HUDSON TUNNEL

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND DRAFT SECTION 4(f) EVALUATION

APPENDIX 11

Natural Resources

11-1: Natural Resources: Agency Correspondence

11-2: Wetland Delineation Report

11-3: Essential Fish Habitat

11-4: Draft Conceptual Compensatory Mitigation Plan

11-5: Draft Section 404(b)(1) Guidelines Evaluation

U.S. Department of Transportation
Federal Railroad Administration

NJTRANSIT
The Way To Go.®

HUDSON TUNNEL

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND DRAFT SECTION 4(f) EVALUATION

APPENDIX 11-1

Natural Resources: Agency Correspondence

U.S. Department of Transportation
Federal Railroad Administration

NJTRANSIT
The Way To Go.®

Requests for Information

AKRF, Inc.
Environmental Planning Consultants
440 Park Avenue South
7th Floor
New York, NY 10016
tel: 212 696-0670
fax: 212 213-3191
www.akrf.com

October 7, 2016

New Jersey Department of Environmental Protection
Natural Heritage Data Request Form
The New Jersey Natural Heritage Program
DEP – Office of Natural Lands Management
Mail Code 501-04
P.O. Box 420
501 E. State Street
Station Plaza #5, 4th Floor
Trenton, NJ 08625-0420

Re: Hudson Tunnel Project: Request for Information on State or Federal Listed Endangered, Threatened, and Proposed Species

Dear Sir or Madam:

AKRF, Inc., on behalf of the Federal Railroad Administration (FRA) and NJ TRANSIT respectfully requests information regarding state-listed and/or federally listed rare, special concern, threatened, or endangered species, and significant habitat communities within a 0.5-mile radius of the proposed Hudson Tunnel Project ("Proposed Project"). The Proposed Project extends from Secaucus, NJ to Penn Station, New York City (**Figure 1**). A copy of the Natural Heritage Data Request Form is included with this letter. Specific information on the location of sensitive species or habitats provided by NJDEP will not be published in any document unless permission is granted by the agency.

The goal of the Proposed Project is to preserve the current functionality of the Northeast Corridor's (NEC) Hudson River rail crossing between New Jersey and New York and strengthen the resilience of the NEC by rehabilitating the existing NEC tunnel, known as the North River Tunnel, which was damaged by Superstorm Sandy in October 2012. While the tunnel was restored to service and is safe for travel, chlorides from the water that inundated the tunnel remain in the tunnel's concrete liner and bench walls, causing ongoing damage to the bench walls, imbedded steel, track, and signaling and electrical components. These improvements must be achieved while maintaining uninterrupted commuter and intercity rail service. Once the North River Tunnel rehabilitation is complete, both the old and new tunnel would be in service, providing redundant capacity and increased operational flexibility for Amtrak and NJ TRANSIT.

The Proposed Project would include the following major components:

- Two new tracks for use by Amtrak and NJ TRANSIT located parallel to the south side of the NEC from east of Secaucus Junction Station in Secaucus, NJ, to the western slope of the Palisades in North Bergen, NJ, where the tunnel would begin. These tracks would cross Penhorn Creek near Secaucus Road, just south of the existing tracks.

- The tracks would continue in a tunnel beneath the Palisades and beneath the Hudson River to connect to the existing approach tracks that lead into Penn Station New York.
- Ventilation buildings would be located above the tunnel on both sides of the Hudson River to provide fresh air to the tunnels and exhaust smoke during emergencies. The ventilation building sites would also serve as staging areas during construction of the Proposed Project.
- Once the new tunnel is complete and in operation, the old tunnel would be rehabilitated one track at a time.

Please send the requested information to me by mail at the address above or by email to scollins@akrf.com. I can be reached by phone at 646-388-9657 if you have any questions regarding this request. Thank you for your time and assistance.

Sincerely,

Sandy Collins
Vice President, AKRF

Enclosures: (2)

State of New Jersey
Mail Code 501-04
Department of Environmental Protection
Natural Heritage Data Request Form

The New Jersey Natural Heritage Program
DEP-Office of Natural Lands Management
P.O. Box 420, Trenton, New Jersey 08625-0420
(609) 984-1339
Fax No.: (609) 984-1427

PLEASE PRINT AND SUBMIT COMPLETED FORM WITH ATTACHMENTS TO THE ADDRESS ABOVE
(Fields shown in bold font must be completed in order for data request to be processed.)

1. **Name:** Sandy Collins Agency/Company: AKRF, Inc.

   Address: 7250 Parkway Drive **City:** Hanover

   State: MD **Zip:** 21076 **Daytime Phone:** 646-388-9657 Ext.: _____

   Cell Phone: _____ Email: _____

2. **Project Name:** Hudson Tunnel Project

   Municipality(ies): _____ County(ies): Hudson County, NJ; New York County, NY

   Block(s): _____ Lot(s): _____

   N.A.D. 1983 State Plane Coordinates (feet) 6 digits only: E (x): _____ N (y): _____

3. **Project Description:** New two-track rail tunnel under the Hudson River. Full project description provided in letter.

4. **USGS Quad:** ☑ A copy of a USGS quad map(s) that clearly indicates the site boundary is included with this form. Specify name of USGS quad(s): Weehawken Quad and Central Park Quad, USGS 7.5 Minute Topographic Map

   (USGS quad maps are required, unless prior arrangements have been made to submit site boundaries in an alternate format. Responses will be delayed if site locations are not delineated in a suitable format.)

5. **Flood Hazard Control Act Use:** **Is this request submitted as part of a Flood Hazard Area Control Act rule (N.J.A.C. 7:13) application? Yes ○ No ◉**

6. **Acknowledgement & Signature:** Any material supplied by the Office of Natural Lands Management will not be published without crediting the Natural Heritage Database as the source of the material. It is understood that there will be a charge of $70.00 per hour for the services requested. An invoice will be sent with the request response and payment should be made by check or money order payable to "Office of Natural Lands Management."

   Signed Sandra L Collins **Date** 10/12/2016

Time Frame for Response:
Data requests are processed in the order in which they are received; please allow 30 days for response. If you would like to send in your data request via email, you may do so by sending it to Natlands@dep.nj.gov . Due to the number of attachments, we cannot fax results. Unless you specifically request that your response be mailed or the response is unusually large, your response will be emailed to the address you provide.

FOR OFFICE USE ONLY

DATE RECEIVED_____

Item Code: REG _____ ST _____ RTC _____ NC _____ REGEO _____ STEO _____ RTCEO _____ NCEO _____

Hrs: _____

Project Code: _____ Inv. #: _____ _____

State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Parks & Forestry
State Forestry Service
Mail Code 501-04
Office of Natural Lands Management – Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. (609) 984-1339 Fax. (609) 984-1427

BOB MARTIN
Commissioner

October 27, 2016

Sandy Collins
AKRF, Inc.
7250 Parkway Drive, Suite 210
Hanover, MD 21076

Re: Hudson Tunnel Project
Secaucus Town, Union City and North Bergen and Weehawken Townships, Hudson County

Dear Ms. Collins:

Thank you for your data request regarding rare species information for the above referenced project site.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Natural Heritage Data Request Form into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

This report does not include information concerning known Northern Long-eared Bat hibernacula and maternity roost trees protected under the provisions of the U.S. Fish & Wildlife Service's 4(d) Rule. You must contact the U.S. Fish & Wildlife Service, New Jersey Field Office, for additional information concerning the location of these features, or visit their website at: http://www.fws.gov/northeast/njfieldoffice/endangered/consultation.html.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the immediate vicinity of the site.

NHP File No. 16-4007471-10778

A list of rare plant species and ecological communities that have been documented from the county (or counties), referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 16-4007471-10778

Mail Code 501-04
Department of Environmental Protection
State Forestry Service
Office of Natural Lands Management
P.O. Box 420 Trenton, New Jersey 08625-0420
Tel. (609) 984-1339 Fax. (609) 984-1427

Invoice

Date	Invoice #
10/27/2016	10778

Bill to:
AKRF, Inc.
7250 Parkway Drive, Suite 210
Hanover, MD 21076

Make check payable to:
Office of Natural Lands Management
And forward with a copy of this statement to:
Mail Code 501-04
Office of Natural Lands Management
P.O. Box 420 Trenton, New Jersey 08625-0420

Quantity (hrs.)	Description	Rate (per hr.)	Amount
1	Natural Heritage Database search for locational information of rare species and ecological communities. Project: 16-4007471-10778	$ 70.00	$ 70.00
Sandy Collins Project Name: Hudson Tunnel Project		**Total**	$ 70.00

Table 1: On Site Data Request Search Results (6 Possible Reports)

Report Name	**Included**	**Number of Pages**
1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	Yes	1 page(s) included
2. Natural Heritage Priority Sites On Site	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
6. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Regional Status	Grank	Srank	Identified	Last Observed	Location
Vascular Plants									
Hydrocotyle ranunculoides	Floating Marsh-pennywort		E	LP, HL	G5	S1	Y - Yes	2006- -	2006: [redacted]

Total number of records: 1

Thursday, October 27, 2016

NHP File No.:16-4007471-10778

Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Little Blue Heron	Egretta caerulea	Foraging	2	NA	Special Concern	G5	S3B,S3N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Yellow-crowned Night-heron	Nyctanassa violacea	Foraging	3	NA	State Threatened	G5	S2B,S2N
Osteichthyes								
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1

Table 2: Vicinity Data Request Search Results (6 possible reports)

Report Name	**Included**	**Number of Pages**
1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	Yes	1 page(s) included
2. Natural Heritage Priority Sites within the Immediate Vicinity	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Immediate Vicinity of the Project Site
Based on Search of Natural Heritage Database
Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Regional Status	Grank	Srank	Identified	Last Observed	Location
Vascular Plants									
Hydrocotyle ranunculoides	Floating Marsh-pennywort		E	LP, HL	G5	S1	Y - Yes	2006- -	2006: [redacted]

Total number of records: 1

Thursday, October 27, 2016

NHP File No.:16-4007471-10778

Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Barn Owl	Tyto alba	Non-breeding Sighting	2	NA	Special Concern	G5	S3B,S3N
	Black-crowned Night-heron	Nycticorax nycticorax	Foraging	3	NA	State Threatened	G5	S2B,S3N
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Little Blue Heron	Egretta caerulea	Foraging	2	NA	Special Concern	G5	S3B,S3N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B
	Osprey	Pandion haliaetus	Nest	3	NA	State Threatened	G5	S2B
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Yellow-crowned Night-heron	Nyctanassa violacea	Foraging	3	NA	State Threatened	G5	S2B,S2N
Osteichthyes								
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1

AKRF, Inc.
Environmental Planning Consultants
440 Park Avenue South
7th Floor
New York, NY 10016
tel: 212 696-0670
fax: 212 213-3191
www.akrf.com

October 7, 2016

NY Natural Heritage Program - Information Services
NYSDEC
625 Broadway, 5th Floor
Albany, NY 12233-4757

Re: New York Natural Heritage Program Data Request, Hudson Tunnel Project, Manhattan, New York City

Dear Sir or Madam:

AKRF, Inc., on behalf of the Federal Railroad Administration (FRA) and NJ TRANSIT respectfully requests information regarding any federally listed or proposed species under the jurisdiction of NMFS that have been recorded in the vicinity of the proposed Hudson Tunnel Project ("Proposed Project"). The Proposed Project extends from Secaucus, NJ to Penn Station, New York City (**Figure 1**). FRA is the Responsible Entity for conducting an environmental review to satisfy the requirements of the National Environmental Policy Act. Specific information on the location of sensitive species or habitats provided by NY Natural Heritage Program will not be published in any document unless permission is granted by the agency.

The goal of the Proposed Project is to preserve the current functionality of the Northeast Corridor's (NEC) Hudson River rail crossing between New Jersey and New York and strengthen the resilience of the NEC by rehabilitating the existing NEC tunnel, known as the North River Tunnel, which was damaged by Superstorm Sandy in October 2012. While the tunnel was restored to service and is safe for travel, chlorides from the water that inundated the tunnel remain in the tunnel's concrete liner and bench walls, causing ongoing damage to the bench walls, imbedded steel, track, and signaling and electrical components. These improvements must be achieved while maintaining uninterrupted commuter and intercity rail service. Once the North River Tunnel rehabilitation is complete, both the old and new tunnel would be in service, providing redundant capacity and increased operational flexibility for Amtrak and NJ TRANSIT.

The Proposed Project would include the following major components:

- Two new tracks for use by Amtrak and NJ TRANSIT located parallel to the south side of the NEC from east of Secaucus Junction Station in Secaucus, NJ, to the western slope of the Palisades in North Bergen, NJ, where the tunnel would begin.
- The tracks would continue in a tunnel beneath the Palisades and beneath the Hudson River to connect to the existing approach tracks that lead into Penn Station New York.
- Ventilation buildings would be located above the tunnel on both sides of the Hudson River to provide fresh air to the tunnels and exhaust smoke during emergencies. The ventilation building sites would also serve as staging areas during construction of the Proposed Project.

- Once the new tunnel is complete and in operation, the old tunnel would be rehabilitated one track at a time.

The Proposed Project would require in-water construction within the Hudson River to modify river bottom soils in order to construct a segment of the tunnel that must be relatively shallow beneath the Hudson River. These activities would occur in a small area of the Hudson River near the Manhattan shoreline. As currently envisioned, this would involve modifying river bottom soils by introducing grout to the river bottom. The work would be conducted within a work area contained by temporary cofferdams to protect water quality of the surrounding area. Following completion of the grouting, a protection cover (potentially precast concrete) would be placed above the treated area.

Please send the requested information to me by mail at the address above or by email to scollins@akrf.com. I can be reached by phone at 646-388-9657 if you have any questions regarding this request. Thank you for your time and assistance.

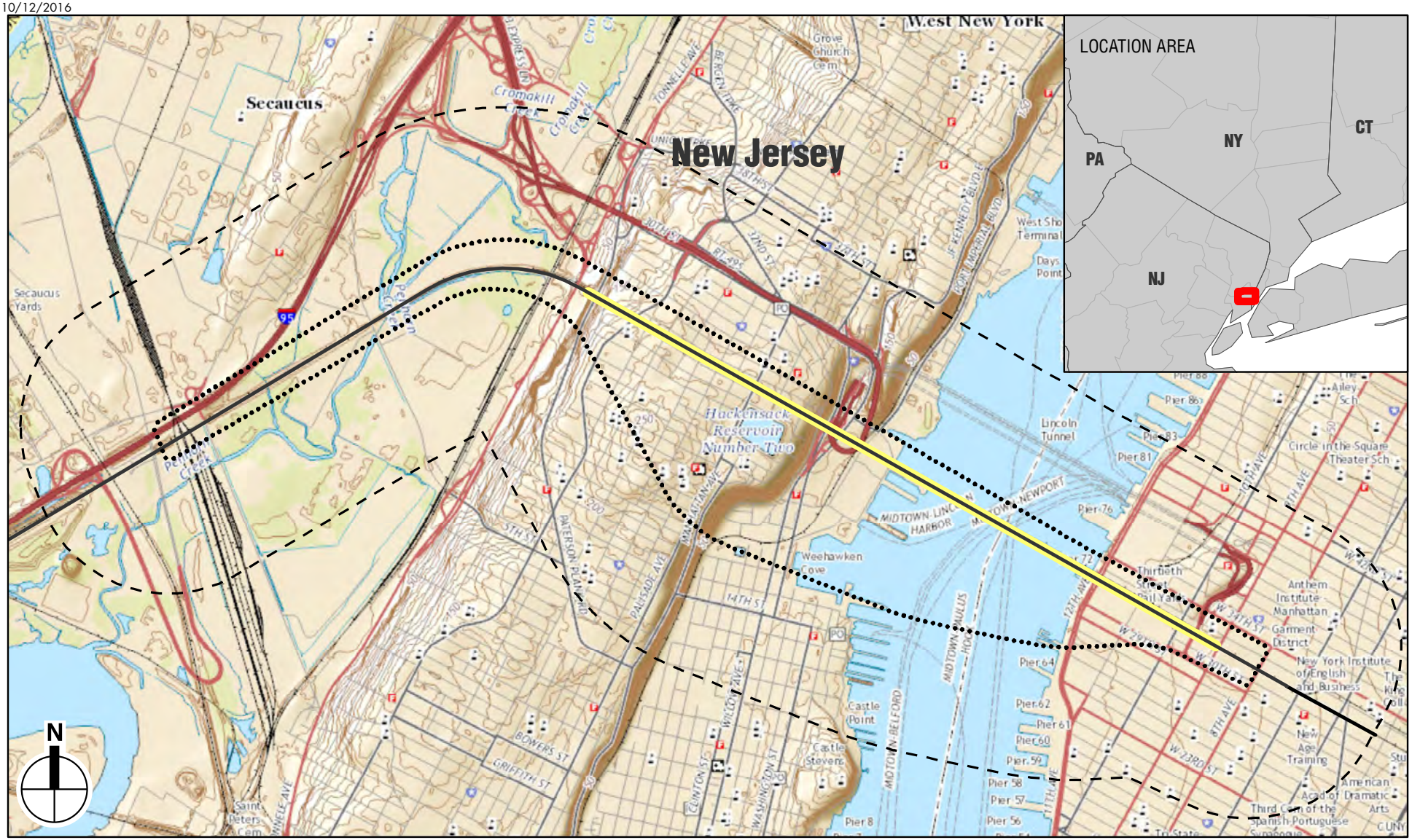
Sincerely,

Sandra L Collins

Sandy Collins
Vice President, AKRF

Enclosures: (1)

10/12/2016



Project Study Area
Half mile boundary
Existing North River Tunnel
Existing Northeast Corridor

Project Location
USGS 7.5 Minute Topographic Map
Weehawken Quad and Central Park Quad
Figure 1

Hudson Tunnel Project

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th Floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • **Fax:** (518) 402-8925
Website: www.dec.ny.gov

November 10, 2016

Sandy Collins
AKRF, Inc.
440 Park Avenue South, 7th Floor
New York, NY 10016

Re: Hudson Tunnel Project, from New Jersey to Penn Station
Town/City: City Of New York. County: New York.

Dear Ms. Collins:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to the above project.

Enclosed is a report of rare or state-listed animals and plants, and significant natural communities that our database indicates occur at the project site or in its immediate vicinity.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our database. We cannot provide a definitive statement as to the presence or absence of all rare or state-listed species or significant natural communities. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

Our database is continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the NYS DEC Region 2 Office, Division of Environmental Permits, as listed at www.dec.ny.gov/about/39381.html.

Sincerely,

Nicholas Conrad
Information Resources Coordinator
New York Natural Heritage Program

1338

The following state-listed animals have been documented in the vicinity of the project site.

The following list includes animals that are listed by NYS as Endangered, Threatened, or Special Concern; and/or that are federally listed or are candidates for federal listing. The list also contains unlisted rare animals found in the same vicinity.

For information about any permit considerations for your project, contact the Permits staff at the NYSDEC Region 2 Office. For information about potential impacts of your project on these species, and how to avoid, minimize, or mitigate any impacts, contact the Wildlife Manager.

A listing of Regional Offices is at http://www.dec.ny.gov/about/558.html.

The following state-listed species have been documented within .5 mile of the project site.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*FEDERAL LISTING*	
Birds				
Peregrine Falcon *Breeding*	*Falco peregrinus*	Endangered		12410

The following state-listed species have been documented in the Hudson River at the project site.

Fish				
Shortnose Sturgeon	*Acipenser brevirostrum*	Endangered	Endangered	1091
Atlantic Sturgeon	*Acipenser oxyrinchus*	No Open Season	Endangered	11464

The following animals, while not listed by New York State as Endangered or Threatened, are of conservation concern to the state, and are considered rare by the New York Natural Heritage Program.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*HERITAGE CONSERVATION STATUS*	
Bees				
Yellow Bumble Bee	*Bombus (Thoracobombus) fervidus*	Unlisted	Critically Imperiled in NYS	
High Line, Manhattan, 2009.				14800

This report only includes records from the NY Natural Heritage database. For most sites, comprehensive field surveys have not been conducted, and we cannot provide a definitive statement as to the presence or absence of all rare or state-listed species. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

Information about many of the listed animals in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, and from NYSDEC at www.dec.ny.gov/animals/7494.html.

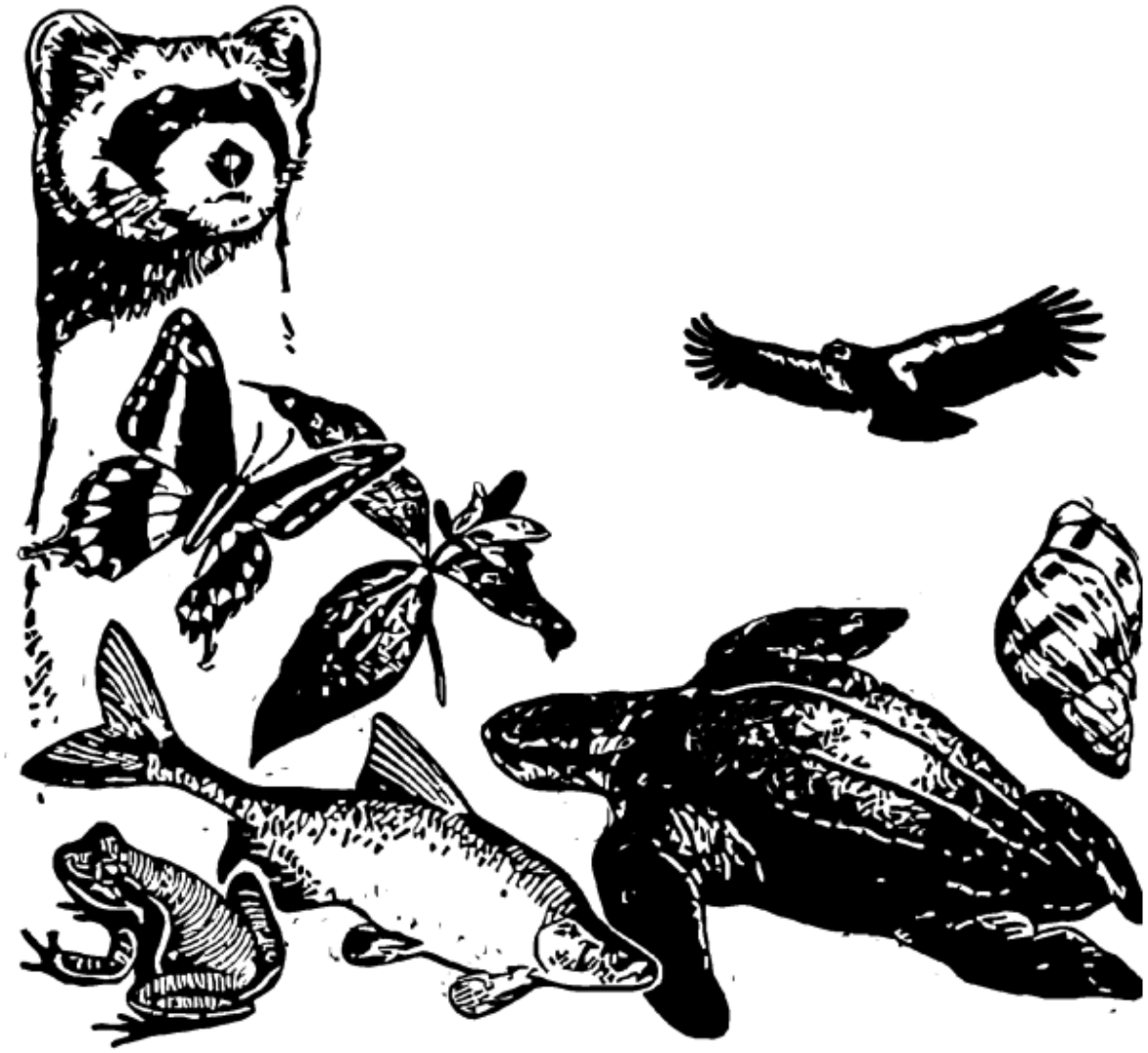
U.S. Fish & Wildlife Service

Hudson Tunnel

IPaC Trust Resources Report

Generated October 12, 2016 10:02 AM MDT, IPaC v3.0.9

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

Table of Contents

U.S. Fish & Wildlife Service

IPaC Trust Resources Report

NAME

Hudson Tunnel

LOCATION

New Jersey and New York

IPAC LINK

https://ecos.fws.gov/ipac/project/ANSAT-3O2HJ-BTLFT-DPOMT-UORXPI

U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

New Jersey Ecological Services Field Office
927 North Main Street, Building D
Pleasantville, NJ 08232-1454
(609) 646-9310

Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967
(631) 286-0485

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

There are no endangered species in this location

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.[1] There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

---

1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The following species of migratory birds could potentially be affected by activities in this location:

American Oystercatcher Haematopus palliatus — Bird of conservation concern
On Land Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G8

American Bittern Botaurus lentiginosus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
On Land Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Black Skimmer Rynchops niger — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EO

Black-billed Cuckoo Coccyzus erythropthalmus — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HI

Blue-winged Warbler Vermivora pinus — Bird of conservation concern
On Land Season: Breeding

Canada Warbler Wilsonia canadensis — Bird of conservation concern
On Land Season: Breeding

Cerulean Warbler Dendroica cerulea — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B09I

Fox Sparrow Passerella iliaca — Bird of conservation concern
On Land Season: Wintering

Golden-winged Warbler Vermivora chrysoptera — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G4

Gull-billed Tern Gelochelidon nilotica — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JV

Hudsonian Godwit Limosa haemastica — Bird of conservation concern
At Sea Season: Migrating

Kentucky Warbler Oporornis formosus — Bird of conservation concern
On Land Season: Breeding

Least Bittern Ixobrychus exilis
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B092

Least Tern Sterna antillarum — Bird of conservation concern
On Land Season: Breeding

Loggerhead Shrike Lanius ludovicianus — Bird of conservation concern
On Land Season: Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY

Peregrine Falcon Falco peregrinus — Bird of conservation concern
On Land Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Pied-billed Grebe Podilymbus podiceps — Bird of conservation concern
On Land Season: Year-round

Prairie Warbler Dendroica discolor — Bird of conservation concern
On Land Season: Breeding

Purple Sandpiper Calidris maritima — Bird of conservation concern
On Land Season: Wintering

Red Knot Calidris canutus rufa — Bird of conservation concern
On Land Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DM

Rusty Blackbird Euphagus carolinus — Bird of conservation concern
On Land Season: Wintering

Saltmarsh Sparrow Ammodramus caudacutus — Bird of conservation concern
On Land Season: Breeding

Seaside Sparrow Ammodramus maritimus — Bird of conservation concern
On Land Season: Year-round

Short-eared Owl Asio flammeus — Bird of conservation concern
On Land Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Snowy Egret Egretta thula — Bird of conservation concern
On Land Season: Breeding

Upland Sandpiper Bartramia longicauda — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HC

Willow Flycatcher Empidonax traillii — Bird of conservation concern
On Land Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

Wood Thrush Hylocichla mustelina — Bird of conservation concern
On Land Season: Breeding

Worm Eating Warbler Helmitheros vermivorum — Bird of conservation concern
On Land Season: Breeding

Wildlife refuges and fish hatcheries

There are no refuges or fish hatcheries in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

This location overlaps all or part of the following wetlands:

Estuarine And Marine Deepwater

E1UBL
E1UBL6x

Estuarine And Marine Wetland

E2EM5P
E2EM5P6

E2EM5P6d
E2EM5Pd

Freshwater Pond

PUBHx

A full description for each wetland code can be found at the National Wetlands Inventory website: http://107.20.228.18/decoders/wetlands.aspx

Consultation with Federal Agencies

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

May 11, 2017

Steve Mars
Regional Supervisor
U.S. Fish and Wildlife Service
New Jersey Field Office
Atlantic Professional Park
4 East Jimmie Leeds Road
Galloway, New Jersey 08205

Re: Request for Concurrence under the Endangered Species, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act for the Hudson Tunnel Project, Secaucus, New Jersey to Manhattan, New York

Dear Mr. Mars:

The Federal Railroad Administration (FRA) and New Jersey Transit Corporation (NJ TRANSIT) are acting as joint lead agencies for the preparation of a Draft Environmental Impact Statement (EIS), in compliance with the National Environmental Policy Act of 1969 (NEPA), for the Hudson Tunnel Project (Project). The FRA has prepared this request for Endangered Species Act (ESA),[1] Migratory Bird Treaty Act of 1918 (MBTA),[2] and Bald and Golden Eagle Protection Act of 1940 (BGEPA)[3] concurrence from your office for the Preferred Alternative for the Project (Preferred Alternative). The Preferred Alternative comprises construction of a new two-track rail tunnel and rehabilitation of the existing passenger rail tunnel beneath the Hudson River between New Jersey and New York Penn Station. The existing passenger rail tunnel, the North River Tunnel, is currently used by Amtrak for intercity passenger rail service and by NJ TRANSIT for commuter rail service.

FRA has made the determination that the Preferred Alternative may affect, but is not likely to adversely affect, any species listed as threatened or endangered by U.S. Fish and Wildlife Service (USFWS) or any critical habitat designated under the ESA of 1973, as amended. More information about the Project and supporting analysis for this determination is provided below.

---

[1] 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.
[2] 40 Stat. 755, as amended; 16 U.S.C. 703-712
[3] 54 Stat. 240, as amended; 16 U.S.C. 668-668c

Proposed Project

The Project is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel beneath the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY) (see **Figure 1**). The Preferred Alternative will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River passenger rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

Construction activities will include: new approach tracks in Secaucus and North Bergen, NJ; construction of the new Hudson Tunnel by tunnel boring machine (TBM); in-water ground improvement over 1.5 acres of sediment in the Hudson River; ground improvement at the Manhattan shoreline; construction of a shaft, staging, and fan plant site at Twelfth Avenue; and rehabilitation of the existing North River Tunnel. Construction activities associated with the new Hudson Tunnel will begin in 2019 and will be completed in 2026. Rehabilitation of the existing tunnel will begin in 2026 and be completed in early 2030.

The USFWS's Information, Planning and Conservation (IPaC) online planning tool indicates that no Federally-listed threatened or endangered species have the potential to occur in the vicinity of the proposed project, and no critical habitats for species under USFWS jurisdiction fall within the project area (**Attachment 1**). Migratory birds and bald eagle, which fall under the jurisdiction of the MBTA and BGEPA, respectively, were identified by the USFWS IPaC resource list as having the potential to be affected by the proposed actions. These species are discussed below.

New Jersey Approach Tracks

The western portion of the new surface alignment from Secaucus to North Bergen will include: construction of a new raised right-of-way (including segments of retained fill, sloped embankment, and viaducts); an adjacent access road in one segment; installation of new tracks and modification of existing tracks; installation of drainage systems; and installation of signals, power supply, and other related rail infrastructure. Construction of the embankment support structures will involve earthmoving and grading, bringing large

quantities of earth and gravel, and additional material to allow for compression and settling to adequately support the track system. In areas of retained fill and retained cut, the retaining walls will be installed on foundations supported by deep piles. Two pile-supported bridges will be required, one over Secaucus Road and one over the Conrail and NYS&W tracks. Piles will be installed along the entire New Jersey alignment to support the associated overhead catenary, signals, communications, and other rail systems. Temporary construction staging areas and temporary construction access roads will be required for this work. A construction staging site will be established to the east and west of Tonnelle Avenue in North Bergen, where the alignment of the Preferred Alternative will cross beneath that roadway, and will be used for the construction of the surface tracks and for the tunnel beneath the Palisades. A new 20-foot-wide permanent access road required for emergency responders will be constructed along the south side of the new tracks in the sloped embankment section east of Secaucus Road.

Hudson River Tunnel

The tunnel section of the Preferred Alternative will begin at the western face of the Palisades at a new excavated tunnel portal. The tunnel through the Palisades will consist of two approximately 5,130-foot-long tubes, each constructed by a TBM operating eastward. The initial 50 feet of the tunnel will be constructed using controlled drilling and blasting, to excavate a starter tunnel in which the TBM can launch. Temporary fire-life safety systems will be installed within the new tunnel as it is excavated to protect workers during construction. This will include temporary tunnel ventilation, powered by large fans that will operate continuously during construction activities. Excavated rock and soil will be removed and transferred to the Tonnelle Avenue staging site, and either reused or disposed of at an appropriate off-site location.

A new ventilation shaft and fan plant for the Hudson Tunnel, the "Hoboken shaft site," will be used as a tunnel access point and staging site during construction of both the Palisades and Hudson River sections of the tunnel. The 130-foot-diameter vertical ventilation shaft will be excavated from the surface through earth and rock, and support walls will be installed to support the sides of the excavated area. The rock portion of the shaft and starter tubes at the bottom of the shaft will be excavated using controlled drill and blast. A soft-soil TBM, which will be used to construct the portion of the tunnel beneath the Hudson River, will be launched from the Palisades tunnel. Ground improvement through injection of grout into the soil and voids in the rock will be used to prepare the ground for the TBMs. Once the Hoboken shaft is completed, it will be used as the terminus of the Palisades tunnel. Following completion of the river tunnel, construction of emergency access/egress components of the shaft and the ventilation fan plant building will occur via typical construction methods.

The tunnel beneath Hoboken and the Hudson River will consist of two approximately 7,200-foot-long tubes, each constructed by a TBM operating eastward. Underpinning and ground improvement through jet grout injection will be conducted along affected portions of the alignment in this location. All river tunnel construction work, with the exception of the in-water ground improvement discussed below, will be conducted underground beneath the river bed. Excavated material from the tunnel and cross passages will be removed at the rear of the TBMs and brought out of the tunnel at the Hoboken shaft site.

In-water Ground Improvement

Beginning about 200 feet west of the New York pierhead line, an approximately 500-foot-long by 120-foot-wide section of the tunnel will be less than 10 feet below the bottom of the river. In this 1.5-acre area (the "low-cover area"), the river bottom will need to be modified through the addition of grout to the soil to provide stability to the ground above the tunnel (i.e., in-water ground improvement). In order to complete the in-water ground improvement using jet-grouting, a sheet pile cofferdam system will be installed via barge across the 550-foot length of the low-cover area; the cofferdams will be removed upon completion of jet grouting. This will be completed in three stages, using three separate cofferdam systems, each enclosing about a third of the work zone. The work will begin in the section closest to the Manhattan shore and move outward towards the navigation channel. In order to minimize the area of water that is disturbed at any one time, only one cofferdam will be present at any given time for the Preferred Alternative. Stages 1 and 2 of the in-water work will each take approximately 4.5 months to complete, each within a cofferdam comprising 24,000 square feet of open water (Stage 2 will begin when the cofferdam for Stage 1 has been removed). Stage 3 will take place within an 18,000-square-foot cofferdam and will be completed over 3.5 months following the removal of the Stage 2 cofferdam.

The sheet pile cofferdam walls will be installed via vibratory hammer based on up to four barges moored-in-place. Driving of the sheet pile cofferdam walls is expected to occur for 8 hours per day, 5 days per week, and for 3-4 weeks for each of the three cofferdam sections. Removal of the sheet pile walls will take 1-2 weeks and will also be conducted using a vibratory hammer. No driving or removal of sheet pile will occur between November 1st and April 30th. The areas within the three cofferdam segments will not be fully dewatered prior to construction activities; work will be conducted in-the-wet, in waters a few feet lower than that outside the cofferdam.

Manhattan Shoreline Ground Improvement

The TBMs will continue below the Hudson River bottom, through the foundations of the Manhattan bulkhead, beneath Hudson River Park and Twelfth Avenue, and to the Manhattan shaft site at Twelfth Avenue, where the TBMs will be removed. In advance of the TBMs passing through, ground improvements will be made in the Manhattan bulkhead area to improve tunneling conditions and avoid cut-and-cover construction through this area. Cement grout will be installed from the land side of the bulkhead, which consists of riprap, cobbles, and timber support piles, to fill large voids and improve stability prior to ground freezing. To allow tunneling beneath the surface, the soft soils in the Manhattan waterfront zone will be treated through ground freezing, a technique that involves installation of a network of underground pipes and then circulation of a cold liquid through the pipe network until the ground around the pipes freezes solid. The pipes will be installed vertically and diagonally to minimize surface disturbance. Freeze plants, typically housed within one or two work trailers, will be temporarily located on the nearby Twelfth Avenue staging site and/or within the West 30th Street Heliport.

Manhattan Shaft and Fan Plant Sites and Track Connections

The Manhattan shaft site is located on the east side of Twelfth Avenue between West 29th and West 30th Streets. A vertical shaft will be excavated from the surface to the depth of the new tunnel, and a slurry plant will be located on the site to support the creation of slurry walls to support the shaft. Once the ventilation shaft is completed, the site will be used for staging of the tunnel segment from the shaft to the median of Twelfth Avenue, which will be conducted via sequential excavation method (SEM). Cut-and-cover construction will be required to cross West 30th Street and Tenth Avenue, near the connection to existing PSNY tracks. A fan plant to provide ventilation for the new tunnel segment from the Twelfth Avenue shaft to the new Manhattan portal at Tenth Avenue will be constructed near Tenth Avenue within an existing Amtrak easement area above the tracks of the A Yard and beneath the Lerner Building. Minor excavation and track modifications will be necessary to connect the Preferred Alternative to the existing track system at PSNY.

North River Tunnel Rehabilitation

Once construction of both tubes of the new tunnel is complete and Amtrak and NJ TRANSIT services are shifted to the new tunnel, rehabilitation of the North River Tunnel will begin in one tube at a time. The Tonnelle Avenue staging area will be used to transport debris and construction materials. Rehabilitation work will include reconstruction of the bench walls and track system; cabling work in the duct banks, along the tunnel crown, and above the bench walls; and any necessary work to address cracking and spalling on the interior face of the tunnel wall. Work will begin at the Manhattan end of the tunnel and move westward toward the portal in North Bergen. Virtually all of this work will occur underground, with only the materials delivery and debris removal being visible at the Tonnelle Avenue staging site. Upon completion of all rehabilitation activities, the rehabilitated tube will be recommissioned and returned to active rail service, and rehabilitation activities in the second tube will commence.

Compliance

Endangered Species Act – According to the USFWS IPaC resource list (**Attachment 1**), there are no threatened or endangered species or critical habitat that have the potential to occur in the vicinity of the proposed project. Therefore, FRA has determined that the proposed project will have no impact on Federally-listed threatened or endangered species or critical habitat under the jurisdiction of USFWS.

Migratory Bird Treaty Act – According to the USFWS IPaC resource list, there are a number of migratory birds of concern that could potentially be affected by the proposed project, as presented in **Table 1**, below. These species are identified as having breeding, wintering, migrating, or year-round habitat in the study area (see **Attachment 1**). No peregrine falcon nests were identified within the vicinity of the project site (NJDEP 2016).

Table 1
Migratory Birds of Concern Listed in USFWS IPaC Resource List

American oystercatcher (*Haematopus palliatus*)	Peregrine falcon (*Falco peregrinus*)
American bittern (*Botaurus lentiginosus*)	Pied-billed grebe (*Podilymbus podiceps*)
Black skimmer (*Rynchops niger*)	Prairie warbler (*Setophaga discolor*)
Black-billed cuckoo (*Coccyzus erythropthalmus*)	Purple sandpiper (*Calidris maritima*)
Blue-winged warbler (*Vermivora cyanoptera*)	Red knot (*Calidris canutus rufa*)
Canada warbler (*Cardellina canadensis*)	Rusty blackbird (*Euphagus carolinus*)
Cerulean warbler (*Setophaga cerulea*)	Saltmarsh sparrow (*Ammodramus caudacutus*)
Fox sparrow (*Passerella iliaca*)	Seaside sparrow (*Ammodramus maritimus*)
Golden-winged warbler (*Vermivora chrysoptera*)	Short-eared owl (*Asio flammeus*)
Gull-billed tern (*Gelochelidon nilotica*)	Snowy egret (*Egretta thula*)
Hudsonian godwit (*Limosa haemastica*)	Upland sandpiper (*Bartramia longicauda*)
Kentucky warbler (*Geothlypis formosa*)	Willow flycatcher (*Empidonax traillii*)
Least bittern (*Ixobrychus exilis*)	Wood thrush (*Hylocichla mustelina*)
Least tern (*Sternula antillarum*)	Worm eating warbler (*Helmitheros vermivorum*)
Loggerhead shrike (*Lanius ludovicianus*)	

In order to minimize impacts to migratory birds with the potential to breed in the vicinity of the proposed project, vegetation clearing and/or initial placement of fill material will not occur in the primary breeding period for most bird species (April through July) and will instead occur between October and March (i.e., prior to or after the breeding season), to prevent birds from attempting to breed where additional construction activity would later occur. Any timing restrictions or other potential conditions will be imposed as a condition of the New Jersey Department of Environmental Protection (NJDEP) permits anticipated for project implementation. Noise generated during construction of the proposed project will be temporary and intermittent, and as such, will not likely have long-term or adverse effects to migratory birds potentially occurring in the area. Wildlife communities, including birds, have been established under existing conditions with visual and auditory disturbances associated with urban environments. Construction activities have the potential to temporarily displace individuals of some species from the immediate vicinity of the activity, however, construction activities are not expected to increase disturbance levels to the extent that these species would abandon the area altogether.

For the reasons presented above, FRA has determined that the project may affect, but is not likely to adversely affect, migratory birds or their habitat.

Bald and Golden Eagle Protection Act – The bald eagle (*Haliaeetus leucocephalus*) was identified by the USFWS IPaC resource list as having the potential to be affected by the proposed project. Based on correspondence with New Jersey Natural Heritage Program on October 27, 2016, and with New York Natural Heritage Program on November 10, 2016, no nesting sites have been identified as occurring in the project vicinity. Any temporary loss of foraging habitat during construction of the proposed project will not adversely affect bald eagles, as any individuals that may be present in the area would be expected to move to other similar available foraging habitat in the vicinity of the project site. Therefore, FRA has determined that the project may affect, but is not

likely to adversely affect, bald eagles or their habitat.

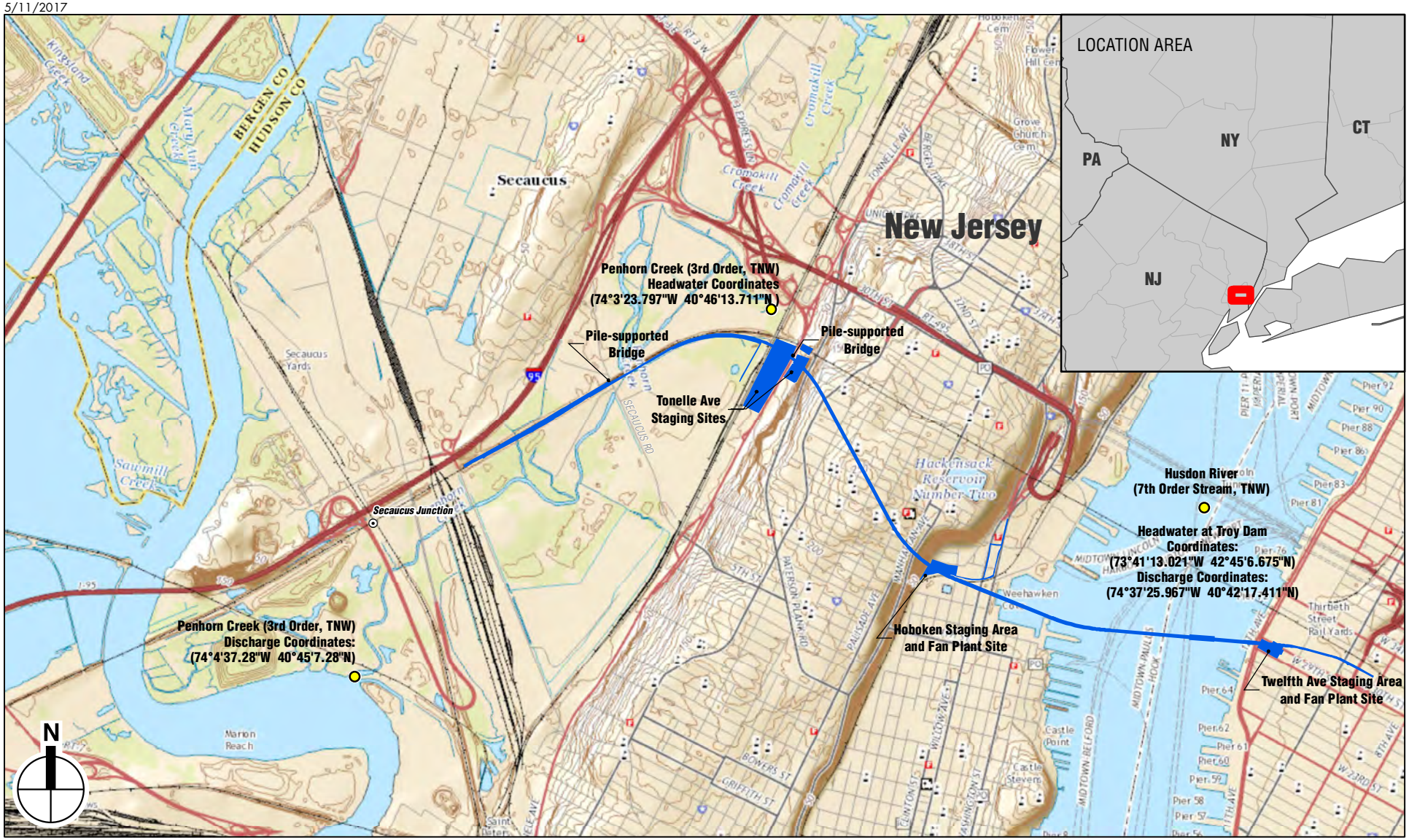
If you have questions or require additional information regarding this request, please contact Amishi Castelli at Amishi.Castelli@dot.gov or 617-431-0416. Thank you for your time and consideration.

Sincerely,

Marlys Osterhues
Chief of Environmental and Corridor Planning
Federal Railroad Administration

Encl (2)
cc: A. Castelli, FRA
R. Palladino, NJ TRANSIT

5/11/2017



Project Construction and Staging Areas

HUDSON TUNNEL PROJECT

Project Location
USGS 7.5 Minute Topographic Map
Weehawken Quad and Central Park Quad
Figure 1

USACE Jurisdictional Determination

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

MAR 3 - 2017

Regulatory Branch

SUBJECT: Draft Wetland Delineation Report, March 1, 2017 for the Proposed Gateway Hudson Tunnel Project Hudson Tunnel Project, NAN-2016-01166-WCA, Town of Secaucus, Township of North Bergen and Township of Weehawken, Hudson County, New Jersey, and City of New York, Kings County, New York.

AMTRAK
ATTN: Mohammed Nasim, P.E.
Senior Director of Engineering and Design
30th Street Station
2955 Market Street – 4S-059
Philadelphia, Pennsylvania 19104

Dear Mr. Nasim:

The New York District of the U.S. Army Corps of Engineers, has reviewed the document entitled "Draft Wetland Delineation Report", dated March 1, 2017, received March 1st, and provides the following comments:

A. As the delineation drawings provided in the draft report appear to be CAD drawings that were reduced to 8.5x11 inches, the applicant should ensure the "Limit of Disturbance", waters of the United States (Traditional Navigable Waters, TNW) and wetland boundaries are all clearly depicted and legible. All drawing notes and legends describing the waters of the United States and wetlands, including the Mean High Water and Spring High Water elevations, should also be legible and clearly labeled. The total acreage of the area within the "Limit of Disturbance" along the proposed alignment should be provided or noted on the title drawing. Additionally, the delineation drawings should depict the limits of the proposed project alignment beneath the Hudson River with the linear length of the Hudson River crossing clearly labeled as well as the Federal Navigation Channels. The "Limit of Disturbance" boundary should extend along the project's proposed alignment on the New York side with the appropriate wetland acreage amount, if any, depicted. This will ensure the approved jurisdictional determination from this office has verified the entire proposed project alignment.

B. All wetland locations (wetland areas A-F) including data points, and waters of the United States (Penhorn Creek and Hudson River) situated within the "Limit of Disturbance" should be clearly labeled on the delineation drawings with their appropriate acreage amounts and/or linear lengths (Penhorn Creek, Hudson River) depicted. Any proposed wetlands within the "Limit of Disturbance" which are indicated in the report as isolated should be included on the drawing but not labeled as isolated, as this will addressed during the site investigation of the alignment, and if determined isolated by

SUBJECT: Draft Wetland Delineation Report, March 1, 2017 for the Proposed Gateway Hudson Tunnel Project Hudson Tunnel Project, NAN-2016-01166-WCA, Town of Secaucus, Township of North Bergen and Township of Weehawken, Hudson County, New Jersey, and City of New York, Kings County, New York.

this office, will be reflected in the approved jurisdictional determination verification letter. A table may additionally be provided depicting the acreage amount of each wetland or linear length of each waters of the United States situated within the projects "Limit of Disturbance".

C. All culverts and outfall structures which may convey waters entering or exiting the delineated wetlands or waterways within the "Limit of Disturbance" of the project alignment should be clearly labeled on the drawing requested above.

Your agency should note that in accordance with Regulatory Guidance Letter No. 07-01, dated June 5, 2017, this office is required to coordinate all isolated wetland determinations with the United States Environmental Protection Agency as well as the New York District Corps of Engineers Division Office for a minimum 21-day review period, if you agency's submitted materials are clear.

Jim Cannon of my staff will contact you in the future to schedule a date to investigate the proposed project alignment if we determine field work is needed to finalize the decision. It is requested that the individual(s) that delineated the wetlands and waters of the United States along the proposed project alignment be available and present during this office's site investigation, should questions arise regarding the delineation.

If any questions should arise concerning this matter, please contact Jim Cannon, of my staff, at (917) 790-8412.

Sincerely,

Christopher S. Gallery

for Stephan A. Ryba
Chief, Regulatory Branch

Cf: New Jersey Transit Corp.
C/o Mr. RJ Palladino, AICP/PP
Senior Program Manager
New Jersey Transit Capital Planning
One Penn Plaza East - 8th Floor
Newark, NJ 07105-2246

NJTRANSIT
One Penn Plaza East
Newark, NJ 07105-2246
973-491-7000

March 17, 2017

Steve Ryba
Chief, Regulatory Branch
NY District U.S. Army Corps of Engineers
26 Federal Plaza, Room 1937
New York, NY 10278

Re: **JD Request and Response to USACE March 3, 2017 Comments**
NAN-2016-01166-WCA, Hudson Tunnel Project,
Town of Secaucus, Township of North Bergen, Township of Weehawken, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York

Dear Mr. Ryba:

The Federal Railroad Administration (FRA) and New Jersey Transit (NJ TRANSIT) are preparing an Environmental Impact Statement (EIS) to evaluate the Hudson Tunnel Project ("the Project"). The EIS is being prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982); the Council on Environmental Quality regulations, Sec. 2 [42 U.S. Code § 4321]; and FRA Procedures for Considering Environmental Impacts (*Federal Register*, May 26, 1999, Vol. 64, No. 101). As described in the Hudson Tunnel Project Notice of Intent (*Federal Register*, May 2, 2016, Vol. 81, No. 84), the Proposed Action is intended to preserve the current functionality of the Northeast Corridor's (NEC) Hudson River passenger rail crossing between New Jersey and New York and strengthen the resilience of the NEC. The NEC extends from Washington, D.C., in the south to Boston, Massachusetts, in the north. Amtrak, the nationwide intercity passenger rail operator, operates over the entire NEC and owns the majority of it, including the portion in New Jersey and the North River Tunnel. NJ TRANSIT operates an extensive commuter rail network in New Jersey that extends to Philadelphia, Pennsylvania; Orange and Rockland Counties in New York; and New York City. In New Jersey, NJ TRANSIT owns much of the commuter rail network that converges on the NEC. NJ TRANSIT's rail lines all include direct or connecting service to Pennsylvania Station New York (PSNY). The Project would consist of construction of a new rail tunnel under the Hudson River, including railroad infrastructure in New Jersey and New York connecting the new rail tunnel to the existing NEC, and rehabilitation of the existing NEC tunnel beneath the Hudson River.

On behalf of the Hudson Tunnel Project, NJ TRANSIT is requesting a Jurisdictional Determination (JD) from the US Army Corps of Engineers for wetlands and other waters of the US (WOUS) within the Limit of Disturbance (LOD) for the construction and staging areas, and temporary construction access for the Project in New Jersey and New York (see **Figure 1**). The LOD totals 60.5 acres along a 22,600-foot (4.28-acre) linear transportation corridor. During construction, staging areas would be located near the tunnel portal and at the ventilation shaft sites in New Jersey and New York. The construction staging locations would be used to access the tunnel and to remove rock and soil from the tunnel while it is being bored using Tunnel Boring Machine (TBM) technology. In addition, potential construction activities are expected to affect the Hudson River riverbed above a portion of the tunnel alignment.

The New York portion of the LOD in Manhattan is within developed areas and was not, therefore, included in the portion of the LOD included in the wetlands delineation study. Wetlands were delineated within the New Jersey portion of the LOD within the new surface alignment (Figure 2, Study Area 1) and in the vicinity of the fan plant/vent shaft in Hoboken (Figure 2, Study Area 2). Approximately 10.77 acres of wetlands were delineated within three wetlands within Study Area 1 in November 2016, and approximately 0.36 acres of wetlands were delineated within one wetland within Study Area 2 in December 2016.

Enclosed is the completed JD Request Checklist (see **Attachment 1**), JD Request Figures (**Attachment 2**), a Wetland Delineation Report (WDR) including photographs and Surveyed Wetland Delineation Drawings (see **Attachment 3**. The Surveyed Wetland Delineation Drawings have been revised to incorporate all items requested in comments A, B, and C of the March 1, 2017 letter.

Please let me know when you would be able to schedule a site inspection to confirm the boundaries of federal wetlands/waters along the project alignment, including study areas 1 and 2 in New Jersey corridor. I can be reached at 973-491-7017.

Thank you for your assistance in this matter.

Sincerely,

John A. Geitner, CHMM,
Sr. Director –Environment, Energy & Sustainability

cc: Christopher Mallery, Jim Cannon, Rosita Miranda (USACE)
Jeremy Colangelo-Bryan, RJ Palladino (NJ TRANSIT)
Amishi Castelli (FRA)
Mohammed Nasim, Marie Corrado (Amtrak)
Michael Petralia (PANYNJ)
Julie Cowing, Stephen Holley, Sandra Collins (AKRF)
Phil Rice, Mary Ann Mason, Tim Hand (GTHP)
Jason Levin (BAH)

Encl:

Attachment 1: JD Checklist Summary

Attachment 2: JD Request Figures

Attachment 3: *Hudson Tunnel Wetland Delineation Report*, March 15, 2017 (includes Figures, Photo Exhibit, Surveyed Wetland Delineation Drawings, and Wetland Determination Data Forms)

Attachment 1

CHECKLIST OF INFORMATION INCLUDED WITH REQUESTS FOR JURISDICTIONAL DETERMINATIONS (JD)

1. Name (including POC if a corporation or other entity), complete mailing addresses and phone numbers of the following:

Current Property Owners:
Names: **Amtrak, NJ TRANSIT**, and multiple private and public property owners along the proposed alignment (*property/easements to be acquired*).
Addresses: **Amtrak, 30th Street Station, 2955 Market Street – 4S-059, Philadelphia, PA 19104**
NJ TRANSIT, One Penn Plaza, Newark, NJ 07105
Phone Numbers: 973-856-0321 (Amtrak Contact Person, Mohammed Nasim, Senior Director Engineering Design, Gateway Program)
973-491-7017 (NJ TRANSIT Contact Person, John A. Geitner, CHMM, Sr. Director –Environment, Energy & Sustainability)

Applicant (Project Sponsor):
Name: **Mr. John A. Geitner, CHMM, NJ TRANSIT, Sr. Director – Environment, Energy & Sustainability**
Address: **One Penn Plaza East, 8th Floor, Newark, NJ 07105-2246**
Phone Number: **973-491-7017**

Wetland Consultant:
Name: **AKRF, Inc.**
Address: **440 Park Avenue South, 7th Floor, New York, NY 10016**
Phone Number: **646-388-9773**

2. 8½ x 11 Location Map showing:

- UTM Grid Coordinates
- Stream order and location
- Head and discharge coordinates of each stream
- Stream identification (TNWs, perennial RPWs, seasonal RPWs, or non-RPWs)

See Attachment 2: JD Request Figures.

<u>Figure 1</u> shows the project corridor, including the Hudson River. The Tunnel Boring Machine would be employed to construct the tunnel under the river bottom. Therefore, no wetlands would be affected within the Hudson River.

Hudson River (TNW, 7th Order stream)

- **Head (Troy Dam): 42.751900, -73.687209**
- **Discharge: 40.704776, -74.024112**

<u>Figure 2</u> shows the New Jersey portion of the tunnel corridor, specifically study areas 1 and 2.

Study area 1:

Delineated wetlands include monotypic stands of *Phragmites australis*, all tributary to Penhorn Creek, a TNW. Penhorn Creek is a 3rd Order stream, a tributary to the Hackensack River, a TNW and 4th Order stream.

Penhorn Creek (TNW, 3rd Order stream):

- **Head: 40.752045, -74.077529**
- **Discharge: 40.752045, -74.077529**

Study area 1:

Delineated wetlands include monotypic stands of *Phragmites australis*, all tributary to the Hudson River, a TNW. The Hudson River is a 7th Order stream.

Hudson River (TNW, 7th Order stream):

- **Head (Troy Dam): 42.751900, -73.687209**
- **Discharge: 40.704776, -74.024112**

Figure 3 shows the New York portion of the corridor, including the Hudson River in relationship to the New York State Department of Environmental Conservation (NYSDEC) mapped littoral zone tidal wetland area within the LOD. The Tunnel Boring Machine would be employed to construct the tunnel under the river bottom. The tunnel ventilation structure and tunnel entrance would be constructed within upland areas. While the tunnel will be constructed below the river bottom, a 1.5-acre portion of the river bottom will receive soil improvement through jet grouting within the area indicated in Figure 3. The Hudson River is a 7th Order stream.

Hudson River (TNW, 7th Order stream):

- **Head (Troy Dam): 42.751900, -73.687209**
- **Discharge: 40.704776, -74.024112**

3. Cover letter (included in report or to be provided) describing the purpose of the request, a general description of the proposed project, the size (acres) of the parcel, and the size of the limits of the project site or review area (if smaller than the parcel). **See Attached Cover Letter**.

4. Delineation report, including the following supporting information:

- Description of any current and/or historic land uses on the site. **The Proposed Project consists of existing and historic rail corridor and industrial uses.**
- DEC Wetlands Maps, NWI Maps, Soil Survey Maps. **See Attachement 3, AKRF Wetland Delineation Report, Figures.**
- Watershed size, drainage area size. **Wetlands/streams delineated within New Jersey in the study area 1 and 2 are tributary to Penhorn Creek and the Hudson River, respectively. Penhorn Creek is located within the Hackensack River Watershed; the Hackensack River Watershed is 197 square miles in size. The Lower Hudson River Watershed from the Troy Dam to New York Harbor, Upper Bay is 12,800 square miles in size.**
- Discussion of whether tributaries (streams) on the site are TNWs, perennial RPWs, seasonal RPWs, or non-RPWs. **Penhorn Creek is a TNW tributary to the Hackensack River, a TNM. The Hudson River is a TNM.**

- Description of whether each wetland on the site either abuts or is adjacent to a tributary, identify which tributary and provide a discussion of the justification for this determination.
  - **<u>Study Area 1</u>: Three vegetated freshwater wetlands (Wetlands A, B, and CD) were delineated in study area 1.**
    - **i. Wetland A is hydrologically connected to Penhorn Creek.**
    - **ii. Wetland B is an emergent seasonally flooded isolated wetland, located in the central portion of study area 1, and restricted to a depression below a billboard. The secondary hydrology indicator is "D4 Microtopographic Relief".**
    - **iii. Wetland CD is an emergent marsh wetland located in the eastern portion of study area 1, and adjacent to a tributary of Penhorn Creek.**
  - **<u>Study Area 2</u>: One wetland was delineated in Study Area 2, Wetland F. Wetland F is an emergent marsh located in the southern portion of Study Area 2, adjacent to the Hudson-Bergen Light Rail tracks. This wetland is adjacent/tributary to the Hudson River.**
- Description of tributary substrate composition (e.g. silts, sands, gravel, etc.). **The substrate of Penhorn Creek is primarily composed of silt and sand. The substrate of the lower Hudson River is primarily composed of silt and clay.**
- Description of tributary connections to a TNW for each aquatic resource on the site, including a discussion of wetland and/or other connections. **See descriptions above.**
- River miles to a TNW; aerial (straight) miles to a TNW. **Study Area 1-Wetland A is 0 feet from Penhorn Creek, Wetland B is 65 feet from Penhorn Creek, Wetland CD is 0 feet from Penhorn Creek. Study Area 2-Wetland F is 820 feet from Hudson River.**
- Identify potential pollutants. **Wetlands A, B, C, and F are located adjacent to rail corridors and industrial areas Potential pollutants within the wetlands have not been documented.**
- Identify potential habitat for species. **Approximately half of the LOD in New Jersey is located in an industrial and heavily urbanized landscape dominated by buildings, transportation infrastructure, and other impervious surfaces that offers minimal habitat for wildlife other than urban-adapted generalists that are ubiquitous throughout the metropolitan area. The remaining portions of the LOD in New Jersey are capable of supporting more rich and diverse communities of wildlife: the wetland complex associated with Penhorn Creek in the Meadowlands and the open water of the Hudson River. These habitats are still subjected to high levels of noise and other indirect and direct forms of human disturbance, however, and are further degraded by invasive species and pollution. As such, the wildlife communities in these areas are depauperate (i.e., lacking in number or diversity of species) and dominated by disturbance-tolerant species. On the basis of the wetland's size, the dominance of non-native common reed (*Phragmites australis*), and its isolation within a heavily urbanized area, the breeding bird community is expected to be composed of marsh birds, waterbirds, and land birds that are tolerant of degraded habitat conditions and ubiquitous in urban wetland habitats. Examples include red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), swamp sparrow (*Melospiza georgiana*), marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), gray catbird (*Dumetella carolinensis*), European starling (*Sturnus vulgaris*), yellow warbler (*Setophaga petechia*), barn swallow (*Hirundo rustica*), tree swallow (*Tachycineta bicolor*), mallard (*Anas platyrhynchos*), American black duck (*Anas***

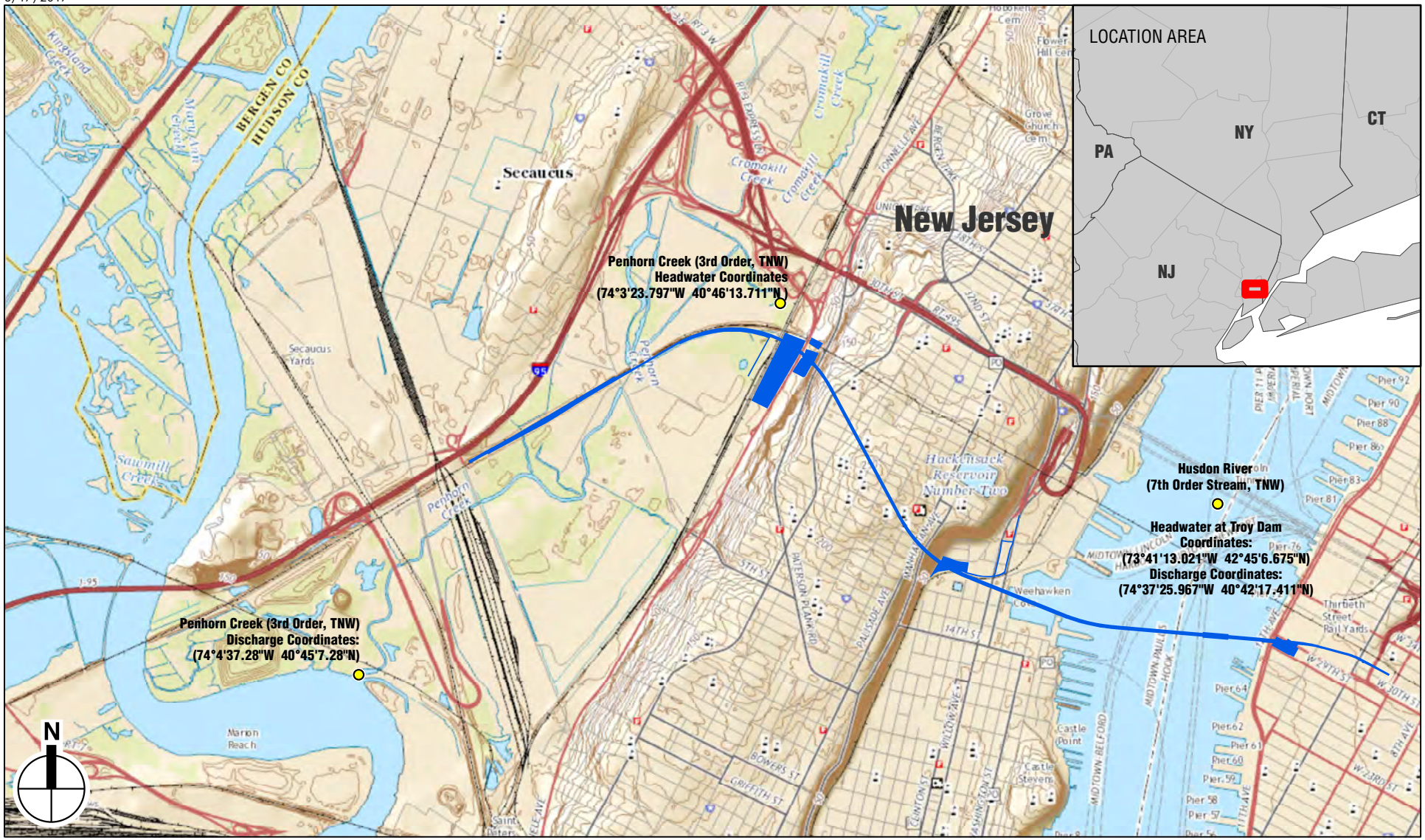
***rubripes*), Canada goose (*Branta canadensis*), green heron (*Butorides virescens*), and spotted sandpiper (*Actitus macularia*). Some additional species that nest elsewhere in the region may utilize this wetland as foraging habitat, including herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and snowy egret (*Egretta thula*). Mammals that are expected to occur in the marsh of the Meadowlands near Penhorn Creek include muskrat (*Ondatra zibethica*), raccoon (*Procyon lotor*), meadow vole (*Microtus pennsylvanicus*), and occasionally, white-tailed deer (*Odocoileus virginianus*). Common reptile species with potential to occur in the wetlands around Penhorn Creek include snapping turtle (*Chelydra serpentina*), eastern painted turtle (*Chrysemys picta*), northern diamondback terrapin (*Malaclemys terrapin terrapin*), eastern garter snake (*Thamnophis setalis*), and northern water snake (*Nerodia sipedon*).**

- Justification for proposed "isolated" (SWANCC) or non-jurisdictional determinations on any wetlands or streams. **Wetland B in study area 2 is a depressional wetland dominated by *Phragmites australis* with no surface connections to other wetlands/waters. It appears to be "isolated", subject to inspection by the USACE.**
- Description of vegetative cover types on the site **See Attachment 3: Wetland Delineation Report.**
- Wetland Delineation Forms for each cover type. **See Attachment 3: Wetland Delineation Report.**
- Color photographs of all representative areas of the site including any connections between tributaries or between tributaries and wetlands. **See photo exhibit in Attachment 3: Wetland Delineation Report.**

5. Surveyed delineation drawing, including the following:

- Title block, including drawing date, scale, revision dates, north arrow, existing topographic contours (if available), benchmarks, and the stamp of a licensed surveyor or a narrative describing how the GPS data were obtained
- Boundary lines of the parcel, AND of the project site, clearly marked with the acres shown on the drawing.
- Delineation flags shown as points that are connected by straight lines (or extend off-site at parcel boundaries), and are identified on the drawing with the corresponding number and/or letter that is written on the flag in the field.
- Appropriate hatching and/or shading to identify the extent of waters of the US, including jurisdictional wetlands, and any "isolated" or non-jurisdictional waterbodies or wetlands
- All defined tributaries on the site, identified either via flagging or a standard tributary symbol that is in the legend, and locations of any other connections between waters (e.g. culverts, ditches and/or swales)
- Table outlining the acres of the waters of the US, and "isolated" or non-jurisdictional waters, in addition to the linear feet of all tributaries within the boundaries of the project site or parcel

See Surveyed Wetland Delineation Drawings, included as part of Attachment 3, Wetland Delineation Report.

