August 2010

CTDEP INLAND WATER RESOURCES DIVISION

Including:
INLAND WETLANDS & WATERCOURSES PERMIT
FLOOD MANAGEMENT CERTIFICATION
STREAM CHANNEL ENCROACHMENT LINES PERMIT
WATER QUALITY CERTIFICATION (SECTION 401)
SECTION 404

New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain
State Project No. 171-305

Prepared for:
Connecticut Department of Transportation

Prepared by:
Baker Engineering
Fitzgerald & Halliday, Inc.

COPY

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Central Permit Processing Unit
79 Elm Street
Hartford, CT 06106-5127

DEPARTMENT OF ENVIRONMENTAL PROTECTION
CENTRAL PERMIT PROCESSING UNIT
AUG 06 2010
RECEIVED BY:

RECEIVED
AUG 12 2010
INLAND WATER RESOURCES DIVISION

CPPU USE ONLY
App #:
Doc #:
Check #: No fee req'd

Permit Application Transmittal Form

Please complete this transmittal form in accordance with the instructions in order to ensure the proper handling of your application(s) and the associated fee(s). Print legibly or type.

Part I: Applicant Information:

- **If an applicant is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, applicant's name shall be stated **exactly** as it is registered with the Secretary of State.*
- *If an applicant is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).*

Applicant: Connecticut Department of Transportation
Mailing Address: 2800 Berlin Turnpike
City/Town: Newington State: CT Zip Code: 06131-7546
Business Phone: 860-594-2931 ext.: n/a Fax: 860-594-3028
Contact Person: Mark W. Alexander Phone: 860-594-2132 ext. n/a
E-Mail: mark.w.alexander@ct.gov
Applicant (check one): ☐ individual ☐ *company ☐ federal gov't ☒ state agency ☐ municipality
*If a company, list company type (e.g., corporation, limited partnership, etc.):
☐ Check if any co-applicants. If so, attach additional sheet(s) with the required information as supplied above.

Please provide the following information to be used for *billing purposes only*, if different:
Company/Individual Name:
Mailing Address:
City/Town: State: Zip Code:
Contact Person: Phone: ext.

Part II: Project Information

Brief Description of Project: *(Example: Development of a 50 slip marina on Long Island Sound)*
CT State Project No. 171-305 New Britain to Hartford Busway
CT State Project No. 93-166 Replacement of Route 175 Bridge over Abandoned Railroad
Location (City/Town): New Britain, Newington, West Hartford, Hartford

Other Project Related Permits (*not* included with this form):

Permit Description	Issuing Authority	Submittal Date	Issuance Date	Denial Date	Permit #
Section 404	ACOE				
Stormwater General	CTDEP				

Part III: Individual Permit Application and Fee Information

New, Mod. or Renew	Individual Permit Applications	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
	AIR EMISSIONS				
	New Source Review	$940.00			1 + 0
	Title V Operating Permits	none			1 + 0
	Title IV	none			1 + 0
	Clean Air Interstate Rule (CAIR)	none			1 + 0
	WATER DISCHARGES				
	To Groundwater	$1300.00			1 + 1
	To Sanitary Sewer (POTW)	$1300.00			1 + 1
	To Surface Water (NPDES)	$1300.00			1 + 2
	INLAND WATER RESOURCES-multiple permits 1 + 6 total copies				
	Dam Construction	none			1 + ~~6~~ 3 **
N	Flood Management Certification	none	1	0	1 + ~~6~~ 3
N	Inland 401 Water Quality Certification	none	1	0	1 + ~~6~~ 3
N	Inland Wetlands and Watercourses	none	1	0	
N	Stream Channel Encroachment Lines	★	1	0	
	Water Diversion	★			1 + 5
	OFFICE OF LONG ISLAND SOUND PROGRAMS				
	Certificate of Permission	$375.00			1 + 3
	Coastal 401 Water Quality Certification	none			1 + 3
	Structures and Dredging/Tidal Wetlands	$660.00			1 + 3
	WASTE MANAGEMENT				
	Aerial Pesticide Application	★			1 + 2
	Aquatic Pesticide Application	$200.00			1 + 0
	CGS Section 22a-454 Waste Facilities	★			1 + 1
	Hazardous Waste Treatment, Storage and Disposal Facilities	★			1 + 1
	Marine Terminal License	$125.00			1 + 0
	Stewardship	$4000.00			1 + 1
	Solid Waste Facilities	★			1 + 2
	Waste Transportation	★			1 + 0
		Subtotal ➡	4	NONE	
	GENERAL PERMITS and AUTHORIZATIONS	Subtotals Page 3 ➡	0	NONE	
	Enter subtotals from Part IV, pages 3 & 4 & 5 of this form	Subtotals Page 4 ➡	0	NONE	
		Subtotals Page 5 ➡	0	NONE	
		TOTAL ➡	4	NONE	
	☐ Indicate whether municipal discount or state waiver applies. Less Applicable Discount ➡			STATE	
		AMOUNT REMITTED ➡		NONE	

Check # ➡ _____ Check or money order should be made payable to: "Department of Environmental Protection"

★ See fee schedule on individual application.

** per Jeff Caiola IWRD

Part IV: General Permit Registrations and Requests for Other Authorizations Application and Fee Information

✓	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
	AIR EMISSIONS				
☐	Limit Potential to Emit from Major Stationary Sources of Air Pollution	$5000.00			1 + 0
☐	Ionizing Radiation Registration	$200.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	WATER DISCHARGES				
☐	Domestic Sewage	$500.00			1 + 0
☐	Food Processing Wastewater	$500.00			1 + 0
☐	Groundwater Remediation Wastewater to a Sanitary Sewer	$500.00			1 + 0
☐ ☐	Groundwater Remediation Wastewater to a Surface Water Registration Only Approval of Registration by DEP	 $625.00 $1250.00			1 + 0
☐ ☐	Hydrostatic Pressure Testing Wastewater Registration Only Approval of Registration by DEP (natural gas pipelines)	 $625.00 $1250.00			1 + 0
☐ ☐	Miscellaneous Discharges of Sewer Compatible Wastewater Flow < 5,000 gpd and fire sprinkler system testwater Flow > 5,000 gpd	 $500.00 $1000.00			1 + 1
☐	Non-Contact Cooling and Heat Pump Water (Minor)	$625.00			1 + 1
☐	Photographic Processing Wastewater (Minor)	$100.00			1 + 0
☐	Printing & Publishing Wastewater (Minor) Flow < 40 gpd	$500.00 $100.00			1 + 0
☐	Stormwater Associated with Commercial Activities	$500.00			1 + 0
☐	Stormwater Associated with Industrial Activities	$500.00			1 + 0
☐ ☐	Stormwater & Dewatering Wastewaters-Construction Activities 5 – 10 acres > 10 acres	 $625.00 $1250.00			1 + 0
☐	Stormwater from Small Municipal Separate Storm Sewer Systems (MS4)	$250.00			1 + 0
☐	Swimming Pool Wastewater - Public Pools and Contractors	$500.00			1 + 0
☐	Tumbling or Cleaning of Parts Wastewater (Minor)	$1000.00			1 + 1
☐ ☐	Vehicle Maintenance Wastewater Registration Only Approval of Registration by DEP	 $500.00 $1000.00			1 + 0
☐	Water Treatment Wastewater	$625.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to POTW	$1500.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to Surface Water	$1500.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to Groundwater	$1500.00			1 + 0
☐	Other, (please specify):				
	Note: Carry subtotals over to Part III, page 2 of this form.	Subtotal ➡	0	NONE	

★★ Contact the specific permit program for this information (Contact numbers are provided in the instructions).

Part IV: General Permit Registrations and Requests for Other Authorizations (continued)

✓	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fee	Original + Required Copies
	AQUIFER PROTECTION PROGRAM				
☐	Registration for Regulated Activities	$625.00			1 + 0
☐	Permit Application to Add a Regulated Activity	$1250.00			1 + 0
☐	Exemption Application from Registration	$1250.00			1 + 0
	INLAND WATER RESOURCES				
☐	Dam Safety Repair and Alteration	$1000.00			1 + 2
☐	Diversion of Water for Consumptive Use: Reauthorization Categories	$1000.00			1 + 2
☐	Diversion of Water for Consumptive Use: Authorization Required	$2500.00			1 + 5
☐	Diversion of Water for Consumptive Use: Filing Only	$1500.00			1 + 4
☐	Habitat Conservation	$1000.00			1 + 2
☐	Lake, Pond and Basin Dredging	$1000.00			1 + 2
☐	Minor Grading	$1000.00			1 + 2
☐	Minor Structures	$1000.00			1 + 2
☐	Utilities and Drainage	$1000.00			1 + 2
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	OFFICE OF LONG ISLAND SOUND PROGRAMS				
☐	4/40 Docks	$700.00			1 + 1
☐	Beach Grading	$100.00			1 + 1
☐	Coastal Remedial Activities Required by Order	$700.00			1 + 1
☐	Marina and Mooring Field Reconfiguration	$700.00			1 + 1
☐	Non-harbor Moorings	$100.00			1 + 1
☐	Osprey Platforms and Perch Poles	none			1 + 1
☐	Pump-out Facilities (no fee for Clean Vessel Act grant recipients)	$100.00			1 + 1
☐	Removal of Derelict Structures	$100.00			1 + 1
☐	Residential Flood Hazard Mitigation	$100.00			1 + 1
☐	Swim Floats	$100.00			1 + 1
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	Note: Carry subtotals over to Part III, page 2 of this form.	Subtotal	0	NONE	

★ See fee schedule on registration/application. ★★ Contact the specific permit program for this information.

Part IV: General Permit Registrations and Requests for Other Authorizations (continued)

✓	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fee	Original + Required Copies
	WASTE MANAGEMENT				
☐	Addition of Grass Clippings at Registered Leaf Composting Facilities	$500.00			1 + 0
☐	Asbestos Disposal Authorization	$300.00			1 + 0
	Certain Recycling Facilities				
☐	Drop-site Recycling Facility	$200.00			1 + 0
☐	Limited Processing Recycling Facility	$500.00			1 + 0
☐	Recyclables Transfer Facility	$500.00			1 + 0
☐	Single Item Recycling Facility	$500.00			1 + 0
	Contaminated Soil and/or Staging Management (Staging/Transfer)				
☐	Registration Only	$250.00			1 + 0
☐	Approval of Registration by DEP	$1500.00			1 + 0
☐	Connecticut Solid Waste Demonstration Project	$1000.00			1 + 0
☐	Disassembling Used Electronics	$400.00			1 + 0
☐	Leaf Composting Facility	none			1 + 1
☐	Municipal Transfer Station	$800.00			1 + 1
☐	One Day Collection of Certain Wastes and Household Hazardous Waste	$1000.00			1 + 0
☐	Special Waste Authorization	$660.00			1 + 0
☐	Storage and Distribution of Two (2) Inch Nominal Tire Chip Aggregate	$500.00			1 + 0
☐	Storage and Processing of Asphalt Roofing Shingle Waste and/or Storage and Distribution of Ground Asphalt Aggregate	★			1 + 0
☐	Storage and Processing of Scrap Tires for Beneficial Use	$1000.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	REMEDIATION				
☐	In Situ Groundwater Remediation: Enhance Aerobic Biodegradation	★			1 + 2
	Note: Carry subtotals over to Part III, page 2 of this form. Subtotal ➡		0	NONE	

★See fee schedule on registration/application. ★★Contact the specific permit program for this information.

In conformance with the ADA, individuals with disabilities who need information in an alternative format to allow them to benefit and/or participate in the agency's programs and services, should call 860-424-3051 or 860-418-5937, or e-mail Marcia Z. Bonitto, ADA Coordinator at Marcia.Bonitto@ct.gov.

COPY

Permit Application for Programs Administered by the Inland Water Resources Division

DEPARTMENT OF ENVIRONMENTAL PROTECTION
CENTRAL PERMIT PROCESSING UNIT
RECEIVED BY JUN 0 6 2010

DEP USE ONLY
APP #
DOC #
CHECK # No fee req'd

Please complete this application form in accordance with the instructions (DEP-IWRD-INST-100) in order to ensure the proper handling of your application. Print or type unless otherwise noted. You must submit the *Permit Application Transmittal Form* (DEP-APP-001) and the initial fee along with this form.

Part I: Application Type

Check the appropriate box identifying the application type.

This application is for (check one):	Please identify any previous or existing permit/authorization/registration number in the space provided.
☒ A *new* application	Existing permit/authorization/registration number:
☐ A *renewal* of an existing permit	
☐ A *modification* of an existing permit	Expiration Date:

Part II: Permit Type and Fee Information

Please note: effective August 21, 2003, the application fees for the programs administered by the Inland Water Resources Division have increased as listed in the following table. The fee for municipalities is 50% of the listed rates.

Type of Permit (check *all* that apply):	Fee to submit with application:
☒ **Inland Wetlands & Watercourses** CGS Sec. 22a-36 et seq.	none
☐ **Dam Construction** *CGS Sec. 22a-403*	none
☒ **401 Water Quality Certificate** *33 U.S.C. 1341*	none
☒ **Flood Management Certification** *CGS Sec. 25-68(b) - (h)*	none
Stream Channel Encroachment *CGS Sec. 22a-342*	
☐ No change in grade and no construction of above-ground structures	$470.00
☒ A change in grade and no construction of above-ground structures	$940.00
☐ A change in grade and above-ground structures or buildings	$4,000.00
Water Diversion: Consumptive Use *CGS Sec. 22a-372(e)*	
☐ Withdrawal > 0.05 and < 0.5 mgd	$2,050.00
☐ Withdrawal ≥ 0.5 and < 2.0 mgd	$4,000.00
☐ Withdrawal ≥ 2.0 mgd	$6,250.00
Water Diversion: Nonconsumptive Use *CGS Sec. 22a-372(e)*	
☐ Watershed < 0.5 sq mi	$2,050.00
☐ Watershed ≥ 0.5 sq mi and < 2.0 sq mi	$4,000.00
☐ Watershed ≥ 2.0 sq mi	$6,250.00

Part III: Applicant Information

1. Fill in the name of the applicant(s) as indicated on the *Permit Application Transmittal Form* (DEP-APP-001):

   Applicant: **Thomas Maziarz – Connecticut Department of Transportation**

   Phone: **860-594-2001** ext. Fax: **860-594-3028**

   ☐ Check here if there are co-applicants. If so, label and attach additional sheet(s) with the required information to this sheet.

2. Applicant's interest in property at which the proposed activity is to be located:

   ☒ site owner ☐ option holder ☐ lessee

   ☐ easement holder ☐ operator ☐ other (specify):

3. List primary contact for departmental correspondence and inquiries, if different than the applicant.

   Name: Connecticut Department of Transportation

   Mailing Address: **2800 Berlin Turnpike, P.O. Box 317546**

   City/Town: **Newington** State: **CT** Zip Code: **06131-7546**

   Business Phone: **860-594-2931** ext. **n/a** Fax: **860-594-3028**

   Contact Person: **Mark W. Alexander** Title: **Assistant Planning Director**

4. List attorney or other representative, if applicable:

   Firm Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Attorney:

5. Facility or Property Owner, if different than the applicant:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Contact Person: Title:

   Home address of owner (for Inland Wetlands applications only):

   Mailing Address:

   City/Town: State: Zip Code:

   Home Phone:

Part III: Applicant Information (continued)

6. List any engineer(s) or other consultant(s) employed or retained to assist in preparing the application or in designing or constructing the activity. ☒ Check here if additional sheets are necessary, and label and attach them to this sheet.
   Name: **Baker Engineering**

   Mailing Address: **500 Enterprise Drive, Suite 2B**

   City/Town: **Rocky Hill** State: **CT** Zip Code: **06067**

   Business Phone: **860-563-3044** ext. Fax: **860-529-6627**

   Contact Person: **Antonio Morelli** Title: **Project Manager**

   Service Provided: Program Management, Engineering Design

Part III: Applicant Information (continued)

6. Additional engineer(s) or other consultant(s) employed or retained to assist in preparing the application or in designing or constructing the activity.

Name: **URS Corporation**

Mailing Address: **500 Enterprise Drive, Suite 3B**

City/Town: **Rocky Hill** State: **CT**Zip Code: **06067**

Business Phone: **860 529-8882**ext. Fax: **860 529-3991**

Contact Person: **Thomas Walb, PE** Title:

Service Provided: **Engineering Design**

Name: **Close, Jensen, and Miller**

Mailing Address: **1137 Silas Deane Highway**

City/Town: **Wethersfield** State: **CT**Zip Code: **06109**

Business Phone: **860 563-9375**ext. Fax: **860 721-1802**

Contact Person: **Cory Garro, PE** Title:

Service Provided: **Engineering Design**

Name: **Ammann-Whitney**

Mailing Address: **96 Morton Street**

City/Town: **New York** State: **NY**Zip Code: **10014**

Business Phone: **212 462-8523**ext. Fax:

Contact Person: **Samia Abdou, PE** Title:

Service Provided: **Engineering Design**

Name: **Washington Group (URS Corporation)**
Mailing Address: **500 Enterprise Drive, Suite 3B**
City/Town: **Rocky Hill** State: **CT** Zip Code: **06067**
Business Phone: **860 529-8882** ext. Fax: **860 529-3991**
Contact Person: **Robert Aloise, PE** Title:
Service Provided: **Engineering Design**

Name: **HW Lochner Inc.**
Mailing Address: **2110 Silas Deane Highway**
City/Town: **Rocky Hill** State: **CT** Zip Code: **06067**
Business Phone: **860 513-4003** ext. Fax: **860 513-4006**
Contact Person: **Richard Bray, PE** Title:
Service Provided: **Engineering Design**

Name: **SEA Consultants, Inc. (Kleinfelder)**
Mailing Address: **200 Corporate Place**
City/Town: **Rocky Hill** State: **CT** Zip Code: **06067**
Business Phone: **860 258-7133** ext. Fax: **860 563-6744**
Contact Person: **Al Bisacky, PE, LEED AP** Title:
Service Provided: **Engineering Design- Stations**

Name: **Fitzgerald and Halliday, Inc.**
Mailing Address: **72 Cedar Street**
City/Town: **Hartford** State: **CT** Zip Code: **06106**
Business Phone: **860 247-7200** ext. Fax: **860 247-7206**
Contact Person: **Linda Perelli Wright** Title:
Service Provided: **Application Preparation**

Part IV: Site Information

1. **Site Location:**

2. a. Name of facility, if applicable: New Britain-Hartford Busway (proposed)

Street Address or Description of Location: **Rail corridor in New Britain, Newington, West Hartford and Hartford; Route 175 Bridge over abandoned rail corridor in Newington**

City/Town: Hartford, West Hartford, Newington, New Britain State: **CT** Zip Code:

Project No., if applicable: CT State Project No. 171-305; 93-166

b. Tax Assessor's Reference: Map Block Lot
(Assessor's reference is not required if requester is an agency of the State of Connecticut.)

c. Latitude and Longitude of the approximate "center of the site" in *degrees, minutes, and seconds*:

Latitude: **72° 43' 56.00" W** Longitude: **41°43' 19.00" N**

Method of determination (check one):

☐ GPS ☒ USGS Map ☐ Other (please specify): If a USGS Map was used, provide the quadrangle name: **Hartford North, Hartford South, New Britain**

d. Drainage Basin number(s) wherein the proposed activity will take place: **4400, 4401, 4402, 4403, 4404**

e. Flood Insurance Rate Map Panel Number: **09003C0364F, 09003C0501F, 09003C0502F, 09003C0503F, 09003C0484F, 09003C0492F**

Date of the map referenced: **September 2008**

f. If applying for a SCEL permit, identify the property wherein the proposed activity will take place by indicating the following:
SCEL Map number(s):

No.	Text	Page	Date
52	Pp-N-	3	June 1968
52	Pp-N-	4	June 1968
52	Pp-N-	5	June 1968
52	Pp-N-	6	June 1968
51	Pp-N-	7	June 1968
51	Pp-N-	8	June 1968

Property Identifier:
Date of the map referenced: **June 1968**

2. **COASTAL BOUNDARY:** Is the activity which is the subject of this application located within the coastal boundary as delineated on DEP approved coastal boundary maps? ☐ Yes ☒ No

If yes, and this application is for a new permit or for a modification of an existing permit, you must submit a *Coastal Consistency Review Form* (DEP-APP-004) with your application as Attachment P.

Information on the coastal boundary is available at the local town hall or on the "Coastal Boundary Map" available at DEP Maps and Publications (860-424-3555).

Part IV: Site Information (continued)

3. **ENDANGERED OR THREATENED SPECIES:** Is the project site located within an area identified as a habitat for endangered, threatened or special concern species as identified on the "State and Federal Listed Species and Natural Communities Map"? ☐☐ Yes ☒☒ No Date of Map: **6/1/2010**

   If yes, complete and submit a *Connecticut Natural Diversity Data Base* (CT NDDB) *Review Request Form* (DEP-APP-007) to the address specified on the form. **Please note NDDB review generally takes 4 to 6 weeks and may require additional documentation from the applicant. DEP strongly recommends that applicants complete this process before submitting the subject application.**

   When submitting this application form, include copies of any correspondence to and from the NDDB, including copies of the completed *CT NDDB Review Request Form*, as Attachment K (Environmental Report) or in Attachment Q if no environmental report is required.

   For more information visit the DEP website at www.ct.gov/dep/endangeredspecies (Review/Data Requests) or call the NDDB at 860-424-3011.

4. **AQUIFER PROTECTION AREAS:** Is the site located within a town required to establish Aquifer Protection Areas, as defined in section 22a-354a through 354bb of the General Statutes (CGS)?

   ☐ Yes ☒ No

   If yes, is the site within an area identified on a Level A or Level B map? ☐ Yes ☐ No

   To view the applicable list of towns and maps visit the DEP website at www.ct.gov/dep/aquiferprotection.

   To speak with someone about the Aquifer Protection Areas, call 860-424-3020.

5. **CONSERVATION OR PRESERVATION RESTRICTION:** Is the property subject to a conservation or preservation restriction? ☐ Yes ☒ No

   If Yes, proof of written notice of this application to the holder of such restriction or a letter from the holder of such restriction verifying that this application is in compliance with the terms of the restriction, must be submitted as Attachment Q.

6. **Other Permits:** List any previous federal, state or local permits or certificates that have already been issued for the site or for the proposed activity:

Type or Nature of Permit	Permit No. Issuing Authority	Date Issued	Expiration Date	Permittee Name

Part V: Supporting Documents

Please check the attachments submitted as verification that *all* applicable attachments have been submitted with this application form. When submitting any supporting documents, please label the documents as indicated in this part (e.g., Attachment A, etc.) and be sure to include the applicant's name as indicated on the *Permit Application Transmittal Form*. The specific information required in each attachment is described in the *Instructions for Completing A Permit Application for Inland Water Resources Division Activities* (DEP-IWRD-INST-100).

☒	Attachment A:	Executive Summary
☒	Attachment B:	An 8 1/2" x 11" copy of a United States Geological Survey (USGS) Topographic Quadrangle Map (scale: 1:24,000) with the regulated activity or project site outlined or pinpointed, as appropriate.
☒	Attachment C:	*Documentation Form for: Inland Wetlands and Watercourses Permit, Stream Channel Encroachment Line Permit, and 401 Water Quality Certification* (DEP-IWRD-APP-101)

Part V: Supporting Documents (continued)

☐ Attachment D: *Documentation Form for Water Diversion Permit* (DEP-IWRD-APP-102)

☐ Attachment E: *Documentation Form for a Dam Construction Permit* (DEP-IWRD-APP-103)

☒ Attachment F: *Documentation Form for Flood Management Certification* (DEP-IWRD-APP-104) (State Agencies Only)

☒ Attachment G: Plan Sheets and Drawings

☒ Attachment H: Engineering Documentation

Part 1: *Engineering Report Checklist* (DEP-IWRD-APP-105A) and an Engineering Report

Part 2: *Hydrologic and Hydraulic Consistency Worksheet* (DEP-IWRD-APP-105B)

Section I: Floodplain Management

Section II: Stormwater Management

For state agencies only:

Section III: State Grants and Loans

Section IV: Disposal of State Land

☒ Attachment I: Flood Contingency Plan

☒ Attachment J: Soil Scientist Report (not required for Flood Management Certification)

☒ Attachment K: Environmental Report (not required for Flood Management Certification)

☒ Attachment L: Mitigation Report - wetlands and watercourses, fish and wildlife (not required for Flood Management Certification)

☒ Attachment M: Alternatives Assessment (not required for Flood Management Certification)

☐ Attachment N: *Applicant Compliance Information Form* (DEP-APP-002) (not required for Flood Management Certification or 401 Water Quality Certification Approvals)

☐ Attachment O: *Applicant Background Information Form* (DEP-APP-008) (not required for Flood Management Certification)

☐ Attachment P: *Coastal Consistency Review Form* (DEP-APP-004) (if applicable)

☒ Attachment Q: Other Information: any other information the applicant deems relevant or is required by DEP. Contains: **Correspondence, Meeting Minutes, Photographs of Wetlands and Watercourses**

Number of Copies of Application:

Submit one original of all application forms, certifications, reports and supporting documents and the number of photocopies of all such materials as noted on the *Permit Application Transmittal Form*. When applying for more than one permit, you should submit the original and no more than six copies.

Part VI: Application Certification

The applicant *and* **all** individuals responsible for actually preparing the application or supporting documentation must sign this part. An application will be considered insufficient unless **all** required signatures are provided. You must include signatures of any person preparing any report or parts thereof filed in support of this application (i.e., professional engineers, surveyors, soil scientists, biologists, environmental and other consultants, etc.).

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief.

I understand that a false statement in the submitted information may be punishable as a criminal offense, in accordance with Section 22a-6 of the General Statutes, pursuant to Section 53a-157b of the General Statutes, and in accordance with any other applicable statute.

I certify that this application is on complete and accurate forms as prescribed by the commissioner without alteration of the text.

I certify that I will comply with all notice requirements as listed in Section 22a-6g of the General Statutes."

Thomas J Maziarz	8-5-2010
Signature of Applicant	Date
Thomas Maziarz	Bureau Chief of Policy and Planning
Name of Applicant (print or type)	Title (if applicable)
Daniel Hageman	7/30/2010
Signature of Preparer (if different than above)	Date
Daniel A. Hageman (Fitzgerald & Halliday, Inc.)	**Principal Planner**
Name of Preparer (print or type)	Title (if applicable)

☐ Check here if additional signatures are required.

If so, please reproduce this sheet and attach signed copies to this sheet.

Reminder: After submitting this application to DEP, except in the case of a Flood Management Certification, you must publish a notice of the application immediately and submit a certified copy of this published notice to DEP. See "Notice of Permit Application" section in the instructions (DEP-IWRD-INST-100).

List the name of the newspaper the Notice of Permit Application will be published in: **Hartford Courant**

Note: Please submit the *Permit Application Transmittal Form*, Application Form, Fee, and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Inland Water Resources Division
Department of Environmental Protection
79 Elm Street, 3rd Floor
Hartford, CT 06106-5127
www.ct.gov/dep

GIS CODE #: ___ ___ ___ ___ ___ ___ ___ ___ ___
For DEP Use Only

Statewide Inland Wetlands & Watercourses Activity Reporting Form

*Complete, print, **sign,** and mail this form in accordance with the instructions on pages 2 and 3.*

PART I: To Be Completed By The Municipal Inland Wetlands Agency *Only*

1. DATE ACTION WAS TAKEN (use drop-down box): Year Month
2. ACTION TAKEN (use drop-down box):
3. WAS A PUBLIC HEARING HELD? (select one only) ☐ Yes ☐ No
4. NAME OF AGENCY OFFICIAL VERIFYING AND COMPLETING THIS FORM:

   (print): (signature) _____

PART II: To Be Completed By The Municipal Inland Wetlands Agency Or The Applicant

5. TOWN IN WHICH THE ACTION IS OCCURRING: **Hartford, CT**

   Does this project cross municipal boundaries? (select one only) ☒ Yes ☐ No

   If Yes, list the other town(s) in which the action is occurring: **New Britain, Newington and West Hartford**

6. LOCATION: USGS Quad Map Name (see hyperlink): **Hartford North, Hartford South, New Britain**

   Quad Number (see hyperlink): **37, 52, 51**

   Subregional Drainage Basin Number (see hyperlink): **4400, 4401, 4402, 4403, 4404**

7. NAME OF APPLICANT, VIOLATOR OR PETITIONER: **Connecticut Department of Transportation**
8. NAME & ADDRESS/LOCATION OF PROJECT SITE: **New Britain-Hartford Busway (proposed) Rail corridor in New Britain, Newington, West Hartford and Hartford**

   Briefly describe the action/project/activity: ☐ Temporary ☒ Permanent

9. ACTIVITY *PURPOSE* CODE (Use drop-down box): N
10. ACTIVITY *TYPE* CODE(S) (Use drop-down box) 2 , 1 , 9 , 10
11. WETLAND / WATERCOURSE AREA ALTERED [must be provided in acres or linear feet as indicated]:

    Wetlands: **2.021** acres Open Water Body: **0.09** acres Stream: **7,473** linear feet
12. UPLAND REVIEW AREA ALTERED [must be provided in acres]: **n/a** acres
13. AREA OF WETLANDS AND / OR WATERCOURSES RESTORED, ENHANCED OR CREATED: 8.65 acres [must be provided in acres]

PART III: To Be Completed By The DEP

DATE RECEIVED: DATE RETURNED TO DEP:

FORM COMPLETED: ☐ YES ☐ NO FORM CORRECTED / COMPLETED: ☐ YES ☐ NO

Connecticut Department of Transportation
State Project No. 171-305, New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain

Attachment A: Executive Summary

Project Description

The Connecticut Department of Transportation (CTDOT) is proposing to construct the New Britain – Hartford Busway (Busway), State Project No. 171-305, consisting of a dedicated Bus Rapid Transit (BRT) facility along a 9.4-mile long corridor between downtown New Britain and downtown Hartford. The project is located within the towns of New Britain, Newington, West Hartford and Hartford (refer to Vicinity Map in Attachment B). From downtown New Britain to approximately Newington Junction in Newington, the Busway will be located within the abandoned Conrail right-of-way (ROW). From Newington Junction north, the Busway will be located within the active Amtrak railroad ROW. In the abandoned rail section, a multi-use trail for bicycle and pedestrian use will be constructed parallel to the Busway.

The dedicated roadway (Busway) will be reserved exclusively for buses, and will be two lanes wide, with one 12-foot lane in each direction. Additional lanes will be provided at station areas to allow non-stop buses to bypass stopped buses, and on and off ramps will be constructed to connect the Busway to the stations. Eleven (11) stations will be constructed to serve Busway passengers. In addition, a new Amtrak Access Road (AAR) will be constructed along the east side of Amtrak's active rail line (Newington to Hartford). The AAR is necessary because the Busway will be constructed on the west side of Amtrak's active rail line, which Amtrak currently uses for track maintenance access.

Construction of the Busway, the stations, the multi-use trail, and the AAR will result in impacts to wetlands, watercourses, 100-year floodplains, stream channel encroachment lines (SCELs), and a floodway. The project will change stormwater runoff and drainage. These impacts are the subject of this application package. Associated construction which does not involve regulated activities or changes in drainage includes the relocation of railroad tracks in Hartford, reconstruction of roadway bridges over the railroad ROW, utility relocations, and local road improvements.

The engineering designs for the Busway, the stations, and the AAR have been designed by different engineering firms. Plans, plates, and tables in this application often refer to the different design contract numbers. The Amtrak Access Road is a separate design contract, and the stations (combined) are another contract. The design contract limits and numbers are shown on the figure included in this section, "Busway By Contract".

Purpose and Need

The purpose of the project is to provide a dedicated Bus Rapid Transit (BRT) facility between downtown New Britain and downtown Hartford to encourage mass transit ridership and therefore reduce vehicular traffic and highway congestion. The need for

this project is demonstrated through the increasing congestion levels on I-84 and parallel roadways during the peak hour and the lack of sufficient interregional transit options and alternative modes of transportation.

Construction Schedule

Construction staging has been carefully designed so that work can be accomplished from the existing ROW as much as possible to avoid wetland impacts, and the ROW will be used for construction haul roads. In addition, construction of the Busway and AAR will be sequenced so that Amtrak has uninterrupted access along their active rail line. Access to the ROW during construction will take place from existing streets and the station sites.

The estimated timing of construction is tabulated below:

Busway Element	Construction Start	Anticipated Finish
Roadway Bridges & Utility Relocations	Spring 2011	Fall 2013
Railroad Relocations	Spring 2011	Winter 2012
Amtrak Access Road	January 2011	Spring 2012
Busway Mainline	Spring 2011	Winter 2013
Busway Stations	Fall 2011	Winter 2013
Wetland Mitigation Construction	Summer 2011	Spring 2012

Impact Summary

Regulated activities are depicted on the plates in Attachment G. Impact locations and impact quantities are summarized in Tables 1 to 4.

The total Busway project will result in approximately 2.111 acres of permanent impacts to federal/state wetlands and 7,108 linear feet (lf) of permanent impacts to intermittent watercourses. There are an additional 0.459 acres of temporary impacts to federal/state wetlands.

The total Busway project will result in a net fill within 100-year floodplains of 2,060 cubic yards, spread over an area of 1.32 acres. Given the project's drainage improvements, which will improve drainage conditions within and adjacent to the Busway, and the very large size of the Piper Brook floodplain, where all but 5 cubic yards of the fill will occur, the net effect of the project on flooding and flooding risks is anticipated to be negligible. The 5 cubic yards of net fill in Kane Brook is not anticipated to increase flooding or flooding risks. The project has one activity (outfall installation) within the mapped floodway of the Trout Brook but it will be installed flush with existing terrain for a net result of zero (0) cubic yards of fill.

The total Busway project will result in a net fill of approximately 4,086 cubic yards within SCELS. This is associated primarily with fill for the Busway alignment within the SCEL of Bass Brook and secondarily with fill for the AAR within the SCEL of Piper Brook.

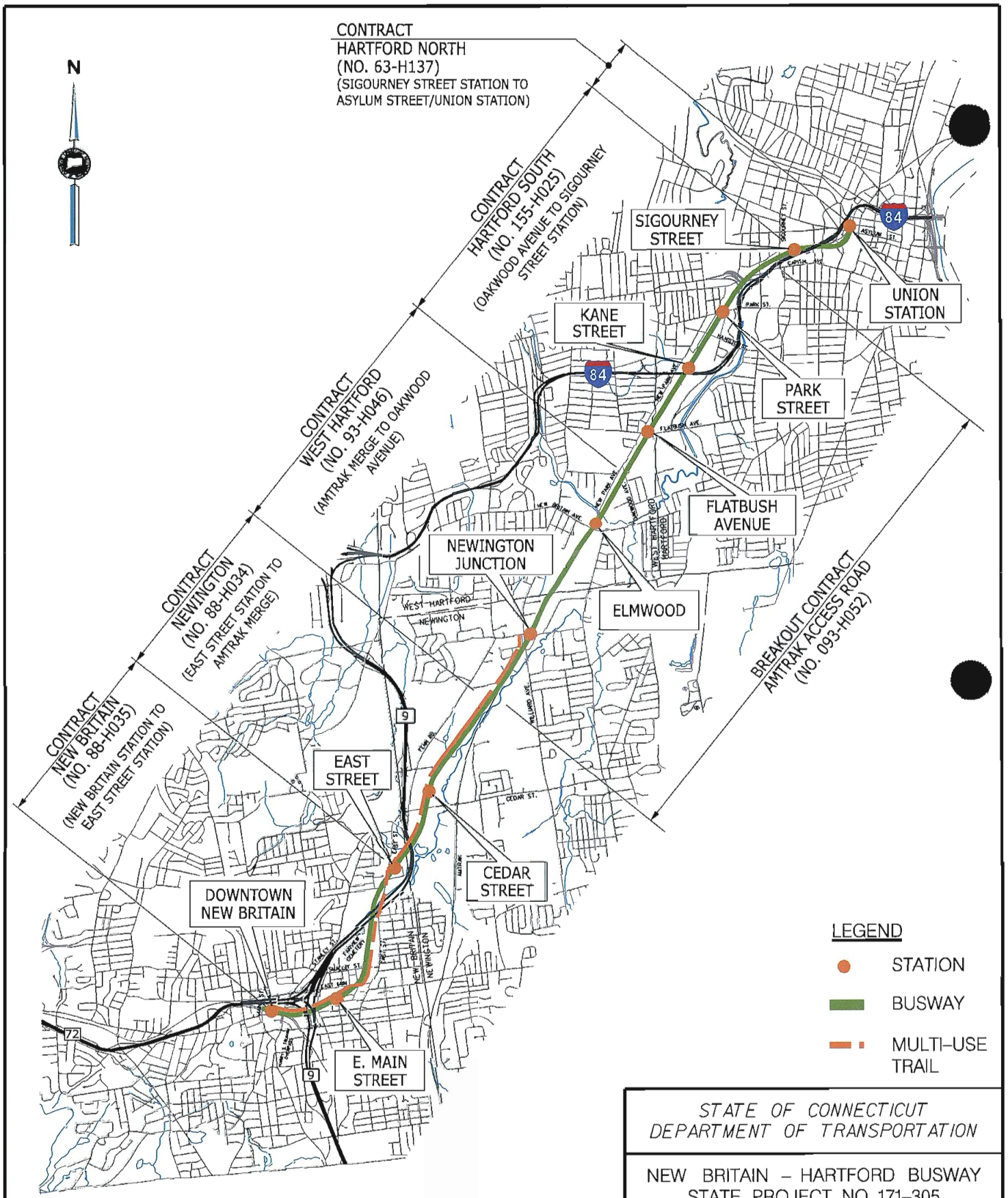
Compensatory Mitigation

The impacts from construction of the Busway are unavoidable, given that the existing rail ROW – an existing transportation facility -- is the most logical and least-impact alternative to developing a much-needed transit option between New Britain and Hartford. CTDOT has developed a Compensatory Mitigation Plan to compensate for the acreage and functions and values of wetlands impacted by the project. Mitigation types, and the acres of each, have been determined based on the U.S. Army Corps of Engineers (USACE) 2007 *Compensatory Mitigation Addendum*. This document provides guidance on suggested mitigation ratios, considering both wetland type and mitigation method (i.e., restoration, creation, enhancement, and preservation). The compensatory mitigation plan provides for the creation and enhancement of 4.98 acres and 3.67 acres, respectively, of wetlands. The table below provides additional detail of the types of wetland mitigation proposed:

Wetland Type	Creation Area	Enhancement Area	Total Creation and Enhancement Area
PFO	2.64	2.15	4.79
PSS	0.49	1.03	1.52
PEM	1.85	0.49	2.34
Total	*4.98*	*3.67*	***8.65***

Mitigation for impacted IWCs will be achieved by the use of grass-lined swales and treatment of the *Phragmites*-infested linear swale adjacent to the wetland mitigation site. Approximately 11,132 linear feet of new grass-lined swales/ditches are proposed throughout the project area, which are expected to perform at a higher level than the existing IWCs to provide improved sediment/toxicant retention, and promote groundwater recharge and stormwater retention.

The proposed mitigation was developed in coordination with the regulatory agencies during multiple meetings and several field walks within the project area. The Mitigation Report in Attachment L contains detailed information on the proposed compensatory mitigation.



STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

NEW BRITAIN – HARTFORD BUSWAY
STATE PROJECT NO. 171–305

BUSWAY BY CONTRACT

Baker
BAKER ENGINEERING NY, INC.
2096-B SILAS DEANE HIGHWAY
ROCKY HILL, CT 06067

JUNE 2006	N.T.S.	

