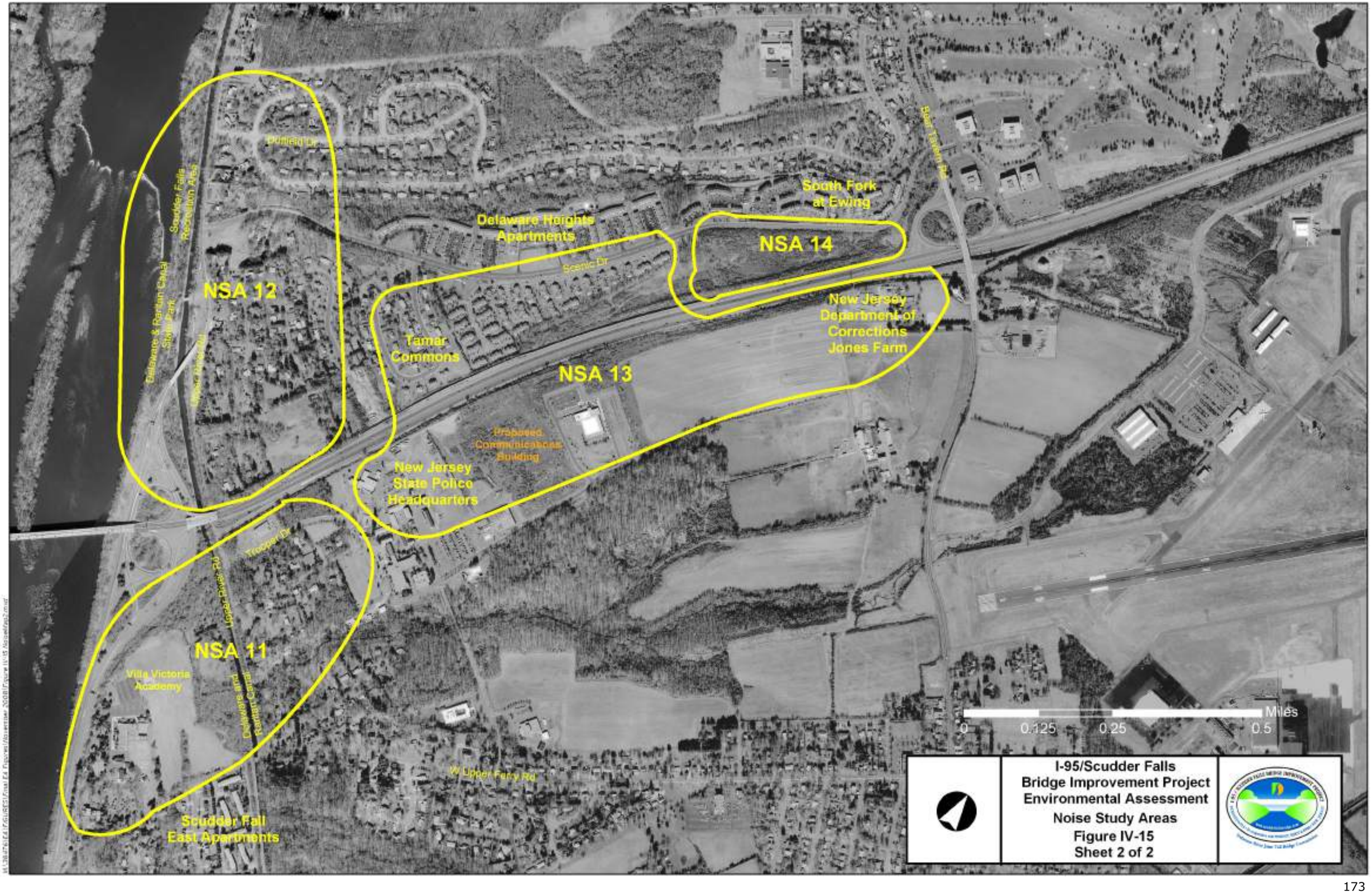

NSA 12
NSA 13
NSA 14
NSA 11
Delaware Heights Apartments
South Fork at Ewing
New Jersey Department of Corrections Jones Farm
Tamar Commons
New Jersey State Police Headquarters
Proposed Communications Building
Scudder Fall East Apartments
Villa Victoria Academy
Scudder Falls Recreation Area
Delaware & Raritan Canal State Park
Dorfield Dr
Scenic Dr
Bear Tavern Rd
Trooper Dr
Upper Ferry Rd
W Upper Ferry Rd
Miles
0
0.125
0.25
0.5
I-95/Scudder Falls
Bridge Improvement Project
Environmental Assessment
Noise Study Areas
Figure IV-15
Sheet 2 of 2

Table IV-16—FHWA Noise Abatement Criteria

Activity Category	Leq(h) Noise Levels (dBA)	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve as important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories or B above
D	--	Undeveloped lands
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Table IV-17—Existing and Future Noise Levels

Noise Study Area	Noise Levels (dBA Leq(h))			Change from Existing		Impacted Receivers	
	Existing	2030 No Build	2030 Build	2030 No Build	2030 Build	2030 No Build	2030 Build
1	Development is removed from proposed alignment						
2	Commercial properties noise levels are below NAC criteria						
3 and 6	55 to 70	55 to 70	56 to 73	0 to 1	-1 to 3	1	12
4	56 to 67	56 to 69	57 to 71	0 to 2	1 to 5	2	6
5	Development is removed from proposed alignment						
6 and 8	54 to 74	55 to 75	55 to 75	0 to 1	-1 to 5	5	13
7	54 to 72	55 to 73	56 to 77	0 to 2	-2 to 5	3	8
9	62 to 66	62 to 66	64 to 69	0	2 to 3	1	7
10	56 to 67	56 to 67	58 to 68	0 to 1	-2 to 4	2	3
11	58 to 63	56 to 63	61 to 67	0 to 2	-3 to 4	0	1
12	58 to 72	59 to 72	61 to 75	1	2 to 4	4	6
13	Commercial properties noise levels are below NAC criteria. Residential properties protected by an existing sound wall.						
14	54 to 77	56 to 77	56 to 78	1 to 3	1 to 3	16	18

2. Impacts

Under FHWA, PennDOT, and NJDOT criteria, a traffic noise impact occurs when noise levels approach or exceed the criteria shown in Table IV-16, or when projected traffic noise levels substantially exceed the existing noise levels in the area. Both PennDOT and NJDOT define 10 dBA as a substantial increase over existing noise levels and define noise levels "approaching" FHWA criteria as noise levels 1 dBA less than criteria levels.

Impacts from traffic noise levels were assessed by predicting future 2030 No Build and Build noise levels.

a) No Build

Under the 2030 No Build condition, noise levels are predicted to increase between 0 to 3 dBA, compared to existing conditions, as a result of normal traffic growth over time. Table IV-17 summarizes the 2030 No Build conditions. There would be a total of 34 impacted sensitive receptors under the 2030 No Build condition.

b) Proposed Action

Comparison of future 2030 Build noise levels to existing noise levels indicate that increases will range from 1 dBA to 5 dBA (Table IV-17). There are no locations where a 10 dBA or more increase in noise levels is predicted.

The future 2030 Build condition is predicted to result in noise increases over the 2030 No Build that will range from 1 to 4 dBA. There are no locations where a 10 dBA or more increase in noise levels is predicted. There would be a total of 74 impacted sensitive receptors under the 2030 Build condition.

c) Incremental Impacts of Pedestrian/Bicycle Facility

Locations considered to be sensitive receptors addressed in noise studies do not include sidewalks along expressways and other roadways. As such, the addition of a pedestrian/bicycle facility across the Delaware River and to the Delaware and Delaware and Raritan Canals will not result in noise impacts to sensitive receptors in the project area.

While pedestrians or bike riders using such a walkway system will certainly be exposed to noise from the adjacent roadway, their exposure to such noise levels is limited in terms of duration. Exposure times would likely be considerably less than other conditions to which people are exposed on a daily basis such as waiting for a bus at a bus stop, walking along city sidewalks, sidewalk café users, or other similar activities.

d) Temporary Construction Impacts

The majority of bridge construction will be scheduled during daytime hours, however some construction operations may be necessary during nighttime hours to minimize disruption to traffic flow. The project will involve use of typical roadway construction equipment and activities, as described in Section III.D. Equipment will be required to maintain noise mufflers.

3. Mitigation

In addition to the FHWA noise abatement criteria, PennDOT and NJDOT have established criteria for determining whether noise barriers are feasible and reasonable. The DRJTBC has established additional criteria for this project that further consideration is warranted for barriers that provide a 5 dBA noise reduction for the majority of first row impacted receivers. The DRJTBC criteria does not set a maximum cost criteria but limits noise barrier heights to 18 feet. Federal and state funds cannot be used for abatement that does not meet the states' criteria. Criteria established by PennDOT, NJDOT, and DRJTBC for noise abatement measures are shown in Table IV-18.

Table IV-18—Noise Barrier Criteria

Factors	PennDOT	NJDOT	DRJTBC
Noise Abatement Design Goals	7 to 10 dBA for majority of impacted residences	5 to 10 dBA for majority of impacted residences	5 to 10 dBA for majority of impacted residences
Minimum Noise Reduction	5 dBA for majority of impacted receptors (for barrier to be considered feasible); 3 dBA for impacted receptors and 5 dBA for non-impacted receptors (for barrier to be considered reasonable)	5 dBA for impacted receptors (for barrier to be considered feasible); 5 dBA for impacted and non impacted receptors (for barrier to be considered reasonable. non impacted receptors count as half)	5 dBA for first row of homes
Maximum Wall Height	---	18 feet	18 feet
Costs per Square Foot of Barrier used in Calculation	$25	$50	same as defined by PennDOT/NJDOT within each state
Barrier Cost criteria	Maximum of $50,000 per residence benefited	Maximum of $50,000 per residence benefited	---

a) Noise Barriers Identified in Noise Study Areas

The following summarizes the site-specific assessment of noise barriers that was performed for each of the 14 Noise Study Areas (Table IV-19).

- **NSA 1—Farmlands including Patterson Farm** - **Areas adjoining PA Route 332, south of I-95:** Development within the farms at the PA Route 332 Interchange are sufficiently removed from I-95 that predicted noise levels for 2030 do not warrant consideration of noise abatement.

- **NSA 2—Lower Makefield Corporate Center and Breezyvale Farm - Areas adjoining PA Route 332, north of I-95:** This area contains the Hampton Inn Hotel, and the predicted exterior noise levels exceed the Noise Abatement Criteria (NAC) of 66 dBA for 2030. However, the only exterior use is the outside pool, which is shielded from I-95 by three sides of the building. Noise levels at the pool are therefore predicted to be below the NAC level. In addition, the building is air conditioned with sealed windows. Thus, interior noise levels can be expected to be 25 to 30 dBA below exterior levels, indicating interior levels below the 52 dBA NAC for interior noise. No other sites within NSA2 are predicted to exceed NAC levels. Therefore, no consideration of noise abatement is deemed warranted for this NSA.