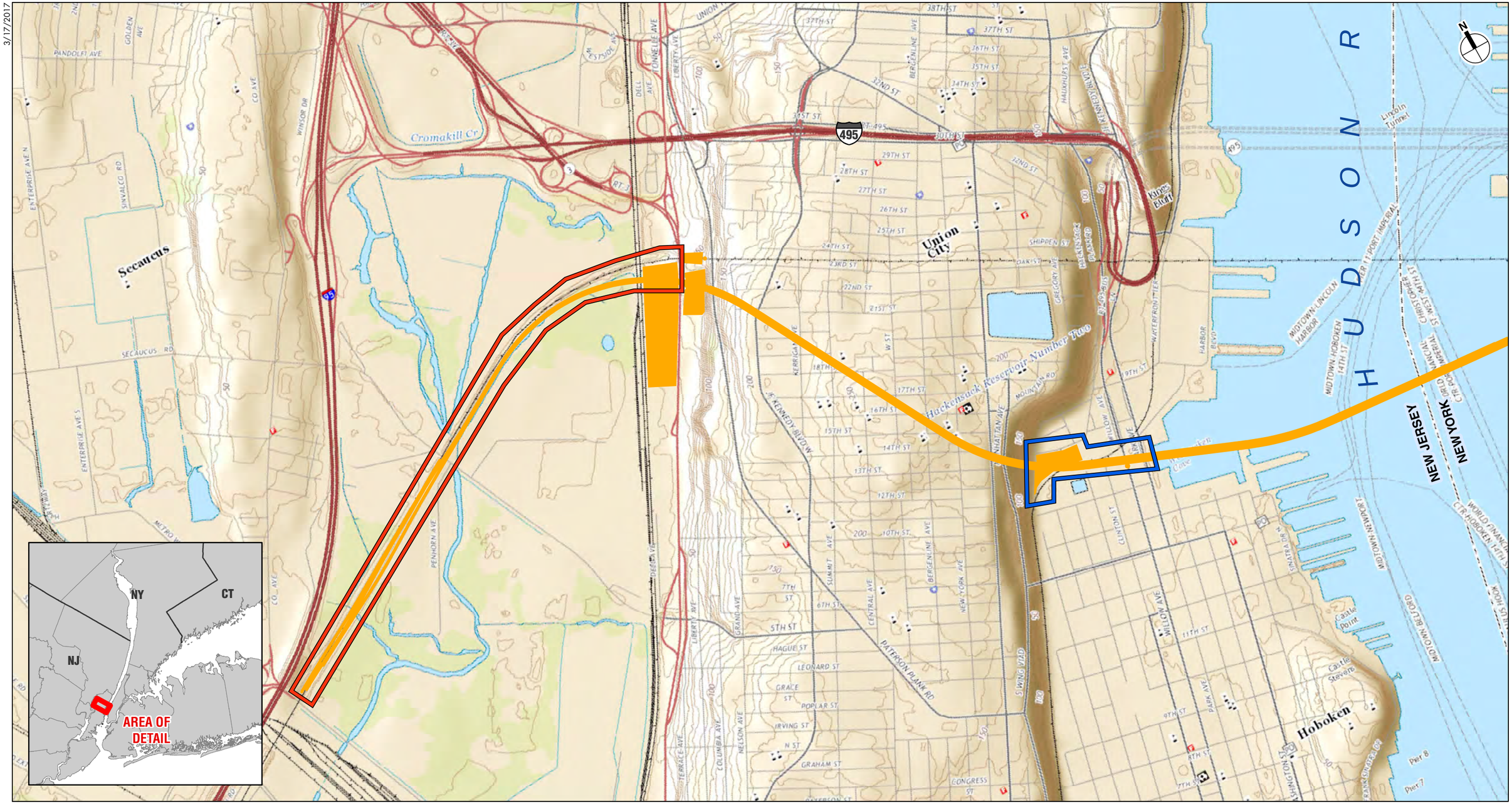


Project Construction and Staging Areas

HUDSON TUNNEL PROJECT

Project Location
USGS 7.5 Minute Topographic Map
Weehawken Quad and Central Park Quad
Figure 1

3/17/2017



Study Area 1

Study Area 2

Approximate coordinates of Project Site:
74°2'33"W 40°45'56"N

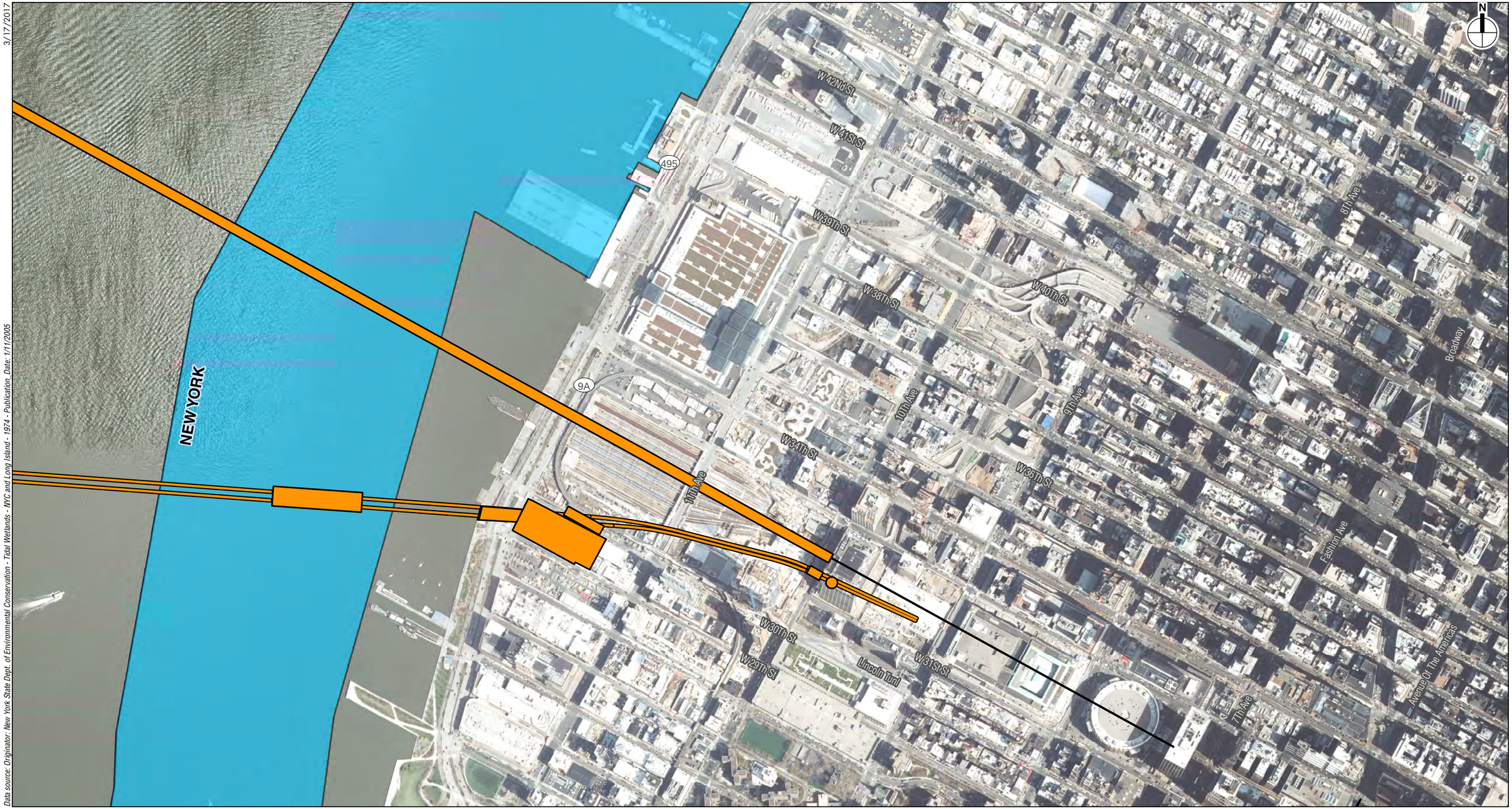
0 5,000 FEET

HUDSON TUNNEL PROJECT

USGS 7.5 Minute Topographic Map
Weekhawken Quad
Figure 2

3/17/2017

Data source: Originator: New York State Dept. of Environmental Conservation - Tidal Wetlands - NYC and Long Island - 1974 - Publication_Date: 1/11/2005



Project Construction and Staging Areas

Project Alignments

Tidal Wetlands: Littoral Zone

0 5,000 FEET

HUDSON TUNNEL PROJECT

NYSDEC Littoral Zone Tidal Wetlands

Figure 3

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

MAY 09 2017

Regulatory Branch

SUBJECT: Permit Application Number NAN-2016-01166-WCA for the Hudson Tunnel Project, Jurisdictional Determination Request, Town of Secaucus, Township of North Bergen, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York.

AMTRAK
ATTN: Mohammed Nasim, P.E.
Senior Director of Engineering and Design
30th Street Station
2955 Market Street – 4S-059
Philadelphia, Pennsylvania 19104

New Jersey Transit Corp.
ATTN: John Geitner, CHMM
Senior Director of Environment, Energy, and Sustainability
One Penn Plaza East
Newark, New Jersey 07105

Dear Sirs:

On March 17, 2017, the New York District of the U.S. Army Corps of Engineers received a request for a Department of the Army jurisdictional determination for the proposed Hudson Tunnel Project. This request was made by Amtrak and the New Jersey Transit Corporation. The proposed 4.28 mile Hudson Tunnel Project alignment would generally extend east along Amtrak's Northeast Corridor (NEC) rail line from County Road in the Town of Secaucus, through a new tunnel portal in the Palisades near Tonnelle Avenue in the Borough of North Bergen, and continue beneath the Hudson River and two federal navigation channels, terminating below the Penn Station Rail Complex in New York City, New York. The proposed Hudson Tunnel Project would consist of two (2) separate single-track tunnels, two (2) tunnel ventilation buildings, modifications to the existing New Jersey side NEC rail line to connect the NEC to the new tunnels, and modifications to the existing Penn Station Rail Complex in New York City. The proposed project alignment would extend through the Hackensack River and Hudson River watersheds, located in the Town of Secaucus, the Township of North Bergen, and the City of Hoboken, Hudson County, New Jersey, and the City of New York, New York County, New York.

In the document entitled "Hudson Tunnel Wetland Delineation Report", dated March 15, 2017, and received on March 17, 2017, your office submitted a proposed delineation of the extent of waters of the United States within the "Limit of Disturbance" along the proposed Hudson Tunnel Project alignment. A site inspection was conducted by representatives of this office on April 12, 2017, in which it was agreed that changes would be made to the delineation and that the modified delineation would be submitted to this office. On April 28, 2017, this office received the modified delineation.

SUBJECT: Permit Application Number NAN-2016-01166-WCA for the Hudson Tunnel Project, Jurisdictional Determination Request, Town of Secaucus, Township of North Bergen, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York.

Based on the material submitted and the observations of the representatives of this office during the site visit, this site has been determined to contain jurisdictional waters of the United States based on: the presence of wetlands determined by the occurrence of hydrophytic vegetation, hydric soils and wetland hydrology according to criteria established in the 1987 "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1 that are either adjacent to or part of a tributary system; the presence of a defined water body (e.g. stream channel, lake, pond, river, etc.) which is part of a tributary system; and the fact that the location includes property below the ordinary high water mark, high tide line or mean high water mark of a water body as determined by known gage data or by the presence of physical markings including, but not limited to, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter or debris or other characteristics of the surrounding area.

Based on the above, it has been determined that the drawings entitled "Amtrak, Hudson Tunnel Project, U.S. Army Corps of Engineers, Jurisdictional Determination Plans, Contract # 9500001023, Figures W-1 through W-31, prepared by Amtrak and the Gateway Trans-Hudson Partnership, and dated April 28, 2017, accurately depict the extent of waters of the United States situated within the "Limit of Disturbance" located along the proposed Hudson Tunnel Project alignment. These drawings indicate that there are five (5) principal jurisdictional areas located within the "Limit of Disturbance" depicted on the referenced drawings. These jurisdictional areas are depicted as Wetland Areas A, B, C/D, F, and the Hudson River. Wetland areas A, B, and C/D, occupy approximately 11.42 acres and consist of open water and emergent wetlands that are situated adjacent to Penhorn Creek. Penhorn Creek is a tributary of the Hackensack River, a navigable water way. Wetland F, occupies approximately 0.36 acres and is located adjacent to the Hudson River. Approximately 5,569 linear feet of the proposed Hudson Tunnel would extend beneath the Hudson River, a navigable water way. These jurisdictional areas are considered to be part of a tributary system, and are considered to be waters of the United States under the jurisdiction of the Corps of Engineers.

This determination regarding the delineation shall be considered valid for a period of five years from the date of this letter unless new information warrants revision of the determination before the expiration date.

This determination was documented using the Approved Jurisdictional Determination Form, promulgated by the Corps of Engineers in June 2007. A copy of that document is enclosed with this letter, and will be posted on the New York District website at:
http://www.nan.usace.army.mil/Missions/Regulatory/JurisdictionalDeterminations/RecentJurisdictionalDeterminations.aspx

SUBJECT: Permit Application Number NAN-2016-01166-WCA for the Hudson Tunnel Project, Jurisdictional Determination Request, Town of Secaucus, Township of North Bergen, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York.

This delineation/determination has been conducted to identify the limits of the Corps Clean Water Act jurisdiction for the particular site identified in this request. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed is a combined Notification of Appeal Process (NAP) and Request For Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the North Atlantic Division Office at the following address:

James W. Haggerty, Regulatory Program Manager, CENAD-PD-OR
North Atlantic Division, U.S. Army Engineer Division
Fort Hamilton Military Community
General Lee Avenue, Building 301
Brooklyn, New York 11252-6700

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Park 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by JUL 0 9 2017. It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this letter.

This delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

It is strongly recommended that the development of the site be carried out in such a manner as to avoid as much as possible the discharge of dredged or fill material into the delineated waters of the United States. If the activities proposed for the site involve such discharges, authorization from this office may be necessary prior to the initiation of the proposed work. The extent of such discharge of fill will determine the level of authorization that would be required.

In order for us to better serve you, please complete our Customer Service Survey located at http://www.nan.usace.army.mil/Missions/Regulatory/CustomerSurvey.aspx.

SUBJECT: Permit Application Number NAN-2016-01166-WCA for the Hudson Tunnel Project, Jurisdictional Determination Request, Town of Secaucus, Township of North Bergen, City of Hoboken, Hudson County, New Jersey, and City of New York, New York County, New York.

If any questions should arise concerning this matter, please contact Jim Cannon, of my staff, at (917) 790-8412.

Sincerely,

Stephan A. Ryba
Chief, Regulatory Branch

Enclosures

Cf: NJDEP
NJSEA

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Amtrak and New Jersey Transit	File Number: NAN-2016-01166	Date MAY 09 2017
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
X	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/appeals.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
Mr. Stephan A. Ryba Chief, Regulatory Branch (CENAN-OP-R) NY District, U.S. Army Corps of Engineers 26 Federal Plaza, Room 1937 New York, NY 10278-0090 Telephone number: 917-790-8512	Mr. James W. Haggerty Regulatory Program Manager (CENAD-PD-OR) U.S. Army Corps of Engineers Fort Hamilton Military Community General Lee Avenue, Building 301 Brooklyn, New York 11252-6700 Telephone number: 347-370-4650

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

	Date:	Telephone number:
_____ Signature of appellant or agent.		

APPENDIX B

Approved JD Form

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): MAY 0 9 2017

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: New York District of the U.S. Army Corps of Engineers, Amtrak and the New Jersey Transit Corporation, Hudson Tunnel Project, NAN-2016-01166-WCA

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State: New Jersey County/parish/borough: Hudson County, New Jersey City: Town of Secaucus, Township of North Bergen, City of Hoboken, New Jersey
Center coordinates of site (lat/long in degree decimal format): Lat. 40.7704° N, Long. -74.0548° W.
Universal Transverse Mercator:
Name of nearest waterbody: Penhorn Creek
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Penhorn Creek
Name of watershed or Hydrologic Unit Code (HUC): Penhorn Creek (02030103180)
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☒ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☐ Office (Desk) Determination. Date:
☒ Field Determination. Date(s): April 12, 2017

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are** *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☒ Waters subject to the ebb and flow of the tide.
☒ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: The wetlands and waters of the United Stated located within the project area are part of a surface water tributary system that is adjacent to Penhorn Creek. This surface water tributary system, which is adjacent Penhorn Creek, is situated behind an existing tide gate. This tide gate is situated within Penhorn Creek, approximately 4,700 feet south of the project site. The portion of Penhorn Creek situated below the tide gate is a tidal. Penhorn Creek is a tributary of the Hackensack River, also a navigable water way. Pursuant to Title 33 of the Code of Federal Regulations, Section 329, the onsite waters of the United States and associated adjacent wetlands are considered "Navigable in Law" and are under the juridiction of the U.S. Army Corps of Engineers.

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** *"waters of the U.S."* within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☒ TNWs, including territorial seas
      ☒ Wetlands adjacent to TNWs
      ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: linear feet: width (ft) and/or acres.
      Wetlands: 14.42 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain:

[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: **Penhorn Creek.**

Summarize rationale supporting determination: The on-site waters of the United Stated, including wetlands, are located above an existing tide gate. This tide gate is situated within Penhorn Creek, located approximately 4,700 feet south of the site. The portion of Penhorn Creek situated below the tide gate is a tidal. Penhorn Creek is a tributary of the Hackensack River, also a navigable water way. Pursuant to Title 33 of the Code of Federal Regulations, Section 329, the onsite waters of the United States and associated adjacent wetlands are considered "Navigable in Law" and are under the juridiction of the U.S. Army Corps of Engineers.

2. **Wetland adjacent to TNW**
Summarize rationale supporting conclusion that wetland is "adjacent": The on-site wetlands met the hydrophytic vegetation, hydric soils and wetland hydrology criteria established in the 1987 "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1. The 14.42 acres of on-site waters of the United States, including wetlands, which include Wetland Areas A, B, and C/D, are considered adjacent to a TNW. Therefore, the wetlands are part of a surface water tributary system of a navigable water of the United States.

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

(i) **General Area Conditions:**
Watershed size: **Pick List**
Drainage area: **Pick List**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) **Physical Characteristics:**
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW[5]: .
Tributary stream order, if known: .

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):
☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):
☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

☐ other (list):

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: .

Identify specific pollutants, if known: .

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☒ Wetlands adjacent to TNWs: 14.42 acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial:
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

Provide estimates for jurisdictional waters in the review area (check all that apply):
- ☐ Tributary waters: linear feet width (ft).
- ☐ Other non-wetland waters: acres.
  Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   ☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):
   - ☐ Tributary waters: linear feet width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
   ☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
   ☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   ☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
   ☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
   ☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
   As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
   - ☐ Demonstrate that impoundment was created from "waters of the U.S.," or
   - ☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
   - ☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
- ☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
- ☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- ☐ which are or could be used for industrial purposes by industries in interstate commerce.
- ☐ Interstate isolated waters. Explain: .
- ☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

---

[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. **Data reviewed for JD (check all that apply** - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: Amtrak and NJ Transit March 17, 2017 submittal.
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☒ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☒ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:Weehawken, NJ.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation:NRCS Soils, Figure 4a & 4b (March 17, 2017 submittal).
☒ National wetlands inventory map(s). Cite name:National Wetland Inventory Map, Figure 2 (March 17, 2017 submittal).
☒ State/Local wetland inventory map(s):NJ State Dept. Environmental Protection Wetands, Figure 3 (March 17, 2017 submittal).
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☐ Aerial (Name & Date): .
or ☒ Other (Name & Date):Provided in March 17, 2017 submittal.
☐ Previous determination(s). File no. and date of response letter:NAN-2008-00874, July 31, 2009 included a portion of the project site.
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☒ Other information (please specify):entitled "Amtrak, Hudson Tunnel Project, U.S. Army Corps of Engineers, Jurisdictional Determination Plans, Contract # 9500001023, Figures W-1 through W-31, prepared by Amtrak and the Gateway Trans-Hudson Partnership, and dated April 28, 2017, and Site Inspection Report dated April 12, 2017.

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

HUDSON TUNNEL

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND DRAFT SECTION 4(f) EVALUATION

APPENDIX 11-2

Wetland Delineation Report

U.S. Department of Transportation
Federal Railroad Administration

NJTRANSIT
The Way To Go.®

HUDSON TUNNEL

WETLAND DELINEATION REPORT

March 15, 2017

Prepared by AKRF, Inc.

On Behalf of:

NJ TRANSIT

Submitted to:
New York District,
U.S. Army Corps of Engineers
Regulatory Branch
26 Federal Plaza
New York, NY 10278

INTRODUCTION

The Federal Railroad Administration (FRA) and NJ TRANSIT are preparing an Environmental Impact Statement (EIS) to evaluate the Hudson Tunnel Project (the "Proposed Action" or the "Project"). As described in the Hudson Tunnel Project Notice of Intent (Federal Register, May 2, 2016, Vol. 81, No. 84), the Proposed Action is intended to preserve the current functionality of the Northeast Corridor's (NEC) Hudson River rail crossing between New Jersey and New York and strengthen the resilience of the NEC. The Project would consist of construction of a new rail tunnel under the Hudson River; including railroad infrastructure in New Jersey and New York connecting the new rail tunnel to the existing NEC, and rehabilitation of the existing NEC tunnel beneath the Hudson River (see **Figure 1**).

The Project is anticipated to include the following elements: a new NEC rail tunnel beneath the Hudson River, extending from a new tunnel portal in North Bergen, New Jersey to the Penn Station New York (PSNY) rail complex in New York City (NYC), New York; modifications to the existing NEC tracks in New Jersey and additional track on the NEC in New Jersey to connect the new tunnel to the NEC; modifications to connecting rail infrastructure at PSNY to connect the new tunnel's tracks to the existing tracks at PSNY; new ventilation shaft buildings above the new tunnel on both sides of the Hudson River; and rehabilitation of the existing North River Tunnel. During construction, staging areas would be located near the tunnel portal and at the ventilation shaft sites in New Jersey and New York. The construction staging locations would be used to access the tunnel and to remove rock and soil from the tunnel while it is being bored using Tunnel Boring Machine (TBM) technology. In addition, potential construction activities are expected to affect the Hudson River riverbed above a portion of the tunnel location.

Once the North River Tunnel rehabilitation is complete, both the old and new tunnels would be in service, providing operational redundancy and increased operational flexibility for Amtrak and NJ TRANSIT, as well as for emergency conditions and maintenance functions. The new tunnel will connect with the existing track infrastructure leading into PSNY, which operates at capacity during peak hours and cannot accommodate any additional train service

Wetlands were delineated within the New Jersey portion of the Project site, within the new surface alignment that would connect to the existing NEC tracks, east of Secaucus Junction Station and County Road, to the new tunnel portal at Tonnelle Avenue (study area 1), and within the temporary construction access adjacent to the proposed shaft and fan plant site in Hoboken, New Jersey (study area 2). Study area 1 comprises 10.77 acres of wetlands and study area 2 comprises 0.36 acres of wetlands. The areas that would be permanently and/or temporarily disturbed by Project construction or operation, including staging areas and temporary haul routes, correspond to the Limits of Disturbance for the Project, which were determined in coordination with the project engineers, and are shown on the attached **Surveyed Wetland Delineation Drawings**. For study area 1, wetlands were delineated south of the existing NEC tracks where the new alignment will be constructed. AKRF delineated three wetlands within study area 1 in November 2016 and one wetland within study area 2 in December 2016. This memorandum presents the results these wetland delineations.

METHODOLOGY

Prior to the wetland delineation, United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) (see **Figure 2**) and New Jersey Department of Environmental Protection (NJDEP) (see **Figure 3**) maps were reviewed to determine locations of state-mapped and/or NWI-mapped wetlands on and in the vicinity of the study areas. The Natural Resources Conservation Service (NRCS) soils maps (see **Figures 4a and 4b**) were also reviewed to determine soil types within the study areas, particularly with respect to soil series identified as hydric. AKRF wetland scientists conducted wetland delineations of study area 1 on November 1 and 3, 2016 and study area 2 on December 19, 2016, using the United States

Army Corps of Engineers (USACE) wetland delineation methodology.[1] Methodology pertaining to the three USACE wetland indicators (i.e., hydrology, hydric soils, and hydrophytic vegetation) is described below. The attached USACE *Wetland Determination Data Form – Northcentral and Northeast Region* (2012) was used to document the wetlands observed on the project site. Photographs were taken of the delineated wetlands (see **Figures 5a, 5b** and **6a through 6d**).

HYDROLOGY AND SOILS

The hydrology of the study area was characterized using aerial photographs, site observations, and an auger to determine soil saturation and/or a high water table. Soils were characterized with the use of an auger and a Munsell Soil Color Chart. During the wetland delineation, both hydrology and soils observations were made during a period of dry weather.

VEGETATION

The USACE *Northcentral and Northeast 2016 Regional Wetland Plant List* was used to determine the wetland/upland status[2] of the plant species identified within the study area. Percent cover was documented in the tree, woody vine, sapling/shrub, and herbaceous strata. In most instances, a 30-foot (ft) radius plot was established to document plant species percent cover in the tree and vine strata. Within this 30-ft plot, a 15-ft radius plot was established for the measurement of percent cover of shrubs and saplings. For species in the herbaceous stratum, a 5-ft radius plot was established within the 30-ft radius plot. Some areas of the project site are constrained to narrow bands by the surrounding topography. Thus, the 15-ft and 30-ft radius plots typically used in the standard USACE methodology for the documentation of saplings/shrubs and trees/woody vines, respectively, would have resulted in overlap between the upland and wetland sampling areas. As such, the standard methodology for sampling vegetation was adapted to fit the site conditions by sampling elongated rectangular plots within these communities, following the USACE recommendations in the methodology.

EXISTING CONDITIONS

MAPPING

National Wetlands Inventory-Mapped Wetlands

NWI wetland maps indicate that three freshwater wetlands and four tidal wetlands occur within the vicinity of study area 1 (see **Figure 2**), no NWI-mapped wetlands occur within the vicinity of study area 2. The NWI-mapped freshwater wetlands in study area 1 include: three riverine unknown perennial wetlands that have unconsolidated bottoms and are permanently flooded (R5UBH). The NWI-mapped tidal wetlands include: an estuarine intertidal wetland dominated by emergent *Phragmites australis* that is irregularly flooded and oligohaline (E2EM5P6), an estuarine intertidal wetland dominated by emergent *Phragmites australis* that is irregularly flooded, has been partially drained/ditched and is oligohaline

[1] Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Miss; U.S. Army Corps of Engineers. 2011. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (version 2.0), ed. J.S. Wakeley, R.W. Lichvar, C.V. Noble, and J.F. Berkowitz. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[2] Wetland/upland statuses for plant species include Obligate (OBL; occurring in wetlands greater than or equal to 99 percent of the time), Facultative Wetland (FACW; occurring in wetlands between 67 and 99 percent of the time), Facultative (FAC; occurring in wetlands between 34 and 66 percent of the time), Facultative Upland (FACU; occurring in wetlands between 1 and 33 percent of the time), and Upland (UPL; occurring in wetlands less than or equal to 1 percent of the time). Dominant species indicative of wetlands include species rated as OBL, FACW, and FAC.

(E2EM5Pd6), an estuarine subtidal wetland with an unconsolidated bottom that is permanently flooded, oligohaline and has been excavated (E1UBLx6), and an estuarine subtidal wetland with an unconsolidated bottom that is permanently flooded (E1UBL). Site inspection conducted during the wetlands delineation survey confirms these mapped wetland types and approximate locations.

New Jersey Department of Environmental Protection-Mapped Wetlands

NJDEP wetland maps indicate that three wetlands occur within the vicinity of study area 1 (see **Figure 3**) and no NJDEP-mapped wetlands occur within the vicinity of study area 2. The three NJDEP-mapped wetlands as labeled with the land use/land cover code of *Phragmites* Dominate Interior Wetlands. Site inspection conducted during the wetlands delineation survey confirms these mapped wetland types and approximate locations.

Natural Resources Conservation Service -Mapped Soils

Within study area 1 soils are mapped as "SecA – Secaucus artifactual fine sandy loam, 0 to 3 percent slopes," "URTILB – Urban land, till substratum, 0 to 8 percent slopes," "URWETB – Urban land, wet substratum 0 to 8 percent slopes," and "WectA – Westbrook mucky peat, 0 to 2 percent slopes, very frequently flooded" by NRCS (see **Figure 4a**). Within study area 2 soils are mapped as "LagA – Laguardia artifactual coarse sandy loam, 0 to 3 percent slopes," "URBEDB – Urban land, bedrock substratum, 0 to 8 percent slopes," and URWETB (see **Figure 4b**). The NRCS lists one of the series mapped for the project site as hydric: WectA, however URWETB contains hydric soil components. Hydric soil is one of the three parameters that define a wetland according to the USACE methodology.

ONSITE DELINEATION

A total of three wetlands (A, B, CD) and one unvegetated stormwater detention basin (E) were delineated in November 2016 within study area 1 and one wetland (F) was delineated in December within study area 2 (see **Surveyed Wetland Delineation Drawings**). These wetlands were flagged as follows:

- Wetland A: A1 to A46;
- Wetland B: B1 to B4;
- Wetland CD: C1 to C24 and D1 to D59;
- Wetland F: F1 to F27; and
- Detention Basin E: E1 to E5.

Wetland A

Wetland A is an emergent marsh wetland located in the western portion of study area 1, east of County Road and south of the NEC (see **Figure 6a, Photograph 1**). The hydric soils, hydrology, and hydrophytic vegetation of Wetland A are described below.

The Data Form for Wetland A depicts the dominant species associated with this wetland. These species include common reed (*Phragmites australis*) (FACW) for the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point.

Soils of this wetland are significantly disturbed, made lands. Ceramic fragments and other evidence of fill material are found 12 inches below the soil surface, and supports the NRCS soil mapping of the "URWETB – Urban land, wet substratum, 0 to 8 percent slope" soil map unit. However Wetland A is located in an appropriate landscape setting (concave surface adjacent to Penhorn Creek) and is the soils are considered to be under a problematic soil situation. The primary hydrology indicators are "A2 High Water Table" at a depth of 10 inches below the soil surface and "A3 Saturation" at the soil surface (see Data Form A). Wetland A is hydrologically connected to Penhorn Creek.

Wetland B

Wetland B is an emergent seasonally flooded isolated wetland, located in the central portion of study area 1, and restricted to a depression below a billboard (see **Figure 6a, Photograph 2**). The hydric soils, hydrology, and hydrophytic vegetation of Wetland B are described below.

The Data Form for Wetland B depicts the dominant species associated with this wetland. These species include common reed (FACW) for the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point.

Soils of this wetland meet the criteria of "F6 Redox Dark Surface." The primary hydrology indicators are "A3 Saturation" at a depth of 11 inches below soil surface and "C3 Oxidized Rhizospheres on Living Roots." The secondary hydrology indicator is "D4 Microtopographic Relief" (see Data Form B).

Wetland CD

Wetland CD is an emergent marsh wetland located in the eastern portion of study area 1, and adjacent to a tributary of Penhorn Creek (see **Figure 6b, Photograph 3**). The hydric soils, hydrology, and hydrophytic vegetation of Wetland CD are described below.

The Data Form for Wetland CD depicts the dominant species associated with this wetland. These species include common reed (FACW) and common boneset (*Eupatorium perfoliatum*) (FACW) in the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point.

Soils of this wetland meet the criteria of "TF12 Very Shallow Dark Surface." The primary hydrology indicators are "A2 High Water Table" at a depth of 7 inches below the soil surface and "A3 Saturation" at the soil surface (see Data Form D).

Detention Basin E

In addition to wetlands, an unvegetated detention basin was flagged within the project site east of Wetland CD. This linear feature flagged in the field as Detention Basin E. Detention Basin E is approximately 10 feet wide at the eastern end and 1 foot wide at the western end (see **Figure 6b, Photograph 4**). The feature runs in the east-west direction and connects to a culvert on the eastern end.

Study Area 1Upland

The area north/northwest of the delineated wetlands in study area 1 is the railroad track and rock ballast. The upland area located between Wetland A and Wetland B is representative of the uplands within the project site. The dominant vegetation within the sampling area was common boneset (FACW) in the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point. There were no wetland hydrology indicators or hydric soil indicators within this area (see Data Form C).

Wetland F

Wetland F is an emergent marsh located in the southern portion of study area 2, adjacent to the Hudson-Bergen Light Rail (HBLR) tracks (see **Figure 6c, Photographs 5 and 6**). A culvert is located within Wetland F and may connect to a tide gate, located approximately 1,250 feet east of the culvert. The hydric soils, hydrology, and hydrophytic vegetation of Wetland F are described below.

The Data Form for Wetland F depicts the dominant species associated with this wetland. These species include common reed (FACW) in the herbaceous layer. There were no tree, woody vine, or sapling/shrub layers within the sampling point.

Soils within this wetland were frozen on the date that the wetland delineation occurred, and as such soils were not sampled to an adequate depth to meet the criteria of hydric soil indicators. However, the wetland is located at the toe of slope in a swale (concave surface), which is an appropriate landscape setting to collect/concentrate water. It is anticipated that if soils were sampled at this location to an adequate depth

that they would meet the criteria of a hydric soil indicator. The primary hydrology indicators are "A1 Surface Water" at a depth of 3 inches, "A2 High Water Table" at 0.5 inches below the soil surface, "A3 Saturation" at the soil surface, "B4 Algal Mat or Crust," "B7 Inundation Visible on Aerial Imagery," and "B9 Water-Stained Leaves" (see Data Form F).

Study Area 2 Upland

The area south of the delineated wetland in study area 2 is the railroad track and rock ballast. The upland area located north of the delineated wetland in study area 2 is an urban vacant lot (see **Figure 6d, Photograph 7**). The dominant vegetation within the sampling areas was eastern cottonwood (*Populus deltoids*) (FAC) in the tree layer, crabgrass (*Digitaria* sp.) (FACU) in the herbaceous layer, and Asiatic bittersweet (*Celastrus orbiculatus*) (UPL) and poison ivy (*Toxicodendron radicans*) (FAC) in the woody vine layer. There was not a sapling/shrub layer within the sampling point. There were no wetland hydrology indicators or hydric soil indicators within this area (see Data Form E).

CONCLUSIONS AND RECOMMENDATIONS

As described above, three vegetated freshwater wetlands (Wetlands A, B, and CD) were delineated in study area 1, and one vegetated freshwater wetland (Wetland F) was delineated in study area 2, per the USACE wetland delineation methodology. Due to the frozen soils encountered within Wetland F and the inability to sample soils to an adequate depth, it is recommended that Wetland F be re-investigated during the growing season. In order to confirm that these delineated boundaries are accurate/official, it is recommended that the boundaries be confirmed by USACE during an onsite field inspection as part of a "jurisdictional determination" (JD), and that the boundaries be verified by the NJDEP Land Use Regulation Program. Once the wetland/waters boundaries are confirmed by the USACE, they are valid for a period of five (5) years. Any impacts to federally- or state-mapped wetlands are subject to Section 401 and 404 permits under the Clean Water Act, the Freshwater Wetlands Protection Act, and the Wetlands Act of 1970, and mitigation in consultation with the USACE and/or NJDEP. For this reason, it is recommended that coordination regarding this wetland delineation commence with NJDEP and USACE.

Figures:

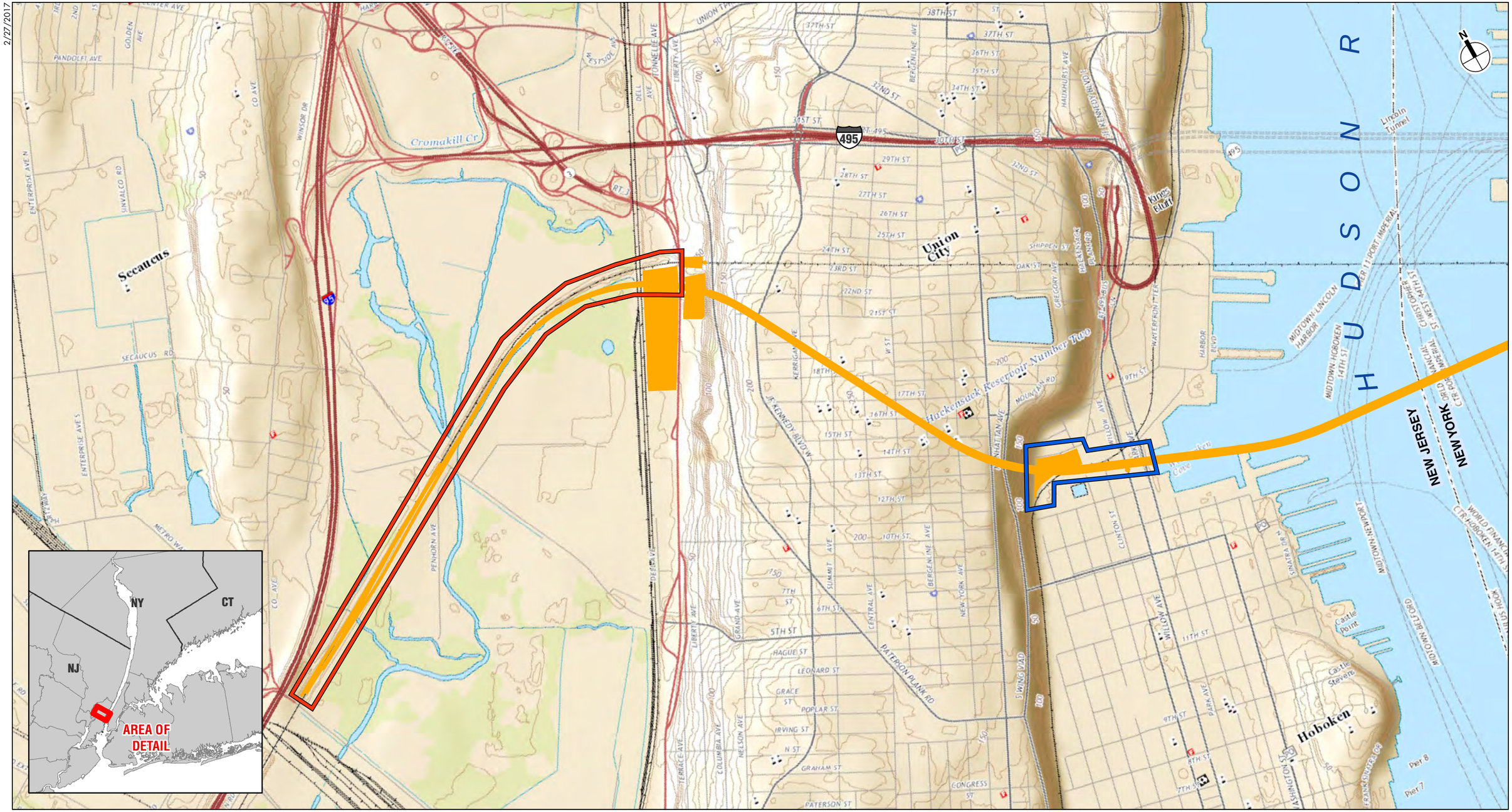
1. USGS Topographic Map
2. NWI Wetlands
3. NJDEP Wetlands
4. NRCS Soils
5. Photograph Key
6. Representative Site Photographs

Attachments:

Surveyed Wetland Delineation Drawings

USACE Wetland Determination Data Forms

2/27/2017



Study Area 1

Study Area 2

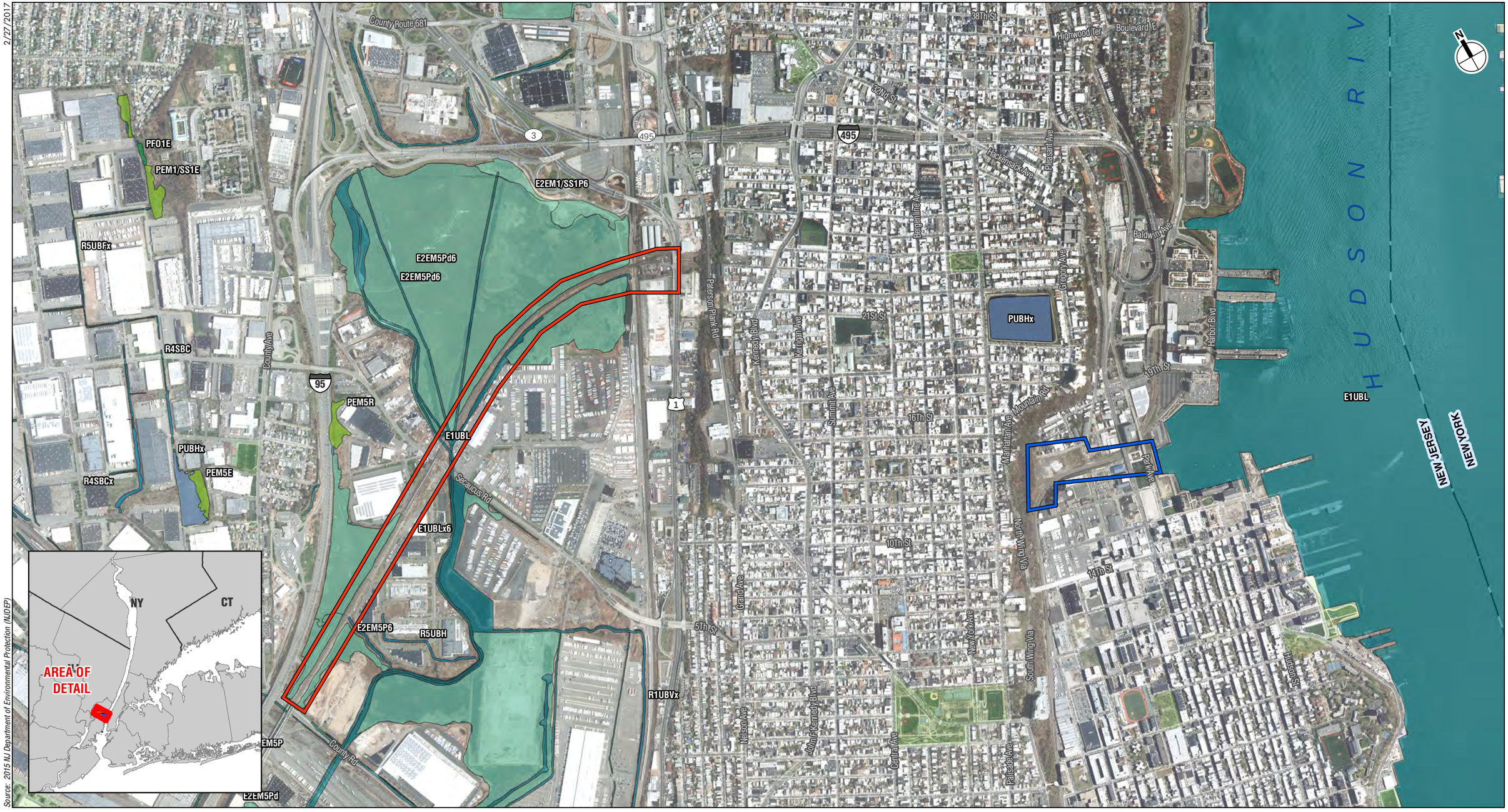
Approximate coordinates of Project Site:
74°2'33"W 40°45'56"N

0 5,000 FEET

HUDSON TUNNEL PROJECT

USGS 7.5 Minute Topographic Map
Weekhawken Quad
Figure 1

2/27/2017



Source: 2015 NJ Department of Environmental Protection (NJDEP)

Study Area 1
Study Area 2

WETLAND_TY

- Freshwater Forested/Shrub Wetland (PFO, PSS)
- Freshwater Emergent Wetland (PEM)
- Freshwater Pond (PUB, PAB)
- Estuarine and Marine Wetland (E2, M2)
- Riverine (R)
- Estuarine and Marine Deepwater (E1, M1)

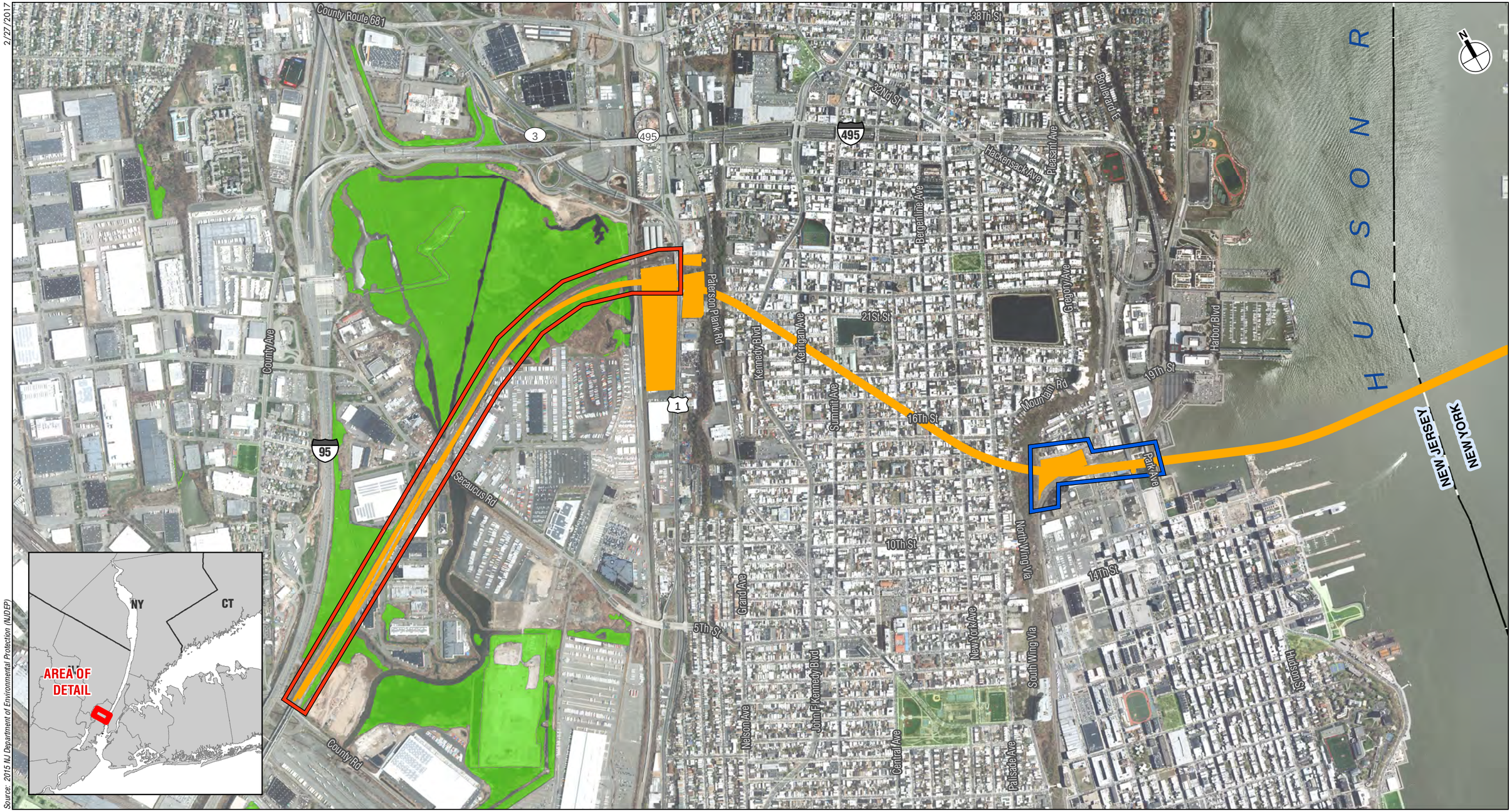
0 5,000 FEET

HUDSON TUNNEL PROJECT

National Wetlands Inventory

Figure 2

2/27/2017



Source: 2015 NJ Department of Environmental Protection (NJDEP)

Study Area 1 | Wetlands

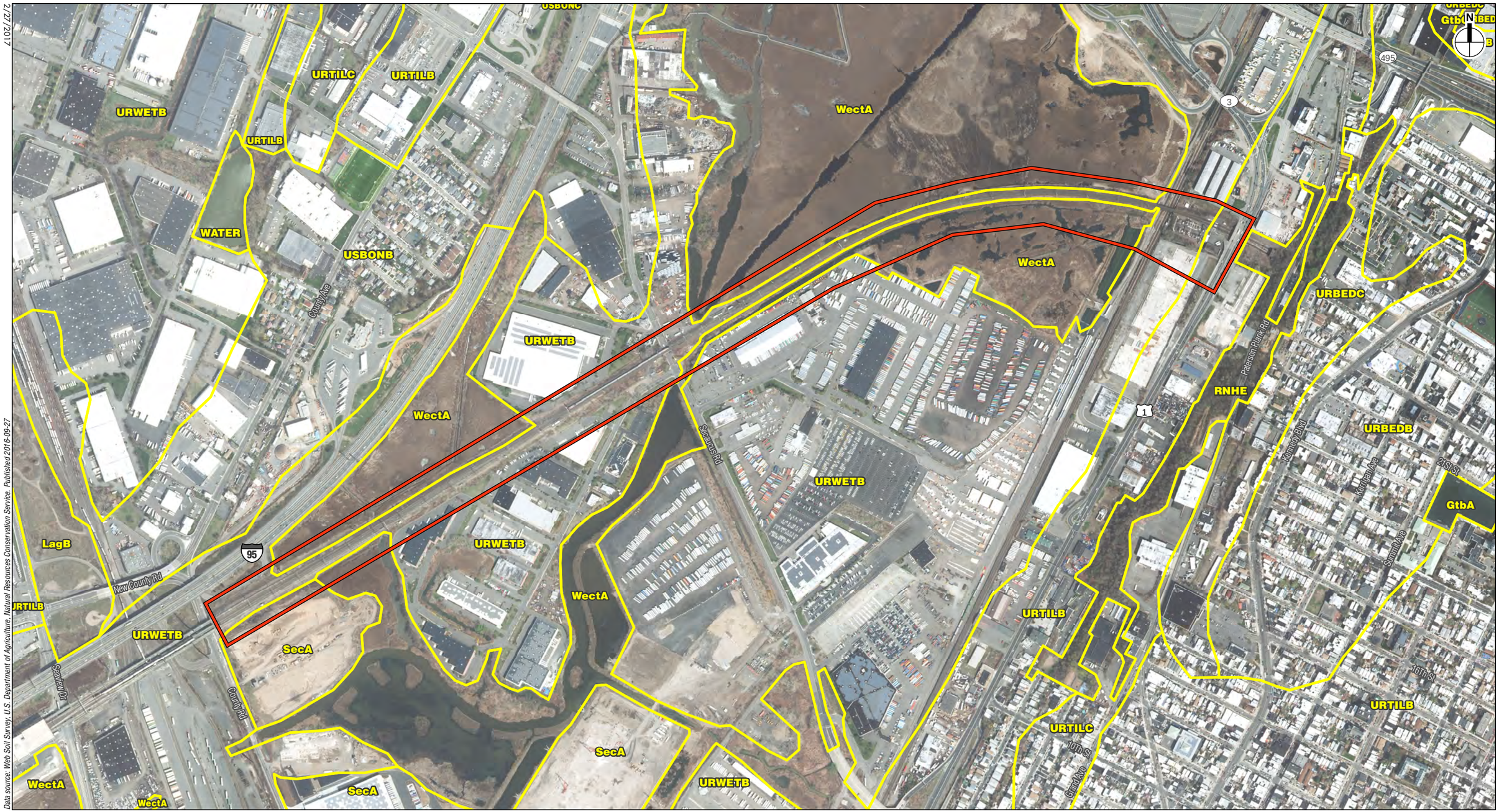
Study Area 2

0 5,000 FEET

HUDSON TUNNEL PROJECT

New Jersey Dept. of Environmental Protection Wetlands

Figure 3



Data source: Web Soil Survey, U.S. Department of Agriculture, Natural Resources Conservation Service. Published 2016-09-27

2/27/2017

HUDSON TUNNEL PROJECT

NRCS Soils

Figure 4a

2/27/2017

Data source: Web Soil Survey, U.S. Department of Agriculture, Natural Resources Conservation Service. Published 2016-09-27

N

URWETB
URBEDC
URBEDB
GtbA
GtbB
RNHE
URTILB
URTILC
RNHF
LagA
WATER
URBEDB
URWETB
URBEDB
URWETB
WATER
RNHE
LagA
URWETB
USGRTA
LagA
LagA
URTILB
USGRTB
GtbB

Paterson Plank Rd
Kerrigan Ave
21St St
16Th St
Kennedy Blvd
Grand Ave
Summit Ave
10Th St
9Th St
Secaucus Rd
John F Kennedy Blvd
New York Ave
Central Ave
County Route 681
South Wing Va
North Wing Va
Mountain Rd
Manhattan Ave
Gregory Ave
Boulevard E
Baldwin Ave
495
19Th St
Harbor Blvd
Park Ave
14Th St
Hudson St

Study Area 2

Map unit symbol

0 5,000 FEET

HUDSON TUNNEL PROJECT

NRCS Soils
Figure 4b

2/27/2017

Study Area 1

Photograph Direction and Reference Number

0 5,000 FEET

HUDSON TUNNEL PROJECT

Photograph Key (Study Area 1)

Figure 5a

2/27/2017

Study Area 2

Photograph Direction and Reference Number

0 5,000 FEET

HUDSON TUNNEL PROJECT

Photograph Key (Study Area 2)

Figure 5b

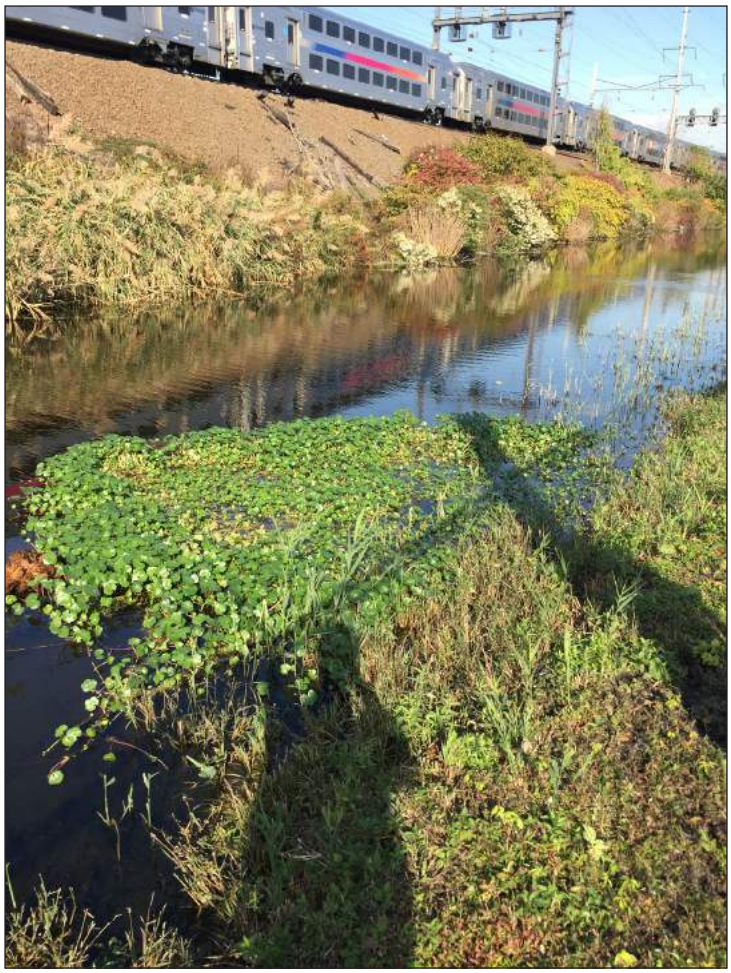
View of Wetland A and Penhorn Creek, facing south. **1**

View of Wetland B (located beneath the billboard), facing north. **2**

HUDSON TUNNEL PROJECT

Representative Site Photographs

Figure 6a



View of Wetland CD, facing north. **3**

View of Detention Basin E, facing west. **4**

HUDSON TUNNEL PROJECT

Representative Site Photographs

Figure 6b

View of Wetland F, facing east. **5**

View of Wetland F, facing west. **6**

HUDSON TUNNEL PROJECT

Representative Site Photographs

Figure 6c

View of the Upland in Study Area 2, facing south. **7**

Attachment 1:
Wetlands Survey Drawings

HUDSON TUNNEL PROJECT

U.S. Army Corps of Engineers Jurisdictional Determination Plans

Contract # 9500001023

April 28, 2017

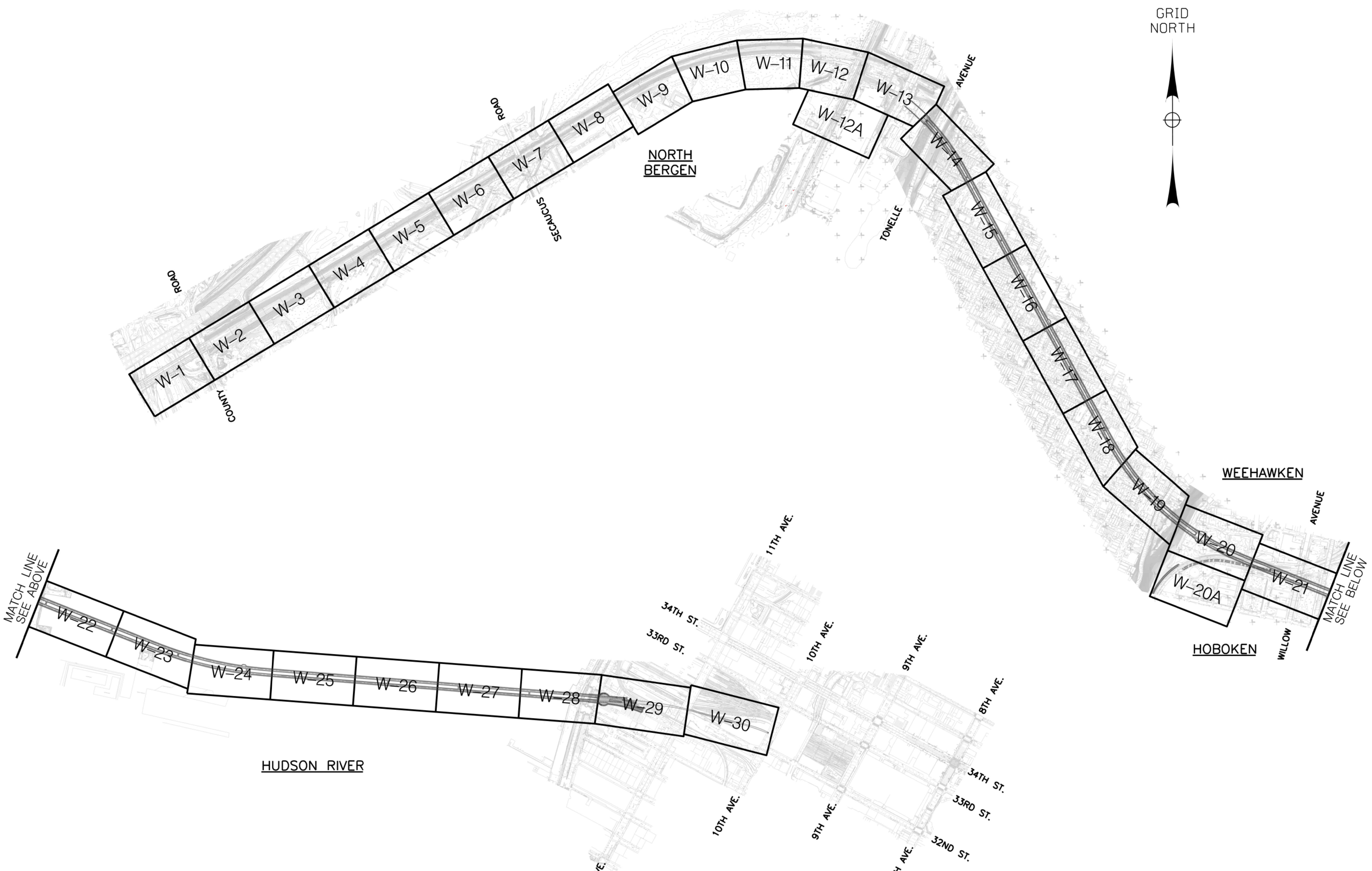
Submitted to:

US Army Corps of Engineers®
New York District

Submitted by:

The Gateway Trans-Hudson Partnership

AECOM WSP | Parsons Brinckerhoff STV 100 Years



NOTE:

1. SURVEY IS IN PENNSYLVANIA RAILROAD DATUM
   NAVD88 = PENNSYLAVANIA RAILROAD DATUM -298.34 FEET

No.	Revisions	Date	By
1	SHOW ENTIRE ALIGNMENT	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership

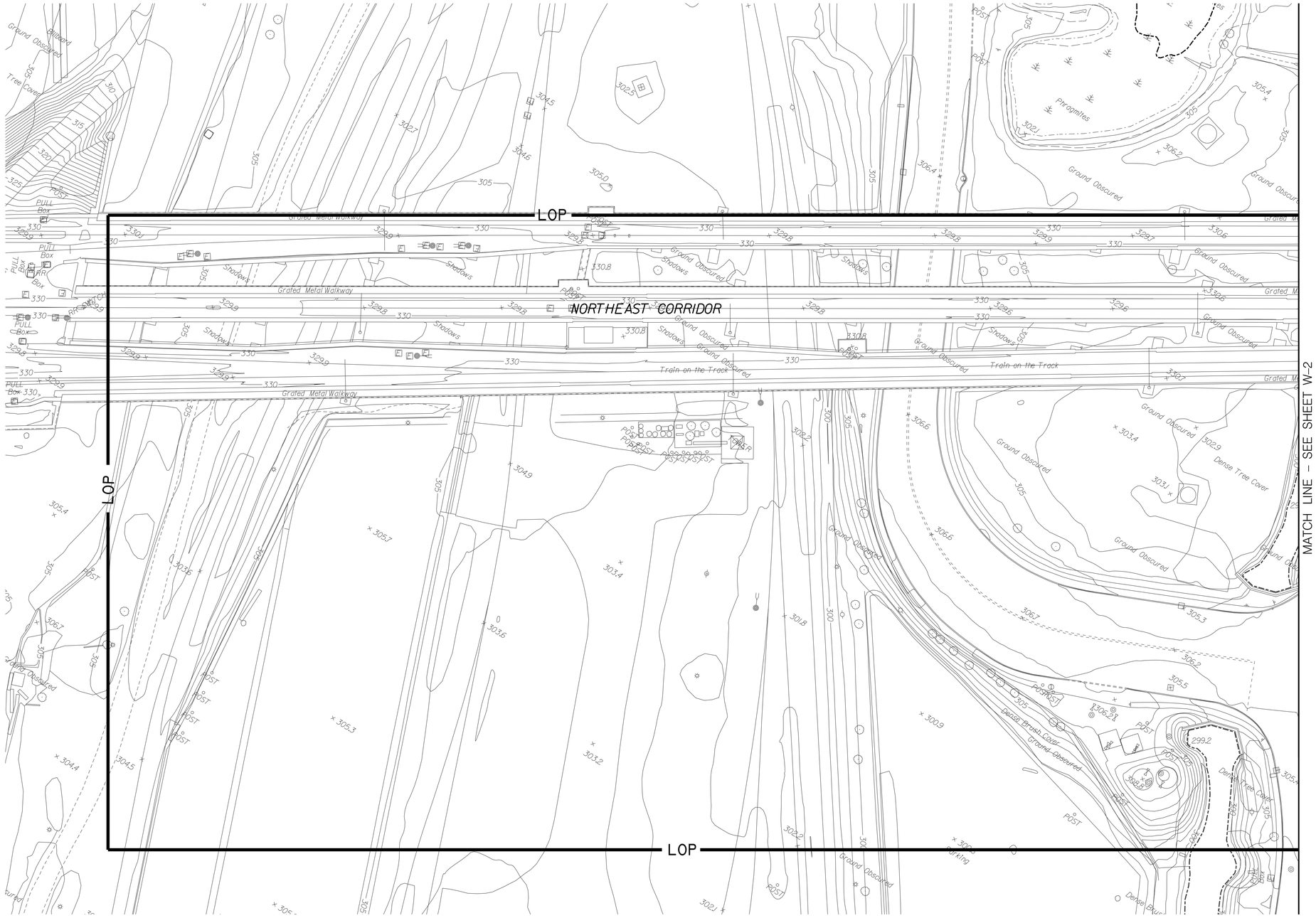
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING

PLAN INDEX

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No.



NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0.06 ACRES
LINEAR LENGTH OF STREAM	147 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

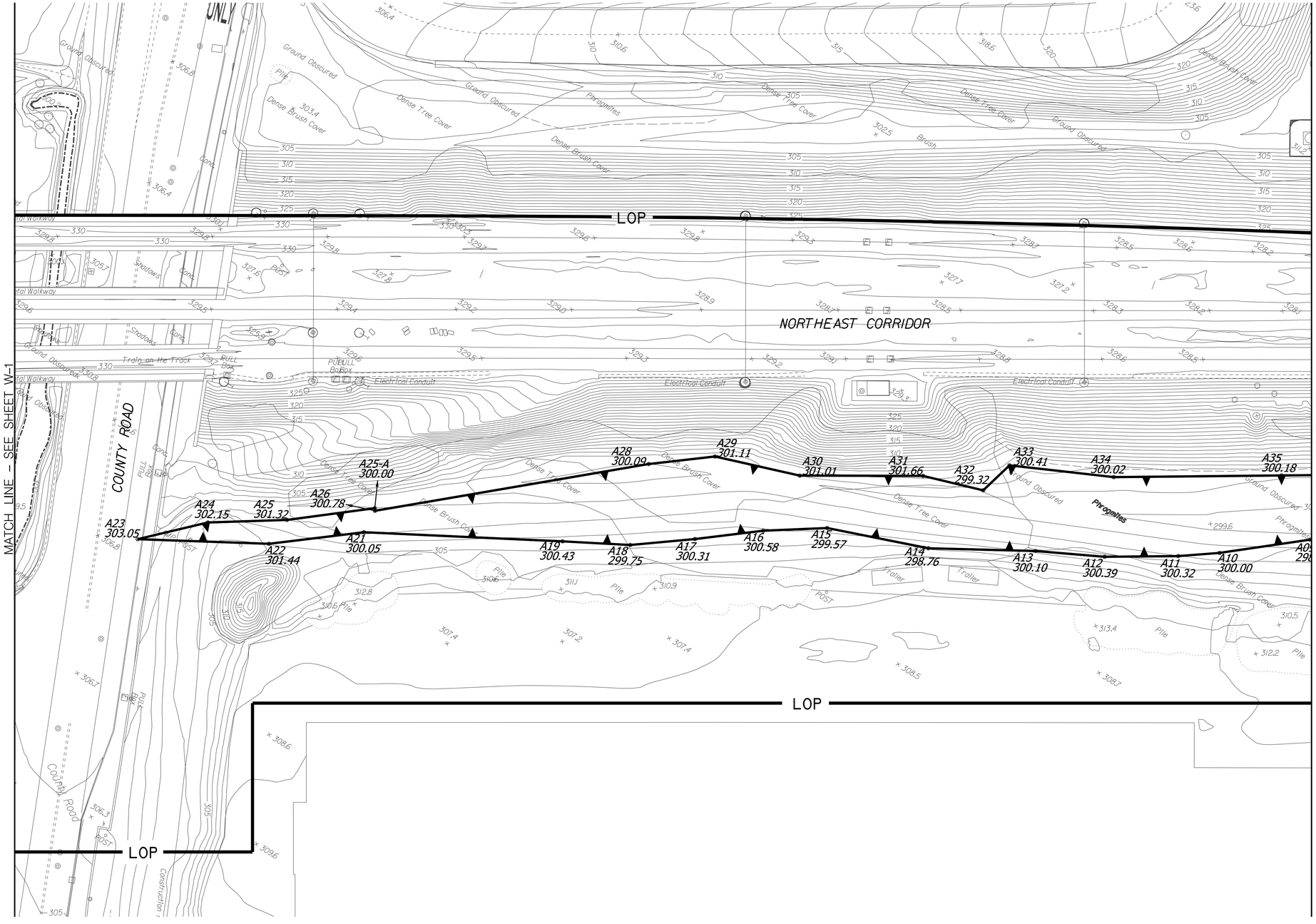
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-1



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- ---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.47 ACRES
OPEN WATERS	0.03 ACRES
LINEAR LENGTH OF STREAM	200 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

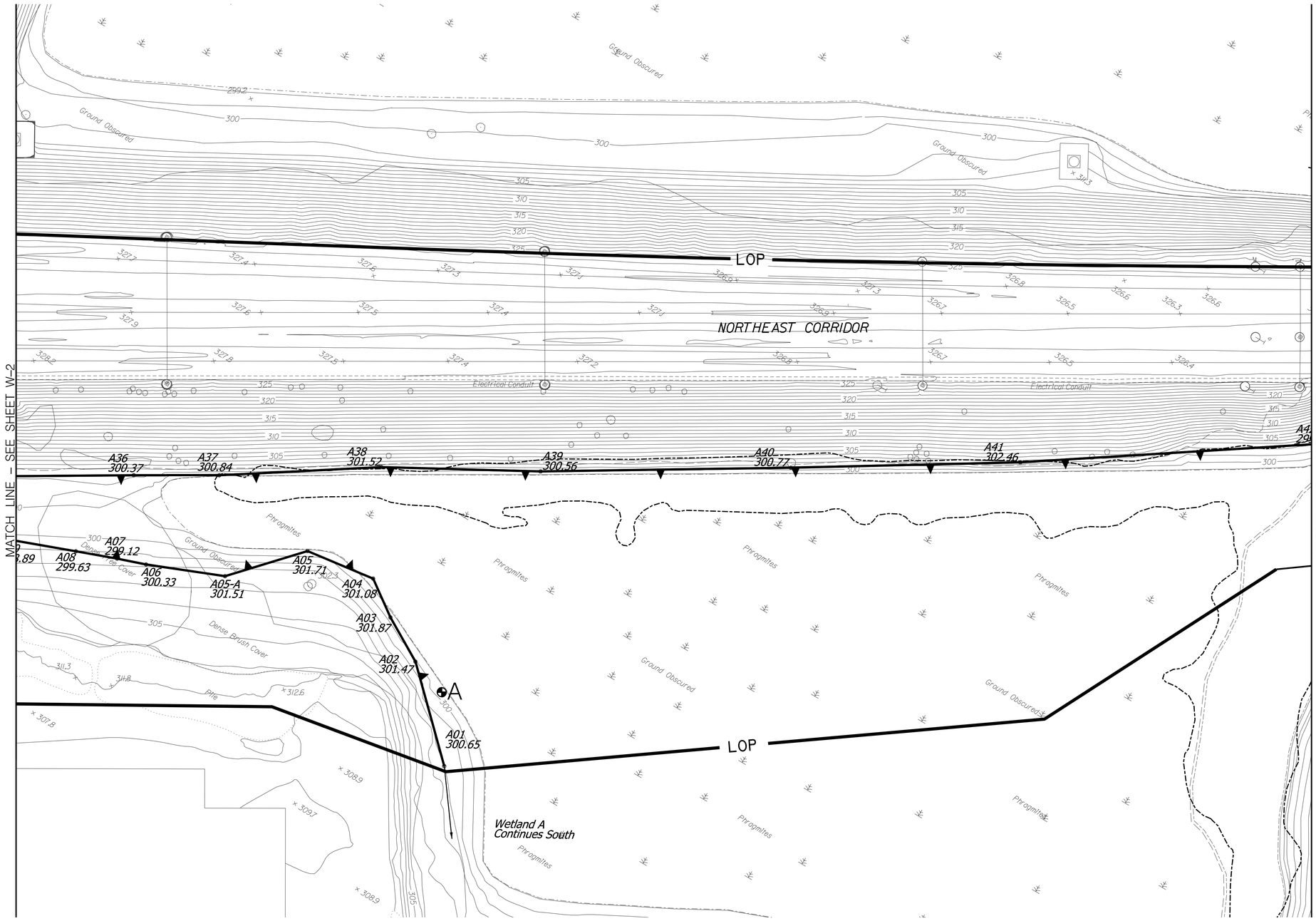
The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-2

P:\AMTRAK - HUDSON TUNNEL PROJECT\PERMITS FOR TUNNEL\USACE\PLANS\CAD FILES\JD FILES\WETLAND-2.DGN
4/27/2017 8:30:21 AM A-HUDSON01.TBL DARIOR



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- A – WETLAND DATA POINT SYMBOL
- ---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	1.44 ACRES
OPEN WATERS	0.43 ACRES
LINEAR LENGTH OF STREAM	650 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE AND DATA POINT	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

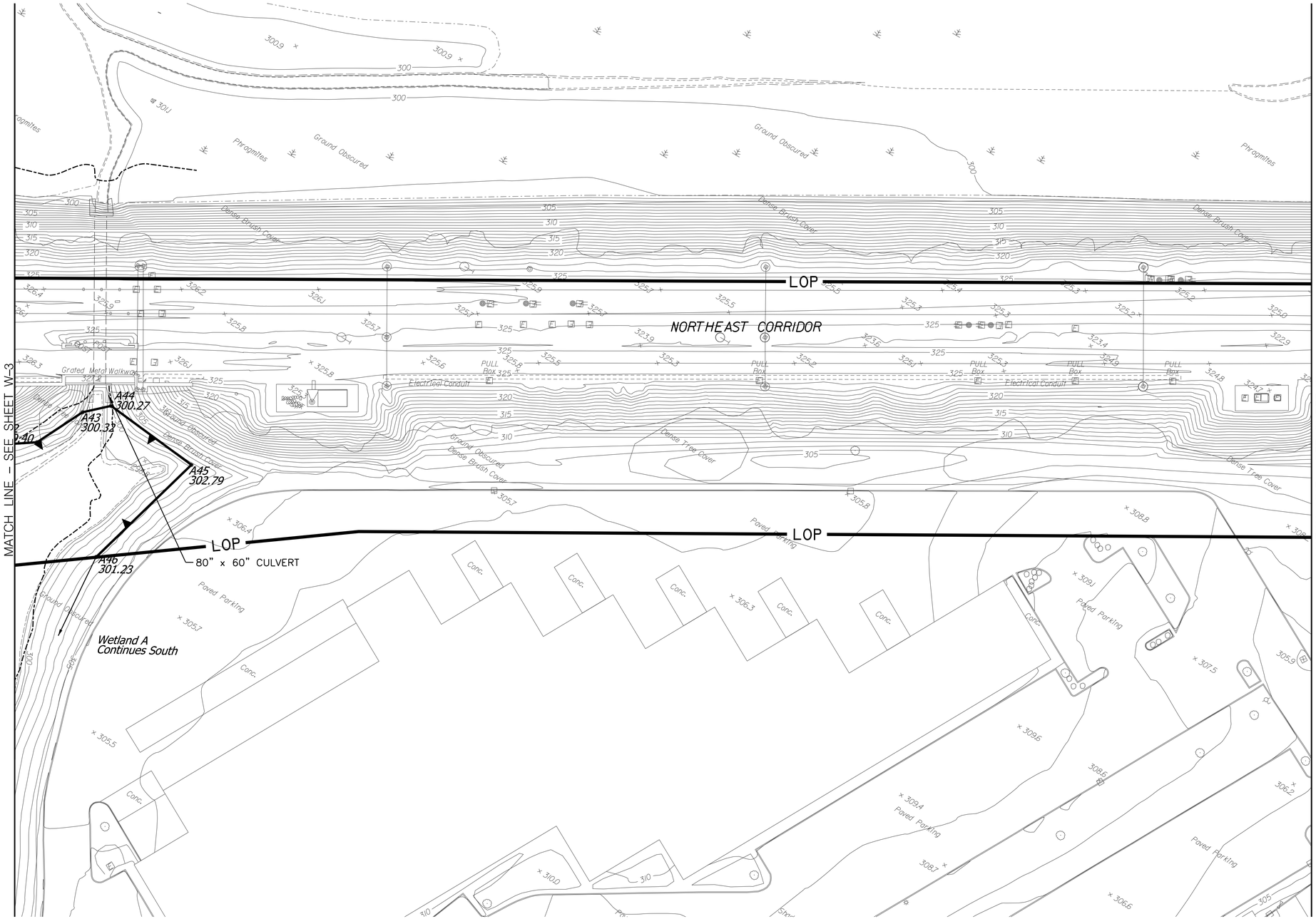
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-3



NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.05 ACRES
OPEN WATERS	0.075 ACRES
LINEAR LENGTH OF STREAM	77 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

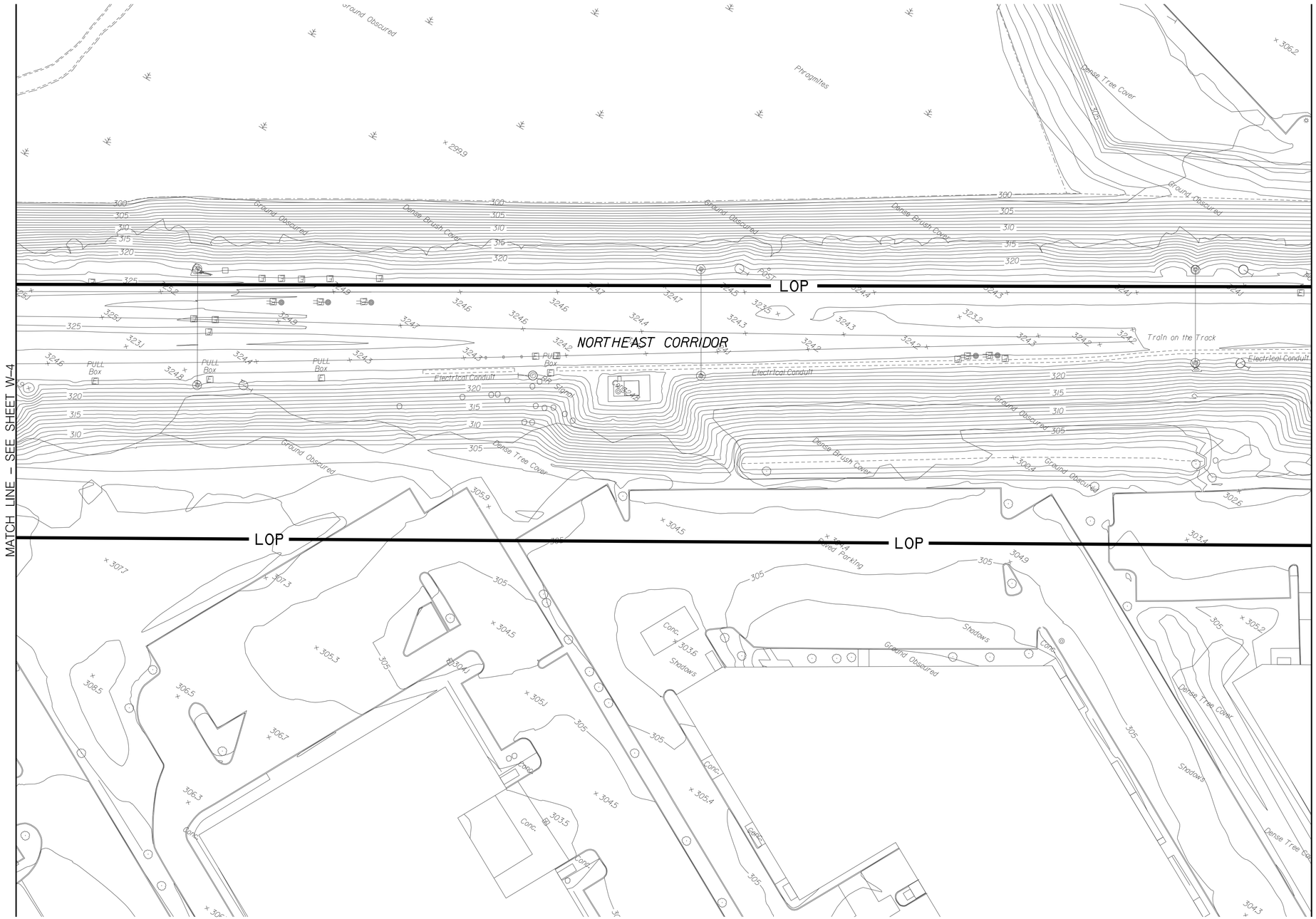
The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-4

P:\AMTRAK - HUDSON TUNNEL PROJECT\PERMITS FOR TUNNEL\USACE\PLANS\CAD FILES\JD FILES\WETLAND-4.DGN
4/27/2017 8:30:23 AM A-HUDSON01.TBL DARI OR



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS ---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

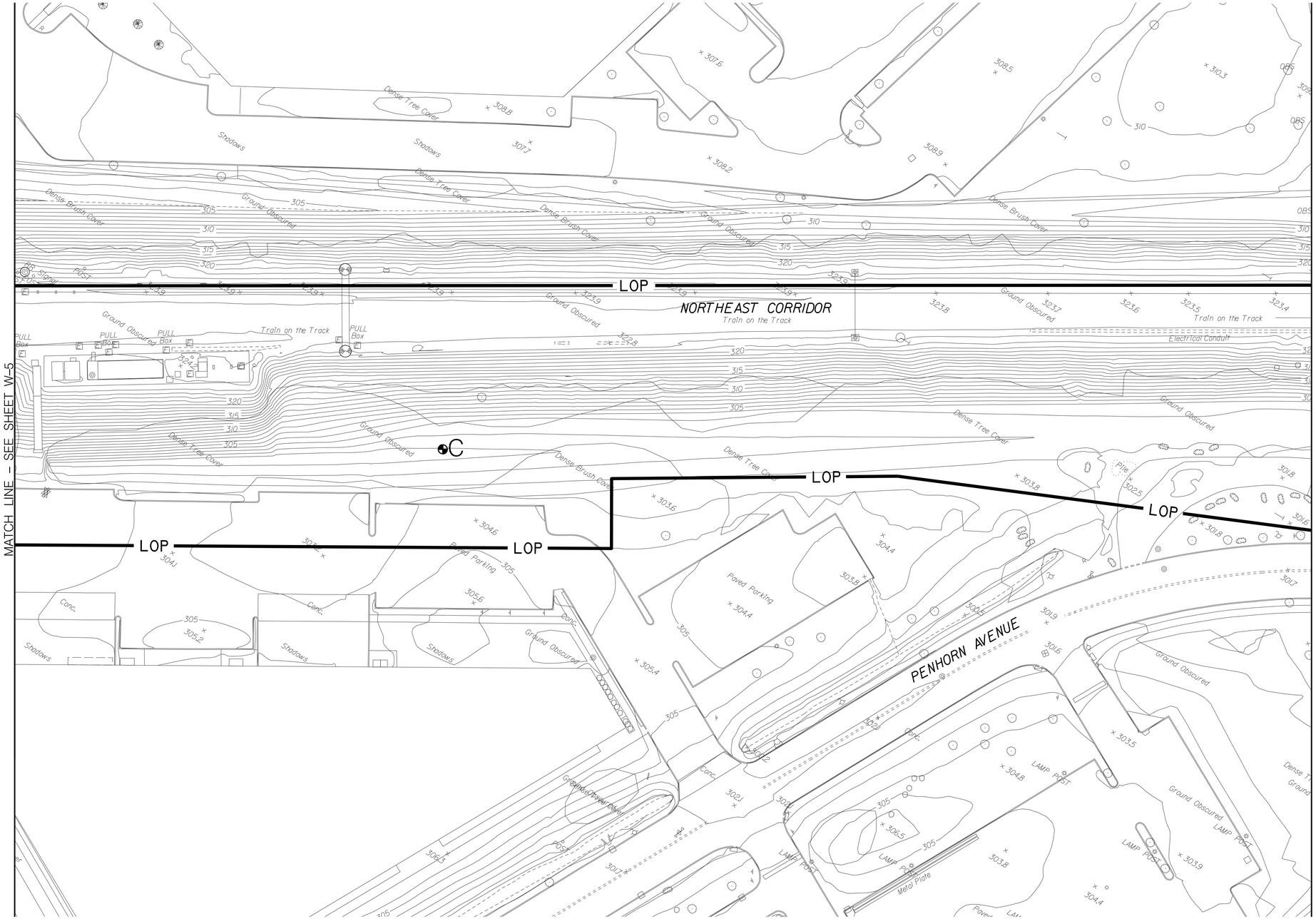
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-5



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- C – WETLAND DATA POINT SYMBOL
- ---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE AND DATA POINT	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

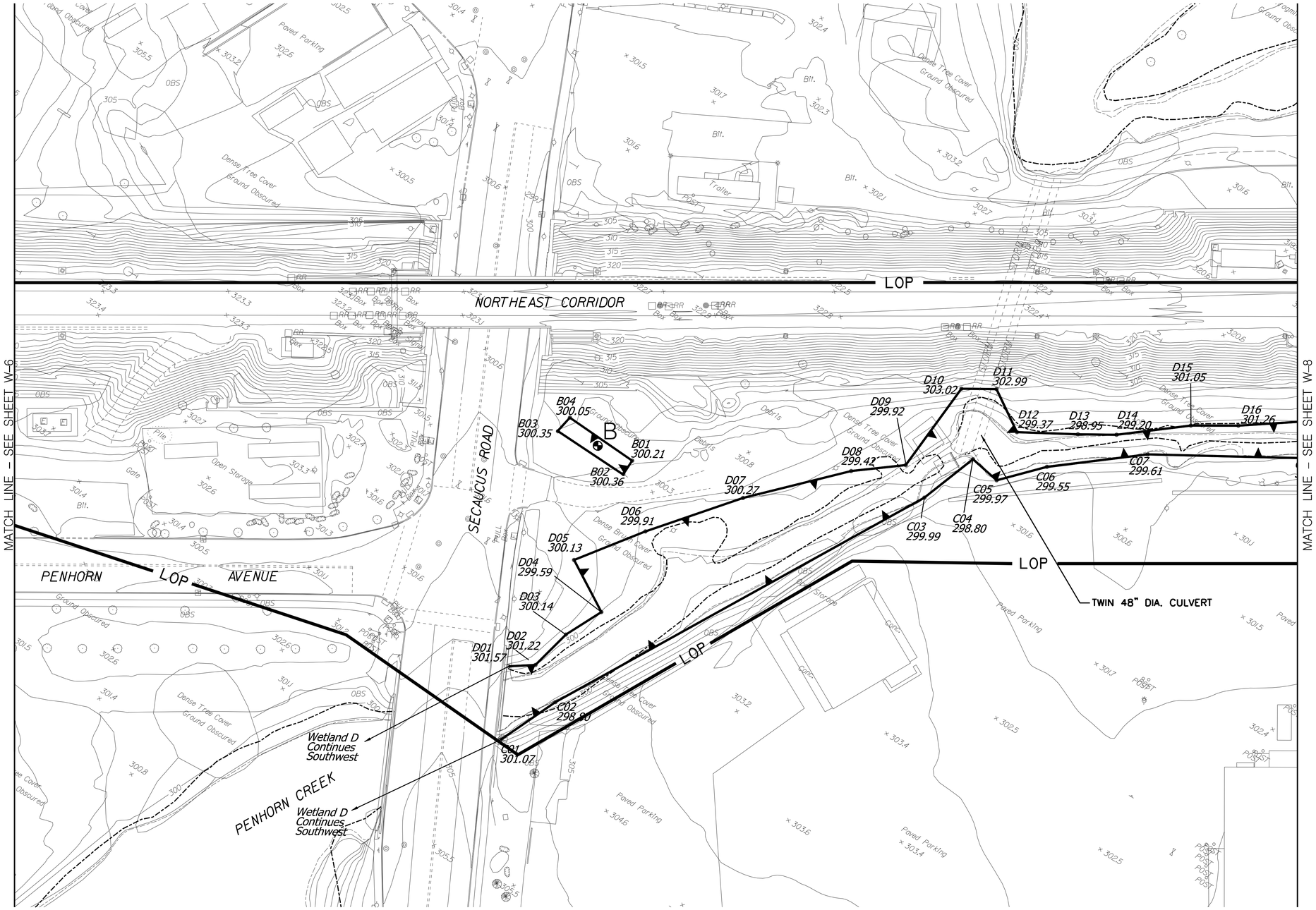
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-6



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP – LIMIT OF PROJECT
- B – WETLAND DATA POINT SYMBOL
- A1 A2 A3 A4 – WETLANDS
- ---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.18 ACRES
OPEN WATERS	0.21 ACRES
LINEAR LENGTH OF STREAM	483 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE AND DATA POINT	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

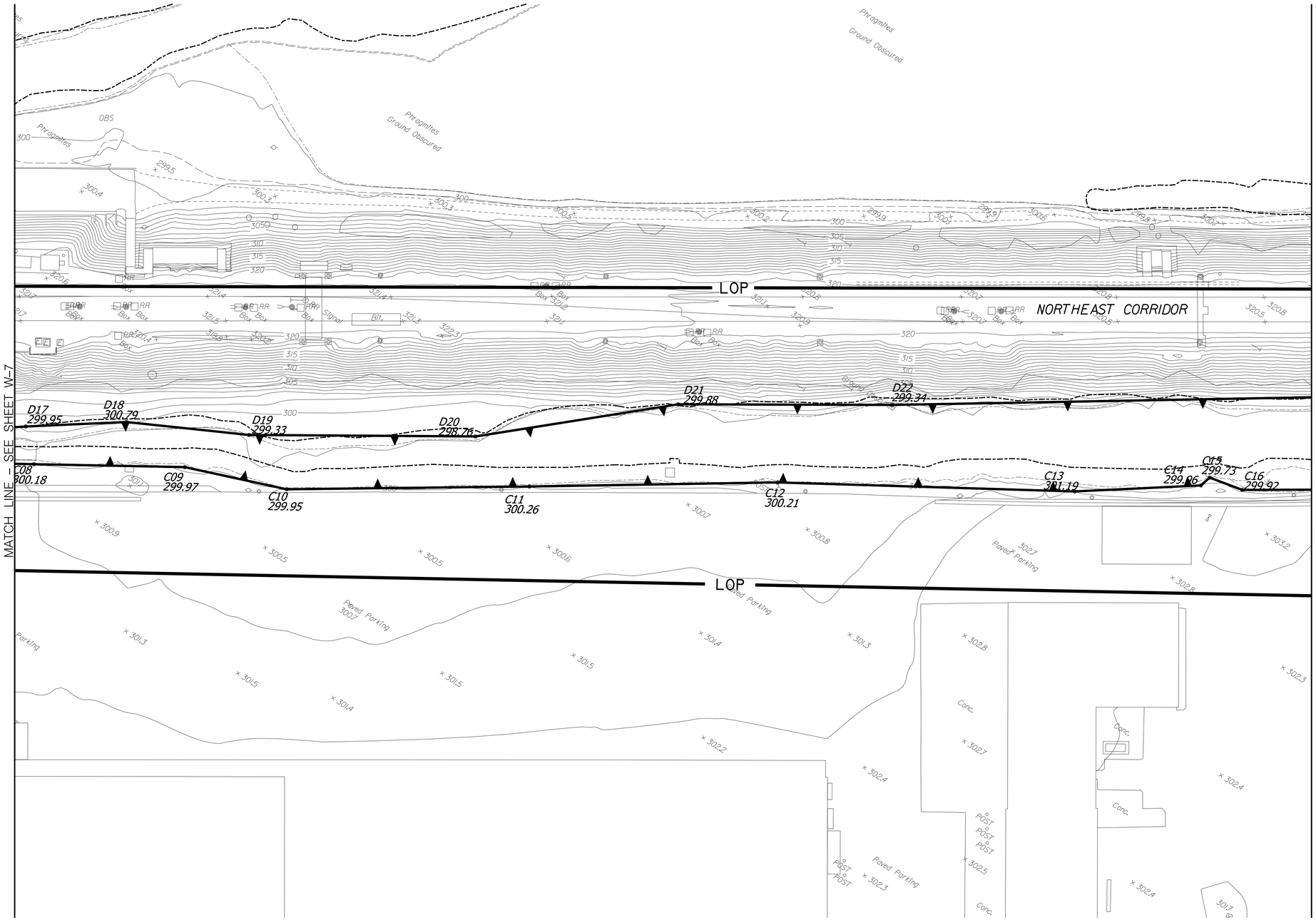
The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. | OF
Dwg. No. W-7

P:\AMTRAK - HUDSON TUNNEL PROJECT\PERMITS FOR TUNNEL\USACE\PLANS\CAD FILES\JD FILES\WETLAND-7.DGN
4/27/2017 8:30:26 AM A-HUDSON01.TBL DARIOR



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.19 ACRES
OPEN WATERS	0.47 ACRES
LINEAR LENGTH OF STREAM	720 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-8

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
– OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.80 ACRES
OPEN WATERS	0.76 ACRES
LINEAR LENGTH OF STREAM	690 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

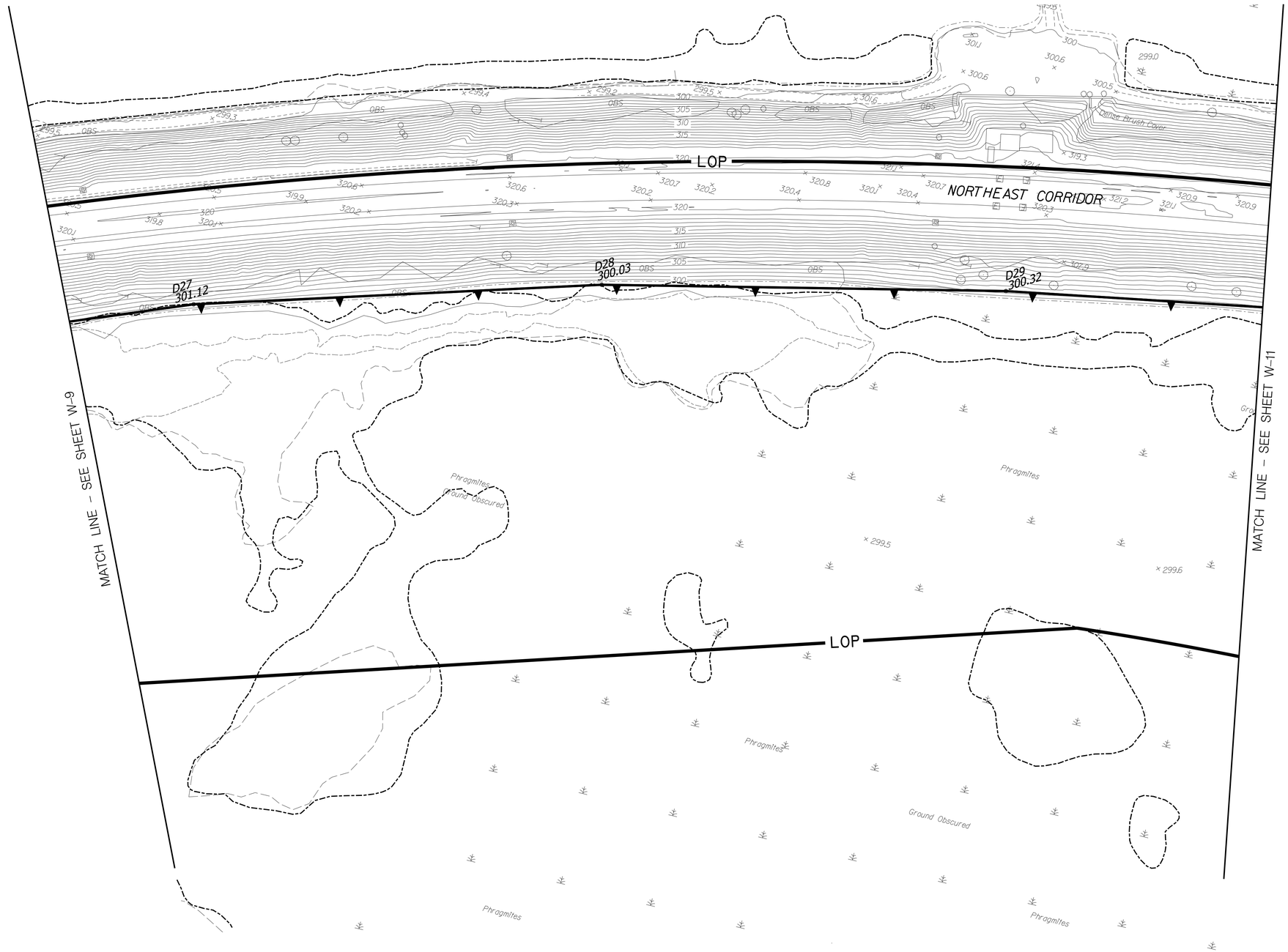
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-9



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- ---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	1.93 ACRES
OPEN WATERS	0.85 ACRES
LINEAR LENGTH OF STREAM	890 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

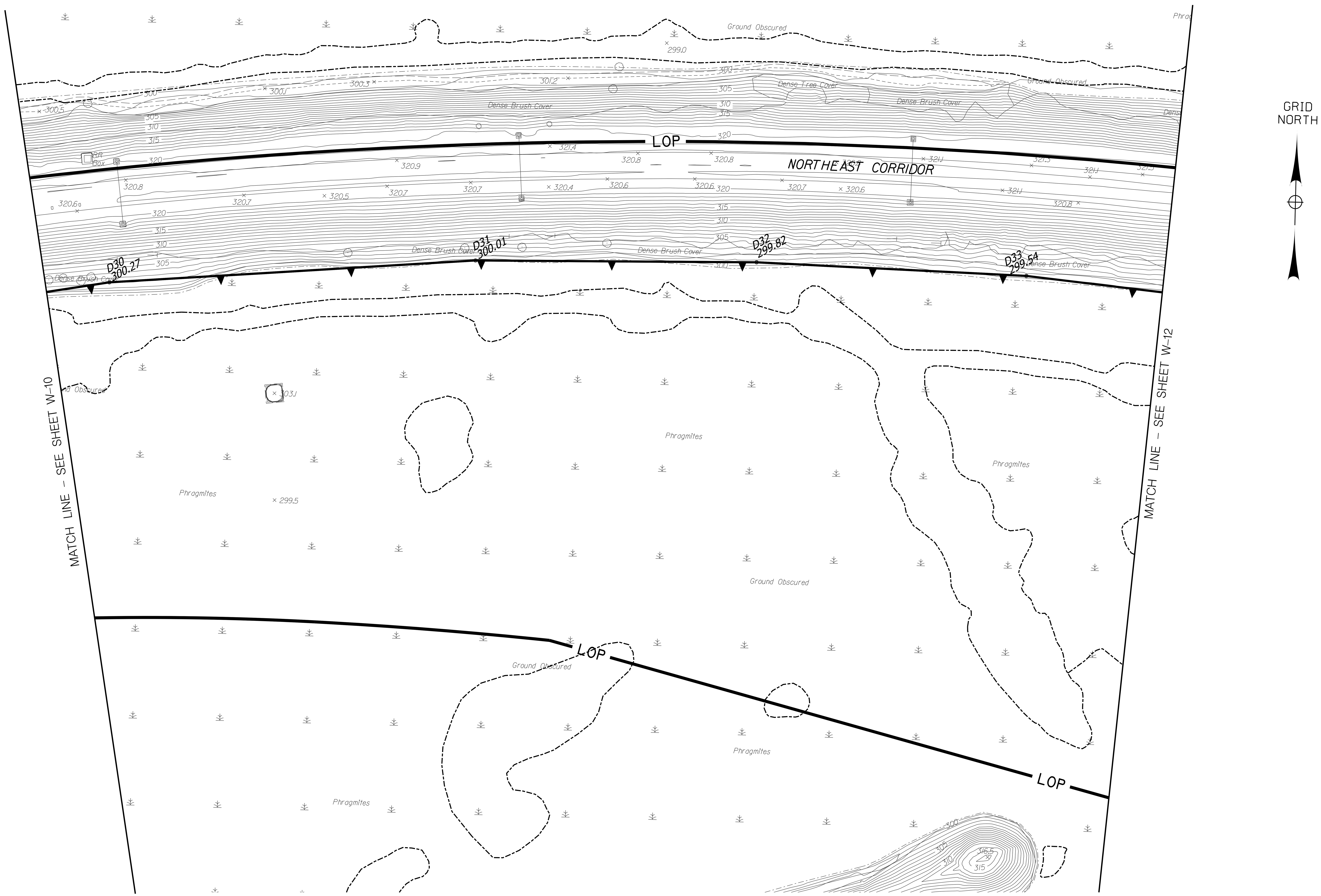
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-10



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP - LIMIT OF PROJECT
- A1 A2 A3 A4 - WETLANDS
- ------------ - OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	2.83 ACRES
OPEN WATERS	0.48 ACRES
LINEAR LENGTH OF STREAM	937 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership

AECOM | WSP | PARSONS BRINCKERHOFF | STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING

USACE JURISDICTIONAL
DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No.
W-11

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- D – WETLAND DATA POINT SYMBOL
- ---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	2.85 ACRES
OPEN WATERS	0.40 ACRES
LINEAR LENGTH OF STREAM	956 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
2	EXTEND LOP LINE	4/24/17	TH
1	ADDED TABLE AND DATA POINT	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Contract No.			
Sheet No.	OF		
Dwg. No.	W-12		
Designed TH	Drawn RC	Checked MM	Date 3/01/2017

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- ---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.000 ACRES
OPEN WATERS	0.000 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

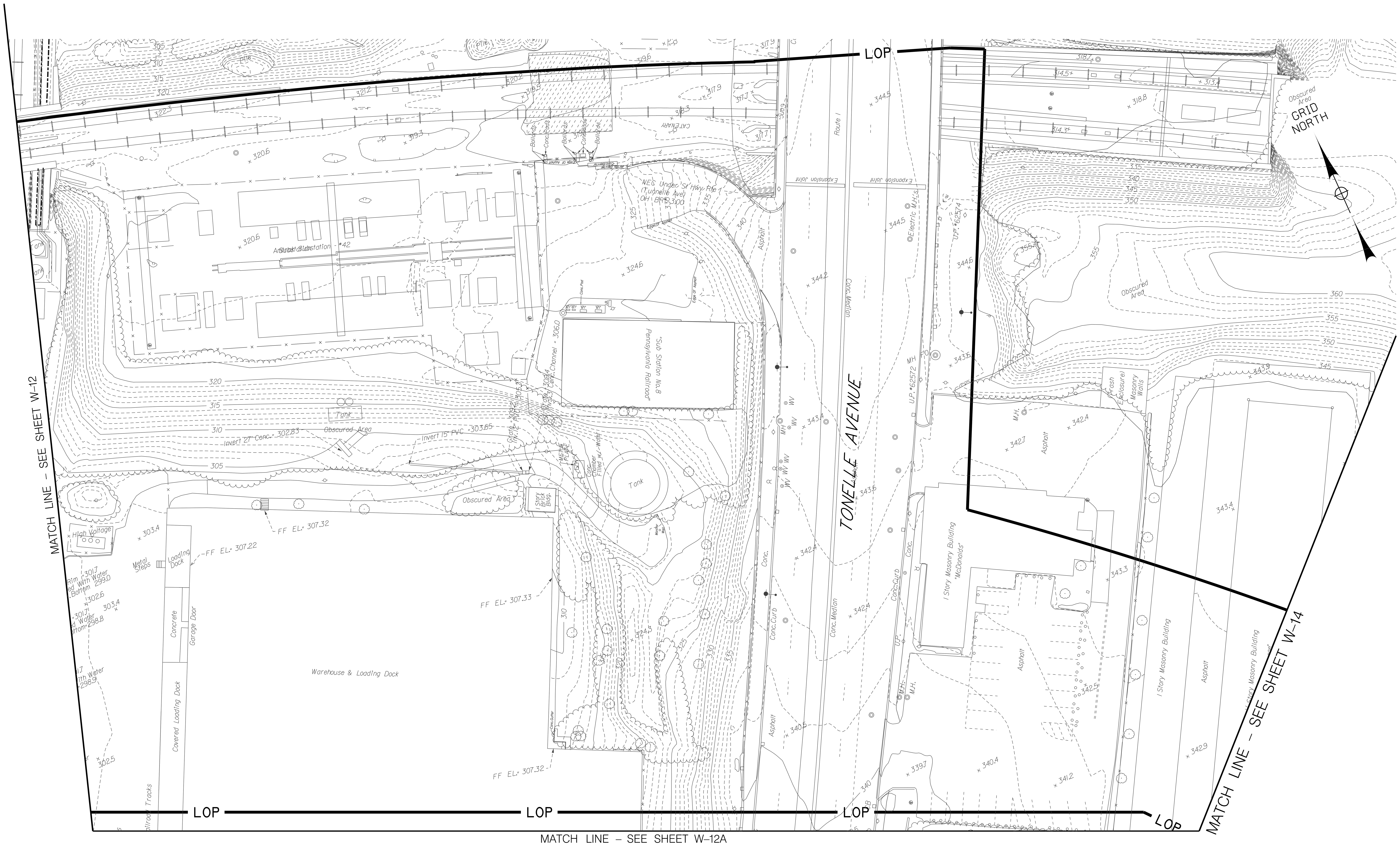
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-12A



NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

—LOP— - LIMIT OF PROJECT

A1 A2 A3 A4 - WETLANDS

------------- - OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.000 ACRES
OPEN WATERS	0.005 ACRES
LINEAR LENGTH OF STREAM	66 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
2	REMOVED WETLAND E PER USACE GUIDANCE	4/17/17	RB
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING

USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-13

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP - LIMIT OF PROJECT
- A1 A2 A3 A4 - WETLANDS
- ---------------- - OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET: 30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-14

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-15

MATCH LINE – SEE SHEET W-15

MATCH LINE – SEE SHEET W-17

LOP

GRID NORTH

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-16

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-17

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed	Drawn	Checked	Date
THTH	RGRC	MMMM	3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-18

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1 A2 A3 A4 – WETLANDS

---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-19

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP — LIMIT OF PROJECT
- A1 A2 A3 A4 — WETLANDS
- E, F — WETLAND DATA POINTS SYMBOL
- ---------- — OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.16 ACRES
OPEN WATERS	0.06 ACRES
LINEAR LENGTH OF STREAM	770 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
2	ADDED CALLOUT TO CULVERT AND OPEN WATER	4/17/17	RB
1	ADDED TABLE AND DATA POINTS	3/15/17	TH

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

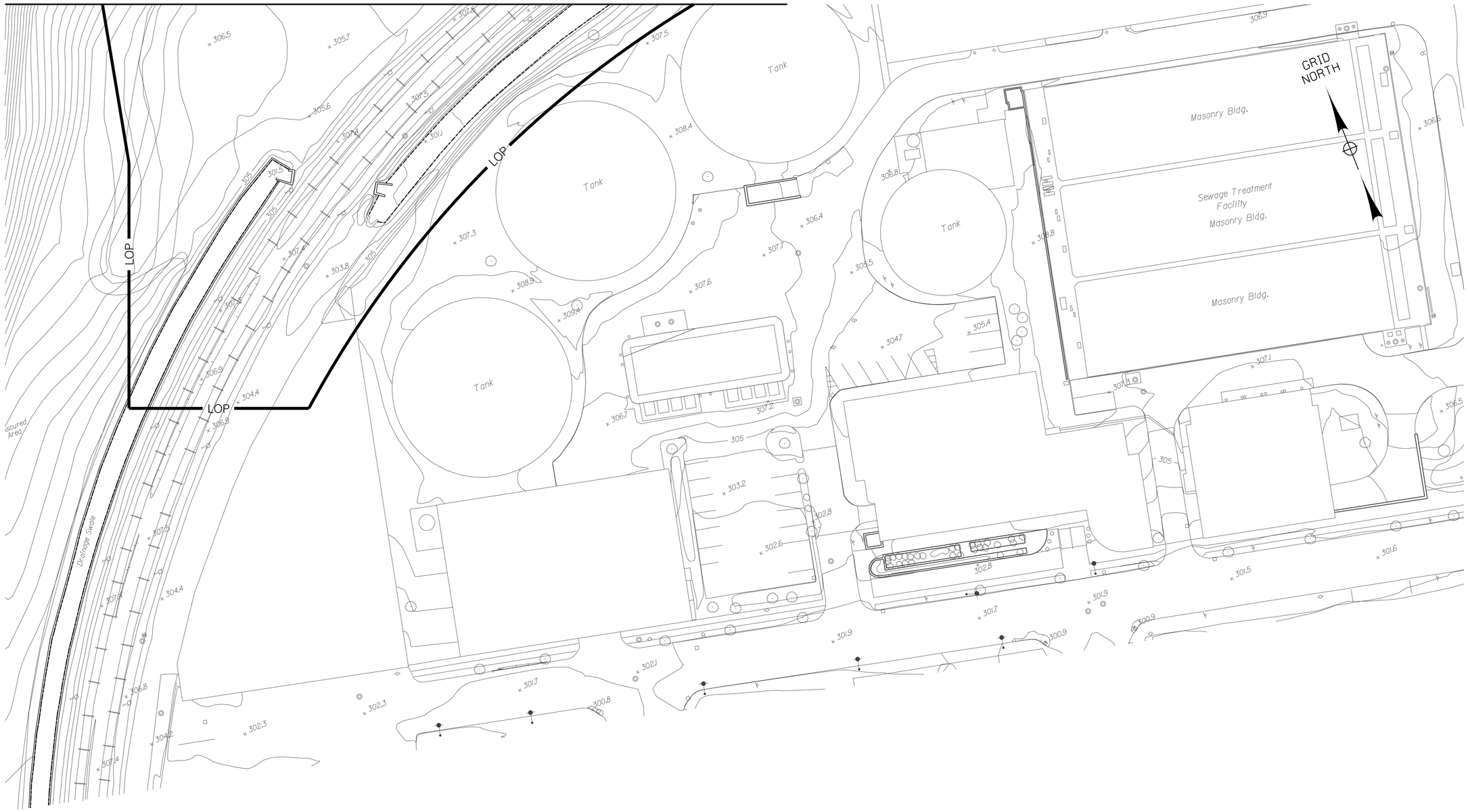
The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-20

MATCH LINE – SEE SHEET 20



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0.07 ACRES
LINEAR LENGTH OF STREAM	190 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-20A

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0.10 ACRES
OPEN WATERS	0.13 ACRES
LINEAR LENGTH OF STREAM	520 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

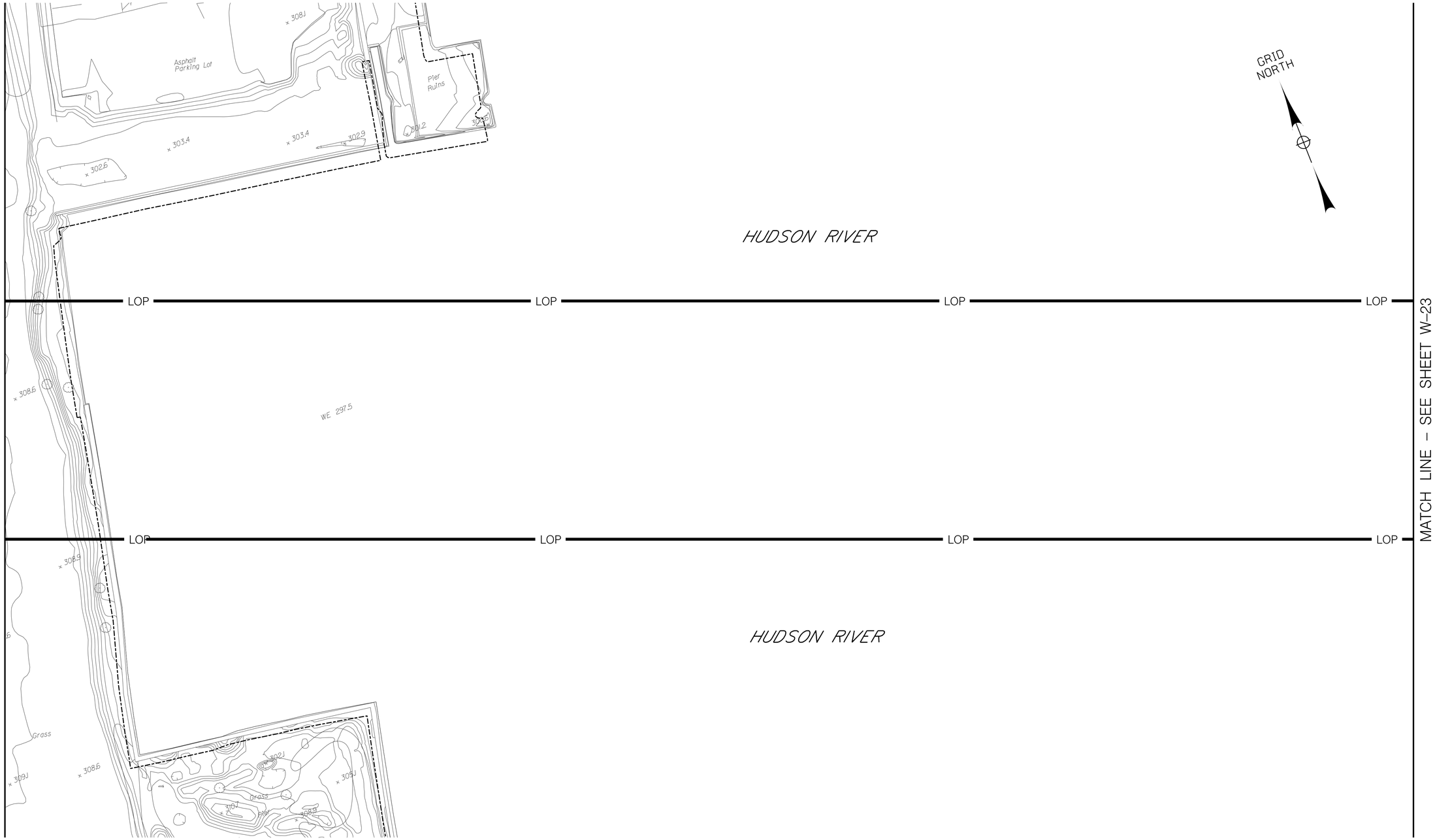
The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-21

P:\AMTRAK - HUDSON TUNNEL PROJECT\PERMITS FOR TUNNEL\USACE\PLANS\CAD FILES\WETLAND-21.DGN
4/27/2017 8:30:43 AM A-HUDSON01.TBL DARIOR



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.68 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

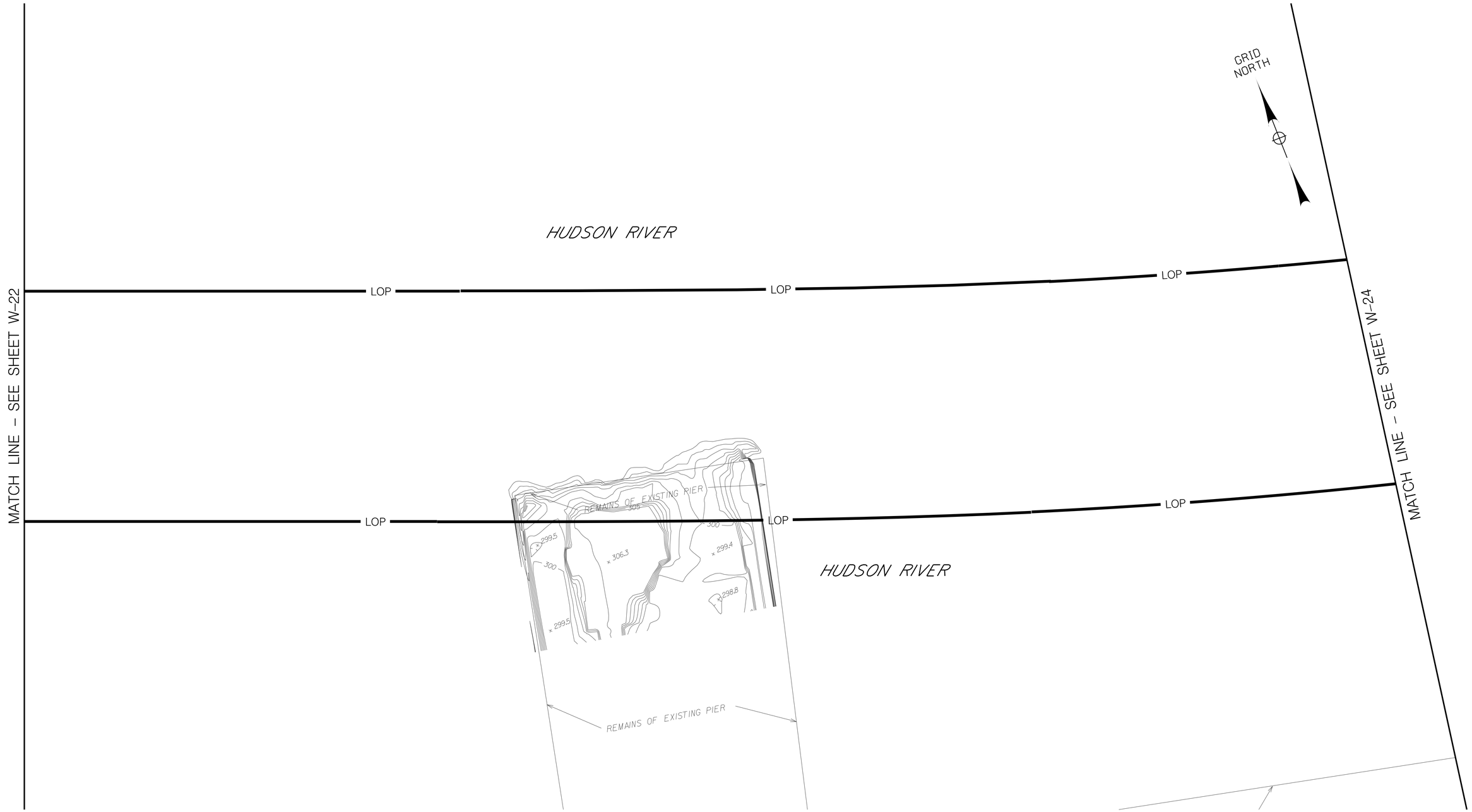
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-22



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.80 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-23

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.75 ACRES
LINEAR LENGTH OF STREAM	153 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-24

GRID NORTH

HUDSON RIVER

LOP — LOP — LOP

MATCH LINE – SEE SHEET W-24

MATCH LINE – SEE SHEET W-26

LOP — LOP — LOP

HUDSON RIVER

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.75 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-25

GRID NORTH

HUDSON RIVER

LOP LOP LOP LOP

MATCH LINE – SEE SHEET W-25

MATCH LINE – SEE SHEET W-27

LOP LOP LOP LOP

HUDSON RIVER

NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.75 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

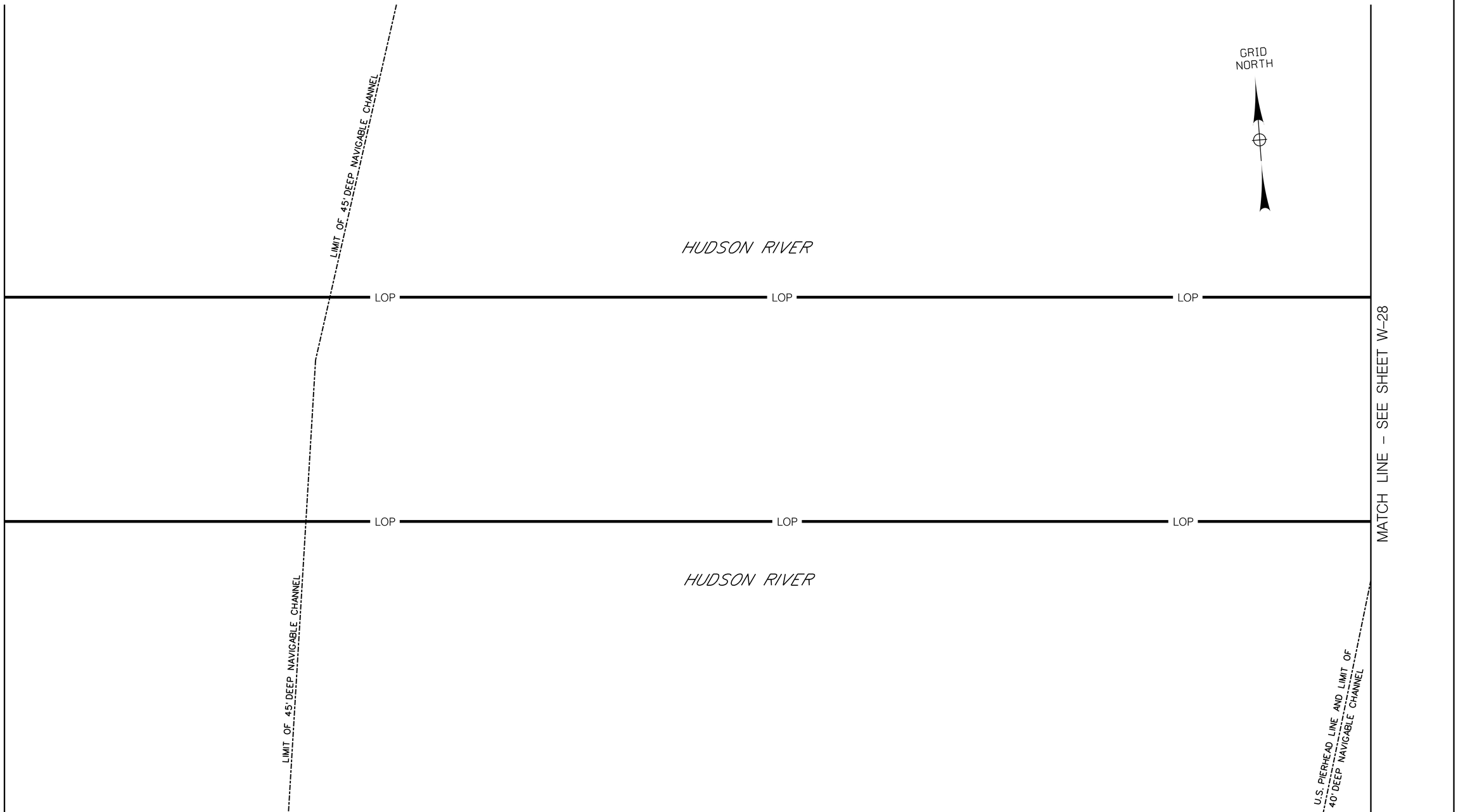
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-26



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
LOP – LIMIT OF PROJECT
A1 A2 A3 A4 – WETLANDS
---------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	2.75 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE AND NAVIGABLE CHANNEL	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

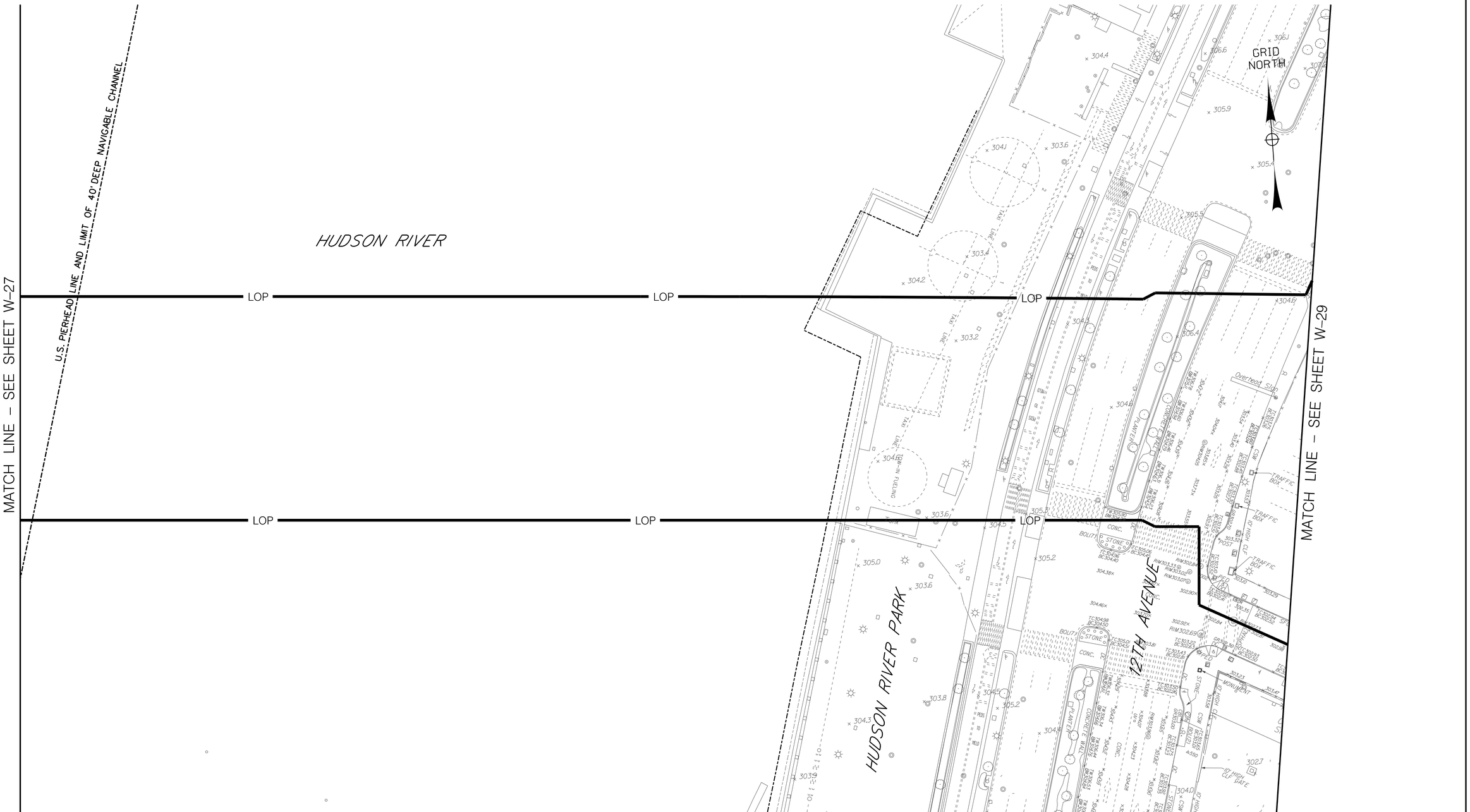
CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-27



NOTES:
1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:
- LOP — LIMIT OF PROJECT
- A1 A2 A3 A4 — WETLANDS
- ---------- — OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	1.65 ACRES
LINEAR LENGTH OF STREAM	145 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE AND NAVIGABLE CHANNEL	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH	Drawn RC	Checked MM	Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-28

MATCH LINE – SEE SHEET W-28

MATCH LINE – SEE SHEET W-30

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

- LOP – LIMIT OF PROJECT
- A1 A2 A3 A4 – WETLANDS
- ---------------- – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET
30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership

AECOM | WSP | PARSONS BRINCKERHOFF | STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING

USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-29

NOTES:

1. THE WETLAND DELINEATION WAS PERFORMED DURING NOVEMBER 1, 2, AND 3, 2016 BY WETLAND SCIENTISTS FROM AKRF, INC. OF NEW YORK, NY.
2. THE SURVEY OF THE WETLAND DELINEATION WAS PERFORMED BY GTS CONSULTANTS, INC. OF NEWARK, NJ.

LEGEND:

LOP – LIMIT OF PROJECT

A1, A2, A3, A4 – WETLANDS

- - - - - – OPEN WATERS

RESOURCES WITHIN LIMIT OF DISTURBANCE	
WETLANDS	0 ACRES
OPEN WATERS	0 ACRES
LINEAR LENGTH OF STREAM	0 FEET

SCALE IN FEET: 30' 20' 10' 0 30' 60'

No.	Revisions	Date	By
1	ADDED TABLE	3/15/17	TH

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership

AECOM | WSP | PARSONS BRINCKERHOFF | STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING

USACE JURISDICTIONAL
DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. OF
Dwg. No. W-30

	AREA OF WETLANDS WITHIN THE LIMIT OF PROJECT (Acres)	AREA OF OPEN WATERS WITHIN THE LIMIT OF PROJECT (Acres)	MEAN HIGH WATER ELEVATION (Feet)	SPRING HIGH WATER ELEVATION (Feet)
A	1.96	0.51	2.38	2.70
B	0.01	0.00	N/A	N/A
C/D	8.77	3.17	2.38	2.70
F	0.30	0.06	1.96	2.28
TOTAL	11.04	3.74		

NOTES:

1. THE PROPOSED HUDSON TUNNEL WILL EXTEND 5,569 LINEAR FEET BENEATH THE HUDSON RIVER FROM THE BULKHEAD IN HOBOKEN, NEW JERSEY TO THE BULKHEAD IN MANHATTAN, NEW YORK.

2. WITHIN THE HUDSON RIVER, THE SPRING HIGH WATER ELEVATION IN THE PROJECT AREA IS 2.28 FEET (NAVD 88)

No.	Revisions	Date	By

Amtrak®

Office of Deputy Chief Engineer
STRUCTURES
National Railroad Passenger Corporation
30th Street Station, Philadelphia, Pennsylvania 19104

AECOM USA, INC.
CERTIFICATE OF AUTHORIZATION
NO. 24GA27986000

CHRISTOPHER K. BENNETT
NJ. PROFESSIONAL ENGINEER
NO. 24GE04154800

The Gateway Trans-Hudson Partnership
AECOM WSP | PARSONS BRINCKERHOFF STV 100 Years

HUDSON TUNNEL PROJECT
PRELIMINARY ENGINEERING
USACE JURISDICTIONAL DETERMINATION PLAN

Designed TH | Drawn RC | Checked MM | Date 3/01/2017

Contract No.
Sheet No. | OF
Dwg. No. W-31

Attachment 2:
Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel City/County: Secaucus/Hudson County Sampling Date: November 3, 2016

Applicant/Owner: Amtrak State: NJ Sampling Point: A

Investigator(s): Jesse Moore and Kurt Philipp Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%):

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: URWETB – Urban land, wet substratum, 0-8% slope; WectA – Westbrook mucky peat, 0-2% slopes, very frequently flooded NWI classification: E2EMM5P6

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil Y, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	**Is the Sampled Area within a Wetland?**	**Yes** X **No**
Hydric Soil Present?	Yes X No		
Wetland Hydrology Present?	Yes X No	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Soils are made land as evidenced by the amount of ceramic and other non-soil, non-organic materials in the soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):		
Water Table Present?	Yes X	No	Depth (inches):	10	
Saturation Present?	Yes X	No	Depth (inches):	0	**Wetland Hydrology Present? Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: A

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. *Phragmites australis*	80	Y	FACW
2. *Eupatorium perfoliatum*	15	N	FACW
3. *Phytolacca americana*	5	N	FACU
4.			
5.			
6.			
7.			
8.			
9..			
10.			
11.			
12.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by	
OBL species		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 – Rapid Test for Hydrophytic Vegetation
- X 2 – Dominance Test is >50%
- ___ 3 – Prevalence Index is #3.0[1]
- ___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10YR 2/1	100					Silt clay	
12-17	10YR 3/4	100					Loamy sand	Ceramic

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (s7) (**LRR, MLRA, 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR, K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- X Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Field Observations:
Type: _____
Depth (inches): _____

Hydric Soil Present? **Yes** X **No**

Remarks:

Soils are significantly disturbed made land. Although the hydric soil indicators listed above are not present, hydrophytic vegetation and wetland hydrology indicators are present. Thus under undisturbed conditions, soils would show hydric soil indicators.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel City/County: Secaucus/Hudson County Sampling Date: November 3, 2016

Applicant/Owner: Amtrak State: NJ Sampling Point: B

Investigator(s): Jesse Moore and Kurt Philipp Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%):

Subregion (LRR or MLRA): LRR R Lat: 40.76949 Long: -74.05695 Datum:

Soil Map Unit Name: URWETB – Urban land, wet substratum, 0-8% slope NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes X	No	If yes, optional Wetland Site ID:
Wetland Hydrology Present?	Yes X	No	

Remarks: (Explain alternative procedures here or in a separate report.)

Soils are made land as evidenced by the amount of ceramic and other non-soil, non-organic materials in the soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):		
Water Table Present?	Yes	No X	Depth (inches):		
Saturation Present?	Yes X	No	Depth (inches):	11	**Wetland Hydrology Present?** **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: B

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. *Phragmites australis*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9..			
10.			
11.			
12.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by	
OBL species		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 – Rapid Test for Hydrophytic Vegetation
- X 2 – Dominance Test is >50%
- ___ 3 – Prevalence Index is #3.0[1]
- ___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-11	10YR 3/1	95	10YR 3/6	5	C	PL	Silt loam	Redox
11-24	10YR 3/1	85	2.5YR 3/6	15	C	M	Clay	Redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (s7) (**LRR, MLRA, 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR, K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Field Observations:
Type: _____
Depth (inches): _____

Hydric Soil Present? **Yes** X **No**

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel City/County: Secaucus/Hudson County Sampling Date: November 3, 2016

Applicant/Owner: Amtrak State: NJ Sampling Point: C

Investigator(s): Jesse Moore and Kurt Philipp Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%):

Subregion (LRR or MLRA): LRR R Lat: 40.76886 Long: -74.05855 Datum:

Soil Map Unit Name: URWETB – Urban land, wet substratum, 0-8% slope NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?** **Yes** **No** X
Hydric Soil Present?	Yes	No X	If yes, optional Wetland Site ID:
Wetland Hydrology Present?	Yes	No X	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present?	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: C

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. *Eupatorium perfoliatum*	5	Y	FACW
2. *Carex annectens*	1	N	FACW
3. *Solanum dulcamara*	1	N	FAC
4. *Phytolacca americana*	2	N	FACU
5. *Lythrum salicaria*	1	N	OBL
6. *Phragmites australis*	1	N	FACW
7.			
8.			
9..			
10.			
11.			
12.			
	11	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by	
OBL species		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 – Rapid Test for Hydrophytic Vegetation
- X 2 – Dominance Test is >50%
- ___ 3 – Prevalence Index is #3.0[1]
- ___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10YR 3/2	100					Silt loam	Brick fragments

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (s7) (**LRR, MLRA, 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR, K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Field Observations:
Type: _____
Depth (inches): _____

Hydric Soil Present? **Yes** **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel City/County: Secaucus/Hudson County Sampling Date: November 3, 2016

Applicant/Owner: Amtrak State: NJ Sampling Point: D

Investigator(s): Jesse Moore and Kurt Philipp Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%):

Subregion (LRR or MLRA): LRR R Lat: 40.77206 Long: -74.04547 Datum:

Soil Map Unit Name: WectA – Westbrook mucky peat, 0-2% slopes, very frequently flooded NWI classification: E2EM5Pd6

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes X	No	If yes, optional Wetland Site ID:
Wetland Hydrology Present?	Yes X	No	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes		No X	Depth (inches):	
Water Table Present?	Yes	X	No	Depth (inches):	7
Saturation Present?	Yes	X	No	Depth (inches):	0

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: D

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. Phragmites australis	25	Y	FACW
2. *Typha angustifolia*	5	N	OBL
3. *Eupatorium perfoliatum*	7	Y	FACW
4. *Baccharis halimifolia*	3	N	FACW
5. *Lythrum salicaria*	1	N	OBL
6. *Panicum sp*	1	N	
7. Panicum virgatum	5	N	FAC
8. Setaria parviflora	2	N	FAC
9.. *Euthamia graminifolia*	1	N	FAC
10. Alisma plantago-aquatica	3	N	OBL
11. Echinocloa walteri	2	N	OBL
12. Persicaria lapathifolia	1	N	FACW
	56	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by	
OBL species		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 – Rapid Test for Hydrophytic Vegetation
- X 2 – Dominance Test is >50%
- ___ 3 – Prevalence Index is #3.0[1]
- ___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: D

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-7	7.5YR 2.5/1	100					Sandy silt	Grey stone, refusal >7 inches

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (s7) (**LRR, MLRA, 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR, K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- X Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Field Observations:
Type: Refusal
Depth (inches): 7

Hydric Soil Present? **Yes** X **No**

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel – Ventilation Shaft City/County: Hoboken/Hudson County Sampling Date: December 19, 2016

Applicant/Owner: NJ TRANSIT, Hudson-Bergen Light Rail State: NJ Sampling Point: E

Investigator(s): Jesse Moore Section, Township, Range: Hoboken

Landform (hillslope, terrace, etc.): Level Local relief (concave, convex, none): None Slope (%):

Subregion (LRR or MLRA): LRR R Lat: 40.758324 Long: -74.031288 Datum:

Soil Map Unit Name: LagA – Laguardia artifactual coarse sandy loam, 0-3 percent slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil Y, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?** **Yes** **No** X
Hydric Soil Present?	Yes	No	If yes, optional Wetland Site ID:
Wetland Hydrology Present?	Yes	No X	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present?	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: E

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deltoides	20	Y	FAC
2.			
4.			
5.			
6.			
7.			
	20	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. *Digitaria sp.*	75	Y	FACU
2. *Plantago lanceolata*	5	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9..			
10.			
11.			
12.			
	80	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1. Celastrus orbiculatus	3	Y	UPL
2. Toxicodendron radicans	5	Y	FAC
3.			
4.			
	8	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by	
OBL species		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 – Rapid Test for Hydrophytic Vegetation
- X 2 – Dominance Test is >50%
- ___ 3 – Prevalence Index is #3.0[1]
- ___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: E

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-10	10YR 2/1	100					Loamy	Contains gravel and ballast

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (s7) (**LRR, MLRA, 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR, K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Field Observations:
Type: _____
Depth (inches): _____

Hydric Soil Present? **Yes** **No**

Remarks:

The ground was partially frozen and refusal was met below 10 inches depth.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Hudson Tunnel – Ventilation Shaft City/County: Hoboken/Hudson County Sampling Date: December 19, 2016

Applicant/Owner: NJ TRANSIT, Hudson-Bergen Light Rail State: NJ Sampling Point: F

Investigator(s): Jesse Moore Section, Township, Range: Hoboken

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave Slope (%):

Subregion (LRR or MLRA): LRR R Lat: 40.758113 Long: -74.030680 Datum:

Soil Map Unit Name: LagA – Laguardia artifactual coarse sandy loam, 0-3 percent slopes NWI classification: None

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil Y, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?** **Yes** X **No**
Hydric Soil Present?	Yes	No	If yes, optional Wetland Site ID:
Wetland Hydrology Present?	Yes X	No	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No	Depth (inches):	3
Water Table Present?	Yes X	No	Depth (inches):	0.5
Saturation Present?	Yes X	No	Depth (inches):	0

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

There is a culvert located at the mid-point (with regards to east-west direction) of the wetland. Waters within the wetland appeared to be brackish.

VEGETATION – Use scientific names of plants. Sampling Point: F

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
2.			
4.			
5.			
6.			
7.			
	0	=Total Cover	
Herb Stratum (Plot Size: 5' radius)			
1. *Phragmites australis*	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9..			
10.			
11.			
12.			
	100	=Total Cover	
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by	
OBL species		x1=	
FACW species		x2=	
FAC species		x3=	
FACU species		x4=	
UPL species		x5=	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 – Rapid Test for Hydrophytic Vegetation
- X 2 – Dominance Test is >50%
- ___ 3 – Prevalence Index is #3.0[1]
- ___ 4 – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: F

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3	10YR 2/2	100					Loamy sand	Contains glass, gravel, and ballast

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (s7) (**LRR, MLRA, 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR, K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Field Observations:
Type: _____
Depth (inches): _____

Hydric Soil Present? **Yes** **No**

Remarks:

The ground was partially frozen and refusal was met below 3 inches depth.

HUDSON TUNNEL

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND DRAFT SECTION 4(f) EVALUATION

APPENDIX 11-3

Essential Fish Habitat

U.S. Department of Transportation
Federal Railroad Administration

NJTRANSIT
The Way To Go.

NOAA FISHERIES
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
Essential Fish Habitat (EFH) Consultation Guidance
EFH ASSESSMENT WORKSHEET

Introduction:

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) mandates that federal agencies conduct an essential fish habitat (EFH) consultation with NOAA Fisheries regarding any of their actions authorized, funded, or undertaken that may adversely affect EFH. An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

This worksheet has been designed to assist in determining whether a consultation is necessary and in preparing EFH assessments. This worksheet should be used as your EFH assessment or as a guideline for the development of your EFH assessment. At a minimum, all the information required to complete this worksheet should be included in your EFH assessment. If the answers in the worksheet do not fully evaluate the adverse effects to EFH, we may request additional information in order to complete the consultation.