NEW BRITAIN - HARTFORD BUSWAY

STATE PROJECT NO. 171-305

TABLE 1

WETLAND AND INTERMITTENT WATERCOURSE (IWC) IMPACTS

Wetland No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Temporary Impact		Permanent Impact		Description	Wetland Classification	Functions & Values of Impacted Area	Proposed Design/Construction Impact
						(ft^2)	(Acre)	(ft^2)	(Acre)				
Federal/State Wetlands													
2A	8	H035	113+05	114+72	LT			2,888	0.066	Small track-side depression with *Phragmites*	Palustrine Emergent	Sed/tox retention	Retaining Wall
2B	9	H034	117+78	118+50	RT	188	0.004	302	0.007	Small wetland between developed parcels	Palustrine Shrub-shrub	GW recharge, sed/tox retention	Busway Fill and Retaining Wall
2C	10	H039	120+55	121+23	LT			728	0.017	Depression within upland forest	Palustrine Shrub-shrub	GW recharge	East Street Station
2D	10A	H034	120+45	121+23	RT			1,160	0.027	Small emergent wetland depression	Palustrine Emergent	GW discharge	Maintenance road at CCSU Facility
3	11	H034	123+75	125+05	RT	634	0.015	0	0.000	Small forested floodplain forest along segmented Bass Brook	Palustrine Forested	GW recharge, sed/tox retention, wildlife habitat	Retaining Wall construction
6A	14	H034	144+60	145+50	RT			2,080	0.048	Corner of larger wetland in area disturbed by vehicles	Palustrine Shrub-shrub	GW recharge, sed/tox retention	Drainage Channel
6A	14	H034	145+95	146+00	RT	128	0.003	0	0.000	Corner of larger wetland in area disturbed by vehicles	Palustrine Shrub-shrub	GW recharge, sed/tox retention	Bridge construction haul road
6B	14	H034	145+40	147+40	LT			3,152	0.072	Narrow degraded finger under Route 9; disturbance has caused obstruction of flow path	Palustrine Emergent	GW discharge, sed/tox retention	Fill for Busway and Trail
6D	15	H034	150+10		RT			60	0.001	Part of extensive Piper Brook floodplain forest	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap apron for outfall
6D	15	H034	151+00	152+60	RT			949	0.022	Part of extensive Piper Brook floodplain forest	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
6D	16	H034	154+00	154+40	RT			48	0.001	Part of extensive Piper Brook floodplain forest	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
6D	16	H034	155+30		RT			45	0.001	Part of extensive Piper Brook floodplain forest	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
6E	16	H034	155+30	156+15	RT			1,126	0.026	Piper Brook floodplain - upland forest/ shrub/ herbaceous vegetation	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
7B	17	H034	158+30		RT			59	0.001	Piper Brook floodplain with drainage to Piper Brook - upland forest / shrub/ herbaceous	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap scour hole
7C	20	H034	171+65		RT			175	0.004	Part of extensive Piper Brook floodplain, receives flow from w. of tracks (Wetland 9A)	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap scour hole

Wetland No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Temporary Impact		Permanent Impact		Description	Wetland Classification	Functions & Values of Impacted Area	Proposed Design/Construction Impact
						(ft^2)	(Acre)	(ft^2)	(Acre)				
7C	20	H034	173+80	174+50	RT			125	0.003	Part of extensive Piper Brook floodplain, receives flow from w. of tracks (Wetland 9A)	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
7C	20	H034	174+65	175+00	RT			846	0.019	Part of extensive Piper Brook floodplain, receives flow from w. of tracks (Wetland 9A)	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap scour hole
7C	20	H034	174+25	174+95	RT	1,640	0.038			Part of extensive Piper Brook floodplain, receives flow from w. of tracks (Wetland 9A)	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Temporary water handling
7E	24	H034	194+00		RT			192	0.004	Riparian zone of Piper Brook	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap scour hole
7F	26	H034	200+70	200+95	RT			66	0.002	depression	Palustrine Forested	Sed/tox retention	Busway Fill
8A	18	H039	151+00	151+50	390 ft LT			285	0.007	Tiny wetland within uplands	Palustrine Emergent	GW recharge, sed/tox retention	Driveway to Cedar St Station
8B	18	H039	152+00	152+50	390 ft LT			241	0.006	Tiny wetland within uplands	Palustrine Shrub-shrub	GW recharge, sed/tox retention	Driveway to Cedar St Station
8C	16-17	H034	154+80	160+80	LT			12,001	0.276	Linear finger west of tracks, draining (under	Palustrine Forested	GW recharge, floodflow alteration, sed/tox	Drainage Channel, Fill for Trail
8C	18A	H039	156+25		LT			21	0.000	Linear finger west of tracks, draining (under	Palustrine Forested	GW recharge, floodflow alteration, sed/tox	Drainage Channel, Fill for Trail
9A	19-20	H034	168+20	175+00	LT	5,449	0.125	7,230	0.166	Flows from this wetland collect along west side of tracks piped to east though existing culvert	Palustrine Forested/ Palustrine Emergent	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Retaining wall construction (temporary & permanent impacts)
9B	21-22	H034	176+00	180+50	LT			1,987	0.046	Narrow linear forested wetland parallel to tracks	Palustrine Forested	Sed/tox retention, wildlife habitat	Busway Fill
10	23	H034	183+60	184+90	LT			1,710	0.039	Created bio-swale	Palustrine Emergent	Sed/tox retention	Trail and Busway Fill
14	30	AAR	710+00	711+00	LT	1,863	0.043			Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by utility berm parallel to	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, sed/tox retention, wildlife habitat	Temporary disturbance for weir and headwall construction
14	29-30	H046	218+62	224+35	LT			8,827	0.203	Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by utility berm parallel to	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, sed/tox retention, wildlife habitat	Fill for Busway and Trail; Headwall
14	31	H046	228+52	228+65	LT			60	0.001	Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by utility berm parallel to	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, sed/tox retention, wildlife habitat	Fill for Trail
14	31	H046	228+50	228+70	LT	162	0.004			Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by utility berm parallel to	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, sed/tox retention, wildlife habitat	Temporary water handling

Wetland No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Temporary Impact		Permanent Impact		Description	Wetland Classification	Functions & Values of Impacted Area	Proposed Design/Construction Impact
						(ft^2)	(Acre)	(ft^2)	(Acre)				
15	31	H046	225+94	228+78	LT			2,111	0.048	Track-side linear depression	Palustrine Forested	GW recharge, sed/tox retention	Fill for Trail; Manhole
16A	33	H046	240+90	243+00	RT			2,523	0.058	Degraded track-side ditch	Palustrine Emergent	Sed/tox retention	Pedestrian Platform (Newington Jct Station)
16B	35	H046	247+42	248+19	LT & RT			1,698	0.039	Small depression w/ degrading vegetation	Palustrine Shrub-shrub	GW recharge/discharge, sed/tox retention	Busway Fill
17	34-35	AAR	737+62	738+03	LT	0	0.000	351	0.008	Unnamed tributary to Piper Brook	Palustrine Forested	None (eroded banks, fill debris)	Culvert replacement; stream reconstruction (perm & temporary), temporary water handling
18	37-39	H046	267+85	274+41	LT			5,415	0.124	Degraded track-side ditch	Palustrine Emergent	Sed/tox retention	Busway Fill
19	46	H046	323+91	325+05	LT			1,077	0.025	Degraded track-side ditch	Palustrine Emergent	Sed/tox retention	Busway Fill
20	47	H046	325+95	328+08	LT			2,381	0.055	Degraded track-side ditch	Palustrine Emergent	Sed/tox retention	Busway Fill
21A	35	AAR	736+19	737+15	RT	680	0.016	1,527	0.035	Unnamed tributary to Piper Brook	Palustrine Shrub-shrub	Sed/tox retention	Culvert replacement; stream reconstruction (perm & temp); temporary water handling and jacking pit
21A2	36	AAR	743+00	743+28	RT			847	0.019	Small track-side depression	Palustrine Emergent	Sed/tox retention	Access Road Fill
21C	51	H025	348+58	351+34	LT & RT			3,637	0.083	Track-side linear depression	Palustrine Emergent	Sed/tox retention	Busway Fill
21D	53	H025	357+14	358+68	LT			1,570	0.036	Track-side linear depression	Palustrine Emergent	Sed/tox retention	Busway Fill
22A	54	H025	362+23	364+71	LT			2,691	0.062	Track-side linear depression	Palustrine Emergent	GW recharge, sed/tox retention	Busway Fill
22B	55-56	H025	371+80	376+35	LT			2,080	0.048	Track-side linear depression	Palustrine Emergent	GW recharge, sed/tox retention	Busway Fill
22C	57	H025	377+45	381+25	LT			3,680	0.084	Track-side linear depression	Forested and emergent	GW recharge, sed/tox retention, wildlife habitat	Busway Fill
27A	30	AAR	709+50	712+15	RT	9,256	0.212	0	0.000	Part of extensive Piper Brook floodplain forest	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Water handling and staging area for pipe jacking
27A	30	AAR	709+88	710+06	RT			96	0.002	Part of extensive Piper Brook floodplain forest	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway fill.
27A	30-31	AAR	710+30	715+60	RT			9,491	0.218	Part of extensive Piper Brook floodplain forest	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Stream reconstruction and Busway fill.
28	44	AAR	778+55	778+86	RT			352	0.008	Tiny track-side depression	Palustrine Emergent	Sed/tox retention	Access Road Fill
30	48	AAR	818+00	821+40	LT & RT			4,068	0.093	Linear track-side depression	Palustrine Emergent	Sed/tox retention	Access Road Fill
Subtotal Federal/State Wetland Impacts						20,000	0.459	91,958	2.111				

Intermittent Watercourses (IWCs)

IWC No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Width (ft)	Linear Feet of Impact	*Description*		Functions & Values of Impacted Area	Proposed Design/Construction Impact
1-1 to 1-4	9	H035	115+66	117+40	LT	7	174	Degraded track-side ditch with debris, sparsely vegetated edges (hydrophytic herbs and upland trees/ shrubs)	**	Sed/tox retention	Busway Fill
3-2 to 3-3	22-23	H034	182+44	183+65	LT	4	121	Track-side ditch, veg. edges (sparse hydrophytic emergents / shrubs and upland herbs)	**	Sed/tox retention	Trail and Busway Fill
3A	13-14	H034	140+80	145+33	LT	5	454	Track-side drainage ditch, vegetated edges (sparse hydrophytic herbs & shrubs)	**	GW recharge, sed/tox retention	Busway Fill
4-1 to 4-11	24-26	H034	194+08	203+58	LT	2	950	Track-side drainage ditch, vegetated edges (upland trees & shrubs)	**	Sed/tox retention	Busway Fill
4A	12	H034	130+14	130+31	LT	4	21	Ditch along base of Rt. 9 slope, vegetated edges (hydrophytic trees & shrubs)	**	GW recharge, sed/tox retention	Trail and Busway Fill
5-1 to 5-5	27	H046	203+76	207+83	LT	4	405	Track-side drainage ditch, vegetated edges (upland trees & shrubs)	**	Sed/tox retention	Busway Fill
10-2 to 10-7	28	H046	213+40	214+05	RT	5	77	Degraded track-side ditch	**	None (degraded)	Busway Fill
11B	37-38	AAR	756+62	759+33	RT	4	271	Degraded track-side ditch w/ debris, sparse emerg veg	**	None (degraded)	Access Road Fill
11-2 to 11-4	33-34	H046	243+15	245+55	RT	4	241	Degraded track-side ditch w/ debris, oil	**	None (eroded banks, fill, debris)	Busway Fill
12-1 to 12-3	32-33	H046	238+90	240+90	RT	4	196	Degraded track-side ditch w/ debris, oil	**	None (eroded banks, fill, debris)	Busway Fill
13-1 to 13-8	39-41	H046	274+47	282+35	LT	3	789	Track-side drainage ditch, veg. edges (sparse emergent & upland herbs)	**	GW recharge, sed/tox retention	Busway Fill
14-1 to 14-6	42-44	H046	284+32	292+49	LT	3	817	Track-side drainage ditch, veg. edges (sparse upland herbs)	**	GW recharge, sed/tox retention	Busway Fill
14B	49-50	AAR	824+60	832+04	LT	3	742	Vegetated drainage ditch (sparse emergent)	**	GW discharge, sed/tox retention	Access Road Fill
14C	51	AAR	835+95	839+03	LT & RT	6	309	Degraded track-side ditch, vegetated edges (sparse emergent)	**	None (degraded)	Access Road Fill
14D	52	AAR	840+91	842+76	LT & RT	4	185	Vegetated drainage ditch (emergent)	**	GW discharge, sed/tox retention	Access Road Fill
14E	59-60	AAR	873+84	878+84	LT & RT	2	501	Vegetated drainage ditch (emergent)	**	GW discharge, sed/tox retention	Access Road Fill

Intermittent Watercourses (IWCs) [Continued]											
IWC No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Width (ft)	Linear Feet of Impact	Description		Functions & Values of Impacted Area	Proposed Design/Construction Impact
14F	61	AAR	883+82	884+83	LT & RT	5	101	Degraded track-side ditch, vegetated edges (sparse emergent)	**	None (degraded)	Access Road Fill
15-1 to 15-5	61-62	H025	394+90	402+44	LT	2	754	Track-side drainage ditch, vegetated edges (upland shrubs)	**	GW recharge, sed/tox retention	Busway Fill
Subtotal State-Only IWC Impacts						----	7,108				

** Federal wetland type not applicable to state-only wetlands and IWCs

Note: Widths of Intermittent Water Courses (IWC) were measured in the field by FHI.

SUMMARY	Temporary Impact (ft^2)	Temporary Impact (Acre)	Permanent Impact (ft^2)	Permanent Impact (Acre)	Linear Feet (IWCs only)
Federal/State Wetland Impacts	20,000	0.459	91,958	2.111	0
IWC Impacts	0	0	0	0	7,108
TOTAL	20,000	0.459	91,958	2.111	7,108

NEW BRITAIN - HARTFORD BUSWAY

STATE PROJECT NO. 171-305

TABLE 2

FLOODPLAIN IMPACTS

Amtrak Access Road					
Plate No.	Floodplain Description	Volume of Excavation (yd^3)	Volume of Fill (yd^3)	Area (acres)	Purpose
29	Piper Brook tributary - AAR 704+40 to 705+70 RT	0	28	0.026	Fill for access road
29-31B	Piper Brook tributary - AAR 706+50 to 718+00 RT	181.4	1,173.3	0.303	Fill for access road
34-35	Piper Brook tributary - AAR 733+70 to 734+90 RT	0	16.3	0.013	Fill for access road
35	Piper Brook tributary - AAR 736+15 to 737+40 RT	28.7	22.5	0.023	Culvert replacement
Contract H034					
Plate No.	Floodplain Description	Volume of Excavation (yd^3)	Volume of Fill (yd^3)	Area (acres)	Purpose
11	Piper Brook tributary - 122+60 to 126+00 RT	302	344	0.24	Install Retaining Wall, Water Quality Basin
11	Piper Brook tributary - 125+40 to 126+00 LT	0	14	0.01	Busway Fill
19	Piper Brook tributary - 168+80 to 171+00 LT	510	0	0.03	Retaining Wall
20	Piper Brook tributary - 171+65 RT	10	0	0.003	Install Scour Hole
20	Piper Brook tributary - 171+90 to 176+00 LT	1,244	0	0.076	Install Retaining Wall, Swale
20	Piper Brook tributary - 173+50 to 175+20 RT	259	0	0.047	Install Scour Hole
20	Piper Brook tributary - 174+50	14	0	0.021	Riprap Pad (temp)
24	Piper Brook tributary - 193+35 RT	13	0	0.004	Install Scour Hole
24	Piper Brook tributary - 194+00 RT	13	0	0.005	Install Scour Hole
Contract H046					
Plate No.	Floodplain Description	Volume of Excavation (yd^3)	Volume of Fill (yd^3)	Area (acres)	Purpose
29-31	Piper Brook tributary - 221+25 to 228+90 LT	0	3,060	0.51	Busway Fill, Trail
Contract H025					
Plate No.	Floodplain Description	Volume of Excavation (yd^3)	Volume of Fill (yd^3)	Area (acres)	Purpose
58	Kane Brook - 384+27 to 385+11 LT	28	5	0.005	Two Outfalls
	TOTALS	2,603	4,663	1.32	
	NET CHANGE		2,060		

NEW BRITAIN - HARTFORD BUSWAY

STATE PROJECT NO. 171-305

TABLE 3

STREAM CHANNEL ENCROACHMENT LINE (SCEL) IMPACTS

Amtrak Access Road					
Plate No.	SCEL Description	Volume of Excavation (yd^3)	Volume of Fill (yd^3)	Area (acres)	Purpose
29-31	Piper Brook tributary- 707+10 to 716+76	0	831		Fill Slope
Contract H034					
Plate No.	SCEL Description	Volume of Excavation (yd^3)	Volume of Fill (yd^3)	Area (acres)	Purpose
12	Bass Brook - Sta. 125+00 to 129+00	381	3,753	0.589	Busway Fill
20	Piper Brook tributary- 171+65 RT	13.14	0	0.004	Install Scour Hole
20	Piper Brook tributary- 174+80 RT	104	0	0.025	Install Scour Holes
	PROJECT TOTALS	498	4,584	0.62	
	NET CHANGE		4,086		

NEW BRITAIN - HARTFORD BUSWAY

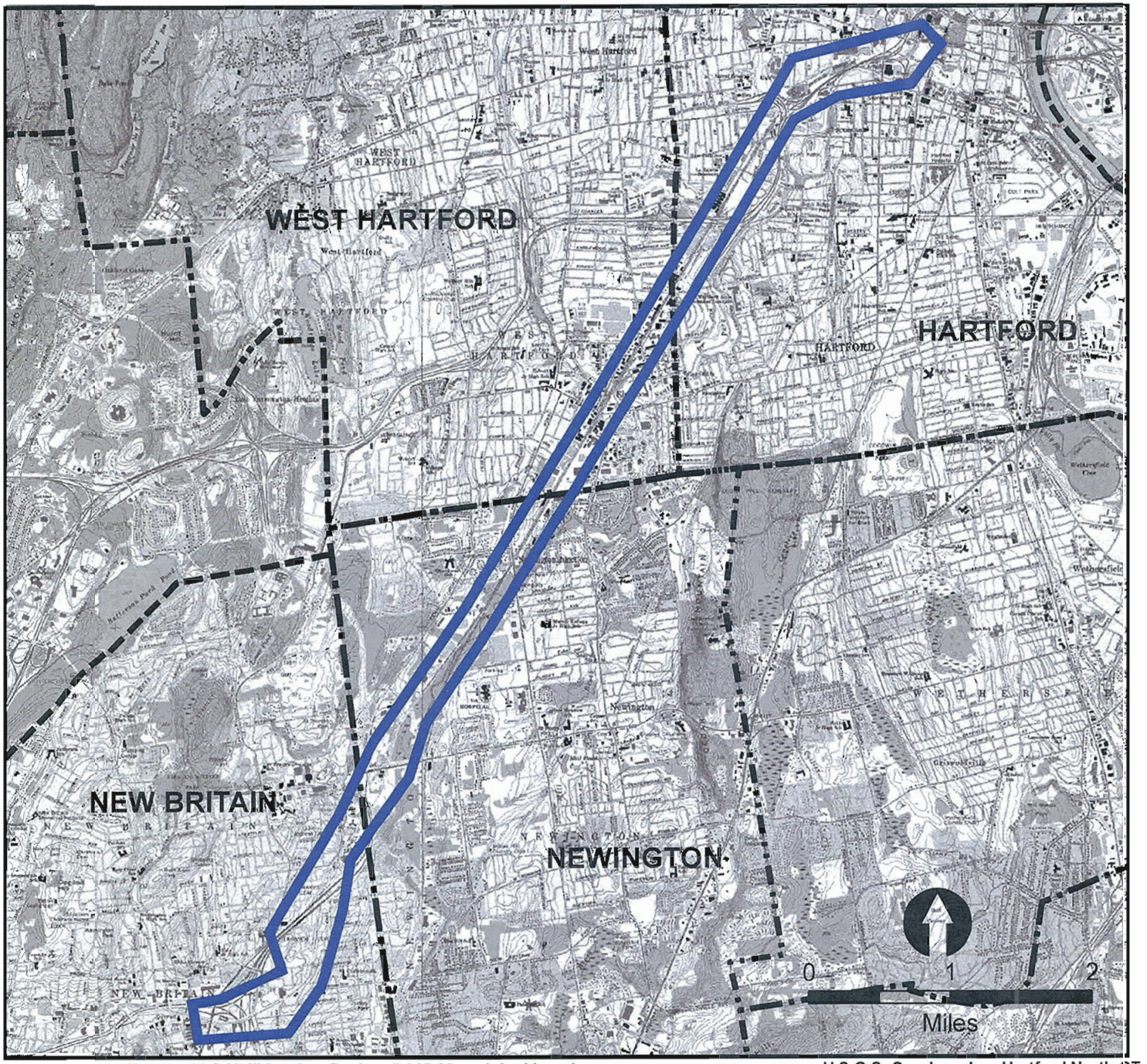
STATE PROJECT NO. 171-305

TABLE 4

EXCAVATION AND FILL BELOW ORDINARY HIGH WATER

Contract H034									
Plate No.	**Wetland No.**	**Waterway Name / Location**	**Cross-Culvert Installation Site No.**	**Volume of Excavation (yd^3)**	**Volume of Fill (yd^3)**	**Net Fill (yd^3)**	**Permanent Impact Area (ft^2)***	**Temporary Impact Area (ft^2)***	**Purpose**
20, 20A	Wetland 9A (west side tracks) and 7C (east side tracks)	Unnamed Tributary to Piper Brook / Busway Sta. 174+90	Site 3	133.9	63.24	-70.66	568	1,488.0	Culvert replacement
Amtrak Access Road									
Plate No.	**Wetland No.**	**Waterway Name / Location**		**Volume of Excavation (yd^3)**	**Volume of Fill (yd^3)**	**Net Fill (yd3)**	**Permanent Impact Area (ft^2)***	**Temporary Impact Area (ft^2)***	**Purpose**
35, 35A-35B	Wetland 17 (west side tracks) and 21A (east side tracks)	Unnamed Tributary to Piper Brook / AAR Sta. 736+20 to 737+30	Site 5	5.5	68.3	62.8	732	1,137.0	Culvert replacement
	PROJECT TOTALS			139	132	-8	1,300	2,625	

** Impact areas are included in wetland impact calculations (Table 1)but note that OHW areas are only a portion of the total wetland impacts at each site*



Project Area Limit

Attachment B
Vicinity Map

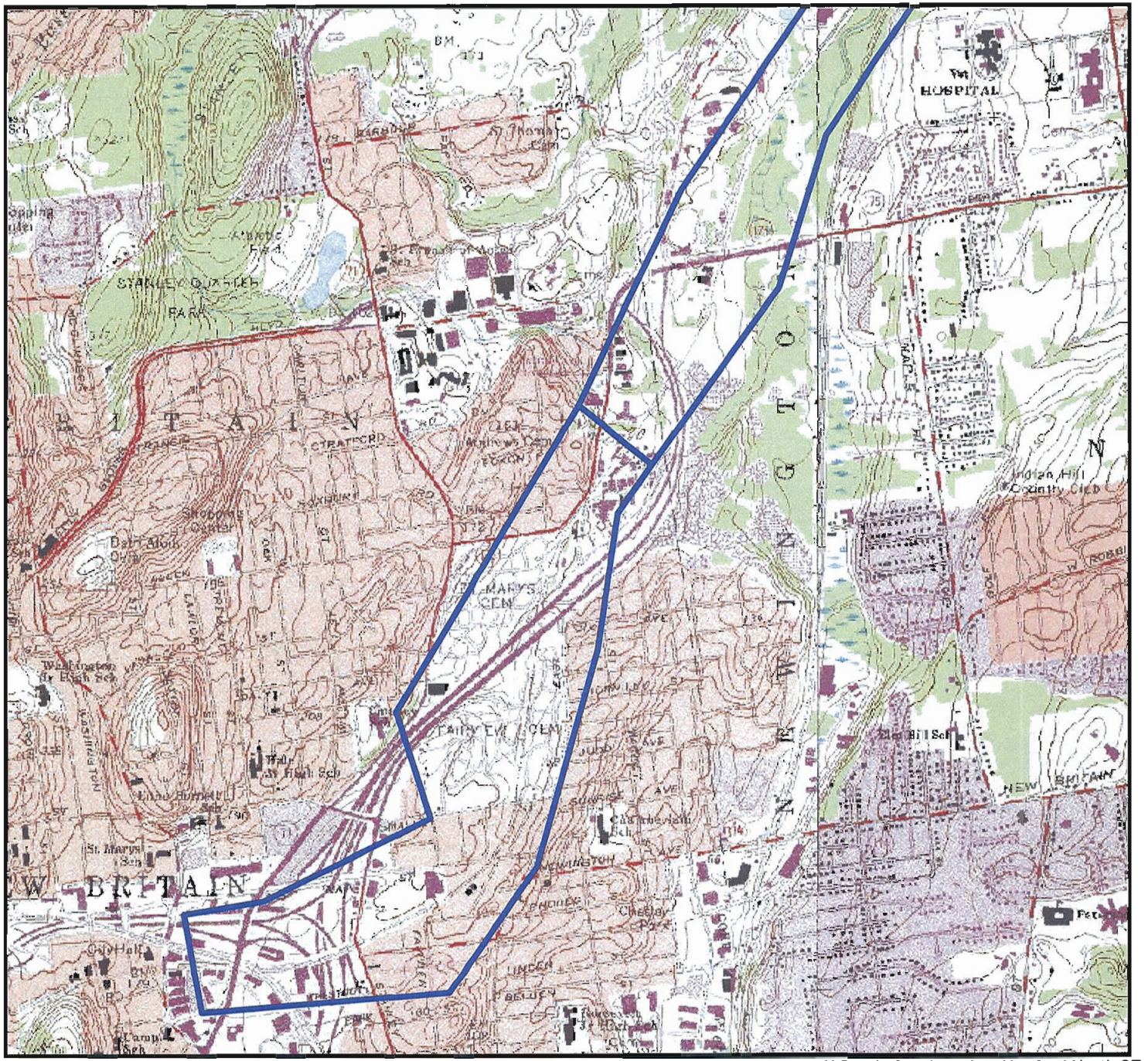
New Britain - Hartford Busway

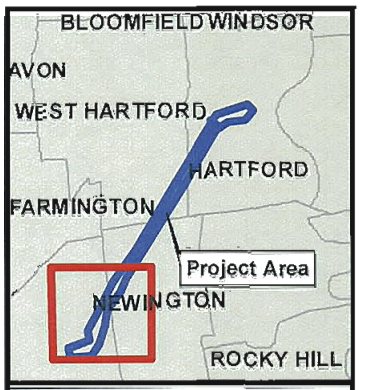
State Project No. 171-305

Hartford, West Hartford, Newington, New Britain CT

February 2009 - Fitzgerald & Halliday, Inc. Project # 615.09 - original in color

U.S.G.S. Quadrangles: Hartford North CT, Hartford South CT, New Britain CT





Project Area Limits

Attachment B
Vicinity Map

New Britain - Hartford Busway

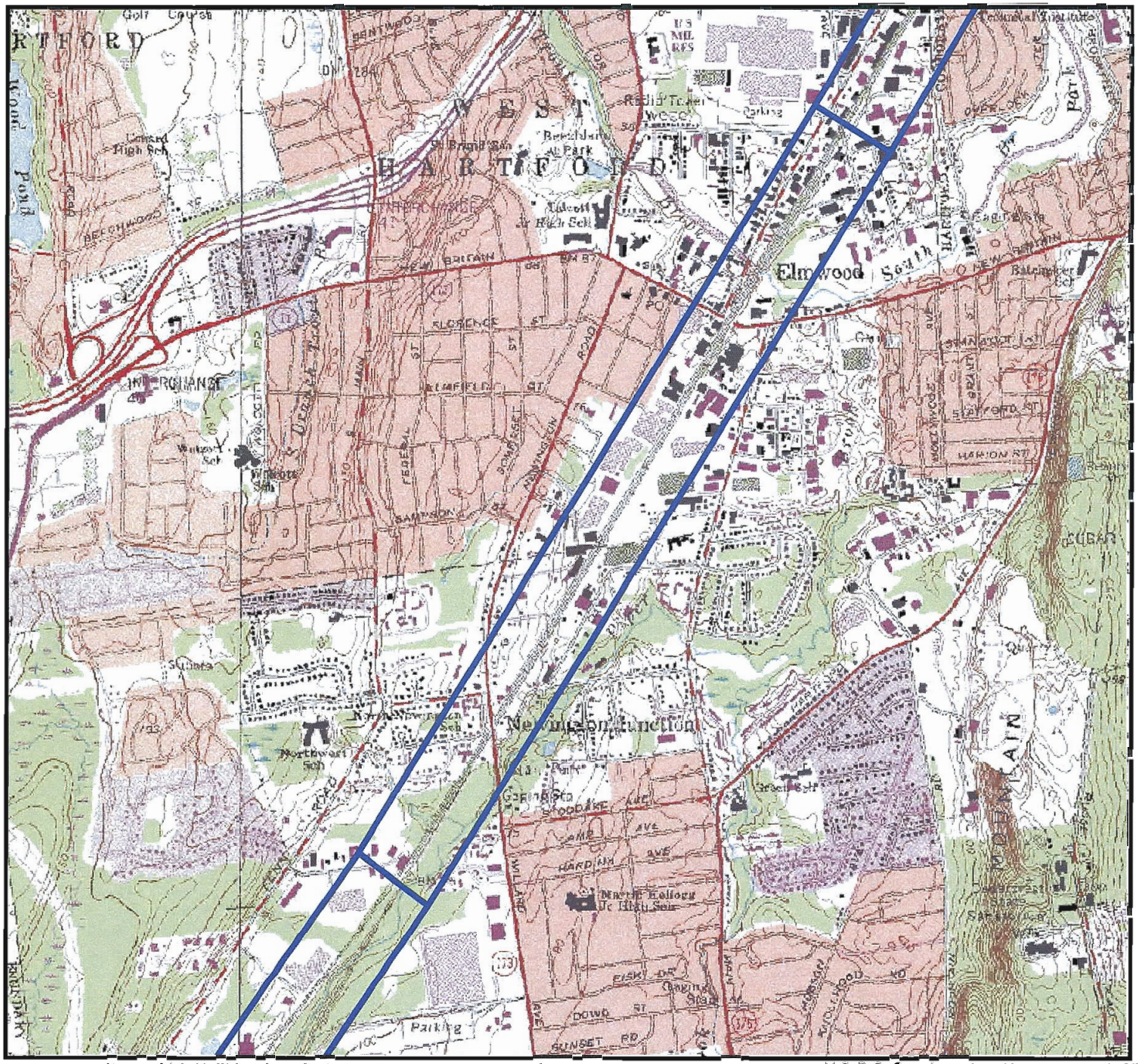
State Project No. 171-305

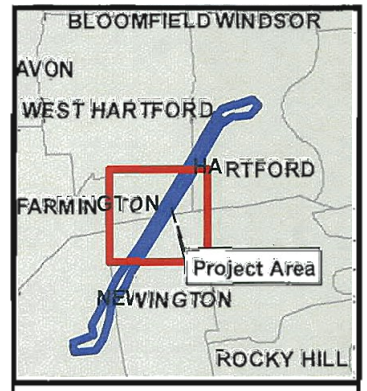
Hartford, West Hartford, Newington, New Britain CT

1:24,000

June 2010 - Fitzgerald & Halliday, Inc. Project # 615.09 - original in color

U.S.G.S. Quadrangles: Hartford North CT, Hartford South CT, New Britain CT





Project Area Limits

Attachment B
Vicinity Map

New Britain - Hartford Busway

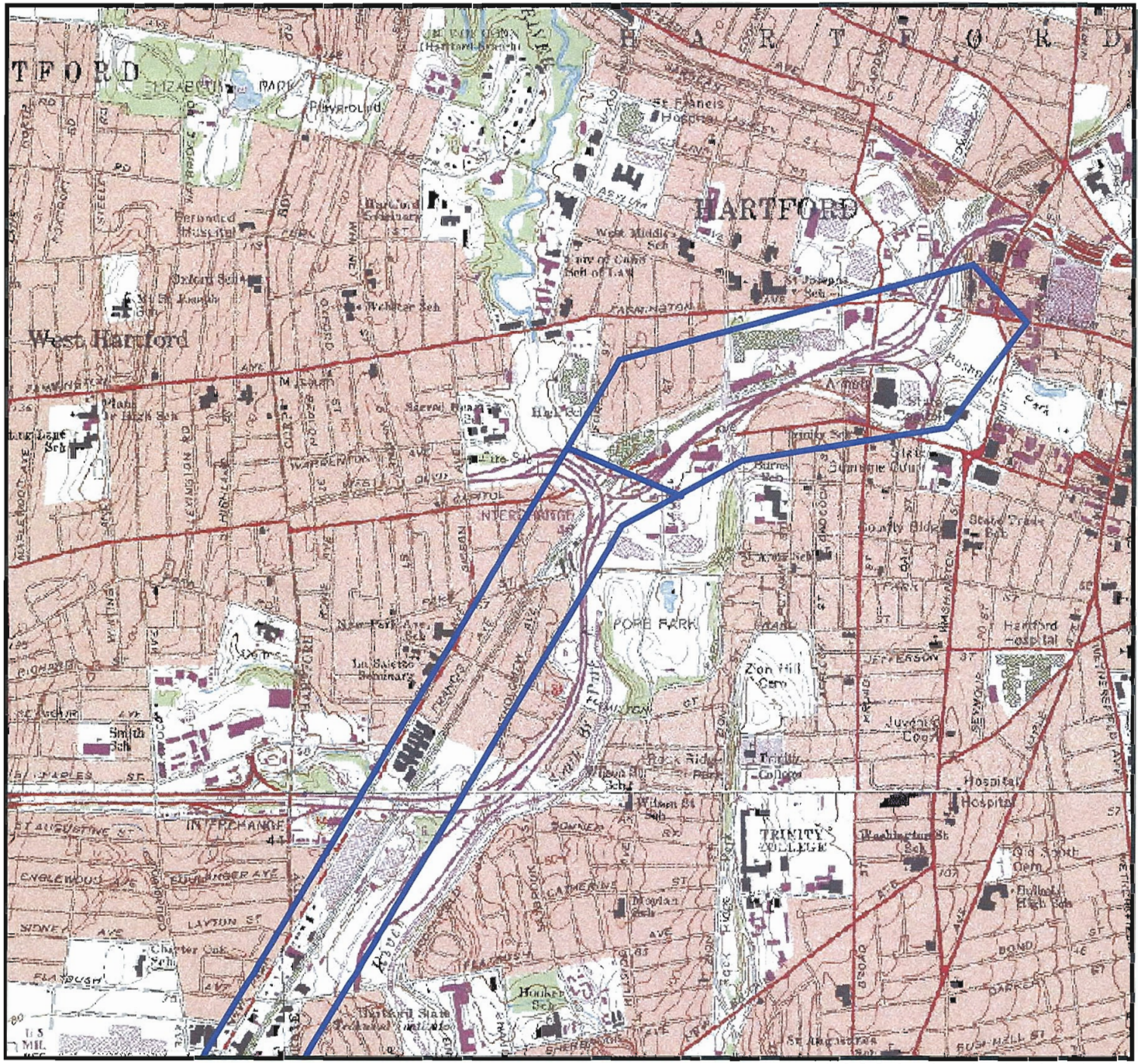
State Project No. 171-305

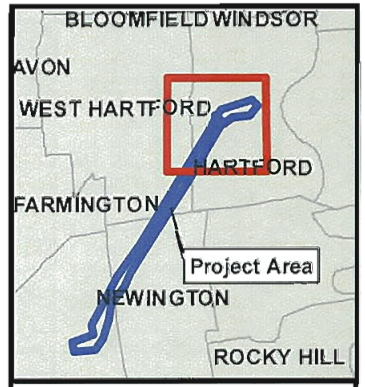
Hartford, West Hartford, Newington, New Britain CT

1:24,000

June 2010 - Fitzgerald & Halliday, Inc. Project # 615.09 - original in color

U.S.G.S. Quadrangles: Hartford North CT, Hartford South CT, New Britain CT





Project Area Limits

Attachment B
Vicinity Map

New Britain - Hartford Busway

State Project No. 171-305

Hartford, West Hartford, Newington, New Britain CT

1:24,000

June 2010 - Fitzgerald & Halliday, Inc. Project # 615.09 - original in color

U.S.G.S. Quadrangles: Hartford North CT, Hartford South CT, New Britain CT

Attachment C: Documentation Form for the Following Permits:

- **Inland Wetlands and Watercourses Permit (CGS Section 22a-39)**
- **Stream Channel Encroachment Line Permit (CGS Section 22a-342 through 22a-349)**
- **401 Water Quality Certification Inland Waters (33 U.S.C. 1341)**

All applicants should review the application instructions (DEP-IWRD-INST-100). Applicants for an Inland Wetlands and Watercourses Permit should review CGS Sections 22a-36 through 22a-45 and RCSA Sections 22a-39-1 through 22a-39-15. Applicants for a Stream Channel Encroachment Line Permit should review CGS Section 22a-342. Applicants for 401 Water Quality Certification should review Section 401 of the Federal Water Pollution Control Act (33 U.S.C. 1341) and Connecticut's Water Quality Standards.

If more space is needed for your response, duplicate the form and attach additional pages to the form. If additional pages are attached, they should be numbered and titled to correspond to the specific number and title of the request for information on the application form.

1. Applicant Name: **Connecticut Department of Transportation**
   (as indicated on the *Permit Application Transmittal Form*)

2. Check the permit(s) being requested in this application (check all that apply):
   - ☒ Inland Wetlands & Watercourses
   - ☒ Stream Channel Encroachment Lines
   - ☒ Water Quality Certification

3. If applying for a SCEL permit, indicate the SCEL Map number(s) wherein the proposed activity will take place, the property identifier and the date of the map referenced:

No.	Text	Page	Date
52	Pp-N-	3	June 1968
52	Pp-N-	4	June 1968
52	Pp-N-	5	June 1968
52	Pp-N-	6	June 1968
51	Pp-N-	7	June 1968
51	Pp-N-	8	June 1968

   Property Identifier:

   Date of the map referenced:

4. Name of wetland(s) and watercourse(s) involved:
   - **Piper Brook**
   - **Unnamed tributaries to Piper Brook**
   - **Bass Brook**
   - **Trout Brook**
   - **South Branch of the Park River**
   - **North Branch of the Park River**
   - **Park River**

5. Describe the purpose and need for the proposed project.

The purpose of the project is to provide a dedicated Bus Rapid Transit (BRT) facility between downtown New Britain and downtown Hartford to encourage mass transit ridership and therefore reduce vehicular traffic and highway congestion. Since buses would not be delayed by congestion on local streets or Interstate 84 (I-84), the busway would improve bus service in the region by increasing travel speeds and reliability over conventional on-street bus or express routes. The busway has more flexibility than rail service since it will have local/intermediate access points along the corridor that would allow buses to enter and exit the facility. As a result, buses can circulate through nearby, local areas before and after accessing the busway, thereby greatly increasing the number of origins and destinations that can be served without a transfer.

The need for this project is demonstrated through the increasing congestion levels on I-84 and parallel roadways during the peak hour and the lack of sufficient interregional transit options and alternative modes of transportation.

The key project elements are a two-lane dedicated bus roadway within existing railroad right-of-way (ROW), construction of stations, entrances and exits from stations, new and rehabilitated bridges, retaining walls, and reconstructed culverts. A multi-use trail to enhance bicycle and pedestrian transportation is included along the southern half of the busway. Another element of the project is a relocated access road (AAR) for use Amtrak service vehicles. This is required because the busway will be constructed in the abandoned rail right-of-way (ROW) next to the active Amtrak line, which Amtrak currently uses (for service vehicles) to maintain the ROW. Without construction of the AAR, use of the rail corridor would not have been permitted.

☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

6. *Description of the Regulated Activity:*

6a. Indicate the area, in acres and volume in cubic yards, of any fill, excavation, or other alterations of wetlands, watercourses and floodplains.

2.078 acres wetlands; **7,108** linear feet intermittent watercourse; **1.32** acres floodplains; **2,060** cubic yards net fill in floodplains

6b. Describe all proposed regulated activities in and affecting wetlands, watercourses and floodplains. Include all discharges of dredged or fill material and storm waters incidental to the construction and/or operation of the proposed project.

See attached narrative (Attachment C 6b)

☒ Check here if additional sheets are necessary, and label and attach them to this sheet.

7. *Description of Site* - Describe all natural and man-made features at the property at which the regulated activity is proposed to be conducted.

The proposed New Britain-Hartford corridor runs in a northeasterly direction from downtown New Britain to Union Station in downtown Hartford. The main feature in the corridor is the existing rail right-of-way (ROW). The abandoned ROW from downtown New Britain to Newington Junction is an earthen path while the active Amtrak ROW from Newington Junction to downtown Hartford is a broad gravel-stone swath with the active tracks on the east side. The ROW formerly supported a second track, which was removed in the early 1990s.

The proposed busway corridor lies within a highly urbanized setting with few undisturbed areas. Surrounding land uses are visible from most of the busway corridor; these consist of occasional pockets of residential development, highway infrastructure (Route 72 and Route 9), and small commercial/industrial sites in New Britain and Newington; larger commercial and industrial sites along the ROW in West Hartford and Hartford, with more highway infrastructure (Interstate 84) crossing the ROW in Hartford.

Most of the watercourses within the corridor have been modified during urbanization and/or construction of the rail line, which is over 100 years old. The rail ROW crosses over culverted sections of Piper Brook, Bass Brook, tributaries to Piper Brook, and Kane Brook. A rail bridge spans Trout Brook, in a concrete channel section of the brook which was constructed as a flood control structure.

There are a few isolated areas, particularly in the southern end of the corridor, which contain vegetated wetland pockets. The largest and most notable of these is north of Cedar Street in Newington, which is the forested area along Piper Brook. This is the largest undisturbed wetland within the corridor. Most of the larger wetlands are located east of the busway, but wetlands span both sides of the rail ROW throughout the corridor. The vegetation and adjacent wetland systems thin out north of the Piper Brook floodplain. From there north are primarily linear ditch-type wetlands and intermittent watercourses (IWCs) running parallel to the existing rail corridor. Additional details of the project corridor environment are contained in Attachment K.

☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

8. *Disposal of Excess Material* - State the type and quantity of excess material anticipated from the project and where such material will be disposed.

A waste management plan for the project is being developed by CTDOT. All controlled materials from the project will be tested and managed for reuse or disposal.

All contaminated soils removed as part of site remediation activities will be disposed of at a permitted treatment/recycling/disposal facility approved by CTDOT. The specific facilities that will be used will be selected by the contractor at the time of the work from a list of CTDOT-approved sites included in the construction contract. All disposal of excess material shall be in compliance with all applicable laws and regulations, as well as bound by the 816.

☐ Check here if a disposal plan is included as Attachment C8.

Connecticut Department of Transportation
State Project No. 171-305, New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain

Attachment C: Documentation Form
Question 6b: Description of Regulated Activities

PROJECT DESCRIPTION

Proposed Busway Facility

The Connecticut Department of Transportation (CTDOT) is proposing to construct the New Britain – Hartford Busway (Busway), State Project No. 171-305, consisting of a dedicated Bus Rapid Transit (BRT) facility along a 9.4-mile long corridor between downtown New Britain and downtown Hartford. The project is located within the towns of New Britain, Newington, West Hartford and Hartford (refer to Vicinity Map in Attachment B). From downtown New Britain to approximately Newington Junction in Newington, the Busway will be located along DOT land within the former Conrail right-of-way (ROW). From Newington Junction north, the Busway will be located within the active Amtrak railroad ROW. Maintaining clearance from the active rail was a major engineering control for Busway design; Amtrak required a horizontal clearance of 16 feet from center of active rail to the back of Busway barrier in most locations. In the abandoned rail section, a multi-use trail for bicycle and pedestrian use will be constructed parallel to the Busway.

The dedicated Busway roadway will be reserved exclusively for buses, and will be two lanes wide, with one 12-foot lane in each direction. Additional lanes will be provided at station areas to allow non-stop buses to bypass stopped buses, and on and off ramps will be constructed to connect the Busway to the stations. The Busway will be protected by concrete barrier curbs, walls and/or chain link fence on both sides to keep unauthorized vehicles and persons off the facility. In addition, where the Busway runs parallel to the Amtrak active rail, a six-foot high fence will be installed on top of the barriers/walls next to the active rail. The Busway will include a new bridge spanning Trout Brook in West Hartford.

Eleven (11) stations will be constructed to serve Busway passengers at the following locations:

- Downtown New Britain (New Britain)
- East Main Street (New Britain)
- East Street (New Britain)
- Cedar Street (Newington)
- Newington Junction (Newington)
- Elmwood (West Hartford)
- Flatbush Avenue (West Hartford)
- Kane Street (Hartford)
- Parkville (Hartford)
- Sigourney Street (Hartford)
- Union Station (existing bus terminal in downtown Hartford)

A new Amtrak Access Road (AAR) will be constructed along the east side of Amtrak's active rail line from Newington to Hartford. The 4.45-mile long AAR is necessary because the Busway will be constructed on the west side of Amtrak's active rail line, which Amtrak currently uses for track maintenance access. The AAR will be a fairly uniform 10-foot width for most of its length, except for a few turnoffs and turnarounds that Amtrak required, and reductions to 8 feet wide in some areas to avoid wetland impacts. The riding surface will consist of sub-ballast (stone) material and will be unpaved. As required by Amtrak, the AAR was designed with 7 feet (minimum) of horizontal clearance from the active rail. The AAR design was also subject to a vertical clearance requirement; Amtrak required that it be located 3 feet below top of Amtrak rail. Construction of the Busway and AAR will be sequenced so that Amtrak has uninterrupted access along their active rail line. The AAR will include a new bridge spanning Trout Brook in West Hartford. This project also includes modifications to the existing track drainage system to promote positive drainage in the strip of ballast between the active Amtrak rail and the Busway. The drainage from this existing track area will be conveyed to six of the proposed Busway and AAR stormwater discharge points. The track drainage will be treated by hydrodynamic separators where runoff quantities warrant and terrain allows. The track runoff is included in the drainage designs and thus in the Attachment H computations for the AAR, H137, and H046 contract areas.

Construction of the Busway will also incorporate the replacement of Bridge No. 04324 (Cedar Street Bridge) (State Project 93-166). This project, designed by the CTDOT, will replace the deteriorating Route 175 (Cedar Street) bridge over the abandoned Conrail Waterbury Line in Newington. The project will be constructed at the same time as the Busway and will result in only minor temporary impacts regulated areas. It does not result in any drainage changes and does not add runoff to the Busway stormwater management system.

Construction of the Busway, stations, multi-use trail, and AAR will result in impacts to wetlands, watercourses, 100-year floodplains, stream channel encroachment lines (SCELs), and a floodway. The project will change stormwater runoff and drainage. These impacts are the subject of this application package.