- **NSA 3—Ridings Subdivision and western part of NSA 6—Quarry Road - Areas South of I-95, west of and along Quarry Road:** The majority of properties evaluated within these NSAs are predicted to have noise levels at or above 66 dBA under the 2030 Build condition.

Therefore, consideration of noise abatement was warranted. When PennDOT feasibility criteria are applied, the noise barrier system was determined to be feasible and reasonable. The combined barrier system will be approximately 3039 feet long with an average height of 11.1 feet.

- **NSA 4—Devonshire Subdivision - Areas North of I-95 and west of Quarry Road:** The majority of properties evaluated within these NSAs are predicted to have noise levels at or above 66 dBA under the 2030 Build condition therefore, consideration of noise abatement is warranted. In order to find a system that would meet criteria, a small length of barrier protecting receptor R-4 and a longer length of barrier protecting the Devonshire subdivision were incorporated, separated by a 50-inch high raised Jersey barrier along the fill section of I-95. The proposed barrier system was determined to be feasible and reasonable based on PennDOT criteria. The wall is approximately 1,235 feet long, with an average height of 13.1 feet.

  When DRJTBC project criteria are applied, an extended noise barrier system was determined to be feasible. The proposed wall is approximately 1,535 feet long with an average height of 12.8 feet.

- **NSA 5—Makefield Brook, Makefield Brook II, and Fairfield at Farmview Subdivision - Areas North of I-95 between Quarry Road and Dolington Road:** The residences within the subdivision in this NSA are sufficiently removed from the proposed project that predicted noise levels for the year 2030 Build condition do not warrant further consideration of noise abatement.

- **Eastern portion of NSA 6—Makefield Chase, LMT Recreational Fields, and Elm Lowne and NSA 8—Hillwood Terrace - Areas South of I-95 between Dolington Road and Taylorsville Road:** This area includes the Makefield Chase community in NSA 6 and the Lower Hilltop Road and Hillwood Terrace communities in NSA 8. The majority of properties evaluated within these NSAs are predicted to have noise levels at or above 66 dBA for the 2030 Build condition. Therefore, consideration of noise abatement was warranted. In order to find a system which would meet PennDOT criteria, the barrier had to be shortened on both its southern and northern ends, resulting in no abatement being provided near the Dolington Road and Taylorsville Road areas of this NSA. This noise barrier system would be approximately 2,600 feet long, with an average height of 11.2 feet.

  When DRJTBC project criteria are applied, an extended noise barrier system was determined to be feasible. The proposed wall is approximately 5,225 feet long with an average height of 15.3 feet. It extends from Dolington Road to Taylorsville Road.

- **NSA 7—Longshore Estates - Areas North of I-95, between Dolington and Upper Hilltop Roads:** This area includes Longshore Estates and homes along Upper Hilltop Road. The majority of properties evaluated within these NSAs are predicted to have noise levels at or above 66 dBA under the 2030 Build condition. Therefore, consideration of noise abatement was warranted. The recommended noise barrier system was determined to be feasible and reasonable based on PennDOT criteria. Two noise barriers are proposed on either side of the rest area. These would have a combined length of approximately 2,469 feet long, with an average height of 10.5 feet.

- **NSA 9—Woodside Road, Clearview Farm, Taylorsville Road, Delaware Canal, and PA Route 32 - Areas North of I-95 surrounding Taylorsville Road, west of the Delaware River:** The majority of properties evaluated within this NSA are predicted to have noise levels

at or above 66 dBA with the 2030 Build condition. Therefore, consideration of noise abatement was warranted. A noise barrier system could not be determined to be feasible based on PennDOT criteria, since a 5 dBA reduction would only be provided for 43% of the impacted properties. However, a noise barrier that meets DRJTBC project criteria was determined to be feasible. This wall would be approximately 1,086 feet long, with an average height of 14 feet, and would extend 200 to 300 feet along the north side of the I-95/Scudder Falls Bridge.

- **NSA 10—Maplevale subdivision, Delaware Canal, and PA Route 32 - Areas South of I-95 between Taylorsville Road and Delaware River:** Several properties evaluated within this NSA are predicted to have noise levels at or above 66 dBA under the 2030 Build condition. Therefore, consideration of noise abatement was warranted. A noise barrier system was determined to be feasible, but could not be determined to be reasonable ($\geq$ $50,000 per benefited residential unit) based on PennDOT criteria. When DRJTBC criteria are applied, a barrier was determined to be feasible that is approximately 800 feet long, with an average height of 10 feet.

- **NSA 11—Trooper and State Police Drives and Delaware and Raritan Canal - Areas South of I-95 between NJ Route 29 and the New Jersey State Police Headquarters :** The only receptors that are predicted to be impacted are portions of the Delaware and Raritan Canal towpath adjacent to the bridge and the facility used by the New Jersey State Police along Trooper Drive at the entrance to the headquarters property. Although there is a basketball hoop at the back of the parking lot on this property, this land use fits Activity Category C (commercial) that has no areas of frequent exterior activities. The NAC for this activity category is 72 dBA for exterior uses, and the building construction (air conditioned, closed window operation) indicates that interior noise levels can be expected to be 25 to 30 dBA below exterior levels, indicating interior levels below the 52 dBA NAC for interior noise. Thus, noise abatement is not proposed for this site. A noise barrier system for the receptor along the Delaware and Raritan Canal towpath was determined to be feasible ($\geq$ 5 dBA provided for 100% of impacted properties), but could not be determined to be reasonable ($\geq$ $50,000 per benefited residential unit) based on NJDOT criteria. Therefore, no further consideration of noise abatement is proposed for this NSA.

- **NSA 12—Upper River Road and Delaware and Raritan Canal - Areas North of I-95 between NJ Route 29 and Bernard Drive:** Several properties evaluated within this NSA are predicted to have noise levels at or above 66 dBA under the 2030 Build condition. Therefore, consideration of noise abatement was warranted. A noise barrier system was determined to be feasible, but could not be determined to be reasonable ($\geq$ $50,000 per benefited residential unit) based on NJDOT criteria. When DRJTBC criteria are applied, the barrier was determined to be feasible, with a total length of approximately 1,124 feet, and an average height of 11.5 feet.

- **NSA 13—New Jersey State Police and Jones Farm Correctional Facility south of I-95 and Tamar Commons and Scenic Drive north of I-95:** This area includes state property on the south and Tamar Commons on the north, which is protected by an existing noise barrier. The New Jersey State Police and correctional facility properties are classified as a Land Use Category C, with an exterior NAC of 72 dBA. While exterior levels at the site exceed the NAC, there are no areas of frequent exterior activities. The building construction (air conditioned, closed window operation) indicates that interior noise levels can be expected to be 25 to 30 dBA below exterior levels, indicating interior levels below the 52 dBA NAC for interior noise. Therefore, no consideration of noise abatement is deemed warranted for this NSA.

- **NSA 14—Planned Retirement Community - Areas North of I-95 and West of Bear Tavern Road:** The majority of units proposed to be built in the future retirement community are predicted to have noise levels at or above 66 dBA under the 2030 Build condition. Therefore, consideration of noise abatement was warranted. A noise barrier system was determined to be feasible, but could not be determined to be reasonable ($\geq$ $50,000 per benefited residential unit) based on NJDOT criteria. When DRJTBC project criteria are applied, the recommended barrier system was determined to be feasible. This barrier would be approximately 1,543 feet long, with an average height of 18 feet.

b) Summary of Noise Mitigation

Based on the noise analysis during the EA and preliminary engineering phase, and when PennDOT and NJDOT criteria are applied, noise barriers appear to be warranted, feasible, and reasonable in NSA's 3, 4, 6, 7 and 8. However, when DRJTBC criteria are applied, noise barriers appear to be warranted, feasible and reasonable in NSAs 3, 4, 6, 7, 8, 9, 10, 12, and 14. With such barriers, noise levels can be decreased to levels at or below existing levels at most locations.

During the final design phase, a detailed optimization of barrier lengths, heights, costs and locations will be conducted in conjunction with the final design engineering process to insure compatibility and the most cost-effective and efficient barrier design. This process may result in barrier heights, lengths, and locations changing from those discussed in this document.

DRJTBC is committed to offer construction of the feasible and reasonable noise abatement measures discussed above contingent upon the following conditions:

- Detailed noise analyses during the final design process
- Analysis and determination of the feasibility and reasonableness of noise abatement measures, methodology, and criteria;
- Community input regarding desires, types, heights, and locations, as well as aesthetic considerations;
- Preferences regarding compatibility with adjacent land uses, particularly as addressed by officials having jurisdiction over such land use;
- Safety and engineering aspects as related to the roadway user and the adjacent property owner

Table IV-19—Summary of Project Noise Abatement Measures

Noise Study Area	Description	Details of Barrier Systems					
		Length (feet)	Average Height (feet)	Average Insertion Loss (dBA)	Cost	Benefited Residences	Cost per Benefited Residence
1	Areas adjoining PA Route 332, south of I-95 (Farmlands including Patterson Farm)	Not Warranted					
2	Areas adjoining PA Route 332, north of I-95 (Lower Makefield Corporate Center and Breezyvale Farm)	Not Warranted					
3 and 6	Areas South of I-95, west of and along Quarry Road (NSA 3—Ridings Subdivision and western part of NSA 6—Quarry Road)	3,039	11.1	6.1	$842,700	12	$70,225
4	Areas North of I-95 and west of Quarry Road (Devonshire Subdivision)	1535	12.8	5.3	$474,100	8	$59,263
5	Areas North of I-95 between Quarry Road and Dolington Road (Makefield Brook, Makefield Brook II, and Fairfield at Farmview Subdivision)	Not Warranted					
6 and 8	Areas South of I-95 between Dolington Road and Taylorsville Road (eastern portion of NSA 6—Makefield Chase, LMT Recreational Fields, and Elm Lowne and NSA 8—Hillwood Terrace)	5,225	15.3	7.2	$2,000,875	26	$76,957
7	Areas North of I-95, between Dolington and Upper Hilltop Roads (Longshore Estates)	2,469	10.5	6.6	$647,625	13	$49,817
9	Areas North of I-95 surrounding Taylorsville Road, west of the Delaware River (Woodside Road, Clearview Farm, Taylorsville Road, Delaware Canal, and PA Route 32	1,086	14.0	4.7	$380,000	6	$63,333
10	Areas South of I-95 between Taylorsville Road and Delaware River (Maplevale subdivision, Delaware Canal, and PA Route 32)	801	10.0	5.1	$200,225	3	$66,742
11	Areas South of I-95 between NJ Route 29 and the NJ State Police Headquarters (Trooper and State Police Drives and Delaware and Raritan Canal)	Not Reasonable					
12	Areas North of I-95 between NJ Route 29 and Bernard Drive (Upper River Road and	1,124	11.5	7.1	$644,600	5	$128,920

Table IV-19—Summary of Project Noise Abatement Measures

Noise Study Area	Description	Details of Barrier Systems					
		Length (feet)	Average Height (feet)	Average Insertion Loss (dBA)	Cost	Benefited Residences	Cost per Benefited Residence
	Delaware and Raritan Canal)						
13	Areas on both sides of I-95, west of Bear Tavern Road (NJ State Police and Jones Farm Correctional Facility south of I-95 and Tamar Commons and Scenic Drive north of I-95)	Not Warranted					
14	Areas North of I-95 and West of Bear Tavern Road (Planned Retirement Community)	1,543	18.0	7.8	$1,388,650	17.5	$79,351

Q. Hazardous Waste

1. Existing Conditions

Detailed information on the noise analysis is presented in Technical Memorandum No. 21, Hazardous Materials—Existing Conditions.