An expanded EFH assessment may be required for more complex projects in order to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. While the EFH worksheet may be used for larger projects, the format may not be sufficient to incorporate the extent of detail required, and a separate EFH assessment may be developed. However, regardless of format, the analysis outlined in this worksheet should be included for an expanded EFH assessment, along with additional information that may be necessary. This additional information includes:

- the results of on-site inspections to evaluate the habitat and site-specific effects
- the views of recognized experts on the habitat or the species that may be affected
- a review of pertinent literature and related information
- an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

Your analysis of adverse effects to EFH under the MSA should focus on impacts to the habitat for all life stages of species with designated EFH, rather than individual responses of fish species. Fish habitat includes the substrate and benthic resources (e.g., submerged

aquatic vegetation, shellfish beds, salt marsh wetlands), as well as the water column and prey species.

Consultation with us may also be necessary if a proposed action results in adverse impacts to other NOAA-trust resources. Part 6 of the worksheet is designed to help assess the effects of the action on other NOAA-trust resources. This helps maintain efficiency in our interagency coordination process. In addition, further consultation may be required if a proposed action impacts marine mammals or threatened and endangered species for which we are responsible. Staff from our Greater Atlantic Regional Fisheries Office, Protected Resources Division should be contacted regarding potential impacts to marine mammals or threatened and endangered species.

Instructions for Use:

Federal agencies must submit an EFH assessment to NOAA Fisheries as part of the EFH consultation. Your EFH assessment must include:

1) A description of the proposed action.
2) An analysis of the potential adverse effects of the action on EFH, and the managed species.
3) The federal agency's conclusions regarding the effects of the action on EFH.
4) Proposed mitigation if applicable.

In order for this worksheet to be considered as your EFH assessment, you must answer the questions in this worksheet fully and with as much detail as available. Give brief explanations for each answer.

Federal action agencies or the non-federal designated lead agency should submit the completed worksheet to NOAA Fisheries Greater Atlantic Regional Fisheries Office, Habitat Conservation Division (HCD) with the public notice or project application. Include project plans showing existing and proposed conditions, all waters of the U.S. on the project site, with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked and sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom habitat areas and shellfish beds, as well as any available site photographs.

For most consultations, NOAA Fisheries has 30 days to provide EFH conservation recommendations once we receive a complete EFH assessment. Submitting all necessary information at once minimizes delays in review and keeps review timelines consistent. Delays in providing a complete EFH assessment can result in our consultation review period extending beyond the public comment period for a particular project.

The information contained on the HCD website (http://www.greateratlantic.fisheries.noaa.gov/habitat/) will assist you in completing this worksheet. The HCD website contains information regarding: the EFH consultation process; Guide to EFH Designations which provides a geographic species list; Guide to EFH Species Descriptions which provides the legal description of EFH as well as important ecological information for each species and life stage; and other EFH reference documents including examples of EFH assessments and EFH consultations.

Our website also includes a link to the NOAA EFH Mapper (http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html). We would note that the EFH Mapper is currently being updated and revised. Should you use the EFH Mapper to identify federally managed species with designated EFH in your project area, we recommend checking this list against the Guide to Essential Fish Habitat Designations in the Northeast (http://www.greateratlantic.fisheries.noaa.gov/hcd/index2a.htm) to ensure a complete and accurate list is provided.

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES (modified 3/2016)

PROJECT NAME: Hudson Tunnel Project

DATE: June 2017

PROJECT NO.:

LOCATION (Water body, county, physical address):

Hudson River, between New York County, NY, and Hudson County, NJ, and Penhorn Creek and tributary of Penhorn Creek between County Road and the Conrail/NYSW freight railroad tracks

PREPARER: AKRF, Inc.

Step 1: Use the Habitat Conservation Division EFH webpage's Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally-managed species for the geographic area of interest (http://www.greateratlantic.fisheries.noaa.gov/hcd/index2a.htm). Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. The list can be included as an attachment to the worksheet. Make a preliminary determination on the need to conduct an EFH consultation.

1. INITIAL CONSIDERATIONS		
EFH Designations	**Yes**	**No**
Is the action located in or adjacent to EFH designated for eggs? **List the species:** See Table 1	X	
Is the action located in or adjacent to EFH designated for larvae? **List the species:** See Table 1	X	
Is the action located in or adjacent to EFH designated for juveniles? **List the species:** See Table 1	X	

Is the action located in or adjacent to EFH designated for adults or spawning adults? **List the species:** See Table 1	X	
If you answered no to all questions above, then EFH consultation is not required - go to Section 5. If you answered yes to any of the above questions proceed to Section 2 and complete remainder of the worksheet.		

<u>Step 2</u>: In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Identify the sources of the information provided and provide as much description as available. These should not be yes or no answers. Please note that there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts. Project plans that show the location and extent of sensitive habitats, as well as water depths, the HTL, MHW and MLW should be provided.

2. SITE CHARACTERISTICS

Site Characteristics	Description
Is the site intertidal, sub-tidal, or water column?	Subtidal and water column habitats are present at the project site.
What are the sediment characteristics?	Sediments in the lower Hudson River are primarily composed of silt and clay with pockets of sand.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the SAV species and spatial extent.	There is no submerged aquatic vegetation at or adjacent to the project site.
Are there wetlands present on or adjacent to the site? If so, describe the spatial extent and vegetation types.	There are wetlands present in the vicinity of the Preferred Alternative. See Attachment 2.
Is there shellfish present at or adjacent to the project site? If so, please describe	Hard clams (Mercenaria mercenaria) occur in soft substrates of the lower Hudson River year-round and could be present in the low-cover area. Soft-shell clams could also be found in the

the spatial extent and species present.	vicinity, although they would more likely occur in the shallower waters outside the low-cover area. There are no known oyster beds in the vicinity of the Project location.
Are there mudflats present at or adjacent to the project site? If so please describe the spatial extent.	There are no mudflats at or adjacent to the project site.
Is there rocky or cobble bottom habitat present at or adjacent to the project site? If so, please describe the spatial extent.	No. Sediments are silt and clay with some pockets of sand.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so for which species, what type habitat type, size, characteristics?	There are no HAPCs designated at or near the project site.
What is the typical salinity, depth and water temperature regime/range?	Salinity ranges from 0.3 to 30.5 ppt in the project area, depending on tidal direction and amount of freshwater inflow. Temperature typically ranges from 32 to 81 degrees Fahrenheit. Depth ranges from 44 to 51 feet at MLLW.
What is the normal frequency of site disturbance, both natural and man-made?	The existing underwater environment on the Hudson River experiences disturbance from boat traffic, as well as natural disturbance from tidal action. Due to the level of existing development in the area, human activity along shorelines is common. Major natural disturbances are infrequent, in the form of periodic extreme storm events.
What is the area of proposed impact (work footprint & far afield)?	See Attachment 1. In-water work in the Hudson River comprises the 1.5-acre footprint of the low-cover area where soil will be stabilized via jet grouting. New culverts and culvert extensions, access road and surface alignment embankment will permanently affect 8 acres of emergent wetlands and open waters of Penhorn Creek.

<u>Step 3</u>: This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS

Impacts	Y	N	Description
Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.			See Attachment 2 for a detailed description of the Preferred Alternative.
Will the benthic community be disturbed? If no, why not? If yes, describe in detail how the benthos will be impacted.	X		See Attachment 2. Modification of soft bottom benthic habitat in the 1.5-acre footprint of the in-water low cover area. 8 acres of wetland and open water habitat associated with Penhorn Creek will be permanently affected. An additional 4 acres will be temporarily affected.
Will SAV be impacted? If no, why not? If yes, describe in detail how the SAV will be impacted. Consider both direct and indirect impacts. Provide details of any SAV survey conducted at the site.		X	There is no submerged aquatic vegetation in the study area.
Will salt marsh habitat be impacted? If no, why not? If yes, describe in detail how wetlands will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?		X	There is no salt marsh habitat in the study area.
Will mudflat habitat be impacted? If no, why not? If yes, describe in detail how mudflats will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?		X	There is no mudflat habitat in the study area.
Will shellfish habitat be impacted? If so, provide in detail how the shellfish habitat will be impacted. What is the aerial extent of the impact?	X		Soft substrate suitable for hard and soft-shell clams, and any shellfish present at the time, will be modified within the low cover area. Shellfish would continue colonizing soft bottom habitats in the vicinity of the soil improvement area and would not be adversely affected by the Preferred Alternative.

Provide details of any shellfish survey conducted at the site.			No shellfish surveys have been conducted within the project site.
Will hard bottom (rocky, cobble, gravel) habitat be impacted at the site? If so, provide in detail how the hard bottom will be impacted. What is the aerial extent of the impact?		X	There is no hard bottom habitat at the site. The Preferred Alternative will result in the loss of soft bottom habitat within the 0.8-acre portion of soilcrete that will be level with the mudline until sediment is deposited on top. Hard bottom habitat will be added within the 0.7-acre elevated portion of soilcrete.
Will sediments be altered and/or sedimentation rates change? If no, why not? If yes, describe how.	X		Sedimentation rates will not change. Sediments will be altered from silt/clay to a mix of cement grout and native soil in the 1.5-acre area of ground improvement. See Attachment 2.
Will turbidity increase? If no, why not? If yes, describe the causes, the extent of the effects, and the duration.	X		Potential for temporary localized increases in turbidity during installation and removal of the cofferdams, during installation of culverts and culvert extensions, and the placement of fill for the access road and surface alignment. Resuspended sediment will settle quickly following these activities.
Will water depth change? What are the current and proposed depths?		X	The Preferred Alternative will not affect water depth within the 0.8-acre portion of the ground improvement level with the mudline. The 0.7-acre area of ground improvement above the mudline will result in 1-2' decrease in water depth at MLLW.
Will contaminants be released into sediments or water column? If yes, describe the nature of the contaminants and the extent of the effects.	X		There may be temporary resuspension of sediments and associated contaminants during installation and removal of the cofferdams. However, jet grouting will be performed within the cofferdams and will not release contaminants into the water column. Any resuspension will be minor and sediments will settle quickly after construction.
Will tidal flow, currents, or wave patterns be altered? If no, why not? If yes, describe in detail how.		X	The Preferred Alternative will not alter tidal flow, currents, or wave patterns.
Will ambient salinity or temperature regime change? If no, why not? If yes, describe in detail how and the effects of the change.		X	The Preferred Alternative will not affect ambient salinity or temperature regimes.

Will water quality be altered? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration of the impact.	X		Installation and removal of the cofferdams may result in temporary and localized increases in turbidity. Any resuspended sediments will settle quickly upon cessation of these activities. The jet grouting will be completed within the cofferdams and will not affect water quality. No permanent effects to water quality are expected as a result of the Preferred Alternative.
Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.	X		The Preferred Alternative will result in a minimal temporary increase in underwater noise associated with the installation of the sheet pile cofferdams and increased vessel activity. See Attachment 2
Does the action have the potential to impact prey species of federally managed fish with EFH designations?	X		The Preferred Alternative will result in the permanent modification to 0.7 acres of soft substrate, which may serve as habitat for prey species of benthic-feeding EFH species. See Attachment 2.

<u>Step 4</u>: This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species (from the list generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage (<u>http://www.greateratlantic.fisheries.noaa.gov/hcd/list.htm</u>) should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT			
Functions and Values	**Y**	**N**	**Describe habitat type, species and life stages to be adversely impacted**
Will functions and values of EFH be impacted for:			
<u>Spawning</u> **If yes, describe in detail**	X		Spawning winter flounder may be present during Jan-Apr, and windowpane may be present in May. See Attachment 3.

how, and for which species. Describe how adverse effects will be avoided and minimized.			
<u>Nursery</u> **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	X		Temporary effects on butterfish, windowpane, Atlantic herring, summer flounder, and smooth dogfish could occur. See Attachment 3.
<u>Forage</u> **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	X		Temporary and permanent effects on juvenile and adult windowpane, summer flounder, winter flounder, and clearnose, little, and winter skate foraging could occur. See Attachment 3.
<u>Shelter</u> **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	X		The addition of 0.7 acres of elevated soilcrete may provide shelter habitat for EFH species such as black sea bass where there was previously only soft bottom habitat.
Will impacts be temporary or permanent? Describe the duration of the impacts.	X		The Preferred Alternative will have both temporary and permanent effects. See Attachment 3.
Will compensatory mitigation be used? If no, why not? Describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation plan, if applicable.	X		Recovery of the 0.7 acres of elevated soilcrete will be monitored for five years to assess the habitat use and re-sedimentation of the modified river bottom. Monitoring of this area will be conducted in consultation with the USACE, NMFS, and NYSDEC

<u>Step 5</u>: This section provides the federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

Please note: if information provided in the worksheet is insufficient to allow NOAA Fisheries to complete the EFH consultation additional information will be requested.

5. DETERMINATION OF IMPACT

	/	Federal Agency's EFH Determination
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: **(check the appropriate statement)**		**There is no adverse effect on EFH or no EFH is designated at the project site.** **EFH Consultation is not required**
	X	**The adverse effect on EFH is not substantial.** **This means that the adverse effects are either no more than minimal, temporary, or that they can be alleviated with minor project modifications or conservation recommendations.** **This is a request for an abbreviated EFH consultation.**
		The adverse effect on EFH is substantial. **This is a request for an expanded EFH consultation**

Step 6: Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats as part of the Fish and Wildlife Coordination Act Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT	
Species known to occur at site (list others that may apply)	**Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.**
alewife	See Attachment 4
American eel	See Attachment 4
American shad	See Attachment 4
Atlantic menhaden	See Attachment 4
blue crab	See Attachment 4
blue mussel	See Attachment 4
blueback herring	See Attachment 4
Eastern oyster	See Attachment 4
horseshoe crab	See Attachment 4
quahog	See Attachment 4
soft-shell clams	See Attachment 4
striped bass	See Attachment 4
other species:	Impacts to sturgeon are included in Attachment 4

Useful Links

National Wetland Inventory Maps
http://www.fws.gov/wetlands/

EPA's National Estuaries Program
http://www.epa.gov/nep/information-about-local-estuary-programs

Northeast Regional Ocean Council (NROC) Data Portal
http://www.northeastoceandata.org/

Mid-Atlantic Regional Council on the Ocean (MARCO) Data Portal
http://portal.midatlanticocean.org/

Resources by State:

Maine

Eelgrass maps
http://www.maine.gov/dmr/rm/eelgrass/
Maine Office of GIS Data Catalog
http://www.maine.gov/megis/catalog/
Casco Bay Estuary Partnership
http://www.cascobayestuary.org/
Maine GIS Stream Habitat Viewer
http://mapserver.maine.gov/streamviewer/index.html

New Hampshire

New Hampshire's Statewide GIS Clearinghouse, NH GRANIT
http://www.granit.unh.edu/
New Hampshire Coastal Viewer
http://www.granit.unh.edu/nhcoastalviewer/

Massachusetts

Eelgrass maps
http://maps.massgis.state.ma.us/images/dep/eelgrass/eelgrass_map.htm
MADMF Recommended Time of Year Restrictions Document
http://www.mass.gov/eea/docs/dfg/dmf/publications/tr-47.pdf
Massachusetts Bays National Estuary Program
http://www.mass.gov/eea/agencies/mass-bays-program/
Buzzards Bay National Estuary Program
http://buzzardsbay.org/
Massachusetts Division of Marine Fisheries
http://www.mass.gov/eea/agencies/dfg/dmf/
Massachusetts Office of Coastal Zone Management
http://www.mass.gov/eea/agencies/czm/

Rhode Island

Eelgrass maps
http://www.savebay.org/file/2012_Mapping_Submerged_Aquatic_Vegetation_final_report_4_2013.pdf
Narraganset Bay Estuary Program

http://www.dem.ri.gov/programs/benviron/water/wetlands/wetldocs.htm
Rhode Island Division of Marine Fisheries
http://www.dem.ri.gov/
Rhode Island Coastal Resources Management Council
http://www.crmc.ri.gov/

Connecticut
Eelgrass Maps
https://www.fws.gov/northeast/ecologicalservices/pdf/wetlands/2012_CT_Eelgrass_Final_Report_11_26_2013.pdf
Long Island Sound Study
http://longislandsoundstudy.net/
CT GIS Resources
http://www.ct.gov/deep/cwp/view.asp?a=2698&q=323342&deepNav_GID=1707
CT DEEP Office of Long Island Sound Programs and Fisheries
http://www.ct.gov/deep/
CT Bureau of Aquaculture Shellfish Maps
http://www.ct.gov/doag/cwp/view.asp?a=3768&q=451508&doagNav=
CT River Watershed Council
http://www.ctriver.org/

New York
Eelgrass report
http://www.dec.ny.gov/docs/fish_marine_pdf/finalseagrassreport.pdf
Peconic Estuary Program
http://www.peconicestuary.org/
NY/NJ Harbor Estuary
http://www.harborestuary.org/

New Jersey
Submerged Aquatic Vegetation mapping
http://crssa.rutgers.edu/projects/coastal/sav/
Barnegat Bay Partnership
http://bbp.ocean.edu/pages/1.asp

Delaware
Partnership for the Delaware Estuary
http://www.delawareestuary.org/
Center for Delaware Inland Bays
http://www.inlandbays.org/

Maryland
Submerged Aquatic Vegetation mapping
http://data.imap.maryland.gov/datasets/da64df6bd4124ce9989e6c186a7906a7_0
MERLIN
http://geodata.md.gov/imaptemplate/?appid=a8ec7e2ff4c34a31bc1e9411ed8e7a7e
Maryland Coastal Bays Program
http://www.mdcoastalbays.org/

Virginia
Submerged Aquatic Vegetation mapping
http://web.vims.edu/bio/sav/maps.html

Table 1

Essential Fish Habitat Designated Species in the Vicinity of the Hudson Tunnel Project

Species	Eggs	Larvae	Juveniles	Adults
Red Hake (*Urophycis chuss)*		X	X	X
Redfish (*Sebastes fasciatus*)	n/a			
Winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
Windowpane flounder (*Scophthalmus aquosus*)	X	X	X	X
Atlantic herring (*Clupea harengus*)		X	X	X
Bluefish (*Pomatomus saltatrix*)			X	X
Long-finned squid (*Loligo pealeii*)	n/a	n/a		
Short-finned squid (*Illex illecebrosus*)	n/a	n/a		
Atlantic butterfish (*Peprilus triacanthus*)		X	X	X
Atlantic mackerel (*Scomber scombrus*)			X	X
Summer flounder (*Paralicthys dentatus*)		X	X	X
Scup (*Stenotomus chrysops*)	X	X	X	
Black sea bass (*Centropristis striata*)	n/a		X	X
Surf clam (*Spisula solidissima*)	n/a	n/a		
Ocean quahog (*Artica islandica*)	n/a	n/a		
Spiny dogfish (*Squalus acanthias*)	n/a	n/a		
King mackerel (*Scomberomorus cavalla*)	X	X	X	X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
Cobia (*Rachycentron canadum*)	X	X	X	X
Clearnose skate (*Raja eglanteria*)			X	X
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X
Bluefin tuna (*Thunnus thynnus*)	X	X	X	X
Smooth dogfish (*Mustelus canis*)	X	X	X	X
Sand tiger shark (*Carcharias taurus*)		X[(1)]		X
Dusky shark (*Carcharinus obscurus*)		X[(1)]		
Sandbar shark (*Carcharinus plumbeus*)		X[(1)]		

Notes: n/a – insufficient data for this life stage exists and no EFH designation has been made.

[(1)] These species do not have a free-swimming larval stage; rather they are live bearers that give birth to fully formed juveniles. For the purposes of this table, “larvae” for sand tiger, dusky, and sandbar sharks refers to neonates and early juveniles.

Sources: National Marine Fisheries Service. “Summary of Essential Fish Habitat (EFH) Designation” posted on the Internet at http://www.nero.noaa.gov/hcd/STATES4/new_jersey/40407400.html and http://www.nero.noaa.gov/hcd/skateefhmaps.htm National Marine Fisheries Service EFH Mapper accessed online at http://www.habitat.noaa.gov/protection/efh/habitatmapper.html

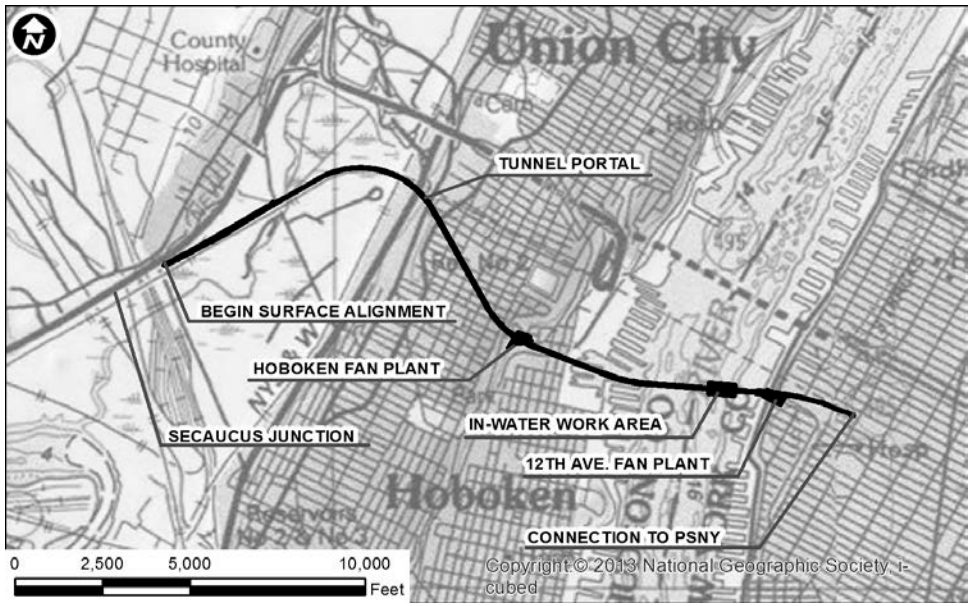
ATTACHMENT 1

AMTRAK

HUDSON TUNNEL PROJECT

U.S. Army Corps of Engineers Section 404/10 Permit Plans

Contract # 9500001023 | June 23, 2017



Submitted To:

US Army Corps of Engineers

Submitted By:

The Gateway Trans-Hudson Partnership

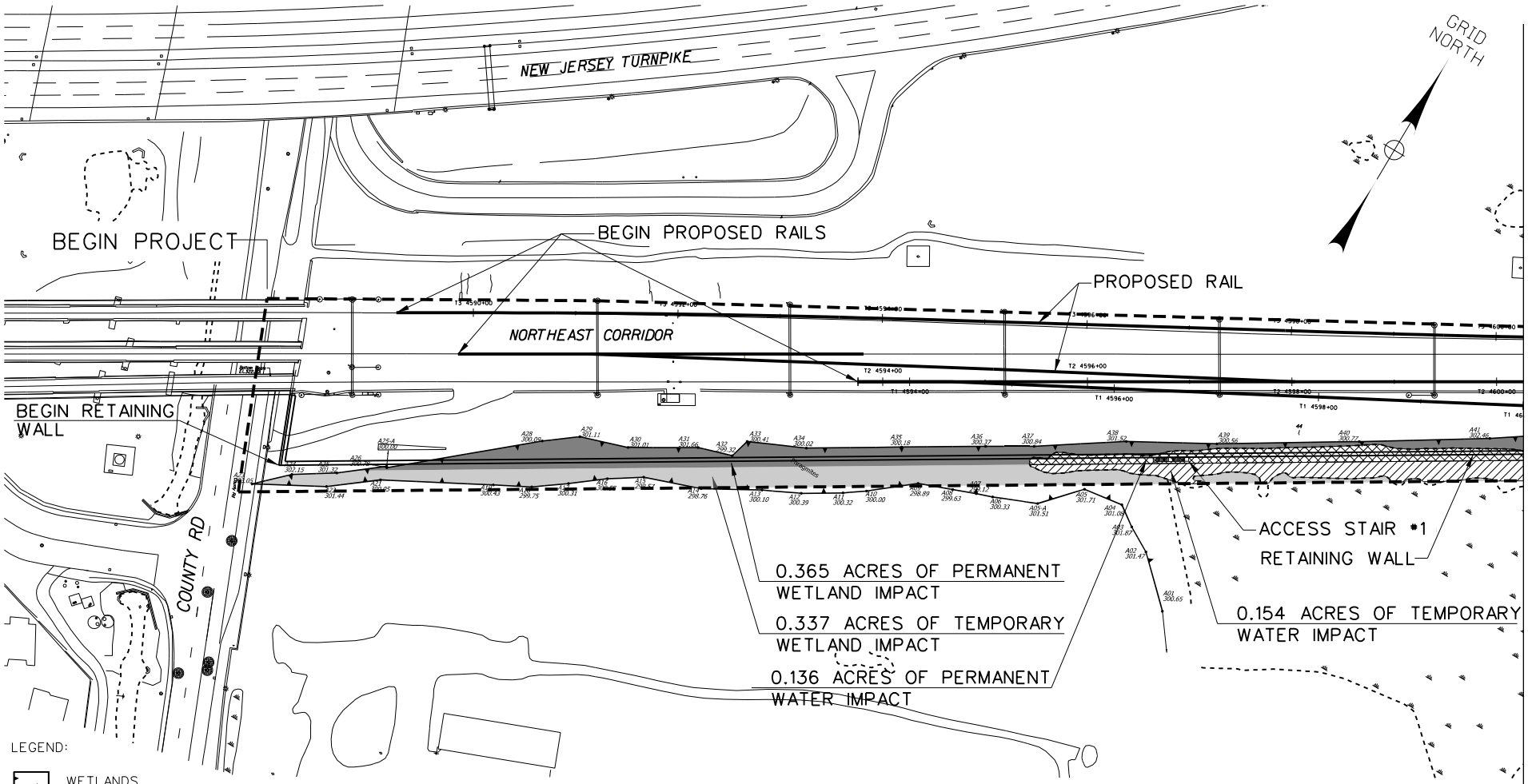
AECOM WSP PARSONS BRINCKERHOFF STV

IMPACT SUMMARY TABLE	
PERMANENT WETLAND IMPACT	5.367 ACRES
TEMPORARY WETLAND IMPACT	3.799 ACRES
PERMANENT WATER IMPACT	4.157 ACRES
TEMPORARY WATER IMPACT	0.508 ACRES
VIADUCT OVER WETLAND	0.067 ACRES
VIADUCT OVER WATER	0.216 ACRES

ATTACHMENT 1

NEWARK

NEW YORK



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.365	0.136
TEMPORARY	0.337	0.154

SCALE IN FEET

150' 0' 150' 300'

THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

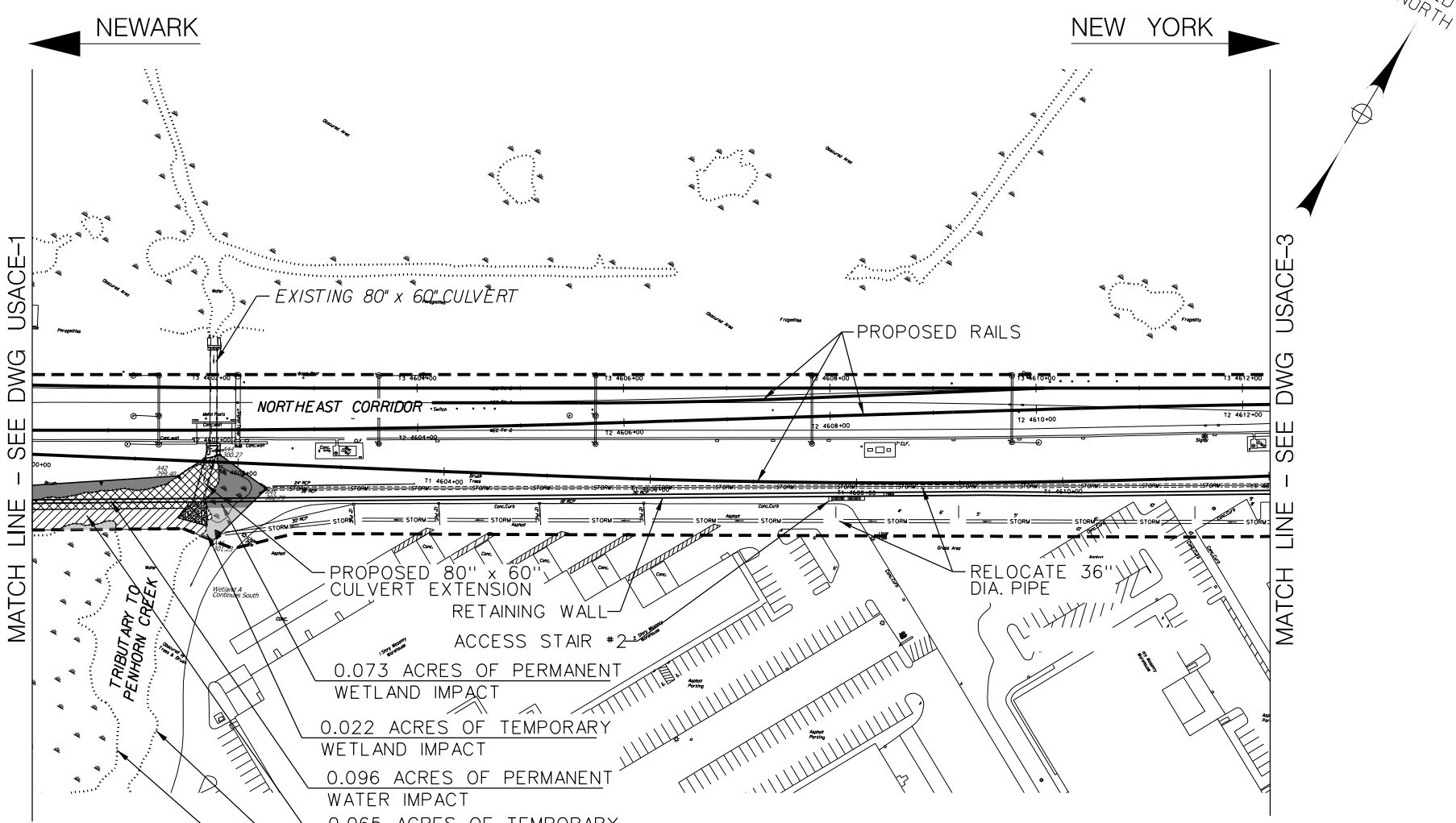
DWG# USACE-1

The Gateway Trans-Hudson Partnership

AECOM WSP PARSONS BRINCKERHOFF STV

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE-1.dgn 4/27/2017 1:54:55 PM $TBLNAME$ $PRFNAME$

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.073	0.096
TEMPORARY	0.022	0.065

SCALE IN FEET

150' 0' 150' 300'

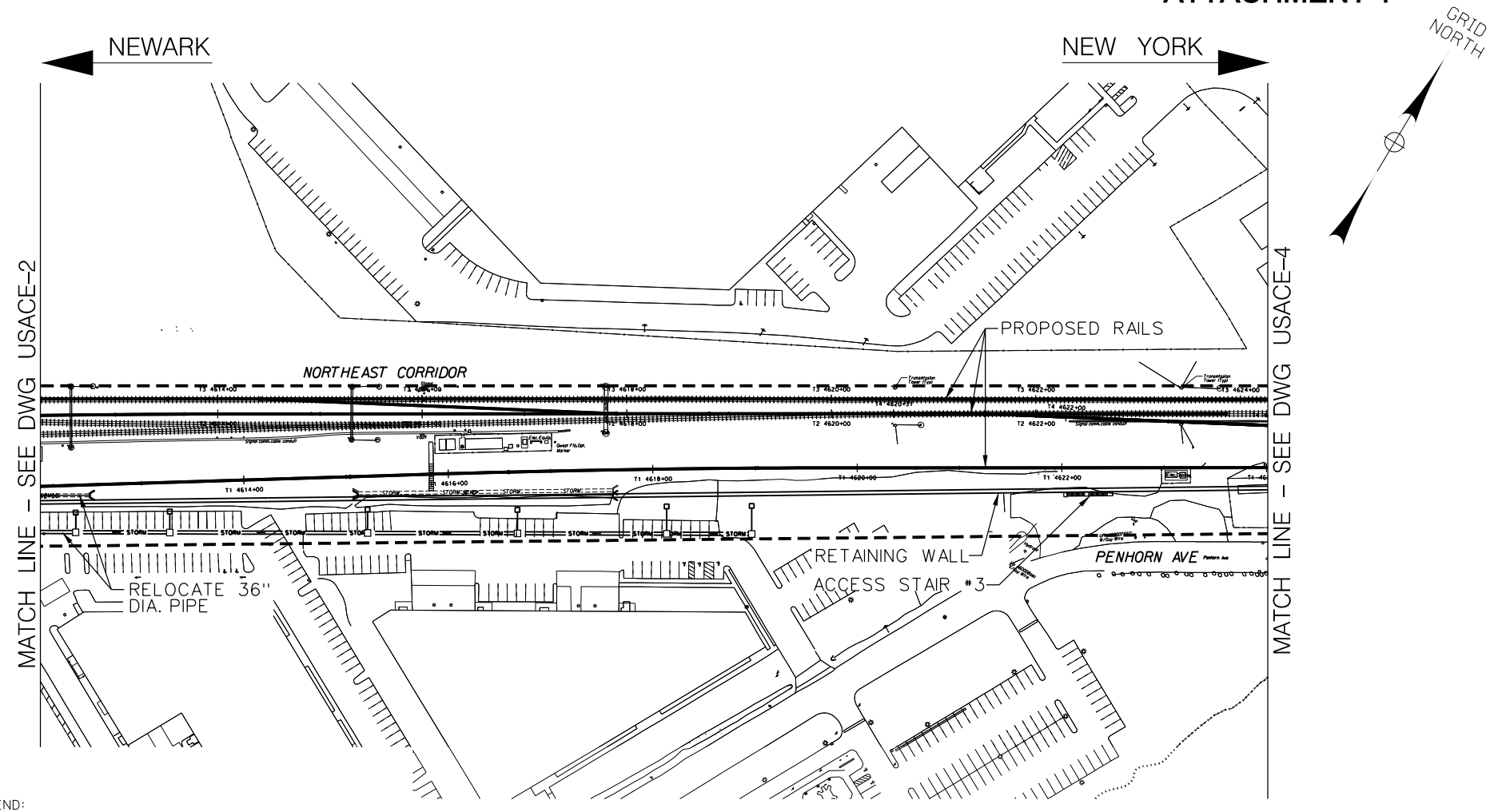
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-2

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE-3.dgn 4/27/2017 1:54:57 PM $TBLNAME$ $PRFNAME$

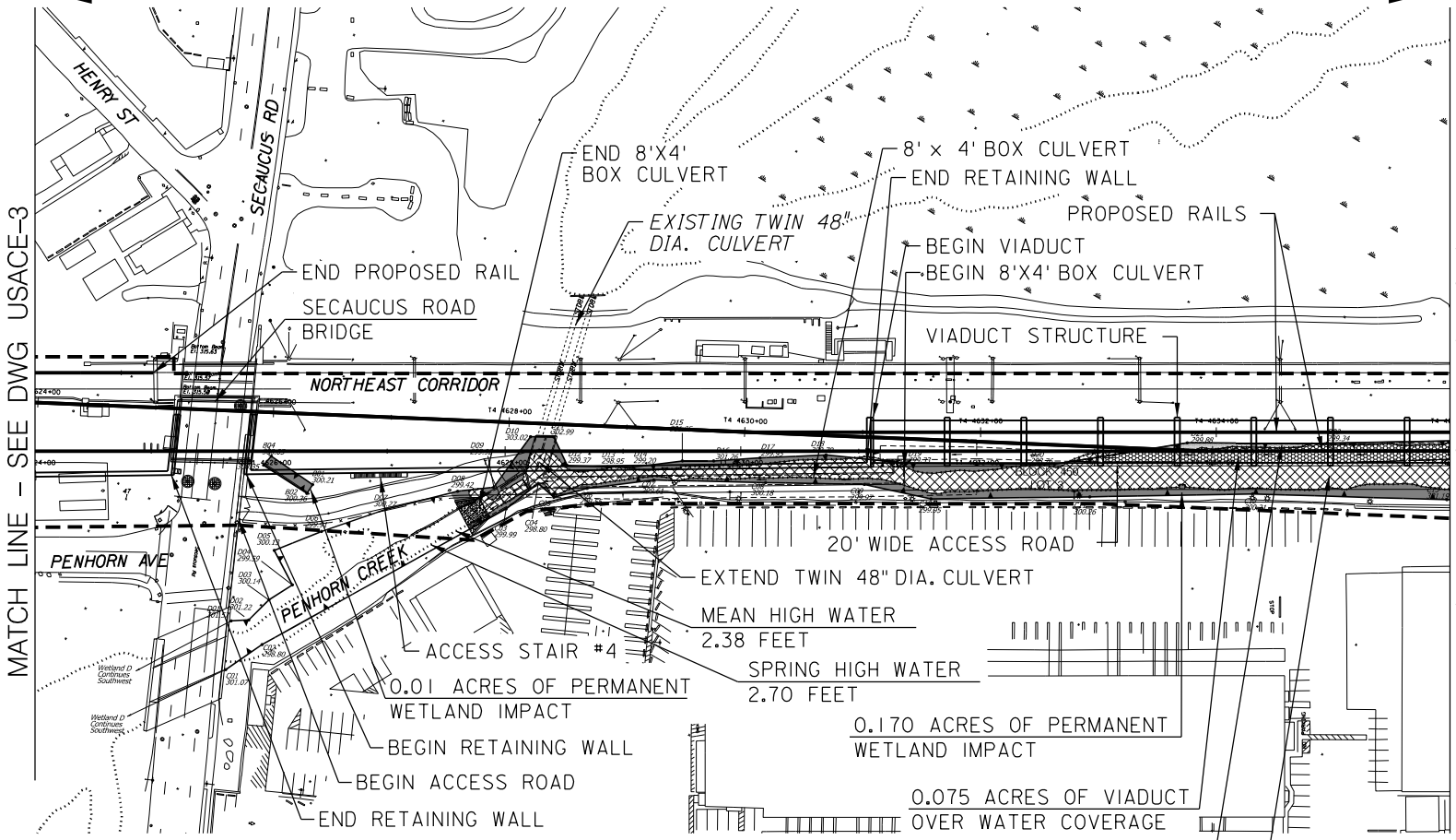
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-3

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- VIADUCT OVER WATER COVERAGE
- VIADUCT OVER WETLAND COVERAGE
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

VIADUCT COVERAGE (ACRES)	
OVER WETLAND	0.025
OVER WATER	0.075

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.180	0.360
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

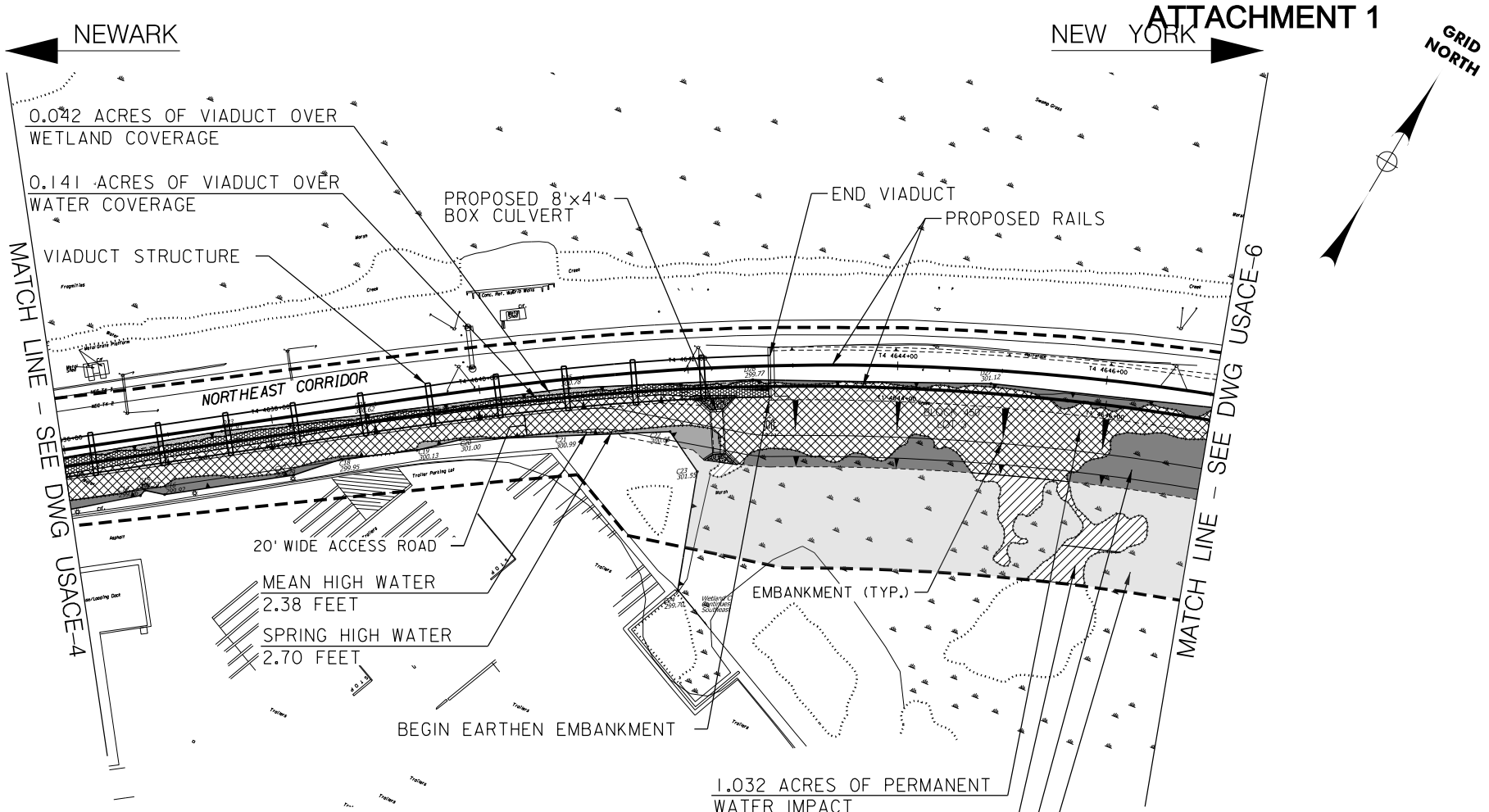
DWG# USACE-4

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV 100

$PRFNAME$ $TBLNAME$ $TIME$ $DATE$ $FILE$

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- VIADUCT OVER WATER COVERAGE
- VIADUCT OVER WETLAND COVERAGE
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

VIADUCT COVERAGE (ACRES)	
OVER WETLAND	0.042
OVER WATER	0.141

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.350	1.032
TEMPORARY	0.901	0.144

THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

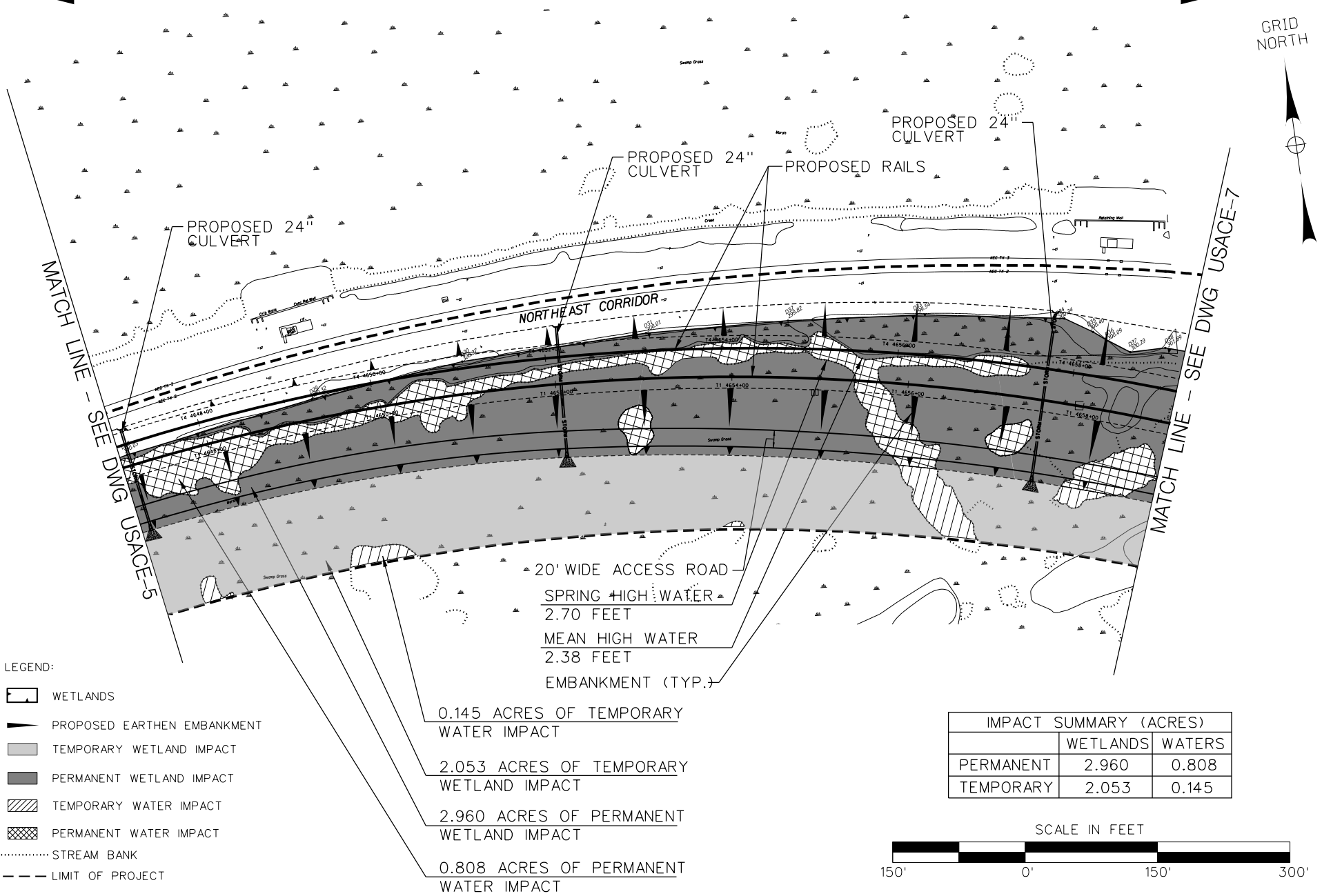
DWG# USACE-5

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

$PRFNAME$ $TBLNAME$ $TIME$ $DATE$ $FILE$

ATTACHMENT 1



IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	2.960	0.808
TEMPORARY	2.053	0.145

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE 6.dgn $PRFNAME$ $TBLNAME$ 4/27/2017 1:54:59 PM

Amtrak®

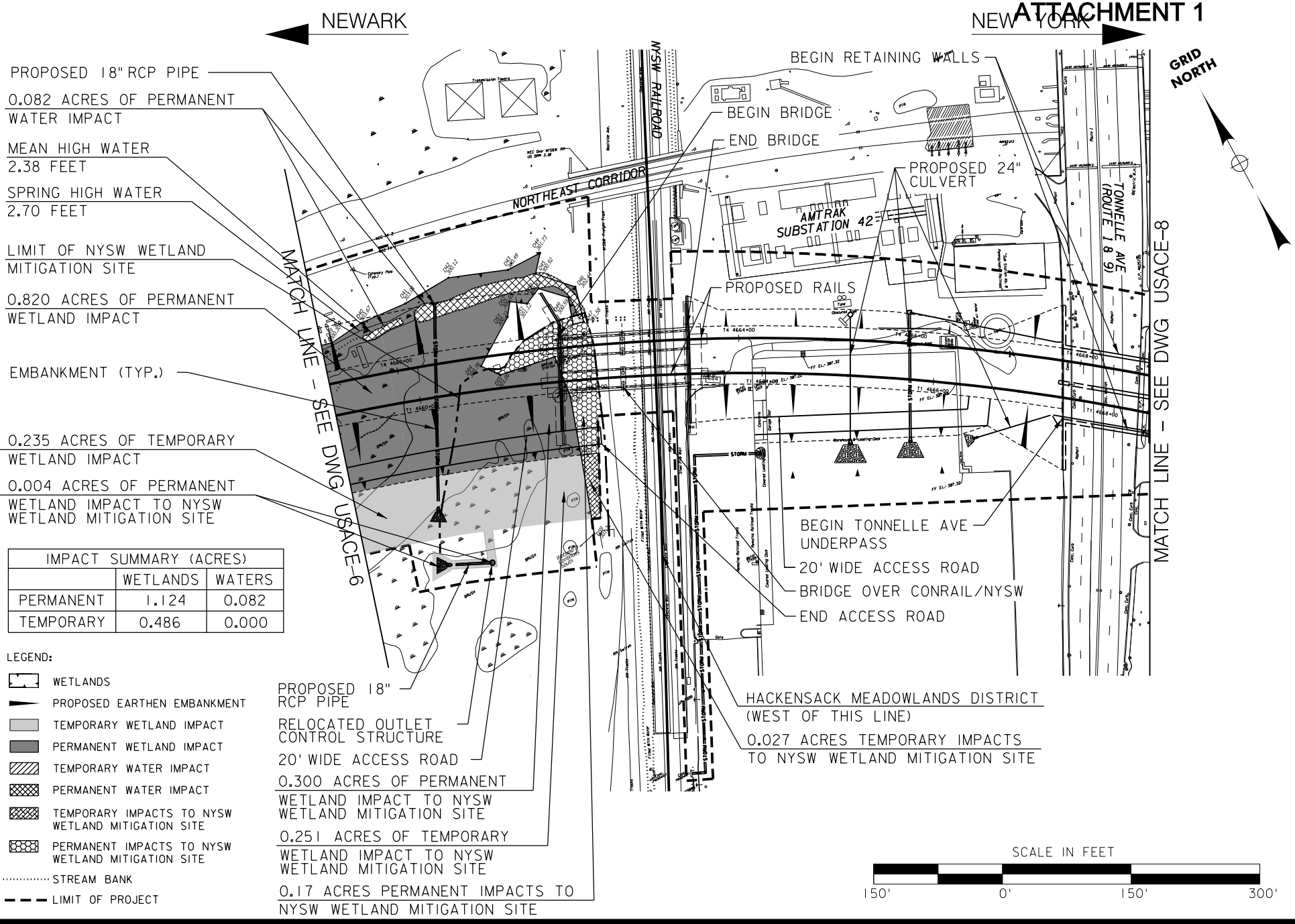
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-6

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV 100

ATTACHMENT 1



IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	1.124	0.082
TEMPORARY	0.486	0.000

LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- TEMPORARY IMPACTS TO NYSW WETLAND MITIGATION SITE
- PERMANENT IMPACTS TO NYSW WETLAND MITIGATION SITE
- STREAM BANK
- LIMIT OF PROJECT

$PRFNAME$ $TBLNAME$ $TIME$ $DATE$ $FILE$

Amtrak®

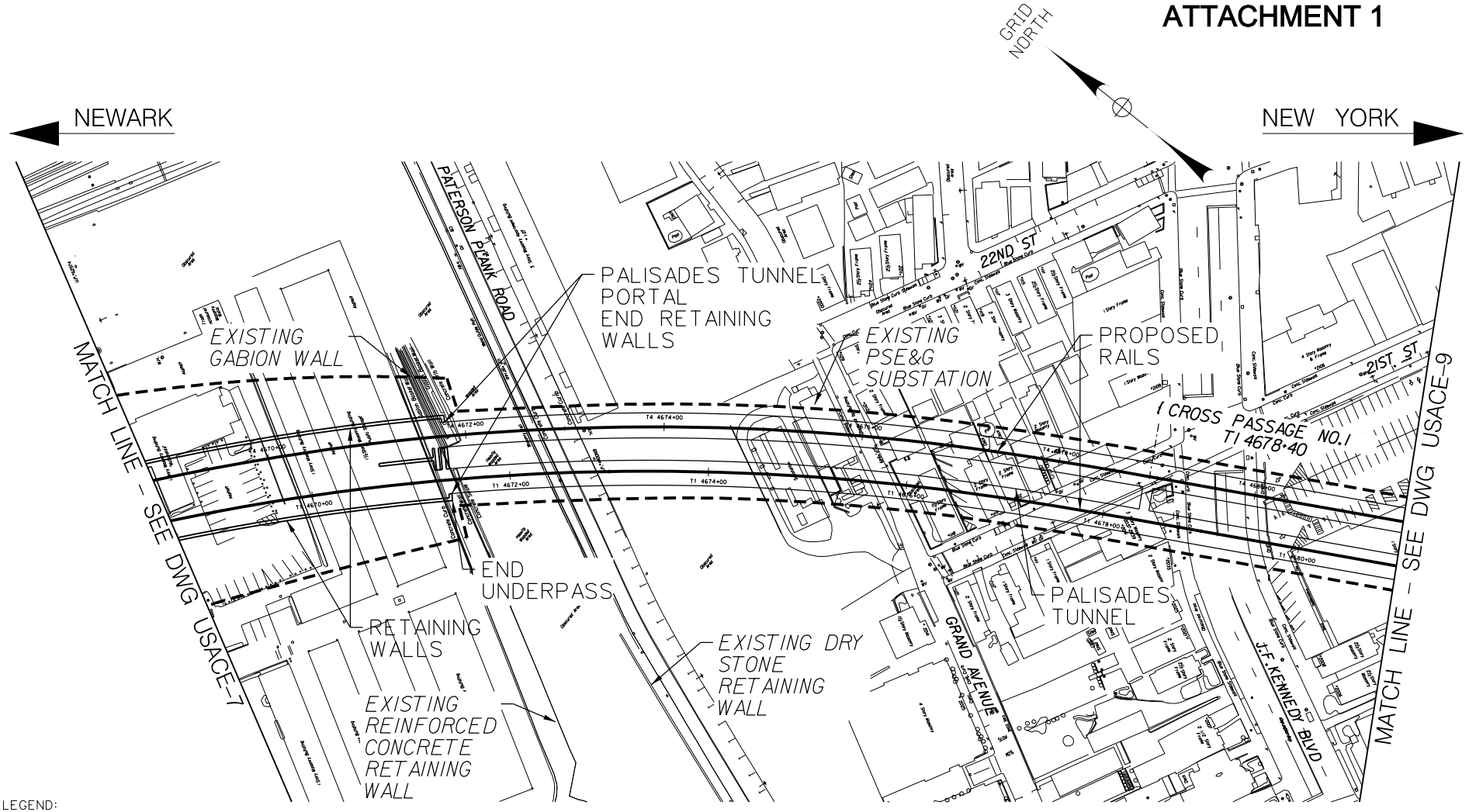
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-7

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE 8.dgn $PRFNAME$ $TBLNAME$ 4/27/2017 1:55:01 PM

Amtrak®

THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-8

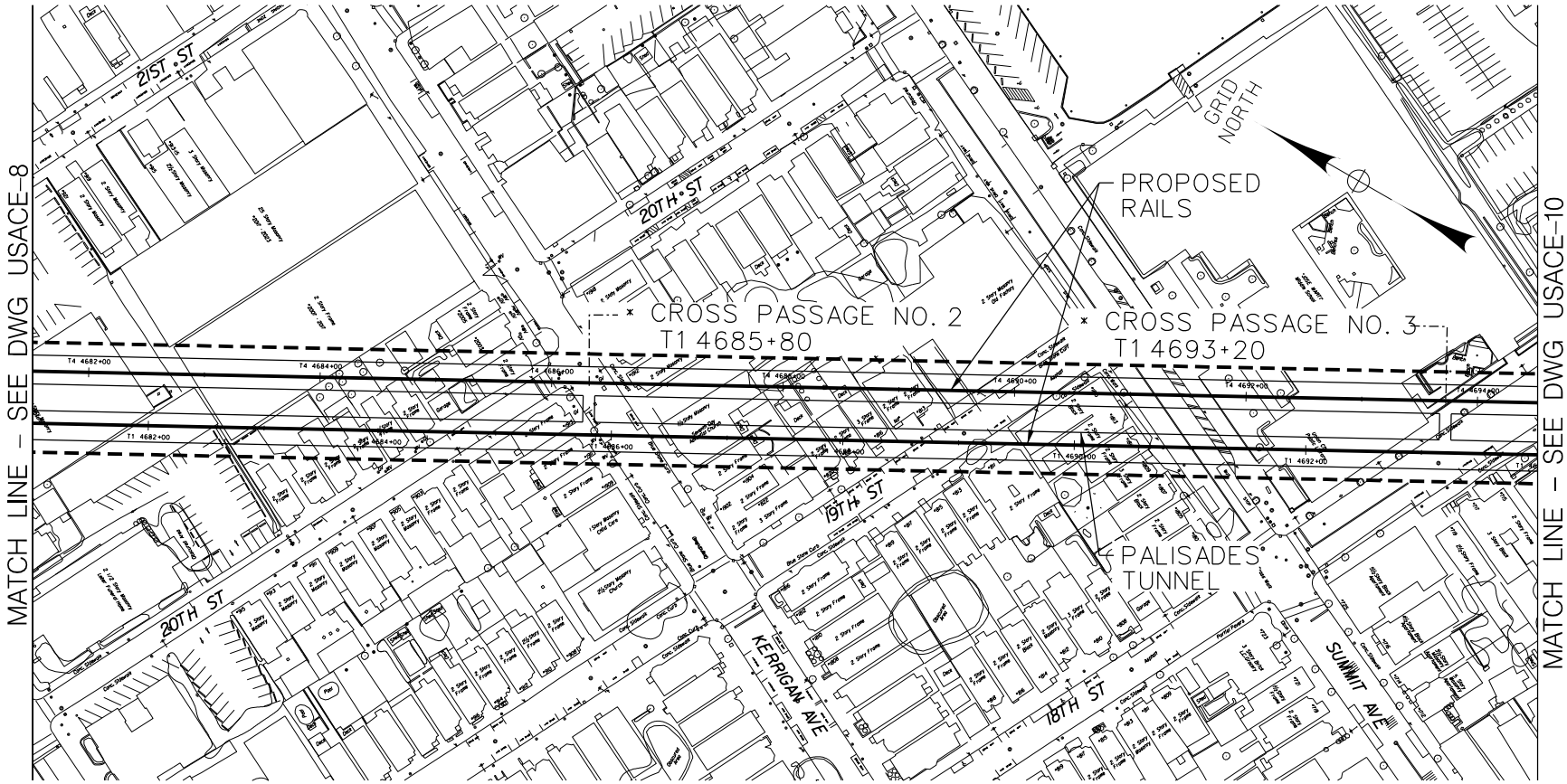
The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1

NEWARK

NEW YORK



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE 9.dgn 4/27/2017 1:55:02 PM $PRFNAME$ $TBLNAME$

Amtrak®

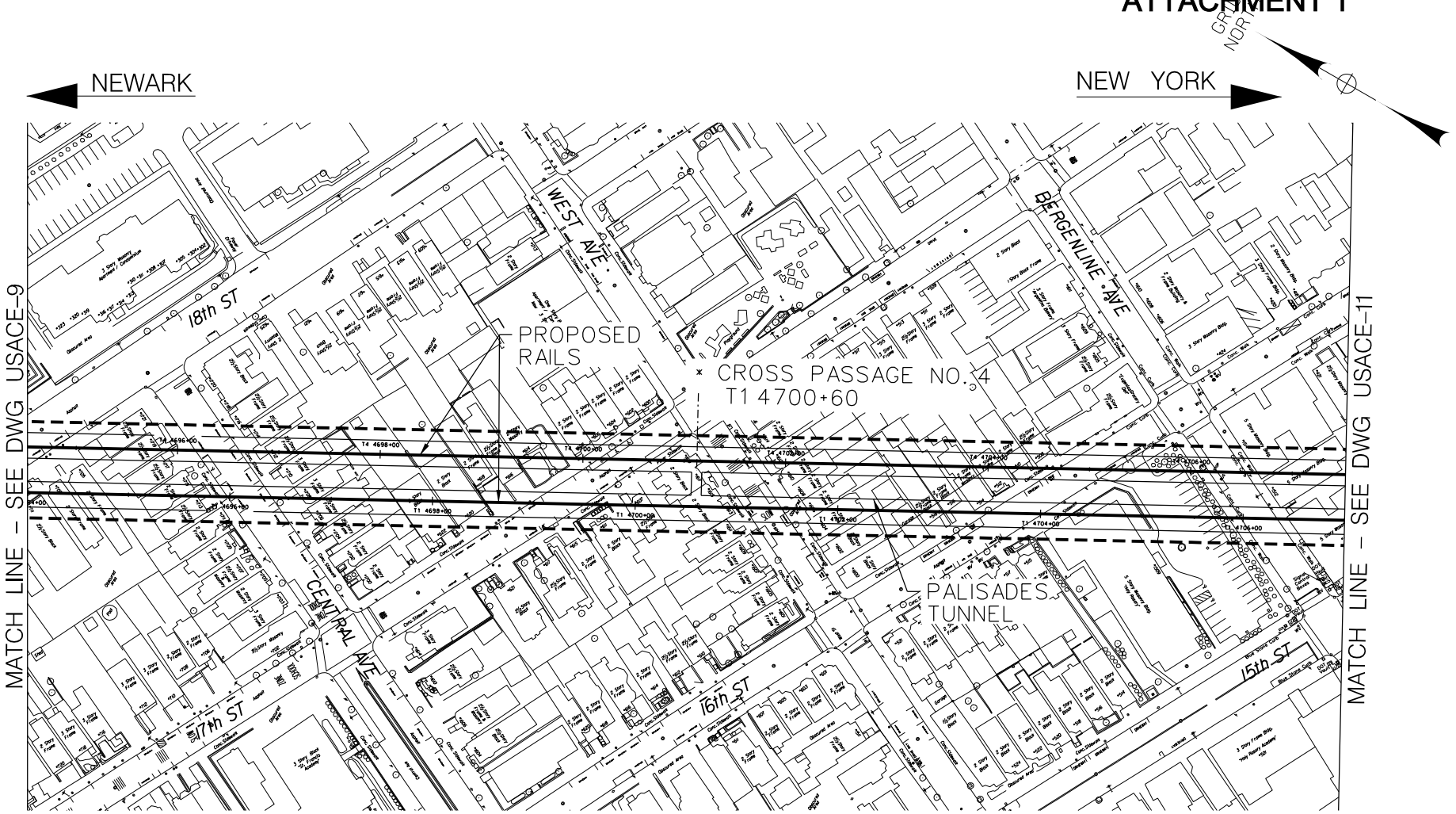
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-9

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE-10.dgn 4/27/2017 1:55:02 PM $TBLNAME$ $PRFNAME$

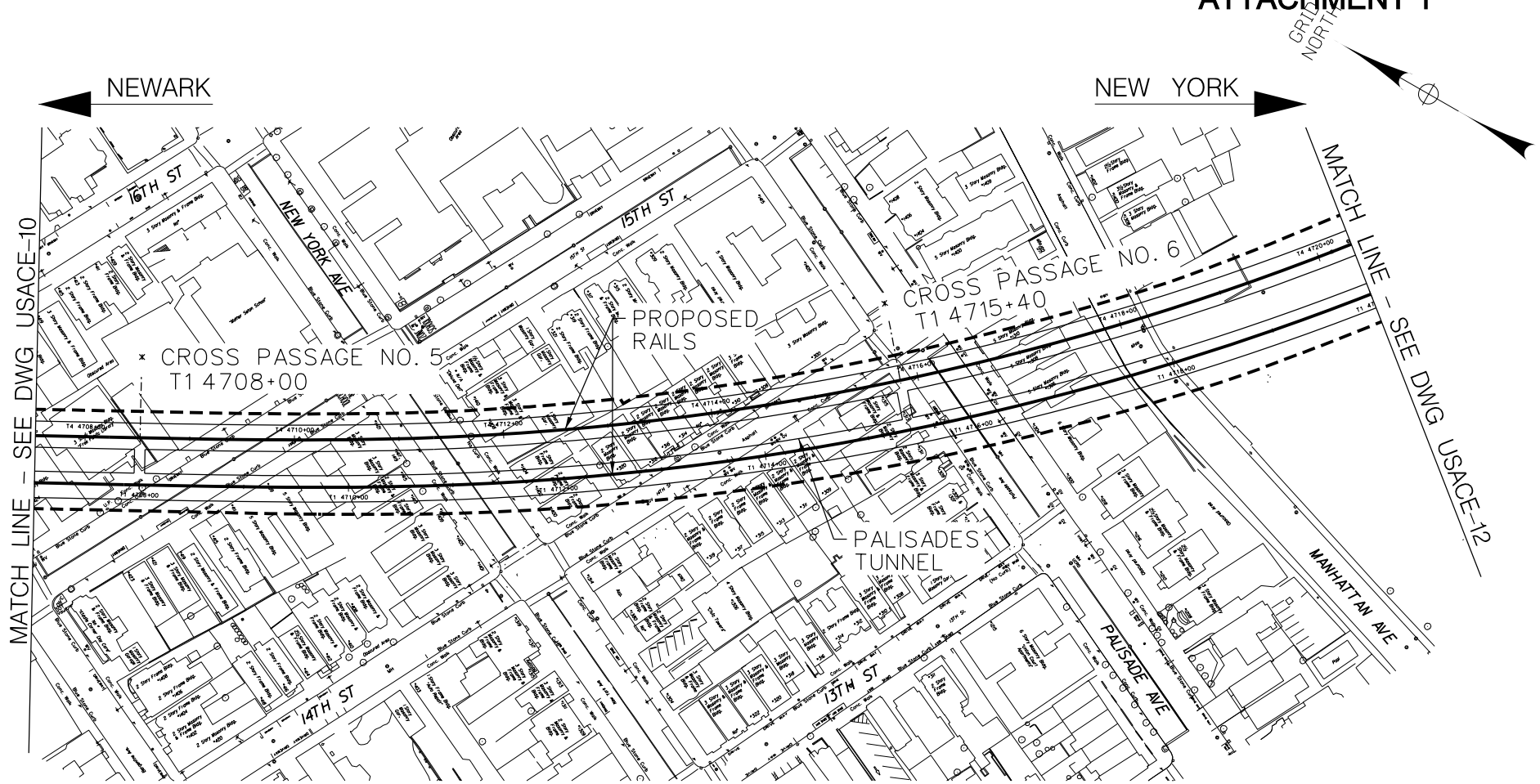
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-10

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK-USACE-11.dgn 4/27/2017 1:55:03 PM $TBLNAME$ $PRFNAME$

Amtrak®

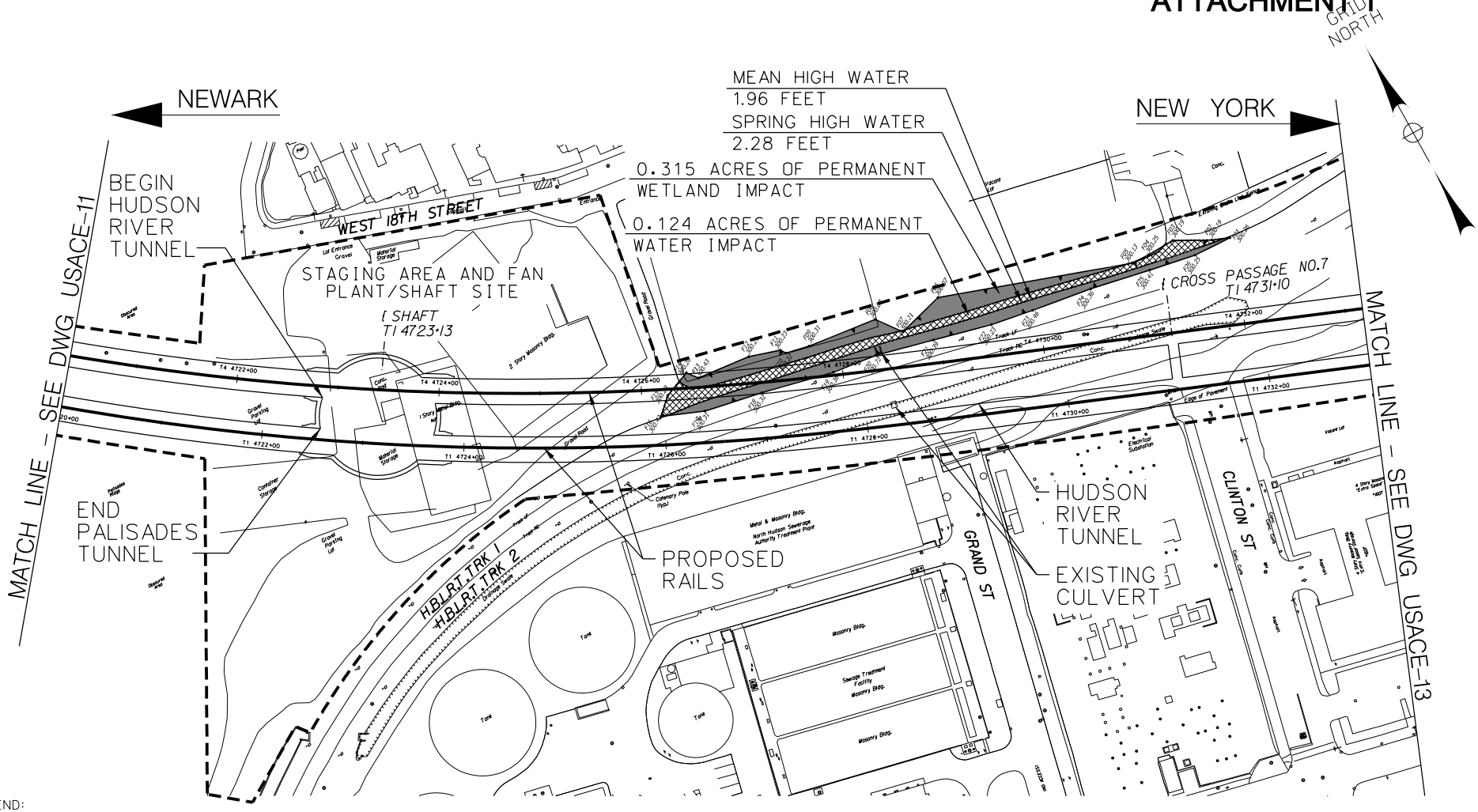
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-11