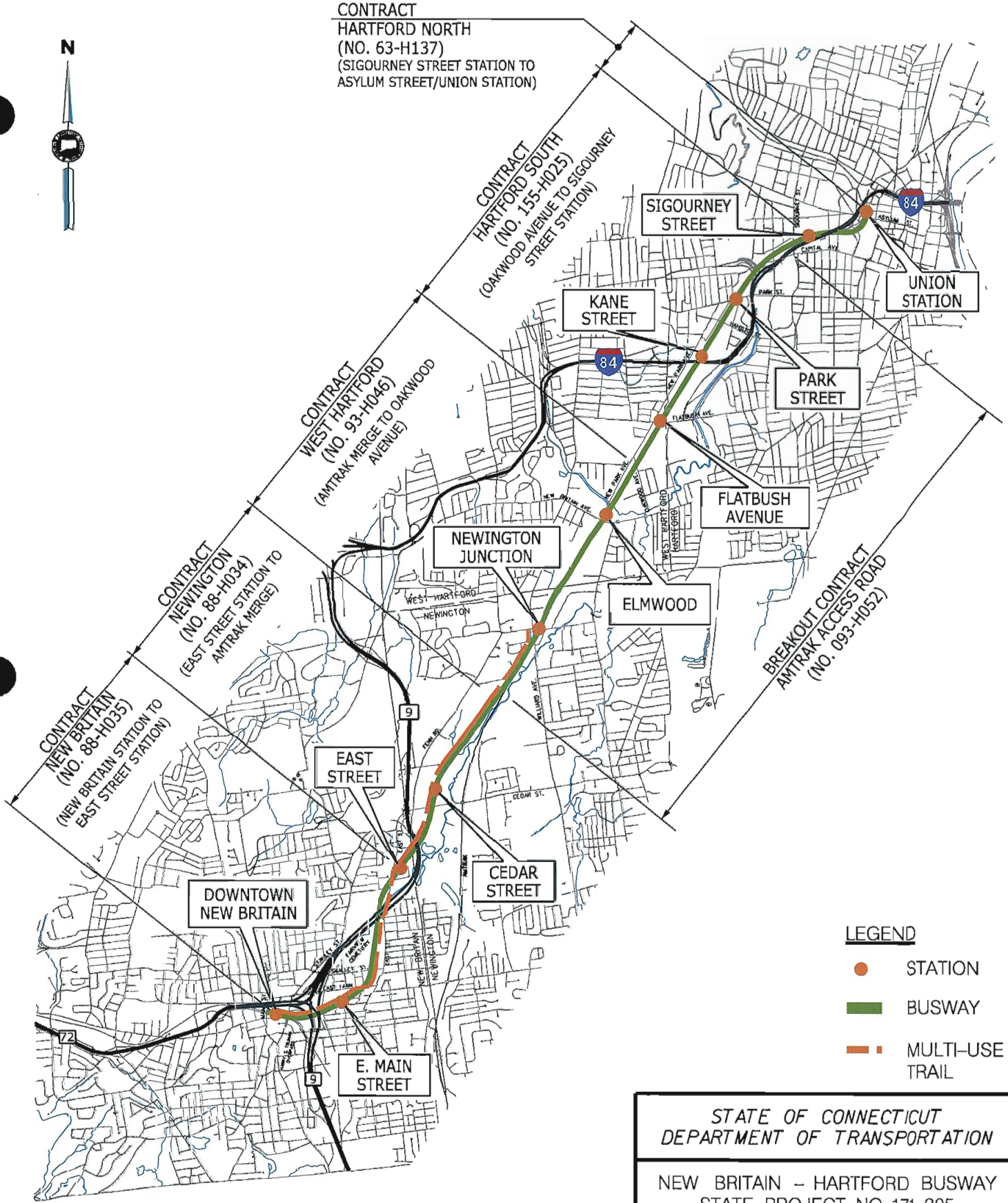
Design Contracts

The engineering designs for the Busway, stations, and AAR, which are the focus of this application, have been designed by different engineering firms. Plans, plates, and some of the tables in this application refer to design contract numbers. This section identifies the contract numbers and their approximate locations.

The mainline Busway design (and adjacent multi-use trail where it occurs) was segmented into five different design contracts. The Amtrak Access Road is a separate design contract, and the stations (combined) are another contract. The design contract limits and numbers are shown on the attached figure, "Busway By Contract". The contract numbers are cross-referenced on plans and tables throughout this application.

Construction Schedule

Construction of the roadway bridges, utility relocations, railroad relocation, and the Amtrak Access Road (AAR) will precede the start of Busway mainline construction and the station components. This is so that Amtrak has uninterrupted access to their active rail line throughout the Busway construction period (as well as permanently thereafter). The anticipated timing and duration of construction are the following:


CONTRACT
HARTFORD NORTH
(NO. 63-H137)
(SIGOURNEY STREET STATION TO
ASYLUM STREET/UNION STATION)
CONTRACT
HARTFORD SOUTH
(NO. 155-H025)
(OAKWOOD AVENUE TO SIGOURNEY
STREET STATION)
CONTRACT
WEST HARTFORD
(NO. 93-H046)
(AMTRAK MERGE TO OAKWOOD
AVENUE)
CONTRACT
NEWINGTON
(NO. 88-H034)
(EAST STREET STATION TO
AMTRAK MERGE)
CONTRACT
NEW BRITAIN
(NO. 88-H035)
(NEW BRITAIN STATION TO
EAST STREET STATION)
BREAKOUT CONTRACT
AMTRAK ACCESS ROAD
(NO. 093-H052)
N
SIGOURNEY STREET
UNION STATION
KANE STREET
PARK STREET
FLATBUSH AVENUE
NEWINGTON JUNCTION
ELMWOOD
EAST STREET
CEDAR STREET
DOWNTOWN NEW BRITAIN
E. MAIN STREET
84
9
72
LEGEND
STATION
BUSWAY
MULTI-USE TRAIL
STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
NEW BRITAIN – HARTFORD BUSWAY
STATE PROJECT NO. 171-305
BUSWAY BY CONTRACT
Baker
BAKER ENGINEERING NY, INC.
2096-B SILAS DEANE HIGHWAY
ROCKY HILL, CT 06067
JUNE 2006
N.T.S.

Busway Element	Construction Start	Anticipated Finish
Roadway Bridges & Utility Relocations	Spring 2011	Fall 2013
Railroad Relocations	Spring 2011	Winter 2012
Amtrak Access Road	January 2011	Spring 2012
Busway Mainline	Spring 2011	Winter 2013
Busway Stations	Fall 2011	Winter 2013
Wetland Mitigation Construction	Summer 2011	Spring 2012

WETLAND NUMBERING

Wetlands and intermittent watercourses (IWCs) are individually numbered for easy reference. Wetlands in the study corridor were numbered consecutively starting from 1 (e.g., 1, 2, 3, etc.) and IWCs were also numbered starting from 1. Wetland numbers generally increase from south to north, as do IWCs. If a particular wetland or IWC is not impacted by the project, that number will be missing from the discussions and impact tables in this permit application.

Where a large wetland system extends along one side of the corridor, such as along Piper Brook (Wetland 7), different portions of the wetland may be identified by use of a letter (e.g., 7A, 7B, 7C, etc.) In other cases, wetlands that are close to each other but not necessarily part of the same connected system share the same wetland number and are differentiated by the letter.

REGULATED ACTIVITIES

Regulated activities will occur at 36 wetland areas, 18 intermittent watercourses (IWCs), four (4) stream channel encroachment line locations, 17 100-year floodplain locations, and one (1) floodway location. Work will take place below the Ordinary High Water (OHW) of perennial watercourses in two (2) locations. Work in waterways is limited to culvert replacements. Bridges over watercourses have been designed to span the watercourses and avoid work in the water. Tables 1 through 4 in Attachment A provide a tabulation of impacts within regulated areas.

Construction impacts have been minimized because the Busway and multi-use trail will be constructed from the existing rail ROW. The west side of the ROW, where a second railroad track used to be located, is a well-established broad gravel path which Amtrak vehicles currently use for ROW maintenance. After the AAR is constructed (to the east of the existing tracks) so that Amtrak can use it for maintenance access, the (former) maintenance path will be used for construction of the Busway. Construction staging has been carefully designed so that work can be accomplished from the existing ROW as much as possible and the ROW will be used for construction haul roads. Only in select locations will any work need to be conducted off of the developed rail bed; at some of these, temporary impacts to wetlands will occur. The greatest temporary impacts are associated with the jacking pits that will be constructed in order to install new culverts at the culvert replacement sites known as Sites 4 and 5. Lesser temporary impacts are associated with the other culvert installations at Sites 2B and 3.

Regulated activities are depicted on the plates in Attachment G. Please note that the "Impact Summary" in the lower left-hand side of the title block on each plate shows the total impact to a wetland even if the impacts to the wetland are spread among multiple plates. This means that where a wetland extends onto two or more plates, the impact quantity refers to the sum of the two or more plates, rather than what can be seen on just one plate.

Project impacts are described below from southwest to northeast along the Busway. References to "Station" (e.g. Station 18+00 through 490+55) refer to the reference point on engineering plans along the linear axis of the main Busway. Within each contract area, station numbering progresses from south to north. The Amtrak Access Road (AAR) has a separate baseline, as it runs parallel to the Busway, so station references along it are preceded by "AAR."

1. New Britain (Contract No. 88-H035) (Station 18+80 to 118+00)

Impacted Regulated Areas: *Wetlands*, *IWCs*

Regulated activities in wetlands and intermittent watercourses include fill for the Busway alignment, and excavation and fill for a retaining wall (numbers 111 and 112). This contract includes construction of a stormwater outfall pipe to Piper Brook -- in a concrete-lined portion of the channel –but avoids work in the water and the floodplain by locating the discharge above these regulatory limits (see Plate 8A).

Drainage: Drainage designs have been coordinated with the City of New Britain and with the station designs adjacent to the contract area. A table summarizing Stormwater Drainage and Receiving Waters from Contract 88-H035 is shown in Attachment H – H035.

2. New Britain to Newington (Contract No. 88-H034) (Station 118+00 to 203+00)

Impacted Regulated Areas: *Wetlands*, *IWCs*, *Floodplains*, *Stream Channel Encroachment Lines*

Regulated activities in wetlands and intermittent watercourses include fill for the Busway alignment, excavation and fill for retaining walls (numbers 111, 101 104, 105, 102, and 103), two culvert replacements at locations known as Site 2B and Site 3, construction of drainage features such as scour holes, and temporary water handling at one of the culvert replacement sites. Culvert replacement will also impact floodplains and stream channel encroachment lines associated with Piper Brook tributaries. Construction sequencing designed to minimize impacts to wetland and watercourse resources during culvert replacement are detailed below in the section on "Construction Sequencing".

Drainage: Stormwater will be treated predominantly with sheet flow over grass and grass-lined swales. The west side of the Busway in this section has no curbing in order to maximize sheet flow. The east side of the Busway has a curb and surface runoff is collected by small systems with one or two catch basins. These small systems discharge to grass-lined swales. There is one larger system collecting from the adjacent project 88-H035 and the East Street Station, where flow will pass through a water quality basin.

A table summarizing Stormwater Drainage and Receiving Waters from Contract 88-H034 is shown at the end of Attachment H – H034.

3. Newington to West Hartford (Contract No. 93-H046) (Station 203+00 to 332+00)

Impacted Regulated Areas: *Wetlands, IWCs, Floodplains, Floodway, Stream Channel Encroachment Line*

Regulated activities in wetlands and intermittent watercourses include fill for the Busway alignment and the multi-use trail. The fill will also affect floodplains and a stream channel encroachment line associated with Piper Brook. An impact to a mapped floodway at Trout Brook will result from installation of a stormwater outfall in a non-wetland (upland) location.

Drainage: This contract uses a combination of piped drainage systems, grass-lined swales and sheet flow. A table summarizing Stormwater Drainage and Receiving Waters from Contract 93-H046 is shown at the end of Attachment H – H046.

4. Hartford South (Contract No. 155-H025) (Station 332+00 to 450+00)

Impacted Regulated Areas: *Wetlands, IWC, Floodplains*

Regulated activities in wetlands and an intermittent watercourse include fill for the Busway alignment. Riprap aprons associated with two outfalls to Kane Brook will affect floodplains.

Drainage: The design of this segment has incorporated several elements to meet water quality goals of the project. To the extent practicable, curbing has been eliminated. Trunk lines are proposed on major drainage systems to reduce potential for the re-suspension of sediments collected in catch basin sumps.

A table summarizing Stormwater Drainage and Receiving Waters from Contract 155-H025 is shown at the end of Attachment H – H025.

5. Hartford North (Contract No. 63-H137)

Impacted Regulated Areas: *None*

This segment will be constructed in the urbanized rail corridor in Hartford. No impacts will occur to wetlands, watercourses, stream channel encroachment lines, or floodplains.

Drainage: Drainage generated from this contract area will be accepted by the Metropolitan District Commission (MDC). A table summarizing Stormwater Drainage and Receiving Waters from Contract 155-H025 is shown at the end of Attachment H – H137.

6. Amtrak Access Road (Contract No. 93-H052) (Station 702+35 to 937+43)

Impacted Regulated Areas: *Wetlands, IWCs, Floodplains, Stream Channel Encroachment Lines*

Regulated activities in wetlands and intermittent watercourses include fill for the AAR, two culvert replacements at locations known as Site 4 and Site 5, and temporary water

handling at the culvert replacement sites. Fill and culvert replacement activities will also impact floodplains and stream channel encroachment lines associated with Piper Brook and Piper Brook tributaries. Construction sequencing designed to minimize impacts to wetland and watercourse resources during culvert replacement are detailed below in the section on "Construction Sequencing".

Drainage: Drainage improvements for the access road will consist primarily of open drainage swales constructed adjacent to the embankment slopes. In some areas it will be necessary to convey flow through piped systems. Two major culvert replacements are required to adequately pass existing drainage flows across the Busway, at locations called Site 4 and Site 5.

A table summarizing Stormwater Drainage and Receiving Waters from Contract 93-H052 is shown at the end of Attachment H - AAR.

7. Busway Stations (Contract No. 88-H039)

Impacted Regulated Areas: *Wetlands*

Regulated activities in wetlands will result from filling during construction of the East Street Station in New Britain and the Cedar Street Station in Newington. The Elmwood Station includes construction of a stormwater outfall pipe to Trout Brook -- in a concrete-lined portion of the channel – but avoids work in the water, floodway, and floodplain by locating the discharge above these regulatory limits (Plate 45).

Drainage: Drainage systems for the new stations will be separated as much as possible from municipal or private systems. The use of vegetated swales and basins has been maximized. A detention basin (grass-lined water quality basin) will be constructed at the Cedar Street Station and a detention basin (vegetated bio-retention basin) will be installed at the Elmwood Station.

A table summarizing Stormwater Drainage and Receiving Waters from Contract 93-H039 is shown at the end of Attachment H for each station that receives drainage from the Busway or that has a stand-alone drainage system.

AVOIDANCE AND MINIMIZATION MEASURES

Project impacts result from three main factors: a) the existing railroad ROW crosses perennial and intermittent watercourses; b) wetlands have formed in linear ditches along the existing ROW due to the lack of positive drainage (very level terrain); and c) the rail alignment was originally located through large wetland systems which still persist at the toe of slope in some areas along the corridor. These conditions made it very difficult for the project to avoid impacts to wetlands and watercourses. In order to take advantage of the existing transportation (rail) corridor, the Busway alignment is the best possible choice. However, construction of the Busway will impact wetlands along the alignment. Considering the history of the rail corridor, these are "edge" impacts to wetlands that have previously been affected by the rail alignment.

Most of the proposed Busway stations are located on properties that were at one time developed or disturbed by commercial or industrial land uses. The selection of such sites

minimized the potential for impacts to regulated areas. Only two of the stations are near or encroach on regulated areas: East Street Station in New Britain and Cedar Street Station in Newington.

The primary design principle to avoid impacts along the Busway was to minimize the change in grade between the existing ROW elevation and the proposed Busway. Designing the Busway to rest at or near existing grades minimized the amount of excavation or fill required to construct the new roadway. Horizontal and vertical adjustments were used to avoid and minimize wetland impacts. The same principle was applied to the Amtrak Access Road; however, Amtrak dictated the requirements of the roadway elevation relative to the existing rail bed for safety of rail operations.

Design elements have been incorporated into the project design to avoid and minimize wetland impacts. These are:

- Minimization of horizontal realignment along the Railroad ROW
- Minimization of vertical grade adjustments on the Railroad ROW
- Use of steeper 1.5:1 riprap slopes ("special riprap slope protection") instead of standard 2:1 slopes to reduce fill in regulated areas (e.g., at pipe-jacking Sites 4 and 5)
- Construction of retaining walls instead of fill slopes in some locations to minimize fill in wetlands, SCELS, and/or floodplains
- Designing construction access and methodology so as to avoid the need for construction equipment/disturbance in regulated areas.

The proposed project has been designed in accordance with, and complies with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control* and the *2004 Connecticut Stormwater Quality Manual*. Best Management Practices (BMPs) will primarily consist of erosion and sedimentation controls during construction. Before the start of construction, geotextile silt fence and haybales would be installed around all fill boundaries within the proposed project area. Geotextile silt fence and haybales will also be installed around all staging and stockpile areas within the project, once determined. Staging and stockpile areas will be sited within an upland area. There would be no storage of machinery or materials within wetland areas. Routine inspection and maintenance of BMP's will take place on a regular basis, particularly after rain events.

CONSTRUCTION SEQUENCING

Due to the linear nature, size and complexity of this construction project, construction sequencing will be of high importance for the protection of wetland resources within the project area. A substantial amount of work will be conducted along the active rail portion of the project. With this in mind, construction sequencing in these areas has been developed to avoid and minimize disruption of the Amtrak live rail activities. Temporary construction crossings of the live rail have also been minimized to the extent practicable. All work in the vicinity of the active rail line, or with the potential to affect the active rail line, has been coordinated with Amtrak.

Construction sequencing, access points, staging areas, and off-site construction routes will all be important aspects of this project. Obvious access points include existing at-grade road crossings and Amtrak access roads, however, additional access points may be available

from the station sites and several other access points off local roads. For example, at the Site 5 culvert crossing, access will be gained from Day Street, to the east of the Busway (Plate 35C).

Staging areas will be sited in upland areas in close proximity to the construction site. Proper erosion and sedimentation controls will be installed and maintained for the duration of the project around all staging areas. Storage of materials that could be injurious to human health or the environment in the event of flooding will be located outside of the 100-year flood zone. Other material or equipment may be stored below the 500-year flood elevation such that the material or equipment is not subject to major damage by floods, and that such material or equipment will be firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding (also see Attachment I – Flood Contingency Plan).

This project will require registration under the CTDEP *General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities*, which regulates stormwater and wastewater management on construction sites, both during and post activity. As part of this registration, the contractor must demonstrate a construction methodology, including sequencing, that ensures erosion and sedimentation are minimized. In compliance with this general permit, a Stormwater Pollution Control Plan will be developed. This plan will outline incorporate methods designed to address two components of stormwater pollution: (1) pollution caused by soil erosion and sedimentation during and after construction; and (2) stormwater pollution caused by use of the site after construction is completed, such as parking lots, roadways and the maintenance of grassed areas.

The proposed design includes the construction of retaining walls throughout the project area. Typically, these retaining walls are constructed to avoid and minimize impacts to wetland resources and other constraints. The retaining walls will be constructed to minimize disturbance by installation of temporary sheet piling on the outer side of the wall. Once the retaining wall has been constructed, the temporary sheeting will be removed and the area restored to its original condition.

Of specific importance is the construction sequencing for the two pipe-jacking sites within the project, Sites 4 and 5, as well as two other conventional culvert replacements, Sites 2B and 3. The following text describes the construction sequence, water handling and access points for these sites.

Site 2B (Plate 17)

This culvert replacement consists of the installation of a new 36" RCP to replace an existing 36" metal pipe. The new 36" RCP will be longer than the existing pipe, to accommodate the additional width requirements of the Busway, multi-use trail, and grass-lined ditch for stormwater treatment.

This culvert replacement is a conventional "open trench" type culvert installation (i.e., it will not require any unique construction methods such as pipe-jacking). Flow through this culvert is intermittent and quantities of water this culvert conveys are insignificant. However, during storm events it does convey stormwater. To minimize potential temporary impacts to water quality, culvert work at this site shall be conducted during periods of low flow. As a result, it is currently not anticipated that a water handling plan is required for this site. All work will be conducted from upland locations.

The following construction sequence will be followed for the installation of this culvert:

1. Install erosion and sedimentation controls as depicted on the plans
2. Remove existing 36" steel pipe
3. Prepare bedding for new 36" RCP
4. Install new 36" RCP
5. Install 36" RCCE at upstream end of pipe and stabilize
6. Install concrete wingwall at downstream end
7. Install Type I modified scour hole at downstream end of pipe and stabilize
8. Re-grade and stabilize all exposed soils as needed
9. Maintain E&S controls and water seeded areas as needed

Site 3 (Plates 20 to 20D)

This culvert replacement consists of the installation of a new 6'x6' concrete box culvert to replace an existing 3'x4' stone box culvert. The new box culvert will be longer than the existing culvert, to accommodate the additional width requirements of the Busway and Multi-use Trail.

Like Site 2B, this culvert replacement is a more conventional "open trench" type culvert installation and will not require pipe-jacking. However, since this culvert experiences a greater flow than that at Site 2B, additional water handling methods will be utilized.

Under existing conditions, this culvert conveys perennial flow from an unnamed tributary to Piper Brook. To minimize potential temporary impacts to water quality, a temporary 48" bypass pipe will be installed to allow work to be conducted in a dry condition. If required, there is provision for pumping of groundwater within work areas. An upland location will be feasible for a temporary pump discharge dewatering basin, if needed (Plate 20). Work will be conducted from both upland locations and temporary work areas within wetlands, as shown on Plate 20.

The following construction sequence will be followed for the installation of this culvert:

1. Erosion and sedimentation controls will be installed
2. Install temporary 48" culvert pipe
3. Install temporary flow diversion barrier at downstream end
4. Install temporary sheet piling at upstream end
5. Install groundwater pump, if needed
6. Install section of footing for Retaining Wall (No. 103) Site No. 3 where box culvert will be installed
7. A dewatering basin will be installed on the existing sewer main mound to the west of the pump
8. Install downstream concrete wingwall
9. Install new 6'x6' concrete box culvert
10. complete retaining wall around upstream end of box culvert
11. Install Type I intermediate riprap scour hole at downstream end of pipe and stabilize
12. Remove temporary flow diversion barrier at upstream end of temporary 48" culvert

13. Remove temporary flow diversion barrier at downstream end of temporary 48" culvert
14. Remove temporary 48" culvert
15. Regrade and stabilize all exposed soils as needed
16. Maintain E&S controls and water seeded areas as needed

Site 4 (Plates 30 to 30F)

This culvert replacement consists of the installation of new twin 78" RCP culverts to replace an existing 3.2'x3' box culvert. The new twin 78" RCPs will be longer than the existing culvert, to accommodate the additional width requirements of the Busway and Multi-use Trail. Unlike Sites 2B and 3, this culvert replacement is not a "conventional" type culvert installation, but will require pipe-jacking. The installation of these new RCPs is complicated by the constrained nature of the site, and a phased water handling approach will be needed to protect wetland resources.

Site access is proposed by utilizing the proposed Newington Junction Station site, located off Willard Avenue in Newington, to gain access to Amtrak's right of way. Construction vehicles will then utilize the existing Amtrak Access Road, located along the westerly side of the tracks, to access the upstream side of the culvert. A temporary access road and staging platform consisting of an 8" stone blanket on geotextile fabric will be required to access the work area (see Plates 30C and 30D).

Under existing conditions, this culvert conveys perennial flow from an un-named tributary to Piper Brook. To minimize potential temporary impacts to water quality, the work areas associated with the new culvert headwall locations will be contained with sheet piling to allow work to be conducted in a dry condition. The existing culvert will be maintained during Stage 1 (Plate 30C) of construction to allow partial construction (approximately 75%) of the new headwalls and installation, through pipe-jacking, of the new RCPs. Upon completion of this stage, Stage 2 (Plate 30D) will be initialized. Under Stage 2, the tributary will be directed into the new RCPs and the unfinished portions of the headwalls and the weir will be segregated via installation of sheet piling. Once flow has been diverted to the new RCPs, the remainder of the weir and headwalls will be constructed in the dry condition. There is provision for pumping of groundwater within work areas through the installation of sheet piling, diversion barriers, groundwater pumps, and dewatering basins. The temporary impact areas shown for both Stage 1 and 2 (Plates 30C and 30D) include room for temporary pump discharge dewatering basins, since adjacent upland areas do not appear feasible at this site.

Work will be conducted from upland locations as well as temporary work areas within wetlands. To access the downstream (outlet) side of the culvert, a temporary at-grade crossing of the tracks is proposed from the existing Amtrak Access Road. Amtrak has given preliminary approval for this crossing. The crossing itself will be installed by Amtrak. The contractor will be required to install a locked gate, in addition to complying with all other Amtrak requirements. A temporary road and staging platform, consisting of an 8" stone blanket on geotextile fabric, will be required to access to actual work area (see Plates 30C and 30D).

The following is a suggested construction sequence for the installation of this culvert:

Stage 1:

1. Install temporary grade crossing.
2. Install erosion and sedimentation controls as indicated.
3. Construct temporary construction access drives and staging areas.
4. Install temporary flow diversion barriers around downstream staging area as indicated.
5. Install temporary bypass pump and check dam to collect and pump base flow as indicated - see special provisions.
6. Remove section of existing endwall on downstream side prior to installation of temporary steel sheet piling.
7. Install temporary steel sheet piling with opening for pipe jacking and construct jacking and receiving pits (design to be provided by contractor).
8. Monitor tracks per amtrak requirements and provide monitoring during jacking procedure.
9. Jack approximately 80 feet of twin 78" rcp class v under railroad embankment - see special provisions.
10. Construct footings for southern section of walls on either end of pipe jacking with key-in for headwalls and support section for twin 78" rcp end sections.
11. Backfill footing heels with crushed stone and install final sections of twin 78" rcp class v.
12. Install temporary diversion barriers on upstream side of existing triple arch pipes as shown.
13. Construct headwall extensions on both sides of existing sanitary sewer for support of concrete weir.
14. Construct south portions of wing type endwall and bridge abutments in place around twin 78" rcp class v.
15. Install temporary 15" rcp through new abutment and remove bypass pump.
16. Remove jacking and receiving pits and temporary steel sheet piling not necessary for flow diversion.

Stage 2:

1. Maintain or remove stage 1 erosion control measures as required. Install additional erosion & sedimentation controls as indicated.
2. Maintain and repair existing access drives and staging areas from stage 1. Construct additional temporary construction access drives and staging areas as indicated on plan.
3. Construct low-flow riprap channel parallel with existing grassed swale on downstream side. Provide additional flow diversion barriers, if necessary (not shown), during excavation of new channel.
4. Install standard riprap channel lining downstream prior to opening twin 78" rcp for use.
5. Install stage 2 temporary flow diversion barriers as indicated and remove remaining stage 1 temporary steel sheet piling and flow diversion barriers.
6. Divert upstream flows to new twin 78" rc pipes.
7. Remove existing upstream culvert headwall. Remove portion of culvert if necessary and cap existing culvert end.

8. Install doghouse manhole on existing box culvert as shown, cap western section from manhole wall to upstream end of culvert and fill section with flowable fill.
9. Remove downstream headwall and install 24" pvc pipe in eastern section of existing box culvert from new headwall to doghouse manhole.
10. Install temporary steel sheet piling as indicated.
11. Construct remaining portion of wall footings, wing type endwall, bridge abutment and superstructure.
12. Construct concrete weir across sanitary sewer berm from headwall to headwall.
13. Relocate flow diversion barrier on upstream end of existing triple arch pipes to block flow and provide bypass pump for base flow to new 78" rcp. Pour 6" concrete lined channel and remove diversion barrier and pump when cured.
14. Remove temporary steel sheet piling and diversion barriers, backfill walls and abutments.
15. Leave temporary 15" rcp and rcce in place until construction of busway and mut begins.
16. Remove temporary access road and staging area when directed by the engineer (see general note 2).
17. Remove erosion control measures.
18. Seed and plant temporarily impacted areas as required.
19. Remove temporary grade crossing.

Site 5 (Plates 35 to 35G)

This culvert replacement consists of the installation of a new 90" RCP culvert to replace existing duel 3.2'x4' and 3.4'x4' box culverts. The new 90" RCP will be longer than the existing culvert, to accommodate the additional width requirements of the Busway and Multi-use Trail. Like Site 4, this culvert replacement is not a "conventional" type culvert installation, but will require pipe-jacking. The installation of this new RCP is complicated by the constrained nature of the site, and a phased water handling approach will be needed to protect wetland resources.

Site access to the Site 5 construction area will utilize Newington Junction Station located off Willard Avenue in Newington to gain access to Amtrak's right of way. Construction vehicles will then utilize the existing Amtrak Access Road located along the westerly side of the tracks to access the upstream side of the culvert. Work will be conducted from both upland locations and temporary work areas within wetlands, as shown on Plates 35C and 35D. Temporary roads and staging platforms consisting of an 8" stone blanket on geotextile fabric will be required to access the actual work area (see Plates 35C and 35D). To access the downstream (outlet) side of the culvert, a temporary construction easement for access from Day Street would be required from (now/formerly) 240 Day Street, LLC. Alternative access was investigated but would require a substantial temporary access road and result in additional impacts to environmentally sensitive areas.

Under existing conditions, this culvert conveys perennial flow from an un-named tributary to Piper Brook. To minimize potential temporary impacts to water quality, the work areas associated with the new culvert headwall locations will be contained with sheet piling and temporary flow diversion barriers to allow work to be conducted in a dry condition. The existing culvert will be maintained during Stage 1 (Plate 35C) of construction to allow partial construction (approximately 50%) of the new headwalls and installation, through pipe-

jacking, of the new 90" RCP. At the downstream end of the existing culverts, two temporary 36" HDPE pipes will be installed to carry flow under the proposed temporary access drive and staging area. The temporary 36" HDPE pipes will be placed within the existing watercourse channel.

Upon completion of this stage, Stage 2 (Plate 35D) will be initialized. Under Stage 2, the tributary will be directed into the new RCP via a temporary flow diversion barrier and sheet piling and the unfinished portions of the headwalls will be segregated via installation of sheet piling. Once flow has been diverted to the new RCP, the remainder of the headwalls will be constructed in the dry condition. There is provision for pumping of groundwater within work areas through the installation of sheet piling, diversion barriers, groundwater pumps, and dewatering basins. There are upland locations where temporary pump discharge dewatering basins will be feasible for both Stage 1 and Stage 2 (Plates 35C and 35D).

The following is a suggested construction sequence for the installation of this culvert:

Stage 1:

1. Install erosion and sedimentation controls as indicated.
2. Temporarily divert downstream flow, utilizing flow diversion barriers as required, and install temporary 36" hdpe pipes, dams and riprap pads.
3. Construct temporary construction access drives and staging areas.
4. Install temporary flow diversion barriers as indicated.
5. Bypass pump base flow as indicated - see special provisions.
6. Construct access drive over temporary 36" pipes.
7. Remove portion of existing upstream and downstream wingwalls.
8. Install temporary steel sheet piling and construct jacking pits.
9. Jack 90" rcp class v - see special provisions.
10. Construct footings for southern section of walls on either end of pipe jacking with key-in for headwalls and support section for 90" rcp end sections.
11. Remove temporary steel sheet piling around jacking and receiving pits and install temporary sheet piling (railroad) for retaining wall construction.
12. Construct southern portion of retaining wall no. 101 (see structure dwgs).
13. Conduct final grading at base of retaining wall and stabilize with special riprap slope protection.
14. Construct portion of new riprap channel lining in relocated streambed at base of special riprap slope protection.

Stage 2:

1. Maintain or remove stage 1 erosion control measures as required. Install additional erosion & sedimentation controls as indicated.
2. Maintain and repair existing access drives and staging areas from stage 1. Construct additional temporary construction access drives and staging areas as indicated on plan.
3. Install pre-formed scour hole and remainder of western portion of riprap channel lining in relocated streambed.
4. Relocate temporary flow diversion barriers as indicated and remove stage 1 temporary steel sheet piling and any unnecessary flow diversion barriers.
5. Divert stream flows to new 90" rc pipe and remove temporary 36" hdpe pipes, dams and unnecessary diversion barriers.

6. Following the opening of the 90" rc pipe to flows, pump any standing water in the downstream eastern portion of relocated streambed into dewatering basin and construct eastern portion of the riprap channel lining.
7. Remove remainder of existing upstream and downstream culvert headwalls, fill existing 3.2'x4.0' box culverts with flowable fill, cap existing culvert ends and backfill.
8. Install remainder of new riprap channel lining in eastern portion of upstream end.
9. Install temporary sheet piling (railroad) as indicated for retaining wall construction.
10. Construct remaining portion of wall footings and northern portion of retaining walls.
11. Remove temporary access road and staging area when directed by the engineer (see note 2).
12. Remove erosion control measures.
13. Seed and plant temporarily impacted areas as required.

AREAS OF ENVIRONMENTAL CONCERN

CTDOT has conducted a series of site investigations to identify potential areas of environmental concern in order to effectively manage and dispose of contaminated materials during construction of the Busway. Relative to work in wetlands, the potential for encountering contaminated soil and groundwater does exist. To manage potential contamination risks, the project will comply with the guidance memorandum, "General Guidance – Management of Controlled Materials and Related Topics" (Tetra Tech Rizzo, October 23 2009) (see Attachment C8). Construction contractors will be required to properly manage controlled materials within the Busway project area. Specifications will be developed and incorporated into the contract for working in and managing contaminated soil and groundwater.

9. *Inland Wetlands and Watercourses Applications Only*:

a. Is the project located in a public water supply watershed? ☐ Yes ☒ No

If Yes, the applicant must give written notice to the water company of the filing of this application in accordance with CGS Section 22a-42f.

If Yes, include a copy of that notice as Attachment C9a.

b. Is any portion of an inland wetland or watercourse in which the regulated activity is proposed located within 500 feet of an another municipality? ☐ Yes ☒ No

If Yes, the applicant must give written notice to the inland wetlands agency of such municipality of the filing of this application in accordance with CGS Section 22a-42c.

If Yes, include a copy of that notice as Attachment C9b.

c. Is the owner of the subject property different than the applicant? ☐ Yes ☒ No

If Yes, the owner must give written consent to the proposed activity in accordance with RCSA Section 22a-39-5.2.

If Yes, include a copy of that consent as Attachment C9c.

10. *Inland Wetlands and Watercourses Applications Only*:

List the names and addresses of the current owners of record of land abutting the site of the proposed regulated activity.

Name:

Address:

City/Town: State: Zip Code:

Mailing address, if different than above:

Mailing Address:

City/Town: State: Zip Code:

Name:

Address:

City/Town: State: Zip Code:

Mailing address, if different than above:

Mailing Address:

City/Town: State: Zip Code:

Name:

Address:

City/Town: State: Zip Code:

Mailing address, if different than above:

Mailing Address:

City/Town: State: Zip Code:

☒ Check here if additional sheets are necessary, and label and attach them to this sheet. **See attached table (Attachment C 10)**

NEW BRITAIN - HARTFORD BUSWAY

STATE PROJECT NO. 171-305

ATTACHMENT C QUESTION 10: PROPERTY OWNERS ABUTTING IMPACTED WETLANDS

Owner Name	Owner Address	Town	State	Zip Code	Actual Street Address	Town
Mirtha L C Medina	PO Box 230052	Hartford	CT	06123	154 Francis Ave	Hartford
Rehord Hartford LLC	1385 Handcock St	Quincy	MA	02169	Francis Ave	Hartford
Jorge A. Ortiz	80 Hilltop Farms Ln	East Hartford	CT	06118	126 Francis Ave	Hartford
Virginia Laureano	122 Francis Ave	Hartford	CT	06106	122 Francis Ave	Hartford
Agostinho M. Silva	15 Sherburne Rd	Wethersfield	CT	06109	118 Francis Ave	Hartford
Teresa Santiago	114 Francis Ave	Hartford	CT	06106	114 Francis Ave	Hartford
State of Connecticut					583 Flatbush Ave	Hartford
Conn Light & Power Co	ATTN_Property Tax Dept	Hartford	CT	06141	1037 New Britain Ave	West Hartford
1030 Building Company	Hirschfeld Mgmt, Inc STE 106	West Hartford	CT	06110	1030 New Britain Ave	West Hartford
The Grody Co	C/O Isham Realty Co	West Hartford	CT	06117	540 New Park Ave	West Hartford
Conn Tar & Asphalt Service, Inc	40 Jansen Court	West Hartford	CT	06110	570 New Park Ave	West Hartford
CT Self Storage of West Hartford LLC	PO Box 271391	West Hartford	CT	06127	580 New Park Rd	West Hartford
Bernard L TR Bodine	237 Fern Street Unit 105 W	West Hartford	CT	06119	620 New Park Ave	West Hartford
235 Newfield Avenue LLC	C/O John Dexheimer	Farmington	CT	06032	235 Newfield Ave	West Hartford
SK Realty	285 Newfield Ave	West Hartford	CT	06106	285 Newfield Ave	West Hartford
NYNH&HRR CO, New Haven	R/W	West Hartford	CT	06110	610 Oakwood Ave	West Hartford
Michael Fine	PO Box 370373	West Hartford	CT	06137	620 Oakwood Ave	West Hartford
630 Oakwood Ave Corp	C/O Marjam Supply Co Inc	Farmingdale	NY	11735	630 Oakwood Ave	West Hartford
Blu Sky Investors LLC	111 Holmes Rd	Newington	CT	06111	111 Holmes Rd	Newington
Blu Sky Investors LLC	111 Holmes Rd	Newington	CT	06111	91 Holmes Rd	Newington
Copper Beech Associate LLC	45 Spring St	Newington	CT	06111	33 spring St	Newington
Christine H. Lombardo	PO BOX 847	Derby	VT	05829	123 Summit Sty	Newington
240 Day Street LLC	100 Burritt St	New Britain	CT	06053	240 Day St	Newington
Catamount Newington LLC	100 Milk Ln	Newington	CT	06111	100 Milk Ln	Newington
National Acme Inc	8 Cutter Ln	Glastonbury	CT	06033	690 Cedar st	Newington
Jeannette R. Koczera	181 Maromas Rd	Middletown	CT	06457	Cedar St	Newington
L &L Realty LLC	PO Box 1527	Avon	CT	06001	697 Cedar St	Newington
Conn State University	0 Coburn Ave	Newington	CT	06111	0 Coburn Ave	Newington
State of Connecticut DOT					146 Willard Ave	Newington
Christine H. Lombardo	PO BOX 847	Derby	VT	05829	125 Summit St	Newington
Frank ET AL Mancini	19 Shadow Ln	West Hartford	CT	06117	Day St	Newington

Conn Light & Power Co	PO Box 270	Hartford	CT	06101	Willard Ave	Newington
GR I Newington LLC	1 One City Center 4th Flr	Portland	ME	04101	Holly Drive	Newington
Hayes kaufman Newington Associates L	1481 Pleasant Valley RD	Manchester	CT	06040	22 Fenn Rd	Newington
Kellogg Co	PO Box 06019	Chicago	IL	60606	50 Hollow Tree Ln	Newington
Fenn Manufacturing Co DIV	300 Fenn Rd	Newington	CT	06111	300 Fenn Rd	Newington
Town of newington	131 Cedar St	Newington	CT	06111	281 Milk Ln	Newington
Fennwyck Estates Condo Accoc LLC	Willard Ave	Newington	CT	06111	Willard Ave	Newington
Sandy Brook LLC	9 Cove Ln	Kings Point	NY	11024	1317 East St	New Britain
CCSU	1615 Stanley St	New Britain	CT	06053	195 Lester St	New Britain
CCSU	1615 Stanley St	New Britain	CT	06053	1285 East St	New Britain
Ishtar Realty LLC	PO BOX 2515	New Britain	CT	06053	50 Saint Clair Ave	New Britain
Chrapek Zdenka	635 Percival Ave	Kensington	CT	06037	46 Saint Clair Ave	New Britain
Anthony T Capozzi	83 Pinnacle Rd	Plainville	CT	06062	36 Saint Clair Ave	New Britain
Podlasek Janusz S	23 Saint Clair Ave	New Britain	CT	06051	20 Saint Clair Ave	New Britain
Brenda Moore	1235-A East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Sardaroud Degranouhi Kasbar	15 Clover Dr	West Hartford	CT	06110	1235-1259 East Street	New Britain
Gozdz Krzysztof	1235-C East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Chochowska Bozena	1235-D East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Theresa B Mcguire	1239 East St #A-1	New Britain	CT	06053	1235-1259 East Street	New Britain
Jean W Pascal	1239 East St B-1	New Britain	CT	06053	1235-1259 East Street	New Britain
JJO LLC	204 Old Farm Dr	Newington	CT	06111	1235-1259 East Street	New Britain
Joseph Jerry K	204 Oldfarm Dr	Newington	CT	06111	1235-1259 East Street	New Britain
Dominik + Mika Bertotti	1239 East St 2-A	New Britain	CT	06053	1235-1259 East Street	New Britain
Violetta Pietrucha	1239 East St 2-B	New Britain	CT	06053	1235-1259 East Street	New Britain
Housing + Urban Development	5 Merrimack	Merrimack	NH	03054	1235-1259 East Street	New Britain
Kristine Lynn Kuharski	1239 East St 2-D	New Britain	CT	06053	1235-1259 East Street	New Britain
Andre Jacques	49 Custer St	West Hartford	CT	06110	1235-1259 East Street	New Britain
Kyle C Jacques	1239 East St 3-B	New Britain	CT	06053	1235-1259 East Street	New Britain
Melissa Lynne White	1239 East St 3-C	New Britain	CT	06053	1235-1259 East Street	New Britain
Marek + Celina Klimek	1239 East St 3-D	New Britain	CT	06053	1235-1259 East Street	New Britain
Lorna E Gaillard	1241 East St 1A	New Britain	CT	06053	1235-1259 East Street	New Britain
Joseph Jerry K	1241 East St 1B	New Britain	CT	06053	1235-1259 East Street	New Britain
Jeanette Stasiak	216 Joy Ln	New Britain	CT	06053	1235-1259 East Street	New Britain
Vilma Cortes	1241 East St 1D	New Britain	CT	06053	1235-1259 East Street	New Britain
Jowita Koper	1241 East St 2A	New Britain	CT	06053	1235-1259 East Street	New Britain
Gloria Maldonado	1241 East St 2B	New Britain	CT	06053	1235-1259 East Street	New Britain
Wissam M Dah	290 Barbourtown Rd	Canton	CT	06019	1235-1259 East Street	New Britain

Bruce Polak	1241 East St 2D	New Britain	CT	06053	1235-1259 East Street	New Britain
Jeanette Gomez	1241 East St 3A	New Britain	CT	06053	1235-1259 East Street	New Britain
Wayne A Moore	1241 East St 3B	New Britain	CT	06053	1235-1259 East Street	New Britain
James + Linda Messier	16 Lynn Dr	Vernon	CT	06066	1235-1259 East Street	New Britain
Janina Sawre	1241 East St 3D	New Britain	CT	06053	1235-1259 East Street	New Britain
Christopher Archer	16 Sylvan Ridge	Rockfall	CT	06181	1235-1259 East Street	New Britain
Edelmira Arroyo	1243 B East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Jolanita + Mariusz Bielski	106 Pfister St	Newington	CT	06111	1235-1259 East Street	New Britain
Robert Kieth Bryan	1243 D East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Todd B Chevalier	353 West 56th st apt 8K	New York	NY	10019	1235-1259 East Street	New Britain
Steven J Grey	1243 F East St	New Britain	CT	06053	1235-1259 East Street	New Britain
JJO LLC	204 Old Farm Dr	Newington	CT	06111	1235-1259 East Street	New Britain
Arthur Wells Jr	1247 B East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Nancy Smith	1247 C East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Piotr + Dorota Lukaszczyk	1247 D East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Lori A Todd	1247 E East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Mariusz Makuch	1247 F East St	New Britain	CT	06053	1235-1259 East Street	New Britain
James + Mary Wilson	1251 A East St	New Britain	CT	06053	1235-1259 East Street	New Britain
My Linh Truong	1251 B East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Dzevdet E Hodzic	1251 C East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Carmen Lagaipa	1251 D East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Shelia L Milam	1251 E East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Richard + Claire Daigle	1251 F East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Janice Jefferys	1259 A East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Bronislawa Palka	1259 B East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Karol Kurkowski	1259 C East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Mariusz + Jolanta Bielski	106 Pfister St	Newington	CT	06111	1235-1259 East Street	New Britain
Joshua Johnson	1259 E East St	New Britain	CT	06053	1235-1259 East Street	New Britain
Mariam Zacharias	1259 F East St	New Britain	CT	06053	1235-1259 East Street	New Britain

11. *Section 401 Water Quality Certification Applications Only:*

In order to obtain a Section 401 Water Quality Certification from the DEP, you must have applied for a federal license or permit for an activity which may result in a discharge into the waters of the United States, including wetlands.

a. Has an application for a federal license or permit been submitted to the Army Corps of Engineers or other federal agency? ☒ Yes ☐ No

If Yes, include a complete copy of the application form and plans as Attachment C11a.

b. If the Section 401 Water Quality Certification application is for an activity authorized by an individual or programmatic general permit issued by the Army Corps of Engineers under section 404 of the federal Clean Water Act, identify such permit by name and application or file number.

Permit Name:

Application or File Number:

12. Summary of Documents submitted with Attachment C: Check each document being submitted under Attachment C as verification that all applicable documents have been submitted.

☒ Attachment C8: Disposal Plan

☐ Attachment C9a: If the project is located in a public water supply watershed, provide a copy of the written notice sent to the water company of the filing of this application in accordance with CGS Section 22a-42f.