A Phase I Environmental Site Assessment was performed that included an environmental database/regulatory records review, field reconnaissance, and interviews. The assessment was performed in accordance with the PennDOT *Waste Site Evaluation Procedures Handbook, Volume I, Publication No. 381*, the *NJDOT Design Manual*, applicable FHWA guidance and policy publications, and with the American Society for Testing and Materials (ASTM) *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (E 1527-00).*

The environmental records review identified 42 records of environmental interest at 18 locations within a mile of the project. These records consisted of:

- Four Resource Conservation and Recovery Information System (RCRIS) sites,
- Four Leaking Underground Storage Tank (LUST) sites,
- Seven Underground Storage Tanks (UST) sites,
- Four Facility Index System (FINDS) sites,
- Four New Jersey Spill sites,
- 15 New Jersey Release incidents, and
- One Unregulated (UNREG) LTANK case.

Additional field reconnaissance, interviews and additional research were performed to determine the potential of these sites to impact project construction. It was determined that these locations have either no or low potential to impact the project due to the distance of the sites from the project and/or the status of the sites.

As part of these investigations, lead-based paint was identified on the I-95/Scudder Falls Bridge, which will need to be addressed during construction. It is assumed that bridges overpassing the Delaware Canal and the Delaware and Raritan Canal may also contain lead paint

Site inspections of areas within the right-of-way were performed, in accordance with the PA DEP Management of Fill Policy and PennDOT Strike-off Letter 401-04-03, which included conducting clean fill due diligence determinations for all potential excess materials. During walking field visits and windshield surveys and wetland delineations conducted in October and November 2003, no areas of stressed vegetation, staining on soils, staining along PennDOT right-of-way or on right-of-way materials, or detectable odors were identified that suggest impact by a spill or release of regulated substances.

2. Impacts

a) No Build

Under the No Build alternative, appropriate containment, disposal and worker safety measures would be employed during maintenance and repair activities.

b) Proposed Action

Based on evaluations performed to date, the project is not expected to result in impacts on hazardous materials. It is anticipated that lead paint on the bridge will be an issue during construction. During final design, the potential for encountering asbestos during utilities construction will be determined.

c) Incremental Impacts of Pedestrian/Bicycle Facility

The pedestrian/bicycle facility is not expected to result in any additional impacts on contaminated materials.

d) Temporary Construction Impacts

The presence of lead-based paint on the I-95/Scudder Falls Bridge, and potentially the I-95 canal bridges, will require that special measures be employed during demolition and construction to prevent contamination of the Delaware River and the canals and worker exposure.

3. Mitigation

Based on the evaluations performed, no further studies are required. However, the presence of lead on the bridge will require that bridge demolition employ lead paint containment, worker safety measures, and proper disposal of waste and demolition debris in accordance with Occupational Safety and Health Administration (OSHA), NJDEP, PA DEP, NJDOT, and PennDOT standards.

During final design, a Spill Prevention Control and Countermeasure Plan (SPCP) will be developed to prevent spills from entering the river during construction. This plan will address practices for storage of fuels and hazardous materials that will avoid or minimize the occurrences of spills or

other incidents in the vicinity of sensitive environmental resources, such as waterways and wellhead protection areas. Additionally, an SPCP will be prepared to address spills from vehicles using the bridge when construction is completed.

R. Secondary Development and Cumulative Impacts

1. Existing Conditions

Secondary impacts are those that are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable," as defined in the NEPA CEQ regulations (40 CFR 1508.8). Secondary impacts typically refer to induced development that is an indirect result of the proposed action. However, regional and local zoning and plans have a bearing on the manifestation of development pressures in a given area and provide a context for secondary impact evaluations. Past, current, and future development trends are also relevant in assessing secondary development in a given area.

Cumulative effects are impacts which result from the incremental consequences of an action when added to other past and reasonably foreseeable future-actions (40 CFR 1508.7). Evaluation of cumulative impacts requires identifying past and ongoing actions.

Because of the interrelationship of past development trends to the likelihood of secondary induced development, the following sections address recent and proposed development and development trends in the area, as they are relevant to both the secondary and cumulative impact assessments.

a) Attractiveness of Area for Development

Since its initial construction, the I-95 corridor has experienced substantial growth over the years, with residential and commercial development spurred on by interstate highway access. Development pressures in the I-95 corridor have continued in recent years, due to access provided by I-95 and several regional transit lines that service Philadelphia and New York City-Newark. This transportation access has enhanced the attractiveness of the area for commuters, since the project area is within commuting distance of major metropolitan areas in Center City Philadelphia, within 20 miles, and New York-Newark, within 50 miles.

The project area is close to the Trenton-Mercer Airport and the Trenton Station, where connections are available into Newark-New York and Philadelphia via the NJ Transit/AMTRAK Northeast Corridor. From the Trenton Station, the SEPTA R7 Line also provides service to Philadelphia and the River LINE provides service to Camden, New Jersey. From the West Trenton Station in Ewing Township and the Yardley Station in Lower Makefield Township, service into Philadelphia is provided by the SEPTA R3 (West Trenton) Line.

I-95 in the project area also provides access to designated growth areas to the north in New Jersey (I-95/I-295 Transportation Development District) and rapidly growing areas to the south in Pennsylvania, as discussed in Section IV.B.1.

b) Past Actions and Proposed Developments

Past actions recently constructed in the vicinity of the project area include:

- I-95/Scotch Road Interchange Improvements
- Merrill Lynch office park development on Scotch Road

- I-95/PA Route 332 Interchange Loop (reconfigured northbound on- and off-ramps at PA Route 332
- New Jersey State Police Emergency Operations Center on NJSP property
- Lower Makefield Township Makefield Highlands Golf Course on Woodside Road

Currently proposed projects include:

- Pennsylvania Turnpike/Interstate 95 Interchange Project
- Route 1, Mercer County Congestion Management & Concept Development Study
- Route 1 Bus Rapid Transit Study
- West Trenton Passenger Rail Service Restoration Study (West Trenton Line)
- Trenton Rail Intermodal Project (Trenton Station Rehabilitation)
- Trenton Mercer Airport Improvements
- New Jersey Public Health, Environmental, and Agriculture Facilities (New Jersey State Police property)
- Tamar Age-restricted Development (I-95/Bear Tavern Road Interchange)
- Lower Makefield Township Recreational Complex on Snipes Tract

c) I-95/I-295 Transportation Development District

At the I-95 exit immediately north of the project area, recently constructed projects in the I-95 corridor include the Scotch Road Interchange improvements proposed in conjunction with the Merrill Lynch office park development. These improvements involved interchange reconstruction and addition of collector/distributor roadways along I-95 and widening along Scotch Road. The Merrill Lynch office park development encompassed approximately 1.7 million square feet off the interchange area, and full buildout for the site will include 3.5 million square feet of office space.

These developments, and other transportation improvements and office park developments at the three I-95 exits north of the project area (Scotch Road, Route 31, and Federal City Road within Ewing, Hopewell, and Lawrence Townships), are being constructed consistent with the I-95/I-295 Transportation Development District (TDD) Plan and the New Jersey State Plan. The TDD district allows for public/private partnership in funding and implementing transportation improvements necessitated by growth. Under both the New Jersey Development and Redevelopment Plan and the Mercer County Growth Management Plan, the Scotch Road Interchange area is slated as a Planned Regional Center and Regional Growth Area, respectively.

d) Development Trends in Ewing Township

In Ewing Township, much of the area adjoining I-95 is currently developed or in state ownership. The only exception, the undeveloped parcel northwest of the Bear Tavern Road Interchange is proposed to be developed as an age-restricted development by a private developer. Adjoining the project area, the New Jersey State Police recently completed construction of an Emergency Operations Center within the New Jersey State Police Headquarters property, south of I-95. On the remaining undeveloped lands within the state police property, in the area south of the Emergency Operations Center and Jones Farm, the New Jersey Public Health, Environmental, and Agricultural (NJPHEA) Laboratory Facilities is proposed to encompass approximately 275,000 square feet. Construction is expected to begin shortly on the facility, and is scheduled to be completed in December 2009.

Due to the built-out nature of Ewing Township, local planning officials and the Ewing Township Master Plan anticipate that current development trends, for redevelopment of existing developed parcels, will continue in the future. Rapid growth and suburbanization of Ewing Township over the past few decades has resulted in construction of single-family, attached housing, and multi-family dwellings along the majority of the north side of the I-95 corridor. Because the areas north of I-95 are largely occupied by residential development, the Ewing Township Master Plan anticipates that future redevelopment activity in the project area is expected to occur in areas surrounding the Bear Tavern Road Interchange and areas south of I-95.

The property south of I-95 in the project area consists predominately of state-owned lands, including the NJDOT maintenance facility, the Jones Farm Correctional Facility and the New Jersey State Police property. Redevelopment within these parcels would be controlled by the state. Moreover, the development rights for the Jones Farm Correctional Facility, a working farm, were deeded to the New Jersey Department of Agriculture in 1999 to restrict future development to agricultural uses only.

The New Jersey State Plan identifies the project area, west of Bear Tavern Road, as a Suburban Planning Area, and areas east of Bear Tavern Road are designated as Metropolitan Planning Area. These planning areas are identified in the State Plan as the areas where development or redevelopment should occur in the state.

e) Development Trends in Lower Makefield Township

In Lower Makefield Township, the Makefield Highlands Golf Complex has been constructed on Woodside Road by Lower Makefield Township. Other township plans in the vicinity of the project area include a recreational complex on the Snipes Tract, south of I-95. The township has also prepared studies evaluating potential reuse and planning for the Elm Lowne property and Patterson Farm.