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.315	0.124
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

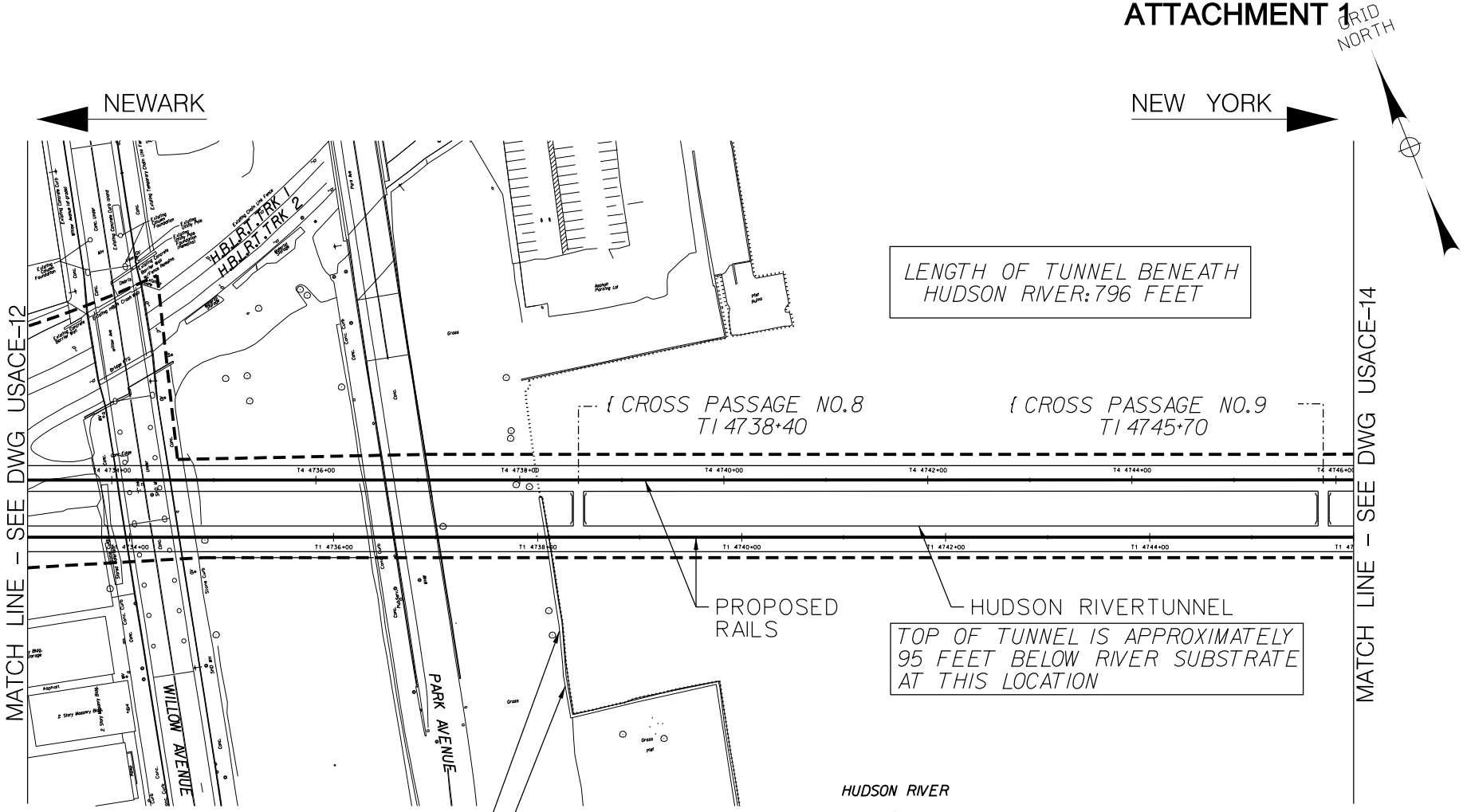
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-12

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE-13.dgn 4/27/2017 1:55:05 PM $TBLNAME$ $PRFNAME$

Amtrak®

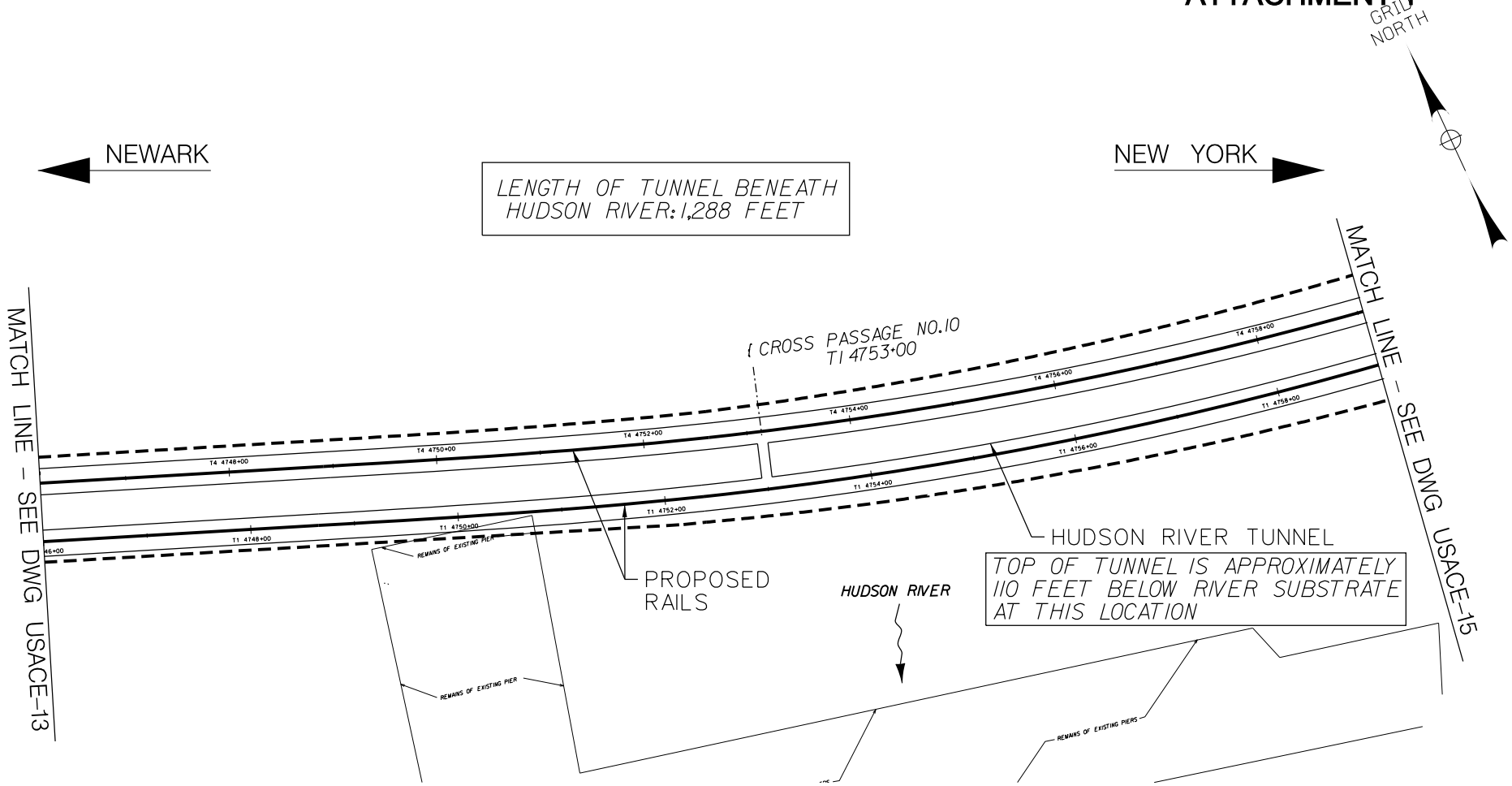
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-13

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV 100

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE-14.dgn 4/27/2017 1:55:05 PM $TBLNAME$ $PRFNAME$

Amtrak®

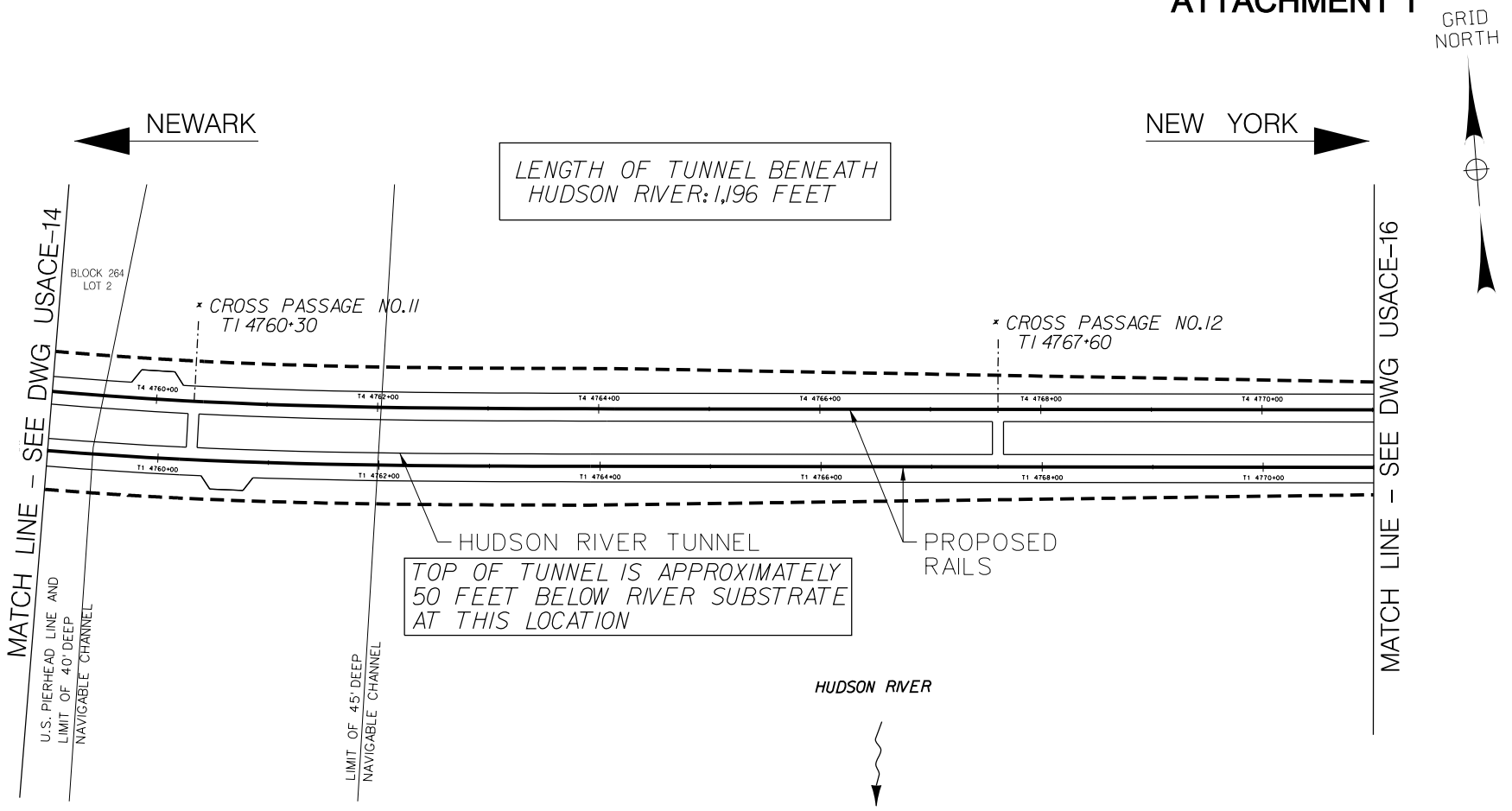
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-14

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE-15.dgn 4/27/2017 1:55:06 PM $TBLNAME$ $PRFNAME$

Amtrak®

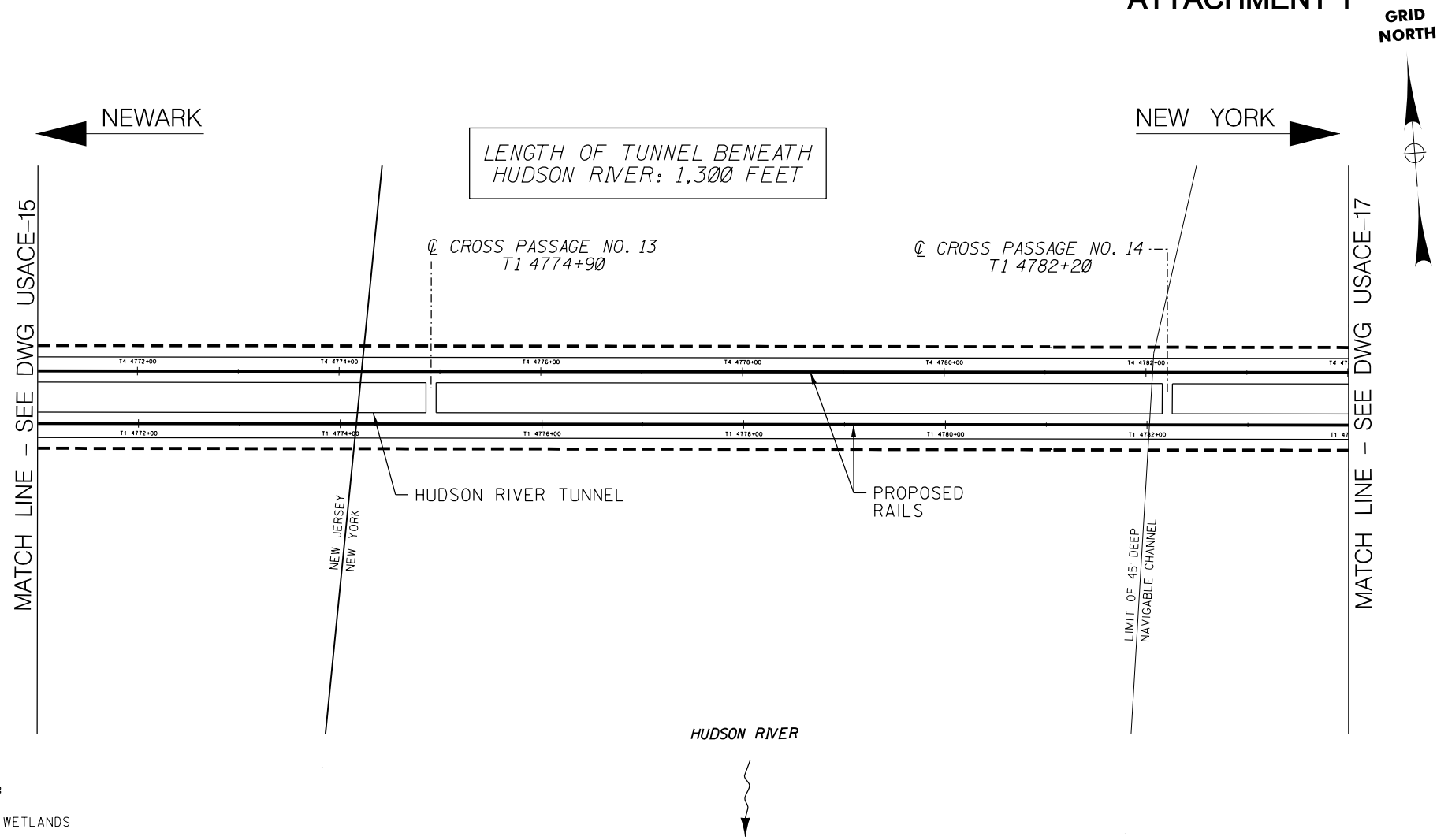
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-15

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- WATER SHADING
- WETLAND SHADING
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.777
TEMPORARY	0.000	0.000

NOTE:

1. IMPACT LOCATIONS PURPOSELY NOT SHOWN.

SCALE IN FEET

150' 0' 150' 300'

$PRFNAME$ $TBLNAME$ $TIME$ $DATE$ $FILE$

Amtrak®

THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-16

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV 100

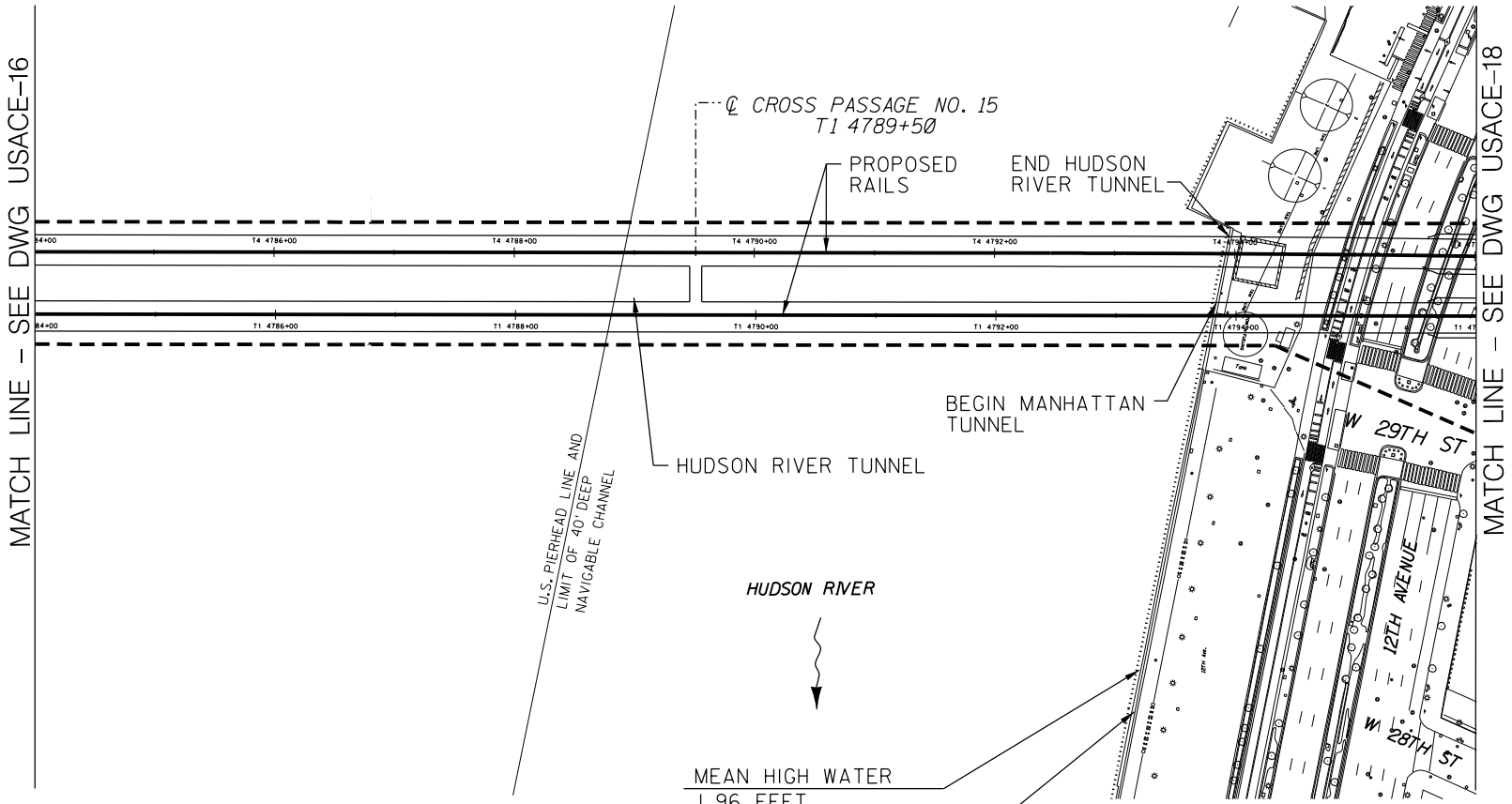
ATTACHMENT 1

GRID NORTH

LENGTH OF TUNNEL BENEATH HUDSON RIVER: 989 FEET

NEWARK

NEW YORK



MEAN HIGH WATER
1.96 FEET

SPRING HIGH WATER
2.28 FEET

LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- WATER SHADING
- WETLAND SHADING
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.742
TEMPORARY	0.000	0.000

NOTE:

1. IMPACT LOCATIONS PURPOSELY NOT SHOWN.

SCALE IN FEET

150' 0' 150' 300'

$PRFNAME$ $TBLNAME$ $TIME$ $DATE$ $FILE$

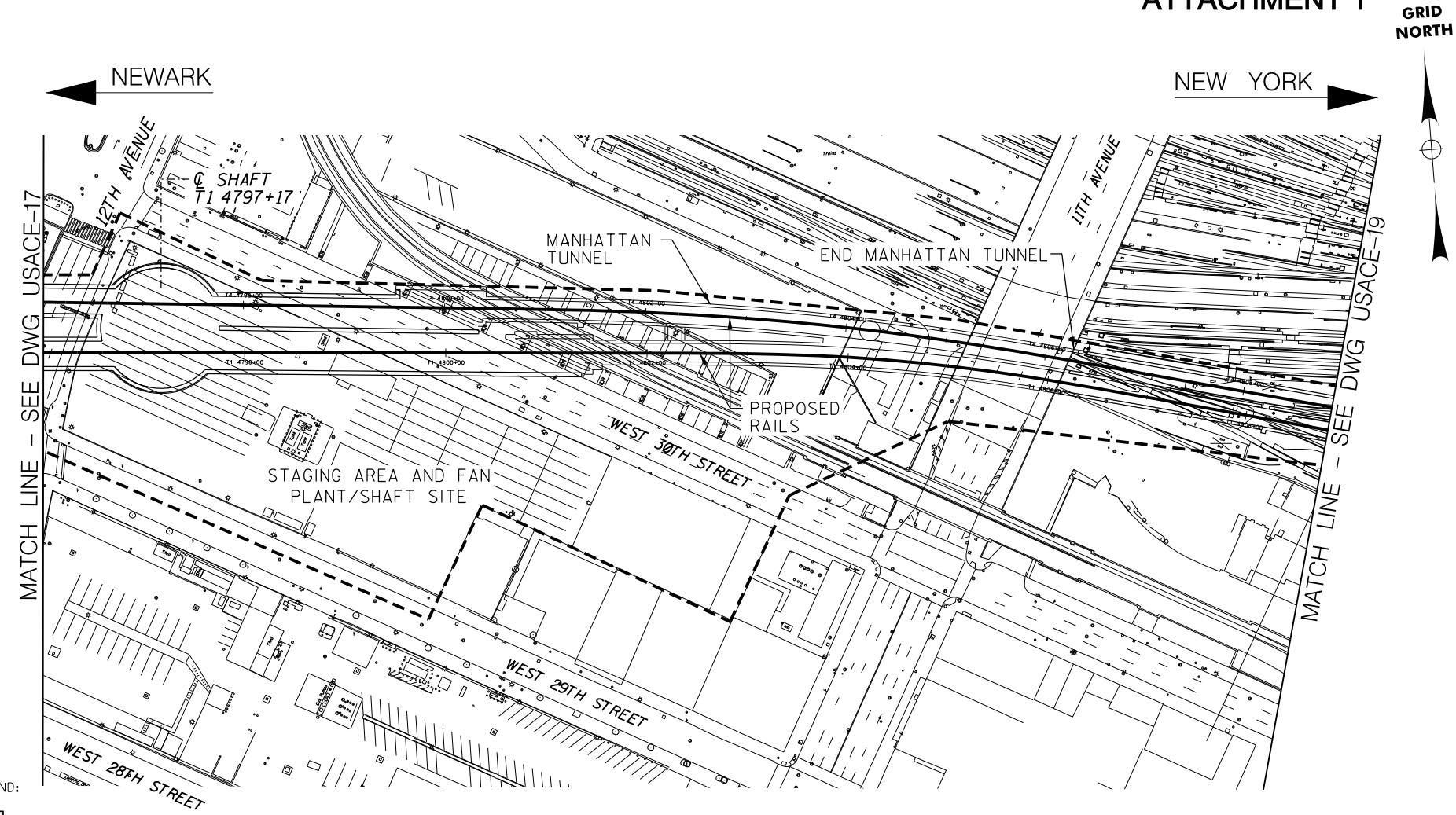
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-17

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV 100

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- WATER SHADING
- WETLAND SHADING
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

$PRFNAME$ $TBLNAME$ $TIME$ $DATE$ $FILE$

Amtrak®

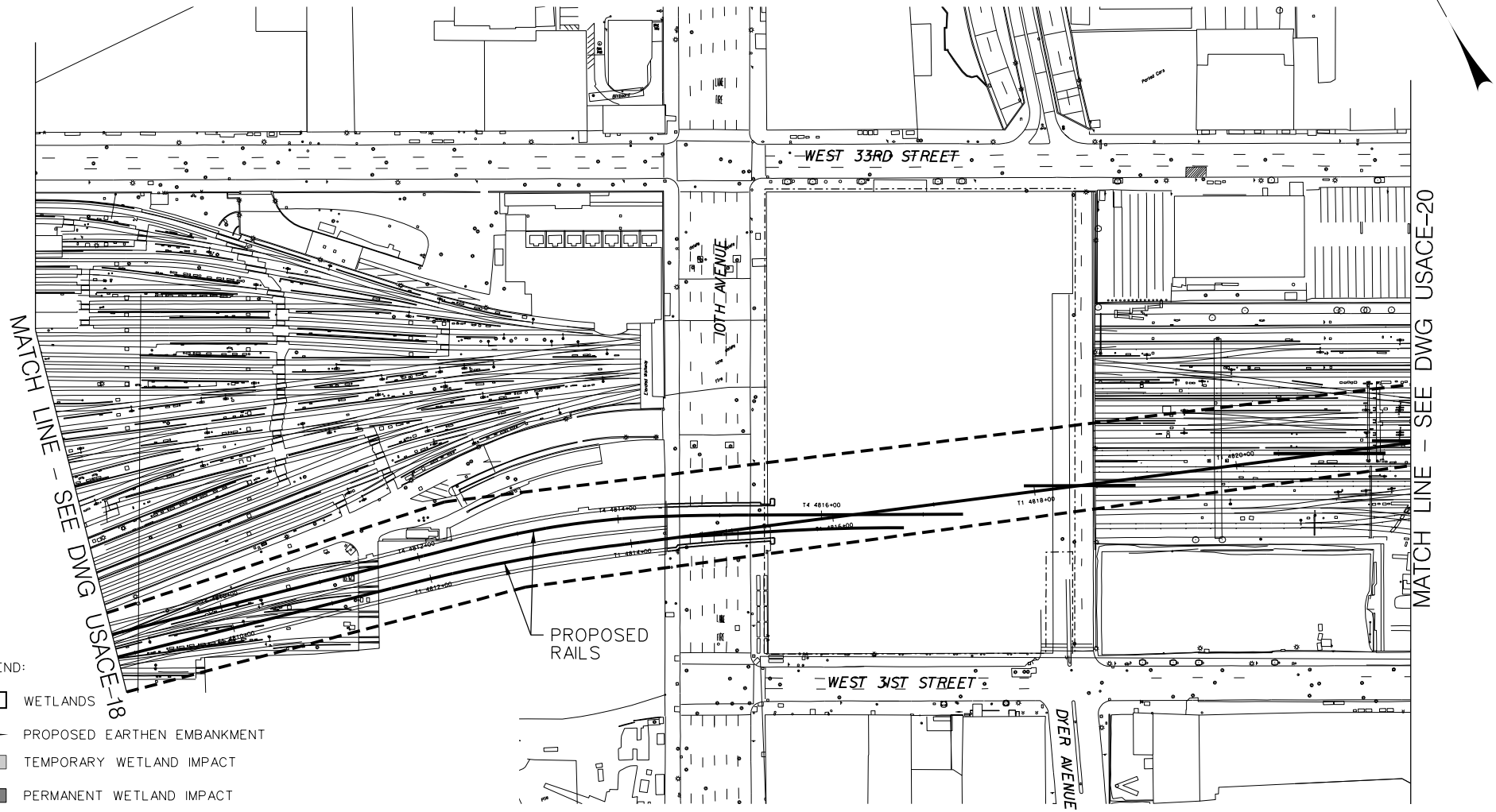
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-18

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE-19.dgn 4/27/2017 1:55:12 PM $TBLNAME$ $PRFNAME$

Amtrak®

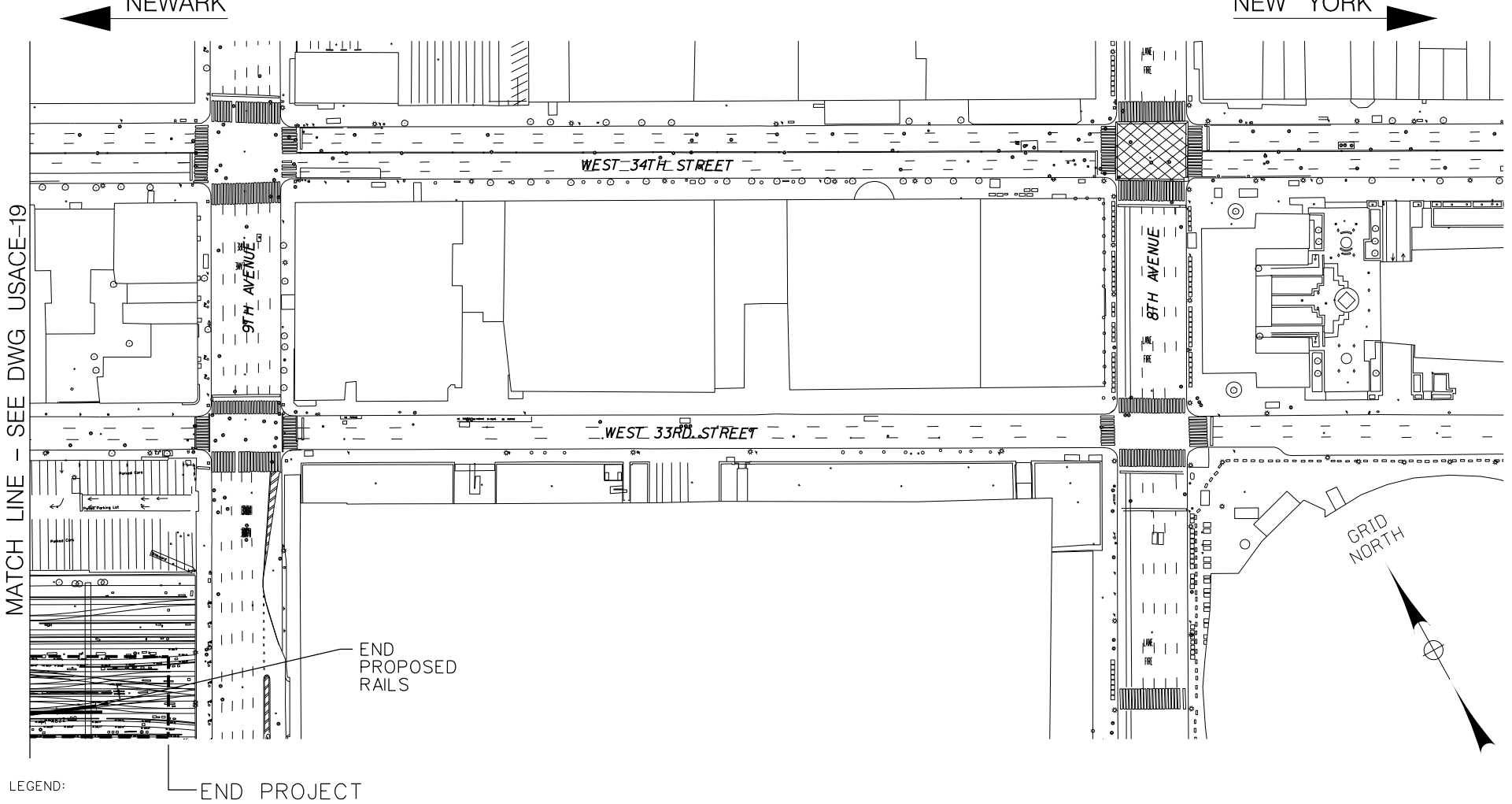
THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE–19

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

ATTACHMENT 1



LEGEND:

- WETLANDS
- PROPOSED EARTHEN EMBANKMENT
- TEMPORARY WETLAND IMPACT
- PERMANENT WETLAND IMPACT
- TEMPORARY WATER IMPACT
- PERMANENT WATER IMPACT
- STREAM BANK
- LIMIT OF PROJECT

IMPACT SUMMARY (ACRES)		
	WETLANDS	WATERS
PERMANENT	0.000	0.000
TEMPORARY	0.000	0.000

SCALE IN FEET

150' 0' 150' 300'

P:\Amtrak - Hudson Tunnel Project\Permits for Tunnel\USACE\Plans\CAD Files\AMTRAK - USACE-20.dgn 4/27/2017 1:55:13 PM $TBLNAME$ $PRFNAME$

Amtrak®

THE HUDSON TUNNEL PROJECT
USACE SECTION 404/10 PERMIT PLAN

DWG# USACE-20

The Gateway Trans-Hudson Partnership

AECOM WSP | PARSONS BRINCKERHOFF STV

Attachment 2 Site Characteristics and Description of Impacts Additional Information

The following information is provided in response to certain questions listed under Step 3 "Description of Impacts" of the EFH Assessment Worksheet.

Are there wetlands present on or adjacent to the site? If so, describe the spatial extent and vegetation types.

NWI Estuarine and Marine Deepwater wetlands (E1UBL) are present in the vicinity of the 1.5-acre soil improvement area within the Hudson River. There is no vegetation associated with this NWI wetland.

Within the New Jersey portion of the Project area, the Preferred Alternative, there are a number of NWI and NJDEP wetlands. NWI wetlands in the vicinity of the Project area comprise riverine unknown perennial wetlands (R5UBH), intertidal wetlands (E2EM5P6 and E2EM5Pd6), and subtidal wetlands (E1UBLx6 and E1UBL). *Phragmites australis* dominates these wetlands. Wetlands designated by NJDEP as "*Phragmites* Dominate Interior Wetlands" are located along both sides of the Northeast Corridor (NEC) in the Meadowlands area between County Road and the New York, Susquehanna & Western Railway (NYSW) rail right-of-way. FRA delineated tidally influenced emergent marshes within the limit of the Project that correspond with the locations of the NWI intertidal and subtidal wetlands. The Preferred Alternative will result in temporary effects to approximately 4.3 acres and permanent impacts to 8.005 acres of delineated wetlands in the vicinity.

Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.

The Project is the construction of a new two-track rail tunnel running approximately parallel to the existing North River Tunnel, extending from the NEC in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY) (**see Attachment 1**), together with rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, which is used by Amtrak for intercity passenger rail service and by NJ TRANSIT for commuter rail service, and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel

rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

Beginning about 200 feet west of the New York pierhead line, an approximately 500-foot-long by 120-foot-wide section of the tunnel will be less than 10 feet below the bottom of the river. In this 1.5-acre area (the "low-cover area"), the river bottom will need to be modified through the addition of grout to the soil to provide stability to the ground above the tunnel (i.e., in-water ground improvement). In order to complete the in-water ground improvement using jet-grouting, a sheet pile cofferdam system will be installed via barge across the 550-foot length of the low-cover area; the cofferdams will be removed upon completion of jet grouting. This will be completed in three stages, using three separate cofferdam systems, each enclosing about a third of the work zone. The work will begin in the section closest to the Manhattan shore and move outward towards the navigation channel. In order to minimize the area of water that is disturbed at any one time, only one cofferdam will be present at any given time for the Preferred Alternative. Stages 1 and 2 of the in-water work will each take approximately 4.5 months to complete, each within a cofferdam comprising 24,000 square feet of open water (Stage 2 will begin when the cofferdam for Stage 1 has been removed). Stage 3 will take place within an 18,000-square-foot cofferdam and will be completed over 3.5 months following the removal of the Stage 2 cofferdam.

The sheet pile cofferdam walls will be installed via vibratory hammer based on up to four barges moored-in-place. Driving of the sheet pile cofferdam walls is expected to occur for 8 hours per day, 5 days per week, and for 3-4 weeks for each of the three cofferdam sections. Removal of the sheet pile walls will take 1-2 weeks and will also be conducted using a vibratory hammer. No driving or removal of sheet pile will occur between November 1st and April 30th. The areas within the three cofferdam segments will not be fully dewatered prior to construction activities; work will be conducted in-the-wet, in waters a few feet lower than that outside the cofferdam.

The jet grouting will be conducted within the cofferdams in waters ranging from 30 to 50 feet in depth, and grout will be injected into the soil to a depth of approximately 34 feet below the river bottom (the midpoint of the tunnel's height) and up to the surface of the river bottom sediment.

Jet grouting operations create columns of moderate strength soilcrete (soil mixed with cement and water) that are similar to low strength rock. The material used will have a consistency equivalent to hard clay and will be applied over 1.5 acres of the river bottom (the "low-cover area"). Within the 1.5-acre low-cover area, 0.7 acres of soilcrete (approximately 120 feet wide and 270 feet long) will be elevated 1 to 2 feet above the mudline, and 0.8 acres will be approximately level with the mudline. Prior to removal of the cofferdam walls, all jet grout excess will be removed and any excess turbidity in pooled water will be brought down to be compliant with contract environmental requirements. Excess soil displaced by the jet grouting will be contained within the cofferdam and removed for off-site disposal by excavators stationed on the barges.

Construction personnel will travel to the in-water work area via tugboat or dinghy; two boats are likely necessary, one for the crew and the other for delivery of materials. The in-water work will be accomplished in two 8-hour shifts per day on weekdays. All construction material and equipment will be left on up to four barges at the work site, which will be moored-in-place for the duration of in-water construction at each cofferdam segment. The barges will be relatively

small (approximately 30 feet wide by 90 feet long; total of up to 10,800 square feet for the four barges) and will be moored in deep water.

During rehabilitation of the existing North River tunnel, which will be conducted entirely within the existing structure, water in the tunnel will continue to be discharged to the North and South Tube Mid-river sump pumps, which empty into the Weehawken sump, and discharge to the Hudson River. This water is and will continue to be monitored and discharged in accordance with the National Railroad Passenger Corporation's (Amtrak) discharge permit NJPDES Permit No. NJ0164640.

Will the benthic community be disturbed? If no, why not? If yes, describe in detail how the benthos will be impacted.

Approximately 1.5 acres of fine-grained silt/clay sediments will be permanently lost to non-motile macroinvertebrates within the low-cover area. Approximately 0.8 acres of the soilcrete will be approximately level with the surrounding riverbed, and over time, sediments will be deposited over this area, which will potentially provide some soft-bottom habitat for benthic invertebrates. The approximately 0.7 acres of soilcrete that will be elevated above the mudline will provide habitat for encrusting organisms, but will have a lower potential to accumulate sediment that could provide soft bottom habitat for benthic organisms. The temporary loss of soft-bottom habitat within the 0.8-acre level portion of the soilcrete represents a small loss of this type of habitat within the lower Hudson River estuary and will not adversely affect benthic invertebrate populations. The 0.7 acres of soft-bottom habitat within the footprint of the elevated soilcrete would be initially unavailable to soft-bottom benthic species, but would create hard substrate for encrusting species. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area for five years after construction to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction. Monitoring of this 1.5-acre area will be conducted in consultation with the USACE, NMFS, and NYSDEC.

Benthic community will be permanently impacted within the 7.56 acres of wetlands and associated open waters that would be filled as a result of the surface alignment in New Jersey.

Will sediments be altered and/or sedimentation rates change? If no, why not? If yes, describe how.

Approximately 1.5 acres of fine-grained silt/clay sediments will be replaced with a mixture of cement grout and native soil, or soilcrete. Within the 1.5-acre low-cover area, 0.8 acres of soilcrete will be approximately level with the mudline, and will eventually accumulate deposited sediments at sedimentation rates typical of the lower Hudson River. The 0.7 acres of elevated soilcrete will be modified from soft-bottom to hard-bottom habitat. This elevated area will not alter sedimentation rates in the lower Hudson River.

Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.

In-water construction will result in temporary increases in underwater noise from vessel activity and driving the sheet pile into the sediment for the cofferdams. During construction, there will be up to four barges moored-in-place in the work area from which cofferdam installation/removal and jet grouting activities will be conducted. Personnel will travel to the barges from an existing pier to the work area via tugboat or dingy, and construction materials will be delivered by a second small vessel. This very minimal increase in the number of vessels

present in the area, and the associated underwater noise, would be well within the typical range of vessel activity in the lower Hudson River, which is an area of heavy commercial vessel traffic. As such, aquatic organisms in the area are likely acclimated to ambient noise levels and will not be adversely affected by the slight, possibly undetectable, increase in vessel noise.

Installation and removal of steel sheet pile with a vibratory hammer will result in temporary increases in underwater noise during installation of each sheet pile section. The cofferdams will be installed in sections, with each section being completed within 3-4 weeks (8 hours of pile driving per day, for 5 days per week for each cofferdam; total of 15 weeks for all three cofferdams including time required for removal). Installation of the sheet pile for the cofferdam structures will result in temporary elevated underwater noise levels that are not expected to exceed the threshold for physiological injury to fishes.[1] Fish will likely avoid portions of the Hudson River in the vicinity of sheet pile installation above the behavioral threshold (150 dB SPLrms) that occur within approximately 100 feet of the pile driving activity. Most of the river will be non-ensonified (<150 dB SPLrms) at any given time during sheet pile installation. Even when the deepest sheet piles are installed closest to the navigation channel, about 80% of the distance across the channel will likely be non-ensonified, leaving room for fish to avoid portions of the river in proximity to the cofferdam. Fish are expected to avoid the area of pile driving activity in favor of suitable habitat in the vicinity, and will return following construction. To further reduce the likelihood of impacts to EFH, sheet pile driving will not occur during the period of pile driving restriction within Hudson River Park of November 1 through April 30 to protect overwintering striped bass and winter flounder spawning.

Does the action have the potential to impact prey species of federally managed fish with EFH designations?

The Preferred Alternative will result in both temporary and permanent impacts to prey species of EFH fish. Construction activities have the potential to result in temporary impacts to fish and macroinvertebrates due to temporary increases in suspended sediment, movement of construction vessels through the water column, shading by the barges moored-in-place at the work site, and underwater noise associated with the sheet pile cofferdam installation/removal and vessel activity. Sediment disturbance associated with installation and removal of the cofferdams would result in minor, short-term increases in suspended sediment and re-deposition of contaminants. Fish and motile benthic macroinvertebrates will be able to avoid the project area during installation of the cofferdams and will not be affected by temporary increases in suspended sediment. Elevated suspended sediment concentrations will dissipate via dispersion by tidal currents of the lower Hudson River upon cessation of sediment disturbing activities. Similarly, any contaminants released to the water column as a result of sediment disturbance would dissipate quickly and would not result in significant adverse long-term impacts to water quality and prey species of EFH. The area shaded by the barges (up to approximately 10,800 square feet) represents a very small area within the lower Hudson River and will not have an adverse effect on prey species of EFH species. Increased vessel activity will be well within the

[1] For vibratory driving of steel sheet piles, typical noise levels at a distance of 33 feet from the pile have been reported as 175 dB SPLpeak, 160 SPLrms, and 160 dB for the 1-second SEL. These sound levels are continuous rather than percussive and would not exceed the threshold of 206 dB SPLpeak that is associated with the onset of recoverable physiological injury to fishes.

typical range of vessel activity in the lower Hudson River, which is an area of heavy commercial vessel traffic, and would not adversely affect prey species in the area.

Temporary increases in underwater noise from vessel activity and sheet pile installation and removal via vibratory hammer may cause motile prey species to avoid the area in favor of suitable habitat in the vicinity. Elevated underwater noise will be temporary, as the cofferdams will be installed in sections, with each section being completed within 3-4 weeks (8 hours of pile driving per day, for 5 days per week for each cofferdam; total of 15 weeks for all three cofferdams including time required for removal). Installation of the sheet pile for the cofferdam structures would result in temporary increased underwater noise levels that would not be expected to exceed the threshold for physiological injury to fishes.[2] These organisms are expected to return to the area following completion of pile driving. The use of a vibratory hammer and any permit conditions restricting the timing of pile driving (e.g., November 1 through April 30 for protection of striped bass) would minimize the effects of elevated noise levels on fish.

In New Jersey, the surface alignment will result in the loss of 7.56 acres of tidally influenced wetlands and associated open water areas and the forage habitat provided by these areas.

In the Hudson River, the Preferred Alternative will result in a permanent loss of non-motile benthic organisms, which may serve as prey for EFH species, within the 1.5-acre footprint of soil improvement. The 0.8-acre portion of the soilcrete that will be level with the riverbed will initially be available as hard bottom habitat for encrusting organisms tolerant of soilcrete, providing some foraging habitat for benthic feeders once the area is colonized. Over time, sediments will be deposited over this area, possibly providing soft bottom habitat for benthic invertebrates, and thus foraging habitat for EFH species. The 0.7-acre elevated portion of the soilcrete will provide habitat for encrusting organisms that could provide some foraging habitat for EFH species, but would have a lower potential to accumulate sediment that would provide soft bottom habitat for infaunal benthic species, and will therefore not provide suitable foraging habitat for soft bottom feeding EFH species such as windowpane, skates, and summer and winter flounder. While burrowing macroinvertebrates will no longer be available to predators within this 0.7-acre footprint, there is similar available habitat in the vicinity, and these organisms will continue to serve as prey to EFH species in these areas. The loss of this area as foraging habitat for soft bottom feeding fish will result in unavoidable adverse effects to EFH resources that would not be substantial. It is expected that encrusting organisms tolerant of the soilcrete will have the potential to colonize the soil improvement area following completion of construction activities and will likewise be available as prey to EFH species. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area for five years after construction to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction. Monitoring of this 1.5-acre area will be conducted in consultation with the USACE, NMFS, and NYSDEC.

[2] For vibratory driving of sheet piles, typical noise levels at a distance of 33 feet from the pile have been reported as 175 dB SPLpeak, 160 dB SPLrms, and 160 dB for the 1-second SEL.

Attachment 3 EFH Assessment – Additional Information

The following information is provided in response to certain questions listed under Step 4 "EFH Assessment" of the EFH Assessment Worksheet.

***Spawning*: If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.**

Spawning winter flounder may be present in the Project area during January through April, and spawning windowpane may be present in May. The Preferred Alternative will comply with any in-water restrictions from NMFS to protect winter flounder spawning EFH at the site, which overlaps with windowpane spawning. Approximately 0.8 acres within the 1.5-acre footprint of the low-cover area will be temporarily unavailable as soft bottom habitat for windowpane and winter flounder but is located within water depths ranging from 44 to 51 feet at Mean Lower Low Water (MLLW), which is too deep to be considered suitable for spawning by either species. expanded

The soil improvement via jet-grouting will be contained within three segments of cofferdams located in waters 44 feet and deeper at MLLW, and is not likely to adversely affect water quality or spawning habitat. During the in-water work, up to four construction barges will be moored-in-place for each cofferdam section and will result in shading of approximately 10,800 square feet of relatively deep open water. Similar habitat is available in the vicinity, and this small area of shading in the open waters of the Lower Hudson River will not adversely affect EFH spawning. Installation and removal of the cofferdams may result in temporary resuspension of sediment, but this effect will be minor, as suspended sediments will dissipate with the tidal currents upon cessation of sediment disturbing activities. Driving of the sheet pile cofferdam walls via vibratory hammer will be temporary, intermittent, and will minimize effects of increased underwater noise. At any given time during sheet pile installation, most of the width of the river would be non-ensonified, leaving room for fish to avoid portions of the Hudson River in proximity to the cofferdam while the sheet pile is driven. Fish will likely avoid portions of the Hudson River in the vicinity of sheet pile installation. Since the vibratory hammer will not reach levels that would exceed the threshold for physiological injury to fishes, and there will be available habitat outside the ensonified area, the temporarily elevated underwater noise levels will not have a significant adverse effect on spawning habitat for EFH.

***Nursery*: If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.**

Windowpane and winter flounder larvae are initially planktonic, but quickly become bottom-oriented and could be affected by installation and removal of the cofferdams if they are present at the project site. Any pelagic larvae that may occur in the study area will be less susceptible to effects from sediment-disturbing activities, as they are able to move away from the construction area to suitable habitat in the vicinity. Larvae in the study area could be temporarily impacted by minor increases in suspended sediment and localized increases in turbidity during installation

and removal of the cofferdams. In-water construction activities will likely be restricted between early January and late May to protect spawning winter flounder, which will also protect any larvae present in the study area during that time. During the in-water work, up to four construction barges will be moored-in-place and will result in shading of approximately 10,800 square feet of deep open water. Similar habitat is available in the vicinity, and this small area of shading in the open waters of the Lower Hudson River will not adversely affect nursery habitat. As noted above, driving of the sheet pile cofferdam walls via vibratory hammer will be temporary, intermittent, and will minimize effects of increased underwater noise. Elevated noise levels during this time may lead to avoidance of the area by some fish, but will not have a significant adverse effect on larvae.

The 0.8 acres in the low-cover area where the soilcrete is level with the mudline will initially be unavailable to species that use soft bottom as nursery habitat. Over time, sediments will be deposited over the soilcrete and could provide soft bottom nursery habitat for these species. The permanent loss of 0.7 acres of soft bottom habitat where soilcrete will be elevated above the mudline within the soil improvement area will not adversely affect nursery habitat for EFH species. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area for five years after construction to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction. Monitoring of this 1.5-acre area will be conducted in consultation with the USACE, NMFS, and NYSDEC.

***Forage*: If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**

Juvenile and adult windowpane, summer flounder, winter flounder, and clearnose, little, and winter skate are benthic feeders. Other EFH species also feed on benthic organisms, although not exclusively. The Preferred Alternative will result in a minor temporary increase in suspended sediment and localized increases in turbidity during the installation and removal of the cofferdams, which could impact bottom dwelling forage species; any sediment disturbed during these activities will dissipate quickly with the tidal currents in the lower Hudson River upon completion of construction. Driving of the sheet pile cofferdam walls via vibratory hammer will be temporary, intermittent, and will minimize effects of increased underwater noise. The temporary loss of foraging habitat within 0.8 acres of the soil improvement area, when compared to the available suitable habitat that will still be available in the lower Hudson River, will not result in a significant adverse effect to foraging habitat for EFH species. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area for five years after construction to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction. Monitoring of this 1.5-acre area will be conducted in consultation with the USACE, NMFS, and NYSDEC.

Will impacts be temporary or permanent? Describe the duration of the impacts.

The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. This effect will be minor, as any resuspended sediment will dissipate quickly with the tidal currents upon cessation of sediment disturbing activities. As the cofferdams are constructed over a 3-4 week period and removed over 1-2 weeks (per cofferdam), motile organisms will be temporarily

displaced to other suitable habitat in the area. There will be a temporary increase in vessel traffic during the construction period, along with shading by the moored-in-place barges, but these actions will not be outside the range of typical vessel activity within the study area in the lower Hudson River, which is a region of high commercial vessel traffic. This temporary increase in vessel traffic will not result in significant adverse impacts to benthic invertebrates or fish communities in the project area. Temporary increases in underwater noise from driving the sheet pile cofferdam walls will be minimized through the use of a vibratory hammer, and will occur intermittently only during cofferdam installation. The elevated noise level will likely cause some fish to avoid the Hudson River in the proximity of pile driving, but they are expected to return to the area following completion of pile driving. In-water construction is expected to last approximately 40 weeks in total (3-4 weeks for installation of each cofferdam, 7-9 weeks for each section of jet grouting, and 1-2 weeks to remove each cofferdam).

Ground stabilization via jet grouting will result in the permanent loss of 0.7 acres of silt/clay bottom in the low-cover area where soilcrete is elevated above the mudline and the temporary loss of 0.8 acres of soft bottom where the soilcrete is level with the mudline, along with non-motile organisms within these footprints. The jet grouting will mix with the soft sediment in the low-cover area to form a hard bottom substrate of soilcrete. After ground stabilization activities are complete, encrusting organisms will be able to colonize the 0.7-acre soil improvement area where the soilcrete is elevated, and sediments will be deposited over time in the 0.8-acre area where the soilcrete is level with the mudline at sedimentation rates typical of the lower Hudson River. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area for five years after construction to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction. Monitoring of this 1.5-acre area will be conducted in consultation with the USACE, NMFS, and NYSDEC.

Attachment 4 Other NOAA-Trust Resources Impact Assessment

The following information is provided in response to Step 6 "Other NOAA-Trust Resources Impact Assessment" of the EFH Assessment Worksheet.

Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.

Alewife

Alewife (*Alosa pseudoharengus*) is a pelagic species that can occur in the lower Hudson River and Penhorn Creek from spring to fall. During the spring months, this species migrates through the New York Harbor to spawning grounds in the Hudson, Raritan, and Navesink Rivers, where eggs are deposited in slow-flowing water over a variety of substrates (Mackenzie 1990, Pardue 1983). Peak abundance of larval alewife in estuaries occurs in waters with salinities of 1-5 parts per thousand (ppt) at the surface and 1-15 ppt at the bottom (Locke and Courtenay 1995). Most juveniles emigrate from freshwater estuarine nursery habitats in the rivers where they were spawned between June and November of their first year (Pardue 1983). Adult alewife school in open waters and occupy a variety of inshore ocean, estuarine, and freshwater habitats depending on the season (Hildebrand 1963). They are only associated with bottom structure or substrate during spawning, which occurs in rivers and tributaries. Larval and juvenile alewife feed on small invertebrates, and adults feed on fish eggs, insects, crustacean eggs and larvae, and smaller fish.

Given that alewife are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, the Preferred Alternative will not adversely affect this species within the Hudson River. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of cofferdams. Any temporary increases in suspended sediments will dissipate upon the cessation of sediment disturbing activities. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for alewife.

To protect anadromous species spawning run in Penhorn Creek, no in-water or sediment-generating activities and pile driving would occur between March 1 and June 30. While the loss

of 7.56 acres of tidally influenced wetlands and open water areas associated with Penhorn Creek would result in the loss of some foraging habitat and prey species, this loss is not expected to result in a substantial effect on alewife and would be mitigated through the purchase of mitigation credits from an approved mitigation bank within the same watershed unit(s) as the Project site.

American Eel

American eel (*Anguilla rostrata*) can occur in the lower Hudson River and Penhorn Creek year-round. This species is catadromous, spending most of its life in fresh water and spawning in salt water. They occur in streams and rivers with continuous flow over muddy or silty substrate (Scott and Scott 1988). During the day they tend to rest in undercut banks and deep pools near logs or boulders (Fischer 1978). At sexual maturity, adults migrate from the Hudson, Raritan, and Navesink Rivers and their tributaries to spawning grounds in the Sargasso Sea (Mackenzie 1990). American eels have several life stages: egg, glass, elver, yellow, and silver. Eggs hatch on the ocean surface in the Sargasso Sea and drift with currents for about a year as they develop into larvae before reaching the Atlantic coast (USFWS 2015). Glass eels, or larvae, are about 2-3 inches long by the time they reach the coast, and metamorphose into elvers, or juveniles, in nearshore areas of estuaries and tidal rivers (USFWS 2015, Fischer 1978). Elvers transform into yellow eels, which are sexually immature adults, and can spend up to 40 or more years living in freshwater habitats before they mature into silver eels and migrate to the Sargasso Sea to spawn; eels that remain in brackish waters tend to mature earlier than those in freshwater (USFWS 2015). American eels feed on a variety of things, including insects, fish, fish eggs, crabs, worms, clams, and frogs (USFWS 2011).

Given that neither spawning nor nursery habitat for American eel occurs within the lower Hudson River, in the Hudson River the Preferred Alternative will not adversely affect this species. In the Hudson River and Penhorn Creek, the Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities. Construction of culvert extensions in Penhorn Creek would include the installation of a temporary cofferdam and sump pits to divert Penhorn Creek water flow around the work area to control infiltration of groundwater during placement and anchoring of culverts or extensions. Water removed during cofferdam dewatering would be treated with temporary sediment control measures developed in consultation with NJDEP (e.g., sediment control basin) before being discharged back to Penhorn Creek. With these measures, the Preferred Alternative will not adversely affect American eel within Penhorn Creek.

Installation and removal of the sheetpile cofferdams in the Hudson River will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for American eel.

American Shad

American shad (*Alosa sapidissima*) is a schooling pelagic species that can occur in the lower Hudson River year-round and seasonally in Penhorn Creek. This species migrates from offshore waters to spawning grounds in the freshwater tidal areas of the Hudson River; they can tolerate moderate salinity but spawn in lower salinity waters over sand and gravel (Leggett 1976, Walberg and Nichols 1967). Spawning occurs over a variety of substrates, but preferably over sand and gravel bottom with sufficient water movement to eliminate silt deposits (Stier and Crance 1985). Larvae prefer brackish waters with salinities of 7 ppt or less (Leim 1924). Larvae and juveniles start to migrate into the open ocean during the fall, and adults spend most of their lives in offshore ocean waters. Larval and juvenile shad feed mainly on aquatic insects and crustaceans, and adults are primarily plankton feeders (Stier and Crance 1985).

Given that American shad are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, within the Hudson River the Preferred Alternative will not adversely affect this species. Within the Hudson River, and Penhorn Creek and associated wetlands, the Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams, and placement of fill material. Suspended sediments will dissipate upon the cessation of sediment disturbing activities.

In Penhorn Creek and associated wetlands, implementing BMPs to minimize sediment resuspension during construction of culvert extensions and the maintenance of flow through existing culverts, and implementing erosion and sediment control measures in accordance with the SPPP would minimize water quality impacts to Penhorn Creek and emergent wetlands, and adverse effects to benthic invertebrates and fish. To protect American shad and other anadromous species spawning run in Penhorn Creek, no in-water or sediment- generating activities and pile driving would occur between March 1 and June 30. While the loss of 7.56 acres of tidally influenced wetlands and open water areas associated with Penhorn Creek would result in the loss of some foraging habitat and prey species, this loss is not expected to result in a substantial effect on American shad and would be mitigated through the purchase of mitigation credits from an approved mitigation bank within the same watershed unit(s) as the Project site.

Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for American shad.

Atlantic Menhaden

Atlantic menhaden (*Brevoortia tyrannus*) can occur in the lower Hudson River year-round. This species migrates seasonally along the Atlantic coast, moving north through the Mid-Atlantic Bight during spring, and south to Cape Hatteras during the fall (Able and Fahay 1998). Adults are found near surface waters, typically in shallow areas overlying the continental shelf, and they occur in greatest abundance adjacent to major estuaries (Jones et al. 1978). They move inshore during the summer and into deeper waters in the winter. Spawning occurs in continental shelf waters and in the lower reaches of estuaries and coastal bays in waters up to 10 meters deep

(Dovel 1971, Rogers and Van Den Avyle 1989). Larvae and juveniles use estuaries during the summer before migrating offshore in the fall (Dovel 1971). Concentrations of young menhaden occur in inshore estuarine waters along the entire Atlantic coast (Rogers and Van Den Avyle 1989). Larvae feed on plankton, and juveniles and adults are filter feeders.

Given that Atlantic menhaden are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River or Penhorn Creek, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities and would not affect use of the lower Hudson River or Penhorn Creek by Atlantic menhaden.

Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for Atlantic menhaden.

Blue Crab

Blue crab (*Callinectes sapidus*) can occur in the lower Hudson River and Penhorn Creek year-round. Mating season occurs from May through October in the mid-Atlantic in the upper areas of estuaries and lower portions of rivers (Hill et al. 1989). Females generally spawn in high salinity waters between 2 and 9 months after mating (Hill et al. 1989). Eggs are deposited as a cohesive mass that remains attached to the female until larvae, called zoeae, emerge (Hill et al. 1989). Zoeae molt multiple times over the course of about 1-1.5 months, transforming into megalops, or the second larval stage, which is crablike in appearance; development into the juvenile "first crab" stage is characterized by adult proportions and appearance after 6-20 additional days (Hill et al. 1989). Areas of submerged aquatic vegetation in high salinity estuarine waters are used as nursery areas (Heck and Thoman 1984). Juveniles gradually migrate into shallower, less saline waters of upper estuaries and rivers, where they grow and mature into adults through a series of molt and intermolt phases over the course of about 12-18 months (Hill et al. 1989). Blue crabs move from shallow areas and tributaries in the summer to deeper waters in the fall (Mackenzie 1990). When not mating, small blue crabs prefer shallow, high salinity waters over substrates of soft detritus, mud, or mud-shell; larger crabs generally prefer deeper estuarine waters with hard bottom substrates (Hill et al. 1989). As detritivores and scavengers, blue crabs feed on a variety of phytoplankton, invertebrates, fish, and other crabs.

The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams in the Hudson River and Penhorn Creek. Suspended sediments will dissipate upon the cessation of sediment disturbing activities and would not be expected to adversely affect blue crab.

Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels may cause avoidance of the area by blue crab, but they are

expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period within the Hudson River will be within the range of typical vessel activity in lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, in the Hudson River, the Preferred Alternative will not impact habitat for blue crab. Blue crabs are motile and are not expected to be adversely impacted by project activities.

The Preferred Alternative will result in minimal loss of habitat within Penhorn Creek associated with culvert extensions but will result in the loss of 7.56 acres of tidally influenced wetlands and associated open water areas that provide habitat for juvenile blue crab. The loss of this wetland would not be expected to result in a substantial adverse effect on blue crab populations in the Hackensack River system. Wetland impacts will be mitigated through the purchase of mitigation credits from an approved mitigation bank within the same watershed unit(s) as the Project site.

Blue Mussel

Blue mussel (*Mytilus edulis*) is a valuable commercial species and is widely distributed and locally abundant in the north and mid-Atlantic regions; it is most common in the littoral and sublittoral zones of oceanic and estuarine waters and can occur in the lower Hudson River year-round. This species is a bivalve mollusk that filter-feeds on phytoplankton and particulate detritus from the water (Rice 2010). Adult mussels typically reach shell lengths of about 4 inches and attach to hard surfaces, including large boulders, pebbles, and other mussels (Rice 2010, Newell 1989). Eggs are released into the water column for fertilization and hatch after about 5 hours (Newell 1989). Blue mussels go through several larval stages lasting between 15 days and 6 months after hatching. After about 6 months, the mussel temporarily attaches to filamentous substrates and develops as a juvenile for up to 2 years (Newell 1989). Juveniles grow to approximately 1.5 mm while attached to filamentous algae, and then are carried by currents until they reattach to a hard substrate (Newell and Moran 1989). Following the juvenile stage, adults live in habitats ranging from flat intertidal shores to vertical surfaces subject to wave splash (Newell 1989). They are typically found in subtidal and intertidal environments over a wide range of salinities (5-35 ppt) and depths ranging from 16 to 32 feet (Zagata et al. 2008).

The ground stabilization area is composed of soft silt and clay substrate that is not suitable for blue mussels; therefore, this species is not likely to occur within the 1.5-acre footprint of ground stabilization through jet grouting. The 0.7 acres of elevated soilcrete may provide habitat for blue mussels, as they require hard substrate. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities and will not adversely impact blue mussel populations in the Hudson River.

Blueback Herring

Blueback herring (*Alosa aestivalis*) is a schooling pelagic species that can occur in the lower Hudson River and Penhorn Creek. Blueback herring adults spend much of their lives in salt water and return to freshwater tributaries to spawn over gravel and sand substrates (Loesch 1969) and would likely only occur in the project area between April and June during migrations into freshwater spawning habitats and back into inland coastal waters post-spawn. Spawning occurs in swift-flowing, deeper stretches of rivers over hard substrate, and in slower-flowing tributaries and flooded areas with soft substrates (Pardue 1983). Eggs adhere to vegetation,

rocks, and debris in fresh water where they are deposited. Blueback herring remain in freshwater habitats as larvae and migrate to low salinity estuarine water as juveniles, generally between June and November of their first year (Loesch 1969, Pardue 1983). Larval and juvenile blueback herring feed on small invertebrates, and adults feed on fish eggs, insects, crustacean eggs and larvae, and smaller fish.

Given that blueback herring are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, in the Hudson River, the Preferred Alternative will not adversely affect this species. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities.

Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for blueback herring.

In Penhorn Creek and associated wetlands, implementing BMPs to minimize sediment resuspension during construction of culvert extensions and the maintenance of flow through existing culverts, and implementing erosion and sediment control measures in accordance with the SPPP would minimize water quality impacts to Penhorn Creek and emergent wetlands, and adverse effects to benthic invertebrates and fish. To protect anadromous species spawning run in Penhorn Creek, no in-water or sediment- generating activities and pile driving would occur between March 1 and June 30. While the loss of 7.56 acres of tidally influenced wetlands and open water areas associated with Penhorn Creek would result in the loss of some foraging habitat and prey species, this loss is not expected to result in a substantial effect on blueback herring and would be mitigated through the purchase of mitigation credits from an approved mitigation bank within the same watershed unit(s) as the Project site.

Eastern Oyster

Eastern oyster (*Crassostrea virginica*) can occur in the deeper waters of the Hudson River and New York Harbor year-round. Adult oysters are non-motile and typically live in clumps, or beds. In mid-Atlantic waters, they prefer water depths ranging from 2 to 16 feet (MacKenzie, Jr. 1996). Spawning occurs via release of eggs into the water, where they are fertilized; eggs and young larvae remain in the water column for 2-3 weeks (Stanley and Sellers 1986). Juveniles, or spat, develop in the water column and attach to hard surfaces such as stones or other oyster shells, usually in established oyster beds, about 2-3 weeks after spawning. This species tolerates a wide range of salinity, generally between 5 and 32 ppt. Sufficient water currents are necessary to flush suspended sediments, remove debris, and transport food over oyster beds. Oyster larvae feed largely on plankton, while adult oysters filter-feed on diatom plankton, dinoflagellates, ostracods, small eggs, and anything else in the water that is 3-4 micrometers in size, including bacteria (Stanley and Sellers 1986).

There are no known natural or man-made oyster beds in the vicinity of the ground stabilization area. The Preferred Alternative will result in a temporary increase in suspended sediment and

localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate quickly upon the cessation of sediment disturbing activities and will not adversely affect oysters that may be present in the lower Hudson River either upstream or downstream of the ground stabilization area. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for oysters.

Horseshoe Crab

Horseshoe crab (*Limulus polyphemus*) can occur in the lower Hudson River. Adult horseshoe crabs migrate from deep offshore waters from April to July to spawn. Eggs are deposited on beaches in the upper portion of the intertidal zone and below the feeding zone of shorebirds (USACE 2009). Spawning habitat depends on ready access to open and undisturbed sandy beaches in relatively calm waters, with a portion of the beach at or above Mean High Water where eggs are laid and larvae develop (Baine et al. 2007). Beach quality, including slope, width, and sediment grain size, can influence spawning activity (Baine et al. 2007); beach slope between 7 and 10° is thought to be optimal for horseshoe crab spawning habitat (USACE 2009). Females make several nests during one beach trip and often return on successive tides to lay more eggs (MDNR 2016). After about one month, the eggs hatch and larvae remain in the intertidal flats or shoal waters where they were spawned until settling to the bottom to molt (USACE 2009, MDNR 2016). During its first 2-3 years, the horseshoe crab molts several times per year, and then about once annually until it reaches sexual maturity around 9-11 years in age (MDNR 2016). Adults remain in deep offshore habitats during most of the year, except during the spawning season. Horseshoe crabs feed mainly on marine worms and shellfish, and serve as an important food source to shorebirds and juvenile sea turtles. Migratory shorebirds rely on horseshoe crab eggs to survive their journey to breeding grounds (MDNR 2016). Horseshoe crab eggs and larvae are also a food source for a variety of species including crabs, whelks, striped bass, white perch, American eel, killifish, silver perch, weakfish, kingfish, silversides, summer flounder, and winter flounder (MDNR 2016).

There are no beaches near the ground stabilization area, therefore, horseshoe crab spawning will not be adversely affected by the Preferred Alternative. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate with the cessation of sediment disturbing activities and will not adversely impact horseshoe crab populations in the lower Hudson River. Installation and removal of the cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels may cause avoidance of the area by horseshoe crab, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for horseshoe crabs.

Quahog

Northern quahog (*Mercenaria mercenaria*), also known as hard clams, can occur in the lower Hudson River year-round. Hard clams are found in the intertidal and subtidal zones of bays and estuaries in waters up to 15 meters deep, most often in higher salinity waters (Stanley and

DeWitt 1983). They can be found in all sediment types, but prefer sediments that are a mixture of sand and mud with some coarse material. Adults burrow an average of 2 centimeters into sand, and an average of just one centimeter into softer substrates; adults can escape 10-50 cm of overburden if buried and can re-burrow if removed from the substrate (Stanley and DeWitt 1983). Eggs are released into the water column for fertilization and are carried by tidal and coastal currents for about 10 hours before hatching. Larvae develop 12-14 hours after hatching and drift up and down through the water column until they reach about 2-3 millimeters in length. At this time, the shell begins to thicken and larvae transform into seed clams, which begin a final migration to their ultimate habitat, settling as adults in their second summer (Stanley and De Witt 1983). Adult clams filter plankton and microorganisms from the water that are carried close to the bottom by currents.