☐ Attachment C9b: If any portion of an inland wetland or watercourse in which the regulated activity is proposed to be located is within 500 feet of an another municipality, provide a copy of the written notice sent to the inland wetlands agency of such municipality of the filing of this application in accordance with CGS Section 22a-42c.

☐ Attachment C9c: If the owner of the subject property is different than the applicant, provide a copy of the owner's written consent to the proposed activity in accordance with RCSA Section 22a-39-5.2.

☒ Attachment C11a: *Section 401 Water Quality Certification Applications Only*: a complete copy of the application form and plans submitted to a federal agency for a federal license or permit.

☐ Other, please specify:

Connecticut Department of Transportation
State Project No. 171-305, New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain

Attachment C8: Disposal Plan

TETRA TECH RIZZO

MEMORANDUM

To: Amie Maines and Judy Nemecek

From: David T. Williams

Re: **General Guidance – Management of Controlled Materials and Related Topics**
New Britain to Hartford Busway Project
State Project No.: 0171-0305

Date: October 23, 2009

Pursuant to our recent meeting with Connecticut Department of Transportation (CT DOT) and design engineers assigned to the New Britain to Hartford Busway Project, Tetra Tech Rizzo (Tetra Tech) is submitting this general guidance memorandum regarding the management of Controlled Materials and other related topics.

Controlled Materials

Controlled Materials are all materials, excluding the existing pavement structure (asphalt and sub base), rock, and bedrock that are excavated within an Area of Environmental Concern (AOEC). CT DOT specifications define how Controlled Materials are handled, reused, solidified (if necessary) and disposed.

Areas of Environmental Concern – Controlled Material Management

AOECs are defined as areas that have been determined to contain contaminants in soil and/or groundwater that exceed one or more of the numerical criteria presented in the Connecticut Department of Environmental Protection's (DEP's) Remediation Standard Regulations (RSRs).

Generally, when Controlled Material is excavated from within an AOEC it is transported to a Waste Stockpile Area (WSA) for waste characterization testing. However, similar to utility work, Controlled Material may be used as backfill in the same AOEC where it originated from without going to the WSA. This is allowed if the material is returned to the originating excavation in a timely manner and is not allowed to be staged for prolonged periods of time in a location other than the WSA. Controlled material that is reused as backfill may not be placed below the water table or in an area subject to erosion.

If excavated Controlled Material is not re-used as backfill in the originating AOEC and/or is deemed unsuitable (structurally unsound, etc.) for backfill, it must go to the WSA for testing. If testing at the WSA determines that the AOEC material **does** have contaminants above the applicable RSR criteria, the material is disposed of at a CT DOT approved facility as Controlled Material. If testing at the WSA determines that the AOEC

150 Trumbull Street, 4th Floor
Hartford, CT 06103
Tel 860.549.8430 Fax 860.549.8422

material **does not** have contaminants above the applicable RSR criteria, the material can be classified as "Reuse Material" and may be reused within the project limits in accordance with the following conditions:

1. Such soil is deemed to be structurally suitable for use as fill by the engineer.
2. Such soil is not placed below the water table.
3. The DEP's groundwater classification of the area where the soil is to be reused as fill does not preclude said reuse.
4. Such soil is not place in an area subject to erosion.

Low Level Areas of Environmental Concern – Material Management

Low Level Areas of Environmental Concern (LLAOEC) are those "polluted" areas defined as containing contaminants at concentrations that have been detected, but not detected above the numerical criteria presented in the RSRs for the specific groundwater classified area. LLAOEC material is not considered Controlled Material.

LLAOEC material that is excavated within the project limits may be reused throughout the project limits without testing. If excavated LLAOEC material cannot be reused within project limits, it is transported to the WSA. At the WSA, the LLAOEC may be staged in a designated re-use area for future use. If LLAOEC material cannot be reused, it is considered excess material and is tested for off-site disposal along with Controlled Material.

Contaminated groundwater that is located in an AOEC is managed in accordance with the CT DOT "Handling of Contaminated Groundwater" specification.

Groundwater Classification – Controlled Material Reuse

Test results from Controlled Material staged at the WSA are compared to the applicable RSR criteria to assess disposal/reuse options. Generally speaking, different RSR criteria apply to different groundwater classification areas. The majority of the groundwater in Connecticut has been classified by the DEP as either GB (impacted due to spills, poor land use practices and not consumable without treatment) or GA (drinking water quality).

Controlled Materials that have been excavated from a GB classified AOEC are typically not reused in any portion of the originated AOEC that is classified GA. The reasoning is to avoid potential negative impacts to groundwater resulting from the placement of degraded material in an area where the groundwater is assumed to be of drinking water quality.

Controlled Materials excavated in a portion of an AOEC that is classified GA and which have contaminants at concentrations above the GA standards but below the less stringent GB standards may be reused in a portion of the same (originating) AOEC if classified

GB. In some cases, construction limits traverse the boundaries of different groundwater classified areas.

Waste Stockpile Area and Characterization Testing

Waste Stockpile Areas (WSAs) are constructed, managed and dismantled in accordance with CT DOT specifications. If the volume of staged soil in any one month is expected to exceed 1,000 cubic yards, a DEP soil staging permit is required and is prepared by Environmental Compliance's consultant. Generally speaking, the size, configuration and location of the WSA are based on a number of factors including the volume of material expected to be generated and managed. Typically WSAs have concrete block "storage bins" capable of staging up to 250 cubic yards in each bin. Material is staged on and covered with plastic sheeting. When bins become full, the material is tested and characterized. A CT DOT specification defines how the WSA is managed, constructed and dismantled.

Connecticut Department of Transportation
State Project No. 171-305, New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain

Attachment C: Documentation Form

Written Notice to Municipalities

1. City of New Britain
2. Town of Newington
3. Town of West Hartford
4. City of Hartford

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546
Phone:

CERTIFIED MAIL, RETURN RECEIPT REQUESTED

August 4, 2010

Honorable Timothy T. Stewart
Mayor
City of New Britain
27 West Main Street
New Britain, Connecticut 06051

Dear Mayor Stewart:

Subject: Notice of Permit Application
New Britain – Hartford Busway
New Britain, Newington, West Hartford and Hartford

Pursuant to Section 22a-42c of the Connecticut General Statutes, the Department is hereby notifying you that an Inland Wetland and Watercourses and Stream Channel Encroachment Permit Application has been submitted to the Department of Environmental Protection to conduct regulated activities associated with the proposed construction of the New Britain – Hartford Busway. The attached Public Notice provides a description of the proposed project.

Please contact Mr. Mark W. Alexander, Transportation Assistant Planning Director at telephone number (860) 594-2931, if you have any further questions concerning this application.

Thank you for your cooperation.

Very truly yours,

Mark W. Alexander
Transportation Assistant Planning Director
Bureau of Policy and Planning

Enclosure

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546
Phone:

CERTIFIED MAIL, RETURN RECEIPT REQUESTED

August 4, 2010

John Salomone
Town Manager
Town of Newington
131 Cedar Street
Newington, Connecticut 06111

Dear Mr. Salomone:

Subject: Notice of Permit Application
New Britain – Hartford Busway
New Britain, Newington, West Hartford and Hartford

Pursuant to Section 22a-42c of the Connecticut General Statutes, the Department is hereby notifying you that an Inland Wetland and Watercourses and Stream Channel Encroachment Permit Application has been submitted to the Department of Environmental Protection to conduct regulated activities associated with the proposed construction of the New Britain – Hartford Busway. The attached Public Notice provides a description of the proposed project.

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Thank you for your cooperation.

Very truly yours,

Mark W. Alexander
Transportation Assistant Planning Director
Bureau of Policy and Planning

Enclosure

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546
Phone:

CERTIFIED MAIL, RETURN RECEIPT REQUESTED

August 4, 2010

Ronald F. Van Winkle
Town Manager
Town of West Hartford
50 South Main Street
West Hartford, Connecticut 06107

Dear Mr. Van Winkle:

Subject: Notice of Permit Application
New Britain – Hartford Busway
New Britain, Newington, West Hartford and Hartford

Pursuant to Section 22a-42c of the Connecticut General Statutes, the Department is hereby notifying you that an Inland Wetland and Watercourses and Stream Channel Encroachment Permit Application has been submitted to the Department of Environmental Protection to conduct regulated activities associated with the proposed construction of the New Britain – Hartford Busway. The attached Public Notice provides a description of the proposed project.

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Thank you for your cooperation.

Very truly yours,

Mark Alexander

Mark W. Alexander
Transportation Assistant Planning Director
Bureau of Policy and Planning

Enclosure

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546
Phone:

CERTIFIED MAIL, RETURN RECEIPT REQUESTED

August 4, 2010

Honorable Pedro E. Segarra
Mayor
City of Hartford
550 Main Street
Hartford, Connecticut 06103

Dear Mayor Segarra:

Subject: Notice of Permit Application
New Britain – Hartford Busway
New Britain, Newington, West Hartford and Hartford

Pursuant to Section 22a-42c of the Connecticut General Statutes, the Department is hereby notifying you that an Inland Wetland and Watercourses and Stream Channel Encroachment Permit Application has been submitted to the Department of Environmental Protection to conduct regulated activities associated with the proposed construction of the New Britain – Hartford Busway. The attached Public Notice provides a description of the proposed project.

Please contact Mr. Mark W. Alexander, Transportation Assistant Planning Director at telephone number (860) 594-2931, if you have any further questions concerning this application.

Thank you for your cooperation.

Very truly yours,

Mark W. Alexander
Transportation Assistant Planning Director
Bureau of Policy and Planning

Enclosure

Attachment F: Documentation Form for Flood Management Certification

1. Applicant Name: **Thomas Maziarz - Bureau Chief of Policy and Planning, CTDOT**
   (as indicated on the *Permit Application Transmittal Form*)

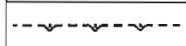
2. Name of Subject Facility or Project/Project Number:
   State Project No. 171-305, New Britain-Hartford Busway

3. Name of floodplain and watercourse:
   Piper Brook, tributaries of Piper Brook, Trout Brook, intermittent stream channels, and unnamed watercourses

4. This Certification is submitted for the Commissioner's approval pursuant to Section 25-68d of the General Statutes. I hereby certify that based on my reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the proposed activity described in this application is consistent with all applicable standards and criteria established in Sections 25-68d(b) of the General Statutes and Sections 25-68h-1 through 25-68h-3, inclusive, of the Regulations of Connecticut State Agencies.

Thomas J Maziarz	8-5-2010
Signature of the head of the certifying State agency or his/her designated agent	Date
Thomas Mariarz	**Bureau Chief**
Name of the head of the certifying State agency or his/her designated agent (print or type)	Title (if applicable)

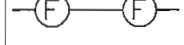
KEY OF IMPORTANT FEATURES


FLAGGED INLAND WETLAND LIMIT

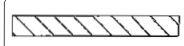
FLAGGED INTERMITTENT WATER COURSE CENTERLINE

LIMIT OF CUT SLOPE GRADING

LIMIT OF FILL SLOPE GRADING

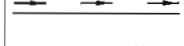

LIMIT OF PERMANENT WETLAND IMPACT

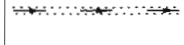
LIMIT OF TEMPORARY WETLAND IMPACT

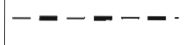

LIMIT OF PERMANENT IWC IMPACT

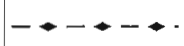
PROPOSED SWALE/CHANNEL/DITCH

PROPOSED TRACK DRAINAGE DITCH

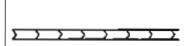

100 YEAR FLOOD LIMIT ELEVATION

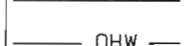

STREAM CHANNEL ENCROACHMENT LINE


PROPOSED CONCRETE BARRIER



ORDINARY HIGH WATER LINE


FLOODWAY LIMITS


SEDIMENTATION CONTROL SYSTEM (SCS)

PROPOSED CATCH BASIN

PROPOSED STORM MANHOLE

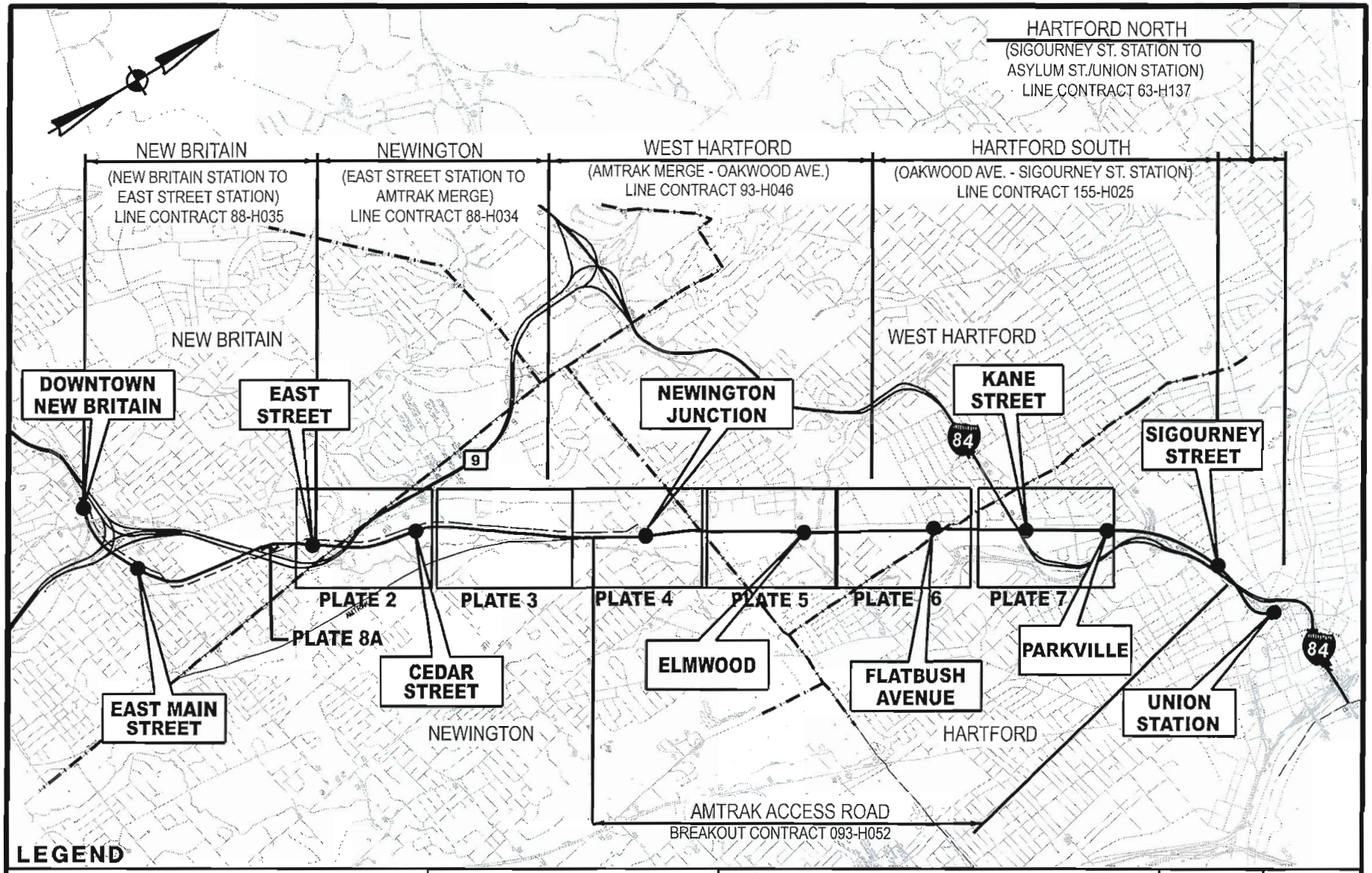
EOR EDGE OF ROAD

GENERAL NOTES:

1. THE CONTRACTOR SHALL BE LIMITED TO WORKING WITHIN THE TEMPORARY WORK AREAS AS INDICATED ON THE PLANS WHEN WORKING WITHIN A DELINEATED WETLAND BOUNDARY. THE TEMPORARY WORK AREAS WILL BE LOCATED AND STAKED IN THE FIELD BY THE CONTRACTOR PRIOR TO CLEARING AND GRUBBING OR THE COMMENCEMENT OF ANY OTHER CONSTRUCTION ACTIVITY. WORK OUTSIDE THE DELINATED IMPACT AREAS IS NOT PERMITTED. IF ANY MEANS AND METHODS CHOSEN BY THE CONTRACTOR REQUIRE ADDITIONAL WETLAND IMPACT, EITHER PERMANENT OR TEMPORARY, THE CONTRACTOR SHALL NOTIFY CTDOT IMMEDIATELY, AS THIS WILL REQUIRE ADDITIONAL REVIEW BY THE CTDOT OFFICE OF ENVIRONMENTAL PLANNING AND CTDEP AT THE CONTRACTOR'S EXPENSE.

2. ALL WETLAND AREAS TEMPORARILY IMPACTED FOR THE PURPOSES OF CONSTRUCTION, STAGING OR ACCESS SHALL BE REESTABLISHED BY THE CONTRACTOR IMMEDIATELY FOLLOWING THE USE OF THESE AREAS, PER CONNECTICUT DOT AND DEP STANDARDS. SEE SPECIAL PROVISIONS FOR INFORMATION ON MATERIAL REQUIREMENTS. SEE PLATE 30F FOR PLANTING PLAN. IMPACTED WETLAND AREAS BETWEEN SPECIFIED PLANTINGS SHALL BE REESTABLISHED WITH WETLAND ESTABLISHMENT SEED MIX. UPLAND AREAS TO BE STABILIZED WITH CTDOT CONSERVATION SEED MIX.

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. KEY



LEGEND

- ● STATION
- —— BUSWAY
- ---- MULTI-USE TRAIL

STATE PROJECT NO.: 171-305

SCALE : NOT TO SCALE

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES
VICINTY AND LOCATION MAP

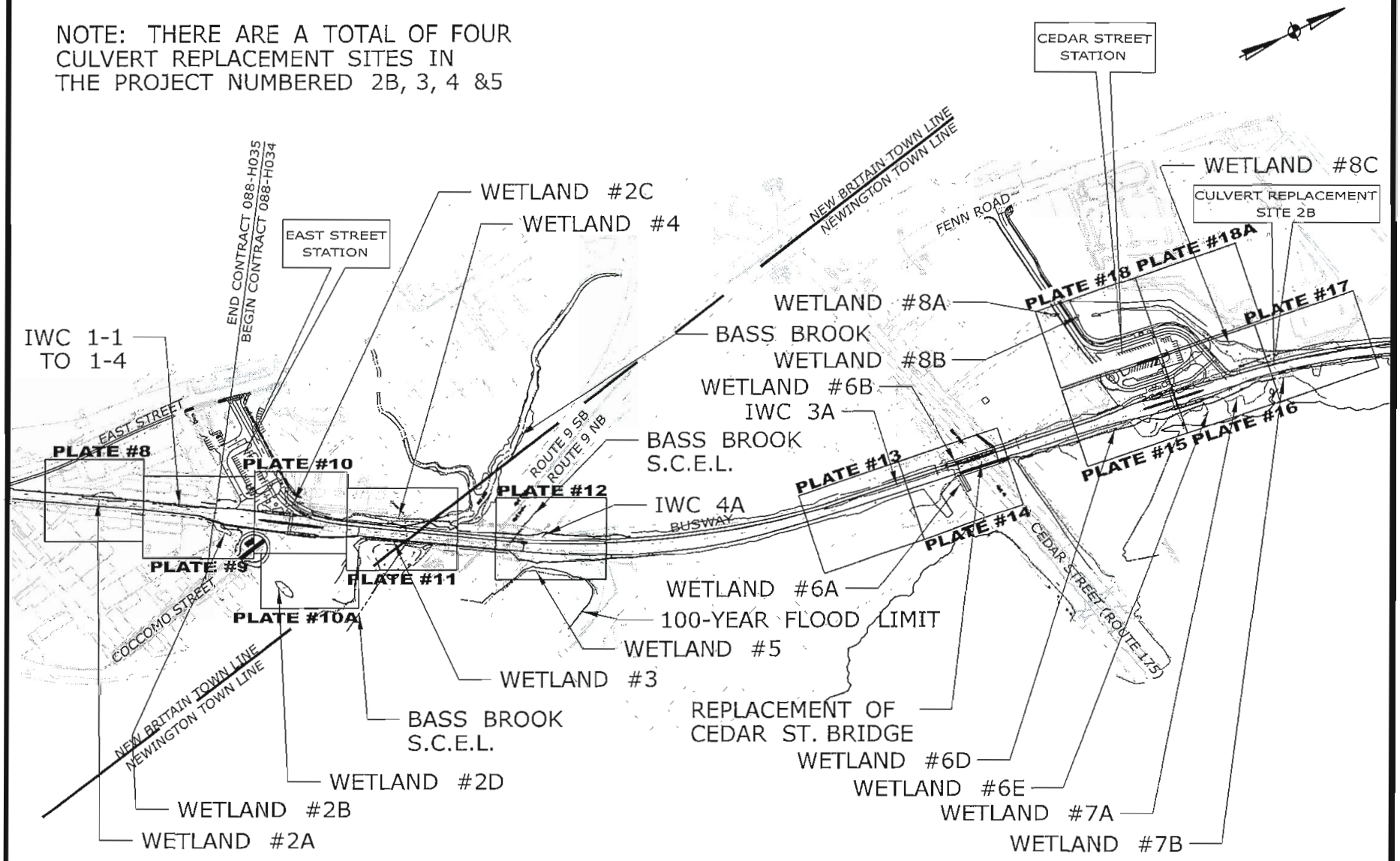
OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 1

NOTE: THERE ARE A TOTAL OF FOUR CULVERT REPLACEMENT SITES IN THE PROJECT NUMBERED 2B, 3, 4 &5



	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
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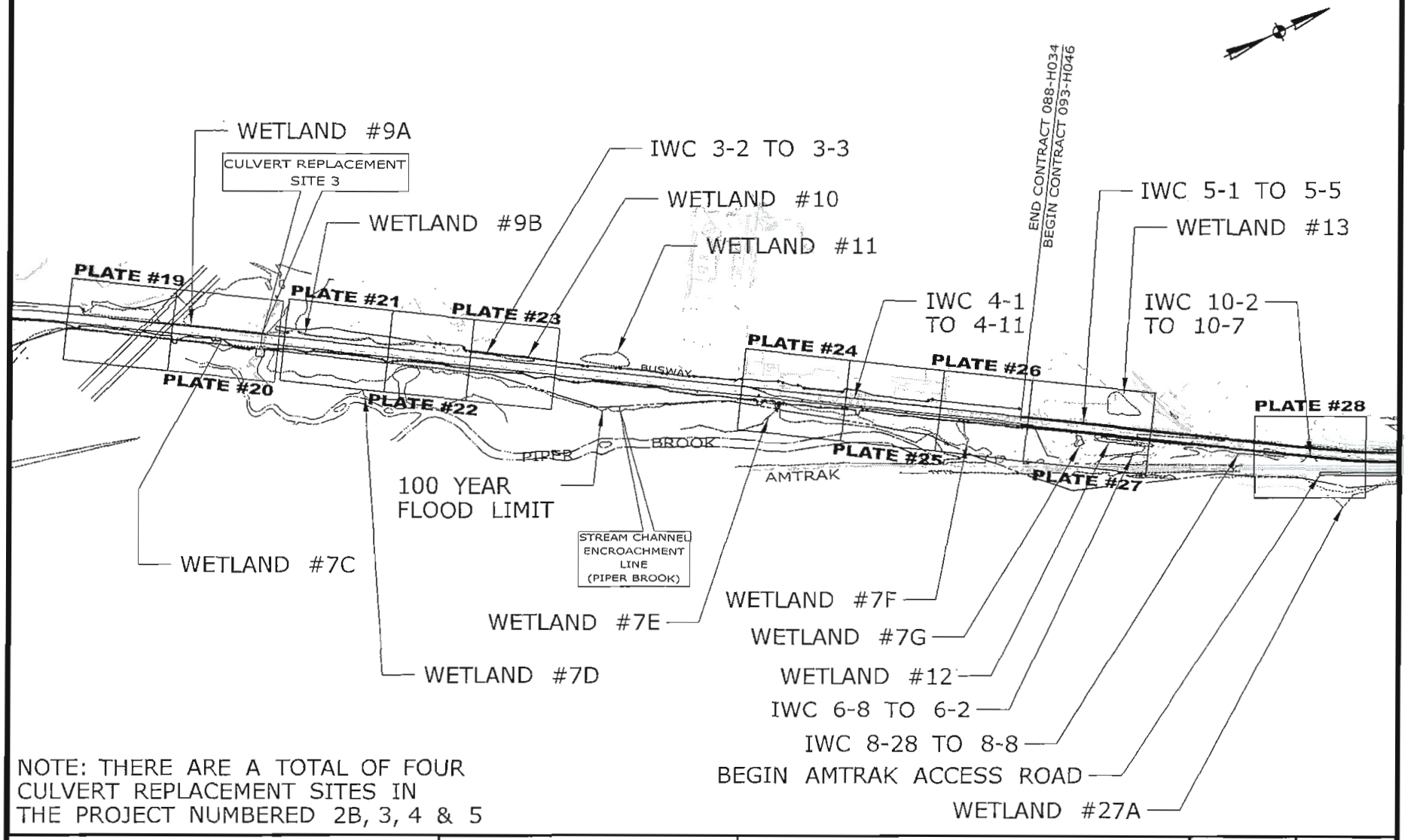

NOTE: THERE ARE A TOTAL OF FOUR CULVERT REPLACEMENT SITES IN THE PROJECT NUMBERED 2B, 3, 4 & 5

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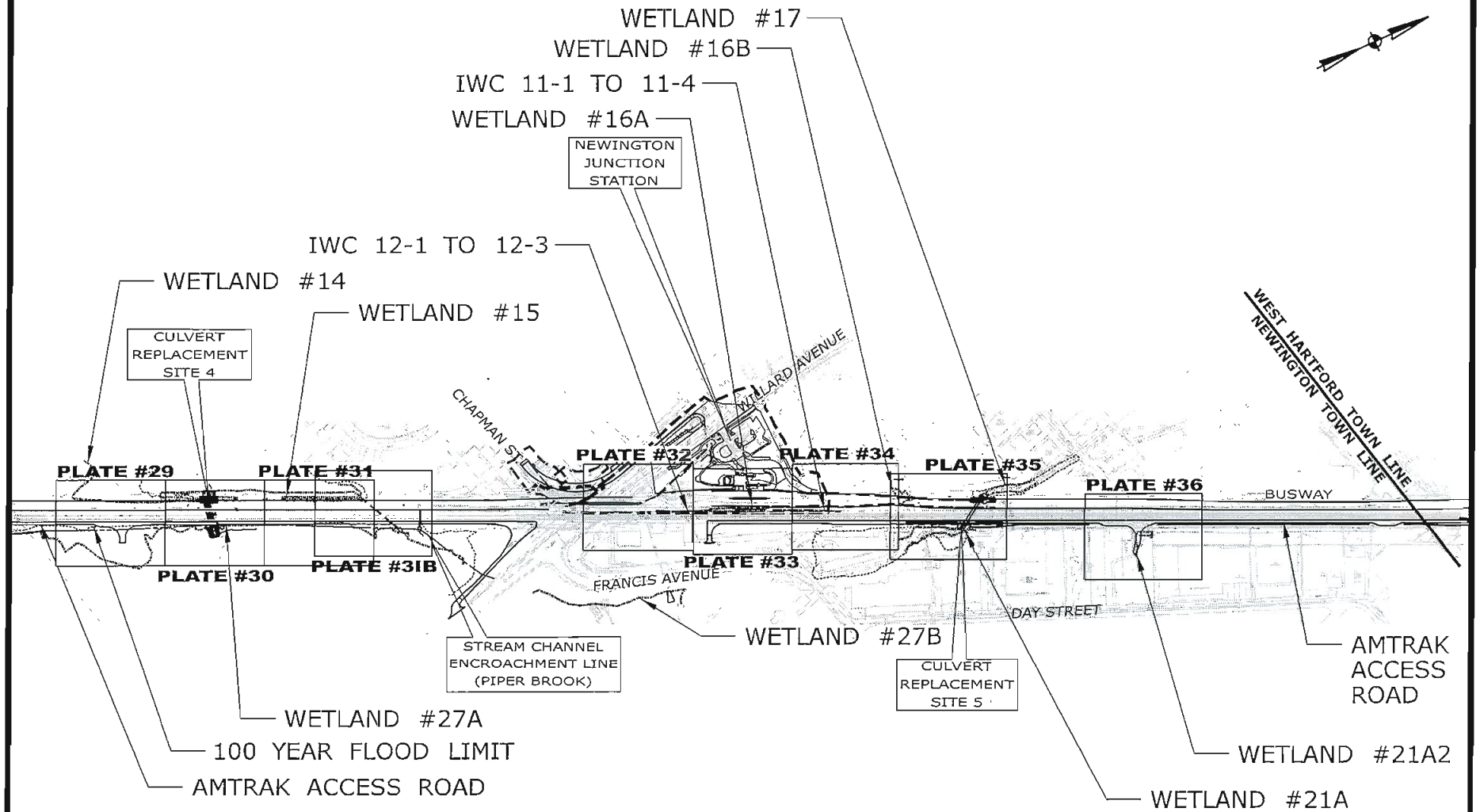

NOTE: THERE ARE A TOTAL OF FOUR CULVERT REPLACEMENT SITES IN THE PROJECT NUMBERED 2B, 3, 4 & 5

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
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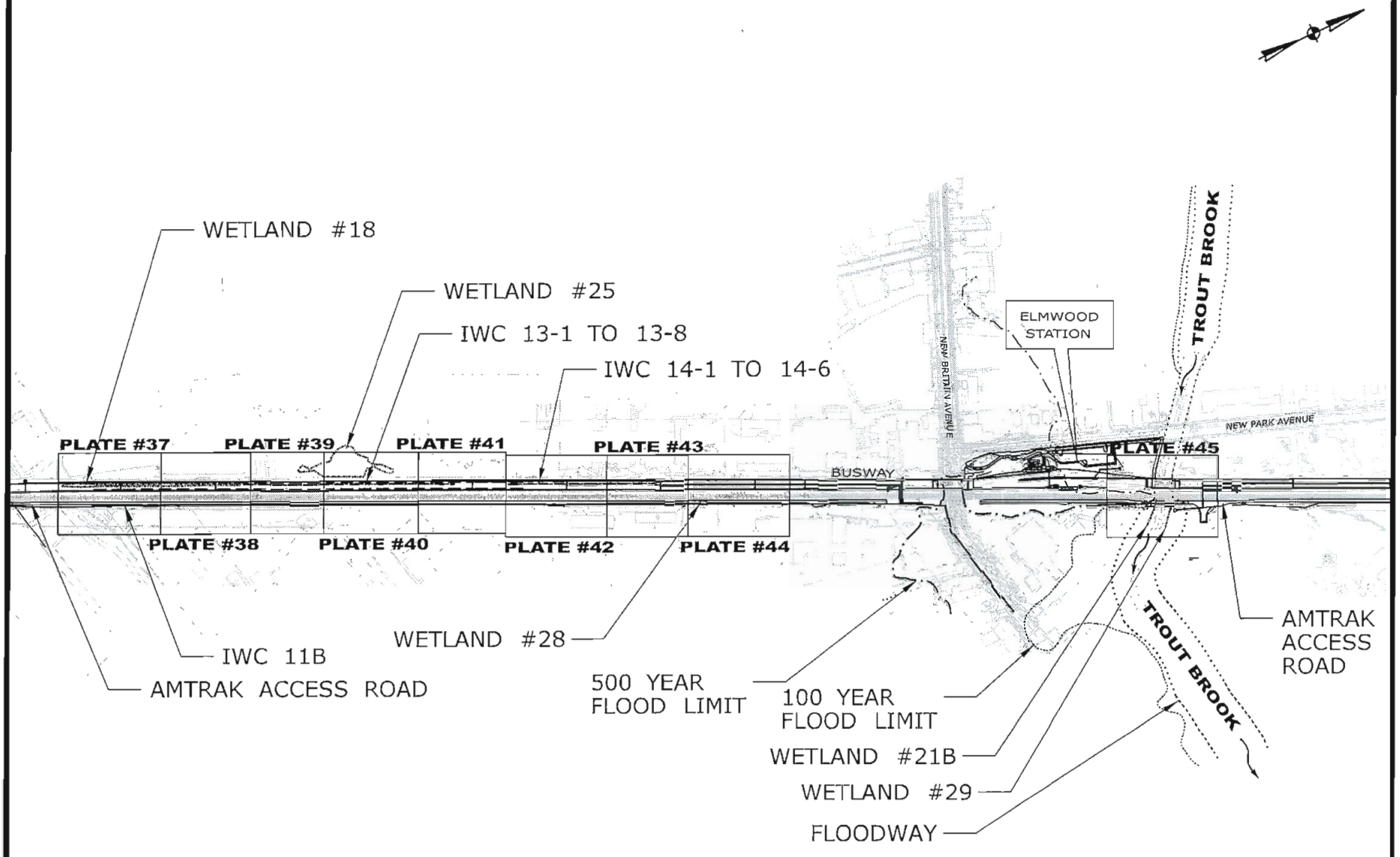

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
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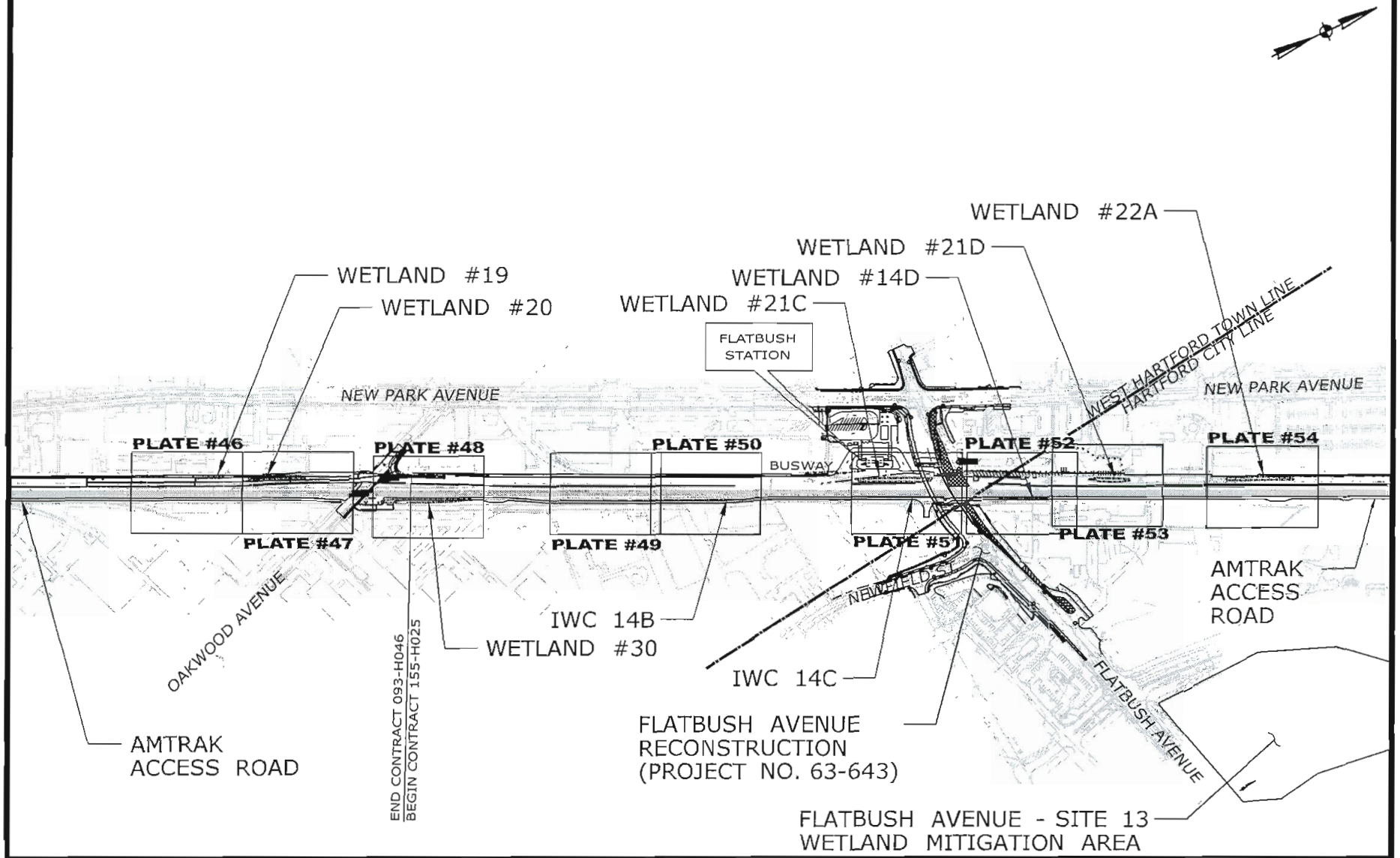
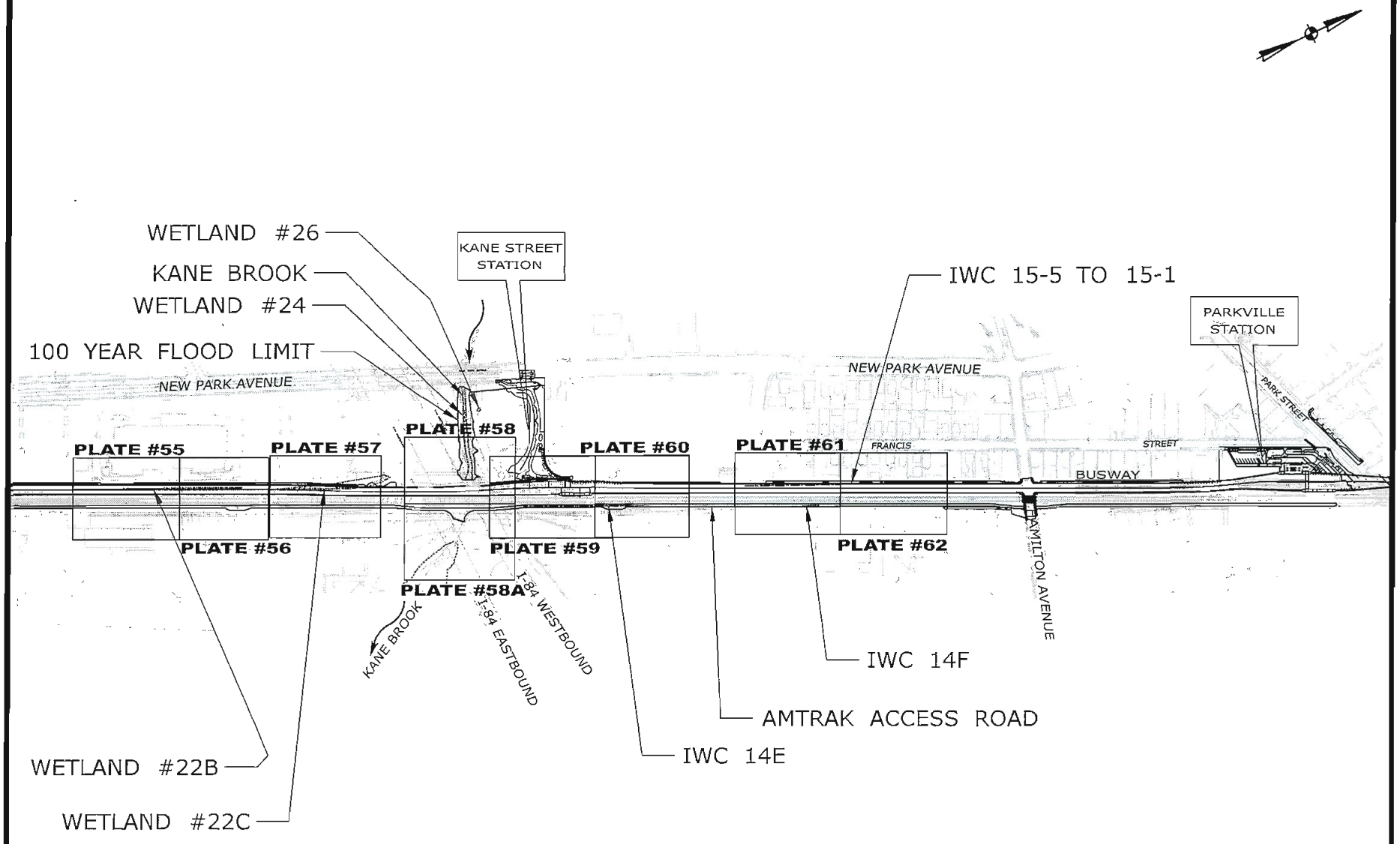
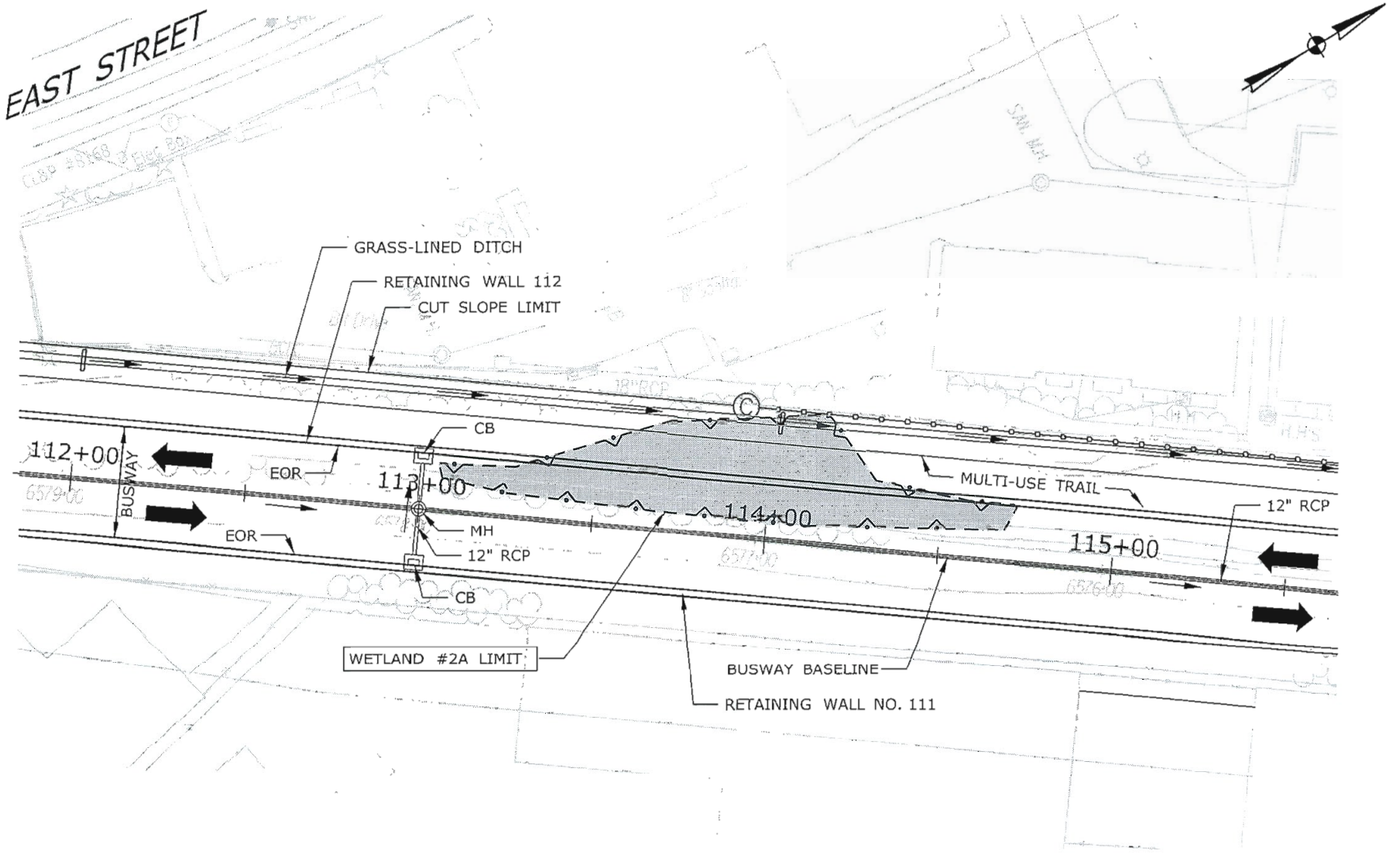


	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION		DATE: JULY 2010
	SCALE 1" = 500' 500 250 0 500	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES KEY PLAN 5 OF 6		PLATE NO. 6



	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE 1" = 500' 500 250 0 500	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES KEY PLAN 6 OF 6	MICHAEL BAKER ENGINEERING	PLATE NO. 7



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #2A IMPACT	2,888 S.F.