A number of private subdivision developments have been constructed within the last 10 years in Lower Makefield Township in areas adjoining I-95, including the Clearview Estates and Bridle Estates developments. This development has generally occurred in conjunction with the Lower Makefield Township Farmland Preservation Program, and developers have purchased adjoining properties to be preserved as open space or farmland. The majority of lands adjoining I-95 in Lower Makefield Township consist of residential developments, preserved farmlands, or publicly owned properties, with the exception of the Lower Makefield Corporate Center. The township has also established, under the Pennsylvania Agricultural Area Security Law (Act 43 of 1981), an Agricultural Security Area that includes enrolled private farmlands and LMTFP farmlands (see Figure II-2), which essentially preserves the remaining private farms that directly adjoining I-95. The one exception of farmland that is not within the Agricultural Security Area consists of the radio tower site: the transmission facilities and surrounding fields in agricultural use.

2. Impacts

a) Secondary Development

Secondary development in the project area is constrained by the current built-out nature of the project area. Land use and zoning patterns are well established in the project area. The remaining undeveloped parcels in the project area are generally either currently proposed to be developed (Tamar age-restricted development and NJPHEA laboratory facilities) or are protected as public open space or preserved farmland. The north side of I-95 in Ewing Township is largely built out

with residential development, and the majority of land south of I-95 in New Jersey is controlled by the state. In Lower Makefield Township, in general, adjoining properties are either built out as residential development or preserved or protected as public open space or farmlands.

Within designated areas in New Jersey and Pennsylvania, future growth is planned to occur, consistent with smart growth principles. A growth center has been designated for the I-95/I-295 TDD in New Jersey. Growth is also planned or expected to occur in Pennsylvania. For instance, Newtown Township is designated as a residential growth center under the joint regional plan with Upper Makefield and Wrightstown Townships.

The future development or redevelopment in the area is expected to occur whether or not the project is constructed, and no secondary impacts are anticipated as a result of the project. Within the project area, future development is also constrained by the lack of available developable parcels that are not protected or publicly owned. The current trend of redevelopment of existing parcels is expected to continue in Ewing Township. In Lower Makefield Township, the area is largely built out for residential development or preserved as open space or farmlands, as provided for under the township's farmland preservation program.

The project will not create a change in access, but would enhance the existing transportation network. Transportation improvements are needed because this development is occurring and will continue in future years, and the proposed capacity and safety improvements support planned development.

b) Cumulative Impacts

Regional transportation plans include plans for a new I-95/Pennsylvania Turnpike Interchange, approximately 8 to 10 miles to the south of the project. North of the project area, I-95 terminates where it meets U.S. Route 1, and is discontinuous in New Jersey. This is the only section of I-95 that is discontinuous in the Northeast, and the project would redesignate existing I-95 in the project area and make I-95 continuous through this portion of New Jersey. Once the new interchange is in place, the designation for I-95 in the project area would be changed to I-195.

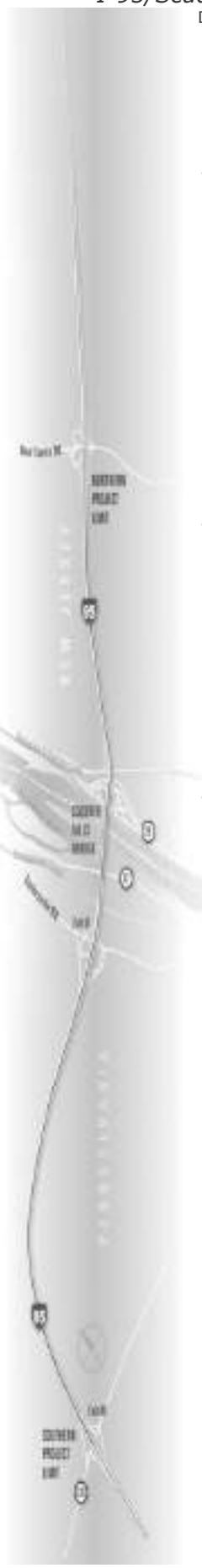
Other regional transportation initiatives include the Route 1 Mercer County Congestion Management and Concept Development Study and the Route 1 Bus Rapid Transit project. The latter project includes consideration of adding feeder bus service from parking lots in the project area in Pennsylvania.

Transit improvements in the area include plans to restore service on 27 miles of the West Trenton Line, north of the West Trenton Station, to provide service into the Newark/New York area via the Raritan Valley Line. This project would include a new I-95 Station in the area of the I-95/Scotch Road Interchange. The Ewing Master Plan also envisions transit-oriented development for the West Trenton Station site area and adjoining underutilized industrialized parcels, as part of future station development and redevelopment occurring in this area. Station rehabilitation is also proposed for the Trenton Station, as part of the Trenton Rail Intermodal Project.

Improvements proposed by Mercer County at the Trenton-Mercer Airport include a new terminal facility and access, taxiway, and apron improvements. The Ewing Township Master Plan envisions ongoing redevelopment at underutilized industrialized parcels surrounding the airport property within this area of West Trenton.

The I-95 improvements, along with other transportation improvements proposed for the area, are being planned to accommodate existing and future projected transportation demands and planned future development. The project goal of providing Level of Service D is consistent with the transportation goals for Mercer County. The Mercer County Highway Master Plan targets a Level of Service D during the peak hours as the minimum level of service to provide for the roadway network. Development in the area is expected to continue according to the framework established by statewide, regional, county, and local land use and master plans.

The plan in Ewing Township for redevelopment of existing developed parcels, and the Lower Makefield Township Farmland Preservation Program, support future growth that is protective of remaining open space, natural resources, and farmlands. Similar to the proposed I-95 improvements, the proposed transportation improvements in the area generally involve reactivation, rehabilitation, or reuse of existing transportation facilities. For instance, highways or rail corridors on new location are not currently proposed. The loss of natural resources would be subject to review by the townships, in implementing their land use plans, and is also regulated by existing federal and state natural resource protection programs. Since existing agriculture lands in the project area and open space are largely preserved or protected, it is not anticipated that cumulative impacts would result in a loss of protected open space or farmlands along the project corridor.



V. COMMENTS AND COORDINATION

The public and agency coordination process for this project conforms to the process outlined in the PennDOT Transportation Development Process, and requirements under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act.

A. Public Involvement

1. Section 106 Consulting/Interested Parties

As part of Section 106 investigations, parties with a demonstrated interest in historic resources that may be impacted by the proposed improvements are identified and asked if they would like to participate in the review process.

The following organizations were identified as consulting/interested parties for New Jersey: U.S. Army Corps of Engineers (USACE) – Philadelphia District; New Jersey Historic Preservation Office (NJ HPO); Ewing Township, New Jersey; Delaware and Raritan Canal Commission; Villa Victoria Academy; Jones Farm Minimum Security Unit; New Jersey State Police; New Jersey Department of Agriculture, State Agriculture Development Committee Staff; New Jersey Department of Community Affairs, Office of Smart Growth; New Jersey Water Supply Authority; Ewing Township Historical Preservation Society; Mercer County Cultural and Heritage Commission; National Railway Historical Society; and the Canal Society of New Jersey.

The following individuals or organizations were identified as consulting parties for Pennsylvania: Elm Lowne Preservation Committee; Society for Pennsylvania Archaeology Chapter 21; Pennsylvania Archaeological Council; Delaware Canal State Park; Friends of the Delaware Canal; Board of Supervisors, Lower Makefield Township; and State Representative Honorable David J. Steil.

Federally recognized Indian Tribes (Tribes) that may attach religious and/or cultural significance to any affected property within the APE, namely the Absentee-Shawnee Tribe of Oklahoma, the Delaware Nation, and the Shawnee Tribe, were also invited to participate in consultation.

2. Stakeholder Meetings

Documentation of the public involvement conducted for this Environmental Assessment is included as part of the Technical Supporting Data for the project.

Groups of project stakeholders were identified and meetings were held with these groups at the beginning of the project. The purpose of the meetings was to create awareness of the project and to obtain early input on issues and concerns. A follow up meeting was held for all the groups combined to present improvement alternatives for comment. A formal presentation about the project was provided at each meeting and the participants were encouraged to comment from the perspective of their organization. Meetings were held during the day in Trenton. Representatives from the following organizations were invited by letter to participate in these meetings:

Environmental Group – Delaware Riverkeeper Network, Sierra Club, Delaware River Greenway Partnership (DRGP), Heritage Conservancy, Delaware & Raritan Canal Watch,

Delaware & Raritan Greenway, Friends of the Delaware Canal (FODC), Natural Resources Defense Council (NRDC), Bucks County Audubon Society (BCAS), The Bucks County Historical Society, The Canal Society of New Jersey, Hopewell Valley Historical Society, Ewing Township Historic Preservation Society (ETHPC), Friends of the William Green Farmhouse, Lower Makefield Township Historical Commission, Yardley Historical Association.

Transportation Group - Tri-State Transportation Campaign (TSTC), Trenton-Mercer Airport, Bicycle Coalition of Greater Philadelphia (BCGP), New Jersey Bicycle Advisory Committee, New Jersey Motor Truck Association (NJMTA), Central Jersey Transportation Forum (CJTF), Greater Mercer Transportation Management Association (TMA), Bucks County TMA.

Business and Industry Group - Greater Mercer County Chamber of Commerce, Central Bucks Chamber of Commerce, Lower Bucks County Chamber of Commerce Sharbell Development Corporation, Mercer County Office of Economic Development, Bucks County Economic Development Corporation, Bristol-Meyers Squibb, Educational Testing Service, Merrill Lynch, Janssen Pharmaceutica Products, L.P., Princeton University, Sarnoff Corporation, Bloomberg L.P.

Smart Growth Group – New Jersey Department of Community Affairs, Office of Smart Growth; Pennsylvania Department of Community and Economic Development (PA DCED), Governor's Center for Local Government Services

Table V-1 summarizes the meetings held to date. Representatives of these organizations generally concurred with the purpose and the need for the project and the range of alternatives and design options selected for further consideration. The issues of concern that were expressed during the course of outreach were focused by group. Environmental group participants were concerned about the environmental impacts of the project on the Delaware River and on the Delaware and Raritan Canal. Representatives from transportation organizations inquired about the opportunities to add a bicycle and pedestrian facility to the bridge, to enhance the local park-and-ride lot in Lower Makefield, and to accommodate a future Bus Rapid Transit (BRT) lane on the bridge. Business persons were interested in the relationship of this improvement project to advancing alternative modes such as transit, carpooling and other alternatives that would decrease congestion now and in the future for employers and workers in the region. Finally, the smart growth group explained that their organizations promote development in well-established locations, and that the project should support alternate modes of travel such as the BRT and other types of transit, and park-and-ride facilities.