Any hard clams present in the 1.5-acre footprint of ground stabilization with jet grouting, where the substrate is suitable for this species, will be lost. Since this area represents a very small portion of available habitat within the lower Hudson River, hard clams are expected to continue to colonize or recolonize in suitable habitat in the vicinity. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate with the cessation of sediment disturbing activities and will not adversely impact horseshoe crab populations in the lower Hudson River. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for hard clams.

Soft-shell Clams

Soft-shell clams (*Mya arenaria*) can occur in the lower Hudson River year-round. This species inhabits sandy, sand-mud, or sandy clay bottoms of inlets and bays, typically at water depths of 3-4 meters and salinities no less than 4-5 ppt (Abraham and Dillon 1986). Adults burrow up to 30 centimeters into the substrate, with siphons extending to the sediment surface to feed on detritus and plankton suspended in the water (Abraham and Dillon 1986). Soft-shell clams spawn biannually based on water temperatures, once in spring at 10-20°C and once in fall when temperature falls to 20°C. Eggs are broadcast into the water and develop into planktonic larvae about 12 hours after fertilization; after about 4-6 weeks, larvae settle to the bottom (Abraham and Dillon 1986). Juveniles are able to move to more favorable locations, usually sandy bottoms with less than 50% silt content, before burrowing into the substrate as adults (Abraham and Dillon 1986).

Any soft-shell clams present in the 1.5-acre footprint of ground stabilization with jet grouting, where the substrate is suitable for this species, will be lost. Since this area represents a very small portion of available habitat within the lower Hudson River, soft-shell clams are expected to continue to colonize or recolonize in suitable habitat in the vicinity. The Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of the sheet pile cofferdams. Suspended sediments will dissipate with the cessation of sediment disturbing activities and will not adversely impact horseshoe crab populations in the lower Hudson River. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the

soil improvement area; therefore, the Preferred Alternative will not impact habitat for soft-shell clams.

Striped Bass

Striped bass (*Morone saxatillis*) can occur in the lower Hudson River and Penhorn Creek from spring to fall. Striped bass can be found in the lower Hudson River and Penhorn Creek during spawning migrations from coastal waters into freshwater spawning grounds between May and June, and back to coastal waters post-spawn in the fall (CHG&E et al. 1999). Larvae drift with the current, but remain in low salinity river waters; juveniles begin to move into higher salinity waters as they grow. Juveniles could be found in the New York Harbor by late summer (CHG&E et al. 1999, Dunning et al. 2009). Outside of spawning periods, adult striped bass migrate along the Atlantic coast and would not likely be found in the lower Hudson River or Penhorn Creek. When they are present, they generally occur in open water, inter-pier, and semi-enclosed basin areas, especially offshore from sandy beaches or rocky shores where prey species are most abundant. Larvae feed mainly on copepods and chironomid larvae, adding larger aquatic invertebrates and small fishes to their diet as they grow (Fay et al. 1983). Larger striped bass begin to school while foraging and feed primarily on clupeids, including bay anchovy and Atlantic menhaden, but also continue to feed on invertebrates (Fay et al. 1983).

Given that striped bass are pelagic, and neither spawning nor nursery habitat occurs within the lower Hudson River, in the Hudson River the Preferred Alternative will not adversely affect this species. In the Hudson River and Penhorn Creek, the Preferred Alternative will result in a temporary increase in suspended sediment and localized increases in turbidity during installation and removal of cofferdams. Suspended sediments will dissipate upon the cessation of sediment disturbing activities.

Installation and removal of the sheet pile cofferdams will result in temporary increases in underwater noise, which will be minimized through the use of a vibratory hammer as recommended by NMFS. The elevated noise levels will likely cause avoidance of the area by fish, but they are expected to return once vibratory hammering is complete. Temporary increases in vessel noise, traffic, and shading during the construction period will be within the range of typical vessel activity in the lower Hudson River, and suitable habitat will still be available within the Hudson River outside the soil improvement area; therefore, the Preferred Alternative will not impact habitat for striped bass.

In Penhorn Creek and associated wetlands, implementing BMPs to minimize sediment resuspension during construction of culvert extensions and the maintenance of flow through existing culverts, and implementing erosion and sediment control measures in accordance with the SPPP would minimize water quality impacts to Penhorn Creek and emergent wetlands, and adverse effects to benthic invertebrates and fish. To protect striped bass and other anadromous species spawning run in Penhorn Creek, no in-water or sediment-generating activities and pile driving would occur between March 1 and June 30. While the loss of 7.56 acres of tidally influenced wetlands and open water areas associated with Penhorn Creek would result in the loss of some foraging habitat and prey species, this loss is not expected to result in a substantial effect on striped bass and would be mitigated through the purchase of mitigation credits from an approved mitigation bank within the same watershed unit(s) as the Project site.

Atlantic and Shortnose Sturgeon

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*; endangered) can occur in the lower Hudson River and may be present in the study area (NMFS 2016a). The full length of the tidal Hudson

River has been proposed as Critical Habitat for Atlantic sturgeon (NMFS 2016b). Atlantic sturgeon is a bottom-dwelling fish that inhabits large freshwater rivers when spawning and primarily marine waters when not breeding. They can also be found in bays, river mouths, and estuaries. Atlantic sturgeon spend most of their lives in marine waters along the Atlantic coast, and return to the freshwater portions of the Hudson River to spawn from late May through mid-July. Adults are more often found in deeper offshore waters, and early life stages are relatively intolerant of salinity. Primary spawning habitat has been identified in Hyde Park, New York at river mile 83 (Bain et al. 2000), well upstream of the project location. Atlantic sturgeon prefer waters between 10 and 15 meters (32 and 49 feet) in depth (Dunton et al. 2010), and no Atlantic sturgeon were collected during multi-year sampling of shallower interpier and underpier habitats in the lower Hudson River during sampling conducted intermittently between 1993 and 2004 (Able et al. 1995, Able et al. 1998, Bain et al. 2006).

Shortnose sturgeon (*Acipenser brevirostrum*; endangered) can occur in the lower Hudson River and may be present in the study area (NMFS 2016a). Shortnose sturgeon are bottom-dwellers that spawn, develop, and overwinter in the Hudson River in its freshwater and brackish reaches, and occasionally use areas of the lower Hudson River downstream of the George Washington Bridge. Shortnose sturgeon prefer the deeper, colder waters of the river channel, and occur in greatest abundance north of river mile 46. Spawning in the Hudson River occurs between March and May in fresh waters over rock or gravel substrate well upstream of the project location (NMFS 1998). Although larvae can be found in brackish areas of the river, juveniles are predominately confined to freshwater areas upstream from the saline area of the lower Hudson River and New York Harbor. Older juveniles, or sub-adults, tend to move downstream in fall and winter and upstream in the spring, and feed mostly in freshwater reaches during the summer. No shortnose sturgeon were collected during multi-year sampling of shallower interpier and underpier habitats in the lower Hudson River during sampling conducted intermittently between 1993 and 2004 (Able et al. 1998, Bain et al. 2006).

No critical habitat has been designated for shortnose sturgeon. However, the full length of the tidal Hudson River from lower Manhattan to the Federal Dam at Troy has been proposed to be designated as critical habitat for Atlantic sturgeon. The physical or biological features of critical habitat essential to conservation of the species include:

- Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (0 to 0.5 ppt) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- Aquatic habitat with a gradual downstream salinity gradient of 0.5 to 30 ppt and soft substrate downstream of spawning sites for juvenile foraging and physiological development;
- Water of appropriate depth to support: unimpeded movement of adults to/from spawning sites, seasonal movement of juveniles, and staging/resting/holding of subadults or spawning condition adults. Water depths greater than or equal to 1.2 meters (3.9 feet) in the main river channel; and
- Water, especially in the bottom meter of the water column, with temperature, salinity, and oxygen values that support: spawning, annual and interannual survival, and growth, development, and recruitment.

Given the location of the Project, construction activities will not occur in the vicinity of hard bottom substrate in low salinity waters, and the installation of the cofferdams will not remove any soft substrate used for juvenile foraging and physiological development. As the in-water construction activities will only produce minimal increases in suspended sediment, it would have insignificant effects on water depth, water flow, dissolved oxygen levels, salinity, temperature, or the ability for Atlantic sturgeon to migrate in the vicinity of the Project. Given the width of the Hudson River in the study area (approximately 4,350 feet), the temporary addition of the cofferdams will not add a physical barrier to passage between the mouth of the river and spawning sites necessary to support unimpeded movement of adults to and from spawning sites, seasonal movement of juveniles, and staging, resting, or holding of subadults or spawning condition adults. The 0.7-acre area of elevated soilcrete will represent an initial loss of soft bottom substrate for foraging habitat for juveniles and thus a modification of the proposed critical habitat. The loss of this soft bottom substrate represents a small area relative to the available foraging habitat in the Hudson River, and the elevated soilcrete will not result in obstruction of passage for Atlantic sturgeon. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area for five years after construction to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction. Monitoring of this 1.5-acre area will be conducted in consultation with the U.S. Army Corps of Engineers (USACE), National Marine Fisheries Service (NMFS), and New York State Department of Environmental Conservation (NYSDEC).

While they are not expected to occur in significant numbers in the study area, as they move through shallower marine waters along the Atlantic coast, transient Atlantic sturgeon adults and sub-adults have the potential to occur within the 1.5-acre area of the lower Hudson River that would receive soil improvement under the Preferred Alternative. While shortnose sturgeon do not undertake the significant marine migrations seen in Atlantic sturgeon, they do make localized coastal migrations and could be found in the New York Harbor and lower Hudson River near the project location. Transient individuals of both sturgeon species would be more likely to occur in the deeper waters of the River along the margins of the deep navigation channel than in shallower waters. Increased underwater noise during installation and removal of each cofferdam, including along the margins of the navigation channel, will likely lead to avoidance of the work area by shortnose and Atlantic sturgeon, but will not reach the thresholds of underwater noise associated with the onset of physiological injury or mortality. Most of the width of the river and about 80 percent of the distance across the navigation channel will be unaffected by the noise from the vibratory hammer, and sturgeon will be able to avoid the portion of the river in proximity to the in-water work in favor of suitable habitat in the vicinity.

Since any impacts to water or sediment quality associated with the Preferred Alternative's in-water construction activities associated with soil improvement would be localized and temporary, the deep channel habitat is unlikely to be adversely affected during construction. Adult and sub-adult sturgeon are benthic feeders, and soil improvement through jet grouting in the 1.5-acre low-cover area has the potential to disturb foraging habitat. However, when compared to the available suitable habitat that will still be available within the lower Hudson River, this loss of foraging habitat that would only be used during migration will not have the potential to result in significant adverse effects to sturgeon. Increased underwater noise during installation and removal of each cofferdam will likely lead to avoidance of the work area by shortnose and Atlantic sturgeon, but will not reach the thresholds of underwater noise associated with physical injury. Sturgeon are expected to return to the area of soil improvement within the

Hudson River following the cessation of in-water construction activities. While the 0.8-acre portion of the low cover area adjacent to the deeper Federal navigation channel that will be level with the riverbed will initially be unsuitable for burrowing organisms, over time sediments are expected to be deposited on top of the soil and grout mixture. These sediments could provide habitat for soft bottom organisms that will provide forage for sturgeon. The 0.7-acre portion of the soilcrete that will extend 1 to 2 feet above the mudline is not likely to be ideal foraging habitat for Atlantic sturgeon or shortnose sturgeon. This area is outside the deep channel habitat, but is within a relatively deep section of the river and thus may provide some foraging habitat for transient juvenile and adult Atlantic sturgeon. Despite the conversion of soft bottom to hard bottom habitat, the loss of this area is small relative to the unaffected soft bottom habitat in the Hudson River, and therefore may affect but is unlikely to adversely affect Atlantic sturgeon. Shortnose sturgeon do have the potential to use the 0.7-acre portion of the Hudson River affected by the elevated soilcrete as foraging habitat. However, considering the extent of suitable foraging habitat in the lower Hudson River that will remain unaffected by the Preferred Alternative, this loss of 0.7 acres of foraging habitat for shortnose sturgeon is not likely to adversely affect this species. The slight increase in elevation of the river bottom in this area will not cause obstruction of passage for either species of sturgeon. Consultation with NMFS regarding potential effects to Atlantic and shortnose sturgeon is ongoing.

References

Able, K.W., A.L. Studholme, and J.P. Manderson. 1995. Habitat quality in the New York/New Jersey Harbor Estuary: An evaluation of pier effects on fishes. Final Report. Hudson River Foundation, New York, NY.

Able, K.W., and F.P. Fahay. 1998. The first year in the life of estuarine fishes in the Middle Atlantic Bight. Rutgers University Press, New Brunswick, New Jersey. 400 pp.

Able, K.W., J.P. Manderson, and A.L. Studholme. 1998. The distribution of shallow water juvenile fishes in an urban estuary: The effects of manmade structures in the lower Hudson River. Estuaries 21: 731-744.

Abraham, B.J., and P.L. Dillon. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic) – softshell clam. U.S. Fish and Wildlife Service Biological Report 82(11.68); U.S. Army Corps of Engineers TR EL-82-4. 18 pp.

Bain, M.B., M.S. Meixler, and G.E. Eckerlin. 2006. Biological status of sanctuary waters of the Hudson River Park in New York. Final Project Report for the Hudson River Park Trust. Cornell University.

Bain, M.B., N. Haley, D. Peterson, J.R. Waldman, and K. Arend. 2000. Harvest and habitats of Atlantic sturgeon *Acipenser oxyrinchus* Mitchill, 1815, in the Hudson River Estuary: Lessons for sturgeon conservation. Instituto Espanol de Oceanografia. Boletin 16: 43-53.

Baine, M., J. Lodge, D.J. Suszkowski, D.B. Botkin, R.J. Diaz, K. Farley, J.S. Levinton, F. Steimle, and P. Wilber. 2007. Target ecosystem characteristics for the Hudson Raritan Estuary: technical guidance for developing a comprehensive ecosystem restoration plan. A report to the Port Authority of NY/NJ, pp. 1-112.

Central Hudson Electric and Gas Corp. (CHG&E), Consolidated Edison Company of New York Inc., New York Power Authority, and Southern Energy New York. 1999. Draft Environmental Impact Statement for State Pollution Discharge Elimination System Permits for Bowline Point, Indian Point 2&4, and Roseton Steam Electric Generating Stations.

Dovel, W.L. 1971. Fish eggs and larvae of the upper Chesapeake Bay. University of Maryland. Natural Resources Institute Special Report 4:1-71.

Dunning, D.J., Q.E. Ross, K.A. McKown, and J.B. Socrates. 2009. Effect of striped bass larvae transported from the Hudson River on juvenile abundance in Western Long Island Sound. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 1:343-353.

Dunton, K.J., A. Jordaan, K.A. McKown, D.O. Conover, and M.G. Frisk. 2010. Abundance and distribution of Atlantic sturgeon (*Acipenser oxyrinchus*) within the Northwest Atlantic Ocean, determined from five fishery-independent surveys. Fisheries Bulletin 108:450-465.

Fay, C.W., R.J. Neves, and G.B. Pardue. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic) – striped bass. U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/11.8. U.S. Army Corps of Engineers, TR EL-82-4. 36 pp. October 1983.

Fischer, W. 1978. FAO species identification sheets for fishery purposes. Western Central Atlantic (fishing area 31). Food and Agriculture Organization of the United Nations.

Heck, K.L., and T.A. Thoman. 1984. The nursery role of seagrass meadows in the upper and lower reaches of the Chesapeake Bay. Estuaries 7: 70-92.

Hildebrand, S.F. 1963. Family: Clupeidae. In: Fishes of the Western North Atlantic, pp. 152-249. Memoir, Sears Foundation for Marine Research 1:1-630.

Hill, J., D.L. Fowler, and M.J. Van Den Avyle. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates Mid-Atlantic) – Blue Crab. U.S. Fish and Wildlife Service Biological Report 82(11.100). U.S. Army Corps of Engineers, TR EL-82-4. 18 pp. March 1989.

Jones, W.P., D.F. Martin, and J.D. Hardy. 1978. Development of fishes of the Mid-Atlantic Bight. An atlas of egg, larval and juvenile stages. Fish and Wildlife Service.

Leggett, W.C. 1976. The American shad with special reference to its migration and population dynamics in the Connecticut River. In: D. Merriman and L.M. Thorpe (eds.), The Connecticut River Ecological Study: The Impact of Nuclear Power Plant, pp. 169-225. American Fishery Society Monograph 1:169-225.

Leim, A.H. 1924. The life history of the shad *Alosa sapidissima*, (Wilson) with special reference to factors limiting its abundance. Contributions to Canadian Biology of Fisheries 2:161-284.

Locke, A., and S.C. Courtenay. 1995. Effects of environmental factors on ichthyoplankton communities in the Miramichi estuary, Culf of St. Lawrence. Journal of Plankton Research 17:333-349.

Loesch, J.L. 1969. A study of blueback herring, *Alosa aestivalis* (Mitchill), in Connecticut waters. PhD Thesis, University of Connecticut, Storrs, CT. 78pp.

MacKenzie, Jr., C.L. 1990. History of the fisheries of Raritan Bay, New York and New Jersey. Marine Fisheries Review 52: 1-45.

MacKenzie, Jr., C.L. 1996. History of oystering in the United States and Canada, featuring the eight greatest oyster estuaries. Marine Fisheries Review 58: 1-79.

Maryland Department of Natural Resources (MDNR). 2016. Horseshoe crab life history. Available http://dnr2.maryland.gov/fisheries/Pages/horseshoe-crab.aspx. Accessed September 2, 2016.

National Marine Fisheries Service (NMFS). 1998. Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 104 pp.

Newell, R.I.E. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North and Mid-Atlantic) – Blue Mussel. U.S. Fish and Wildlife Service Biological Report 82(11.102). U.S. Army Corps of Engineers, TR El-82-4. 25 pp. June 1989.

Newell, R.I., and D. Moran. 1989. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (North and Mid-Atlantic) blue mussel. Biological Report 82(11.102). Fish and Wildlife Service, U.S. Department of the Interior.

Pardue, G.B. 1983. Habitat suitability index models: alewife and blueback herring. U.S. Fish and Wildlife Service FWS/OBS-82/10.58. 22 pp. September 1983.

Rice, M.A. 2010. Cultured mussels of the Northeast. Northeastern Regional Aquaculture Center, NRAC Publication No. 210-2010.

Rogers, S.G., and M.J. Van Den Avyle. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic) – Atlantic menhaden. U.S. Fish and Wildlife Service Biological Report 82(11.108). U.S. Army Corps of Engineers TR EL-82-4. 23 pp. August 1989.

Scott, W., and M. Scott. 1988. Atlantic fishes of Canada. Canadian Bulletin of Fisheries and Aquatic Science, 219. University of Toronto Press, Toronto, Canada.

Stanley, J.G., and R. DeWitt. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic) – hard clam. U.S. Fish and Wildlife Service FWS/OBS-82/11.18. U.S. Army Corps of Engineers, TR EL-82-4. 19 pp. October 1983.

Stanley, J.G., and M.A. Sellers. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic) – American Oyster. U.S. Fish and Wildlife Service Biological Report 82(11.65). U.S. Army Corps of Engineers, TR EL-82-4. 25 pp. July 1986.

Stier, D.J., and J.H. Crance. 1985. Habitat suitability index models and instream flow suitability curves: American shad. U.S. Fish and Wildlife Service Biological Report 82(10.88). 34 pp. June 1985.

United States Army Corps of Engineers (USACE). 2009. Delaware River main stem and channel deepening project. Draft Essential Fish Habitat evaluation. February 2009.

United States Fish and Wildlife Service (USFWS). 2011. The American Eel. Available http://www.fws.gov/northeast/newsroom/facts.html. Updated December 21, 2011.

United States Fish and Wildlife Service (USFWS). 2015. American eel, *Anguilla rostrata*. October 2015.

Walberg, C.H., and P.R. Nichols. 1967. Biology and management of the American shad and status of the fisheries. Atlantic coast of the United States, 1960. U.S. Fish and Wildlife Service, Special Science Report, Fisheries, 550. 105pp.

Zagata, C., C. Young, J. Sountis, and M. Kuehl. 2008. *Mytilus edulis*. Available http://animal.diversity.ummz.umich.edu/site/accounts/informatino/Mytilus_edulis.html.

HUDSON TUNNEL

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND DRAFT SECTION 4(f) EVALUATION

APPENDIX 11-4

Draft Conceptual Compensatory Mitigation Plan

U.S. Department of Transportation
Federal Railroad Administration

NJTRANSIT
The Way To Go.®

Draft Conceptual Compensatory Mitigation Plan

1) PROJECT DESCRIPTION

The Hudson Tunnel Project (Project) is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel beneath the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area, and beneath the Hudson River to connect to the existing approach tracks at Penn Station New York (PSNY) (see **Figure 1)**. It will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River passenger rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson River Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

Construction activities will include: new approach tracks in Secaucus and North Bergen, NJ; construction of the new Hudson River Tunnel by tunnel boring machine (TBM); in-water ground improvement over 1.5 acres of sediment in the Hudson River; ground improvement at the Manhattan shoreline; construction of a shaft, staging, and fan plant site at Twelfth Avenue; and rehabilitation of the existing North River Tunnel. Construction activities associated with the new Hudson River Tunnel will begin in 2019 and will be completed in 2026. Rehabilitation of the existing North River Tunnel will begin in 2026 and be completed in 2030.As shown in **Figure 2**, major components of the Project will include:

- Two new surface tracks parallel to the south side of the NEC beginning at a realigned Allied Interlocking in Secaucus[1], New Jersey just east of NJ TRANSIT's Secaucus Junction Station. The eastern portion of these tracks where the tracks deviate from the NEC will be accessible for maintenance via new gravel access road. The new Hudson River Tunnel with two tracks in separate tubes beneath the Palisades and the Hoboken waterfront area east of the Palisades, continuing beneath the Hudson River to Manhattan. In New Jersey, the tunnel

[1] An interlocking is a system of switches and signals that allows trains to make connections from one track to another.

will begin at a portal in the western slope of the Palisades, just east of Tonnelle Avenue (US Routes 1 and 9). The two new tracks will continue through the Manhattan bulkhead, beneath Hudson River Park and Twelfth Avenue (Route 9A) to meet the underground Hudson Yards Right-of-Way Preservation Project being constructed by Amtrak beneath the Hudson Yards overbuild project at the Western and Eastern Rail Yards in Manhattan.

- Two new tracks and associated rail systems to be added by the Project to the Hudson Yards Right-of-Way Preservation Project.
- Extension of the tunnel past the Hudson Yards Right-of-Way Preservation Project beneath Tenth Avenue to a tunnel portal east of Tenth Avenue, within the complex of tracks located beneath the existing building that spans the tracks on the east side of Tenth Avenue (450 West 33rd Street, referred to as the Lerner Building). The new tunnel portal will be adjacent to the tunnel portals for Amtrak's Empire Line and for the North River Tunnel.
- Track connections east of Tenth Avenue to the existing approach tracks into PSNY.
- A ventilation shaft and associated fan plant building in Hoboken, New Jersey.
- A ventilation shaft and fan plant building near Twelfth Avenue between West 29th and 30th Streets (Block 675) in Manhattan.
- A fan plant beneath or near the Lerner Building at Tenth Avenue between 31st and 33rd Streets, which sits above the rail right-of-way.
- Rehabilitation of the existing North River Tunnel.

2) POTENTIAL FOR IMPACT ON WATERS OF THE UNITED STATES

The Project will result in the placement of fill in waters of the United States (WOTUS) in Penhorn Creek and associated wetlands in New Jersey and in the Hudson River. The Project will also result in temporary impacts to WOTUS resulting from construction activities. Wetlands within the Limit of the Project (LOP) were delineated in November and December of 2016. Approximately 14.5 acres of wetlands delineated within the limit of the Project for the new surface alignment in November 2016, and approximately 0.439 acres within the proposed construction access road for the fan plant/vent shaft in Hoboken in December 2016. A request for Jurisdictional Determination (JD) was submitted to the USACE on March 17, 2017, and USACE conducted the site visit on April 12, 2017. The modifications to the JD drawings requested by the USACE as a result of the site visit were submitted on May 1, 2017. The USACE determined wetlands A, CD and F to be jurisdictional waters regulated by the USACE under Section 404 of the Clean Water Act (see **Figures 2a**, **b**, and **c**).

In the Hudson River, the Project will modify the river bottom in an approximately 1.5-acre area in New York waters. In this area, the new Hudson River Tunnel will be relatively shallow beneath the river bottom, which could cause difficulties during tunnel boring. To ensure that the new Hudson River Tunnel has a minimum cover of 11 feet above the tunnel below the river bottom, grout will be injected into the river bottom soils in the 1.5-acre area, to create a hardened sediment/grout mixture (soilcrete) above the tunnel, described in greater detail below. In that area, 0.7 acres will have soilcrete above the mudline, resulting in a net placement of fill within 0.7 acres of WOTUS within the Hudson River low-cover area. The remaining 0.8 acres of existing river bottom to be impacted via jet-grouting will not result in a change in the elevation of the bottom sediment and will not require mitigation.

Wetlands A, B, and CD

Table 1 summarizes temporary and permanent impacts to Wetlands A, B, and CD resulting from the Project. These are tidally influenced emergent marshes dominated by *Phragmites australis*. Installation of erosion and sediment control measures and security fencing would temporarily impact approximately 4.307 acres of Wetlands A, B, and CD. Implementation of erosion and sediment control measures (e.g., hay bales, silt fences, seeding and mulch, straw or hay) in accordance with the Stormwater Pollution Prevention Plan (SPPP) required under NJPDES General Permit NJ0088323 for Construction Activity Stormwater (General Permit 5G3) will minimize indirect impacts to these wetlands due to deposition of soil and other material. Construction of the new culverts and culvert extension would include the installation of a temporary cofferdam and sump pits to divert water flow around the work area to control infiltration of groundwater during placement and anchoring of culverts or extensions. Water removed during cofferdam dewatering would be treated with temporary sediment control measures before being discharged back to surface waters or wetlands. Additional measures, such as the use of low ground-pressure vehicles and marsh matting (where required by resources agencies), would be considered where feasible to minimize temporary impacts to wetlands that will not be permanently impacted by the Project. Following the completion of construction, where possible, wetlands temporarily affected during construction would be restored back to original topography and stabilized in accordance with the SPPP.

The surface alignment will result in the unavoidable permanent loss of approximately 8.005 acres of emergent wetlands with associated open water areas within the footprint of the expanded embankment, permanent gravel access roads, culverts, retaining walls, new embankment and bridge abutment over the freight railroad right-of-way in and near the Meadowlands.

Additionally, these same elements have the potential to result in indirect impacts to wetlands due to changes in hydrology within the study area. The drainage ditch that parallels the NEC embankment, located east of Secaucus Road, would be relocated to a 300-foot-long box culvert adjacent to the proposed retaining wall. In addition, four 24-inch diameter culverts would cross beneath the embankment of the new alignment and the adjacent access road. The embankment and access road would limit the flow of water between the drainage ditch that parallels the NEC embankment and the wetlands to the south. Altering the hydrology of wetlands within the study area (e.g., flooding, draining) would disturb the ecology of the wetlands and their distribution. The Project Sponsor will conduct additional evaluations to confirm that the culverts are designed to minimize secondary wetland impacts due to changes in hydrology.

Wetland F

The Project will result in impacts to a 0.439-acre wetland area in Hoboken, Wetland F, located in a drainage ditch adjacent to the north side of the Hudson-Bergen Light Rail (HBLR) right-of-way. This wetland will be filled for use as a construction access road for the Project's construction staging area at the ventilation fan plant and shaft site in Hoboken during the seven-year construction period at this site. Drainage culvert(s) will be installed as part of the construction access road to maintain the existing drainage pattern while the road is in place. Due to the duration that the construction access road will remain in place, it is considered a permanent impact, and will be mitigated as such. Once construction of the Project in this area is complete, the construction access road will either be removed or it will remain in place for maintenance access.

Table 1
Summary of Impacts to Wetlands and Waters of the United States Under USACE Jurisdiction

Wetlands and Waters of the United States under USACE Jurisdiction	Permanent Impact due to Permanent Fill (Acres)	Temporary Impact due to Construction Activity (Acres)
Wetland A	0.670	0.578
Wetland B	0.010	0.000
Wetland CD	6.886	3.729
Wetland F*	0.439	0.000
Total Impact within Delineated Wetlands	**8.005**	**4.307**
Total Impact within NYSW Mitigation Site**	0.170	0.280
Total Impact within the Hudson River***	0.7	0.0
Total Impact Acreage	**8.875**	**4.587**

Notes:

* Due to the duration that the construction access road will remain in place, this impact is considered permanent by USACE.

** Total permanent impact within the NYSW mitigation site is 0.47 acres, of which 0.3 acres occur within the delineated wetlands while 0.17 acres occur within upland areas.

*** 0.7 acres of the 1.5-acre low cover area will be elevated above the mudline; the remaining 0.8 acres will be at the elevation of the Hudson River.

Existing NYSW Wetland Mitigation Site

A portion of the 3-acre New York Susquehanna & Western (NYSW) Railway wetland mitigation site is located within the Limit of the Project. This site is located adjacent to the eastern portion of Wetland CD, south of the NEC, to the west of Tonnelle Avenue, along the western side of the NYSW Secaucus yard (see **Figure 2-b**).

The wetland mitigation site is compensation for the permitted filling of 3 acres of WOTUS (U.S. Department of Army (USACE) Permit No. 90-0679 (the "Permit") dated November 24, 1995). In order to mitigate for the loss of these 3 acres, the Permit required NYSW to perform on-site wetlands creation and/or enhancement activities in accordance with a mitigation plan titled "Revised Wetlands Mitigation Plan, Resources Terminal Project (Phase IIB) North Bergen, New Jersey," dated April 1995. The plan required the creation of palustrine scrub-shrub, emergent, aquatic bed and open water habitats in what was previously a *Phragmites australis*-dominated wetland. The Permit also required NYSW to restrict the use of the mitigation site (the "site") in perpetuity by creation of a conservation easement or outright transfer of the site to an entity acceptable to USACE.

On December 12, 2012, NYSW and the USACE signed a Settlement Agreement stating that NYSW had failed to complete mitigation or restrict the use of the mitigation site in perpetuity as required by the USACE Permit 90-0679. The Settlement Agreement reaffirmed acceptance of the original mitigation plan with additional conditions. One such condition required NYSW to grant a conservation easement, dated March 27, 2013, to the New Jersey Department of Environmental Protection (NJDEP) to restrict subsequent development of the site. As designed, the wetland mitigation project is to include palustrine scrub-shrub, emergent, aquatic bed and

open water habitats. NYSW implemented the mitigation plan in 2014. North Bergen Combined Sewer Overflow (CSO) outfall 011A discharges to the southernmost end of the mitigation site. NJDEP holds a conservation easement on the mitigation site.

The Project will result in 0.47 acres of permanent impacts (0.3 acres within wetlands and 0.17 acres within uplands) and 0.28 acres of temporary impacts to this wetland mitigation site. Similar to the other portions of the surface alignment, permanent impacts will result from placement of fill for the new track embankment and gravel access road and drainage structures with riprap outlet protection. Temporary impacts will result from the installation of erosion and sediment control measures and security fencing, and culverts with associated riprap outlet protection. The Project has the potential to result in indirect impacts to the wetland mitigation site and adjacent wetlands due to changes in hydrology and hydraulics associated with the loss of wetland area and change in the discharge point from the wetland mitigation site to the adjacent wetland. The Project Sponsor will conduct additional evaluations to confirm that the outlet structure for the wetland mitigation site is designed to minimize hydraulic impacts to the wetland mitigation site and the North Bergen CSO outfall 011A, and the functioning of the wetland with respect to water quality and minimizes impacts to the wetland receiving the discharge from the mitigation site.

Low-Cover Area within Hudson River

In the Hudson River, the Project will modify the river bottom in an approximately 1.5-acre area within the boundaries of New York State. In this area, the new Hudson River Tunnel will be relatively shallow beneath the river bottom, which could cause difficulties during tunnel boring. To ensure that the new Hudson River Tunnel has a minimum cover of 11 feet above the tunnel below the river bottom, a 1.5-acre area of river bottom in New York waters within the Hudson River will be strengthened using jet grout, involving a mix of cement grout, water, and compressed air at high pressure that will mix with and partially replace the soil. This will result in a stronger, solidified cemented soil with a consistency equivalent to a hard clay, i.e., a moderate-strength "soilcrete." Approximately 0.7 acres of soilcrete (approximately 120 feet wide and 270 feet long) will extend between 1 and 2 feet above the mudline and therefore meets the definition of "fill" at 33 CFR § 323.2(e). The remaining 0.8 acres of soilcrete will not extend above the mudline and would not be considered by the USACE to be a permanent placement of fill requiring mitigation.

3) ALTERNATIVES CONSIDERED

This section describes the alternatives of the Project that were assessed in determining a Preferred Alternative. A preliminary screening evaluation of 15 alternatives was conducted during the Project's National Environmental Policy Act (NEPA) scoping process. The 15 alternatives were evaluated against a two-tiered set of criteria: whether the alternative met the purpose and need of the Project, and, if the alternative met the purpose and need of the Project, it was assessed in terms of its feasibility and reasonableness, which included an assessment of the likelihood for substantial environmental impact relative to other alternatives. The results of the screening analysis resulted in only one Build Alternative that met the Project's purpose and need. A No Action Alternative was also assessed.

ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Under the No Action Alternative no new passenger rail tunnel would be constructed across the Hudson River. The No Action Alternative would implement only those projects that are

necessary to keep the existing North River Tunnel in service and provide continued maintenance as necessary to address ongoing deterioration and maintain service. The No Action Alternative is not a practicable alternative because it does not preserve the current functionality of passenger rail service between New Jersey and PSNY, does not repair the deteriorating North River Tunnel, and does not strengthen the NEC's resiliency to support reliable passenger rail service by providing redundant capability under the Hudson River.

ALTERNATIVE 2 – THE PREFERRED ALTERNATIVE

The single Build Alternative concept identified in the alternatives screening process was a new tunnel connecting the NEC to PSNY, together with rehabilitation of the North River Tunnel. The new tunnel would include two new tracks branching off from and running alongside the existing NEC just east of Frank R. Lautenberg Secaucus Junction Station in New Jersey, continuing in a tunnel beneath the Palisades and the Hudson River, and connecting to the existing approach tracks that lead into PSNY. This Build Alternative was then refined to develop the Preferred Alternative.

In order for the Build Alternative to meet the Project's purpose and need, it must maintain current levels of train service on the NEC for Amtrak and NJ TRANSIT while the North River Tunnel is being rehabilitated. To do this, the alignment of the Build Alternative's new tunnel is constrained by a number of geographic considerations, which limit the potential Project alignment at its western and eastern ends, where it must connect to the NEC and the existing tracks at PSNY. These are as follows:

- On the west, the Build Alternative must connect to the NEC in New Jersey in a way that allows operational flexibility for trains moving between the NEC and the new tunnel. Therefore, to provide a new route close to the NEC that maximizes the use of existing infrastructure, maintains flexible and redundant NEC rail operations for Amtrak and NJ TRANSIT, and minimizes the potential for environmental and community impact associated with new right-of-way, the Build Alternative's two new tracks should be immediately adjacent to the existing NEC, using existing Amtrak right-of-way where possible, and connect to the NEC as close as possible to the new tunnel portal while providing switches between tracks for operational flexibility. The new tunnel must be south of the existing North River Tunnel to connect to PSNY (as described below). New approach tracks to the tunnel on the south side of the NEC in New Jersey would avoid the need for tunneling beneath or flying over the NEC to connect to the tunnel, and therefore would have fewer potential environmental impacts than new approach tracks on the north.
- On the east, the Build Alternative must connect to the array of approach tracks that lead into PSNY, which provide access to PSNY Station Tracks 1 through 18. Connecting to these tracks allows trains to reach existing PSNY platforms and is essential to maintaining the NEC's current capacity and functionality. This connection can only be made at the southwestern end of the PSNY approach tracks, because areas farther north are occupied by the existing tracks from the North River Tunnel, Amtrak's Empire Line (which heads north to Albany), and tracks connecting to the Long Island Rail Road's (LIRR's) John D. Caemmerer West Side Yard. The connection point on the southern end of the approach tracks would make use of the Hudson Yards Right-of-Way Preservation Project being constructed by Amtrak along the southern edge of the West Side Yard. The Hudson Yards Right-of-Way Preservation Project preserves a rail right-of-way beneath the extensive

overbuild project that is planned to be constructed on a platform above the rail complex. Any other connection point would conflict not only with the existing rail infrastructure but also with the foundations and supports for this platform.

These connection points narrow the area where the Build Alternative can be located. The constraints in New Jersey related to connections to the NEC require the Build Alternative to be located immediately south of the NEC through the New Jersey Meadowlands. The constraints in New York related to connections to PSNY set both the horizontal and vertical alignment of the new tunnel, so that the new tunnel must be relatively shallow beneath the Hudson River to allow trains to connect to approach tracks to PSNY that begin along the south side of the LIRR train storage yard.

Within these parameters, multiple alignment options are possible for the Build Alternative's new tunnel between its portal at the western slope of the Palisades and the Manhattan shoreline. To identify the routing that best meets the Project's purpose and need, four conceptual alignment options were identified based on potential locations where a ventilation shaft and associated fan plant could be sited in New Jersey. The vertical ventilation shaft must be directly connected to the tunnel at a point east of the Palisades, in an area where few undeveloped properties exist. The location of the ventilation shaft therefore determines the tunnel alignment between the tunnel portal and the waterfront area east of the Palisades. The ventilation shaft site would also be used as a construction staging site. The options were as follows:

- Alignment Option 1: Tunnel alignment close to the existing North River Tunnel, with a ventilation shaft site near the Lincoln Tunnel Helix in Weehawken, New Jersey.
- Alignment Option 2: Tunnel alignment south of Option 1, with a shaft site north of 19th Street near JFK Boulevard East in Weehawken.
- Alignment Option 3: Tunnel alignment south of Option 2, with a shaft site south of 19th Street near the HBLR in Weehawken. Two potential shaft sites were identified for this alignment.
- Alignment Option 4: Tunnel alignment south of Option 3, with a shaft site south of 18th Street in Hoboken, New Jersey. This option would follow the same horizontal alignment in New Jersey identified for the previous Access to the Region's Core (ARC) Project, and would use the same shaft site in Hoboken as the ARC Project.

The four alignment options were evaluated comparatively in terms of how well each option met the Project's goals and objectives. The four alignment options would be the same over the surface portion of the alignment in New Jersey, as well as in Manhattan, so those segments were not considered in the comparison. In addition, based on the analyses conducted for the ARC Project, it is assumed that potential construction or operational effects (e.g., noise and vibration) related to the alignment of the deep rock tunnel beneath the Palisades would not be significant for areas directly above the tunnel, so that was not a factor in the comparison.

The alignment options were evaluated and compared in terms of how well they meet the Project's goals and related objectives. The Project's goals are as follows:

- Improve service reliability and upgrade existing tunnel infrastructure in a cost-effective manner.
- Maintain uninterrupted existing NEC service, capacity, and functionality by ensuring North River Tunnel rehabilitation occurs as soon as possible.

- Strengthen the NEC's resiliency to provide reliable service across the Hudson River crossing, facilitating long-term infrastructure maintenance and enhancing operational flexibility.
- Do not preclude future trans-Hudson rail capacity expansion projects.
- Minimize impacts on the natural and built environment.

The refined screening evaluation concluded that Alignment Option 4 best meets the Project goals and objectives and is the preferred alignment option. Alignment Option 4 offers the following advantages over the other alignment options:

- Least potential for delays to the Project schedule, because of the pre-construction risk related to property acquisition, investigation, and remediation already conducted for the ventilation shaft site as part of the ARC Project;
- Minimal impacts to existing transit and other transportation services; and
- Least impact related to displacement of active uses (residential, business, and future residential), since NJ TRANSIT has already acquired the properties needed for the New Jersey shaft site and staging areas.

While Alignment Option 4 would have a slightly longer tunnel than the other options, this was not found to result in negative impacts that outweighed this option's advantages. Alignment Option 4 would have a greater construction cost for tunneling than Options 1 through 3 because of the additional length, but if construction is delayed for Options 1 through 3 because of their greater pre-construction risk, the cost difference would be minimized and might be eliminated after accounting for cost increases that occur from inflation. Similarly, while the tunneling for Alignment Option 4 could take slightly longer than for the other options (2.5 months longer than the shortest alignment option, Option 1), this would be a small difference relative to the total schedule of seven years, and could be eliminated with any delay in Alignment Options 1 through 3. Finally, the slightly longer tunnel length for Alignment Option 4 would not meaningfully increase travel time for trains in the tunnel, especially once operating conditions at and near PSNY are considered. While trains operating at the maximum design speed through the tunnel would have different potential total travel times, in reality, controlling signals at Tenth Avenue near PSNY would result in a uniform speed step-down for eastbound trains approaching PSNY. This would reduce the difference between different travel times farther west (for example, from the Tonnelle Avenue portal to the middle of the Hudson River) as trains are slowed to reach a common location at a common point in time, based on PSNY dispatching and operational issues. In reality, therefore, the four alignment options would likely have little or no difference in travel times between Secaucus Junction Station and PSNY.

Each of the other alignment options (Alignment Options 1 through 3) would be feasible, but was found to have one or more substantial disadvantages relative to Alignment Option 4:

- Alignment Option 1 would have a construction staging site within the Lincoln Tunnel Helix (the curving approach ramp to the Lincoln Tunnel), which would require displacement of NJ TRANSIT's existing Weehawken bus parking and staging site currently located there. The bus parking facility is used to store approximately 160 buses at a location close to the Lincoln Tunnel so that they can reliably reach the Port Authority Bus Terminal for the evening commute. Displacement of this bus parking area would result in substantial negative impacts on NJ TRANSIT's trans-Hudson bus operation serving the Port Authority Bus

Terminal and providing service to thousands of commuters. Alignment Option 1's shaft site and staging area would also have the potential for major conflicts with future Lincoln Tunnel Helix reconstruction being planned by the Port Authority of New York & New Jersey. In addition, Alignment Option 1 may introduce delays to the Project schedule associated with the need to acquire new property for the shaft site and staging area and to conduct other pre-construction activity. For these reasons, Option 1 was eliminated from further consideration

- Alignment Option 2 would require the acquisition and demolition of an existing, occupied, multi-story office building for its shaft site and staging area, an adverse impact that could be avoided by Option 4. In addition, Alignment Option 2 may introduce delays to the Project schedule associated with the need to acquire new property for the shaft site and staging area and to conduct other pre-construction activity. Alignment Option 2 has no substantial advantages over Option 4 and would not reduce potential environmental impacts relative to Option 4. For these reasons, Option 2 was eliminated from further consideration.
- Alignment Option 3 would preclude the development of at least a portion of a major planned residential development currently under construction at 800 Harbor Boulevard, or, alternatively, would require displacement of the active commercial use at Dykes Lumber Company, adverse impacts that could be avoided by Option 4. In addition, Alignment Option 3 may introduce delays to the Project schedule associated with the need to acquire new property for the shaft site and staging area and to conduct other pre-construction activity. Option 3 has no substantial advantages over Option 4. Therefore, Alignment Option 3 was eliminated from further consideration.

FRA and NJ TRANSIT thus identified Alignment Option 4 as the tunnel alignment for the Build Alternative. The Build Alternative including the tunnel alignment identified as a result of the screening process was identified as the Preferred Alternative for evaluation in the NEPA Environmental Impact Statement (EIS).

Least Environmentally Damaging Practicable Alternative Evaluation

As described above, only one Build Alternative was found to meet the purpose and need for the Project: a new two-track tunnel beneath the Palisades and Hudson River connecting the existing NEC in the New Jersey Meadowlands to the existing PSNY approach tracks in New York. This alternative will have a ventilation shaft, associated fan plant building, and construction staging area on a site just east of the Palisades in Hoboken, New Jersey (with small portions of the site also located in Union City and Weehawken, New Jersey). It will also require filling of wetlands at two locations in New Jersey—in the Meadowlands (Secaucus and North Bergen) and in Hoboken—and modifications within the Hudson River in New York County, as discussed below.

Meadowlands

The Build Alternative for the Project must be located within the New Jersey Meadowlands, because it must connect to the NEC, which is already located on a berm within the New Jersey Meadowlands. The track connections will be accomplished in a new interlocking (a system of switches, signals, and track connections that connects multiple tracks, so that trains can move between the tracks) that begins just east of County Road and Secaucus Junction Station in Secaucus, New Jersey. Within the Meadowlands, the new track will be located largely on a berm, with some segments on bridges and a long viaduct.

The western end of the Meadowlands section will be closest to the existing NEC berm, since this is the area where tracks will begin to diverge from the NEC. In this area, the widened embankment will be supported by a retaining wall along its southern edge because the tracks will be close to adjacent businesses and use of a retaining wall for a widened embankment will reduce the land area needed for the new tracks.

Beyond the section supported by the retaining wall, approximately 1,000 feet of the new alignment will be supported on a viaduct. A viaduct is proposed here rather than a retaining wall or berm, because the proximity of adjacent businesses limits the space available for new right-of-way and the location of Penhorn Creek and the need for new replacement drainage features in this portion of the right-of-way means that a berm is not practicable.

For the eastern, curved portion of the surface alignment, the tracks will be located on a sloped embankment curving away from the NEC to connect to the new tunnel portal location, which is approximately 600 feet south of the existing North River Tunnel portal. The length of the alignment where this widened embankment is proposed is approximately 1,910 linear feet, and will include the rail right-of-way and an adjacent service road that will provide access during construction and serve as a vital fire/life/safety road following construction during the operational phase of the railroad. This curved portion of the new alignment that will cross through an area of wetlands, including the northern portion of the established and federally approved NYSW Railway's wetland mitigation site.

A widened embankment is proposed in this section rather than another structure, because of the substantial increased cost associated with a viaduct structure. As the new surface alignment curves from the eastern end of the proposed viaduct segment toward the new tunnel's portal east of Tonnelle Avenue, the distance between the new tracks increases from the existing NEC. The widened embankment will be more easily constructed than a viaduct, as deeper structures such as piles and/or retaining walls (due to increased depth to bedrock) will not be required. Even considering a 12-month pre-loading period for fill material, the widened embankment will also involve a much shorter overall construction duration. As a result of these considerations, a widened embankment will cost considerably less than a viaduct in this location, with the estimated cost for the embankment of $22.1 million and the estimated cost for a viaduct of $45.4 million, a $23.3 million difference. A viaduct would reduce impacts to wetlands by approximately 2.6 acres, but the additional cost of this reduction would be substantial.

Hoboken

The alternatives analysis conducted in coordination with the Project's NEPA review considered multiple alignments for the tunnel that would in turn have different ventilation shaft and construction staging area locations. The alignment selected best met the Project goals and objectives because of its shorter time to implement and smaller impact on the environment and surrounding community.

The selected alignment option will result in permanent impacts during construction to a 0.44-acre wetland area in Hoboken, Wetland F, located in a drainage ditch adjacent to the north side of the HBLR right-of-way. This area will be filled for use as part of the Project's construction staging area. As noted above, other alignment options that avoided this wetland area would result in greater environmental and community impacts in other respects.

4) AVAILABLE MITIGATION CREDITS

The Project Sponsor will purchase acre-credits for the 8.175 acres of permanent impacts to wetlands and associated open water areas (including 0.17 acres within the NYSW mitigation site) from an approved Wetland Mitigation Bank or Banks whose primary service areas include the Hackensack-Passaic Hydrologic Unit 02030103 watershed where the New Jersey surface alignment portion of the Project is located and the Lower Hudson Hydrologic Unit 02030101 watershed where the 0.439-acre wetland area in Hoboken is located. It is anticipated that the Project Sponsor will solicit bids from approved Wetland Mitigation Banks to procure the necessary mitigation acre-credits once the project has received approval from the regulatory authorities. The anticipated mitigation ratio is 1 acre-credits purchased for every 1 acre impacted, with each acre-credit representing a mitigation ratio of 3 to 1.

As mitigation for the 0.7 acres of elevated soilcrete, the Project Sponsor will monitor the area for five years to assess its recovery as fish foraging habitat. Monitoring of this area will be conducted in consultation with USACE, NMFS, and NYSDEC. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction.

5) GOALS AND OBJECTIVES

The primary objective of this mitigation plan is to offset the 8.875 acres of permanent wetland and WOTUS impacts identified in **Table 1** that will result from the Project through the purchase of mitigation credits from an approved Wetland Mitigation Bank to compensate for 7.566 acres of impacts to Wetlands A, B, and CD; 0.439 acres of impacts to Wetland F; and 0.17 acres of impacts to upland habitat, and five years of post-construction monitoring developed in consultation with NMFS, USACE and NYSDEC for the approximately 0.7 acres within the Hudson River occupied by soilcrete. The 4.587 acres of temporary wetland and WOTUS impacts will be offset through the removal of temporary fill material, restoration of topography, and stabilization through seeding with suitable native plant species.

Approximately 0.8 acres of the soilcrete area will be approximately level with the surrounding riverbed, and over time, sediments will be deposited over the soilcrete at sedimentation rates typical of the lower Hudson River, possibly providing some soft-bottom habitat for benthic invertebrates. Therefore, within this portion of the low-cover area, modification of the river bottom to achieve the soil improvement necessary to protect the Hudson River Tunnel will not result in adverse impacts to aquatic biota. The 0.7-acre elevated portion of the soilcrete will provide habitat for encrusting organisms, which will provide some foraging habitat for fish. However, this area will have a lower potential to accumulate sediment that would provide soft-bottom habitat for benthic invertebrates and will not, therefore, provide forage habitat to soft-bottom feeding fish species such as windowpane, skates, and summer and winter flounder. The loss of soft-bottom habitat within the 0.7-acre elevated portion of the soilcrete represents a small loss of this type of habitat within the harbor estuary and will not adversely affect populations of benthic invertebrates. After construction is complete, the Project Sponsor will monitor the recovery of the 0.7 acres for five years to assess the habitat use and re-sedimentation of the modified river bottom. Monitoring of this area will be conducted in consultation with the USACE, NMFS, and NYSDEC.

6) SITE PROTECTION

The wetlands that will be restored as a result of temporary construction impacts are within the right-of-way for National Railroad Passenger Corporation (Amtrak) and within the NYSW right-

of-way. The Project Sponsor will be responsible for ensuring the protection of the restored wetland areas.

7) BASELINE CONDITIONS

OVERALL PROJECT SITE

The western half of the study area within New Jersey is located within the New Jersey Meadowlands, a large complex of tidal marshes and impounded wetlands surrounded by developed areas that include paved parking areas, warehouse and industrial development, and transportation infrastructure such as major highways and secondary roads. Natural areas, including wetland habitats and adjacent upland habitats have been documented, by the New Jersey Sports and Exhibition Authority (NJSEA) and NJDEP, to provide habitat for many resident and migratory species, including some species that have been listed by state or Federal regulatory agencies as being of special concern, threatened, or endangered. The following sections describe the natural resources within the study area, within and outside the Meadowlands.

WETLANDS

FRA reviewed the National Wetlands Inventory (NWI) published by the USFWS, NJDEP's wetland maps, and conducted a field reconnaissance in fall 2016. The NWI shows large areas of estuarine wetlands and smaller areas of freshwater wetlands within the New Jersey study area in the Hackensack Meadowlands (see **Figure 3**).

The freshwater wetlands shown on the NWI are riverine unknown perennial wetlands that have unconsolidated bottoms and are permanently flooded (designated by USFWS as "R5UBH"). As shown on the NWI, this R5UBH wetland is mapped on Penhorn Creek as it crosses the NEC east of County Road in Jersey City, New Jersey and again crosses the NEC and the Project alignment near Secaucus Road in Secaucus, NJ, and on a wetland area immediately north of the NEC near the NYSW right of way at the eastern edge of the Meadowlands.

The estuarine tidal wetlands within the study area (see **Figure 3**) include an intertidal wetland spanning both sides of the NEC from County Road to Penhorn Creek that is irregularly flooded oligohaline (i.e., brackish water with a salinity ranging from 0.5 to 3.0 parts per thousand [ppt]) and dominated by emergent *Phragmites australis* (a large perennial reed species that is invasive within the United States) ("E2EM5P6"). Outside Penhorn Creek, the NWI indicates large areas of oligohaline intertidal wetlands along both sides of the NEC east of Secaucus Road that are irregularly flooded, dominated by emergent *Phragmites australis*, and partially drained/ditched (E2EM5Pd6). The NYSW wetland mitigation project is located within a portion of the area mapped as E2EM5Pd6. The following section presents a detailed description of this wetland mitigation site. In addition, the NWI indicates subtidal wetlands with the following characteristics in small areas close to Penhorn Creek and County Road: subtidal wetlands with an unconsolidated bottom that is permanently flooded, oligohaline, and excavated (E1UBLx6); and subtidal wetland with an unconsolidated bottom that is permanently flooded (E1UBL). FRA confirmed these wetland types and approximate locations during site reconnaissance conducted in fall 2016.

NJDEP-mapped wetlands are located in the study area (see **Figure 4**). These wetlands are designated by NJDEP with the land use/land cover code, "*Phragmites* Dominate Interior Wetlands." They are located along both sides of the NEC in the Meadowlands area between County Road and the NYSW right-of-way. FRA confirmed this wetland type and approximate wetland locations during site reconnaissance.

Delineated Wetlands

FRA delineated wetlands within the New Jersey study area during November and December 2016, in accordance with USACE's three-parameter approach for identifying wetlands[2]. These wetlands, Wetlands A, B, CD, and F, are described in greater detail in **Appendix 11-2** to the DEIS, "Wetland Delineation Report." Two of these wetlands are located along the NEC and are tidally influenced emergent marshes that correspond with the locations of NWI-mapped wetlands E2EM5P6, R5UBH, E1UBLx6, and E2EM5Pd6 (Wetlands A and CD). An isolated, emergent wetland was delineated along the NEC (Wetland B). An emergent wetland with a possible nexus to the Hudson River through a tide gate was delineated along the HBLR right-of-way in Hoboken (Wetland F).

NYSW Wetland Mitigation Site

An existing USACE-approved wetland mitigation site is located within the Project area in Secaucus, NJ just south of the NEC, to the west of Tonnelle Avenue, along the western side of the NYSW Secaucus yard (see **Figure 2b**). The USACE approved the implementation of a plan within a 3-acre portion of the NYSW right-of-way to mitigate for project activities undertaken in North Bergen, NJ by NYSW that resulted in 3 acres of fill to waters of the United States. As designed, the wetland mitigation project is to include palustrine scrub-shrub, emergent, aquatic bed and open water habitats. NYSW implemented the mitigation plan in 2014. North Bergen Combined Sewer Overflow (CSO)[3] outfall 011A discharges to the southernmost end of the mitigation site. NJDEP holds a conservation easement on the mitigation site.

NEW JERSEY SURFACE WATERS

The western surface alignment portion of the Project site in New Jersey crosses through the Penhorn Creek watershed within the Meadowlands, which the Meadowlands Environmental Research Institute (MERI, 2016a) divides into four subwatersheds. Penhorn Creek is a tributary to the Hackensack River and drains a portion of the Meadowlands to the east of the Hackensack River. The ridgeline of the Palisades sill forms the eastern boundary of Penhorn Creek's watershed, and the ridgeline running through Secaucus forms the western boundary of the watershed. Dikes formed by roadway fill constructed across the Meadowlands and the Hackensack River form the northern and southern boundaries of the watershed, respectively.

---

[2] Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Miss; U.S. Army Corps of Engineers. 2011. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (version 2.0), ed. J.S. Wakeley, R.W. Lichvar, C.V. Noble, and J.F. Berkowitz. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[3] A combined sewer overflow (CSO) is the discharge or release of water from a combined sewer system (a sewer system designed to collect storm water runoff, domestic sewage, and industrial wastewater in the same pipe and bring it to wastewater treatment facilities) caused by snowmelt or storm water runoff.

Penhorn Creek's bed elevation is lower than much of the tidal range in the Hackensack River; however, its waters are regulated by a tide gate at St. Paul's Avenue near its mouth (NJMC, 2006).

Several municipal CSO outfalls[4] discharge to the Penhorn Creek watershed (see **Figure 5**). The North Bergen CSO outfall 011A (New Jersey Pollutant Discharge Elimination System (NJPDES) Number NJ0108898), discharges to the NYSW wetland mitigation site, which then drains to the wetlands within the Project site. No surface waters other than the Hudson River are located within the portion of the Project area east of the Palisades that is within the Hudson River watershed. Runoff within this urbanized area is conveyed to the Hudson River by storm sewers and CSO outfalls (**Figure 5**).

Water Quality

Surface Water Quality Standards for New Jersey Waters (N.J.A.C. 7:9B) establish the designated uses to be achieved, provide management guidelines, and specify the water quality criteria necessary to protect the state's waters. Designated uses include potable water, propagation of fish and wildlife, recreation, agricultural and industrial supplies, and navigation. These are reflected in use classifications assigned to specific waters.

All waters of Penhorn Creek are classified FW2-NT/SE2. "FW2-NT" represents fresh waters that are non-trout and not in the Pinelands. "SE2" waters are saline waters of estuaries. The combined classification, "FW2-NT/SE2" includes waterways where there may be a salt water/fresh water interface. The exact point of demarcation between the fresh and saline waters is defined as "that point where the salinity reaches 3.5 parts per thousand at mean high tide" (N.J.A.C. 7:9B).

MERI operates a surface water monitoring station, station PHC6, on Penhorn Creek (MERI, 2016b) (**Figure 5**). With the exception of a sample collected on February 19, 2014, all measured salinity concentrations, which have been collected quarterly from 1993 to the present, were below 3 parts per thousand (ppt), indicating that the waters may be below the salinity threshold for the saline waters classification and therefore classified as FW2-NT. However, concentrations at PHC6 are highly dependent on the condition of the downstream tide gate.

The NJPDES permit for North Bergen Township MUA's CSO outfall 011A (NJDEP, 2015) indicates that the Penhorn Creek tributary receiving the discharge is classified SE2. The NJPDES permit also indicates that it is a "C2" or Category Two water, which is New Jersey's lowest antidegradation designation below Outstanding National Resource Waters[5] and Category One waters.

Table 2 summarizes water quality parameters and heavy metal concentrations reported for MERI Station PHC6, as well as the NJDEP surface water quality standards for Class SE2 waters, including Penhorn Creek. Both dissolved oxygen (DO) and biological oxygen demand (BOD) have increased over the years, indicating some improvement in water quality (increased

[4] http://www.nj.gov/dep/dwq/cso.htm.

[5] An Environmental Protection Agency (EPA) designation which applies to New Jersey surface waters classified as freshwater 1 waters and "Pinelands waters;" these waters are considered nondegradation waters that are set aside for posterity because of their unique ecological significant, exceptional recreational significance, or exceptional water supply significance.

DO) but also some level of continued pollution (increased BOD). Except for copper, dissolved heavy metal concentrations remained below their respective acute standards from 1996 through 2015.

Table 2
NJDEP Water Quality Standards and Data for Penhorn Creek Sampling Station PHC6

Parameter	NJDEP SWQS for Class SE2 Waters	Water Quality Data (Average)				
		1993-1995	1996-2000	2001-2005	2006-2010	2011-2015
Ammonia (mg/L)	0.115 (acute); 0.030 (chronic)	3.85	1.97	2.42	1.27	2.25
BOD (mg/L)	No standard	5.37	4.66	9.20	8.67	9.33
Dissolved oxygen (mg/L)	Not less than 4.0 at any time	4.69	6.22	5.87	6.01	7.39
Nitrate (mg/L)	No standard	-	0.30	2.91	1.70	6.78
Temperature (°C)	Summer seasonal average shall not exceed 29.4°C	18.3	15.0	13.5	13.7	13.6
Cadmium (µg/L)[1]	40 (acute); 8.8 (chronic)	30.7	4.8	3.8	1.4	1.4
Chromium (µg/L)	No standard	23.8	5.5	8.0	7.2	3.5
Copper (µg/L)[1]	4.8 (acute); 3.1 (chronic)	24.7	9.3	13.8	16.3	79.0
Lead (µg/L)	210 (acute); 24 (chronic)	69.4	50.2	41.1	33.2	21.9
Nickel (µg/L)[1]	64 (acute); 22 (chronic)	27.6	22.7	22.9	9.1	7.0
Zinc (µg/L)[1]	90 (acute); 81 (chronic)	155.7	37.4	43.6	61.5	62.2

Notes: 1 - The NJDEP surface water quality standards for cadmium, copper, nickel, and zinc are based on water hardness and expressed in terms of dissolved criteria.

Except for nitrate, for which fewer samples were collected in each year range, average values were based on 10 samples for 1993-1995, 20 samples for 1996-2000, 16 samples for 2001-2005, 20 samples for 2006-2010, and 19 samples for 2011-2015.

Sources: MERI 2016; N.J.A.C. 7:9B Surface Water Quality Standards

Aquatic Biota: Macroinvertebrates

The portion of the study area along the NEC in the Meadowlands features aquatic biota[6] in the wetlands and Penhorn Creek. These include two common mollusks: the mud snail (*Nassarius obsoleta*) and ribbed mussel (*Geukensia demissa*). Common epibenthic[7] crustaceans of the tidal and semi-tidal (impounded) streams and wetlands in this area include blue crab (*Callinectes sapidus*), fiddler crabs (*Uca* spp.), white-fingered mud crabs (*Rhithropanoepus harrisii*), mysid shrimp (*Neomysis americana*), sand shrimp (*Crangon septemspinosa*), grass shrimp (*Palaemonetes pugio*), and several species of amphipods (Cerrato 2006). Neither the NJDEP's Landscape Project–Piedmont Plains nor the USFWS's IPaC databases list any threatened or endangered invertebrate species in the study area.

Fish

The most abundant and commonly occurring fish in the New Jersey Meadowlands, which are therefore likely to occur in the Meadowlands portion of the study area, include mummichog (*Fundulus heteroclitus*), Atlantic silverside (*Menidia menidia*), inland silverside (*Menidia beryllina*), white perch (*Morone americana*), blueback herring (*Alosa aestivalis*), Atlantic

[6] Aquatic biota are organisms living in or depending on the aquatic environment.

[7] Epibenthic crustaceans are those that live on the surface of sediments at the bottom of a water body.

tomcod (*Microgadus tomcod*), brown bullhead (*Ameriurus nebulosus*), striped killifish (*Fundulus majalis*), striped bass (*Morone saxatilis*), pumpkinseed sunfish (*Lepomis gibbosus*), American eel (*Anguilla rostrata*), and bay anchovy (*Anchoa mitchilli*). An inventory of fisheries resources conducted by the Hackensack Meadowlands Development Commission (now the New Jersey Sports and Exhibition Authority) in 1989 (HMDC Inventory of Fisheries Resources 1989) reported that the mummichog, closely associated with salt marsh habitats, comprised 85 percent and 91 percent of the total catches during the two years of sampling of the study. Bragin et al. (2005) reconfirmed found that mummichog was the most abundant species in a 2001-2003 fish inventory.

Other common resident fish known to occur in the Hackensack River include white catfish (*Ameiurus catus*) and the non-native common carp (*Cyprinus carpio*); these have the potential to occur in Penhorn Creek. Alewife (*Alosa pseudoharengus*), blueback herring, American shad (*Alosa sapidissima*), Atlantic tomcod, and striped bass are anadromous fish (i.e., fish that migrate from salt water to spawn in fresh water) that use the Hackensack River and associated marshes such as Penhorn Creek in the spring. Some marine fish, such as juvenile Atlantic menhaden (*Brevoortia tyrannus*) and juvenile bluefish (*Pomatomus saltatrix*), also occur in the Hackensack River (Bragin et al. 2005) and have the potential to occur in Penhorn Creek.

HUDSON RIVER

Aquatic Resources

The 1.5-acre low cover area is located within the Lower Hudson River Estuary, a tidally influenced portion of the Hudson River that is part of the New York–New Jersey Harbor Estuary, which also includes upper and lower New York Harbor, Arthur Kill, Kill Van Kull, East River, Raritan Bay, and Jamaica Bay. Salt water from Upper New York Harbor enters the Lower Hudson River Estuary during the flood phase of the tidal cycle and lower salinity water is discharged from the Estuary to the Harbor during the ebb phase. The typical tidal range in the Hudson River is approximately 5 feet (Geyer and Chant). Average tidal velocities near the Project site are about 2.4 feet per second, and the average predicted ebb flow is about 2.6 feet per second (NOAA 2013). Freshwater and higher salinity waters are well mixed during low-flow conditions, but are stratified under high-flow conditions when freshwater inflow from upriver overrides the denser saltwater layer (Moran and Limburg 1986). Ristich et al. (1977) classified the lower Hudson River as polyhaline (indicating moderate salinity, less than seawater, with salinity of 18-30 ppt) in summer and fall months and mesohaline (less salinity, 5-18 ppt) in spring and early summer.

USACE maintains a Federally authorized navigation channel at a depth of 40 to 48 feet below mean low water (MLW) from the mouth of the Hudson River upstream to approximately 59th Street in New York (USACE 2016). Bathymetric surveys conducted by USACE in April 2016 showed depths ranging from about 36 to 48 feet below mean lower low water (MLLW) on the eastern side of the navigation channel, and depths from 33 to 51 feet below MLW on the western side of the navigation channel in the Project vicinity (USACE 2016, sheet 5 of 11). Shallower depths were found near or adjacent to piers and other structures, and depths rapidly increased to 40 feet or more over a distance of less than 200 feet from these structures. NOAA's Nautical Chart #12335 shows current water depths ranging from 3 to 17 feet below MLLW around the piers outside the navigation channel, and from 40 to 54 feet below MLW within the navigation channel. At the edges of the channel, depths are about 20 to 30 feet below MLLW (NOAA

2016). Sedimentation in the lower Hudson River tends to be highest in the shallows on the west side of the river (Geyer 1995). Sedimentation within the interpier areas where current velocities are lower ranges from 1 to 2 feet per year (Smith 1992).

Water Quality

Federal agencies such as USACE, multi-jurisdictional agencies such as the Port Authority of New York & New Jersey (PANYNJ), the states of New Jersey and New York, New York City, and cooperative efforts such as the New York–New Jersey Harbor Estuary Program (HEP) have implemented programs to monitor and improve water quality in the New York–New Jersey Harbor and connected waterbodies. These programs have, over time, resulted in water quality improvements documented by monitoring programs such as the Harbor-Wide Water Quality Monitoring Report for the New York–New Jersey Harbor Estuary and the NYCDEP New York Harbor Water Quality Report. The City of New York has monitored harbor water quality with an annual survey for more than 90 years.

NYSDEC classifies the lower Hudson River as Class I saline surface waters from Battery Park in Manhattan upstream to Spuyten Duyvil, New York, including the Project site area. Suitable uses of Class I waters are secondary contact recreation[8], fishing, and fish propagation and survival. NJDEP classifies the lower Hudson River in the Project site area as SE2 saline surface waters. Suitable uses of SE2 waters are secondary contact recreation, maintenance and propagation of biota, and maintenance of diadromous fish and wildlife. **Table 3** presents the surface water quality standards for the Project area in the Hudson River for both New Jersey and New York jurisdictions.

Table 3
NYSDEC and NJDEP Surface Water Quality Standards

Parameter	NYSDEC Class I Waters	NJDEP Class SE2 Waters
Temperature	No standard	Summer seasonal average shall not exceed 29.4°C (84.9°F)
Salinity (psu)	No standard	No standard
pH	Normal range shall not be extended by more than 0.1 pH unit	6.5 – 8.5
Dissolved oxygen (DO) (mg/L)	Not less than 4.0 at any time	Not less than 4.0 at any time
Fecal coliform (cfu/100mL)	Monthly geometric mean, from a minimum of five examinations, shall not exceed 2,000 cfu/100mL	Monthly geometric mean, based on a minimum of five samples shall not exceed 770 cfu/100mL
Enterococcus (cfu/100mL)(1)	EPA Bathing Standard = 35 cfu/100mL	EPA Bathing Standard = 35 cfu/100mL
Secchi transparency (ft)	No standard	No standard
Total suspended solids (mg/L)	None from sewage, industrial wastes or other wastes that will impair usage	None of which would render the water unsuitable for the designated uses

Note: (1) NYSDEC does not identify a standard for enterococcus; however, USEPA provides a standard for bathing of 35 cfu/100mL; NJDEP does establish enterococcus standards, but not for SE2 waters.

Sources: 6 NYCRR Part 703 Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations; NJAC 7:9B Surface Water Quality Standards; EPA Recreational Water Quality Criteria (Office of Water 820-F-12-058)

[8] "Secondary contact recreation" means recreational activities where the probability of water ingestion is minimal and includes, but is not limited to, boating and fishing.

New York Water Quality Monitoring

The Project site falls within the NYCDEP Harbor Survey Inner Harbor study area, which includes the Hudson River from the New York City–Westchester County line through the Battery to the Verrazano Narrows; the Lower East River from north end of Roosevelt Island to the Battery; and the Kill Van Kull–Arthur Kill system (NYCDEP 2013). Class I portions of the Hudson River in New York County are listed as impaired for polychlorinated biphenyls (PCBs) and other toxins, which may include mercury, dioxins/furans, polycyclic aromatic hydrocarbons (PAHs), pesticides, and other heavy metals (NYSDEC 2016).Results of recent Harbor Surveys conducted by NYCDEP (2010, 2012, 2013, 2014) show that the water quality of New York–New Jersey Harbor, including the lower Hudson River within the Inner Harbor, has improved since the 1970s as a result of measures undertaken by New York City (e.g., improvements to wastewater treatment plants and increased capture of stormwater runoff) and others (NYCDEP 2013).