STATE PROJECT NO.: 171-305
NEW BRITAIN SECTION
CONTRACT NO. 88-H035

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

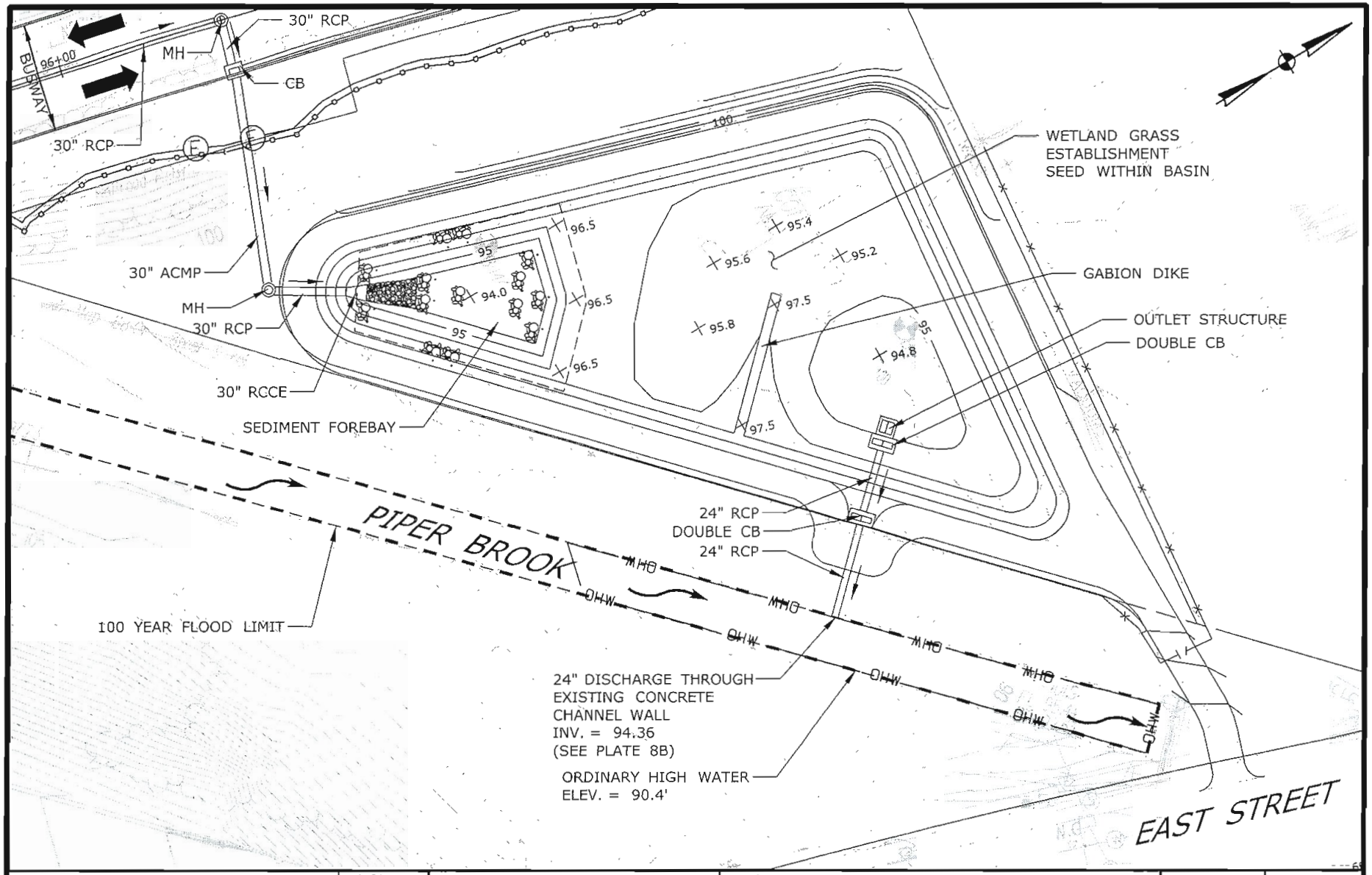
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

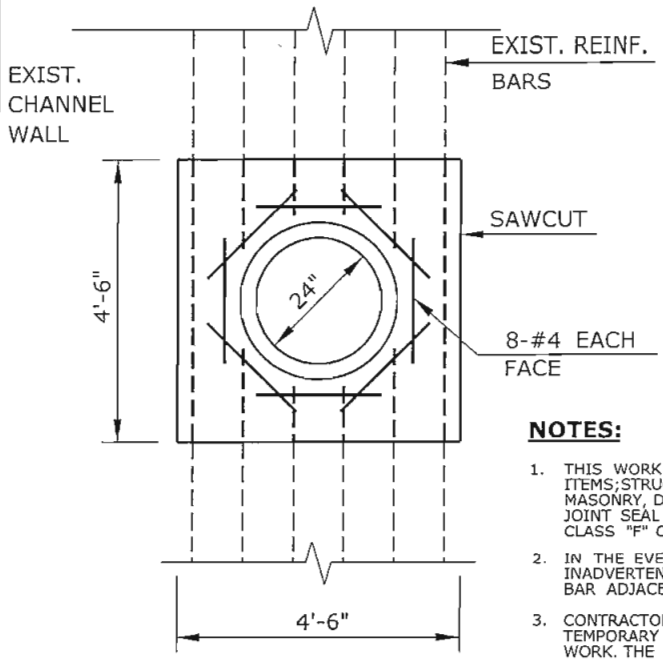
MICHAEL BAKER ENGINEERING

DATE: JULY 2010

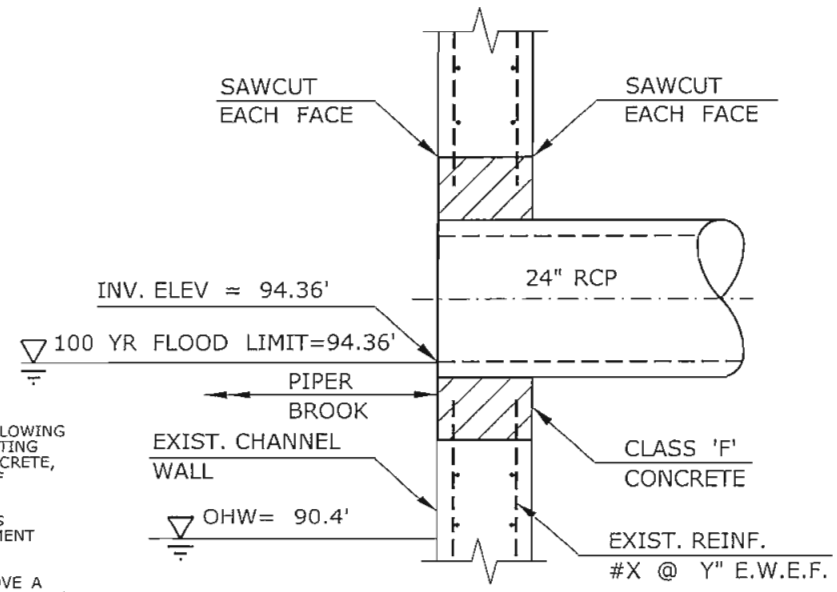
PLATE NO. 8



IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 NEW BRITAIN SECTION CONTRACT NO. 88-H035	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
NO WETLAND IMPACTS					
		SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 8A



ELEVATION



SECTION

NOTES:

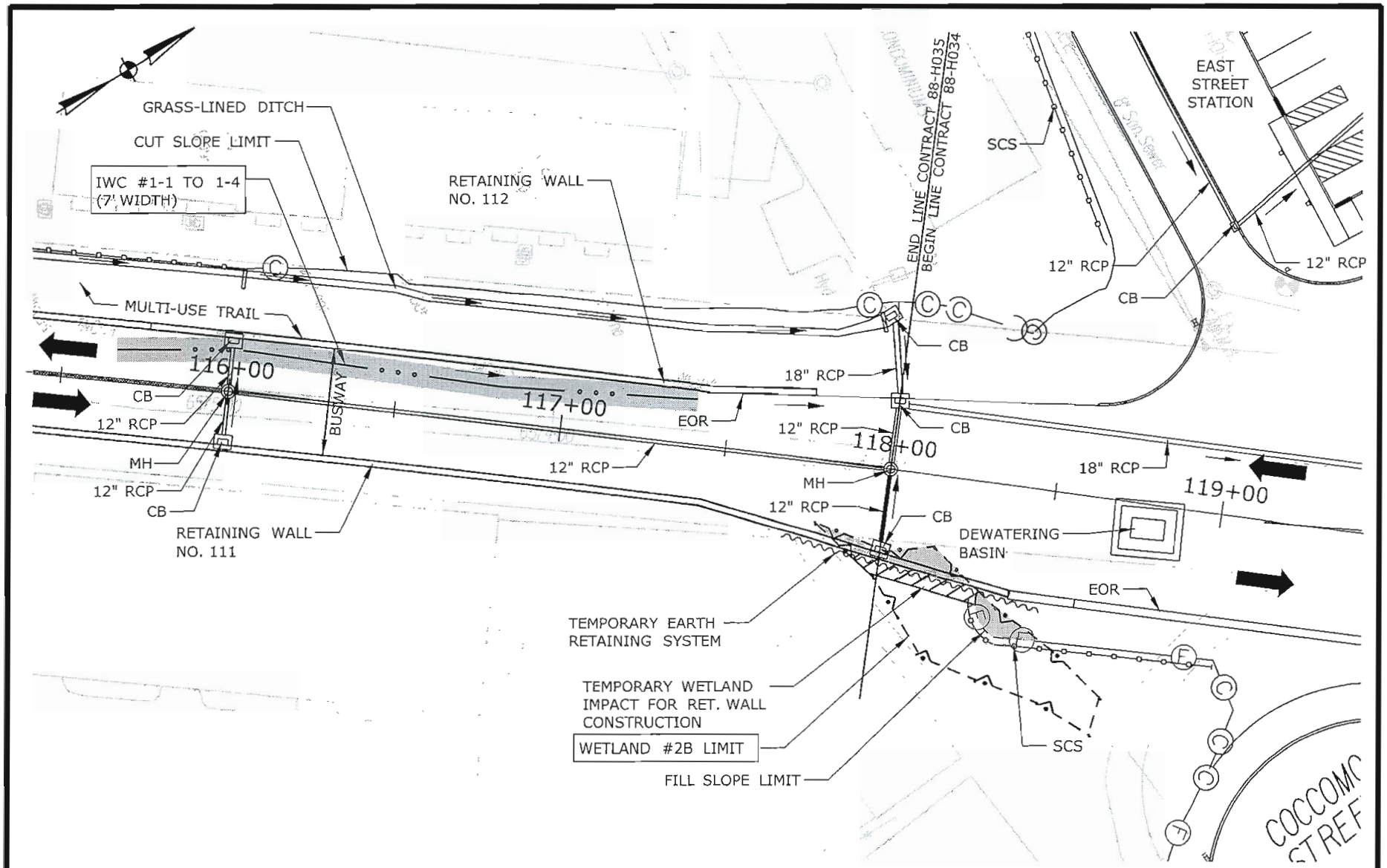
1. THIS WORK SHALL BE PAID FOR UNDER THE FOLLOWING ITEMS;STRUCTURE EXCAVATION, REMOVAL OF EXISTING MASONRY, DEFORMED STEEL BARS, CLASS "F" CONCRETE, JOINT SEAL SHALL BE INCLUDED IN THE COST OF CLASS "F" CONCRETE.
2. IN THE EVENT THAT EXISTING REINFORCEMENT IS INADVERTENTLY CUT. DRILL AND GROUT REPLACEMENT BAR ADJACENT TO CUT REBAR.
3. CONTRACTOR SHALL FURNISH, INSTALL, AND REMOVE A TEMPORARY SUPPORT SYSTEM REQUIRED TO PERFORM THIS WORK. THE SUPPORT SYSTEM SHALL INCLUDE PROVISIONS TO CONTAIN DEBRIS FROM THE SAWCUTTING AND REMOVAL OF THE EXISTING CONCRETE.
4. TEMPORARY SUPPORT SYSTEM SHALL NOT EXTEND BELOW THE ELEVATION OF ORDINARY HIGH WATER (OHW).
5. SAWCUTTING ON THE CHANNEL FACE OF THE WALL SHALL BE PERFORMED DRY WITHOUT USE OF WATER TO LUBRICATE THE SAW BLADE.

CONSTRUCTION SEQUENCE:

1. SAWCUT (1/2" MAX. DEPTH) PERIMETER OF PIPE BLOCKOUT ON EACH FACE OF WALL.
2. REMOVE EXISTING MASONRY AND MAINTAIN EXISTING REINFORCEMENT.
3. PARTIALLY CUT REINFORCEMENT THAT OBSTRUCTS PIPE OPENING.
4. INSTALL TEMPERATURE REINFORCEMENT AS SHOWN. FORM AND POUR CONCRETE.
5. REMOVE FORM AFTER CONCRETE HAS SET AND APPLY JOINT SEAL.

DRAINAGE OUTLET AT PIPER BROOK CHANNEL

	STATE PROJECT NO.: 171-305 NEW BRITAIN SECTION CONTRACT NO. 88-H035	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 8B



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #2B IMPACT	302 S.F.
TEMPORARY WETLAND #2B IMPACT	188 S.F.
PERMANENT IWC #1 IMPACT	174 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H035/H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

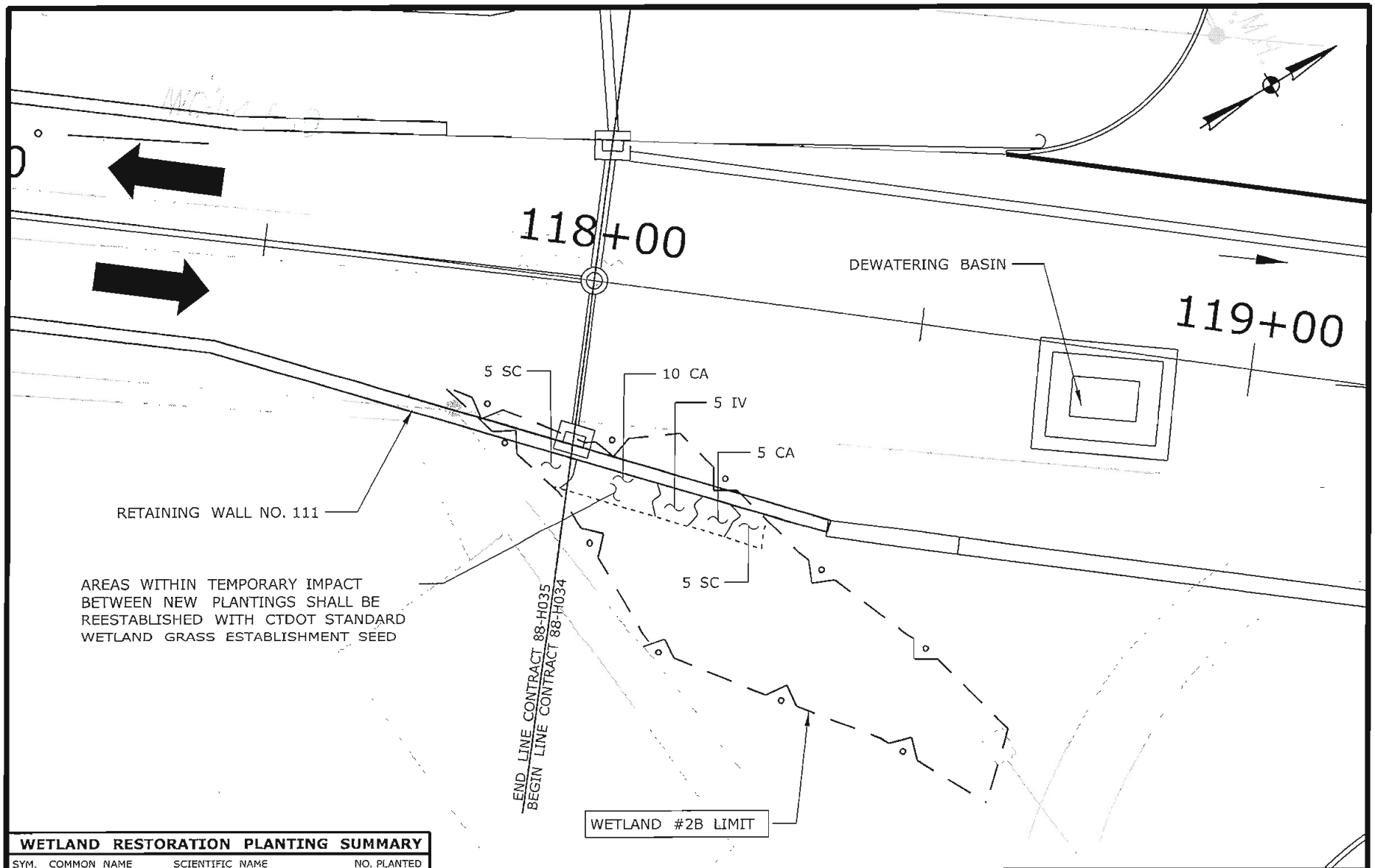
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 9



WETLAND RESTORATION PLANTING SUMMARY

SYM.	COMMON NAME	SCIENTIFIC NAME	NO. PLANTED
SC	ELDERBERRY	SAMBUCUS CANADENSIS	10
CA	SILKY DOGWOOD	CORNUS AMOMUM	15
IV	WINTERBERRY	ILEX VERTICILLATA	5
TOTAL PLANTINGS			30

STATE PROJECT NO.: 171-305
CONTRACT NO.: H035/H034

SCALE 1" = 20'
20 10 0 20

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

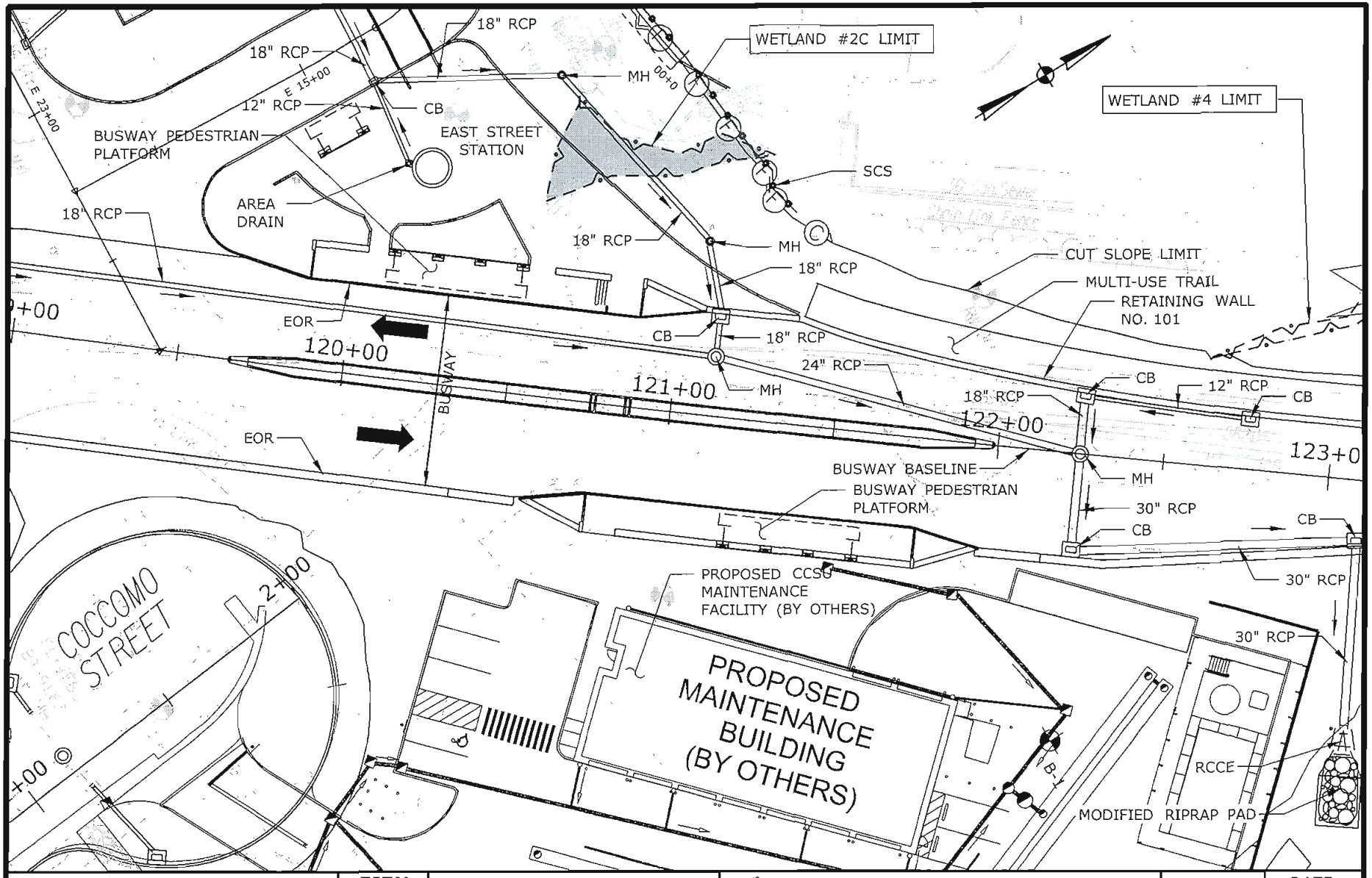
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 9A



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #2C IMPACT	728 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

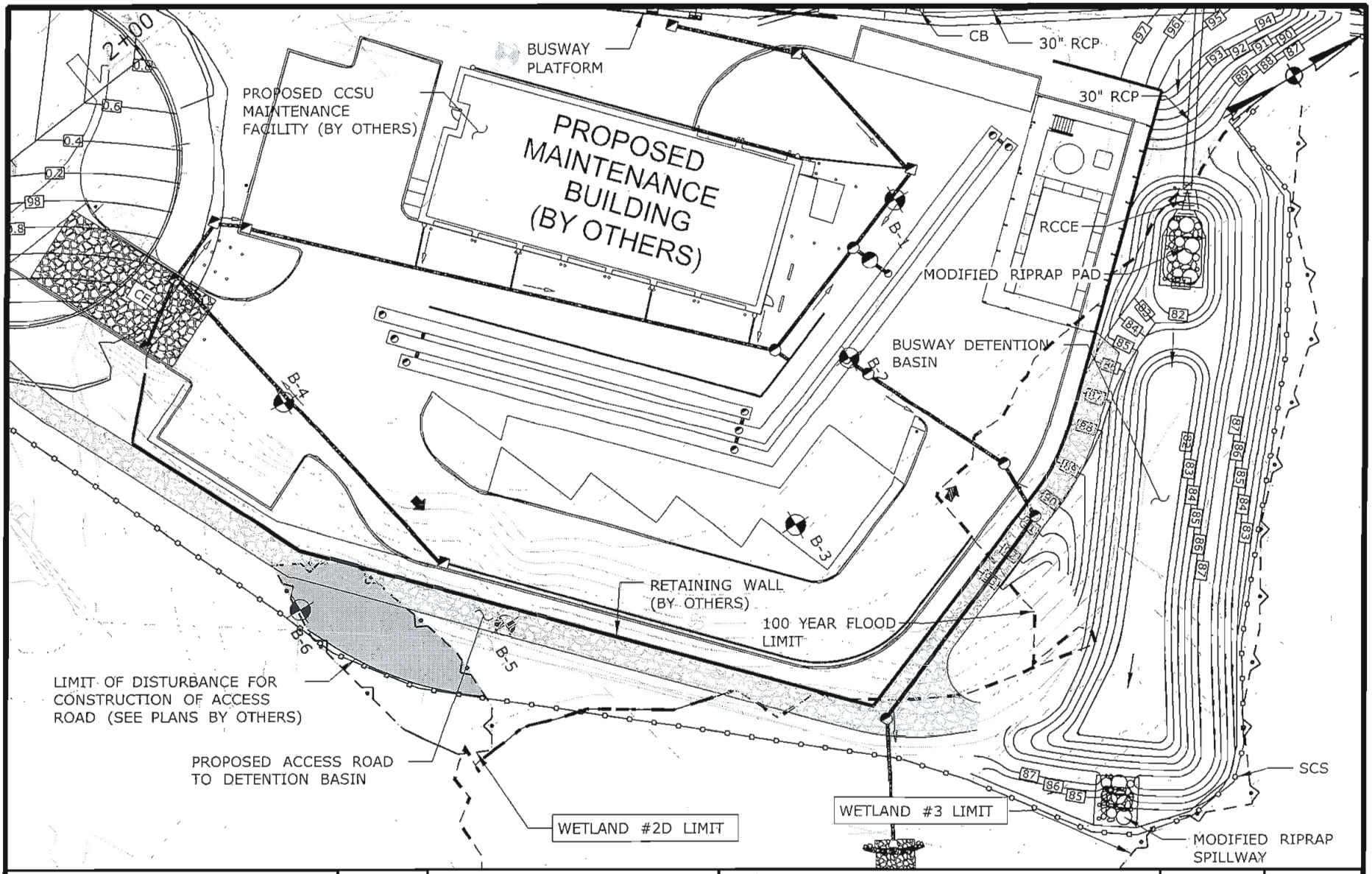
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

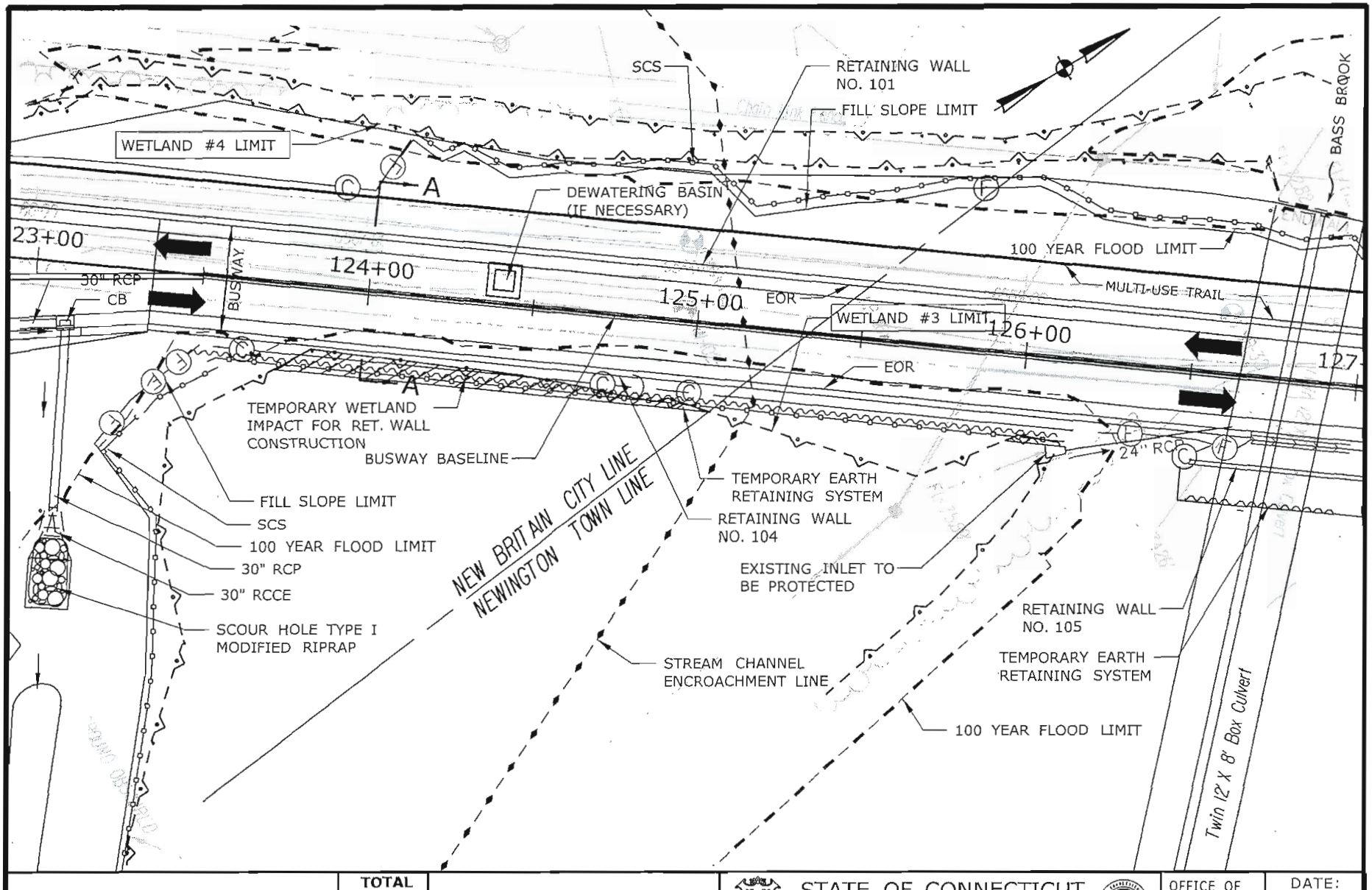
MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 10



IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H034	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
PERMANENT WETLAND #2D IMPACT	1,160 S.F.	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 10A



IMPACT SUMMARY	TOTAL IMPACT AREA
TEMPORARY WETLAND #3 IMPACT	634 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

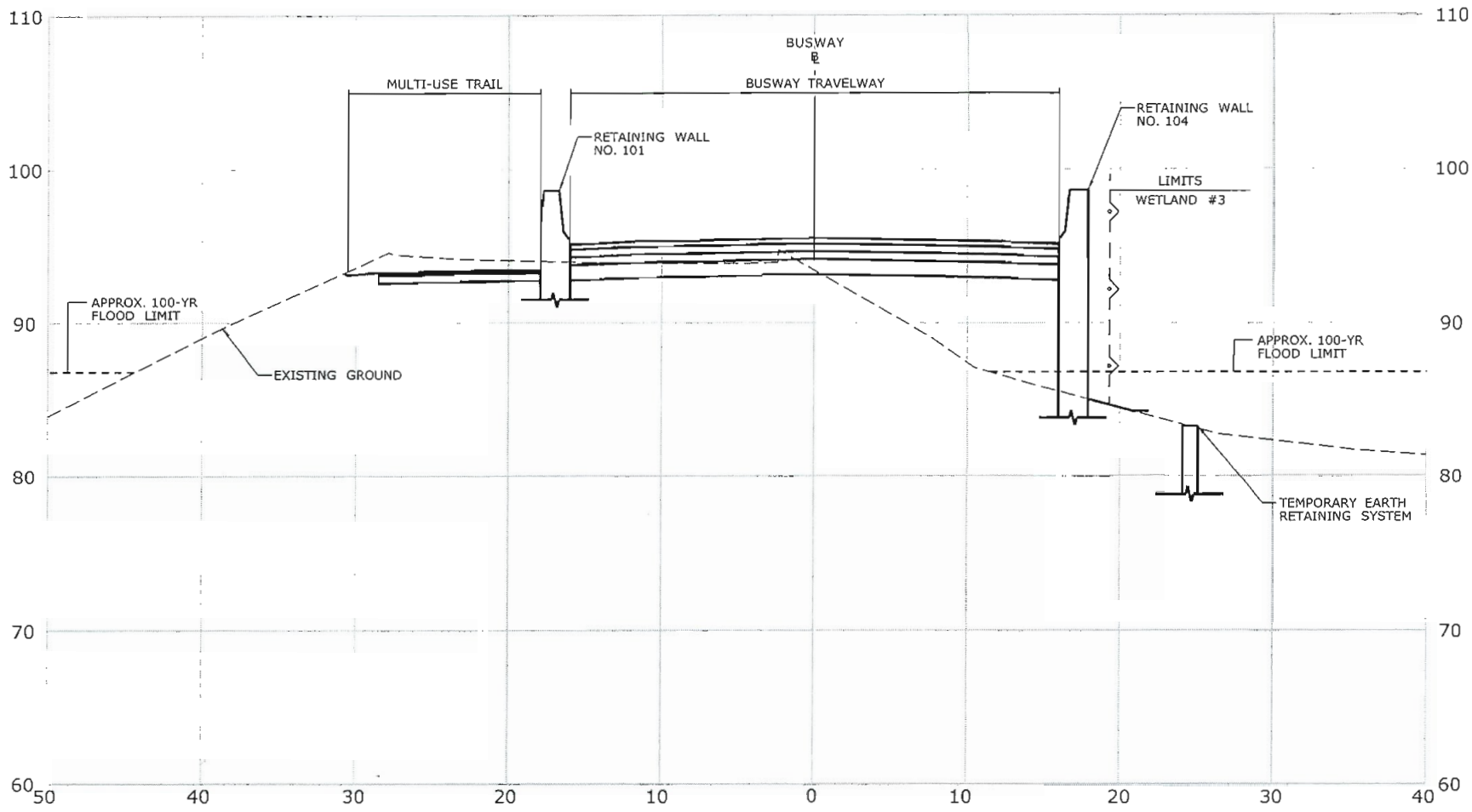
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

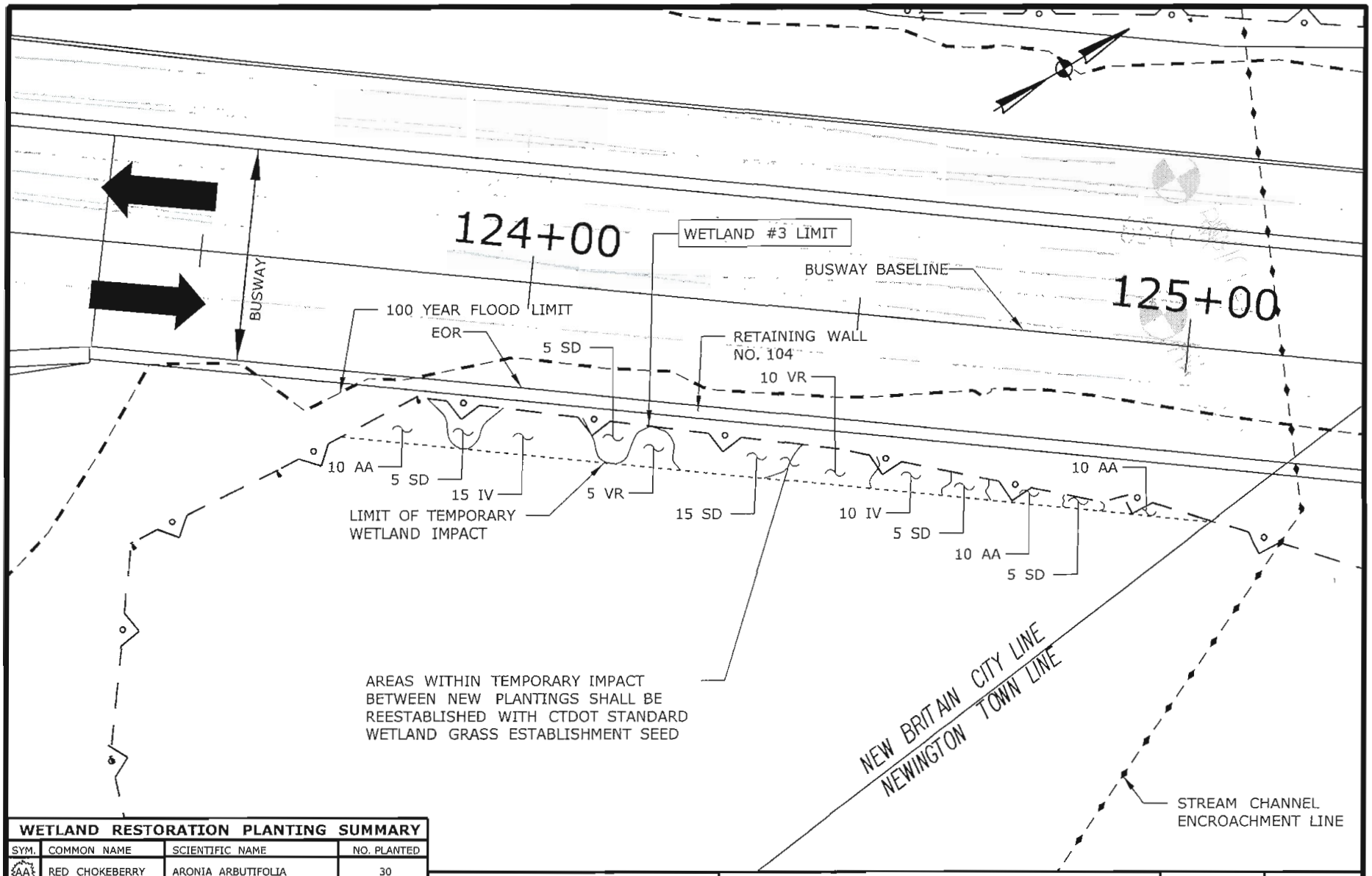
DATE: JULY 2010

PLATE NO. 11



SECTION A-A (ON PLATE 11)

TYPICAL SECTION WHERE RETAINING WALL IS USED TO MINIMIZE WETLAND IMPACT	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 11A



WETLAND RESTORATION PLANTING SUMMARY

SYM.	COMMON NAME	SCIENTIFIC NAME	NO. PLANTED
AA	RED CHOKEBERRY	ARONIA ARBUTIFOLIA	30
SD	PUSSY WILLOW	SALIX DISCOLOR	35
IV	WINTERBERRY	ILEX VERTICILLATA	25
VR	NORTHERN ARROWWOOD	VIBURNUM RECOGNITUM	15
TOTAL PLANTINGS			105

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 20'
20 10 0 20

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

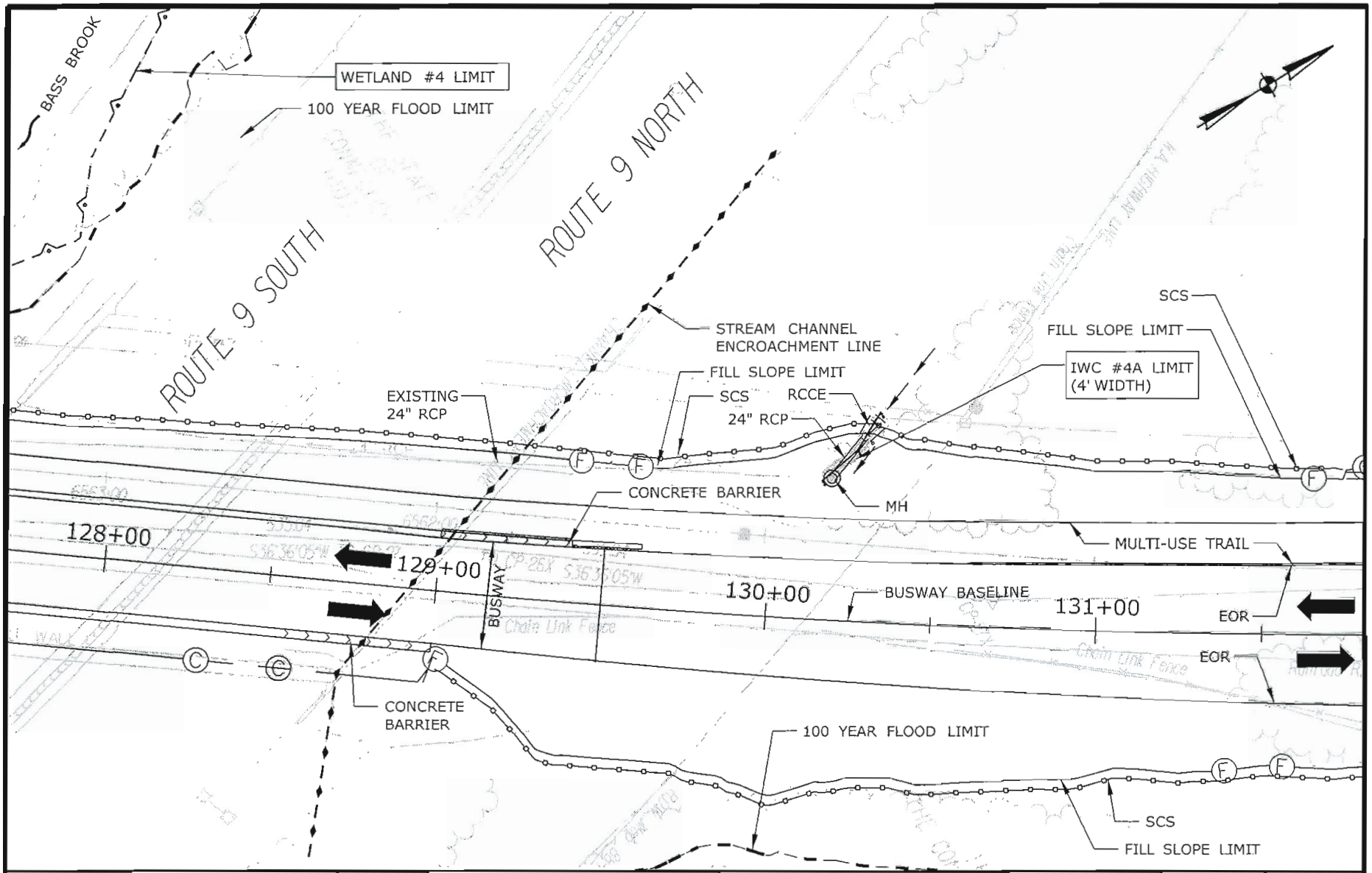
OFFICE OF ENGINEERING

DATE: JULY 2010

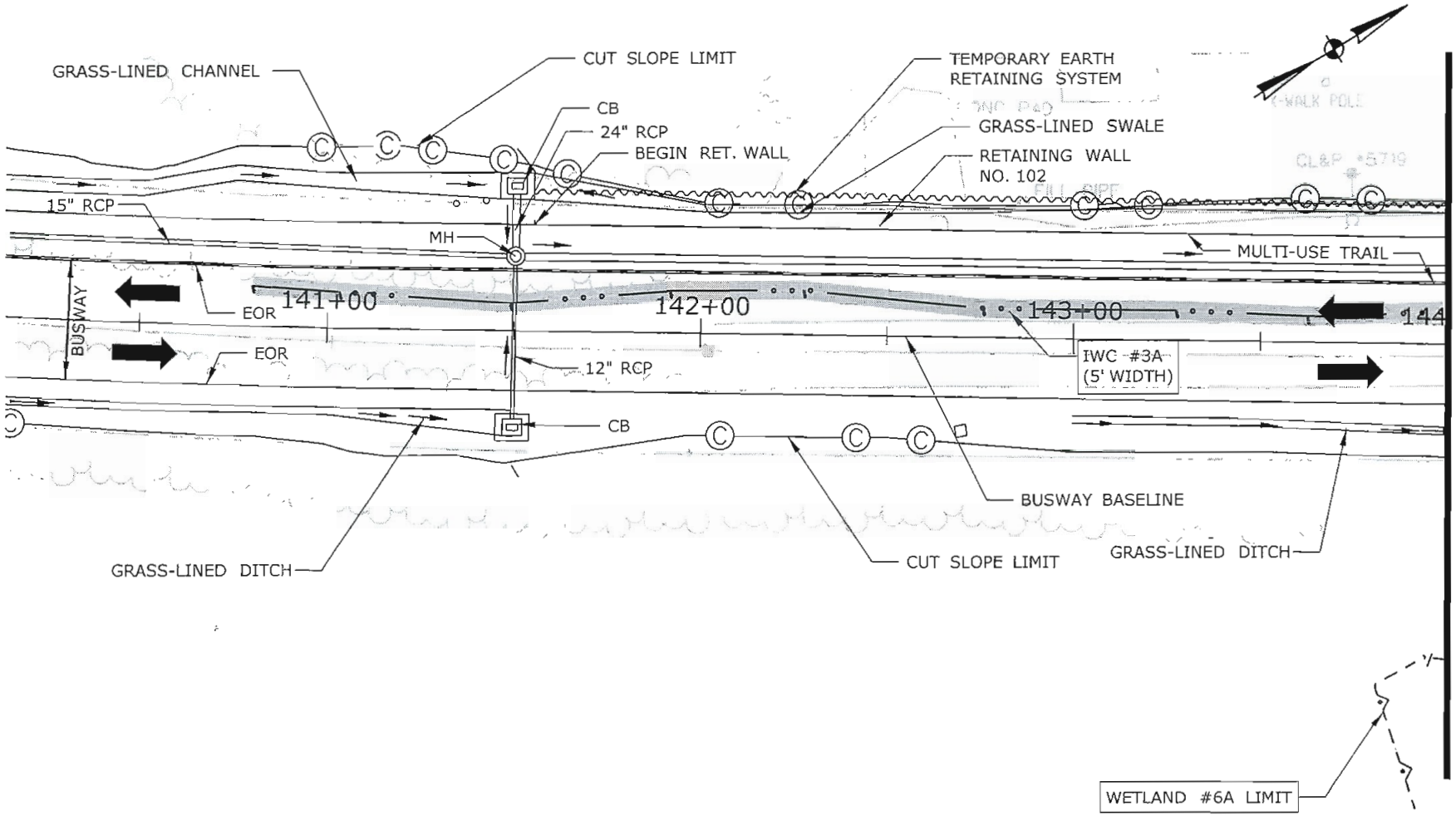
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