Through these forums, project stakeholders articulated transportation-related objectives that are addressed in the project (see Chapter I).

Table V-1—Summary of Stakeholder Meetings

Meeting	Date	Purpose/Summary of Meeting
Start Up Meeting - Environmental Group	December 16, 2003	The start up meeting presented an overview of the project, the Purpose and Need for the project and preliminary improvement concepts to obtain early feedback from environmental groups.
Start Up Meeting - Transportation Group	January 7, 2004	The start up meeting presented an overview of the project, the Purpose and Need for the project and preliminary improvement concepts to obtain early feedback from transportation agencies.
Start Up Meeting – Business & Industry	January 14, 2004	The start up meeting presented an overview of the project, the Purpose and Need for the project and preliminary improvement concepts to obtain early feedback from major businesses and organizations that represent the interests of local businesses.
Start Up Meeting – Smart Growth	February 11, 2004	The start up meeting presented an overview of the project, the Purpose and Need for the project and preliminary improvement concepts to obtain early feedback from smart growth agencies.
Follow Up Meeting	April 27, 2005	The follow up meeting presented bridge alternatives and highway and interchange design options and evaluation criteria to obtain feedback from environmental groups, transportation agencies, major businesses and smart growth agencies.

3. Public Open Houses and Township Meetings

Public open house meetings and Township meetings were held at key points in the development project to present the status of the project and to obtain input from the public on improvement alternatives and potential impacts. Each open house meeting was held in the evening hours in Lower Makefield Township, PA and in Ewing Township, NJ for the convenience of residents and officials in both locations. The open house format provided displays of data results and alternative plans that were available for public review. There were opportunities for the public to discuss the project with the DRJTBC and to record opinions on alternatives through written surveys. Township meetings included formal presentations of the status of the project and opportunities for the public to engage the DRJTBC in a question and answer session. Some Township meetings were held specifically for the project and other meetings took place during regularly scheduled board of supervisor meetings in Lower Makefield Township and at council meetings in Ewing. All meetings were announced in the project newsletter and on the project website and advertised in local newspapers. News releases about the meetings were distributed to local newspapers in advance. Public open house and Township meetings were all well attended drawing 100 persons or more to each meeting.

Table V-2 summarizes the meetings held to date. Members of the public and officials generally concurred with the purpose and the need for the project and the range of alternatives and design options selected for further consideration. Several residents suggested additional alternatives and options that were analyzed and eventually dismissed from further consideration due to engineering and traffic concerns. The issues of concern that were expressed during the course of outreach to the public included the potential acquisition of properties for the project, the increase in noise from traffic along I-95 and the bridge, the feasibility of providing a bicycle and pedestrian facility on the bridge, and construction schedules and impacts.

A final open house and public hearing is planned during the comment period for the Environmental Assessment (EA).

Table V-2--Summary of Public Open Houses and Township Meetings

Meeting	Date	Purpose/Summary of Meeting
Township Meeting – Lower Makefield, PA	February 2, 2004	The Township meeting informed residents and officials about the scope of the project, project needs and the public participation program.
Township Meeting, Ewing Township, NJ	March 22, 2004	The Township meeting informed residents and officials about the scope of the project, project needs and the public participation program.
Open House - Ewing Township, NJ	June 22, 2004	The public open house informed residents and officials about existing conditions and draft improvement concepts to obtain early feedback on the concepts.
Open House - Lower Makefield Township, PA	June 23, 2004	The public open house informed residents and officials about existing conditions and draft improvement concepts to obtain early feedback on the concepts.
Township Meeting – Ewing Township, NJ	January 10, 2005	The Township meeting informed residents and officials about the status of the project including traffic analysis and engineering activities, the development of improvement alternatives and evaluation criteria.
Township Meeting – Lower Makefield, PA	February 7, 2005	The township meeting informed residents and officials about the status of the project including traffic analysis and engineering activities, the development of improvement alternatives and evaluation criteria.
Open House - Ewing Township, NJ	May 10, 2005	The public open house informed residents and officials about the options, alternatives and environmental impacts to obtain feedback about design preferences.
Open House - Lower Makefield Township, PA	May 11, 2005	The public open house informed residents and officials about the options, alternatives and environmental impacts to obtain feedback about design preferences.
Township Meeting – Lower Makefield, PA	May 2, 2007	The township meeting informed residents and officials about recommendations for the bridge and I-95 and the options under consideration for the interchanges. Noise study results were also presented.
Township Meeting – Ewing Township, NJ	May 9, 2007	The township meeting informed residents and officials about recommendations for the bridge and I-95 and the options under consideration for the interchanges. Noise study results were also presented.

4. Local Organization Meetings

On occasion, the DRJTBC was invited to present the I-95/Scudder Falls Bridge Improvement Project to special interest groups in the region. Chambers of commerce were particularly interested in finding out information about the project and presentations were well-received. Table V-3 summarizes the meetings held to date.

Table V-3 - Summary of Local Organization Presentations

Meeting	Date	Purpose/Summary of Presentations
Lawrence Township Chamber of Commerce	May 6, 2004	The presentation described the DRJTBC's overall capital program, and the scope of the project, including the approach to public involvement.
Mercer County Chamber of Commerce	August 30, 2004	The presentation described the project scope, the Purpose and Need for the project and preliminary improvement concepts.
Southeastern Bucks League of Municipalities	December 9, 2004	The presentation described the project scope, the Purpose and Need for the project and initial alternatives for the bridge, I-95 and the interchanges.
ASHE – Region 6	March 23, 2005	The presentation described the project scope, the Purpose and Need for the project and initial alternatives for the bridge, I-95 and the interchanges.

5. Local Media Relations

At the outset of the project the DRJTBC provided information to local newspapers to inform the public about the project and to publicize project activities. The DRJTBC met with the Trenton Times and Bucks County Courier Times several times to discuss the details of the project. In addition news releases were prepared and distributed to local newspapers to announce project events such as open houses, Township meetings, website updates and the initiation of the project hotline. Press kits and interviews were provided to reporters at open house meetings.

6. Newsletters

Ten issues of the project newsletter were produced to inform the public about project progress. Primarily, the newsletter for this project was used to reach residents and businesses that are located closest to the I-95/Scudder Falls Bridge and I-95 in the limits of the project area. The newsletter contained general project information, an update on activities, and announcements. Every issue contained contact information and explained how to reach the website and hotline. Each issue was placed on the website so could be viewed and printed out by internet users. Approximately 2,000 persons appear on the newsletter mailing list. Table V-4 summarizes the newsletters that have been issued for the project.

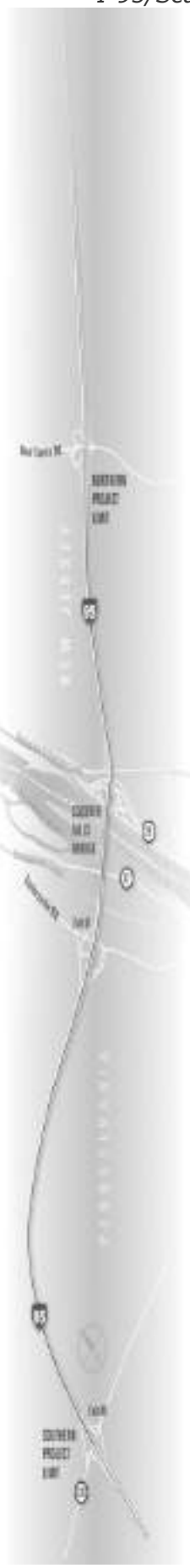


Table V-4 – Summary of Newsletters Issued

Newsletters	Date	Purpose/Summary of Newsletter
Issue 1	Fall 2003	The newsletter contained the project overview, the NEPA process, project schedule and public involvement activities.
Issue 2	Winter 2004	The newsletter contained information about data collection activities, the project schedule and public involvement activities.
Issue 3	Spring 2004	The newsletter contained information about existing conditions, the project schedule and an announcement about the public open house meetings.
Issue 4	Summer 2004	The newsletter contained a summary of the public open house meetings, the alternatives analysis process, the project schedule, and public involvement activities.
Issue 5	Fall 2004	The newsletter contained a description of the draft improvement concepts, the project schedule, and an announcement about the Township meetings.
Issue 6	Winter 2005	The newsletter contained a description of the refinement and screening of alternatives, the project schedule and an announcement about the public open house meetings.
Issue 7	Summer 2005	The newsletter contained a description of the noise abatement analysis and decision-making process, the project schedule, and public involvement activities.
Issue 8	Winter 2006	The newsletter contained a project update, the project schedule, and public involvement activities.
Issue 9	Spring 2007	The newsletter contained an update on the preparation of the environmental assessment, the project schedule, and an announcement about the Township meetings.
Issue 10	Winter 2008	The newsletter contained illustrations of the Preferred Alternative for the bridge, I-95 and the interchanges and announced the public open house/Public Hearing.

7. Project Media

Project Website - A project website was developed at www.scudderfallsbridge.com to provide a location on the Internet where residents and other stakeholders could obtain information about the project at their convenience. The website included relevant project information and was updated as needed to announce upcoming public meetings and the outcome of project activities. It was also used to publish the newsletter about the project. Contact information appeared on the site so residents and officials could communicate with the DRJTBC about concerns, issues and suggestions. All written materials and graphics incorporated the project website address so that it is widely advertised.

Project Hotline - A project hotline number was established at 800-879-0849 to provide the general public with a toll-free telephone number to contact the DRJTBC directly with questions about the project in between open house meetings and Township meetings. The hotline was staffed during regular business hours on Monday through Friday. A recorded message was played after business hours. During a typical month, approximately five telephone calls were received on the hotline number.

Highway Signage – The DRJTBC installed signs on I-95 at the approaches to the I-95/Scudder Falls Bridge advertising the project website and hotline number.

B. Agency Coordination

Federal, state, regional, and local agency input was obtained throughout the course of the project through individual consultation meetings and correspondence, and regularly scheduled meetings in two forums, the Special Agency Coordination Meetings (SACM) and the Interagency Coordination Meetings. The agency consultations and coordination for this project are described in the following sections. In addition to meetings and consultations, field views were conducted with resource and regulatory agencies.

Documentation of the agency coordination conducted for this Environmental Assessment is included as part of the Technical Supporting Data for the project.