NYCDEP Harbor Survey stations N3B, N4, and N5 are located in the vicinity of the study area. Between 2000 and 2015, temperature, salinity, and pH were similar from Station N3B downstream to Station N5. Temperatures ranged from about 32 to 81°F, with an average of 66°F at the surface and 64°F at the bottom. As a tidal estuarine system, the lower Hudson River exhibits a wide range of salinity, from less than 1 ppt to 30.5 ppt at Station N4 near the Project site. Average dissolved oxygen measurements upstream and downstream from the Project site showed similar variation, ranging from 7.4 to 7.7 mg/L at the surface and 6.3 to 6.6 mg/L at the bottom. Dissolved oxygen near the Project site fell below the standard for Class I waters only once at the surface and 13 times at the bottom over the 15-year period. These data are consistent with those reflecting Harborwide improvements in dissolved oxygen levels over the past couple of decades. NYCDEP (2013) indicates that by 2012, fecal coliform levels had not exceeded the standard at any of its monitoring sites in the Harbor since the early 1990s. Similarly, enterococci levels did not exceed the bathing standard at monitoring sites in the lower Hudson River.

Sediment Quality

Complex flow patterns lead to widely variable sediment characteristics throughout the New York–New Jersey Harbor and connected waterbodies. Lower Hudson River sediments are primarily silt and clay (USACE 1999). Typical of most urban watersheds, sediments in the New York–New Jersey Harbor, including the lower Hudson River where the Project site is located, are contaminated due to a history of surrounding industrial uses. EPA's (2012) National Estuary Program Coastal Condition Report rates overall New York–New Jersey Harbor sediment quality as poor, based on sediment toxicity, contamination, and/or total organic carbon levels. The lower Hudson River is listed as being impaired for PCBs and other toxic materials,[9] and the suspected source for these impairments is contaminated sediment. EPA has designated the 200-mile stretch of the Hudson River from the Battery upstream to Hudson Falls, New York, a Superfund site as a result of PCB contamination. Contaminants found throughout the New York–New Jersey Harbor Estuary include pesticides such as chlordane and DDT, heavy metals like mercury, cadmium, lead, and copper, PCBs, and various PAHs (Rohmann and Lilienthal 1987). While the sediments of the harbor are generally contaminated, the concentrations of most sediment contaminants (e.g., dioxin, DDT, PCBs, and mercury) have decreased on average by an order of

[9] Other toxic materials may include mercury, dioxins/furans, PAHs, pesticides, and other heavy metals.

magnitude over the past few decades, mainly due to control measures implemented through the Clean Water Act (Steinberg et al. 2004).

Aquatic Biota

The New York–New Jersey Harbor Estuary, including the lower Hudson River, supports a diverse and productive aquatic community of more than 100 species of finfish, more than 100 invertebrate species, and a variety of phytoplankton and zooplankton.

Primary Producers

Primary producers are plants or microorganisms that can convert light energy or chemical energy into organic matter (e.g., plant growth or cell growth) which is then eaten by other organisms. Primary producers are the base of the aquatic food chain. In the Hudson River, primary producers include phytoplankton and macroalgae. Phytoplankton are microscopic plants whose movements within the system are largely governed by prevailing tides and currents. Light penetration, turbidity, and nutrient concentrations are important factors in determining phytoplankton productivity and biomass. Diatoms such as *Skeletonema costatum* and *Thalassiosira* spp. generally dominate the phytoplankton community within the lower Hudson River, with lesser contributions from dinoflagellates and green algae (Brosnan and O'Shea 1995). Phytoplankton sampling in the lower Hudson River between 1991 and 2000 resulted in the collection of 71 taxa; the most abundant species were *Nannochloris atomus* and *Skeletonema costatum* (NYCDEP 2007). Phytoplankton sampling from 1996-2003 on the Hudson River near Pier 26, downstream of the Project site, found that the most dominant species were: *Asterionella japonica*, *Chaetoceros subtilis*, *Coscinodiscus excentricus*, *Ditylum brightwelli*, *Eucampia zodiacus*, *Gyrosigma* sp., *Nitzchia reversa*, *Pseudonitzchia seriata*, *Rhizosolenia setigera*, and *Ebria tripartite* (Levandowsky and Vaccari 2004). The most common benthic macroalgae, or large multicellular algae, present in the Project site area include sea lettuce (*Ulva* spp.), green fleece (*Codium fragile*), and brown algae (*Fucus* spp.) (PBS&J 1998). While nutrient concentrations in most of the harbor are high, low light penetration has often precluded the occurrence of phytoplankton blooms. Limited light penetration also restricts the distribution of submerged aquatic vegetation (SAV) in the vicinity of the Project site (Olson et al. 1996). Extensively developed shorelines and swift currents further limit SAV growth in this area.

Zooplankton

Zooplankton are an integral component of aquatic food webs; they are primary grazers on phytoplankton and detritus, and serve as prey for higher trophic level organisms. Consumers of zooplankton typically include forage fish, such as bay anchovy, as well as commercially and recreationally important species in their early life stages, such as striped bass and white perch. Zooplankton sampling in the Hudson River between 1991 and 2000 resulted in the collection of 16 taxa, most commonly *Tintinnopsis* spp. and nauplius of copepods (NYCDEP 2007).

Benthic Invertebrates

Major benthic invertebrate groups in the New York–New Jersey Harbor Estuary include: aquatic earthworms (oligochaetes), segmented worms (polychaetes), snails (gastropods), bivalves, barnacles, cumaceans, amphipods, isopods, crabs, and shrimp (EEA 1988, EA 1990, Coastal 1987, PBS&J 1998). Most benthic invertebrates that have been found in the area are classified as pollution-tolerant species (Adams et al. 1998). A study conducted between the summers of 2002 and 2004 collected a total of 145 benthic invertebrate taxa in the Hudson River Park area, downstream of the Project site (Bain et al. 2006). Abundant species in this sampling program include: polychaetes *Mediomastus* spp., *Streblospio benedicti*, *Leitoscoloplos* spp.,

Heteromastus spp., *Spio setosa*, and *Tharyx* spp.; bivalves *Mulinia lateralis* and *Tellina agilis*; gastropods *Acteocina canaliculata* and *Rictaxis punctostriatus*; crustacean *Leocon americanus*; and oligochaete worms (Bain et al. 2006). Blue crab (*Callinectes sapidus*) and American lobster (*Homarus americanus*) may also be present within the Upper Harbor region (NMFS 2001).

Finfish

The finfish community in the New York–New Jersey Harbor and connected waterbodies is typical of large coastal estuaries and inshore waterways along the mid-Atlantic Bight in that it supports a variety of estuarine, marine, catadromous (migrating from fresh water to spawn in the sea), and anadromous (migrating from salt water to spawn in fresh water) fish species that use its waters for spawning and nursery, migratory, and foraging purposes. The Lower Hudson River and Upper Harbor fish community is spatially and seasonally dynamic. A 2002-2004 survey collected a total of 41 fish species from the Hudson River Park region, the most abundant being bay anchovy, Atlantic herring (*Clupea harengus*), striped bass, and blueback herring, all of which use open water habitat (Bain et al. 2006).

Essential Fish Habitat (EFH)

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The NMFS designates EFH within squares identified by latitude and longitude coordinates. The Project site is within a portion of the Hudson River estuary EFH that includes the Hudson River and Bay from Guttenberg, New Jersey south to Jersey City, New Jersey, including the Global Marine Terminal and the Military Ocean Terminal, Bayonne, New Jersey; Hoboken, New Jersey; Weehawken, New Jersey; Union City, New Jersey; Ellis Island; Liberty Island; Governors Island; the tip of Red Hook Point on the west tip of Brooklyn, New York; Newark Bay, and the Hackensack River, New Jersey. Table 4 lists the EFH species and life stages within the project area. **Appendix 11** to the DEIS contains the EFH Worksheet.

Table 4
Essential Fish Habitat Designated Species
in the Vicinity of the Project Site

Species	Designated Life Stage			
	Eggs	Larvae	Juveniles	Adults
Red Hake (*Urophycis chuss)*		X	X	X
Redfish (*Sebastes fasciatus*)	n/a			
Winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
Windowpane flounder (*Scophthalmus aquosus*)	X	X	X	X
Atlantic herring (*Clupea harengus*)		X	X	X
Bluefish (*Pomatomus saltatrix*)			X	X
Long-finned squid (*Loligo pealeii*)	n/a	n/a		
Short-finned squid (*Illex illecebrosus*)	n/a	n/a		
Atlantic butterfish (*Peprilus triacanthus*)		X	X	X
Atlantic mackerel (*Scomber scombrus*)			X	X
Summer flounder (*Paralichthys dentatus*)		X	X	X
Scup (*Stenotomus chrysops*)	X	X	X	
Black sea bass (*Centropristis striata*)	n/a		X	X
Surf clam (*Spisula solidissima*)	n/a	n/a		
Ocean quahog (*Arctica islandica*)	n/a	n/a		
Spiny dogfish (*Squalus acanthias*)	n/a	n/a		
King mackerel (*Scomberomorus cavalla*)	X	X	X	X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
Cobia (*Rachycentron canadum*)	X	X	X	X
Clearnose skate (*Raja eglanteria*)			X	X
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X
Bluefin tuna (*Thunnus thynnus*)	X	X	X	X
Smooth dogfish (*Mustelus canis*)	X	X	X	X
Sand tiger shark (*Carcharias taurus*)		X[(1)]		X
Dusky shark (*Carcharinus obscurus*)		X[(1)]		
Sandbar shark (*Carcharinus plumbeus*)		X[(1)]		

Notes: n/a – insufficient data for this lifestage exists and no EFH designation has been made.
[(1)] These species do not have a free-swimming larval stage; rather they are live bearers that give birth to fully formed juveniles. For the purposes of this table, "larvae" for sand tiger, dusky, and sandbar sharks refers to neonates and early juveniles.

Sources: NMFS. "Summary of Essential Fish Habitat (EFH) Designation" at http://www.nero.noaa.gov/hcd/STATES4/new_jersey/40407400.html and http://www.nero.noaa.gov/hcd/skateefhmaps.htm.
NMFS EFH Mapper at http://www.habitat.noaa.gov/protection/efh/habitatmapper.html.

Wildlife

On and over the open waters of the Hudson River, urban-adapted waterbirds such as double-crested cormorant (*Phalacrocorax auritus*), ring-billed gull, herring gull, and Canada goose occur year-round. Common terns, least terns, and osprey can also be found foraging for fish over the river during spring, summer, and fall. During winter, additional waterbirds, such as bufflehead (*Bucephala albeola*), red-breasted merganser (*Mergus serrator*), horned grebe (*Podiceps auritus*), brant, lesser scaup (*Aythya affinis*), greater scaup (*Aythya marila*), green-winged teal (*Anas carolinensis*), American widgeon (*Anas americana*), common goldeneye (*Bucephala clangula*), surf scoter (*Melanitta perspicillata*), black scoter (*Melanitta americana*), common loon (*Gavia immer*), canvasback (*Aythya valisineria*), and ruddy duck (*Oxyura jamaicensis*), can also often be found on the river, usually in nearshore areas (Fowle and Kerlinger 2001).

Threatened, Endangered, or Special Concern Species

NJNHP identified shortnose sturgeon (*Acipenser brevirostrum*) as having the potential to occur in the lower Hudson River study area in 2016. Also in 2016, both NMFS and NYNHP identified shortnose sturgeon and Atlantic sturgeon as having the potential to be present within the lower Hudson River study area. The following sections discuss these species. Appendix 11 to the DEIS includes the correspondence from these agencies.

Shortnose Sturgeon

NMFS (2016) indicated that no eggs or larval shortnose sturgeon occur in the saline waters of the lower Hudson River or its adjacent bays and tributaries; however, older life stages are present in the Hudson River and connected waterbodies. The shortnose sturgeon is an anadromous bottom-feeding fish that can be found throughout the Hudson River from the Battery to the Federal Dam at Troy. Peterson and Bain (2002) estimated that the Hudson River shortnose sturgeon population contained about 61,000 fish. Shortnose sturgeon may occasionally use areas of the lower Hudson River downstream of the George Washington Bridge; however, spawning, nursery, and overwintering areas are located well upstream of the Project site (Bain et al. 2007). Although larvae can be found in brackish regions of the Hudson River, juveniles from 2 to 8 years old are predominately confined to reaches upriver from the Project site. Bain et al. (2007) reported that primary summer habitat for shortnose sturgeon is the river channel, where water depths range from 43 to 138 feet, in the middle section of the Hudson River Estuary. However, more recently the New York State Thruway Authority conducted mobile tracking of tagged shortnose sturgeon within the Hudson River north of the Project site, between the George Washington Bridge and Stony Point and found that approximately 58 percent of all detections of shortnose sturgeon were in waters shallower than 20 feet (NMFS 2017a), indicating some use of shallower water habitat within that portion of the Hudson River. The Hudson River south of the Tappan Zee Bridge, including the portion of the lower Hudson River where the Project site is located, is not considered optimal shortnose sturgeon habitat (Bain 1997).

Long-term Hudson River monitoring data collected by the New York utilities and others since the 1970s have also indicated that shortnose sturgeon occur in greatest abundance north of the Tappan Zee Bridge. Hoff et al. (1988) reported most captures of adult shortnose sturgeon during river monitoring efforts by Hudson River electric utilities were made between approximately river mile 24 and river mile 76, or from the Tappan Zee Bridge to Poughkeepsie. Shortnose sturgeon were collected between the Statue of Liberty (south of river mile 0) and the George Washington Bridge (river mile 12) during winter sampling in 2003-2004 and 2004-2005 (15 and 18 shortnose sturgeon, respectively). These sturgeon were collected within the channel, and all but two individuals were collected north of approximately river mile 2 (Young 2005, Mattson 2005), suggesting that shortnose sturgeon are still rare in the lower Hudson River in the vicinity of the Project site. During sampling conducted between 2002 and 2004 near Hudson River Park, just downstream of the Project site, no sturgeon were collected (Bain et al. 2006).

Atlantic Sturgeon

NMFS (2016) indicated that no eggs or larval Atlantic sturgeon occur in the saline waters of the lower Hudson River or its adjacent bays and tributaries; however, older life stages could occur in the study area. The Atlantic sturgeon is an anadromous bottom-feeding species that occurs within the New York–New Jersey Harbor and Hudson River estuaries (Woodhead 1990). Adults of this species spawn in freshwater rivers and migrate between riverine and coastal marine waters. In the Hudson River, Atlantic sturgeon are found in deeper waters and generally do not

occur farther upstream than Hudson, New York. Adults migrate from the ocean upriver to spawn in fresh water above the salt front from late April to early July (Smith 1985, Stegemann 1999). Females migrate from the river back to marine waters following spawning, but males may remain in the river until October or November. Early life stages (i.e., eggs, larvae, and smaller juveniles) are relatively intolerant of salinity; young-of-year Atlantic sturgeon exhibit poor survival at salinities ranging from 5 to 10 ppt, and older juveniles (Age-1 and Age-2) may tolerate salinities up to 12 ppt (Kynard and Horgan 2002, ASMFC 2012).

In the New York–New Jersey Harbor, Atlantic sturgeon typically occur in deeper waters. According to recent surveys conducted by NMFS and multiple state agencies in the region[10], the majority of Atlantic sturgeon occurred in waters between 32 to 49 feet in depth; many of these sturgeon were found off the west coast of Long Island (Dunton et al. 2010). Tagging studies have indicated that Atlantic sturgeon from this aggregation have been detected in the Hudson River north of the Project site (NMFS 2017a). While Atlantic sturgeon are not expected to occur in significant numbers within the study area, transient sub-adults (i.e., larger juveniles that have migrated from the river to the nearshore coastal waters of the Atlantic Ocean) may be present as they move through shallower marine waters along the Atlantic coast; adults are most likely to be seasonal migrants and would occur primarily in the deeper waters of the river channel adjacent to the Project site.

Critical Habitat

The study area is located within an area proposed to be designated as critical habitat for Atlantic sturgeon (NMFS 2016).[11] Critical habitat for Atlantic sturgeon has been proposed for the length of the tidal Hudson River from lower Manhattan to the Federal Dam at Troy. For Atlantic sturgeon, the physical or biological features of critical habitat that are essential to the conservation of the species include:

- Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (0 to 0.5 ppt) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- Aquatic habitat with a gradual downstream salinity gradient of 0.5 to 30 ppt and soft substrate downstream of spawning sites for juvenile foraging and physiological development;
- Water of appropriate depth to support: unimpeded movement of adults to/from spawning sites, seasonal movement of juveniles, and staging/resting/holding of subadults or spawning condition adults. Water depths greater than or equal to 1.2 meters (3.9 feet) in the main river channel; and
- Water, especially in the bottom meter of the water column, with temperature, salinity, and oxygen values that support: spawning, annual and interannual survival, and growth, development, and recruitment.

Significant Coastal Fish and Wildlife Habitat

The NYSDOS has designated 15 Significant Coastal Fish and Wildlife Habitats within New York City. The Project site falls within one of these designated areas, the Lower Hudson Reach. Significant Coastal Fish and Wildlife Habitats are coastal habitats designated by the NYSDEC

[10] The reference for these studies, Dunton et al. 2010, includes an author from NYSDEC and received data from NJ, ME, and MA state agencies.

[11] 81 Federal Register 35702; June 3, 2016.

based on the uniqueness of the habitat; presence of protected or vulnerable species; recreational, education, and other uses; abundance of ecologically important species; and habitat irreplaceability (NYSDOS 1984). The Lower Hudson Reach includes the 19-mile stretch of the Hudson River from Battery Park to the tip of Manhattan and from there north to Yonkers near Glenwood, and includes areas with deep waters, shallows, piers, and interpier basins. NYSDEC designated the Lower Hudson Reach as a Significant Coastal Fish and Wildlife Habitat in part because it provides an important wintering habitat for young-of-the-year, yearling, and older striped bass. In addition, the Lower Hudson Reach is one of the few large tidal river mouth habitats in the northeastern United States, which is part of the greater Hudson River Estuary system that supports a diverse and historically highly productive ecosystem of fish and invertebrate species (Briggs and Waldman 2002, NYDOS 1992). Significant numbers of other fish species and waterfowl also use the Lower Hudson Reach, including winter flounder, summer flounder, white perch, Atlantic tomcod, Atlantic silversides, bay anchovy, hogchoker, and American eel. The Lower Hudson Reach is potentially important for bluefish and weakfish young of year, American shad, blue crab, Atlantic sturgeon, and shortnose sturgeon. Planktonic and benthic animals that provide an important food source are also present, including copepods, rotifers, mysid shrimp, nematodes, oligochaetes, polychaetes, and amphipods. Wintering waterfowl that use habitat in the Lower Hudson Reach include canvasback, scaup, mergansers, mallards, and Canada geese (NYSDOS 1992). In addition, the portion of the Project site beneath the Hudson River east of the New York pierhead line is located within (beneath) the Hudson River Park Estuarine Sanctuary.

The USFWS (1997) also designated the Lower Hudson River Estuary, from the Battery at the southern tip of Manhattan up to Stony Point at river mile 41, as a Significant Habitat Complex because it is a regionally significant nursery and wintering habitat for a number of anadromous, estuarine, and marine fish species, including striped bass, and is a migratory and feeding area for birds and fish that feed on the abundant fish and benthic invertebrate resources found in this portion of the estuary. Striped bass are anadromous and range from along the North American Atlantic coast from Canada to northern Florida. Striped bass was one of the four most abundant species collected within Hudson River Park from June 2002 through June 2004 (Bain et al. 2006).

Adult striped bass spend much of the year from summer through late winter in the nearshore coastal waters of the Atlantic Ocean. Northward migration of Hudson River fish along the Atlantic coast extends as far north as the Bay of Fundy, Nova Scotia, with older fish tending to travel farther north (Waldman et al. 1990). Although most migrate to sea, some striped bass adults remain in the Hudson River year-round, never migrating. During winter, these resident adults (ages 4 and older) are joined by migratory adults returning to the estuary to spawn. Adults aggregate near the mouths of their natal rivers and begin moving upstream to spawn as water temperatures increase in the spring.

The Hudson River supports one of the principal spawning populations of striped bass along the U.S. Atlantic coast. Other important spawning populations include Delaware Bay, Chesapeake Bay, the Roanoke and Chowan Rivers and Albemarle Sound, North Carolina, the Santee River in South Carolina, and the St. Johns River in northern Florida. Peak spawning in the Hudson River typically occurs between mid-May and mid-June in freshwater areas where currents are moderate to swift, from Indian Point, NY (river mile 42) upstream to Saugerties, New York (river mile 106) (CHGE et al. 1999; ASA 2010). Fecundity depends on age and size and females

may produce up to several million pelagic eggs (ASFMC 2015). Utilities' fish surveys conducted from 1998 to 2007 during May and June primarily collected striped bass eggs upstream of Indian Point at river mile 46. Peak densities typically occur near Cornwall, New York (river mile 56 to 61), with very few eggs found south of the Tappan Zee Bridge region. The spawning area is considerably upriver of the Project site.

Larval striped bass recruit to the lower salinity areas of the Hudson River well upstream of the Project site from May to July. Larvae are abundant throughout the Hudson River during this time and are more common from the Tappan Zee Bridge to Hyde Park than the lower estuary. Striped bass juveniles begin to move to shallower nursery habitat in the lower estuary. Juvenile abundances typically peak in July and August upstream of Hyde Park in deeper (greater than 20 feet deep) bottom habitats. Many juvenile striped bass move downstream by the end of their first summer to occupy the lower estuary and into New York Harbor, western Long Island Sound, and along the south shore of Long Island. Juvenile striped bass remain near shore until November or December, before moving to deeper coastal waters; juveniles, however, may overwinter (December through March) in the interpier areas within the Hudson River Park, which is adjacent to the Project site (AKRF, Inc. et al. 1998; Dunning et al. 2009; CHGE et al. 1999). The lower Hudson River, including the area near the Project site, contains striped bass throughout the year and provides important winter habitat (mid-November to mid-April) for young-of-the-year, yearling, and older striped bass (Heimbuch et al. 1994, NYSDOS 1992).

At two to three years old, striped bass leave Atlantic coast estuaries and begin the typical seasonal coastal migration, northward during the spring and summer and southward during the fall. Some individuals are thought to mature and remain year-round in the upper freshwater portion of the estuary, while others adopt an anadromous pattern and, once sexually mature, spend most of their time in coastal saltwater habitats migrating into freshwater and brackish habitats in the spring to spawn (Zlokovitz et al. 2003).

Adult striped bass are top predators and are prey to few other animals. Adult striped bass in the Lower Hudson–Raritan Estuary prey upon at least 20 different taxa, dominated by a variety of small-bodied and juvenile fishes and crustaceans (Steimle et al. 2000; Dunning et al. 2009). The coastal stock is healthy, with spawning stock biomass well above the target level specified in the Interstate Fisheries Management Plan (ASMFC 2015) and stocks at historically high levels (NYSDEC 2010).

TERRESTRIAL RESOURCES

Ecological Communities

The Project area includes the wetlands/industrial landscape of the Meadowlands and the urban landscape east of the Palisades in Weehawken and Hoboken. Railroad[12], mowed lawn[13], urban

[12] Edinger et al. (2014) define this community as "a permanent road having a line of steel rails fixed to wood ties and laid on gravel roadbed that provides a track for cars or equipment drawn by locomotives or propelled by self-contained motors. There may be sparse vegetation rooted in the gravel substrate along regularly maintained railroads. The railroad right of way may be maintained by mowing or herbicide spraying."

[13] Edinger et al. (2014) define this community as "residential, recreational, or commercial land, or unpaved airport runways in which the groundcover is dominated by clipped grasses and there is less than 30 percent cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50 percent cover. The groundcover is maintained by mowing and broadleaf herbicide application."

vacant lot[14], and successional southern hardwoods[15] communities (Edinger et al. 2014[16]) occur within the Project area. The railroad community represents the NEC tracks and is largely covered by ballast and is unvegetated areas. A few ruderal species (plants growing in waste places and along roadsides), including common mullein (*Verbascum thapsus*), pokeweed (*Phytolacca americana*), and common mugwort (*Artemisia vulgaris*), are found on the slope adjacent to the railroad tracks. The mowed lawn and urban vacant lot communities are vegetated primarily by herbaceous species, including crabgrass (*Digitaria* sp), Kentucky bluegrass (*Poa pratensis*), English plantain (*Plantago lanceolata*), common mugwort, and clovers (*Trifolium* spp). The successional southern hardwoods community is confined to narrow bands at the toe of slope of the railroad tracks. Dominant species within the successional southern hardwoods community include: black locust (*Robinia pseudoacacia*), grey birch (*Betula populifolia*), eastern cottonwood (*Populus deltoides*), princess tree (*Paulownia tomentosa*), and tree of heaven (*Ailanthus altissima*) in the tree stratum; common blackberry (*Rubus allegheniensis*), multiflora rose (*Rosa multiflora*), and winged sumac (*Rhus copallinum*) in the shrub stratum; Asiatic bittersweet (*Celastrus orbiculatus*) and poison ivy (*Toxicodendron radicans*) in the vine stratum; and common mugwort in the herbaceous stratum.

Wildlife

Approximately half of the Project area is located in an industrial and heavily urbanized landscape dominated by buildings, transportation infrastructure, and other impervious surfaces that offers minimal habitat for wildlife other than urban-adapted generalists that are ubiquitous throughout the metropolitan area. The remaining portions of the Project area (e.g., the wetland complex associated with Penhorn Creek in the Meadowlands) are capable of supporting more rich and diverse communities of wildlife. These habitats are still subjected to high levels of noise and other indirect and direct forms of human disturbance, and are further degraded by invasive species and pollution. As such, the wildlife communities in these areas are lacking in number or diversity of species and dominated by disturbance-tolerant species.

Birds

The most substantive habitat for supporting birds and other wildlife in the Project area is the wetland complex around Penhorn Creek. Based the wetland's relative large size, the dominance of non-native common reed (*Phragmites australis*), within it, and its isolation within a heavily urbanized area, breeding bird species likely to use this habitat include marsh birds, waterbirds, and land birds that are tolerant of degraded habitat conditions and ubiquitous in urban wetland habitats. Examples include red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), swamp sparrow (*Melospiza georgiana*), marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), gray catbird (*Dumetella carolinensis*),

[14] Edinger et al. (2014) define this community as "an open site in a developed, urban area that has been cleared either for construction or following the demolition of a building. Vegetation may be sparse, with large areas of exposed soil, and often with rubble or other debris."

[15] Edinger et al. (2014) define this community as "a hardwood or mixed forest that occurs on sites that have been cleared or otherwise disturbed."

[16] The "Classification of Vegetation Communities of New Jersey: Second Iteration" by Breden et al. does not include descriptions of "cultural" vegetation communities, the category to which the vegetation communities of the study area belong. Therefore, Edinger et al. 2014 was used to classify vegetation communities within the New Jersey and New York study areas.

European starling (*Sturnus vulgaris*), yellow warbler (*Setophaga petechia*), barn swallow (*Hirundo rustica*), tree swallow (*Tachycineta bicolor*), mallard (*Anas platyrhynchos*), American black duck (*Anas rubripes*), Canada goose (*Branta canadensis*), green heron (*Butorides virescens*), and spotted sandpiper (*Actitus macularia*). Some additional species that nest elsewhere in the region may use this wetland as foraging habitat, including herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), osprey (*Pandion haliaetus*), great blue heron (*Ardea Herodias*), great egret (*Ardea alba*), and snowy egret (*Egretta thula*).

During winter, birds likely to use the habitats within the Meadowlands portion of the Project area include likely only a few temperate migrants and non-migratory species, such as white-throated sparrow (*Zonotrichia albicollis*), European starling, house sparrow (*Passer domesticus*), Canada goose, brant (*Branta canadensis*), herring gull (*Larus argentatus*), and ring-billed gull (*Larus delawarensis*). During spring and fall migration, the same species that nest in the area may also use the wetland as stopover habitat on route to more northern breeding grounds or southern wintering grounds. Some additional species that are not likely to nest or overwinter in the area, such as the least sandpiper (*Calidris minutilla*), northern harrier (*Circus cyaneus*), and saltmarsh sparrow (*Ammodramus caudacutus*) might also use the wetland as stopover habitat during their migration.

Mammals

Mammals that are expected to occur in the marsh of the Meadowlands near Penhorn Creek include muskrat (*Ondatra zibethica*), raccoon (*Procyon lotor*), meadow vole (*Microtus pennsylvanicus*), and occasionally, white-tailed deer (*Odocoileus virginianus*).

Reptiles and Amphibians

Common reptile species with potential to occur in the wetlands around Penhorn Creek include snapping turtle (*Chelydra serpentina*), eastern painted turtle (*Chrysemys picta*), northern diamondback terrapin (*Malaclemys terrapin terrapin*), eastern garter snake ((*Thamnophis setalis*), and northern water snake (*Nerodia sipedon*). The newly described southern leopard frog species (*Rana kauffeldi*; formerly classified as *Rana sphenocephala utricularius*) that is endemic to the New York metropolitan area and inhabits coastal freshwater and brackish wetlands (Newman et al. 2012, Feinberg et al. 2014) also has the potential to occur in the wetlands around Penhorn Creek.

THREATENED, ENDANGERED, OR SPECIAL CONCERN SPECIES

According to the USFWS's IPaC database, there are no Federal threatened or endangered species or critical habitats (including wildlife refuges or fish hatcheries) within the New Jersey portion of the Project area.

The New Jersey Natural Heritage Program (NJNHP) identified the following threatened, endangered, special concern, and rare species, wildlife habitats, and ecological communities as having have the potential to occur in the Project area or its vicinity: glossy ibis (*Plegadis falcinellus*; special concern), little blue heron (*Egretta caerulea*; special concern), osprey (*Pandion haliaetus*; threatened), snowy egret (*Egretta thula*; special concern), yellow-crowned night-heron (*Nyctanassa violacea*; threatened), shortnose sturgeon (*Acipenser brevirostrum*; endangered), black-crowned night-heron (*Nycticorax nycticorax*; threatened), barn owl (*Tyto alba*; special concern), and floating marsh-pennywort (*Hydrocotyle ranunculoides*; endangered) (NJNHP 2016).

The NJDEP's Landscape Project–Piedmont Plains database identified the study area as foraging habitat for little blue heron, snowy egret, yellow-crowned night-heron, and glossy ibis (NJDEP 2016).Glossy ibis, little blue heron, and black-crowned night-herons, have the potential to nest within the portion of the Project area within the Meadowlands. Ospreys have the potential to nest on trees or artificial structures in and around the wetlands surrounding Penhorn Creek, and have the potential to occur over the open waters of the wetlands while foraging for fish Barn owls have the potential to occur in the study area, and would be most likely to occur in the wetland complex surrounding Penhorn Creek.

The state-endangered floating marsh-pennywort (*Hydrocotyle ranunculoides*) is documented as occurring in the vicinity of the Project area just north of the NEC. Floating marsh-pennywort is a perennial floating aquatic plant in the Apiaceae family. It is found in shallow, slow-moving or stagnant waters or in muddy soils. Threats to populations of floating marsh-pennywort include development, herbicide runoff, and displacement by invasive species (WDNR 2005). FRA observed a population of floating marsh-pennywort within the Project area on November 1, 2016. It has also been documented within the NYSW mitigation site.

8) DETERMINATION OF CREDITS

Table 1 summarized impacts to New Jersey wetlands and associated open waters under USACE jurisdiction. **Table 5** below identifies the proposed allocation of mitigation credits for impacts to wetlands.

Table 5
Proposed Allocation of Wetland Mitigation Credits

Affected Resource	Area Affected (Acres)	Anticipated Mitigation Ratio	Mitigation Below MHW (Acres)
Permanent Impacts to Tidal Wetlands A, B, CD, and F	8.175	3:1 for Mitigation Banking	8.175*
Temporary Impacts to Tidal Wetlands A and CD	4.307	1:1 Restoration of Impacted Wetlands	4.307
Notes: * Each single mitigation credit represents a 3 to 1 mitigation ratio.			

As compensation for the 0.7 acres of elevated soilcrete, the Project Sponsor will monitor the recovery of the area for five years to assess its recovery as fish foraging habitat. Monitoring of this area will be conducted in consultation with USACE, NMFS, and NYSDEC. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction.

9) FINANCIAL ASSURANCES

The Project Sponsor will provide financial assurances to USACE within 60 days of permit issuance or prior to beginning work on the surface alignment portion of the Project.

REFERENCES

Adams, D.A., J.S. O'Connor, and S.B. Weisberg. 1998. Final Report: Sediment quality of the NY-NJ Harbor System. An investigation under the Regional Environmental Monitoring and Assessment Program (R-EMAP). EPA-902-R-98-001.

AKRF, Inc., PBS&J, Inc., Philip Habib & Associates, al Perspectives, Inc., and A&H Engineers, P.C. 1998. Hudson River Park Project Final Environmental Impact Statement. Prepared for the Empire State Development Corporation in cooperation with the Hudson River Park Conservancy. May 1998.

Applied Science Associates, Inc. (ASA). 2010. Hydrothermal Modeling of the Cooling Water Discharge from the Indian Point Energy Center to the Hudson River. ASA Project 09-167. March 22, 2010.

Atlantic States Marine Fisheries Commission (ASMFC). 2015. Atlantic Striped Bass Stock Assessment Update 2015. Atlantic States Marine Fisheries Commission, Washington, D.C

Bain, M.B., M.S. Meixler, and G.E. Eckerlin. 2006. Biological status of sanctuary waters of the Hudson River Park in New York. Final Project Report for the Hudson River Park Trust. Cornell University.

Bain, M.B., N. Haley, D.L. Peterson, K.K. Arend, K.E. Mills, and P.J. Sullivan. 2007. Recovery of a US Endangered Fish. PLoS ONE Issue 1, e168 pp: 1-9.

Bragin, A.B., J.Misuik, C.A. Woolcott, K.R. Barrett, and R. Jusino-Atresino. 2005. A fishery resource inventory of the lower Hackensack River within the Hackensack Meadowlands District: A Comparative Study 2001-2003 vs. 1987-1988. New Jersey Meadowlands Commission, Meadowlands Environmental Research Institute. May 2005. 231 pp.

Brosnan, T.M., and M.L. O'Shea. 1995. New York Harbor Water Quality Survey: 1994. New York City Department of Environmental Protection, Marine Sciences Section, Wards Island, NY.

Central Hudson Gas & Electric Corp., Consolidated Edison Company of New York Inc., New York Power Authority, and Southern Energy New York (CHGE). 1999. Draft Environmental Impact Statement: For State Pollutant Discharge Elimination System Permits for Bowline 1 & 2, Indian Point 2 & 3, and Roseton 1 & 2 Steam Electric Generating Stations, Orange, Rockland, and Westchester Counties. December 1, 1999.

Cerrato, R.M., 2006. Long-term and large-scale patterns in the benthic communities of New York Harbor. Pp. 242-265. In: The Hudson River Estuary, J.S. Levinton and J.R. Waldman (Eds.), Cambridge University Press.

Coastal Environmental Services (Coastal). 1987. Television City Project: Characterization of the aquatic ecology of the site and assessment of potential impacts of the project on the aquatic biota. Prepared for Berle, Cass, and Case, New York, New York; McKeown and Franz, Inc., New York, NY; and The Trump Organization, New York, NY.

Dunning, D. J., Q. E. Ross, K. A. McKown, and J. B. Socrates. 2009. Effect of striped bass larvae transported from the Hudson River on juvenile abundance in Western Long Island Sound. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 1: 343-353.

Dunton, K.J., A. Jordaan, K.A. McKown, D.O. Conover, and M.G. Frisk. 2010. Abundance and distribution of Atlantic sturgeon (Acipenser oxyrinchus) within the Northwest Atlantic Ocean, determined from five fishery-independent surveys. Fisheries Bulletin 108: 450-465.

EA Engineering, Science, and Technology (EA). 1990. Phase I feasibility study of the aquatic ecology along the Hudson River in Manhattan. Final Report. Prepared for new York City Public Development Corporation, New York, NY. Newburgh, NY.

EEA, Inc. (EEA). 1988. Hudson River Center Site Aquatic Environmental Study. Final Report. Garden City, NY.

Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero. 2014. Ecological Communities of New York State, Second Edition. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.Edinger et al. 2014

Feinberg, J.A, C.E. Newman, G.J. Watkins-Colwell, M.D. Schlesinger, B. Zarate, B.R. Curry, H.B. Shaffer, and J. Burger. 2014. Cryptic diversity in metropolis: Confirmation of a new leopard frog species (Anura: Ranidae) from New York city and surrounding Atlantic coast regions. PloS One 9:e108213.

Fowle, M.T., and P. Kerlinger. 2001. The New York City Audubon Society Guide to Finding Birds in the Metropolitan Area. Cornell University Press. Ithaca, New York. 230 pg.

Geyer, W.R. 1995. Final Report: Particle trapping in the lower Hudson Estuary. Submitted to the Hudson River Foundation, New York, NY.

Geyer, W.R., and R. Chant. 2006. The Physical Oceanography Processes in the Hudson River Estuary. In: J.S. Levinton and J.R. Waldman (eds.) The Hudson River Estuary. Cambridge University Press, New York, NY.

Hackensack Meadowlands Development Commission (HMDC). 1989. Inventory of Fishery Resources of the Hackensack River within the jurisdictional boundary of the Hackensack Meadowlands Development Commission from Kearny, Hudson County, to Ridgefield, Bergen County, New Jersey.

Heimbuch, D., S. Cairns, D. Logan, S. Janicki, J. Seibel, D. Wade, M. Langan, and N. Mehrotra. 1994. Distribution Patterns of Eight Key Species of Hudson River Fish. Coastal Environmental Services, Inc. Linthicum, MD. Prepared for the Hudson River Foundation, New York, NY.

Levandowsky, M., and D. Vaccari. 2004. Analysis of phytoplankton data from two lower Manhattan sites. Final Report of a Grant from the Hudson River Foundation. March 2004.

Moran, M.A., and K.E. Limburg. 1986. The Hudson River Ecosystem. In: K.E. Limburg, M.A. Moran, and W.H. McDowell (eds.) The Hudson River Ecosystem. Springer-Verlag, New York, NY. pp. 6-40.

National Marine Fisheries Service (NMFS). 2001. Regional Council Approaches to the Identification and Protection of Habitat Areas of Particular Concern. Office of Habitat Conservation, NOAA.

National Oceanic and Atmospheric Administration (NOAA). 2013. Current station locations and ranges. Available https://www.tidesandcurrents.noaa.gov/currents10/tab2ac4.html. Revised October 15, 2013.

National Oceanic and Atmospheric Administration (NOAA). 2016. Mean Sea Level Trend, 8518750, The Battery, New York. National Ocean Service. Revised: 10/15/2013. tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8518750. Website accessed November 2016.

National Oceanic and Atmospheric Administration (NOAA). 2016. Nautical Chart #12335: Hudson and East Rivers, Governors Island to 67th Street. Last correction: May 18, 2016.

New Jersey Meadowlands Commission (NJMC). Hackensack Meadowlands Tide Gates Inspection Report. Prepared in conformity to The National Flood Insurance Program Community Rating System. March 27, 2006.

New Jersey Department of Environmental Protection, Natural Heritage Program (NJNHP). 2016. Letter from R. Cartica, NJNHP, to S. Collins, AKRF, re Hudson Tunnel Project. October 27, 2016.

Newman, C.E., J.A. Feinberg, L.J. Rissler, J. Burger, and H.B. Shaffer. 2012. A new species of leopard frog (Anura: Ranidae) from the urban northeastern US. Molecular Phylogenetics and Evolution 63:445-55.

New York City Department of Environmental Protection (NYCDEP). 2007. East River and Open Waters Waterbody/Watershed Facility Plan Report. June 2007.

New York City Department of Environmental Protection (NYCDEP). 2010. New York Harbor Water Quality Report for 2009.

New York State Department of State (NYSDOS). 1992. Significant Coastal Fish and Wildlife Habitats Program: A part of the New York Coastal Management Program and New York City's approved Waterfront Revitalization Program.

New York State Department of State (NYSDOS). 1984. Technical Memorandum: Procedures Used To Identify, Evaluate and Recommend Areas For Designation As "Significant Coastal Fish And Wildlife Habitats." July 24, 1984.

Olson, A.M., E.G. Doyle, and S.D. Visconty. 1996. Light requirements of eelgrass: A literature survey.

PBS&J. 1998. The Hudson River Park, Natural Resources Appendix to Final Environmental Impact Statement. Prepared for the Empire State Development Corporation and the Hudson River Park Conservancy.

Rohmann, S.O., and N. Lilienthal. 1987. Tracing a river's toxic pollution: A case study of the Hudson, Phase II. Inform, Inc., New York, NY.

Smith, C.L., ed. 1992. Estuarine Research in the 1980s: The Hudson River Environmental Society Seventh Symposium on Hudson River Ecology.

Steinberg, N., D.J. Suszkowski, L. Clark, and J. Way. 2004. Health of the Harbor: the first comprehensive look at the state of the NY-NJ Harbor Estuary. Prepared for the New York–New Jersey Harbor Estuary Program by the Hudson River Foundation, New York, NY.

Ristich, S.S., M. Crandall, and J. Fortier. 1977. Benthic and epibenthic macroinvertebrates of the Hudson River: Distribution, natural history and community structure. Estuarine and Coastal Marine Science 5: 255-266.

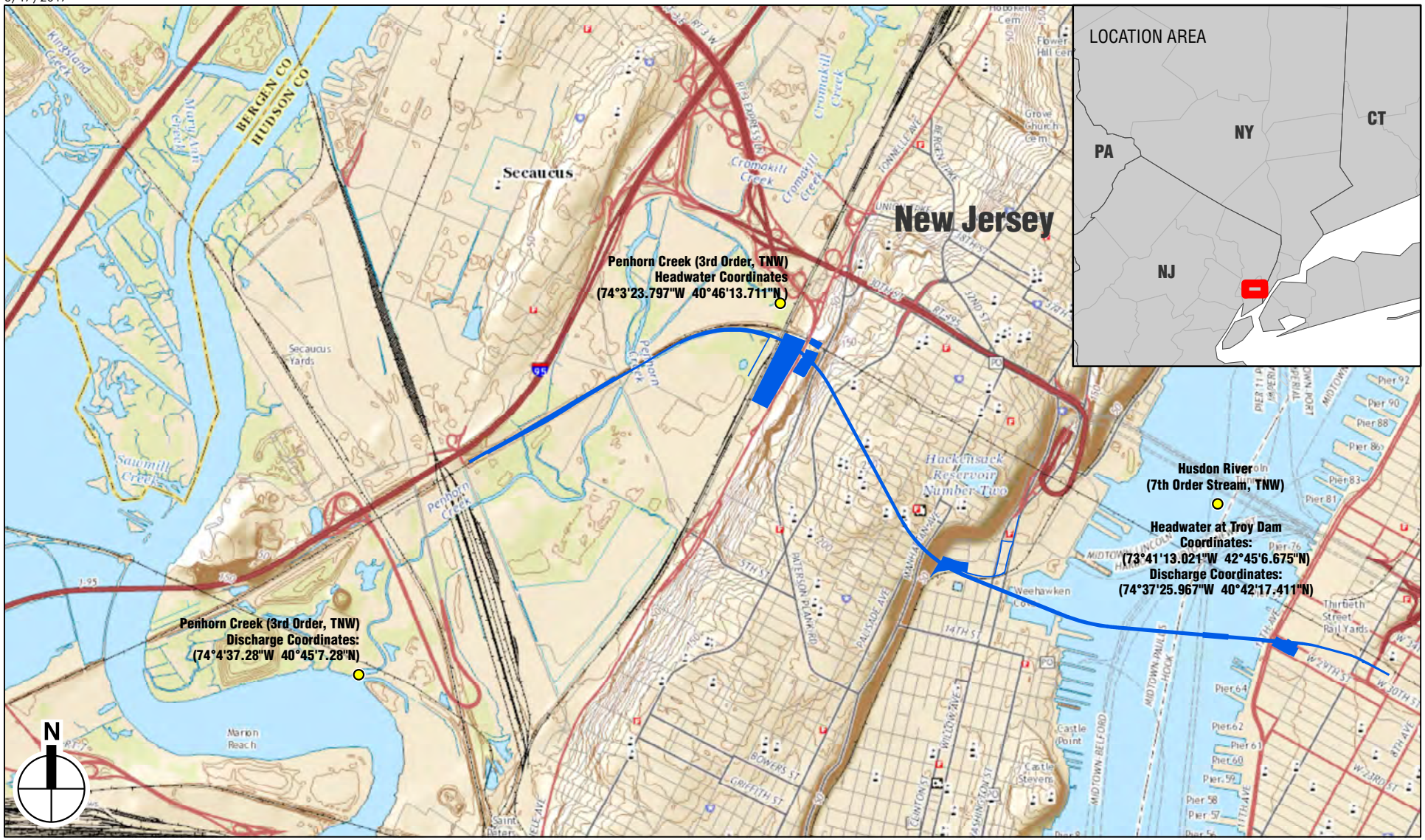
United States Fish and Wildlife Service (USFWS). 1997. Significant Habitats and Habitat Complexes of the New York Bight Watershed. USFWS Southern New England–New York Bight Coastal Ecosystems Program, Charlestown, RI.

United States Army Corps of Engineers (USACE). 1999. New York and New Jersey Harbor Navigation Study. Draft Environmental Impact Statement.

United States Army Corps of Engineers (USACE). 2016. Report of Channel Conditions; Hudson River Channel, New York. April 13, 2016.

Waldman, J.R., D.J. Dunning, Q.E. Ross, and M.T. Mattson. 1990. Range dynamics of Hudson River striped bass along the Atlantic Coast. Transactions of the American Fisheries Society 119: 910-919.

Zlokovitz, E.R., D.H. Secor, and P.M. Piccoli. 2003. Patterns of migration in Hudson River striped bass as determined by otolith microchemistry. Fisheries Research 63: 245-259. ✷



Project Construction and Staging Areas

HUDSON TUNNEL PROJECT

Project Location
USGS 7.5 Minute Topographic Map
Weehawken Quad and Central Park Quad
Figure 1

Wetlands data source: 2015 NJ Department of Environmental Protection (NJDEP)

0 5,000 FEET

Delineated Wetland Boundary

Project Alignments

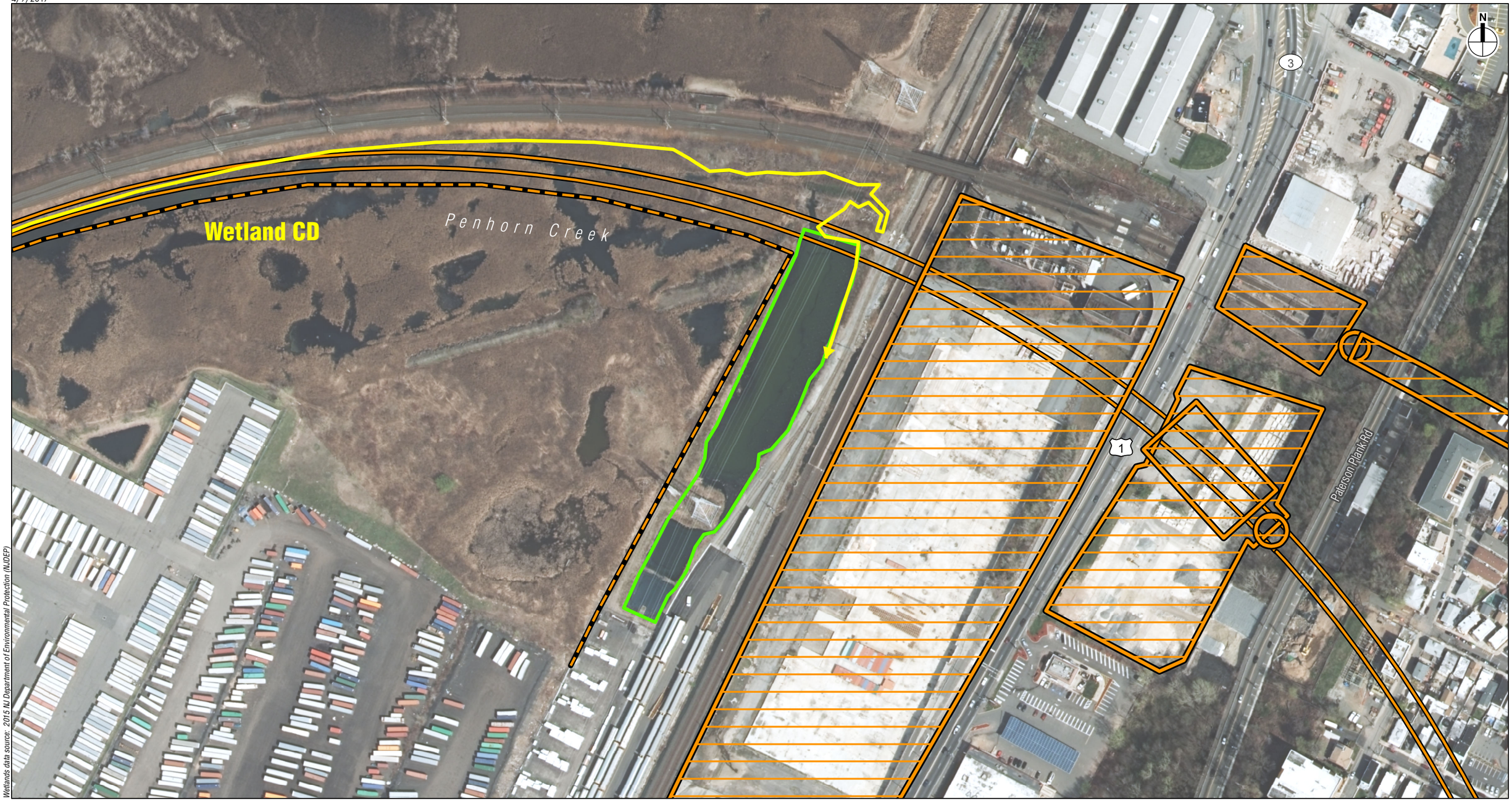
HUDSON TUNNEL PROJECT

Delineated Wetlands

Figure 2a

4/9/2017

DRAFT



Wetlands data source: 2015 NJ Department of Environmental Protection (NJDEP)

Delineated Wetland Boundary

Project construction and staging areas

Existing NYS&W Wetland MitigationSite

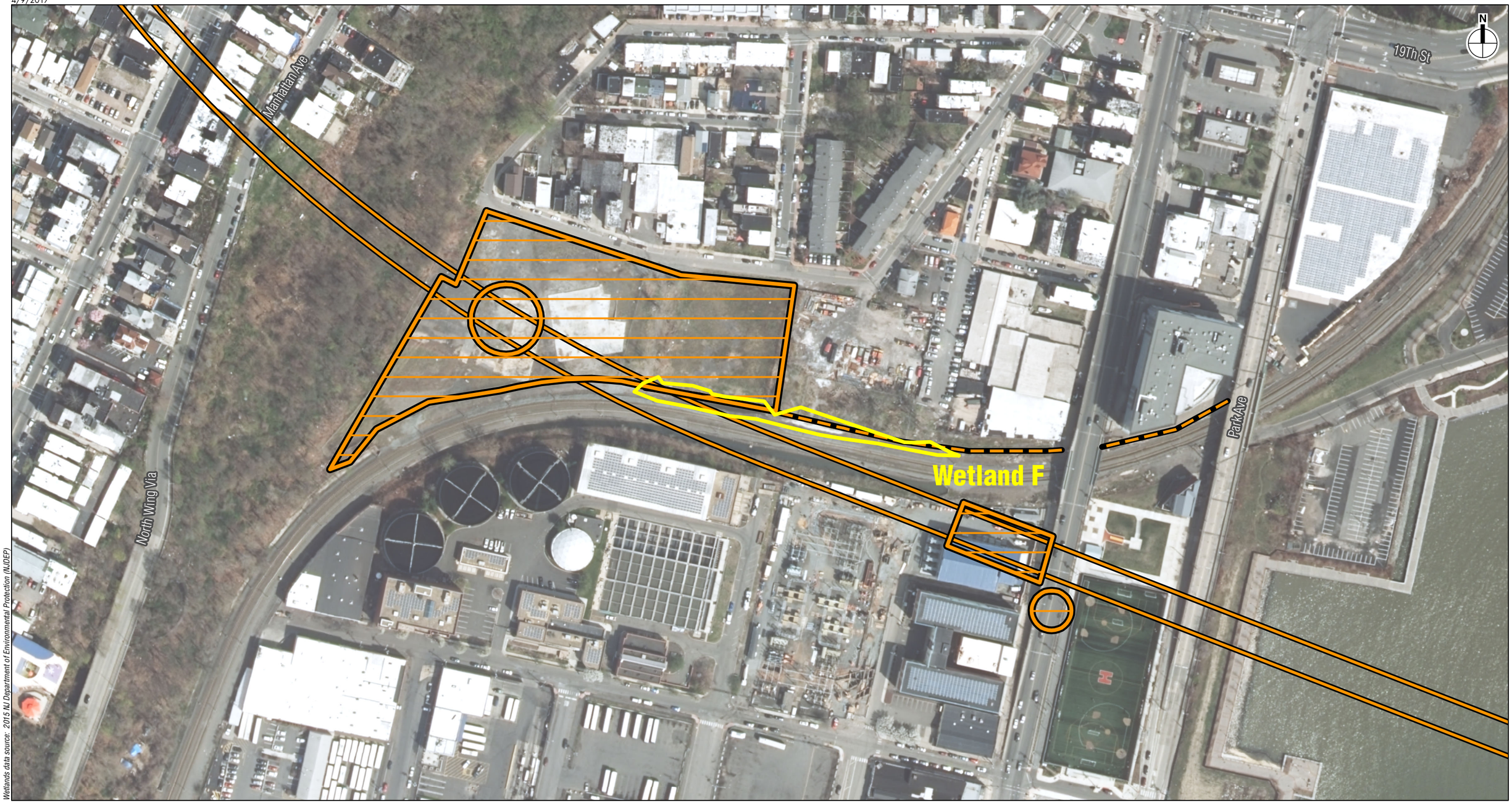
Construction Access Roads

Project Alignments

HUDSON TUNNEL PROJECT

Delineated Wetlands

Figure 2b



Wetlands data source: 2015 NJ Department of Environmental Protection (NJDEP)

Delineated Wetland Boundary

Project construction and staging areas

Construction Access Roads

Project Alignments

0 5,000 FEET

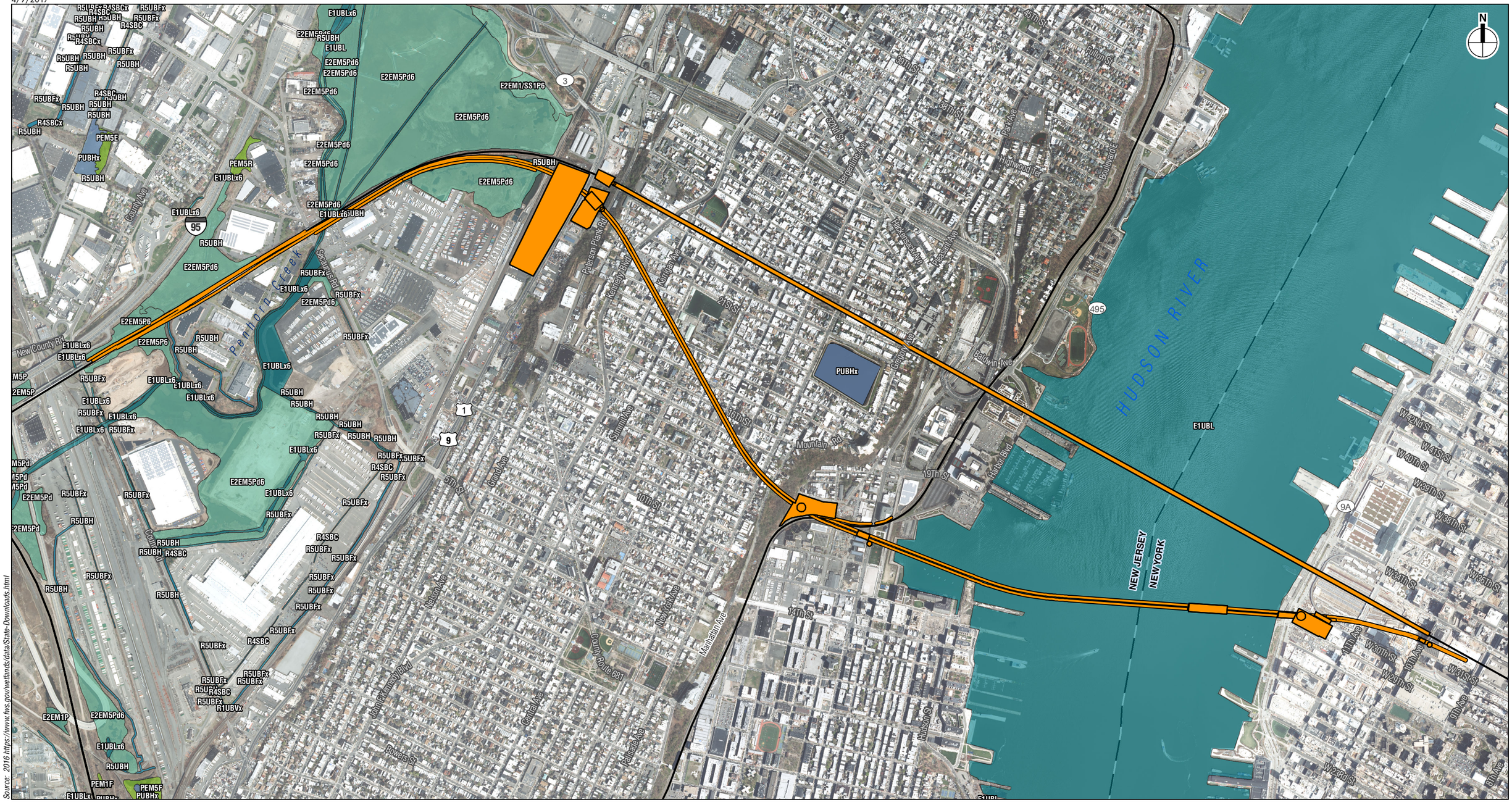
HUDSON TUNNEL PROJECT

Delineated Wetlands

Figure 2c

4/9/2017

DRAFT



Source: 2016 https://www.hvs.gov/wetlands/dataState-Downloads.html

Wetland Type (Map Codes)

- *Project Alignments*
- *Project construction and staging areas*
- *Freshwater Emergent Wetland (PEM)*
- *Freshwater Pond (PUB, PAB)*
- *Estuarine and Marine Wetland (E2, M2)*
- *Riverine (R)*
- *Estuarine and Marine Deepwater (E1, M1)*

HUDSON TUNNEL PROJECT

National Wetlands Inventory

Figure 3

4/9/2017

DRAFT

Wetlands data source: 2015 NJ Department of Environmental Protection (NJDEP)

0 5,000 FEET

Project construction and staging areas

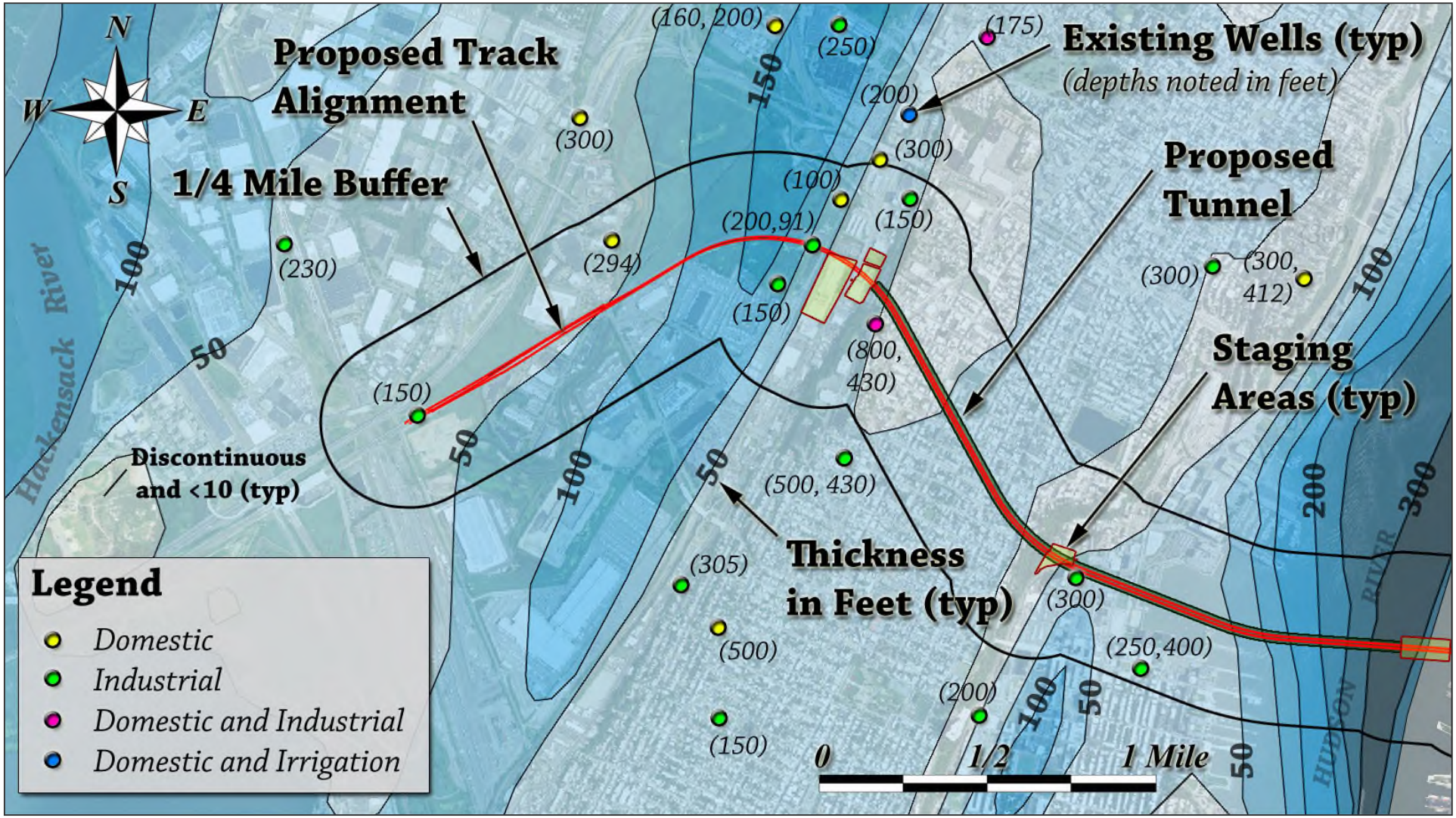
Project Alignments

Wetlands

HUDSON TUNNEL PROJECT

New Jersey Department of Environmental Protection Wetlands

Figure 4



Source: NJ GeoWeb, 2016b; NJDEP, 2016a; modified by AKRF

HUDSON TUNNEL PROJECT

Thickness of Unconsolidated Sediments and Groundwater Wells

Figure 5

HUDSON TUNNEL

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND DRAFT SECTION 4(f) EVALUATION

APPENDIX 11-5

Draft Section 404(b)(1) Guidelines Evaluation

U.S. Department of Transportation
Federal Railroad Administration

NJTRANSIT
The Way To Go.®

Draft Section 404(b)(1) Guidelines Evaluation

Hudson Tunnel Project

New Jersey and New York

June 2017

DRAFT SECTION 404(B)(1) GUIDELINES EVALUATION

HUDSON TUNNEL PROJECT

NEW JERSEY AND NEW YORK

INTRODUCTION

Section 404 of the Clean Water Act (CWA) prohibits discharges of dredge or fill materials into Waters of the United States (WOTUS), including jurisdictional wetlands, unless permitted to do so by the United States Army Corps of Engineers (USACE). The definition of WOTUS, at 33 CFR § 328.3 (a), includes coastal waters subject to the ebb and flow of the tide and inland waters, lakes, rivers, and streams, including adjacent wetlands and tributaries. The United States Environmental Protection Agency (USEPA) Section 404(b)(1) Guidelines (40 CFR Part 230) are the substantive environmental criteria used by the USACE to evaluate permit applications under CWA § 404 (40 C.F.R. § 230.2 (a) (1)). Under these guidelines, an analysis of practicable alternatives is used to determine whether a discharge will be authorized. The overall purpose of the guidelines is to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredged or fill material (40 C.F.R. § 230.1 (a).

This document presents a draft Section 404(b)(1) guidelines evaluation for the Hudson Tunnel Project (hereafter referred to as the Proposed Project). The goal of the Proposed Project is to preserve the current functionality of Amtrak's Northeast Corridor (NEC) service and NJ TRANSIT's commuter rail service between New Jersey and Penn Station New York (PSNY) by repairing the deteriorating North River Tunnel; and to strengthen the NEC's resiliency to support reliable service by providing redundant capability under the Hudson River for Amtrak and NJ TRANSIT NEC trains between New Jersey and the existing PSNY. The evaluation is based on the regulations found in 40 CFR 230, Section 404(b)(1): Guidelines for Specification of Disposal Sites for Dredged or Fill Material.

DRAFT 404(b)(1) EVALUATION

I. Project Description

a. Location – The Proposed Project is located in Secaucus, North Bergen, Union City, and Hoboken, New Jersey, within and underneath the Hudson River, and in western Manhattan, New York.

b. General Description – The Hudson Tunnel Project (Proposed Project) is the construction of a new two-track rail tunnel (the Hudson River Tunnel) running approximately parallel to the existing rail tunnel beneath the Hudson River (the North River Tunnel), extending from the Northeast Corridor (NEC) in Secaucus, New Jersey on two new surface tracks on berms and a viaduct in the New Jersey Meadowlands, beneath the Palisades (North Bergen and Union City) and the Hoboken waterfront area where a fan plant and vent shaft would also be located for the Proposed Project, and beneath the Hudson River to connect to the existing

approach tracks at Penn Station New York (PSNY). Beneath the Hudson River the top (crown) of the proposed Hudson River Tunnel would generally be located 25 to 50 feet below the river bottom. However, beginning about 1,300 feet west of the Manhattan shoreline, an approximately 550-foot-long section of the tunnel would be shallower beneath the river bottom than the minimum depth suitable for tunnel boring, which is 14 feet, or half the diameter of each new tube, below the river bottom. In this "low cover" area the river bottom would be modified through the addition of grout to the soil to provide more stability above the tunnel. The eastern edge of the ground improvement area would be about 200 feet west of the New York pierhead line (the pierhead line is the legal boundary established as the farthest point to which piers and other structures may legally extend into otherwise navigable waters). Approximately 1.5 acres of river bottom would be modified through the injection of grout to form a grout/sediment mixture termed soilcrete. The Project will also include rehabilitation of the existing North River Tunnel. In October 2012, Superstorm Sandy inundated the North River Tunnel, and today the tunnel remains compromised. Despite ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel. To perform the needed rehabilitation in the existing North River Tunnel, each tube of the tunnel will need to be closed for more than a year; if no new Hudson River passenger rail crossing is provided, closing a tube of the existing tunnel for rehabilitation would reduce the number of trains that could serve PSNY to a fraction of current service. In order to ensure rehabilitation is accomplished without notable reductions in weekday service, the Project will include construction of two new rail tubes beneath the Hudson River (the Hudson River Tunnel) that can maintain the existing level of train service while the damaged North River Tunnel tubes are taken out of service one at a time for rehabilitation. Once the North River Tunnel rehabilitation is complete, both the old and new tunnels will be in service, providing redundant capability and increased operational flexibility for Amtrak and NJ TRANSIT.

c. Authority – The Federal Railroad Administration (FRA) and NJ TRANSIT are acting as joint lead agencies for the environmental review of the Hudson Tunnel Project in accordance with the National Environmental Policy Act (NEPA).

d. Project Purpose

(1) Basic Project Purpose – To preserve the current functionality of the Northeast Corridor's (NEC) Hudson River passenger rail crossing between New Jersey and New York and strengthen the resilience of the NEC.

(2) Overall Project Purpose – The existing North River Tunnel is a critical NEC asset and is the only intercity passenger rail crossing into New York City from New Jersey and areas west and south. This tunnel, constructed between 1904 and 1908 and opened for service in 1910, is more than 100 years old and was designed and built to early 20th-century standards.

Service reliability through the tunnel, already suboptimal because of the tunnel's age and antiquated standards, has been further compromised because of the damage to tunnel components caused by Superstorm Sandy. The Proposed Project would preserve the current functionality of Amtrak's NEC service and NJ TRANSIT's commuter rail service between New Jersey and PSNY by repairing the deteriorating North River Tunnel; and would strengthen the NEC's resiliency to support reliable service by providing redundant capability under the Hudson River for Amtrak and NJ TRANSIT NEC trains between New Jersey and the existing PSNY. These improvements must be achieved while maintaining uninterrupted commuter and intercity rail service and by optimizing the use of existing infrastructure.

e. General Description of Fill Material

(1) General Characteristics of Material –

(a) Penhorn Creek – Fill within Penhorn Creek and the jurisdictional wetlands adjacent to the existing NEC will consist of new surface tracks, constructed in the form of retained fill, viaduct, and embankment. The retained fill segment is a raised section, like an embankment, that is supported by retaining walls rather than a side slope, and may be cast-in-place concrete or mechanically stabilized earth walls. The viaduct segment will consist of support piers with concrete girders spanning between the piers. The embankment segment will consist of raised sections (above surrounding grade) of engineered fill with concrete culverts. A gravel access road will be constructed south of the new surface tracks adjacent to the portion of the surface tracks between Secaucus Road and the freight railroad right-of-way used by the New York Susquehanna & Western (NYSW) Railway west of Tonnelle Avenue.