MICHAEL BAKER ENGINEERING

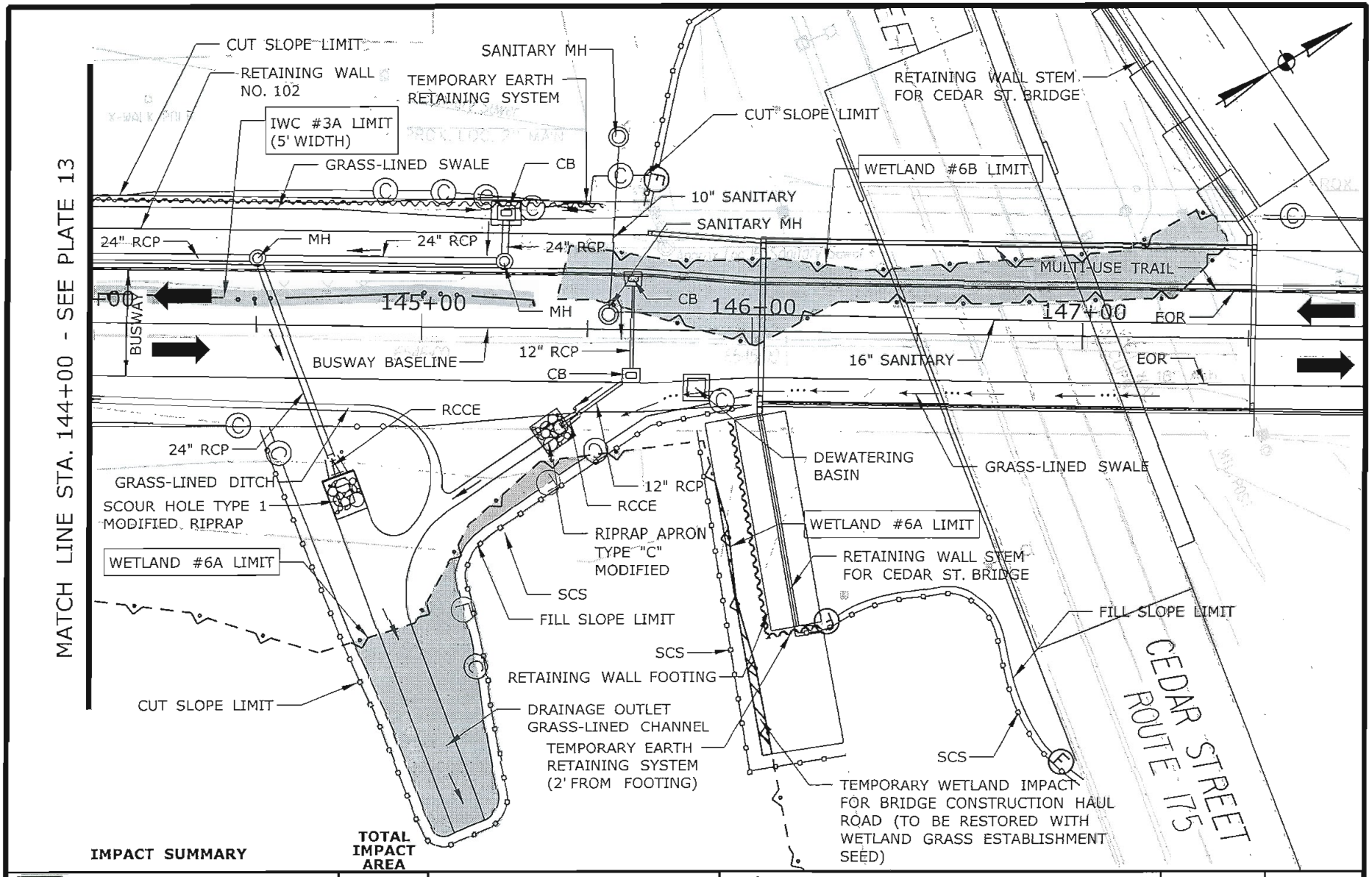
PLATE NO. 11B



IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H034	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
PERMANENT IWC #4A IMPACT	21 L.F.	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 12



IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H034	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
PERMANENT IWC #3A IMPACT	454 L.F.	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 13



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #6A IMPACT	2,080 S.F.
PERMANENT WETLAND #6B IMPACT	3,152 S.F.
TEMPORARY WETLAND #6A IMPACT	128 S.F.
PERMANENT IWC #3A IMPACT	454 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034/93-166

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

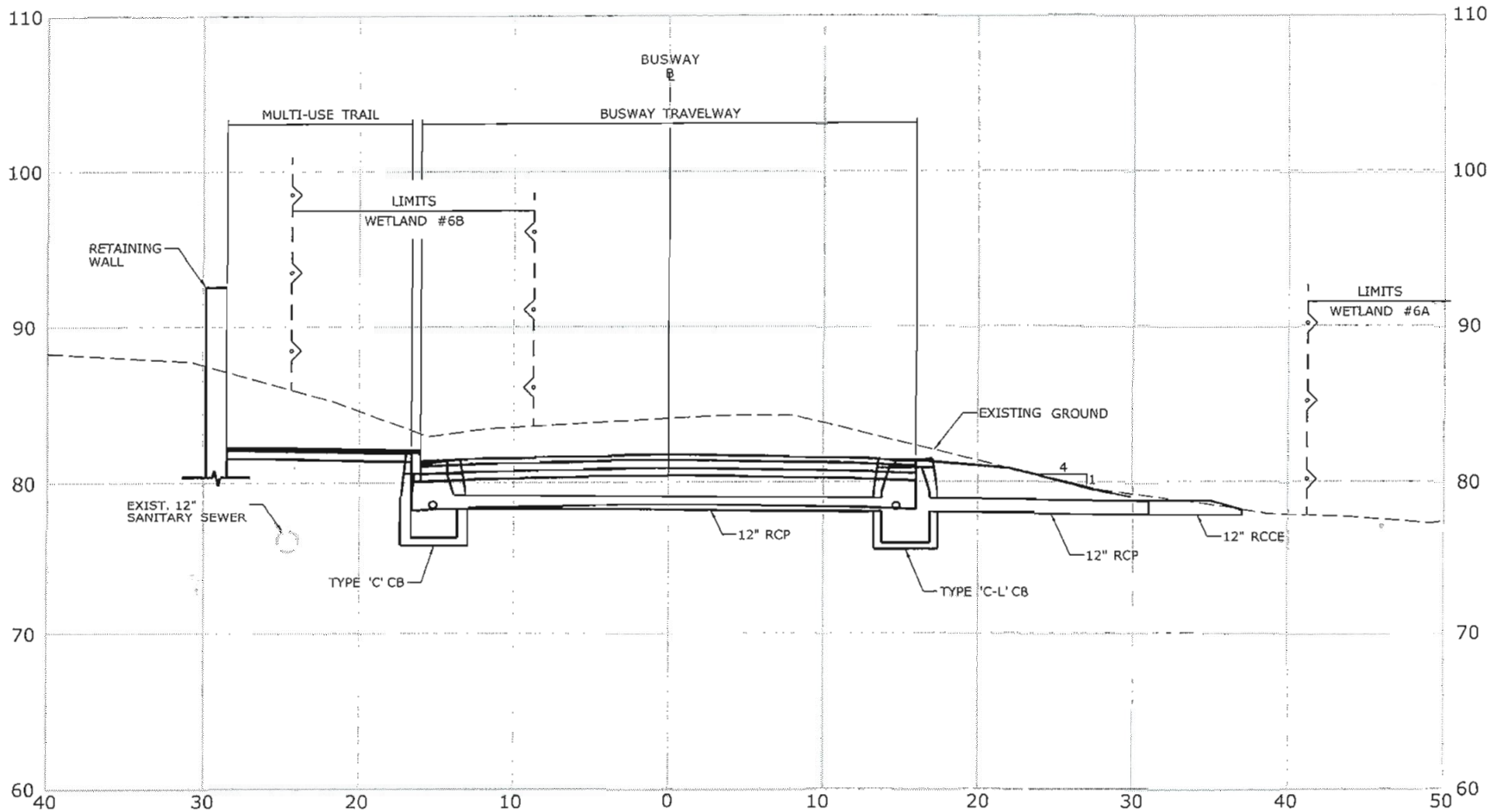
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

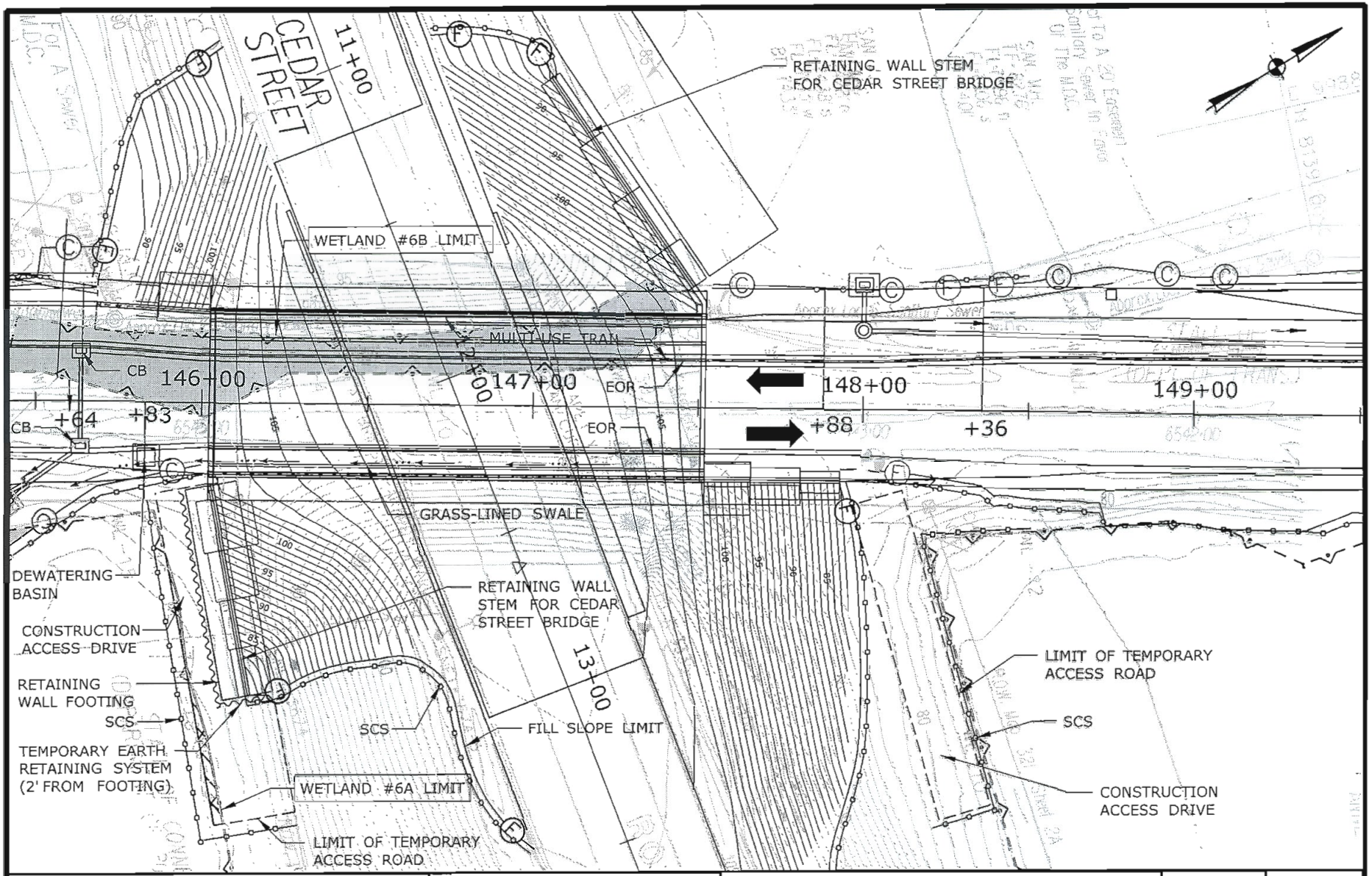
DATE: JULY 2010

PLATE NO. 14



TYPICAL SECTION A-A
(SEE PLATE 14)

TYPICAL SECTION WHERE CUT WITHIN WETLAND IS REQUIRED FOR CONSTRUCTION	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 14A



CEDAR STREET BRIDGE ABUTMENT GRADING PLAN

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034/93-166

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

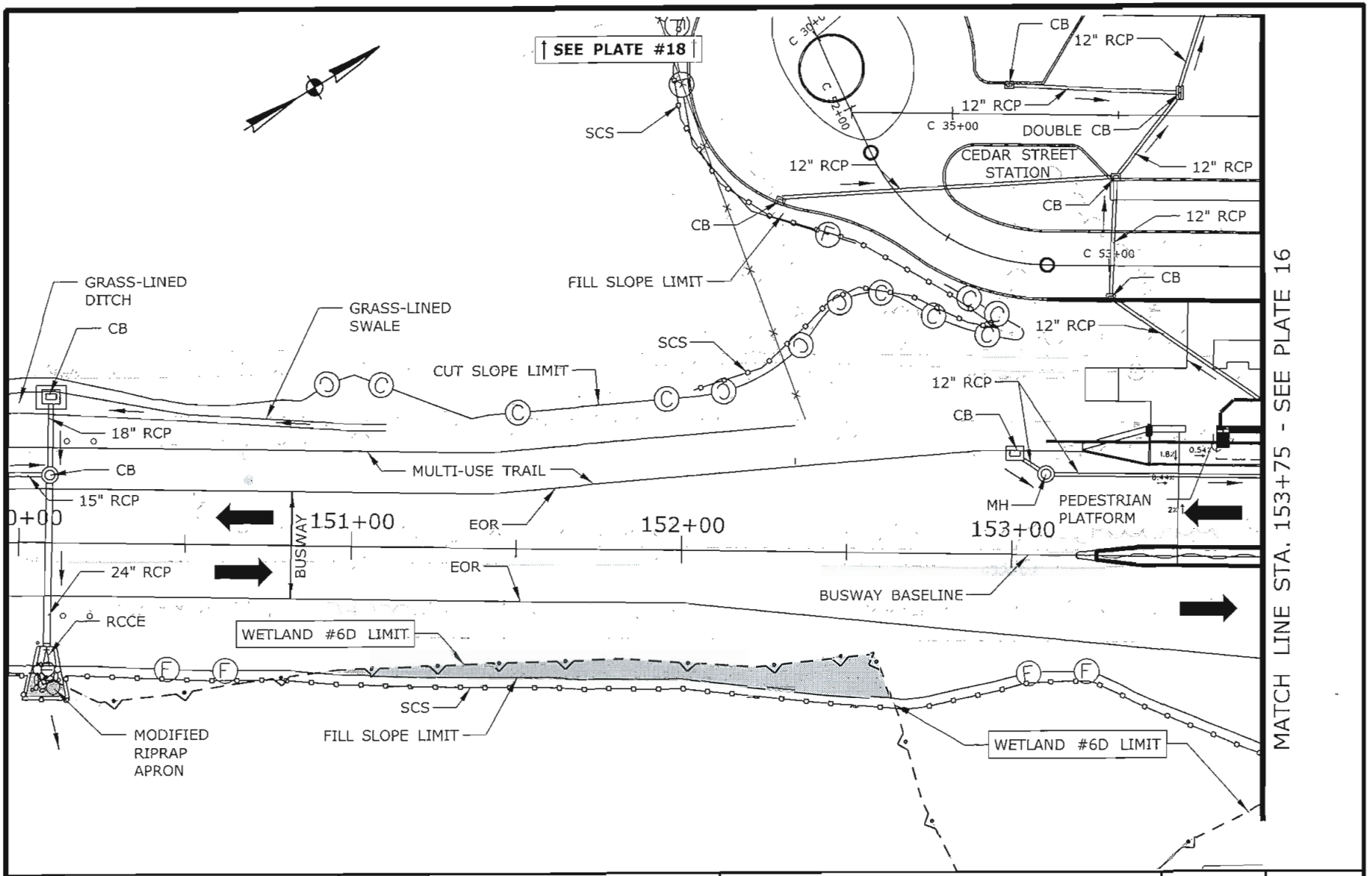
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 14B



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #6D IMPACT	1,102 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034/H039

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

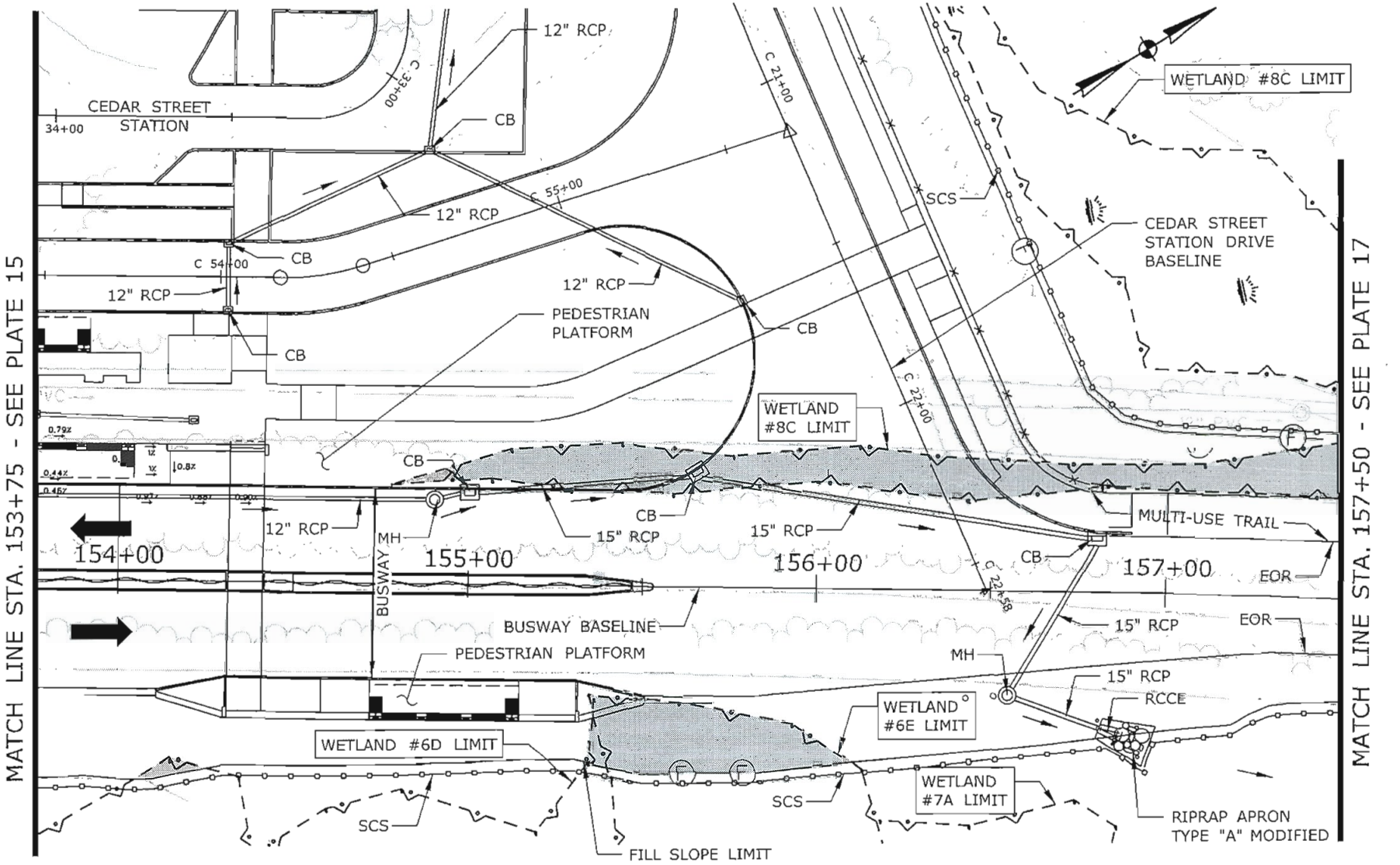
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 15



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #8C IMPACT	12,001 S.F.
PERMANENT WETLAND #6D IMPACT	1,102 S.F.
PERMANENT WETLAND #6E IMPACT	1,126 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034/H039

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

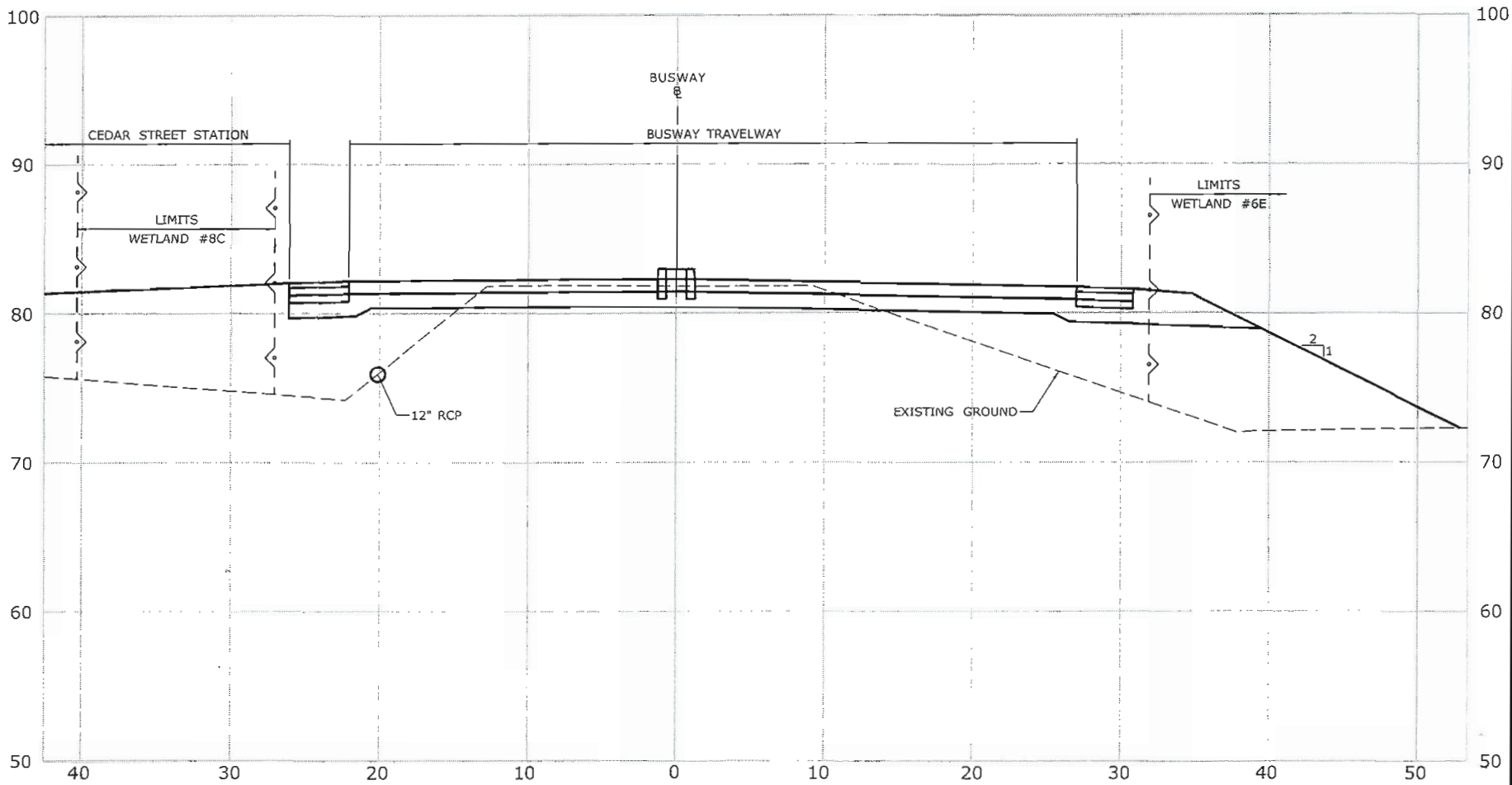
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

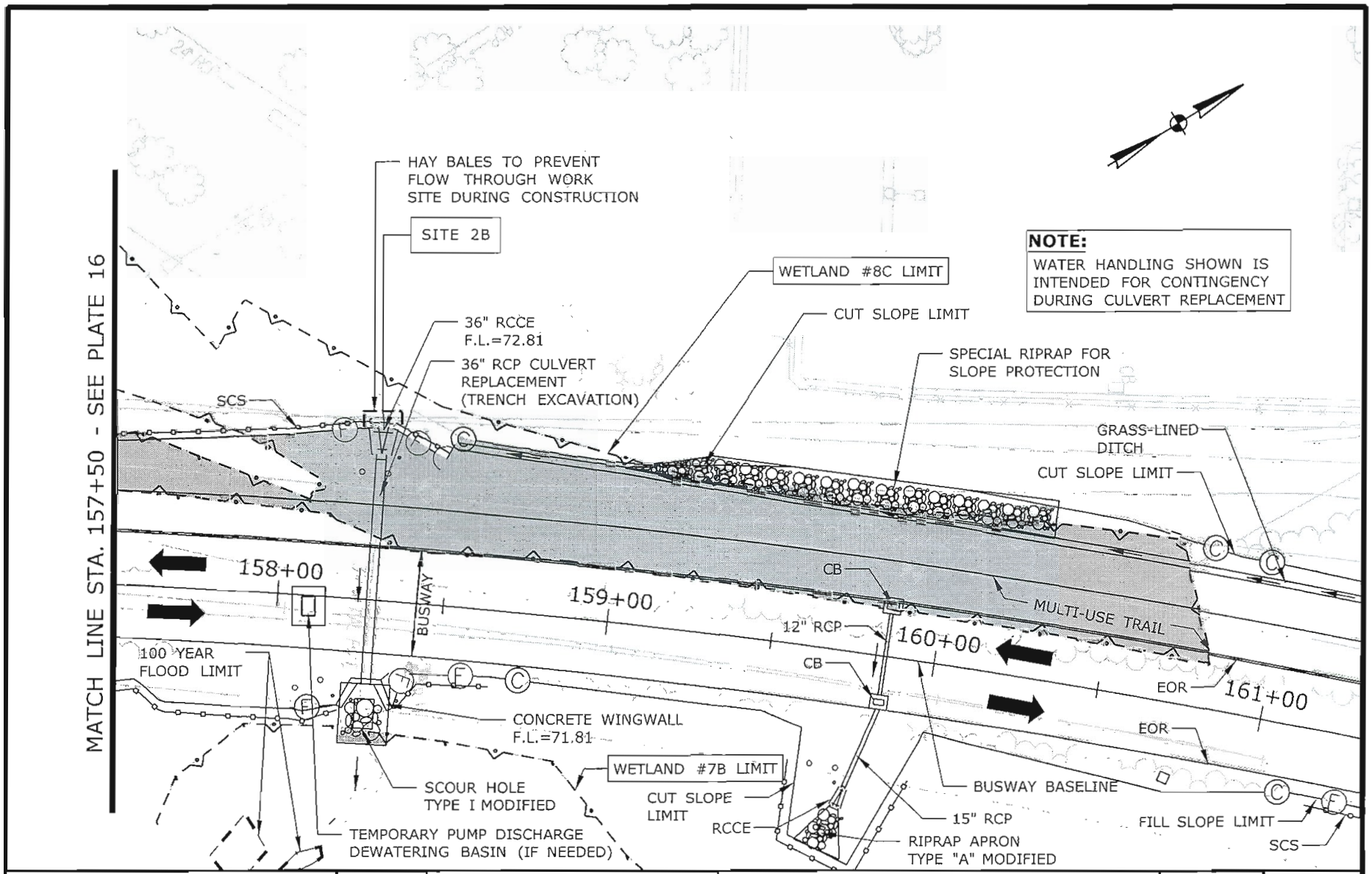
MICHAEL BAKER ENGINEERING

PLATE NO. 16



TYPICAL SECTION A-A
(SEE PLATE 16)

TYPICAL SECTION WHERE CUT WITHIN WETLAND IS REQUIRED FOR CONSTRUCTION	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 16A



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #8C IMPACT	12,022 S.F.
PERMANENT WETLAND #7B IMPACT	59 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034/H039

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

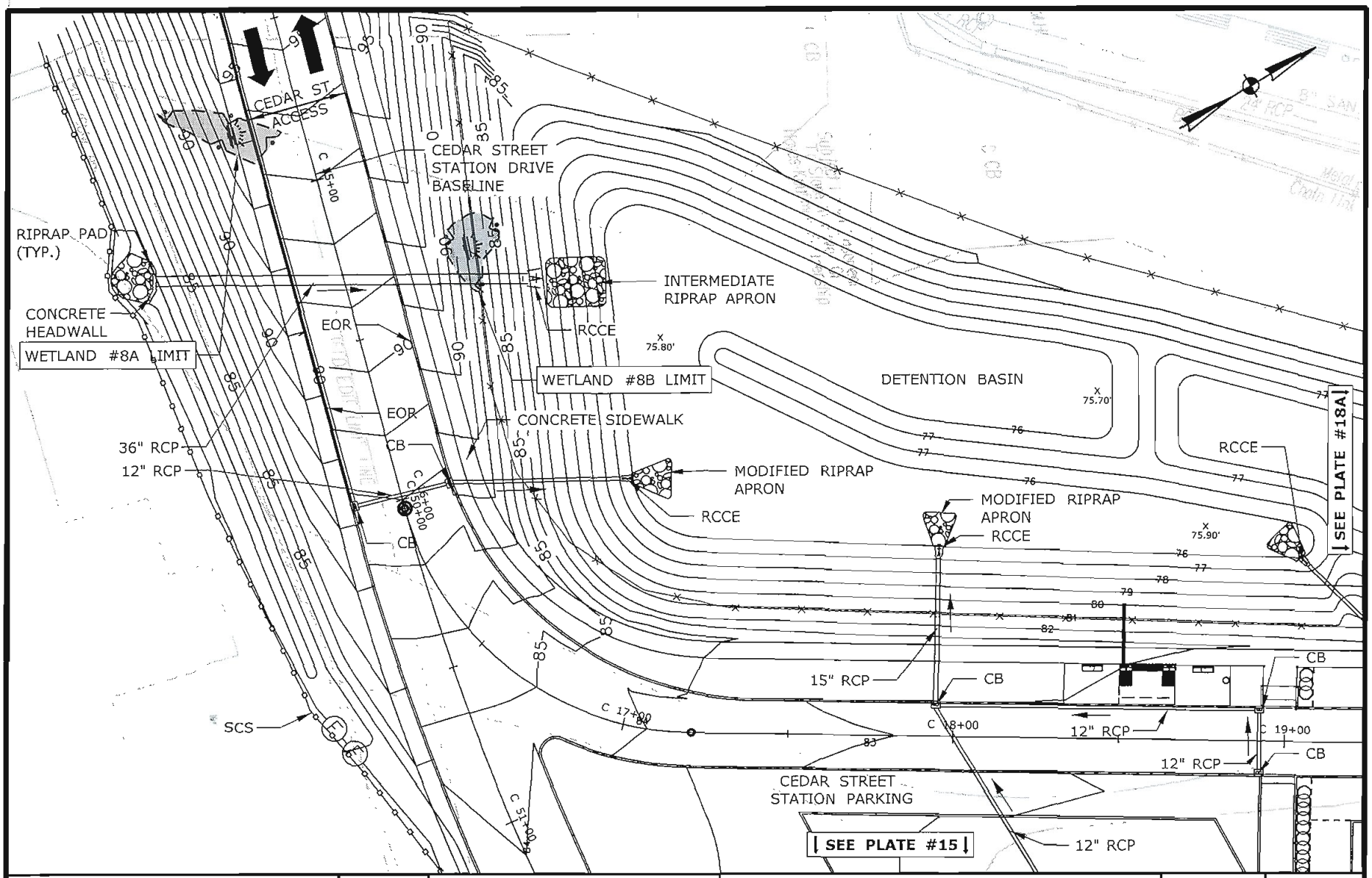
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 17



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #8A IMPACT	285 S.F.
PERMANENT WETLAND #8B IMPACT	241 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034/H039

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

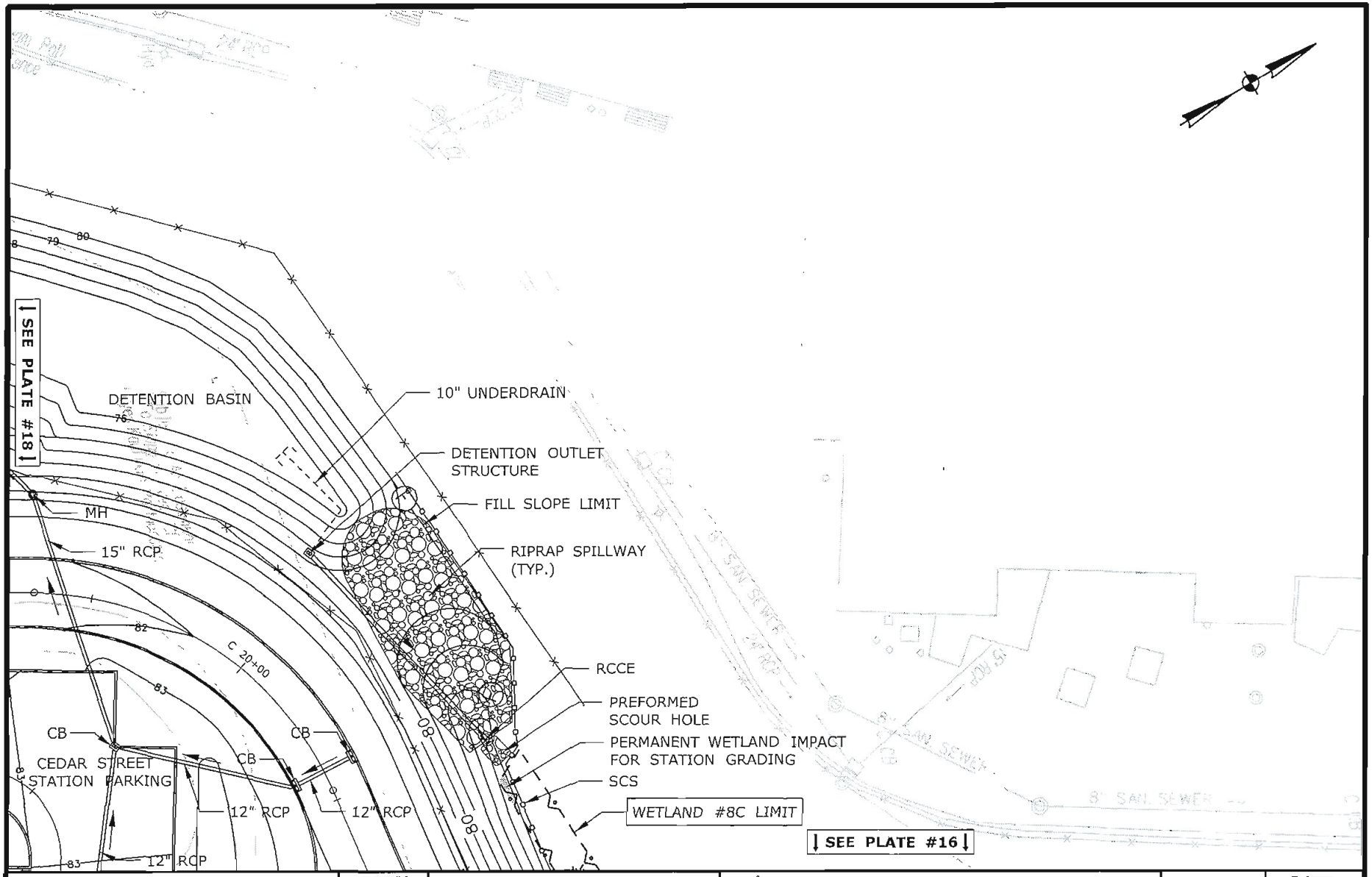
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 18



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #8C IMPACT	12,022 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034/H039

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

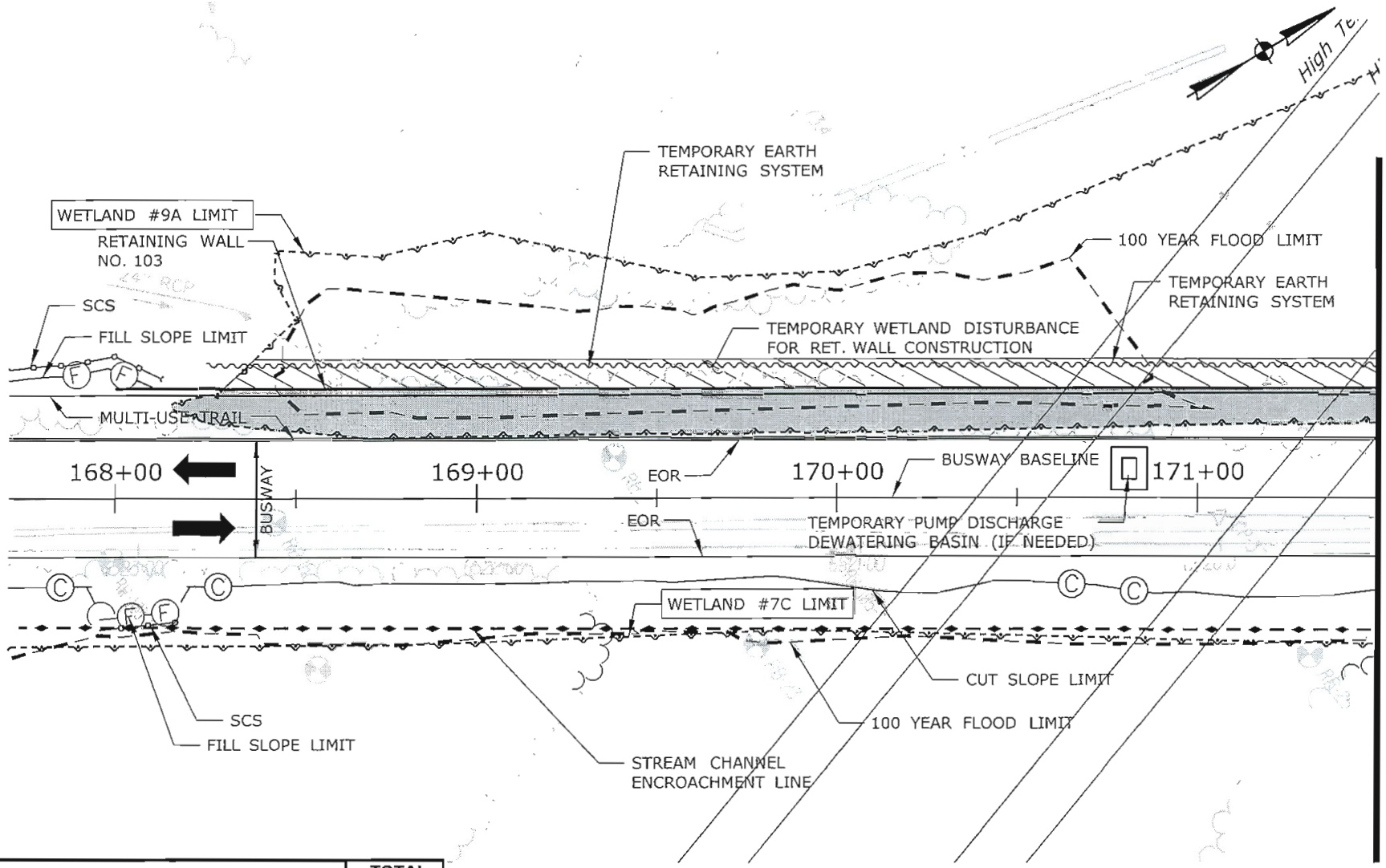
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 18A



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #9A IMPACT	7,230 S.F.
TEMPORARY WETLAND #9A IMPACT	5,449 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

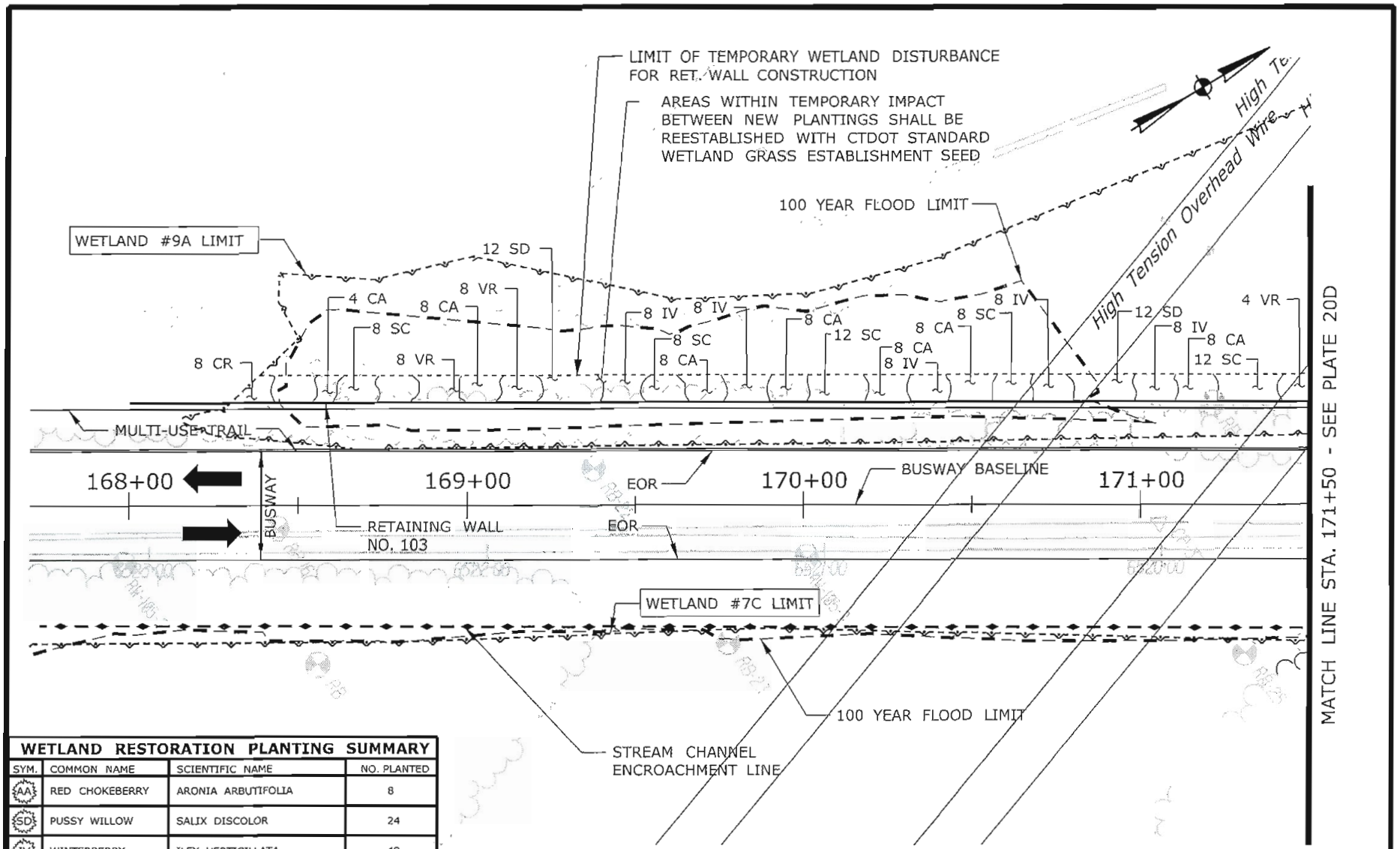
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 19