1. Special Agency Coordination Meetings

Special agency coordination meetings were held at regular intervals to review project plans with federal, regional, Pennsylvania, and New Jersey regulatory and resource agencies throughout the course of the project. A total of four meetings were held at key points throughout the study to brief SACM members on the progress and status of the project and to obtain agency input into the NEPA process and development of project plans. A final SACM is planned during the comment period for the EA. Representatives of the SACM included the U.S. Environmental Protection Agency (USEPA), the U.S. Army Corps of Engineers (USACOE), the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), the National Park Service (NPS), the Delaware and Lehigh National Heritage Corridor Commission, the Delaware River Basin Commission (DRBC), the Delaware Valley Regional Planning Commission (DVRPC), Pennsylvania Department of Environmental Protection (PA DEP), Pennsylvania Fish and Boat Commission (PFBC), Pennsylvania Game Commission (PGC), Pennsylvania Historical and Museum Commission (PHMC), Pennsylvania Department of Agriculture (PDA), Pennsylvania Department of Conservation and Natural Resources (PA DCNR), PA DCED, Delaware Canal State Park, Delaware and Raritan Canal Commission, New Jersey Department of Environmental Protection (NJ DEP), New Jersey Historic Preservation Office (NJHPO), New Jersey Department of Agriculture (NJDA), New Jersey Water Supply Authority (NJWSA), New Jersey Division of Parks and Forestry, New Jersey Division of Fish and Wildlife (NJDFW), New Jersey Office of Smart Growth (NJOSG), and New Jersey Green Acres Program.

Table V-5 summarizes the meetings held to date. SACM members generally concurred with the purpose of and need for the project and the range of alternatives and design options selected for further consideration. The issues of concern that were expressed during the course of SACM coordination included the need to study fisheries and rare species impacts related to bridge and causeway construction on the Delaware River. The canal representatives generally supported the concept of linking canal towpaths on each side of the river with provision of pedestrian/bicycle access across the bridge, but had concerns related to potential impacts on aesthetics, noise, and drainage at canal crossings. Issues of concern to the New Jersey agencies included coordination required for Green Acres approvals that would be needed for construction activities affecting state-owned parklands.

Table V-5—Summary of SACM Meetings

Meeting	Date	Purpose/Summary of Meeting
SACM #1	November 18, 2003	SACM #1 included a presentation on an introduction/overview of the project, review of the draft purpose and need statement, and the scope of the study, which was followed by a field view of the project area.
SACM #2	July 20, 2004	SACM #2 presented the purpose and need statement for the project, provided an overview of existing conditions/issues to be addressed in the study, and reviewed the range of alternatives to be considered in the study.
SACM #3	April 19, 2005	SACM #3 presented the range of alternatives and design options being considered for the I-95 mainline, the I-95/Scudder Falls Bridge, and the NJ Route 29 and Taylorsville Road Interchanges and reviewed the results of preliminary alternatives screening.
SACM #4	March 20, 2007	SACM #4 presented the results of screening and impact assessments for the preliminary preferred alternative (standard I-95 lane additions, inside widening along the Pennsylvania mainline, an upstream river crossing, outside widening in New Jersey, and refinements to Taylorsville Road Interchange Options 1 and 2 and NJ Route 29 Interchange Options 1a and 1b), a pedestrian/bicycle facility, and conceptual construction staging.

2. Interagency Advisory Committee Meetings

An Interagency Advisory Committee (IAC), composed of transportation, regulatory, and planning agencies and county/local officials, was formed to provide broad-based oversight/guidance into the transportation study process. Four meetings were held at key points in the study to brief the IAC on the progress of the project and obtain input into the project development process. A final IAC meeting is planned during the public comment period on the EA.

The IAC included representatives of the USACOE, DRBC, DVRPC, Southeastern Pennsylvania Transportation Authority (SEPTA), New Jersey Transit (NJ Transit), PA DEP, NJDEP, PA DCED, NJOSG, PHMC, and NJHPO. Representatives of the following county, township, and transportation organizations were also invited to attend the IAC meetings: Mercer County, Bucks County, Lower Makefield Township, Ewing Township, Upper Makefield Township, Borough of Yardley, Newtown Township/Borough of Newtown, City of Trenton, Hopewell Township, Greater Mercer TMA, Bucks County TMA.

Table V-6 summarizes the meetings held to date. The IAC generally concurred with the need for the project and the alternatives and design options selected for further consideration. Issues that were raised over the course of IAC coordination included the need to study a pedestrian/bicycle facility and to incorporate multimodal alternatives and Transportation Systems Management/Transportation Demand Management (TSM/TDM) measures into the study. Local officials also expressed concerns regarding potential flooding impacts of a causeway to be used during construction.

Table V-6—Summary of IAC Meetings

Meeting	Date	Purpose/Summary of Meeting
IAC #1	December 10, 2003	IAC #1 was held to introduce the project, present purpose and need, and review the scope of the study and improvements.
IAC #2	June 16, 2004	IAC #2 reviewed the project purpose and need and the range of alternatives under consideration and presented results of baseline studies performed to date.
IAC #3	April 19, 2005	IAC #3 presented the results of preliminary screening of design options for the mainline, I-95/Scudder Falls Bridge, and Taylorsville Road/NJ Route 29 Interchanges.
IAC #4	March 20, 2007	IAC #4 presented the results of impact assessments for the preliminary preferred alternative (standard lane additions, inside widening along the Pennsylvania mainline, upstream I-95/Scudder Falls Bridge, and refinements to Taylorsville Road Interchange Options 1 and 2 and NJ Route 29 Interchange Options 1a and 1b), a pedestrian/bicycle facility, and conceptual construction staging.

3. Other Agency Coordination

In addition to regularly scheduled meetings with the SACM and IAC, coordination meetings were held to obtain input into the project to address issues of concern. Agency consultations were held to discuss and review potential canal impacts, to review wetland delineations, and to provide input into cultural resource assessments. Correspondence with agencies continued throughout the course of the project, as documented in the EA.

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DISTRIBUTION LIST

FEDERAL:

Federal Transit Administration
Office of Planning and Program Development
(ATTN: Transportation Program Specialist)
1760 Market Street, Suite 500
Philadelphia, PA 19103

Kevin Dougherty
U.S. Army Corps of Engineers
Regulatory Branch
Philadelphia District
The Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

U.S. Army Corps of Engineers
Philadelphia District
Environmental Resources Branch
The Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

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Office of Federal Activities
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(ATTN: Program Development and Management Branch)
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1200 Pennsylvania Avenue, N.W.
Room 7241, Mail Code 2252-A
Washington, D.C. 20044

Barbara Okorn
U.S. Environmental Protection Agency,
Region 3
1650 Arch Street (3ES42)
Philadelphia, PA 19103-2029

LeAndrea Dames
U.S. Environmental Protection Agency, Region 2
290 Broadway, 26th Floor
New York, New York 10007

Willie Taylor, Director
U.S. Department of the Interior
Office of Environmental Policy and Compliance
Philadelphia Region
1849 C Street, NW
Mail Stop 2340 MIB
Washington, DC 20240

Federal Emergency Management Agency
(ATTN: Mitigation Division)
One Independence Mall, 6th Floor
615 Chestnut Street
Philadelphia, PA 19106-4404

U.S. Department of Agriculture
Natural Resources Conservation Service
(ATTN: Water Resources Department)
One Credit Union Place, Suite 340
Harrisburg, PA 17110-2993

U.S. Department of Housing and Urban Development
Pennsylvania State Office
(ATTN: Environmental Officer)
The John Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3380

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
Special Programs Group, Chief
4770 Buford Highway, NE
MSF 29
1600 Clifton Road
Atlanta, GA 30341-3724

Julie Crocker
National Marine Fisheries Service
Protected Resources Division
Northeast Regional Office
55 Great Republic Drive
Gloucester, MA 01930

Karen Greene
National Marine Fisheries Service
Habitat Conservation Division
74 Magruder Road
Highlands, NJ 07732

Jennifer Kagel
U.S. Fish and Wildlife Service
315 South Allen Street
State College, PA 16801

Advisory Council on Historic Preservation
Eastern Office of Review
(ATTN: Preservation Specialist)
1100 Pennsylvania Avenue, NW, Suite 803
Old Post Office Building
Washington, DC 2004

William Bolger
National Park Service
National Landmarks Program
200 Chestnut Street
Philadelphia, PA 19106

Allen Sachse
Executive Director
Delaware and Lehigh National Heritage Corridor Commission
1 South 3rd Street
8th floor, Alpha Building
Easton, PA 18042

PENNSYLVANIA:

Governor Edward G. Rendell's Office
Office of Planning and Policy
225 Main Capitol Building
Harrisburg, Pennsylvania 17120

General Manager
SEPTA
1234 Market Street, 10th Floor
Philadelphia, PA 19107

Dave Spotts
Pennsylvania Fish and Boat Commission
Environmental Services Division
450 Robinson Lane
Bellefonte, PA 16823-9620

Tracey Librandi Mumma
Pennsylvania Game Commission
2001 Elmerton Avenue
Harrisburg, PA 17110-9797

Pennsylvania Department of Environmental Protection
Office of Policy
(ATTN: Environmental Policy Specialist)
Rachel Carson State Office Building
400 Market Street, 15th Floor
P.O. Box 2063
Harrisburg, PA 17105-2063

Christian Vlot
Pennsylvania Department of Environmental Protection
Southeast Regional Office
2 East Main Street
Norristown, PA 19401

Doug Wolfgang
Pennsylvania Department of Agriculture
2301 North Cameron Street
Harrisburg, PA 17110

Phil Robbins
Department of Community and Economic Development
Governor's Center for Local Government Services
400 North Street, 4th Floor
Commonwealth Keystone Building
Harrisburg, PA 17120-0225

Jean Cutler, Director
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0093

Tim Keptner, Chief
Bureau of Recreation and Conservation
Pennsylvania Department of Conservation and Natural Resources
Heritage Parks Program/Field Office Division
6th Floor, Rachel Carson State Office Building
P.O. Box 8475
Harrisburg, PA 17105

Pennsylvania Department of Health
Office of Policy
Health and Welfare Building
7th & Forster Streets
Harrisburg, PA 17120

Ken Lewis, Manager
Bureau of State Parks
Pennsylvania Department of Conservation and Natural Resources
Delaware Canal State Park
11 Lodi Hill Road
Upper Black Eddy, PA 18972

Marian Hrubovcak, Chief
Greenways and Conservation Partnership Division
Pennsylvania Department of Conservation and Natural Resources
6th Floor, Rachel Carson Office Building
P.O. Box 8475
Harrisburg, PA 17105

Richard Dalton
Manager
Pennsylvania Department of Conservation and Natural Resources
Delaware Canal State Park
11 Lodi Hill Road
Upper Black Eddy, PA 18972

NEW JERSEY:

Governor Jon Corzine
Office of the Governor
Office of Policy
PO Box 001
Trenton, NJ 08625

Executive Director
New Jersey Transit
One Penn Plaza East
Newark, NJ 07105-2246

Tom Clark
New Jersey Transit
Director of Communications and Government Affairs
110 Plaza East
Newark, NJ 07105