(b) Emergent wetland with nexus to Hudson River – Fill within this wetland will comprise culvert(s) and engineered fill for establishment of construction access road.

(c) Hudson River – Material used for jet grouting in the Hudson River will be a mix of cement grout, water, compressed air at high pressure, mixed with, the fine-grained silt/clay river bottom sediment to form soilcrete.

(2) Quantity of Material –

(a) Penhorn Creek – Approximately 26,500 cubic yards (CY) of permanent fill will be placed within wetlands and associated open water areas below ordinary high water. Approximately 11,950 CY of temporary fill will be placed in wetlands and associated open water areas.

(b) Emergent wetland with nexus to Hudson River – Engineered fill sufficient to establish construction access road.

(c) Hudson River –The area of grouting will occur within 1.5 acres of the Hudson River bottom and will extend upward from the springline (vertical midpoint) of the tunnel alignment to the river bottom. This area of ground improvement also includes one cross passage location where the jet grouting will be deeper. Jet grouting will result in a net increase in the volume of the sediment/grout mixture (soilcrete) within 0.7 acres extending between 1 and 2 feet above the existing river bottom elevation. Soilcrete within the remaining 0.8-acre portion of the low cover area will be at the mudline.

f. Proposed Discharge Site

(1) Location –

(a) Penhorn Creek – Penhorn Creek is a tributary of the Hackensack River, located along the border of Secaucus and Jersey City, New Jersey. It drains to the Hackensack River just south of Secaucus Junction Station on the NEC. The portion of the Project consisting of retained fill will extend from County Road to approximately 550 feet east of Secaucus Road. The portion of viaduct will extend approximately 1,200 feet from the eastern edge of the retained fill to approximately where the new surface tracks deviate from the existing NEC. The new embankment for the tracks will extend from the viaduct to the NYSW tracks. A 20-foot-wide access road will run along the south side of the new tracks from Secaucus Road to the NYSW right of way on a toe berm about 5 feet above existing grade.

(b) Emergent wetland with nexus to Hudson River – This 0.439-acre wetland is located in a drainage ditch within the Hudson-Bergen Light Rail (HBLR) right-of-way in Hoboken. It is north of the tracks and south of the proposed site for the Project's Hoboken ventilation shaft and fan plant. This wetland will be filled for construction of an access road for the Proposed Project's construction staging area at the ventilation fan plant and shaft site in Hoboken. Drainage culvert(s) will be installed as part of the construction access road to maintain the existing drainage pattern while the road is in place. Once construction of the Project in this area is complete, the construction access road will either be removed or it will remain in place for maintenance access to be used by the HBLR.

(c) Hudson River – The low cover area is within the Lower Hudson River, beginning at approximately 200 feet west of the New York pierhead line and extending approximately 450 feet west into the 40-foot project depth Federal Navigation Channel, and then about 100 feet into the 45-foot project depth Federal Navigation Channel.

(2) Size –

(a) Penhorn Creek – Fill activities will occur within approximately 7.566 acres of wetlands and associated open water under USACE jurisdiction, along approximately 5,650 linear feet. Temporary impacts will occur within approximately 4.307 acres of wetlands and associated open waters under USACE jurisdiction, comprising temporary fill, erosion and sediment control measures and construction fencing.

(b) Emergent wetland with nexus to Hudson River – Fill will be placed within this 0.439-acre wetland to establish a construction access road.

(c) Hudson River – Jet grouting will occur over a 1.5-acre (65,340 square feet) area of Hudson River bottom.

(3) Type of Sites/Habitat –

(a) Penhorn Creek – Penhorn Creek and its associated wetlands in the Project area contain both open water and wetland habitats with associated open waters. Penhorn Creek is a tributary to the Hackensack River and drains a portion of the Meadowlands to the east of the Hackensack River. The ridgeline of the Palisades sill forms the eastern boundary of Penhorn Creek's watershed, and the ridgeline running through Secaucus forms the western boundary of the watershed. Dikes formed by roadway fill constructed across the Meadowlands and the Hackensack River form the northern and southern boundaries of the watershed, respectively. Penhorn Creek's bed elevation is lower than much of the tidal range in the Hackensack River; however, its waters are regulated by a tide gate at St. Paul's Avenue. The National Wetlands Inventory (NWI) shows large areas of estuarine wetlands and smaller areas of freshwater wetlands within the New Jersey study area in the Hackensack Meadowlands. The freshwater wetlands shown on the NWI are riverine unknown perennial wetlands that have unconsolidated bottoms and are permanently flooded (designated by USFWS as "R5UBH"). As shown on the NWI, this R5UBH wetland is mapped on Penhorn Creek as it crosses the NEC east of County Road in Jersey City, NJ and the Project alignments and again near Secaucus Road in Secaucus, NJ, and on a wetland area immediately north of the NEC near the NYSW right of way at the eastern edge of the Meadowlands. The estuarine tidal wetlands within the study area include an intertidal wetland (designated by USFWS as "E2EM5P6") spanning both sides of the NEC from County Road to Penhorn Creek; this wetland is irregularly flooded, oligohaline, and dominated by emergent *Phragmites australis*. Outside Penhorn Creek, the NWI indicates large areas of oligohaline intertidal wetlands along both sides of the NEC east of Secaucus Road that are irregularly flooded, dominated

by emergent *Phragmites australis*, and partially drained/ditched (E2EM5Pd6). An existing wetland mitigation project implemented by NYSW within their right-of-way in compliance with a USACE permit is located within a portion of the area mapped as E2EM5Pd6. In addition, the NWI indicates subtidal wetlands with the following characteristics in small areas close to Penhorn Creek and County Road: subtidal wetlands with an unconsolidated bottom that is permanently flooded, oligohaline, and excavated (E1UBLx6); and subtidal wetland with an unconsolidated bottom that is permanently flooded (E1UBL). Field reconnaissance conducted in fall 2016 confirmed these wetland types and approximate locations. NJDEP-mapped wetlands in the Penhorn Creek area include those with the land use/land cover code, "Phragmites Dominate Interior Wetlands." They are located along both sides of the NEC in the Meadowlands area between County Road and the NYSW right-of-way. The NJDEP wetlands were also confirmed by site reconnaissance in fall 2016. FRA delineated wetlands within the New Jersey portion of the Project area during November and December 2016 in accordance with USACE's three-parameter approach for identifying wetlands. Two of these wetlands are located along the NEC and are tidally influenced emergent marshes that correspond with the locations of NWI-mapped wetlands E2EM5P6, R5UBH, E1UBLx6, and E2EM5Pd6. The other two, potentially isolated, emergent wetlands are not associated with any NWI-mapped wetlands. One of these two wetlands is an isolated wetland along the NEC, and the other is located along the HBLR right-of-way in Hoboken. The Hoboken wetland is not mapped by NJDEP, but may have possible nexus to the Hudson River through a tide gate located near Harbor Boulevard in Weehawken.

(b) Emergent wetland with nexus to Hudson River – This 0.439-acre emergent wetland dominated by *Phragmites australis* is connected to the Hudson River via a tidal gate. It is not mapped by the NWI or NJDEP.

(c) Hudson River – The Project will occur in a tidally-influenced portion of the Lower Hudson River. Saltwater from Upper New York Harbor enters the lower Hudson River Estuary during the flood phase of the tidal cycle and lower salinity water is discharged from the Estuary to the Harbor during the ebb phase. The typical tidal range in the Hudson River is approximately 5 feet (Geyer and Chant 2006). Average tidal velocities near the Project site are about 2.4 feet per second, and the average predicted ebb flow is about 2.6 feet per second (NOAA 2013). Freshwater and higher salinity waters are well mixed during low-flow conditions, but are stratified under higher flow conditions when freshwater inflow from upriver overrides the denser saltwater layer (Moran and Limburg 1986). USACE maintains a Federally-authorized navigation channel at a depth of 45 feet at mean lower low water (MLLW) from the mouth of the Hudson River

upstream to approximately 59th Street, and a 40 foot at MLLW project depth Federal Navigation Channel on the outside of the 45 foot channel (USACE 2016). Bathymetric surveys conducted by USACE in April 2016 showed depths ranging from about 36 to 48 feet at MLLW on the eastern side of the navigation channel, and depths from 33 to 51 feet at MLLW on the western side of the navigation channel in the Project vicinity (USACE 2016, sheet 5 of 11). Shallower depths were found near or adjacent to piers and other structures, and depths rapidly increased to 40 feet or more over a distance of less than 200 feet from these structures. The National Oceanic and Atmospheric Administration's (NOAA) Nautical Chart #12335 shows current water depths ranging from 3 to 17 feet at MLLW around the piers outside the navigation channel, and from 40 to 54 feet at MLW within the navigation channel. At the edges of the channel, depths range from 20 to 30 feet at MLLW (NOAA 2016). Sedimentation in the lower Hudson River tends to be highest in the shallows on the west side of the river (Geyer 1995). Sedimentation within the interpier areas where current velocities are lower ranges from 1 to 2 feet per year (Smith 1992).

(4) Time and Duration of Discharge –

(a) Penhorn Creek – Construction of the segments of retained fill, viaduct, embankment, and access road will likely occur over approximately 4.5 years, beginning in late 2019 and ending in early 2024.

(b) Emergent wetland with nexus to Hudson River – Placement of fill within the wetland to construct the access road will likely occur in late 2019 and remain in place for seven years, until late 2026.

(c) Hudson River – The ground improvement in the low-cover area of the Hudson River will likely occur over 15 months, beginning in late 2019 and ending in late 2020. The ground improvement will occur in three stages/segments: two 200-foot-wide segments, and one 150-foot-wide segment. Once the first segment is completed, cofferdams will be removed and set up for the next segment.

g. Disposal Method –

(1) Penhorn Creek – Construction of the embankment support structures will involve earthmoving and grading, using engineered fill material to build the embankments, and additional material for surcharging the embankment areas to allow for compression and settling to adequately support the track system. The retaining walls in the area of retained fill will be installed on foundations supported by deep piles. The viaduct will be constructed by installing support piles, then erecting the viaduct piers, and finally the spans of the viaduct to support the new tracks.

(2) Emergent wetland with nexus to Hudson River – Construction of the

construction access road will involve earthmoving and grading equipment.

(3) Hudson River – The low-cover area will be split into three approximately 200-foot long sections, each of which will, one at a time, be enclosed by a cofferdam (a temporary, watertight structure) that will isolate the water affected by construction from the surrounding river water. By conducting the jet grouting in three segments, the area of river bottom disturbed at a given time would be reduced. The cofferdam will consist of sheet pile walls driven into the river bottom from adjacent barges. Water within the cofferdam will be maintained at a few feet below the river level to maintain water pressure that flows inward to the cofferdam rather than outward. Barges will be moored outside the cofferdam, with construction equipment mounted on the barges. Working from the barges, the soils of the river bottom will be modified using a technique called jet grouting, which involves the injection of a mix of cement grout, water, and compressed air at high pressure to mix with and partially replace the existing bottom soil. The area of grouting will extend upward from the springline (vertical midpoint) of the tunnel alignment to the river bottom. This area of ground improvement also includes one cross passage location; in this location, the jet grouting would be deeper. Jet grouting operations create columns of moderate strength soilcrete (soil mixed with cement and water) that are similar to a low strength rock. When jet grouting is completed within a given section of the low cover area, the cofferdam will be removed and then installed for the next segment. Jet grout columns can be placed adjacent to one another to form an overlapping mass of grouted soil. The material used will have approximately the hardness of a weak rock material, and would not damage dredging equipment. Excess soil displaced by the jet grouting and the waste grout material will be contained within the cofferdam, removed by excavators on the barges, and then transported by barge for off-site transport to disposal sites.

II. Factual Determinations

a. Physical Substrate Determination –

(1) Substrate Elevation and Slope –

(a) Penhorn Creek – The Proposed Project will result in new substrate elevations and slope as a result of the new raised right-of-way (including segments of retained fill, sloped embankments, and viaducts), an adjacent access road along a portion of the embankment, and installation of drainage systems. The proposed embankment will be at the same elevation as the existing embankment, 20 to 30 feet above the surrounding properties, and will have a slope of 2 to 1. The design flood elevation (DFE) for the Proposed Project is the base flood elevation (BFE) plus 5 feet. The BFE ranges from 8 to 9 feet NAVD88. Project elements will be

either above the DFE or will be flood-proofed. The DFE will apply to all critical Project structures (i.e., any asset/component which, if impacted by flood waters, could limit functionality of the NEC). The DFE for the Project will therefore be at least elevation 14 feet NAVD88 west of Palisades and elevation 16 feet NAVD88 for the Hoboken fan plant,

(b) Emergent wetland with nexus to Hudson River – The construction access road will be slightly elevated above the surrounding land surface. The BFE at this wetland is 11 feet NAVD88.

(c) Hudson River – Jet grouting will result in soilcrete extending between 1 to 2 feet above the existing mudline within 0.7 acres of the 1.5-acre low cover area. Soilcrete within the remaining 0.8-acre portion will be at the mudline.

(2) Sediment Type –

(a) Penhorn Creek – The Proposed Project will result in a change in sediment type in the locations of the retained fill and embankments. Retained fill will consist of either concrete or mechanically stabilized earth walls. The sloped embankment will consist of engineered fill. The existing sediment outside the footprint of fill placement will be unaffected.

(b) Emergent wetland with nexus to Hudson River – The existing hydric soil will be covered by engineered fill.

(c) Hudson River – The Proposed Project will result in alteration of the sediment characteristics within the 1.5-acre low cover area, where fine-grained silt/clay sediments will be mixed with cement grout (termed "soilcrete"). The resulting soilcrete would be similar to a firm or dense soil substrate and would not lead to leaching or resuspension that could adversely affect sediment quality. Beyond the limited low-cover area, there will be no changes in sediment type.

(3) Dredged/Fill Material Movement –

(a) Penhorn Creek – Erosion and sediment control measures will be implemented in accordance with the stormwater pollution prevention plan (SPPP) to control movement of soil, rock and gravel outside the Project area. Material will be placed to minimize movement outside the new embankment and permanent access road footprint.

(b) Emergent wetland with nexus to Hudson River – Erosion and sediment control measures will be implemented in accordance with the SPPP to minimize movement of material outside the footprint of the construction access road.

(c) Hudson River – Soil improvement through jet grouting within the 1.5-acre low cover area will be conducted within cofferdams, minimizing the potential for the grout to extend beyond the footprint of the soil improvement area and for increases in suspended sediment.

(4) Physical Effects on Benthos –

(a) Penhorn Creek – The Proposed Project will result in the permanent loss of 7.566 acres of emergent wetlands and associated benthic habitat along the existing NEC between Allied Interlocking and the new tunnel portal and 0.439 acres of emergent wetlands in Hoboken. The permanent loss of the 7.566 acres of wetlands adjacent to the existing NEC will be properly mitigated for through the purchase of mitigation credits. These mitigation activities are described in greater detail in the "Draft Conceptual Mitigation Plan."

(b) Emergent wetland with nexus to Hudson River – The Proposed Project will result in the loss of 0.439 acres of wetland in Hoboken during construction. Any invertebrates currently using this wetland area will be lost due to construction of the access road. After construction is complete, the construction access road will either be removed or it will remain in place to be used as maintenance access for the HBLR. The 0.439 acres of impacts to this wetland will also be mitigated through the purchase of mitigation credits, as described in greater detail in the "Draft Conceptual Mitigation Plan."

(c) Hudson River – The Proposed Project will result in the permanent conversion of 1.5-acres of soft silty bottom habitat to soilcrete (i.e., grout mixed with soft sediment). Approximately 0.7 acres of soilcrete (approximately 120 feet wide and 270 feet long) will be between 1 and 2 feet above the mudline. This elevated portion of the soilcrete will provide habitat for encrusting organisms that will provide some foraging habitat for fish but may have a lower potential to accumulate sediment that would provide habitat for soft bottom habitat for benthic invertebrates. Approximately 0.8 acres of the soilcrete will be approximately level with the surrounding riverbed, and over time, sediments will be deposited over the soilcrete at sedimentation rates typical of the lower Hudson River, possibly providing some soft bottom habitat for benthic invertebrates. The loss of soft bottom habitat within the 0.7-acre elevated portion of the soilcrete represents a small loss of this type of habitat within the harbor estuary and will not adversely affect populations of benthic invertebrates. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area, in coordination with the USACE, National Marine Fisheries Service (NMFS), and the New York State Department of Environmental Conservation (NYSDEC), for five years to assess its recovery as fish foraging

habitat. The Project Sponsor will also monitor the recovery of the remaining 0.80 acres of soilcrete for five years post-construction. Therefore, the modification of the river bottom to achieve the soil improvement necessary to protect the Proposed Project will not result in long-term adverse impacts to benthos.

(5) Other Effects – N/A.

(6) Actions Taken to Minimize Impacts to Physical Substrates –

(a) Penhorn Creek – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation into Penhorn Creek. The plan will include measures such as the installation of silt fences, hay bales and/or fabric filters at the construction periphery, and vegetative stabilization of soils to prevent sedimentation. The SPPP and site-specific soil erosion and sediment control plan will be prepared in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, certified by the Hudson Essex Passaic County Soil Conservation District, and will be implemented as part of the Preferred Alternative's BMPs for construction. Additional measures, such as the use of low ground-pressure vehicles and marsh matting (where required by resources agencies), will be considered where feasible to minimize temporary impacts to wetlands.

(b) Emergent wetland with nexus to Hudson River – Erosion and sediment control measures will be implemented in accordance with the SPPP.

(c) Hudson River – A Pollution Prevention Plan will be implemented for the in-water construction activities to minimize the potential for discharge of materials to the Hudson River during sheet pile installation and jet grouting activities conducted from construction barges. Grout will be contained within coffer dams.

b. Water Circulation, Fluctuation and Salinity Determinations

(1) Water

(a) Salinity –

- Penhorn Creek – The installation of culverts along in the New Jersey portion of the Project area is designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. Therefore, the Proposed Project will not result in an adverse effect to salinity levels in Penhorn Creek.
- Emergent wetland with nexus to Hudson River – The loss of this wetland will not result in any changes in salinity of the Hudson River.

- Hudson River – The installation of the cofferdams and the replacement of soft bottom sediment with soilcrete that will be at the same elevation as that of the existing sediment within the 1.5-acre low-cover area will not affect the salinity of the Hudson River.

(b) Water Chemistry – The Proposed Project will result in temporary resuspension of sediments during construction in both Penhorn Creek and the Hudson River (during installation and removal of cofferdams) that could temporarily affect water chemistry; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, impacts relating to suspended sediment will be minimized through the use of erosion and sediment control measures, such as silt fences in the Penhorn Creek area and during construction of the construction access road in Hoboken. The installation of culverts along in the New Jersey portion of the Project area is designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. The soilcrete will not result in adverse impacts to water quality of the Hudson River. Therefore, the Proposed Project will not result in a long-term change in water chemistry within the Project site.

(c) Clarity –

- Penhorn Creek – The Proposed Project will result in a temporary resuspension of sediments during construction in Penhorn Creek that could temporarily affect water clarity; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, impacts relating to suspended sediment will be minimized through the use of sediment and erosion control measures, such as silt fences. The installation of culverts along Penhorn Creek is designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. The Proposed Project will not result in a long-term change in water clarity in Penhorn Creek and its surrounding wetlands.
- Hudson River – The Proposed Project will result in a temporary resuspension of sediments during construction in the Hudson River during installation and removal of cofferdams that could temporarily affect water clarity; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. The Proposed Project will not result in a long-term change in water clarity in the Hudson River.

(d) Color –

- Penhorn Creek – The Proposed Project will result in a temporary resuspension of sediments during construction in Penhorn Creek and its surrounding wetlands that could temporarily affect water color; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, impacts relating to suspended sediment will be

minimized through the use of sediment and erosion control measures, such as silt fences. The installation of culverts along Penhorn Creek is designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. The Proposed Project will not result in a long-term change in water color in Penhorn Creek or its surrounding wetlands.

- Hudson River – The Proposed Project will result in a temporary resuspension of sediments during construction in the Hudson River during installation and removal of cofferdams that could temporarily affect water color; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. The Proposed Project will not result in a long-term change in water color in the Hudson River.

(e) Odor – The Proposed Project is not expected to result in a change in odor within any portion of the Project site.

(f) Taste – The Proposed Project is not expected to result in a change in taste within any portion of the Project site.

(g) Dissolved Gas Levels –

- Penhorn Creek – Dissolved gas levels in Penhorn Creek and surrounding wetlands may be temporarily impacted during construction as sediments are disturbed. Upon completion of construction, dissolved gas levels are expected to return to pre-construction conditions. Additionally, the installation of culverts along Penhorn Creek is designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek.
- Hudson River – Dissolved gas levels may be locally altered during construction as a result of increased suspended sediments. However, the average tidal current in the Hudson River is 1.4 knots (Geyer and Chant 2006), which is strong enough to maintain sufficient flushing throughout the Project site so as not to affect overall dissolved gas levels in the Hudson River.

(h) Nutrients –

- Penhorn Creek – The Proposed Project, through extension of culverts and drainage swales, and sizing them to minimize hydraulic changes, will maintain sufficient flushing within the wetlands associated with Penhorn Creek so as not to result in an increase in nutrient concentrations. The culvert extensions will be of the same diameter as the existing culverts to maintain flow within the creek.
- Hudson River –The installation of grout within the 1.5-acre low cover area will not affect nutrient levels within the Hudson River. The soilcrete will not release nutrients to the river.

(i) Eutrophication –

- Penhorn Creek – The Proposed Project, through extension of culverts and drainage swales sized to maintain sufficient flushing within Penhorn Creek and its surrounding wetlands, will not have the potential

to result in eutrophication.

- Hudson River – The installation of grout within the 1.5-acre low cover area will not have the potential to result in eutrophication of the Hudson River. The soilcrete will not release nutrients to the river that would promote eutrophication.

(j) Others – N/A.

(2) Current Patterns and Water Circulation

(a) Current Patterns and Flow –

- Penhorn Creek – The Proposed Project will not result in changes to current patterns and flow within Penhorn Creek. Existing culverts beneath the NEC at the Penhorn Creek pump station will be extended to accommodate the Project, and will maintain or exceed their existing capacity. The project does have the potential to affect current pattern and water circulation in the wetlands associated with Penhorn Creek. The drainage swale located on the south side of the NEC between an existing CSO (CSO 011A) and the Penhorn Creek pump station will be reconstructed and partially culverted with equal or greater than its present capacity. In addition, four culverts (18 and 24-inches in diameter) will cross beneath the embankment of the new alignment and the adjacent access road. The embankment and access road would limit the flow of water between the drainage ditch that parallels the NEC embankment and the wetlands to the south. Altering the hydrology of wetlands within the study area (e.g., flooding, draining) would disturb the ecology of the wetlands and their distribution. The Project sponsor will conduct additional evaluations to confirm that the culverts are designed to minimize secondary wetland impacts due to changes in hydrology.
- Hudson River – Temporary impacts to current patterns and flow will occur during construction of the 1.5-acre low cover area. Flow patterns immediately adjacent to the cofferdams will be altered during construction. Once construction is complete, minor changes in flow patterns will occur surrounding the 0.7 acres of elevated soilcrete; however, these changes will be minor and are not expected to adversely impact overall Hudson River flow and currents.

(b) Velocity –

- Penhorn Creek – The placement of fill and relocation of drainage swales and culverts may result in changes in velocity in Penhorn Creek. The proposed culverts are designed to minimize adverse impacts to the hydrology of Penhorn Creek and the surrounding wetlands.
- Hudson River – Temporary changes in velocity may occur during construction of the 1.5-acre low cover area in small, localized areas surrounding the cofferdams. Once construction is complete, changes in velocity could occur in the immediate vicinity of the 0.7 acres of elevated soilcrete; however, these changes will be minor and are not expected to

adversely affect overall Hudson River velocity.

(c) Stratification –

- Penhorn Creek – The Proposed Project would not result in a change in stratification within Penhorn Creek. The culvert extensions will be sized to maintain the existing flow pattern and will not contribute to stratification of the creek.
- Hudson River – The conversion of 1.5 acres of Hudson River bottom sediment to soilcrete will not result in a change in the existing stratification pattern within the Hudson River. The soilcrete will not modify flow patterns such that stratification is affected.

(d) Hydrologic Regime –

- Penhorn Creek – The Proposed Project will not alter the hydrologic regime of Penhorn Creek. The culvert extensions will be the same size as the existing culverts to maintain the existing flow pattern. The proposed culverts will be designed to minimize adverse impacts to the hydrology of Penhorn Creek and the surrounding wetlands.
- Hudson River –While flow patterns immediately adjacent to the cofferdams will be altered during construction, the overall hydrologic regime of the Hudson River will not be altered as a result of the 1.5-acre low cover area.

(3) Normal Water Level Fluctuations –

(a) Penhorn Creek – Water level fluctuations will not be affected in Penhorn Creek. Water elevations in the surrounding wetlands may be altered as a result of the Proposed Project if discharges to Penhorn Creek are not sufficient to allow surface discharges to the wetlands to drain as under the existing condition. Potential changes in water elevation will be minimized through the design of culverts that will maintain the wetland hydrology.

(b) Hudson River – The Proposed Project will not adversely affect normal water level fluctuations.

(4) Salinity Gradients –

(a) Penhorn Creek – The Proposed Project will not affect the salinity gradient in Penhorn Creek. Penhorn Creek is controlled by a tide gate at St. Paul's Avenue. Salinity gradients are highly dependent on this tide gate. The Proposed Project will not affect operation of the tide gate; as such, no long-term changes in salinity gradients are anticipated as a result of the Proposed Project.

(b) Hudson River – The Proposed Project will not result in changes to salinity gradients within the Hudson River.

(5) Actions Taken to Minimize Impacts –

(a) Penhorn Creek – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation into Penhorn Creek during extension of drainage culverts and other construction activities that have the potential to discharge sediment to waters that discharge to Penhorn Creek. The plan would include measures such as the construction of water quality/detention basins, installation of silt fence, hay bales and/or fabric filters at the construction periphery, and vegetative stabilization of soils to prevent sedimentation into surface waters. Fill material will be placed so as to minimize discharges outside the footprint of the embankment and access road. Culverts will be sized to maintain the existing flows within Penhorn Creek and to minimize changes in flow within the wetlands. Additional measures, such as the use of low ground-pressure vehicles and marsh matting (where required by resources agencies), will be considered where feasible to minimize temporary impacts to wetlands.

(b) Hudson River – Construction activities within the low cover area will occur within an area enclosed by temporary cofferdams used to protect the surrounding waters. The cofferdams will be installed in three separate sections/segments, each approximately 250 feet long by 120 feet wide, in order to minimize the area of the river that is disturbed at any one time.

c. Suspended Particulates and Turbidity Determination –

(1) Expected changes – The Proposed Project will result in temporary, minor increases in suspended particulates and turbidity.

(2) Effects on Chemical and Physical Properties of the Water Column –

(a) Light Penetration –

- Penhorn Creek – There may be short-term, minor impacts on light penetration during construction of the Proposed Project as sediments are resuspended during construction, resulting in increased turbidity; however, the use of sediment and erosion control measures will minimize these short-term impacts. Of the approximately 43,100 square feet (0.99 acres) occupied by the proposed viaduct, only approximately 12,300 square feet (0.28 acres) along the southern edge of the viaduct will be located above wetlands. The viaduct will be positioned between 18 and 19 feet above the surface of the wetlands and located immediately south of the NEC tracks. This elevation above the emergent wetland combined with the southern exposure will allow sufficient sunlight to reach the wetland during periods of the day to support the existing plant community. Therefore, no long-term adverse effect on light penetration as a result of the Proposed Project is anticipated.

- Hudson River – The installation and removal of cofferdams will result in short-term, temporary, and minor impacts on light penetration as a result of sediment resuspension. These impacts will cease once construction is complete and will not result in long-term adverse effects on light penetration.

(b) Dissolved Oxygen (DO) –

- Penhorn Creek – There is potential for short-term, minor changes in DO levels during construction of the Proposed Project in Penhorn Creek and its associated wetlands as sediments are resuspended; however, suspended sediment will dissipate upon cessation of sediment-disturbing activities and DO levels will be expected to return to pre-construction levels.
- Hudson River – The average tidal current in the Hudson River is 1.4 knots (Geyer and Chant 2006), which is strong enough to maintain sufficient flushing throughout the Project site so as not to affect the potential for changes in DO during construction. Following construction, the presence of the soilcrete will not have the potential to affect DO concentration.

(c) Toxic Metals and Organics –

- Penhorn Creek – All of the properties within the Meadowlands portion of the Project site are mapped as having historical fill, which could include dredged material, construction and demolition waste, other solid wastes (including municipal garbage) and ash. As such, historical fill material can contain heavy metals, PCBs, pesticides, SVOCs, VOCs and other hazardous materials. For much of the 20th Century, unregulated dumping of solid waste took place in the Meadowlands. As such, there is the potential for contamination for activities requiring excavation such as culverts and outlet structures. Construction would be completed as a Linear Construction Project (LCP) under the oversight of an assigned Licensed Site Remediation Professional (LSRP). The LSRP would prepare a Materials Management Plan and would oversee the reuse (where suitable) or disposal of all project-related contaminated materials.
- Hudson River – Excess material generated during jet grouting will be disposed of in accordance with State and Federal regulations and will not have the potential to adversely affect the Hudson River.

(d) Pathogens –

- Penhorn Creek – The Proposed Project, through extension of culverts and drainage swales, will maintain sufficient flushing within Penhorn Creek and its surrounding wetlands so as not to result in an increase in pathogens. The Proposed Project, and in particular the modifications to the NYSW wetland mitigation site will be designed so as not to adversely affect the operation of North Bergen CSO outfall 011A and the water quality improvements resulting from the discharge from the CSO to the wetland mitigation site.

- Hudson River – The installation of the soilcrete within the 1.5-acre low cover area will not adversely affect pathogen concentrations within the Hudson River.

(e) Aesthetics –

- Penhorn Creek – Temporary increases in suspended sediment during construction may impact aesthetics of the water column in Penhorn Creek and surrounding wetlands; however, once construction is complete and sediment disturbing activities cease, aesthetics of the water column are anticipated to return to pre-construction conditions. Culverts will be sized to maintain the hydrology of the wetlands associated with Penhorn Creek so as not to affect the aesthetics of the Project area.
- Emergent wetland with nexus to Hudson River – Upon completion of construction, the temporary access road will be removed, topography restored within the drainage and the area stabilized and seeded to restore a vegetated wetland.
- Hudson River – Temporary increases in suspended sediment during construction may impact aesthetics of the water column in the Hudson River immediately surrounding the construction site; however, once construction is complete and sediment disturbing activities cease, aesthetics of the water column are anticipated to return to pre-construction conditions.

(f) Others as Appropriate – N/A.

(3) Effects on Biota –

(a) Primary Production, Photosynthesis, Suspension/Filter Feeders, and Sight Feeders – Increases in suspended sediment during construction could temporarily impact primary production, photosynthesis, suspension/filter feeders, and sight feeders; however, sediment suspension will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities.

(b) Actions taken to Minimize Impacts – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation into Penhorn Creek. The plan will include measures such as the installation of silt fences, hay bales and/or fabric filters at the construction periphery, and vegetative stabilization of soils to prevent sedimentation. The SPPP and site-specific soil erosion and sediment control plan will be prepared in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, certified by the Hudson Essex Passaic County Soil Conservation District, and will be implemented as part of the Preferred Alternative's BMPs for construction.
Jet grouting will be done within cofferdams to minimize the potential for discharges to the Hudson River. A Pollution Prevention

Plan will be implemented for the in-water construction activities to minimize the potential for discharge of materials to the Hudson River during sheet pile installation and jet grouting activities conducted from construction barges. Consultation with NMFS is ongoing with respect to measures to minimize construction-related impacts to EFH due to temporary loss of forage area, and to anadromous species. Any materials containing toxic metals or organics that may be recovered will be disposed of in accordance with federal, state and local regulations.

d. Contaminants –

(1) Total Suspended Solids –

(a) Penhorn Creek – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation (and associated contaminants) into Penhorn Creek during extension of drainage culverts and other construction activities that have the potential to discharge sediment to waters that discharge to Penhorn Creek.

(b) Hudson River – Installation and removal of cofferdams may result in temporary increases in suspended sediment containing low to moderate levels of contamination. Any sediments and associated contaminants resuspended during installation and removal of the cofferdams will be expected to be localized and will dissipate quickly with the tidal currents. Resuspended sediment will be expected to settle out over sediment with similar levels of contamination, and thus will not result in adverse impacts to sediment quality. Ground stabilization through jet grouting will be contained within the cofferdams and will not result in increased turbidity or contaminant resuspension in the river. The jet grouting would result in alteration of the sediment characteristics from soft bottom to soilcrete, or hard bottom, within the 1.5-acre low-cover area.

Actions taken to Minimize Impacts – Implementation of erosion and sediment control measures in accordance with the SPPP will minimize the potential for sedimentation into Penhorn Creek. The SPPP and site-specific soil erosion and sediment control plan will be prepared in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, certified by the Hudson Essex Passaic County Soil Conservation District, and will be implemented as part of the Proposed Project's Best Management Practices (BMPs) for construction. A Pollution Prevention Plan will be implemented for the in-water construction activities to minimize the potential for discharge of materials to the Hudson River during sheet pile installation and jet grouting activities conducted from

construction barges. Any materials containing toxic metals or organics that may be recovered will be disposed of in accordance with federal, state and local regulations.

e. Aquatic Ecosystems and Organisms Determination –

(1) Effects on Plankton, Nekton, and Benthos –

(a) Penhorn Creek – There will be a permanent loss of 7.85 acres of emergent wetlands that will result in adverse effects on plankton, nekton, and benthos within this footprint. These adverse effects will be offset through the purchase of wetland mitigation credits within the same 8-digit Hydrologic Unit Code (HUC-08) watershed, as outlined in the "Draft Conceptual Mitigation Plan."

(b) Hudson River - The 1.5-acre low cover area within the Hudson River of fine-grained silt/clay sediments will be permanently lost to infaunal macroinvertebrates and the species that prey on them. This area will initially be available as hard bottom habitat for encrusting organisms tolerant of soilcrete. The soilcrete in 0.8 acres will be approximately level with the surrounding riverbed, and over time, sediments will be deposited over the soilcrete at sedimentation rates typical of the Lower Hudson River, possibly providing some soft bottom habitat for benthic invertebrates. The 0.8-acre portion of the soilcrete within the low cover area that is elevated above the mudline between 1 and 2 feet will be less likely to receive sufficient sediment deposition to provide habitat for soft bottom organisms. No changes will occur to the tidal regime, salinity, DO or water quality in this location. Therefore, the Proposed Project will not result in adverse effects to plankton, nekton and benthos. The loss of the 0.439-acre emergent wetland with a nexus to the Hudson River will not affect plankton, nekton and benthos of the Hudson River.

(2) Effects on Aquatic Food Web –

(a) Penhorn Creek – The permanent loss of 7.566 acres of emergent wetlands may affect the aquatic food web along Penhorn Creek and its associated wetlands. These effects will be offset by the purchase of wetland mitigation credits within the same 8-digit Hydrologic Unit Code (HUC-08) watershed, as outlined in the "Draft Conceptual Mitigation Plan." The minimal loss of bottom habitat within the footprint of the box culvert extension within Penhorn Creek will not result in adverse impacts to the aquatic food web. To minimize impacts to anadromous species spawning run in Penhorn Creek, no in-water or sediment generating activities and pile driving would occur between March 1 through June 30.

(b) Hudson River – The permanent loss of 1.5 acres of soft bottom sediment and its replacement with soilcrete will not adversely affect

the aquatic food web within the Hudson River. When compared to the width and length of the river, the alteration of a 1.5-acre area is negligible. Additionally, sediments are expected to settle over the soilcrete over time, resulting in available habitat for aquatic organisms. The loss of the 0.439-acre emergent wetland with a nexus to the Hudson River will not affect the aquatic food web of the Hudson River.

(3) Effects on Special Aquatic Sites –

(a) Sanctuaries and Refuges – The Project site falls within one of the 15 designated Significant Coastal Fish and Wildlife Habitats, the Lower Hudson Reach. NYSDEC designated the Lower Hudson Reach as a Significant Coastal Fish and Wildlife Habitat in part because it provides an important wintering habitat for young-of-the-year, yearling, and older striped bass. In addition, the Lower Hudson Reach is one of the few large tidal river mouth habitats in the Northeastern United States, which is part of the greater Hudson River Estuary system that supports a diverse and historically highly productive ecosystem of fish and invertebrate species (Briggs and Waldman 2002, NYDOS 1992). The permanent modification of 0.7 acres of bottom habitat within the Lower Hudson Reach due to the soil improvement through jet grouting that will result in soilcrete extending between 1 and 2 feet above the mudline will not result in an adverse impact to striped bass and other fish species given the ubiquity of this bottom habitat elsewhere in the lower Hudson River. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area, in coordination with the USACE, NMFS, and the NYSDEC, for five years to assess its recovery as fish foraging habitat. The Project Sponsors will also monitor the recovery of the remaining 0.80 acres of soilcrete for five years post-construction. In-water construction activities in the 1.5-acre soil improvement area will have the potential to result in temporary increases in suspended sediment that will be localized and expected to dissipate quickly and will not result in adverse impacts to aquatic biota. Installation of the sheetpile for the cofferdam structures used for the three phases of soil improvement will result in temporary increases in underwater noise levels that will not be expected to exceed the threshold for physiological injury to fishes. Fish will likely avoid portions of the river in proximity to the cofferdam while the sheet pile is driven. Pile driving restrictions between November 1 and April 30 required for pile driving within Hudson River Park will minimize the potential of increased underwater noise to adversely impact to overwintering striped bass and other fishes. The temporary loss of foraging habitat within and in the vicinity of the soil improvement area, when compared to the available suitable habitat that will still

be available within the lower Hudson River, would not result in adverse effects to striped bass or other aquatic biota. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area, in coordination with the USACE, NMFS. and the NYSDEC, for five years to assess its recovery as fish foraging habitat. The Project Sponsors will also monitor the recovery of the remaining 0.80 acres of soilcrete for five years post-construction.

(b) Wetlands – Construction of the Preferred Alternative, including retaining walls, embankments, access roads, culverts, and a pile-supported viaduct, will result in permanent impacts to 7.566 acres of emergent wetlands along the existing NEC between Allied Interlocking and the new tunnel portal. A construction access road will result to the loss of 0.439 acres of emergent wetlands in Hoboken. Prior to construction, existing culverts under the NEC surface tracks will be extended to maintain drainage and minimize indirect permanent impacts to wetlands. A culvert would be installed for a construction access road to the Hoboken shaft site and staging area within the small 0.439-acre wetland to maintain drainage between the portions of the wetland not directly affected by the placement of the access road. Once construction has been completed, the construction access road will either be removed or it will remain in place for maintenance access. Installation of erosion and sediment control measures and security fencing will temporarily impact 4.3 acres of emergent wetlands. Implementation of erosion and sediment control measures (e.g., hay bales and silt fences) in accordance with the Stormwater Pollution Prevention Plan (SPPP) required under NJPDES General Permit NJ0088323 for Construction Activity Stormwater (General Permit 5G3) will minimize indirect impacts to wetlands due to deposition of soil and other material. Following the completion of construction, where possible, wetlands temporarily affected during construction will be restored back to original topography and stabilized in accordance with the SPPP.

(c) Mud Flats – There are no mudflats within the Project site.

(d) Vegetated Shallows – The open water areas within the wetlands surrounding the Project site, and the NYSW wetland mitigation site contain populations of floating marsh pennywort. The project proponent will develop and implement a transplantation plan for the floating marsh-pennywort populations in consultation with NJDEP prior to initiating construction activities affecting Penhorn Creek.

(e) Coral Reefs – There are no coral reefs within the Project site.

(f) Riffle and Pool Complexes – There are no riffle and pool complexes within the Project site.

(4) Threatened and Endangered Species –

New Jersey:

There are no Federal threatened or endangered species or critical habitats designated by the United States Fish and Wildlife Service within the New Jersey portion of the Project area. State-listed endangered, threatened, special concern, and rare species listed by the New Jersey Natural Heritage Program as having the potential to occur near the Project site in New Jersey include glossy ibis (*Plegadis falcinellus*; special concern), little blue heron (*Egretta caerulea*; special concern), osprey (*Pandion haliaetus*; threatened), snowy egret (*Egretta thula*; special concern), yellow-crowned night-heron (*Nyctanassa violacea*; threatened), black-crowned night-heron (*Nycticorax nycticorax*; threatened), barn owl (*Tyto alb*a; special concern), and floating marsh-pennywort (*Hydrocotyle ranunculoides*; endangered). In order to minimize impacts to migratory birds with the potential to breed in the vicinity of the proposed project, vegetation clearing and/or initial placement of fill material will not occur in the primary breeding period for most bird species (April through July) and will instead occur between October 1 and March 14 (i.e., prior to or after the breeding season), to prevent birds from attempting to breed where additional construction activity would later occur. The Proposed Project will result in permanent impacts to 7.85 acres of emergent wetlands and associated open water habitat associated with Penhorn Creek, and there will be some potential changes in hydrology that will be minimized through the design of culvert structures that would maintain water flow. Noises generated during construction of the Preferred Alternative will likely not have long-lasting or adverse effects to threatened and species of special concern birds potentially occurring in the area. The wildlife communities in the Project area have been established under noisy existing conditions associated with the urban environment. Visual and auditory disturbances during construction would have the potential to temporarily displace some individuals of some species from the immediate vicinity of the site of activity, but the construction activities would not be expected to increase levels of disturbance to the extent that these species would altogether abandon the area. The permanent loss of wetland areas will represent a negligible reduction in the amount of such habitat available to the state-listed birds potentially in the area and will not impact the size or viability of their local populations. An abundance of interior wetland habitat surrounding Penhorn Creek will remain once the Project is in place, and glossy ibis, little blue heron, osprey, snowy egret, yellow-crowned night heron, black-crowned night heron, and barn owl will all have the same potential to occur in this area as at present. A transplant plan will be developed in coordination with NJDEP to minimize potential impacts to the floating marsh-pennywort population impacted due to construction. With the implementation of a transplantation plan, no adverse operational effects to floating marsh-pennywort are expected as a result of the Proposed Project.

Hudson River:
Federally-listed aquatic species that are considered by NMFS to have the potential to occur in the Hudson River near the project site include Atlantic sturgeon (*Acipenser oxyrhynchus*) and shortnose sturgeon (*Acipenser brevirostrum*). Because the lower Hudson River Estuary is used by shortnose and Atlantic sturgeon primarily for migration rather than extended occupation for feeding or reproduction, it is unlikely that construction would significantly affect these species. Atlantic sturgeon are more likely to occur in deep water habitat of the Hudson River in the vicinity of the Project site during migration to and from upriver foraging, overwintering, and/or spawning grounds. It is unlikely that individuals of either species would occur in the vicinity of the Project site except perhaps as occasional transients. The potential for project vessel interaction with sturgeon is extremely minimal, as barges will be moored-in-place in relatively deep water during in-water work, and two small vessels will be used periodically to transport personnel and materials to the site. Because any impacts to water or sediment quality associated with the Project's in-water construction activities in the low-cover area will be localized and temporary, the deep channel habitat typically used by shortnose and Atlantic sturgeon is unlikely to be adversely affected during construction. Increased underwater noise during installation and removal of each cofferdam will likely lead to avoidance of the work area by shortnose and Atlantic sturgeon, but will not reach the thresholds of underwater noise associated with the onset of physiological injury or mortality. While sheetpile cofferdams would be installed in deeper waters of the river along the margins of the deep navigation channel, about 80 percent of the distance across the channel would likely not be affected by increased underwater noise generated by the Proposed Project, and sturgeon would be able to avoid the portion of the river in proximity to the cofferdams in favor of suitable habitat in the vicinity. In order to minimize potential behavioral impacts to migrating subadult and adult Atlantic sturgeon, which could occur in the soil improvement area, cofferdam installation will commence in May in the section closest to the shore and move outward toward the channel. Jet grouting activities will be contained within the cofferdams, in accordance with best management practices for minimizing silt and as recommended by NMFS (2016) for the protection of sturgeon. Sturgeon are benthic feeders, and soil improvement through jet grouting in the 1.5-acre low-cover area will permanently disturb foraging habitat within this area. However, when compared to the available suitable habitat that will still be available within the lower Hudson River, this temporary loss of foraging habitat will not result in an adverse impact to sturgeon. Sturgeon will be expected to return to the low-cover area following the cessation of in-water construction activities. While the 0.8 acres of the 1.5-acre low-cover area will initially be unsuitable for burrowing organisms, over time sediments will be expected to be deposited on top of the soil and grout mixture. These sediments could provide habitat for soft bottom organisms that provide forage for sturgeon.

New York:
There are no Federal threatened or endangered spices or critical habitats designated by the United States Fish and Wildlife Service within the New York

portion of the Project area. State listed endangered, threatened, and special concern species listed by the New York Natural Heritage Program as having the potential to occur within a half-mile of the Project site in New York include peregrine falcon (*Falco peregrinus*; endangered) and yellow bumblebee (*Bombus* (*Thoracobombus*) *fervidus*; unlisted species identified as of conservation concern). Construction activities for the Proposed Project will occur primarily subsurface, although there will be above-ground construction at the Twelfth Avenue staging area. Neither construction activities nor the permanent operation of the Project will adversely affect existing habitats on the High Line. Therefore, there will be no loss of habitat for the yellow bumble bee. There will also be no potential impact to peregrine falcon nesting sites, which in New York City are limited to bridges and the rooftops of tall buildings. Urban peregrine falcons have a particularly high tolerance for noise and indirect human disturbance (White et al. 2002), and will not be affected by any construction activities of the Project. Urban peregrine falcons primarily prey upon rock doves (DeMent et al. 1986, Rejt 2001), whose abundance will not change as a result of the Project. Prey availability and foraging habitat therefore will not be affected. Overall, peregrine falcons will not be adversely affected by the Proposed Project and will have the same potential to occur in the Project area as at present.

(5) Other Wildlife

(a) Fish – The Proposed Project has the potential to result in temporary impacts to fish within the Hudson River during the installation of grout for the in-water soil improvement. These impacts include temporary increases in suspended sediments, movement of construction vessels through the water column, shading by the barges moored-in-place at the work site, and underwater noise associated with the sheet pile cofferdam installation/removal and vessel activity. Approximately 0.7 acres of soilcrete (approximately 120 feet wide and 270 feet long) will be between 1 and 2 feet above the mudline. This elevated portion of the soilcrete will provide habitat for encrusting organisms that will provide some foraging habitat for fish but would have a lower potential to accumulate sediment that would provide habitat for soft bottom habitat for benthic invertebrates and would not provide forage habitat to soft-bottom feeding fish species such as windowpane, skates, and summer and winter flounder. The loss of soft bottom habitat within the 0.7-acre elevated portion of the soilcrete represents a small loss of this type of habitat within the harbor estuary and will not adversely affect populations of benthic invertebrates. However, the loss of this area as foraging habitat for bottom-feeding fish such as will result in unavoidable adverse effects to EFH and other fish resources that will not be substantial. As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area, in coordination with the USACE, NMFS, and the NYSDEC, for five years to assess its recovery as fish foraging habitat. About 0.8 acres of the soilcrete

will be approximately level with the surrounding riverbed, and over time, sediments will be deposited over the soilcrete at sedimentation rates typical of the lower Hudson River, possibly providing some soft bottom habitat for benthic invertebrates and foraging habitat for bottom feeding fish. The Project Sponsor will also monitor the recovery of the remaining 0.80 acres of soilcrete for five years post-construction.

(6) Actions to Minimize Impacts to Aquatic Ecosystems and Organisms – The following measures implemented by the Proposed Project will minimize impacts to aquatic ecosystems and organisms within the Hudson River:

- Use of cofferdams in the low-cover area to contain jet grouting activities, in accordance with best management practices for minimizing silt and as recommended by NMFS for the protection of sturgeon.
- Installation and removal of steel sheetpile in the Hudson River low-cover area with a vibratory hammer.
- Limiting sheetpile driving installation so that no pile driving installation or removal occurs between November 1 through April 30, to protect overwintering striped bass and winter flounder spawning.
- In order to minimize potential behavioral impacts to migrating subadult and adult Atlantic sturgeon, sequencing cofferdam installation so that it commences in May in the section closest to the shore and moves outward toward the channel.
- To minimize impacts to anadromous species spawning in Penhorn Creek, no in-water or sediment generating activities and pile driving would occur from March 1 through June 30.
- After construction is complete, the Project Sponsor will monitor the recovery of the 1.5 acres for five years to assess the habitat use and re-sedimentation of the modified river bottom. Monitoring of this area will be conducted in consultation with the USACE, NMFS, and NYSDEC.

f. Proposed Disposal Site Determination –

(1) Mixing Zone Determination – The areas immediately adjacent to the placement of fill in Penhorn Creek for the installation of the culvert extensions, and within the footprint of the embankment and gravel access roads in the wetlands and adjacent to the 1.5-acre low-cover area within the Hudson River will serve as an appropriate mixing zone. It is expected that sediments resuspended as a result of the placement of fill will be minor, temporary, localized, and will settle quickly upon cessation of sediment disturbing activities.

(2) Determination of Compliance with Applicable Water Quality Standards – The Proposed Project will not adversely affect the ability for Penhorn Creek and the Hudson River to meet applicable water quality standards.

(3) Potential Effects on Human Use Characteristics –

(a) Municipal and Private Water Supplies – The project will have no effect on municipal or private water supplies west of the Palisades, in the Hudson River, or in the New York portion of the Project.

(b) Recreational and Commercial Fisheries – The New Jersey portion of the Project site does not contain recreational or commercial fisheries resources. The construction zone that will be established in the Hudson River around the low-cover area will be approximately 750 feet long and 300 feet wide and will consist of an enclosed area surrounded by barges with construction equipment. Measures will be taken during construction to warn maritime traffic, including recreational boaters, of the construction zone and to ensure the continued safety of boaters. Therefore, there will be minimal, temporary effects on recreational and commercial boating on the Hudson River that will not adversely affect the river's usefulness as a recreational or commercial fisheries resource during construction. Once construction is completed, there will be no substantive change to the river that would affect fisheries. The low-cover area is expected to be covered with sediments over time that forage species can colonize.

(c) Water-Related Recreation –
Penhorn Creek is not used for water-related recreation. As stated above, the construction zone around the low-cover area in the Hudson River will be approximately 750 feet long and 300 feet wide and effects on recreational activities on the Hudson River will be minimal and temporary, and will not adversely affect the river's usefulness as a recreational resource during construction. The whole width of the Hudson River is navigable and used by small human-powered watercraft including canoes and kayaks, and there are several launches in the Project vicinity. After construction of the Project is complete and the cofferdams removed, there will be no permanent impact to water-related recreation on the river.

(d) Aesthetics – During construction of the Project, construction activity will be visible in the Meadowlands in the area between County Road and Tonnelle Avenue. The activity will be visible from the parking lots and loading docks at the rear of the buildings during the construction of the new tracks and accompanying infrastructure. The Project will include a small work zone within the Hudson River for a period of about 15 months. This work will be constructed in three

stages, each affecting an area of the river about 400 feet long (from east to west) and 320 feet wide (from north to south). At the closest point, the work zone will be about 700 feet from the Manhattan shoreline. This construction zone will include an in-water work zone enclosed by a cofferdam (barrier) extending above the water line, and barges anchored around the barrier from which work will be conducted. Viewed from the shoreline or from nearby boats, this work zone will appear similar to other equipment barges periodically moored along the Manhattan shoreline. Given the large expanse of the Hudson River and the distance from the shore, this temporary construction activity will not notably obstruct views from New Jersey or Manhattan.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves – Four parks (which all received Green Acres funding) are located in proximity to the Project's Hoboken construction staging site or local truck routes: the 19th Street Basketball Courts; 1600 Park; Harborside/Hoboken Cove Park; and the Hudson River Waterfront Walkway. Potential impacts to these parks include increased noise levels from construction and increased construction vehicle traffic. Impacts from increased noise levels will generally be temporary (noise impacts to the 19th Street Basketball Courts may occur over four years) and will not constitute adverse impacts to these parks. The Proposed Project's tunnel alignment will pass directly beneath three open spaces that are part of NJDEP's Green Acres Program: 1600 Park, Harborside/Hoboken Cove Park, and the Hudson River Waterfront Walkway. For these parks, subsurface easements must be obtained from the City of Hoboken, and approval of the subsurface easements must be obtained in accordance with the Green Acres Program. The acquisition of the easements will not have an impact on the public's access to or use of these parks. Coordination with the NJDEP Green Acres Program will occur during final design of the Proposed Project to initiate the Green Acres approval process. There are two publicly accessible open spaces near the Proposed Project alignment and construction activities in New York, Hudson River Park and the High Line. The Project will have a direct impact on Hudson River Park, as the Project's tunnel alignment will pass directly beneath the park, and portions of the park will be used for construction activities. A small area of the park will be closed temporarily during construction but all park features would continue to be accessible. Construction noise and views of construction equipment will be buffered by temporary barriers installed along the limits of construction staging. No physical disruption to the High Line will occur during construction of the Preferred Alternative. The new tunnel route would pass beneath the High Line within the concrete casing currently being constructed along the southern side

of the West Side Yard, and construction activity directly beneath the High Line will occur entirely within the concrete casing structure. One portion of the High Line may experience elevated levels of noise between Monday and Friday as a result of construction, but the High Line is more heavily used on weekends, and visitors will consequently be able to enjoy the remainder of the area during the week. The Preferred Alternative's Twelfth Avenue fan plant will be located across Route 9A from Hudson River Park and across West 30th Street from the High Line. This tall new structure (its maximum height will be approximately 150 feet, less than the height of other proposed development projects in the immediate vicinity) will change the visual context of the immediate area but will be one of many new tall buildings being developed in the New York study area.

g. Determinations of Cumulative Effects on the Aquatic Ecosystem – Cumulative effects on the aquatic ecosystem as a result of the Proposed Project include the loss of 7.566 acres of emergent wetlands and associated open water habitats along the existing NEC between Allied Interlocking and the new tunnel portal, loss of 0.439 acres of emergent wetlands in Hoboken, temporary impacts to 4.307 acres of emergent wetlands and associated open water habitats, and alteration of the sediment characteristics within the 1.5-acre low cover area in the Hudson River. The permanent loss of 8.005 acres of wetlands will mitigated through the purchase of wetland mitigation credits, as outlined in the "Draft Conceptual Mitigation Plan." The Proposed Project will result in a temporary resuspension of sediments during construction in both Penhorn Creek and the Hudson River (during installation and removal of cofferdams) that could temporarily affect water chemistry; however, these increases in suspended sediment will be minor, temporary, localized, and will dissipate upon cessation of sediment disturbing activities. Additionally, impacts relating to suspended sediment will be minimized through the use of sediment and erosion control measures, such as silt fences in the Penhorn Creek area. The installation of culverts along in the New Jersey portion of the Project area is designed to minimize adverse impacts to the hydrology of wetlands within the study area and Penhorn Creek. Upon completion of construction, the 1.5-acre low cover areas in the Hudson River will be available as hard bottom habitat for encrusting organisms tolerant of soilcrete, providing some foraging habitat for benthic feeders once the area is colonized. The 0.8 acres of soilcrete that will be approximately level with the surrounding riverbed will, over time, accumulate sediments that will be deposited over the soilcrete at sedimentation rates typical of the Lower Hudson River, possibly providing some soft bottom habitat for benthic invertebrates.

h. Determinations of Secondary Effects on the Aquatic Ecosystem –The Proposed Project has the potential to result in indirect impacts to the NYSW wetland mitigation site and adjacent wetlands due to changes in hydrology and hydraulics associated with the loss of wetland area and change in the discharge

point from the wetland mitigation site to the adjacent wetland. The Project sponsor will conduct additional evaluations to confirm that the outlet structure for the wetland mitigation site is designed to minimize hydraulic impacts to the wetland mitigation site and the North Bergen CSO outfall 011A, and the functioning of the wetland with respect to water quality and minimizes impacts to the wetland receiving the discharge from the mitigation site

The 12,300 square feet (0.28 acres) of emergent wetlands that will be located beneath the southern edge of the viaduct will be separated from the viaduct by between 18 and 19 feet. This separation distance combined with the southern exposure, will allow sufficient sunlight to reach the wetland during periods of the day to support the existing plant community and minimize secondary effects to these wetlands.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation – No adaptations of the Section 404(b)(1) Guidelines were made within this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem – The §404(b)(1) Guidelines prohibit discharges of dredged or fill material into WOTUS if a practicable alternative to the proposed discharge exists that would have less adverse impacts on the aquatic ecosystem, including wetlands, as long as the alternative does not have other significant adverse environmental impacts (40 CFR § 230.10 (a)). An alternative is considered practicable if it is available and capable of being implemented after considering cost, existing technology, and logistics in light of overall project purpose. This section analyzes practicable alternatives to the proposed action.

(1) Alternative 1 – No Action Alternative – Under the No Action Alternative no new passenger rail tunnel across the Hudson River would be constructed. The No Action Alternative would only implement those projects that are necessary to keep the existing North River Tunnel in service and provide continued maintenance as necessary to address ongoing deterioration and maintain service. The No Action Alternative is not a practicable alternative because it does not preserve the current functionality of passenger rail service between New Jersey and PSNY, does not repair the deteriorating North River Tunnel, and does not strengthen the NEC's resiliency to support reliable passenger rail service by providing redundant capability under the Hudson River.

(2) Alternative 2 – The Proposed Project – In order for the Proposed Project to meet the Project's purpose and need, it must maintain current levels of train service on the NEC for Amtrak and NJ TRANSIT while the North River Tunnel is being rehabilitated. To do this, the alignment of the

Proposed Project's new tunnel is constrained by a number of geographic considerations, which limit the potential project alignment at its western and eastern ends, where it must connect to the NEC and the existing tracks at PSNY. Several tunnel alignment options were considered within these geographic constraints to establish a "least environmentally damaging practicable alternative." This alternative is the Proposed Project, which includes a new two-track tunnel beneath the Palisades and Hudson River connecting the existing NEC in the New Jersey Meadowlands to the existing PSNY approach tracks in New York. This alternative will have a ventilation shaft, associated fan plant building, and construction staging area on a site just east of the Palisades in Hoboken, New Jersey (with small portions of the site also located in Union City and Weehawken, New Jersey). Requirements for the Proposed Project that were analyzed prior to deciding on a Preferred Alternative are discussed below.

Meadowlands

The Project must be located within the New Jersey Meadowlands, because it must connect to the NEC, which is already located on a berm within the New Jersey Meadowlands. The track connections will be accomplished in a new interlocking (a system of switches, signals, and track connections that connects multiple tracks, so that trains can move between the tracks) that begins just east of County Road and Secaucus Junction Station in Secaucus, New Jersey. Within the Meadowlands, the new track will be located largely on a berm, with segments on bridges and a long viaduct. The western end of the Meadowlands section will be closest to the existing NEC berm, since this is the area where tracks will begin to diverge from the NEC. In this area, the widened embankment will be supported by a retaining wall along its southern edge because the tracks will be close to adjacent businesses and use of a retaining wall for a widened embankment will reduce the land area needed for the new tracks. Beyond the section supported by the retaining wall, approximately 1,000 feet of the new alignment will be supported on a viaduct. A viaduct is proposed here rather than a retaining wall or berm, because the proximity of adjacent businesses limits the space available for new right-of-way and the location of Penhorn Creek and the need for new replacement drainage features in this portion of the right-of-way means that a berm is not practicable.

For the eastern, curved portion of the surface alignment, the tracks will be located on a sloped embankment curving away from the NEC to connect to the new tunnel portal location, which is approximately 600 feet south of the existing North River Tunnel portal. The length of the alignment where this widened embankment is proposed is approximately 1,910 linear feet, and will include the rail right-of-way and an adjacent service road that will provide access during construction and serve as a vital fire/life/safety road following construction during the operational phase

of the railroad. This curved portion of the new alignment that will cross through an area of wetlands, including the northern portion of the established and federally approved New York Susquehanna & Western (NYSW) Railway's wetland mitigation site.

A widened embankment is proposed in this section rather than another structure, because of the substantial increased cost associated with a viaduct structure. As the new surface alignment curves from the eastern end of the proposed viaduct segment toward the new tunnel's portal east of Tonnelle Avenue, the distance between the new tracks increases from the existing NEC. The widened embankment will be more easily constructed than a viaduct, as deeper structures such as piles and/or retaining walls (due to increased depth to bedrock) will not be required. Even considering a 12-month pre-loading period for fill material, the widened embankment will also involve a much shorter overall construction duration. As a result of these considerations, a widened embankment will cost considerably less than a viaduct in this location, with the estimated cost for the embankment of $22.1 million and the estimated cost for a viaduct of $45.4 million, a $23.3 million difference. A viaduct would reduce impacts to wetlands by approximately 2.6 acres, but the additional cost of this reduction would be substantial.

Hoboken

The alternatives analysis conducted in coordination with the Project's NEPA review considered multiple alignments for the tunnel that would in turn have different ventilation shaft and construction staging area locations. The alignment selected best met the Project's goals and objectives because of its shorter time to implement and smaller impact on the environment and surrounding community.

The selected alignment option will result in impacts to a 0.439-acre wetland area in Hoboken, located in a drainage ditch adjacent to the north side of the Hudson-Bergen Light Rail right-of-way. This area will be filled for use as part of the Project's construction staging area. Once construction has been completed, the construction access road will either be removed or it will remain in place for maintenance access. Other alignment options that avoided this wetland area would result in greater environmental and community impacts in other respects.

c. Compliance with Applicable State Water Quality Standards – The proposed placement of materials is expected to comply with the conditions anticipated to be issued by the NYSDEC and the NJDEP under Section 401 water quality certification for the project.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act – The proposed placement of materials is

not expected to violate the toxic effluent standards of Section 307 of the Clean Water Act.

e. Compliance with Endangered Species Act of 1973 –The proposed placement of materials will be in compliance with the Endangered Species Act. The Project will comply with measures that may be required as a result of consultation with NMFS in accordance with Section 7 of the Endangered Species Act. There are no Federally-listed species under the jurisdiction of the USFWS within the project area.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972 – The Proposed Project has no potential to adversely affect any designated marine sanctuaries.

g. Evaluation of Extent of Degradation of the Waters of the United States –

(1) Significant Adverse Effects on Human Health and Welfare – The placement of materials for the Proposed Project will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems – The placement of materials for the Proposed Project will not result in significant adverse effects on life stages of aquatic life and other wildlife. The permanent loss of 8.005 acres of emergent wetlands as a result of the Proposed Project along the existing NEC and in Hoboken will be mitigated through the purchase of wetland mitigation credits within the same HUC-08 watershed. The placement of materials in the Hudson River will result in a permanent change from soft bottom to hard bottom in the 1.5-acre low cover area. The 0.7 acres that will extend between 1 and 2 feet above the mudline will be monitored for five years after construction to assess its habitat use and re-sedimentation; this monitoring will occur in consultation with USACE, NMFS, and NYSDEC. Fill placed within the 0.44-acre emergent wetland impacted by the construction access road will be removed following construction, the area restored to the original drainage topography and stabilized with suitable native plant species.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity and Stability – The permanent loss of 8.005 acres of emergent wetlands as a result of the Proposed Project will be mitigated through the purchase of wetland mitigation credits within the same HUC-08 watershed. The placement of materials in the Hudson River will result in a permanent change from soft bottom to hard bottom in the 1.5-acre low cover area. The 0.7-acre portion of this low cover area that extends

above the mudline will be monitored for five years after construction to assess its recovery as fish foraging habitat; this monitoring will occur in consultation with USACE, NMFS, and NYSDEC. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction. With inclusion of appropriate mitigation and enhancement measures, the placement of materials for the Proposed Project will not result in significant adverse effects on aquatic ecosystem diversity, productivity, and stability.

(4) Significant Adverse Effects on Recreational, Aesthetic, and Economic Values – The placement of materials for the Proposed Project will not result in significant adverse effects on recreational, aesthetic, and economic values.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem – Proposed measures are as follows:
-Design of culverts within the surface alignment are designed to avoid changes in hydrology, and therefore to minimize secondary wetland impacts due to changes in hydrology.
-Development and implementation of mitigation for direct and indirect wetland impacts in consultation with NJDEP and USACE, likely including the purchase of mitigation credits from an approved mitigation bank within the same watershed unit as the Project site.
-Implementation of erosion and sediment control measures (e.g., hay bales, silt fences, and post-construction stabilization with seeding and mulch, straw or hay) set forth in an SPPP and site-specific soil erosion and sediment control plan.
-Use of low ground-pressure vehicles and marsh matting within the Meadowlands where feasible and where required by regulatory agencies.
-Restoration of disturbed wetlands back to original topography and stabilize with wetland vegetation, following the completion of construction.
-Inclusion of a culvert within the small wetland area in Hoboken that would be affected by the construction haul route.
-Following construction, removal of the Hoboken haul route and restoration of topography and stabilization of soil with wetland vegetation in accordance with the SPPP.
-Implementation of erosion and sediment control measures in accordance with the SPPP to minimize the potential for sedimentation into Penhorn Creek.
-During installation of culvert extensions in Penhorn Creek, use of best management measures developed in consultation with NJDEP to minimize sediment resuspension (e.g., cofferdam or turbidity curtain) while at the same time maintaining flow within the creek. To protect the anadromous species spawning run in Penhorn Creek, no in-water or sediment generating activities and pile driving will occur from March 1 through June 30.
-In the Meadowlands portion of the Project alignment (west of the Conrail / NYSW freight right-of-way), limit vegetation clearing and/or initial placement of fill material to the period between October and March (i.e., prior to or after the breeding season, which is April through July), to prevent birds from

attempting to breed where additional construction activity would later occur.
-Development and implementation of a transplantation plan for the floating marsh-pennywort population in consultation with NJDEP for implementation prior to initiating construction activities affecting Penhorn Creek.
-Implementation of stormwater BMPs for construction of the Hoboken fan plant.
-Use of a comprehensive stormwater management system to treat Project runoff and meet all local and State requirements prior to discharge to existing drainage systems.
-Use of cofferdams in the low-cover area to contain jet grouting activities, in accordance with best management practices for minimizing silt and as recommended by NMFS for the protection of sturgeon.
-Installation and removal of steel sheetpile in the Hudson River low-cover area with a vibratory hammer.
-Limiting sheetpile driving installation and removal so that no pile driving installation occurs between November 1 through April 30, to protect overwintering striped bass and winter flounder spawning. Consultation with NMFS is ongoing with respect to measures to minimize construction-related impacts to EFH due to loss of forage, and to anadromous fish species during migration.
-Limiting any in-water or sediment generating activities and pile driving so that these activities do not occur from March 1 through June 30 to protect anadromous species spawning run in Penhorn Creek.
-In order to minimize potential behavioral impacts to migrating subadult and adult Atlantic sturgeon, sequencing cofferdam installation so that it commences in May in the section closest to the shore and moves outward toward the channel.
- As compensation for the change in the nature and elevation of bottom habitat within the 0.7 acres, the Project Sponsor will monitor this area, in coordination with the USACE, NMFS, and the NYSDEC, for five years to assess its recovery as fish foraging habitat. The Project Sponsor will also monitor the recovery of the remaining 0.8 acres of soilcrete for five years post-construction.

i. <u>On the Basis of the Guidelines. the Proposed Disposal Site(s) for the Discharge of Dredged or Fill Material (specify which) is (select one)</u> –

(1) Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

REFERENCES

Briggs, P. T. and J. R. Waldman. 2002. Annotated list of fishes reported from the marine waters of New York. Northeastern Naturalist. 9: 47-80.

DeMent, S.H., J.J. Chisolm, Jr., J.C. Barber, and J.D. Strandberg. 1986. Lead exposure in an "urban" peregrine falcon and its avian prey. Journal of Wildlife Diseases 22:238-244.

Geyer, W.R. 1995. Final Report: Particle trapping in the lower Hudson Estuary. Submitted to the Hudson River Foundation, New York, NY.

Geyer, W.R., and R. Chant. 2006. The Physical Oceanography Processes in the Hudson River Estuary. In: J.S. Levinton and J.R. Waldman (eds.) The Hudson River Estuary. Cambridge University Press, New York, NY.

Moran, M.A., and K.E. Limburg. 1986. The Hudson River Ecosystem. In: K.E. Limburg, M.A. Moran, and W.H. McDowell (eds.) The Hudson River Ecosystem. Springer-Verlag, New York, NY. pp. 6-40.

National Marine Fisheries Service (NMFS). 2016. Letter from Mark Murray-Brown, NMFS, to Sandy Collins, AKRF, re response to request for information on threatened and endangered species. December 8, 2016.

National Oceanic and Atmospheric Administration (NOAA). 2013. Current station locations and ranges. Available https://www.tidesandcurrents.noaa.gov/currents10/tab2ac4.html. Revised October 15, 2013.

New York State Department of State (NYSDOS). 1992. Significant Coastal Fish and Wildlife Habitats Program: A part of the New York Coastal Management Program and New York City's approved Waterfront Revitalization Program.

Rejt, L. 2001. Feeding activity and seasonal changes in prey composition of urban Peregrine Falcons Falco peregrinus. Acta Ornithologica 36:165–169.

Smith, C.L., ed. 1992. Estuarine Research in the 1980s: The Hudson River Environmental Society Seventh Symposium on Hudson River Ecology.

United States Army Corps of Engineers (USACE). 2016. Report of Channel Conditions; Hudson River Channel, New York. April 13, 2016.

White, C.M, N.J. Clum, T.J. Cade, and W.G. Hunt. 2002. Peregrine Falcon (Falco peregrinus). In The Birds of North America, No. 660 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.