WETLAND RESTORATION PLANTING SUMMARY

SYM.	COMMON NAME	SCIENTIFIC NAME	NO. PLANTED
AA	RED CHOKEBERRY	ARONIA ARBUTIFOLIA	8
SD	PUSSY WILLOW	SALIX DISCOLOR	24
IV	WINTERBERRY	ILEX VERTICILLATA	48
VR	NORTHERN ARROWWOOD	VIBURNUM RECOGNITUM	24
SC	ELDERBERRY	SAMBUCUS CANADENSIS	48
CA	SILKY DOGWOOD	CORNUS AMOMUM	52
CR	GREY-STEM DOGWOOD	CORNUS RACEMOSA	8
TOTAL PLANTINGS			212

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

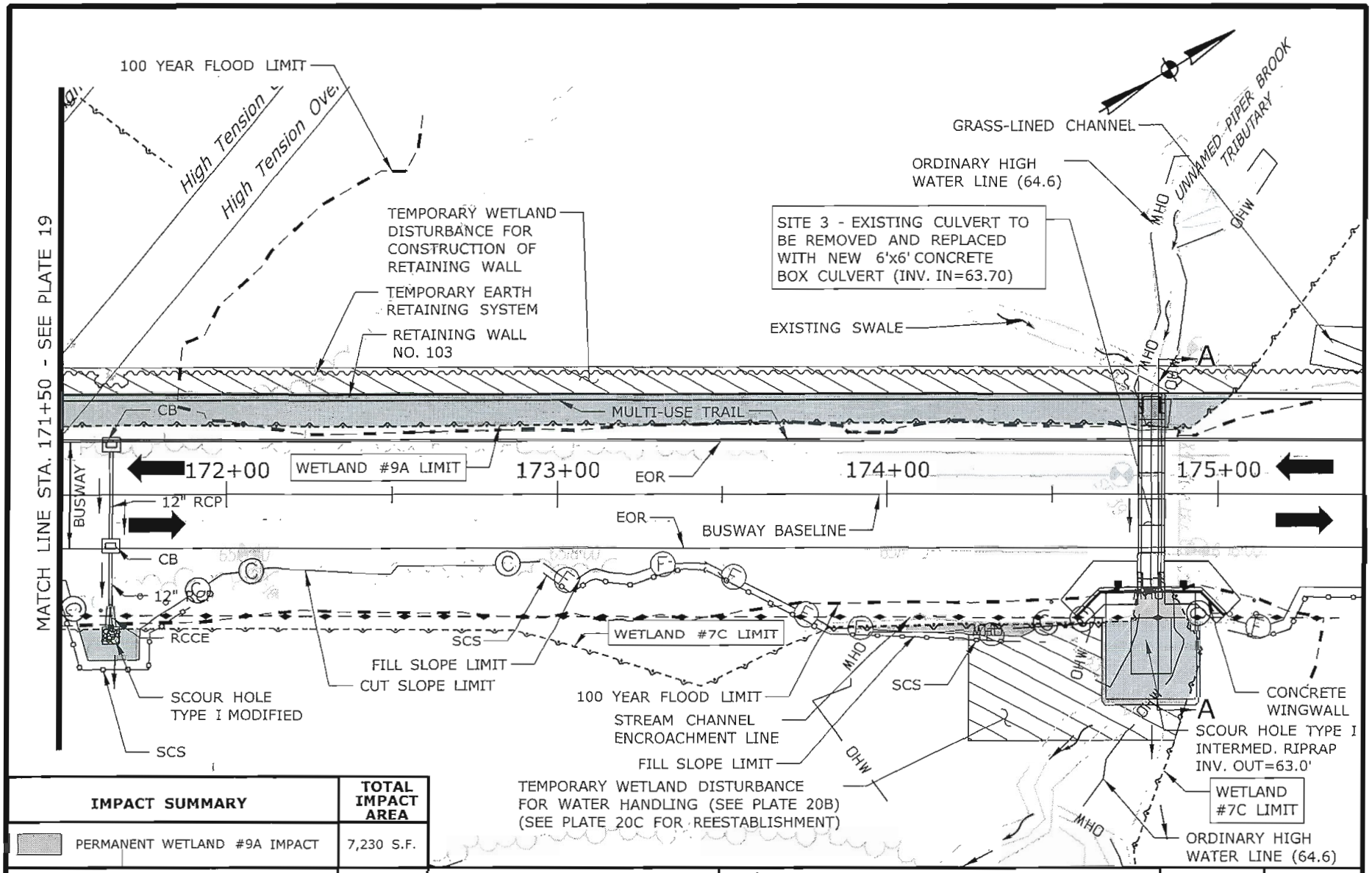
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 19A



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #9A IMPACT	7,230 S.F.
PERMANENT WETLAND #7C IMPACT	1,146 S.F.
TEMPORARY WETLAND #9A IMPACT	5,449 S.F.
TEMPORARY WETLAND #7C IMPACT	1,640 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

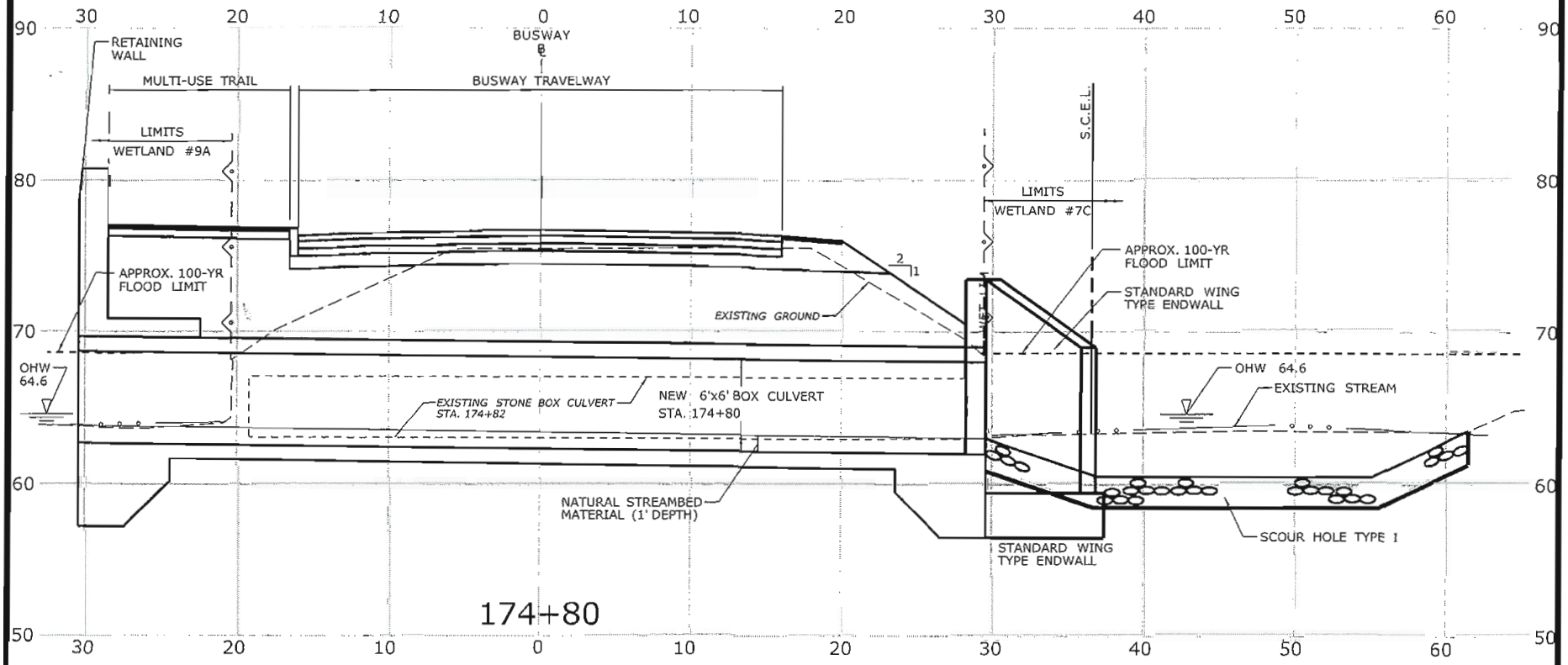
OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

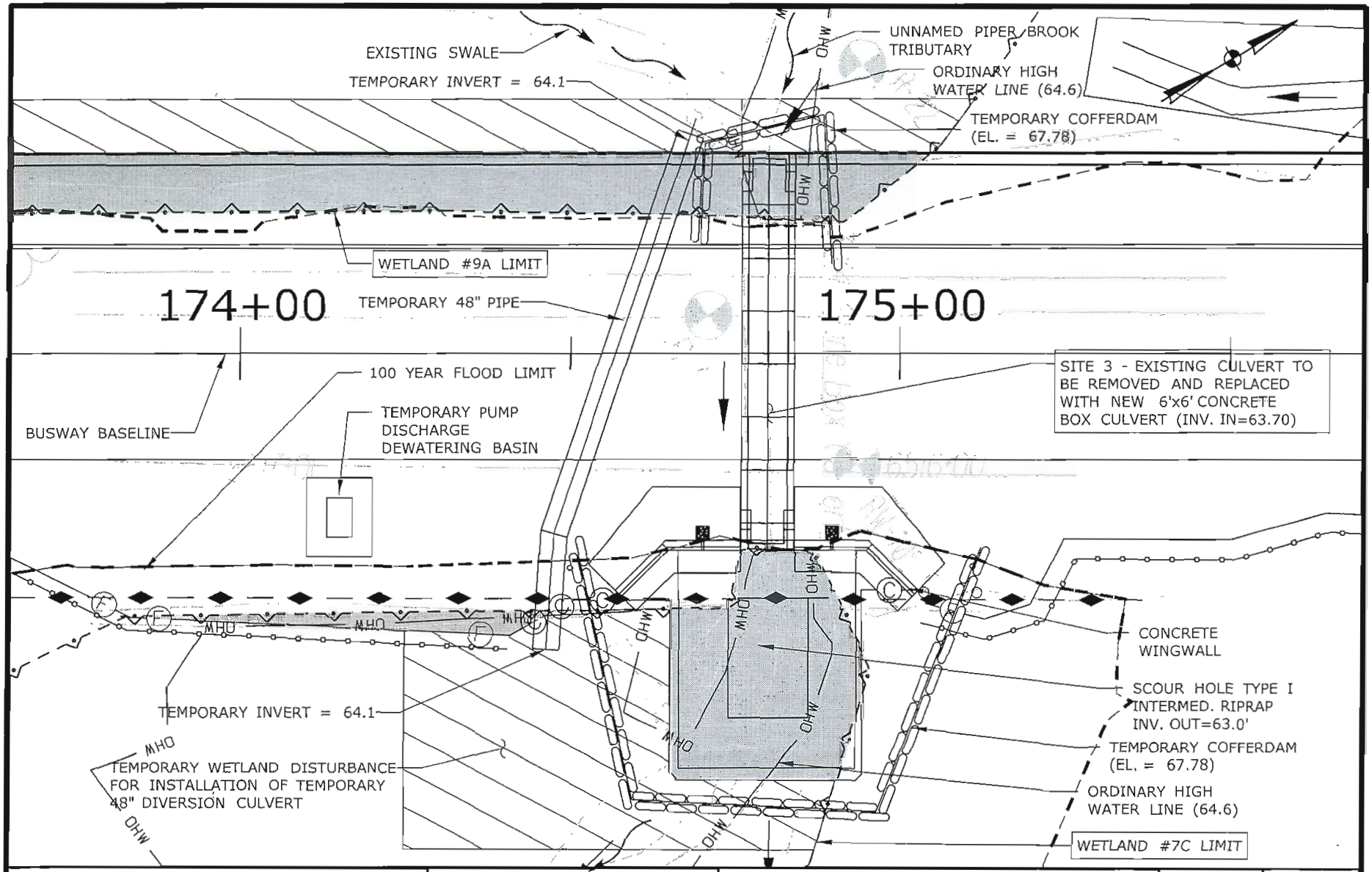
PLATE NO. 20

Site 3



SECTION A-A (SEE PLATE 20)

TYPICAL SECTION OF WETLAND IMPACTS AT SITE 3 CULVERT REPLACEMENT	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 20A



SITE 3
WATER HANDLING PLAN

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 20'
20 10 0 20

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 20B

GENERAL NOTES:

1. THE CONTRACTOR SHALL MAINTAIN WATER THROUGH THE TEMPORARY BYPASS PIPE AS SHOWN DURING CONSTRUCTION OF THE NEW CULVERT.

2. ALL WORK ASSOCIATED WITH THE TEMPORARY WATER DIVERSION, INCLUDING THE TEMPORARY BYPASS PIPE SHALL BE INCLUDED UNDER "HANDLING WATER".

3. A PUMP DISCHARGE AREA SHALL BE ESTABLISHED OUTSIDE OF THE WETLAND LIMITS, USING THE MODIFIED RIPRAP FILTERING SYSTEM SHOWN. THE LOCATION AND SIZE OF THE DEWATERING BASIN SHOWN IS APPROXIMATE. THE EXACT LOCATION MAY VARY BASED ON THE SIZE OF BASIN REQUIRED TO PROVIDE A STORAGE VOLUME CAPABLE OF RETAINING THE FIRST TWO HOURS OF PUMP DISCHARGE.

4. SEE PERMIT PLATES FOR ADDITIONAL DETAILS AND NOTES.

CONSTRUCTION SEQUENCE:

THE FOLLOWING SEQUENCE SHALL BE FOLLOWED FOR THE CONSTRUCTION OF THE NEW BOX CULVERT AND RETAINING WALL NO. 103 UNLESS OTHERWISE APPROVED:

1. CONSTRUCT THE TEMPORARY BYPASS PIPE AS SHOWN AND IN ACCORDANCE WITH THE "HANDLING WATER" SPECIAL PROVISION AND THE PERMIT DOCUMENTS.

2. CONSTRUCT THE COFFERDAM AS SHOWN.

3. DIVERT THE BROOK THROUGH THE BYPASS PIPE USING SANDBAGS OR SIMILAR MEANS TO DEFINE THE CHANNEL.

4. REMOVE THE EXISTING CULVERT.

5. CONSTRUCT THE BOX CULVERT, WINGWALLS AND THE PORTION OF RETAINING WALL NO.103 INSIDE THE COFFERDAM. DEWATERING SHALL BE ACCOMPLISHED BY PUMPING.

6. ONCE THE CULVERT IS IN PLACE, COMPLETE THE CHANNEL IMPROVEMENTS AND REMOVE THE COFFERDAM.

7. DIVERT THE BROOK THROUGH THE CULVERT USING SANDBAGS OR SIMILAR MEANS.

8. REMOVE THE TEMPORARY BYPASS PIPE.

9. CONSTRUCT THE RETAINING WALL AS SHOWN ON THE RETAINING WALL PLANS.

10. REMOVE THE TEMPORARY PUMP DISCHARGE BASIN.

11. CONSTRUCT THE ROADWAY AND STABILIZE SLOPES AS SHOWN ON THE PLANS.

12. ONCE ALL DISTURBED AREAS HAVE BEEN STABILIZED, REMOVE THE SEDIMENTATION CONTROL SYSTEMS.

CONSTRUCTION METHODS:

1. INSTALL SEDIMENTATION CONTROL SYSTEM AS SHOWN ON THE PLANS PRIOR TO CONSTRUCTION. THE EROSION PROTECTION SHALL REMAIN IN PLACE UNTIL ALL OF THE DISTURBED AREAS ARE STABILIZED.

2. BEST MANAGEMENT PRACTICES SHALL BE FOLLOWED DURING CONSTRUCTION AS DESCRIBED IN THE SPECIFICATIONS.

3. TURF ESTABLISH ALL DISTURBED AREAS ONCE FINAL SLOPES ARE ESTABLISHED.

NATIVE STREAMBED MATERIAL NOTES:

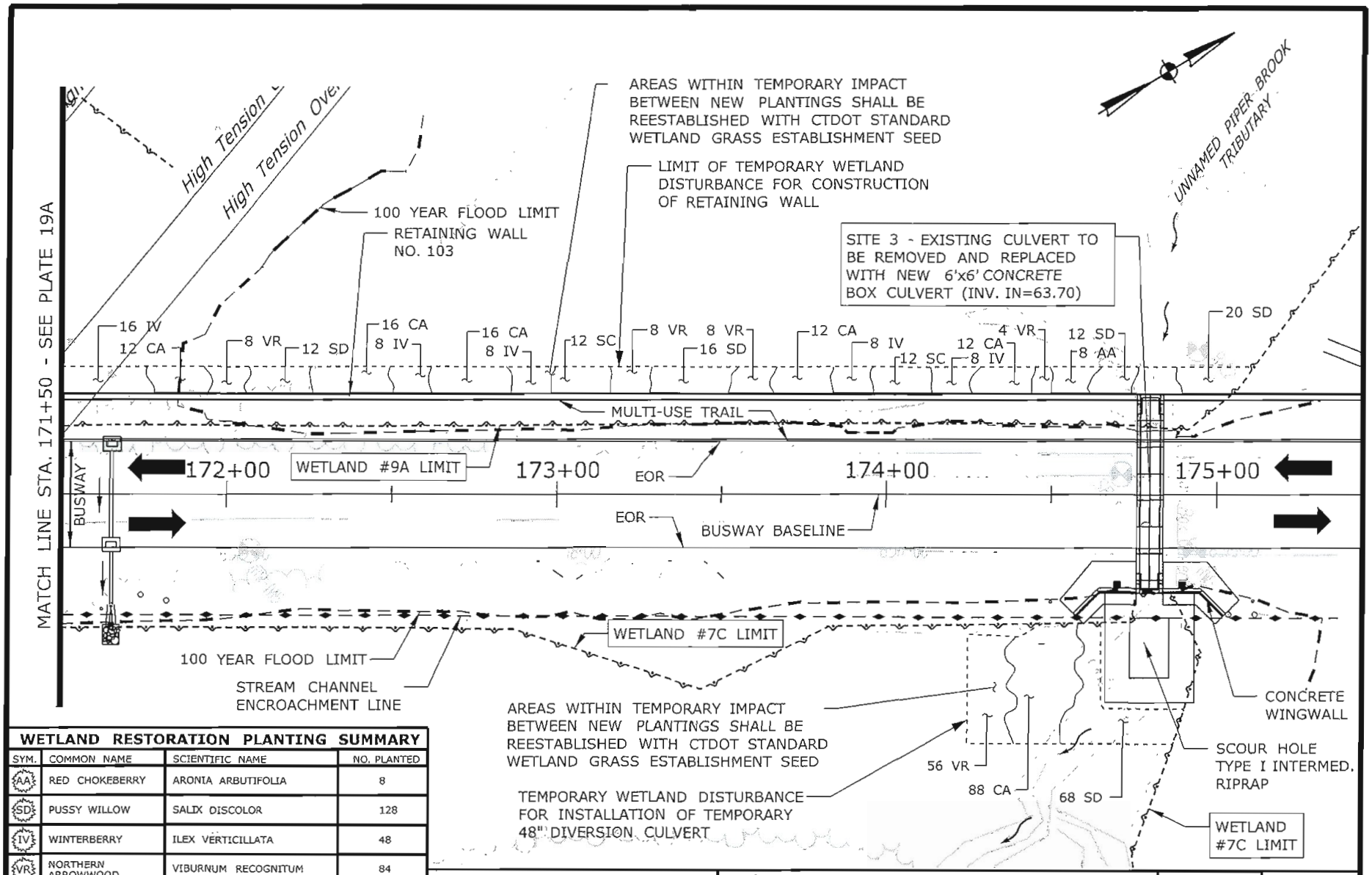
1. NATIVE STREAMBED MATERIAL EXCAVATED DURING THE CULVERT INSTALLATION SHALL BE STOCKPILED AND THEN REPLACED WITHIN THE CULVERT TO THE DEPTH SHOWN ON THE PLANS, AND AS DIRECTED BY THE ENGINEER.

2. THE STOCKPILE SHALL BE LOCATED OUTSIDE THE WETLAND LIMITS AND PROTECTED WITH SEDIMENTATION CONTROL SYSTEM.

2. THE COST OF STOCKPIING AND REPLACING THE STREAMBED MATERIAL WITHIN THE CULVERT SHALL BE INCLUDED IN THE COST OF THE ITEM "STRUCTURE EXCAVATION EARTH (EXCLUDING COFFERDAM AND DEWATERING)".

TEMPORARY HYDRAULIC DATA	
AVERAGE DAILY FLOW	0.6 cfs
AVERAGE SPRING FLOW	1.15 cfs
2-YEAR FREQUENCY DISCHARGE	63.0 cfs
TEMPORARY DESIGN DISCHARGE	63.0 cfs
TEMPORARY DESIGN FREQUENCY	2 YEAR
TEMPORARY WATER SURFACE ELEVATION UPSTREAM	67.78'
TEMPORARY WATER SURFACE ELEVATION DOWNSTREAM	65.5'

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 20C



WETLAND RESTORATION PLANTING SUMMARY			
SYM.	COMMON NAME	SCIENTIFIC NAME	NO. PLANTED
AA	RED CHOKEBERRY	ARONIA ARBUTIFOLIA	8
SD	PUSSY WILLOW	SALIX DISCOLOR	128
IV	WINTERBERRY	ILEX VERTICILLATA	48
VR	NORTHERN ARROWWOOD	VIBURNUM RECOGNITUM	84
SC	ELDERBERRY	SAMBUCUS CANADENSIS	24
CA	SILKY DOGWOOD	CORNUS AMOMUM	156
CR	GREY-STEM DOGWOOD	CORNUS RACEMOSA	8
TOTAL PLANTINGS			456

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

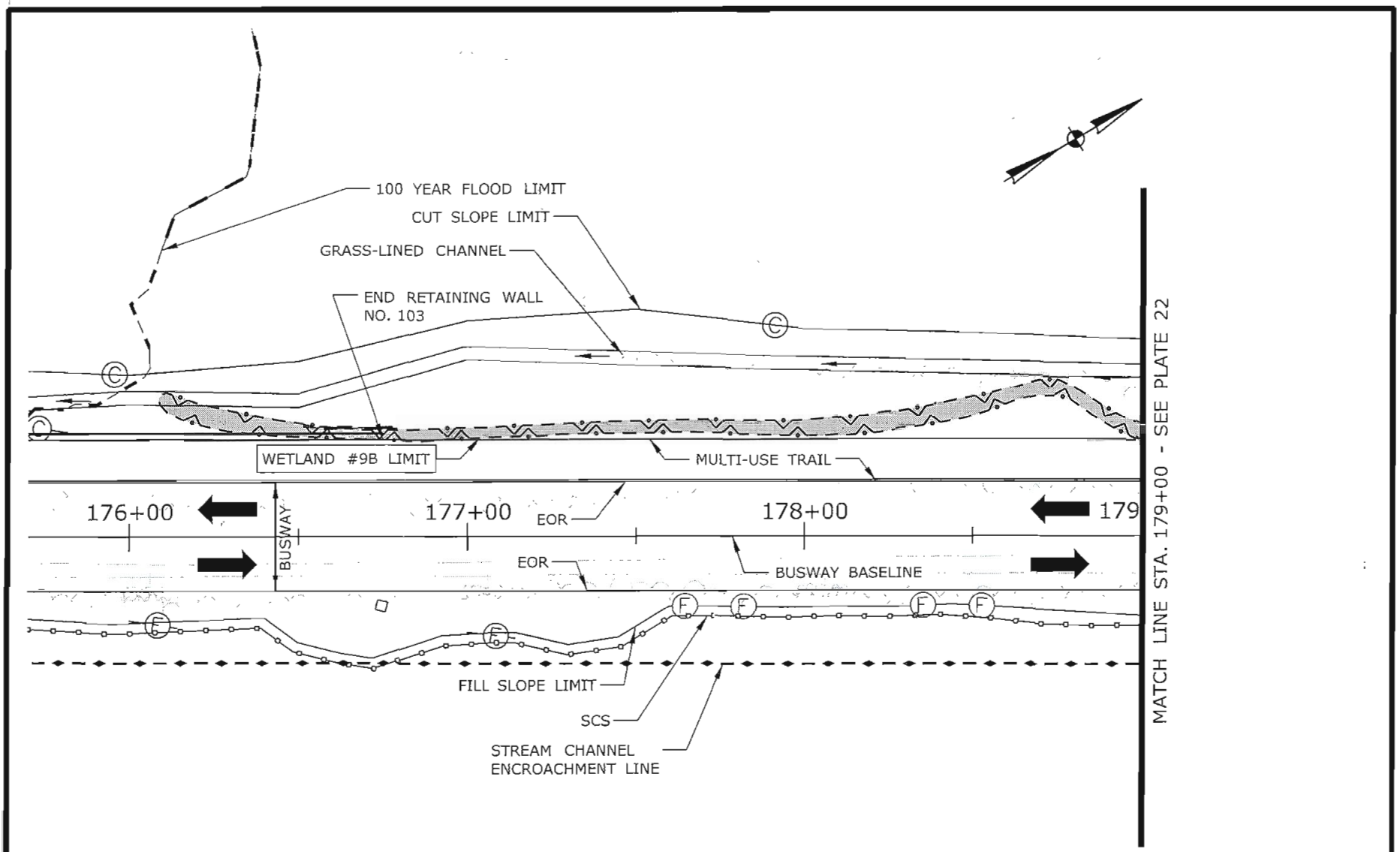
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 20D



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #9B IMPACT	1,987 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

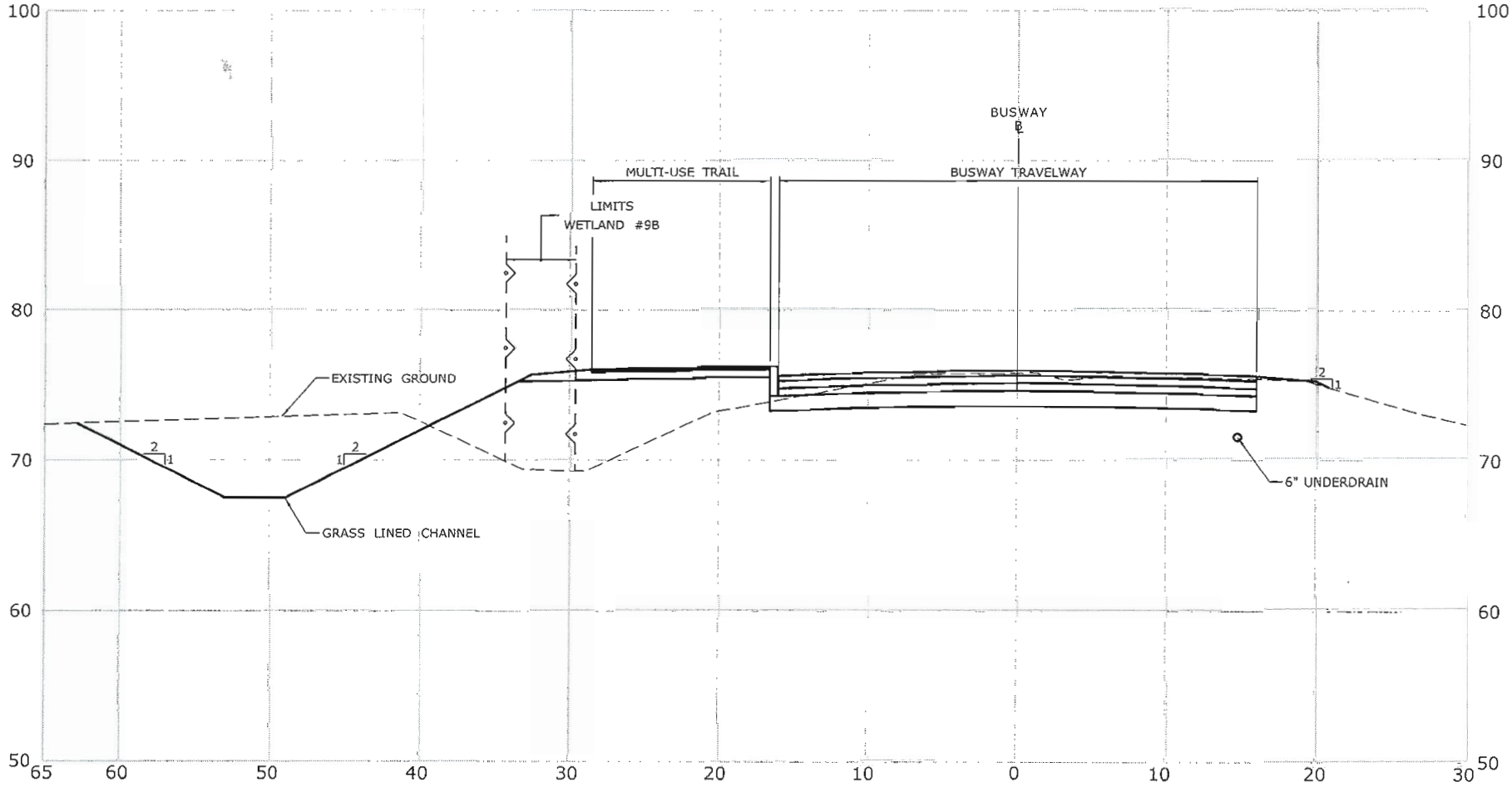
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

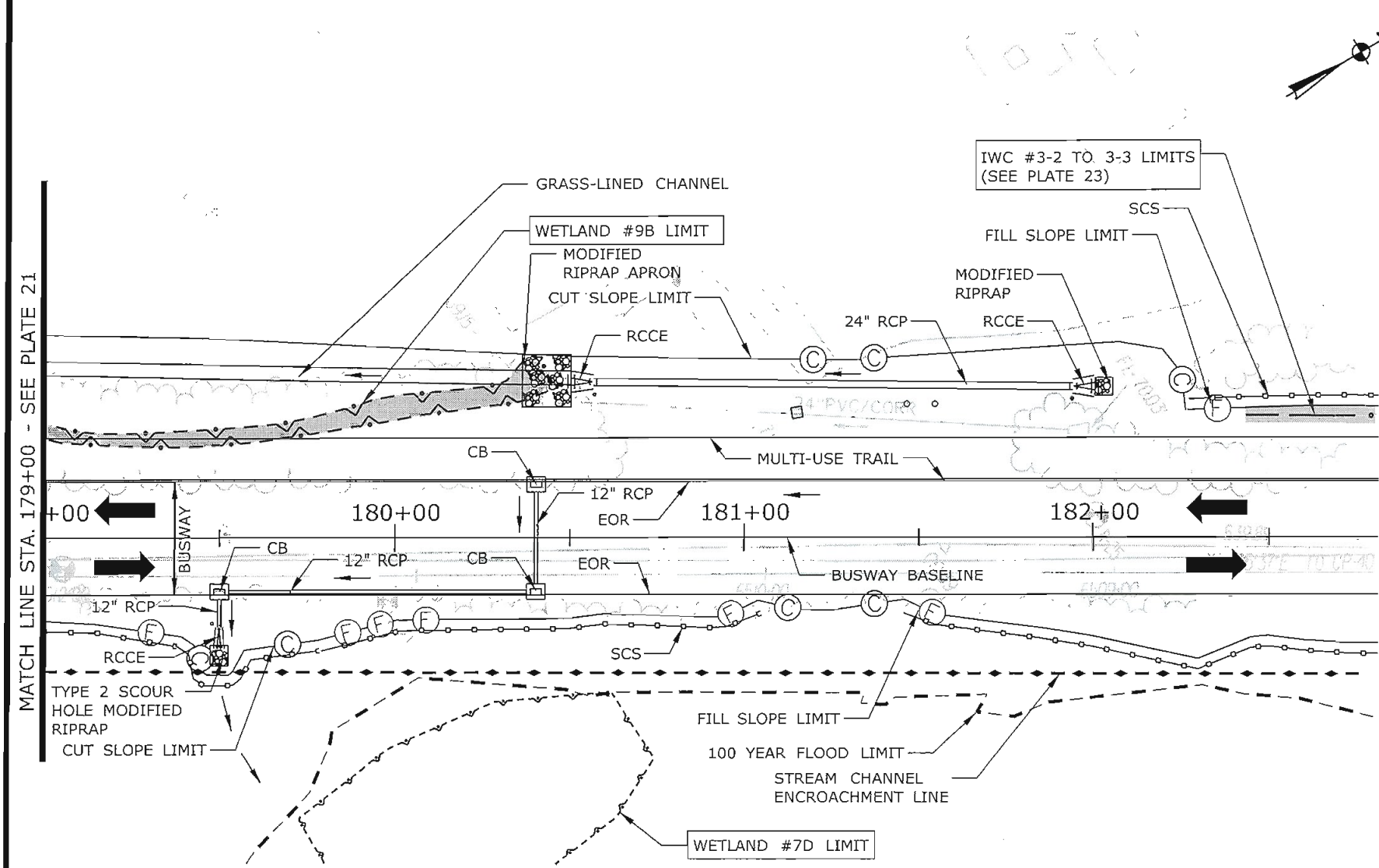
DATE: JULY 2010

PLATE NO. 21



TYPICAL SECTION A-A
(SEE PLATE 21)

TYPICAL SECTION OF COMPLETE WETLAND FILL AND CONSTRUCTION OF NEW GRASS-LINED DITCH	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY, 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 21A



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #9B IMPACT	1,987 S.F.
PERMANENT IWC #3-2 TO 3-3 IMPACT	121 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

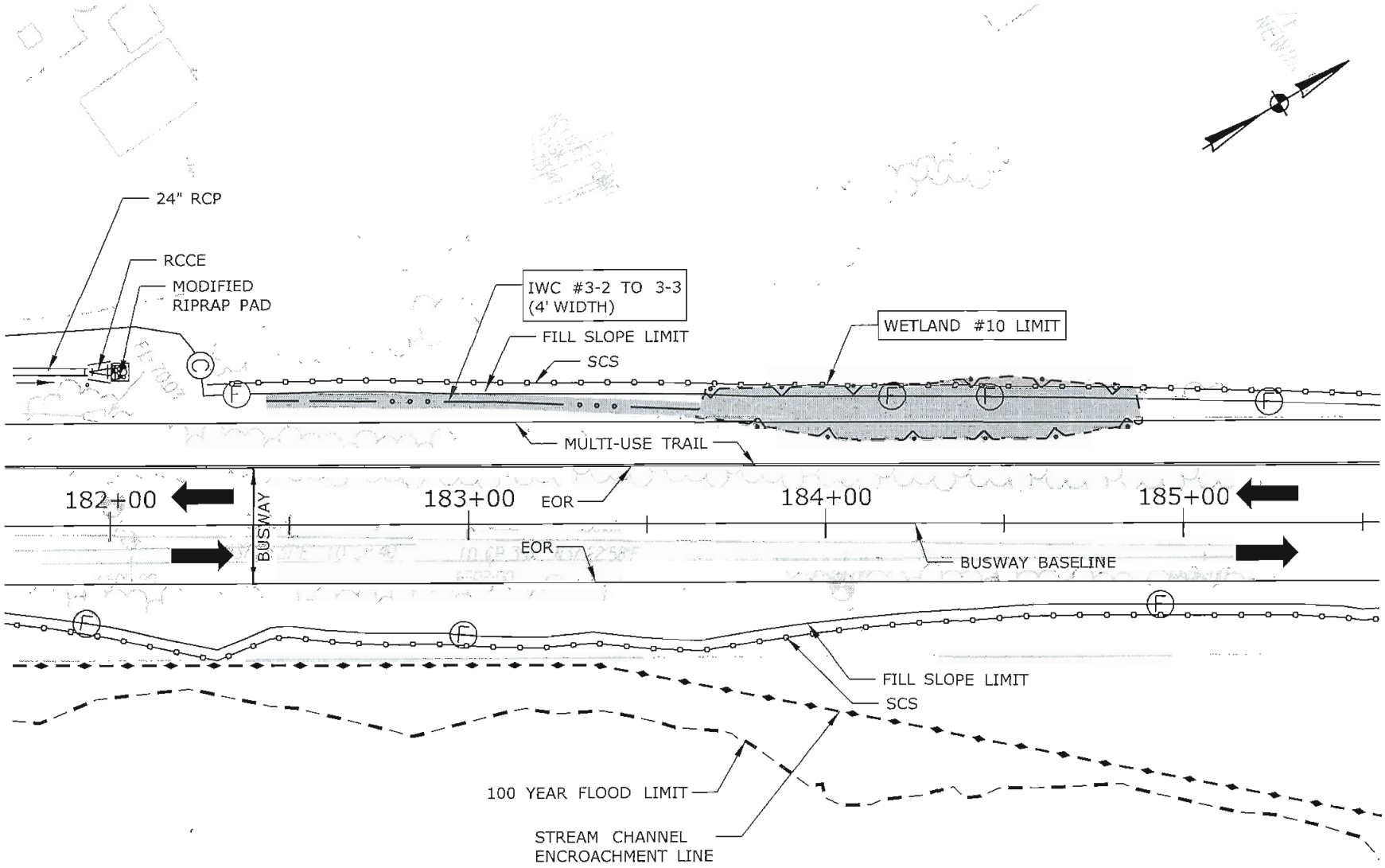
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 22



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #10 IMPACT	1,710 S.F.
PERMANENT IWC #3-2 TO 3-3 IMPACT	121 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO. H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

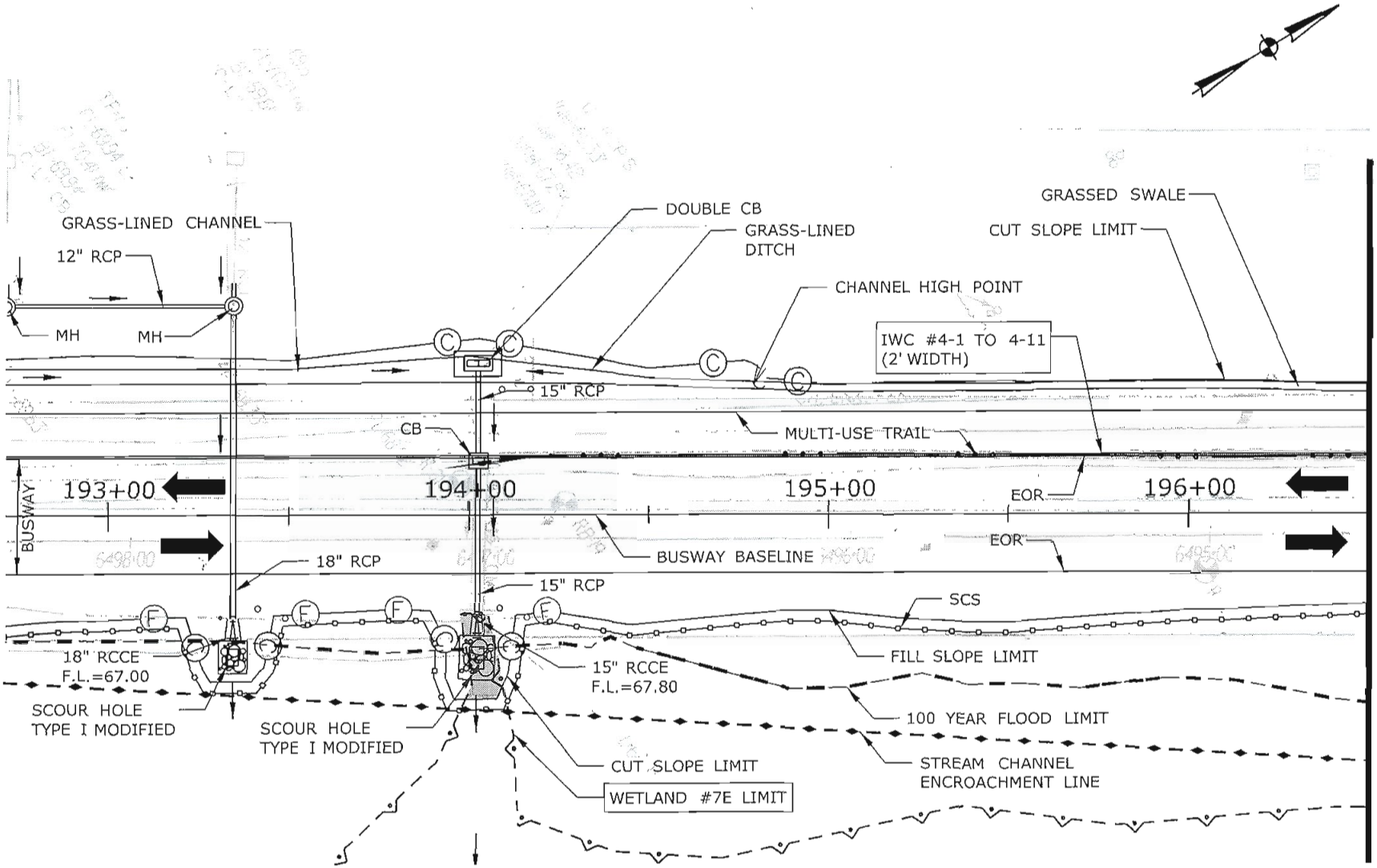
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 23



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #7E IMPACT	192 S.F.
PERMANENT IWC #4 IMPACT	950 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

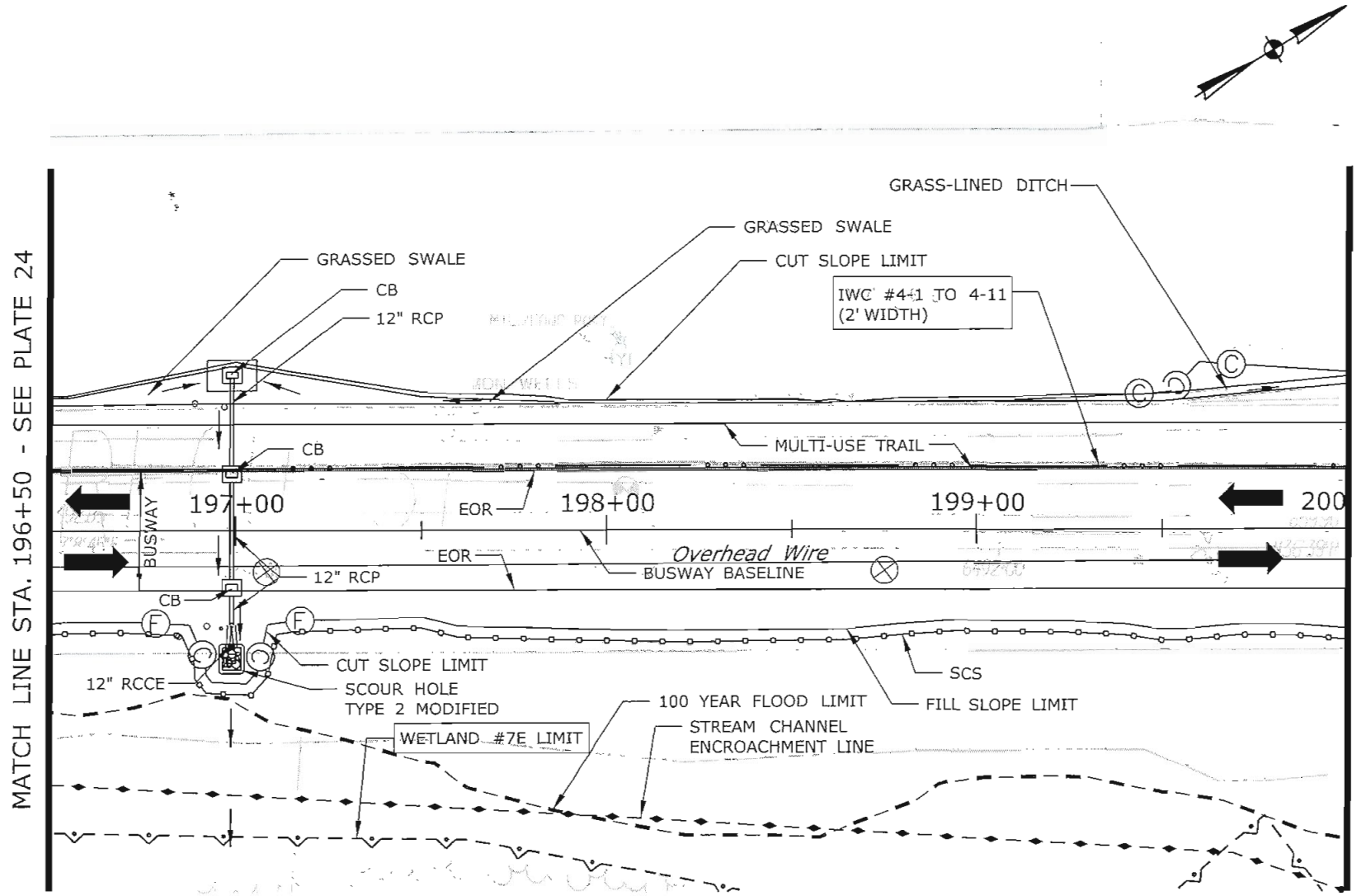
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 24