Mark Mauriello, Commissioner
New Jersey Department of Environmental Protection
401 E. State St
7th Floor, East Wing
P.O. Box 402
Trenton, NJ 08625-0402

Thomas Micai, Director
New Jersey Department of Environmental Protection
Land Use Regulation Program
P.O. Box 439
501 East State Street, 2nd Floor
Trenton, NJ 08625-0439

Joe Corleto
New Jersey Department of Environmental Protection
Office of Permit Coordination and Environmental Review
P.O. Box 423
Trenton, NJ 08625-0423

Kevin Koslosky
New Jersey Department of Environmental Protection
Green Acres Program
501 East State Street
P.O. Box 412
Trenton, NJ 08625-0412

David Chanda, Director
New Jersey Department of Environmental Protection
Division of Fish and Wildlife
501 East State St, 3rd Floor
P.O. Box 400
Trenton, NJ 08625-0400

Jeanne Mroczko, Acting Director
New Jersey Department of Environmental Protection
Division of Parks and Forestry
501 East State St, 4th Floor
P.O. Box 404
Trenton, NJ 08625-0404

Daniel Saunders, Deputy State Historic Preservation Officer
Department of Environmental Protection
Natural and Historic Resources
Historic Preservation Office
P.O. Box 404
Trenton, NJ 08625-0404

Bill Bogosian
Manager, Raritan Basin System
New Jersey Water Supply Authority
1851 State Route 31
P.O. Box 5196
Clinton, NJ 08809-0196

Tim Brill
Planning Manager
New Jersey Department of Agriculture
State Agriculture Development Committee Staff
P.O. Box 330
Trenton, NJ 08625-0404

Ben Spinelli
Executive Director
New Jersey Department of Community Affairs
Office of Smart Growth
P.O. Box 204
101 South Broad Street, 7th Floor
Trenton, NJ 08625

Ernie Hahn
Executive Director
Delaware and Raritan Canal Commission
Route 29, Prallsville Mills
P.O. Box 539
Stockton, NJ 08559

Anthony R. Mazzella, Manager
Lease Operations and Space Planning
NJ State Police Division Headquarters
P.O. Box 7068
West Trenton, NJ 08628-0068

REGIONAL:

Barry Seymour, Executive Director
Delaware Valley Regional Planning Commission
190 N. Independence Mall West, 8th Floor
Philadelphia, PA 19106-1520

Lynn Bush
Director
Bucks County Planning Commission
1260 Almshouse Road
Doylestown, PA 18901

Donna M Lewis, Planning Director
Mercer County Administration Building
McDade Administration Building
640 South Broad Street
P.O. Box 8068
Trenton, NJ 08650-0068

Carol Collier
Executive Director
Delaware River Basin Commission
25 State Police Drive
P.O. Box 7360
West Trenton, NJ 08628-0360

LOCAL:

Board of Supervisors, Lower Makefield Township
1100 Edgewood RD
Yardley, PA 19067

Lower Makefield Farmland Preservation Corporation
1100 Edgewood RD
Yardley, PA 19067

Ewing Council, Ewing Township
2 Jake Grazio Drive
Ewing, NJ 08628

NATIVE AMERICAN TRIBES:

Karen Kaniatobe, Tribal Historic Preservation Officer
Absentee-Shawnee Tribe of Oklahoma
2025 S. Gordon Cooper Drive
Shawnee, OK 74801

Tamara Francis, NAGPRA Director
Delaware Nation, Oklahoma
P.O. Box 825
Anadarko, OK 73005

LIST OF PREPARERS

Federal Highway Administration – Pennsylvania Division

Ross A. Mantione, Document Reviewer
Mr. Mantione is an Environmental Specialist at the Pennsylvania Division of the Federal Highway Administration. He has 24 years of experience. Mr. Mantione provided review and comment on draft documents including the Environmental Assessment and Section 4(f) Evaluation. Mr Mantione holds a Bachelor of Science Degree in Environmental Science.

Amy S. Fox, Engineering Reviewer
Ms. Fox is Metropolitan Intermodal Engineer at the Pennsylvania Division of the Federal Highway Administration. She has 15 years of experience. Ms. Fox provided review and comment on engineering studies and draft documents including the Environmental Assessment and Section 4(f) Evaluation. Ms. Fox holds a Bachelor of Science Degree in Civil Engineering.

Federal Highway Administration – New Jersey Division

Matthew Zeller, Document Reviewer
Mr. Zeller is a Senior Operations Engineer at the New Jersey Division Office of the Federal Highway Administration. Mr. Zeller provided review and comment on draft documents including the Environmental Assessment and Section 4(f) Evaluation. Mr. Zeller holds Bachelor of Science and Master of Science Degrees in Civil Engineering.

Jeanette Mar, Environmental Coordinator
Ms. Mar is an Environmental Coordinator at the New Jersey Division Office of the Federal Highway Administration. Ms. Mar provided review and comment on draft documents including the Environmental Assessment and Section 4(f) Evaluation. Ms. Mar holds Bachelor of Science Degree in Biology.

Delaware River Joint Toll Bridge Commission

George G. Alexandridis PE, Project Manager
Mr. Alexandridis is the DRJTBC Project Director for the project who provided consultant oversight and document review. His experience includes planning, design and construction management of bridges, tunnels, highways, commuter rail and transit and buildings infrastructure. He holds a Bachelor's Degree in Civil Engineering has completed post-graduate courses in city and transportation planning. He is a registered Professional Engineer in five states including the Commonwealth of Pennsylvania and the State of New Jersey.

Kevin M. Skeels PE, Project Manager
Mr. Skeels is the DRJTBC Project Manager for the project who provided consultant oversight and document review. He has over 20 years of engineering and Project Management experience in public sector transportation projects. His experience includes design and construction management of bridges, tunnels, highways, rail and transit and buildings infrastructure. He holds a Bachelor's Degree in Civil Engineering, and is a registered Civil Engineer in Pennsylvania and Massachusetts.

W. Michael Cane Deputy Project Manager
Mr. Cane was DRJTBC Deputy Project Manager for the project who assisted with consultant oversight and document review. He has over 18 years of engineering experience in public sector transportation projects involving bridge infrastructure facilities. He holds a Bachelor's Degree in Civil Engineering.

Roy W. Little PE, Program Area Manager
Mr. Little was DRJTBC Program Area Manager for the project who assisted with consultant oversight and document review. He has 29 years of experience in the area of transportation engineering and planning. He holds a Bachelor's Degree in Civil Engineering and has completed post-graduate studies in management. He is a registered Professional Engineer and Professional Planner in the State of New Jersey.

Linda M. Spalinski, Director of Community Affairs
Ms. Spalinski was Director of Community Affairs for the project who assisted with consultant oversight and document review. She has 30 years of experience in public policy, government relations and community affairs. She holds a Bachelor's Degree and Master's Degree in Political Science and Public Policy.

Pennsylvania Department of Transportation

Robert Eppley, Document Reviewer
Mr. Eppley is the District 6-0 Environmental Manager at the Pennsylvania Department of Transportation. He has 16 years of experience. Mr. Eppley provided review and comment on draft documents including the Environmental Assessment and Section 4(f) Evaluation. Mr. Eppley holds a Master of Science Degree in Microbial Ecology.

Monica Harrower, Document Reviewer
Ms. Harrower is a Cultural Resource Specialist at the Pennsylvania Department of Transportation. She has 10 years of experience. Ms. Harrower provided review and comment on draft documents including the Environmental Assessment and Section 4(f) Evaluation. Ms. Harrower holds a Master of Science Degree in Historic Preservation.

Keith Highlands, Document Reviewer
Mr. Highlands is a Project Development Engineer at the Bureau of Design of the Pennsylvania Department of Transportation. He has 25 years experience. Mr. Highlands provided review and comment on draft documents including the Environmental Assessment and Section 4(f) Evaluation. Mr. Highlands holds a Bachelor of Science Degree in Civil Engineering.

Antonia Zawisa, Document Reviewer
Ms. Zawisa is a Fisheries Biologist and Natural Resource Specialist at the Pennsylvania Department of Transportation. She has 24 years of experience. Ms. Zawisa provided review and comment on draft documents including the Environmental Assessment and Section 4(f) Evaluation. Ms. Zawisa holds a Bachelor of Science Degree.

Catherine Spohn, Document Reviewer
Ms. Spohn is a Cultural Resource Professional in Archaeology at the Pennsylvania Department of Transportation. She has 30 years of experience. Ms. Spohn provided review and comment on draft documents including the Environmental Assessment and Section 4(f) Evaluation. Ms. Spohn holds a PhD in Anthropology.

Mary Raulerson, Document Reviewer
Ms. Raulerson is a Consultant Project Manager at the Pennsylvania Department of Transportation. She has 21 years of experience. Ms. Raulerson provided review and comment on draft documents including the Environmental Assessment and Section 4(f) Evaluation. Ms. Raulerson holds a Bachelor of Science Degree in Biological Sciences.

New Jersey Department of Transportation

Thomas B. Carbone, Project Manager
Mr. Carbone was NJDOT Project Manager for this project. Mr. Carbone provided guidance with respect to New Jersey policies and procedures and document review. He has 20 years experience in the preparation and supervision of studies and documentation for compliance with NEPA, Sec. 106, Sec 4(f) and NJ State regulatory compliance and 11 years experience supervising the planning, alternatives development and preliminary design for highway, drainage and bridge projects. Mr. Carbone received his Bachelor's Degree in Civil Engineering and his Master's Degree in Transportation Planning both from Polytechnic Institute of Brooklyn.

Janet A. Fittipaldi, Cultural Resource Manager
Ms. Fittipaldi was a Cultural Resource Manager for the project responsible for review and comment on cultural resources studies and documents and coordination related to Section 106. Ms. Fittipaldi has 23 years experience working with the New Jersey Department of Transportation. She has a Bachelor's Degree in Anthropology/Archeology.

DMJM Harris

Bijan Pashanamaei PE, Project Manager
Mr. Pashanamaei was Consultant Team Project Manager responsible for the overall management of the engineering and environmental phases of this project. He has over 25 years of experience in planning, design, and construction of large multi-disciplined transportation projects with particular emphasis on interstate facilities. He has a Master's Degree in Civil Engineering and is a registered Professional Engineer in the Commonwealth of Pennsylvania, the State of New Jersey, and several other States.

Thomas Cushman PE, Deputy Project Manager
Mr. Cushman was Consultant Team Deputy Project Manager in developing the design alternatives and preliminary engineering deliverables. He has over 20 years of comprehensive experience with the design and management of interstate/limited access reconstruction projects for the Pennsylvania Department of Transportation, Pennsylvania Turnpike Commission, and New Jersey Department of Transportation among many other agencies. He has a Bachelor's Degree of Civil Engineering and a Master's Degree of Business Administration.

Timothy Gunner PE, Engineering Task Leader
Mr. Gunner was the Engineering Task Leader for the project. He has demonstrated experience in the management, design and inspection of a wide variety of highway projects. His experience includes both new design and extensive rehabilitation of major transportation facilities involving all functional classifications of highways with complex alignment, construction staging and maintenance and protection of traffic issues.

Jihane Fazio, PE, Civil Engineering Task Leader
Ms. Fazio was the Civil Engineer Task Leader on the project and was responsible for developing the various alternatives for the project. She has over 10 years of experience in site development and highway design. She holds a Bachelor's Degree in Civil Engineering and is a registered Professional Engineer in the Commonwealth of Pennsylvania.

Edward Reagle, PE, Traffic Engineering Task Leader
Mr. Reagle was the Traffic Engineering Task Leader and was responsible for the traffic engineering tasks for the project. He has 20 years of experience in planning, design, and construction of large

multi-disciplined transportation projects including interstate facilities, interchanges, and arterials signal systems. He has a Bachelor's Degree in Civil Engineering and is a registered Professional Engineer in the Commonwealth of Pennsylvania and the State of Maryland.

Chris Bishop-Edkins, Public Outreach Task Leader
Ms. Bishop-Edkins was the Public Outreach Task Leader and was responsible for the management of the public involvement activities of the project including public and stakeholder meetings, newsletters and the project website. She has 25 years of experience in transportation planning preparing long-range plans and corridor studies and conducting outreach programs. She has a Master's Degree in Urban Planning and is a member of the American Institute of Certified Planners.

Leslie Roche AICP, Environnemental Planner
Ms. Roche was an Environmental Planner responsible for the quality assurance aspect of the EA. She has 24 years of experience in the preparation of NEPA-compliant environmental impact statements, environmental assessments and technical studies for transportation projects. She has a Bachelor's Degree in Anthropology and is a Certified Planner by the American Institute of Certified Planners.

HNTB Corporation

Joseph G. Grilli PE, Deputy Project Manager
Mr. Grilli was Consultant Team Deputy Project Manager responsible for the environmental studies and documentation for the project. He has over 25 years of experience in planning and environmental documentation for transportation projects. He holds a Bachelor's Degree in Civil Engineering and is a registered Professional Engineer in the State of Maine.

Addie Kim, Principal Author
Ms. Kim was Principal Author of the Environmental Assessment and was responsible for socioeconomic, land use, parklands, and farmlands assessments. She has 20 years of experience in the preparation of environmental documents and permitting. She holds a Bachelor's Degree in Geology and Environmental Studies and a Master's Degree in Geological Sciences.

Essek B. Petrie, GIS Analyst
Mr. Petrie was a GIS analyst for the environmental studies. He contributed to the socioeconomic, land use, and property impacts assessments and prepared GIS and CADD exhibits for the Environmental Assessment. Mr. Petrie has 10 years of experience in transportation and environmental planning and holds a Bachelor's Degree in Geography and Regional Planning and a Master's Degree in City Planning.

Kathleen A. Legere, GIS Analyst
Ms. Legere was a GIS analyst for the environmental studies. She contributed to the socioeconomic and land use assessments and prepared GIS exhibits for the Environmental Assessment. Ms. Legere has three years experience in GIS, wetland assessments and environmental permitting. She holds a Bachelor's Degree in Environmental Science and a Master's Degree in Water Resources.

STV Incorporated

Scott Aharonian, Environmental Scientist
Mr. Aharonian was an Environmental Scientist assisting with preparation of the hazardous materials assessment. He has 19 years of experience in preparing environmental assessments, waste

management projects, remediation, sample collection and managing projects at U.S. EPA Superfund and RCRA facilities. He holds a Bachelor's Degree in Horticulture and is a Registered Environmental Assessor.

Robert Briggs LEED, Environmental Manager
Mr. Briggs was an Environmental Manager responsible for managing and preparing the hazardous materials, wetlands, groundwater, surface waters and terrestrial and aquatic habitats assessments. He has 28 years of experience in preparing and managing environmental assessments. He holds Bachelor's Degree in Earth Sciences and a Master's Degree in Applied Geology. He is a licensed Professional Geologist in the Commonwealth of Pennsylvania, a Registered Environmental Manager and a Leadership in Energy and Environmental Design (LEED) Accredited Professional.

Angela Kisela LEED, Environmental Scientist
Ms. Kisela was an Environmental Scientist assisting with preparation of the hazardous materials, wetlands, groundwater, surface waters and terrestrial and aquatic habitats assessments. She has seven years experience in preparing environmental assessments. She holds a Bachelor's Degree in Environmental Resource Management. She is a certified wetland delineator and a Leadership in Energy and Environmental Design (LEED) Accredited Professional.

Wendy Schellhamer LEED, Environmental Scientist
Ms. Schellhamer was an Environmental Scientist assisting with preparation of the wetlands, surface waters and terrestrial and aquatic habitats assessments. She has 15 years experience preparing environmental assessments. She holds a Bachelor's Degree in Environmental Resource Management. She is a certified wetland delineator and a Leadership in Energy and Environmental Design (LEED) Accredited Professional.

Gannett Fleming

Ahmed El-Aasser, Ph.D., Environmental Engineer
Mr. El-Aasser was an Environmental Engineer responsible for conducting traffic noise studies and air quality analysis. He has 9 years of experience with conducting traffic noise field investigations, traffic noise and air quality modeling, impact assessments, and mitigation. He holds a Ph.D. in Environmental Engineering.

Harvey Knauer, PE, Traffic Noise Engineer
Mr. Knauer was a Traffic Noise Engineer responsible for conducting traffic noise analysis for the project. He has 40 years of experience in all phases of acoustical and air quality analyses including noise monitoring, impact assessment, mitigation, noise barrier design, and training. He holds a Master's Degree in Civil Engineering and is a registered Professional Engineer and surveyor in the Commonwealth of Pennsylvania.

Esther McGinnis, Environmental Manager
Ms. McGinnis was an Environmental Manager responsible for managing and preparing the Section 4(f) Evaluation, Traffic Noise studies, and Air Quality analysis. She has 25 years of project development experience including environmental studies and preliminary engineering. She holds a Bachelor's Degree in Civil Engineering.

AD Marble & Company

Brad Bauman, Architectural Historian
Mr. Bauman was an Architectural Historian for the project. He has over six years experience in cultural resource management including positions in both archaeology and historical preservation. He has extensive experience in the preparation of historical resource surveys and eligibility reports,

historical contexts and assessment of effect documents. He holds a Bachelor's Degree in History from Shippensburg University and meets the National Park Service's professional requirements as specified in 36 CFR Part 61.

Brook Blades Ph.D., Principal Archaeologist Investigator
Dr. Blades was Principal Archaeologist Investigator for the project. He has directed precontact and historic excavations at archaeological sites in the Delaware Valley and in southeastern Pennsylvania for more than three decades. Previous archaeological research includes the Late Woodland Pardee site in the upper Delaware River Valley, the Matsunk site in the Schuylkill River Wally and several eighteenth- and nineteenth-century historic sites. Dr. Blades holds a Ph.D., in Anthropology from New York University.

Travis Beckwith, Architectural Historian
Mr. Beckwith was an Architectural Historian for the project. He has over five years of experience in the field of historic preservation and public history. His experiences include historic resource surveys, primary historic research, historical structure rehabilitation and historic downtown revitalization. Travis holds a Bachelor's Degree in History and a Master's Degree in History/Historic Preservation. He also exceeds the professional qualifications for Architectural Historians as outlined in 36 CFR Part 61.

Barbara Frederick, Senior Architectural Historian
Ms. Fredrick was a Senior Architectural Historian for the project. She has over thirteen years experience in cultural resource management, including positions in both the private and public sectors. She has extensive experience in the preparation of historical resources surveys, historical contexts, assessments of effect documentation, public coordination and HABS/HAER recordation's. Ms. Frederick has a Bachelor's Degree from Mary Washington College and meets the National Park Service's professional requirements as specified in 36 CFR Part 61.

Paul Schopp, Field Investigator
Mr. Schopp was a Field Investigator for the Scudder Falls project. He was a former director of the Camden County (NJ) Historic Society, and has conducted historical research for numerous projects in the Bucks County, Pennsylvania, and Mercer County, New Jersey. Mr. Schopp is a recognized author on industrial sites such as the Delaware Canal and the Delaware and Raritan Canal.

Joseph Schuldenrien Ph.D., Principal Geoarchaeologist
Dr. Schuldenrein was Principal Geoarchaeologist for the project. He is perhaps the preeminent geoarchaeologist in the investigation and interpretation of sedimentary sequences from archaeological sites along the Delaware River. He has directed archaeological investigations at Lower Black's Eddy site and directed geoarchaeological research at the Sandts Eddy site. Dr. Schuldenrein has prepared a model for interpreting sedimentary sequences on Delaware River terraces that was published in *Geoarchaeology of Landscapes in the Glaciated Northeast* (New York State Museum, 2003). Dr. Schuldenrein received his Ph.D. in Anthropology from the University of Chicago.

Alan D. Tabachnick, Cultural Resource Manager
Mr. Tabachnick was the Cultural Resource Manager for the project. He has over 16 years experience of cultural resources expertise garnered though the Mid-Atlantic area. He has surveyed thousands of historical properties of all ages and types and has been involved in the documentation of numerous historic road and railroad bridges to HAER standards, having produced all types of 106 documentation, including Historical Resources Survey Reports, Determination of Eligibility Reports, Determination of Effect Reports, Memoranda of Agreements and mitigation documents. Mr. Tabachnick has a Bachelor's Degree in Anthropology and a Master's Degree in Historic Preservation.

Connie Torbeck, Senior Architectural Historian
Ms. Torbeck was a Senior Architectural Historian for the project. She has completed numerous Section 106 projects, which range from surveying and photographing company towns, industrial properties and bridges to documenting coal mining facilities to Historic American Engineering Records (HAER) standards. Her writing expertise includes National Register of Historical Places Nomination forms, Historic Structure Surveys, Determination of Eligibility and Determination of Effect reporting and Memorandum of Agreement. Ms. Torbeck has a Bachelor's Degree in Paralegal Studies and a Master's Degree in Historic Preservation.

David Weinberg, Field Investigator
Mr. Weinberg was a Field Investigator for the project. He has directed numerous excavations on precontact and historic sites in Pennsylvania and Delaware over the past decade, including sites directly comparable in age to those along the Delaware River near Scudder Falls Bridge. Mr. Weinberg received a Bachelor's Degree in Anthropology and Geology from the University of Delaware.