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #7E IMPACT	192 S.F.
PERMANENT IWC #4 IMPACT	950 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

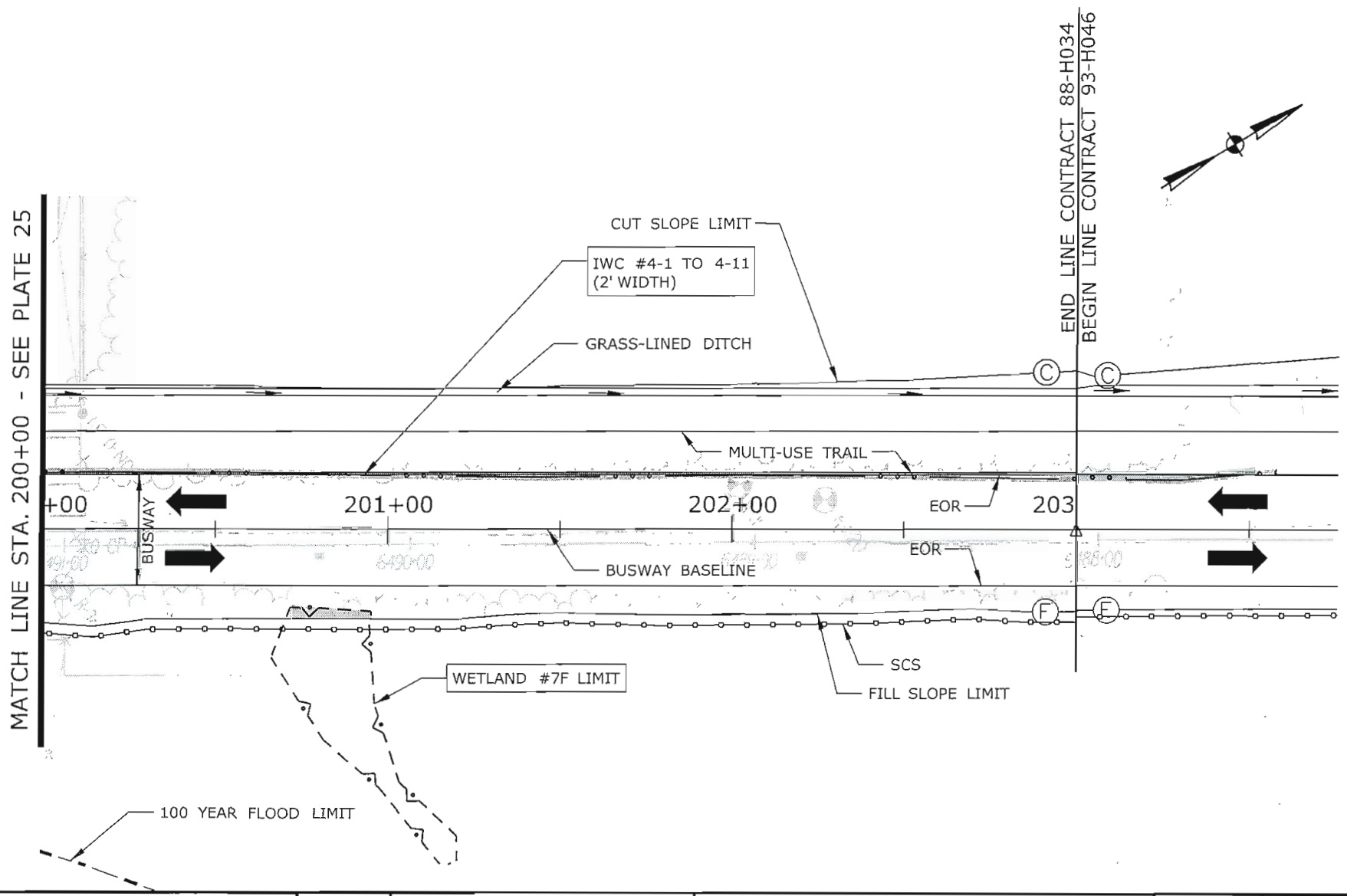
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 25



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #7F IMPACT	66 S.F.
PERMANENT IWC #4 IMPACT	950 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034/H046

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

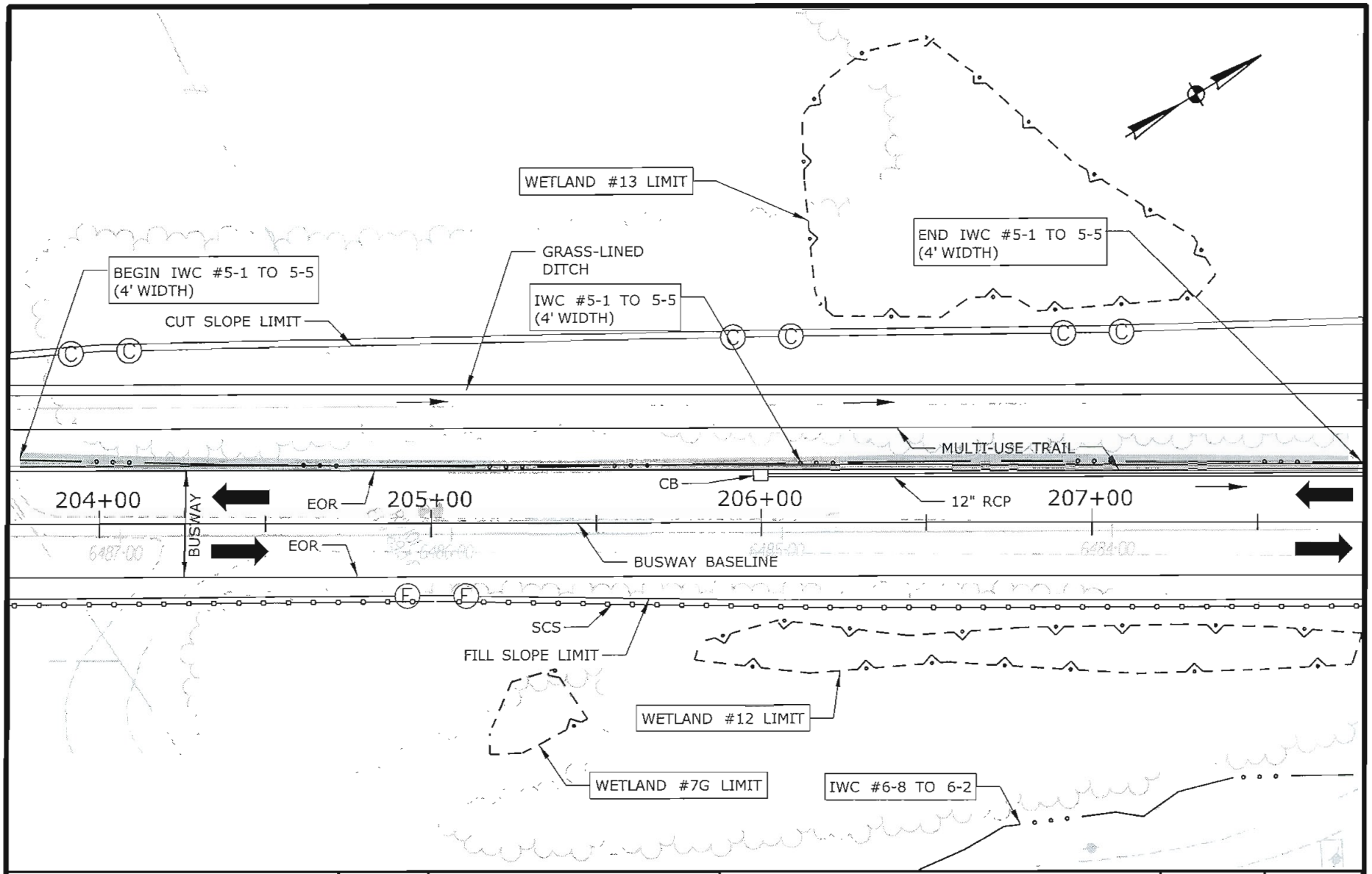
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 26



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #5 IMPACT	405 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

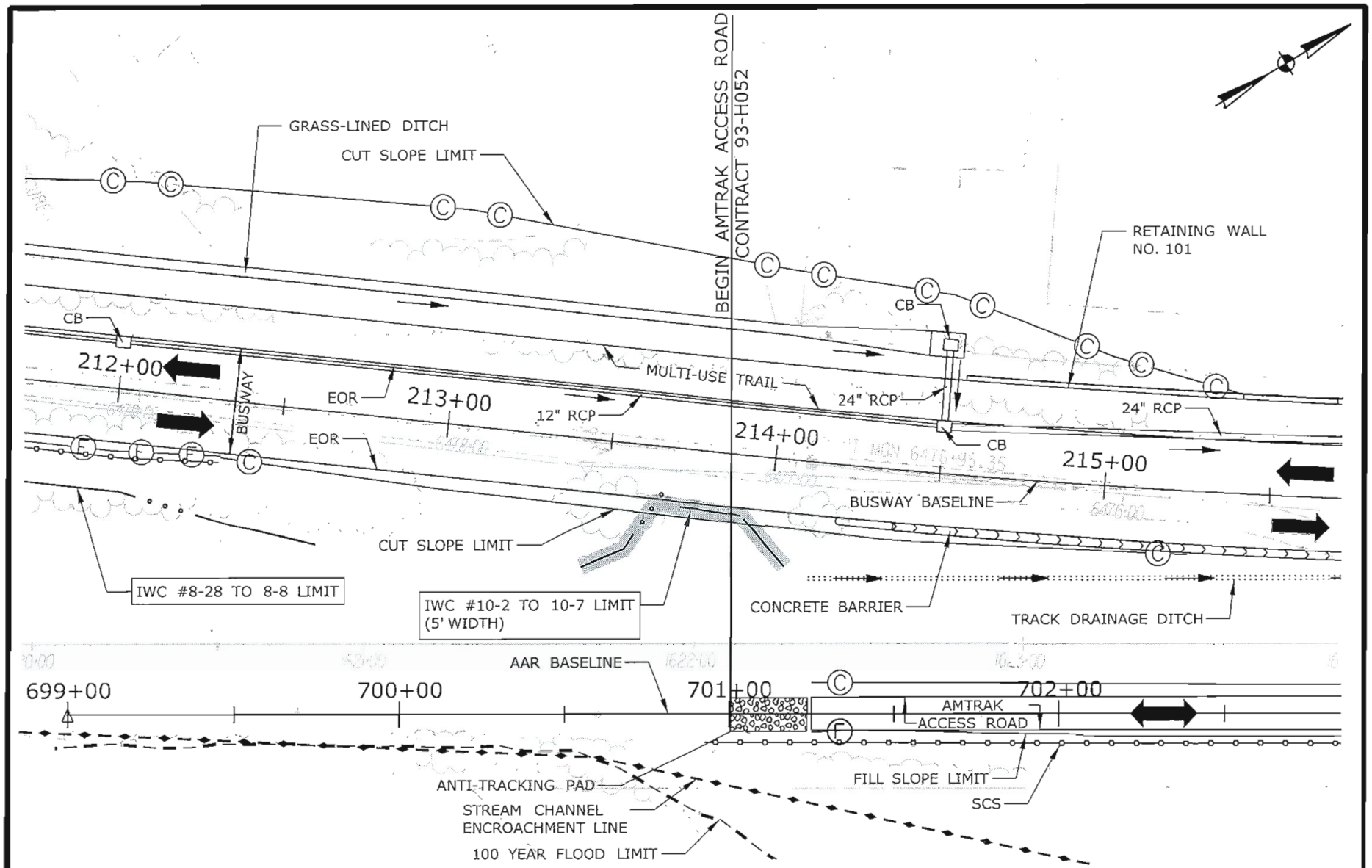
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 27



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #10 IMPACT	77 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

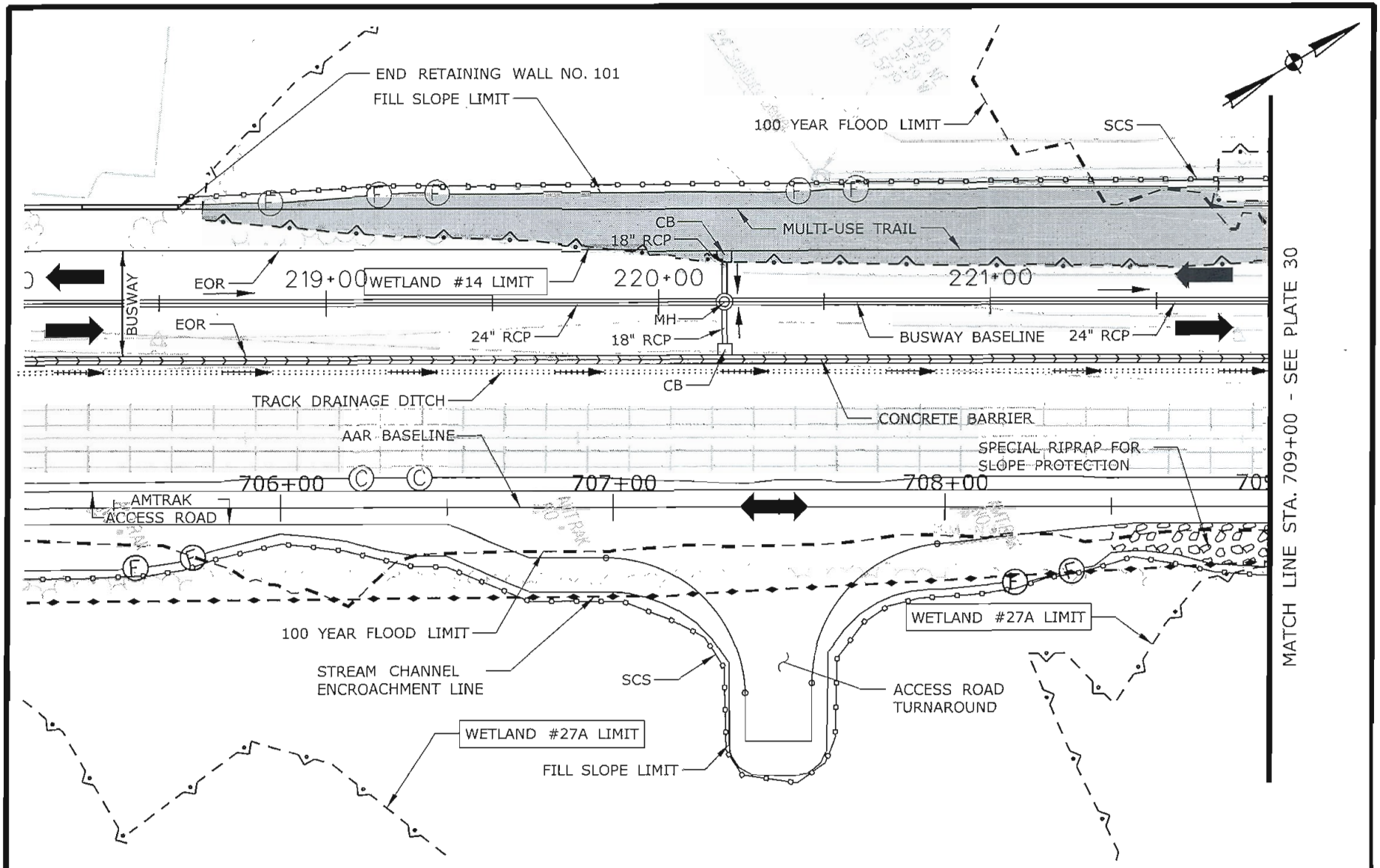
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 28



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #14 IMPACT	8,887 S.F.
PERMANENT WETLAND #27A IMPACT	9,587 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

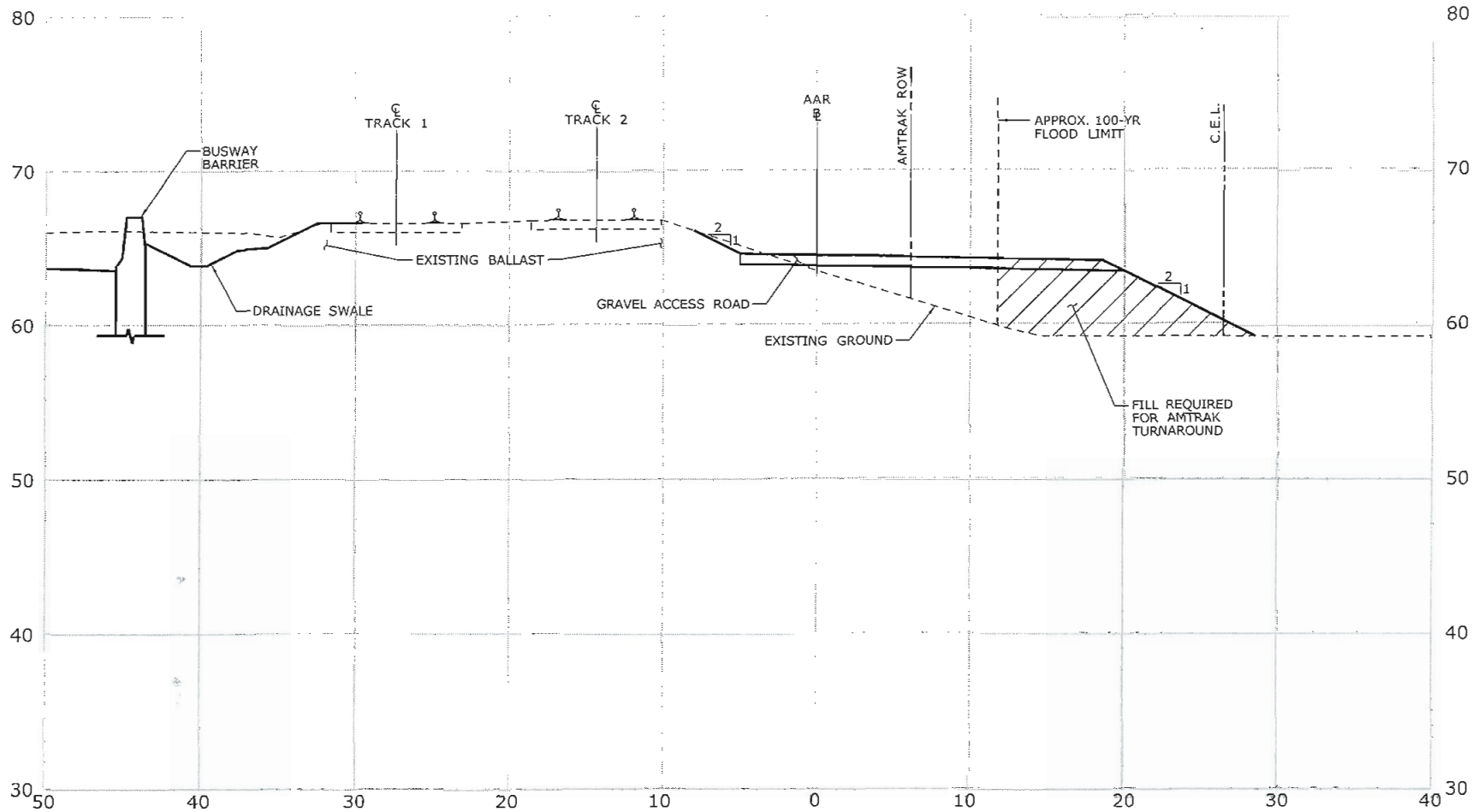
OFFICE OF ENGINEERING

DATE: JULY 2010

NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

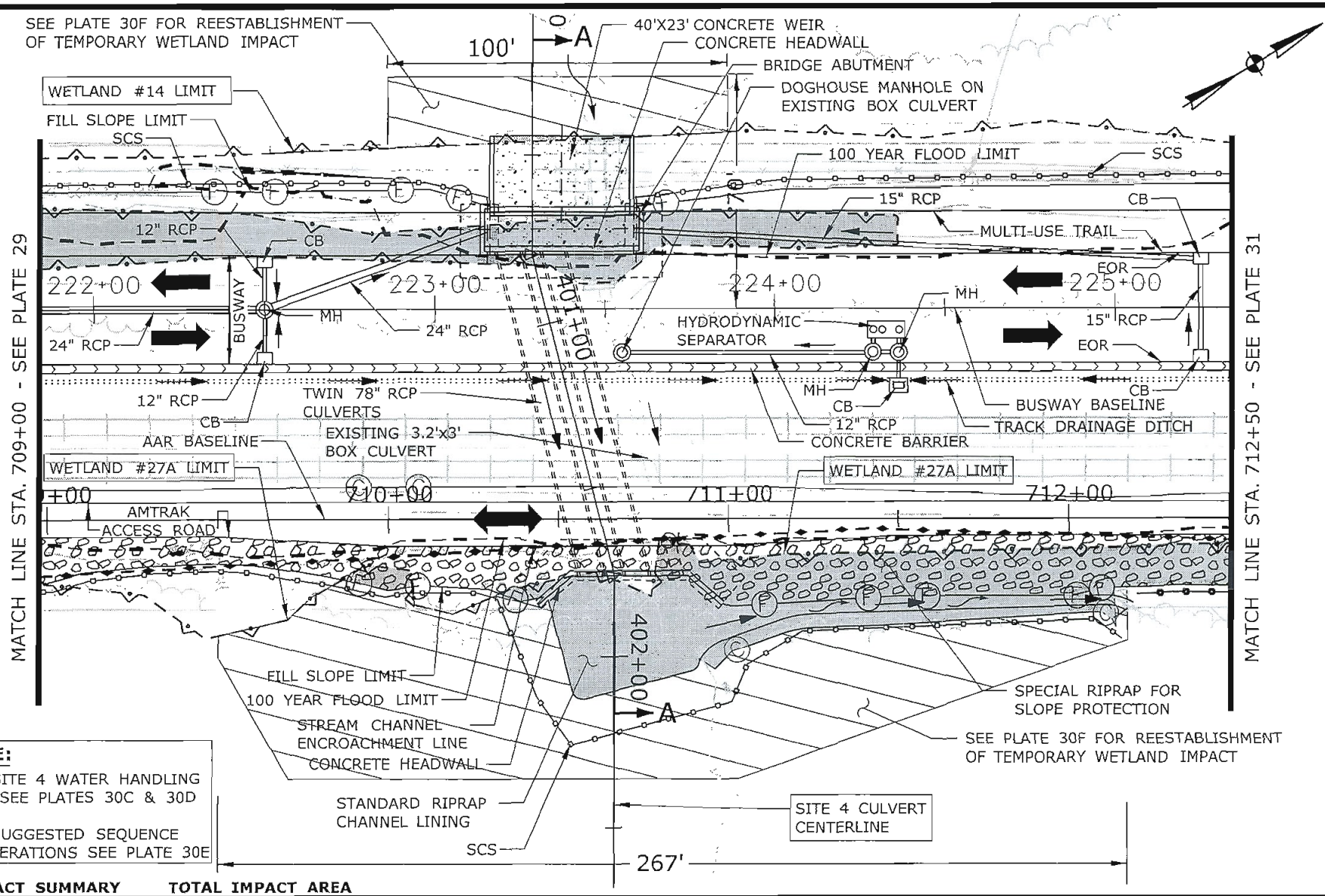
MICHAEL BAKER ENGINEERING

PLATE NO. 29



TYPICAL SECTION A-A
(SEE PLATE 29)

TYPICAL SECTION OF FILL WITHIN 100-YEAR FLOOD LIMIT AND STREAM CHANNEL ENCROACHMENT LINE	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 29A



NOTE:

FOR SITE 4 WATER HANDLING PLAN, SEE PLATES 30C & 30D

FOR SUGGESTED SEQUENCE OF OPERATIONS SEE PLATE 30E

IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #14 IMPACT	8,887 S.F.
PERMANENT WETLAND #27A IMPACT	9,587 S.F.
TEMPORARY WETLAND #14 IMPACT	2,025 S.F.
TEMPORARY WETLAND #27A IMPACT	9,256 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

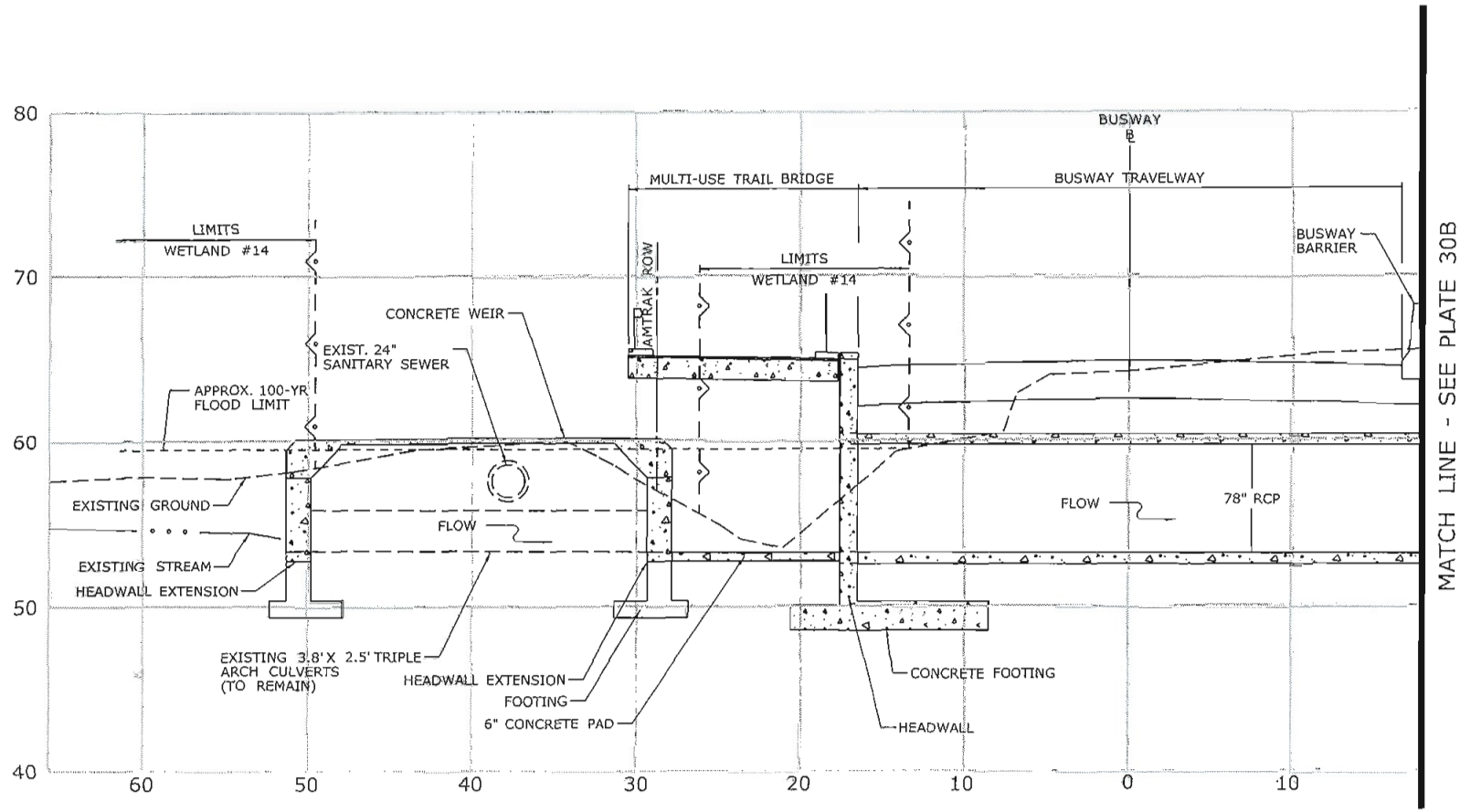
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

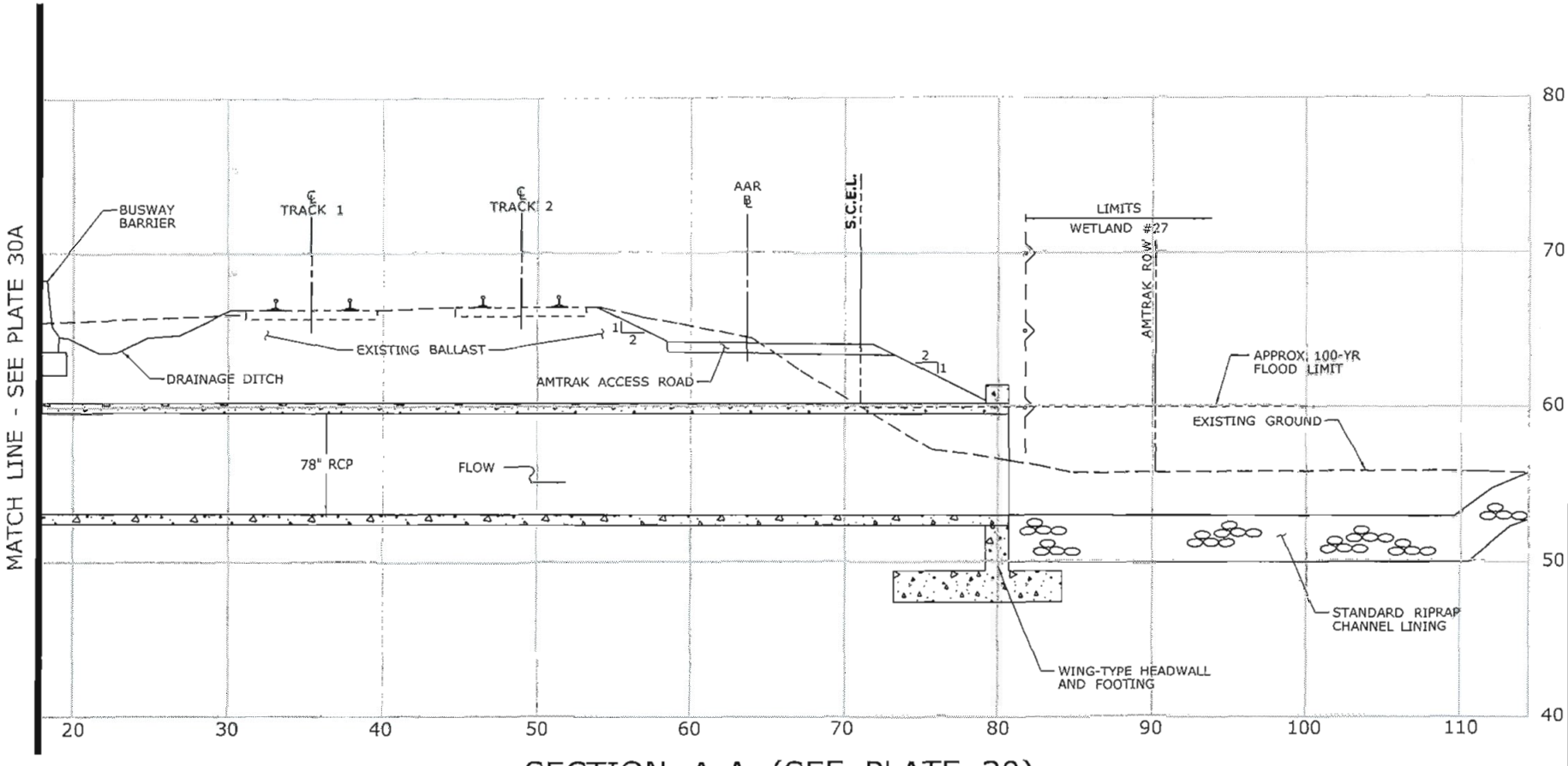
MICHAEL BAKER ENGINEERING

PLATE NO. 30



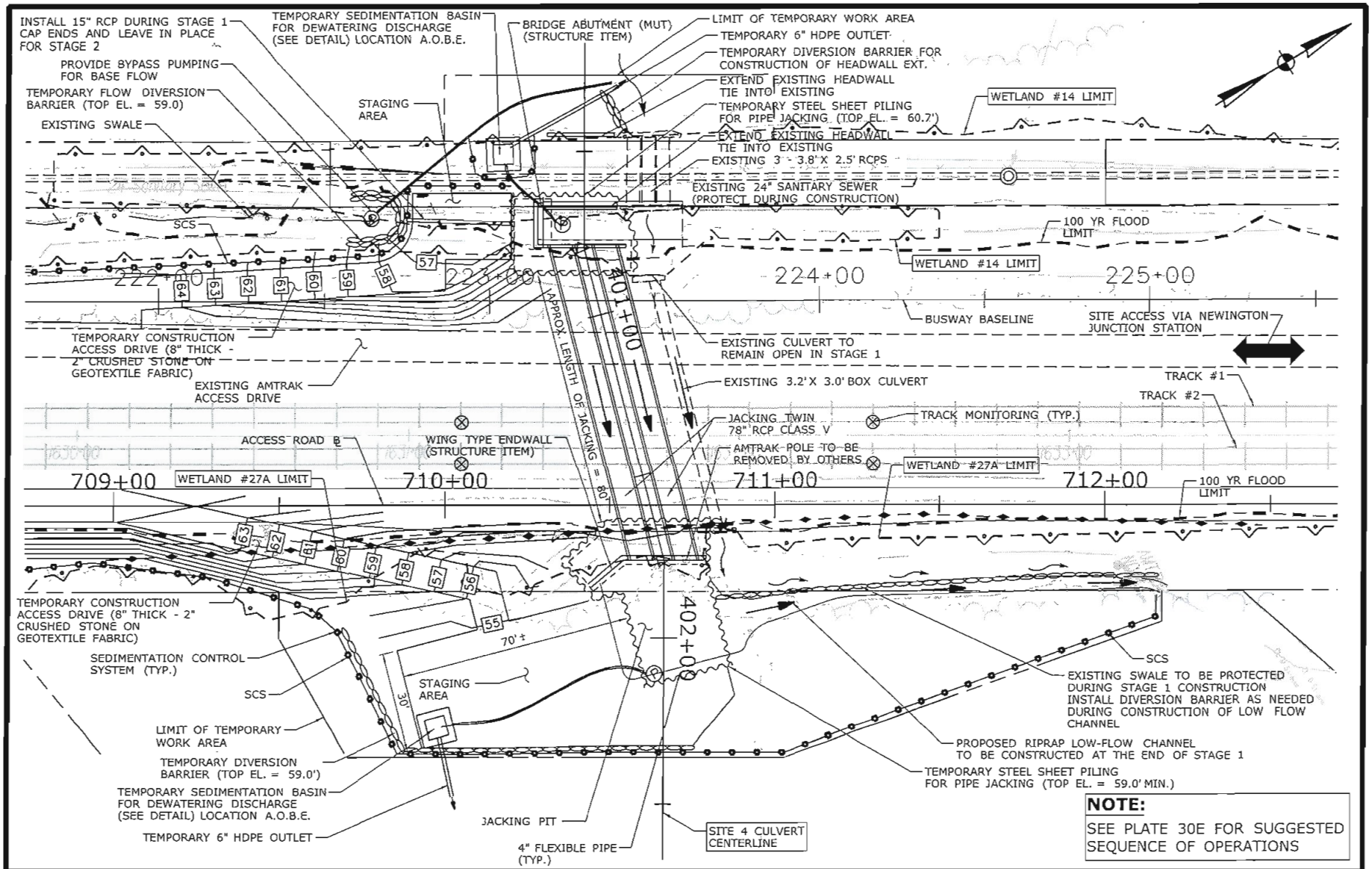
SECTION A-A (SEE PLATE 30)

SITE 4 CULVERT REPLACEMENT	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 30A

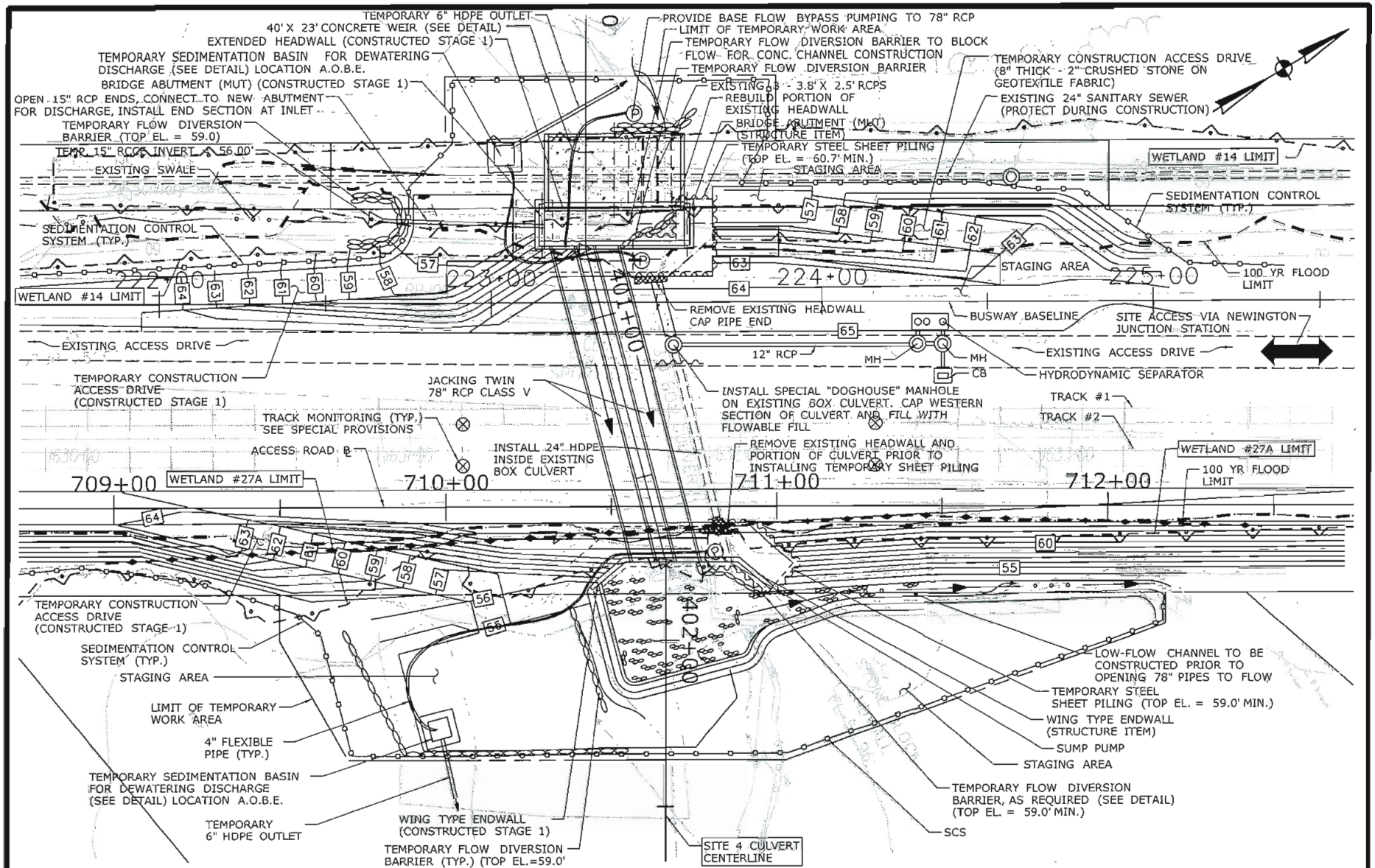


SECTION A-A (SEE PLATE 30)

SITE 4 CULVERT REPLACEMENT	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 30B



CONSTRUCTION STAGING AND WATER HANDLING PLAN FOR SITE 4 CULVERT REPLACEMENT	STATE PROJECT NO.: 171-305 CONTRACT NO.: H046/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
STAGE 1	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 30C



CONSTRUCTION STAGING AND WATER HANDLING PLAN FOR SITE 4 CULVERT REPLACEMENT	STATE PROJECT NO.: 171-305 CONTRACT NO.: H046/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
STAGE 2	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 30D

GENERAL NOTES:

1. THE CONTRACTOR SHALL BE LIMITED TO WORKING WITHIN THE TEMPORARY WORK AREAS AS INDICATED ON THE PLANS WHEN WORKING WITHIN A DELINEATED WETLAND BOUNDARY. THE TEMPORARY WORK AREAS WILL BE LOCATED AND STAKED IN THE FIELD BY THE CONTRACTOR PRIOR TO CLEARING AND GRUBBING OR THE COMMENCEMENT OF ANY OTHER CONSTRUCTION ACTIVITY. WORK OUTSIDE THE DELINATED IMPACT AREAS IS NOT PERMITTED. IF ANY MEANS AND METHODS CHOSEN BY THE CONTRACTOR REQUIRE ADDITIONAL WETLAND IMPACT, EITHER PERMANENT OR TEMPORARY, THE CONTRACTOR SHALL NOTIFY CTDOT IMMEDIATELY, AS THIS WILL REQUIRE ADDITIONAL REVIEW BY THE CTDOT OFFICE OF ENVIRONMENTAL PLANNING AND CTDEP AT THE CONTRACTOR'S EXPENSE.

2. ALL WETLAND AREAS TEMPORARILY IMPACTED FOR THE PURPOSES OF CONSTRUCTION, STAGING OR ACCESS SHALL BE REESTABLISHED BY THE CONTRACTOR IMMEDIATELY FOLLOWING THE USE OF THESE AREAS, PER CONNECTICUT DOT AND DEP STANDARDS. SEE SPECIAL PROVISIONS FOR INFORMATION ON MATERIAL REQUIREMENTS. SEE PLATE 30F FOR PLANTING PLAN. IMPACTED WETLAND AREAS BETWEEN SPECIFIED PLANTINGS SHALL BE REESTABLISHED WITH WETLAND ESTABLISHMENT SEED MIX. UPLAND AREAS TO BE STABILIZED WITH CTDOT CONSERVATION SEED MIX.

3. ALL WORK ASSOCIATED WITH THE TEMPORARY WATER DIVERSION, INCLUDING THE TEMPORARY BYPASS PIPE SHALL BE INCLUDED UNDER "HANDLING WATER".

4. A PUMP DISCHARGE AREA SHALL BE ESTABLISHED OUTSIDE OF THE WETLAND LIMITS, USING THE MODIFIED RIPRAP FILTERING SYSTEM SHOWN. THE LOCATION AND SIZE OF THE DEWATERING BASIN SHOWN IS APPROXIMATE. THE EXACT LOCATION MAY VARY BASED ON THE SIZE OF BASIN REQUIRED TO PROVIDE A STORAGE VOLUME CAPABLE OF RETAINING THE FIRST TWO HOURS OF PUMP DISCHARGE.

5. SEE PERMIT APPLICATION NARRATIVE FOR ADDITIONAL INFORMATION.

6. SEQUENCE OF OPERATIONS AND STAGING IS FOR DEMOSTRATION PURPOSES ONLY. THE CONTRACTOR SHALL SUBMIT A MEANS AND METHODS PROCEDURE PRIOR TO THE START OF CONSTRUCTION.

TABLE 3-3

AVERAGE DAILY FLOW (CFS)	1
AVERAGE SPRING FLOW (CFS)	2
2-YEAR FREQUENNCY DISCHARGE * (CFS)	88
TEMPORARY DESIGN DISCHARGE (CFS)	88
TEMPORARY DESIGN FREQUENCY YEAR	2
TEMPORARY WATER SURFACE ELEV. UPSTREAM (FT)	AMTRAK CULVERT =60.7
TEMPORARY WATER SURFACE ELEV. DOWNSTREAM (FT)	NONE FOR 2-YR STORM

* ESTIMATED

SUGGESTED CONSTRUCTION SEQUENCE:

STAGE 1:

1. INSTALL TEMPORARY GRADE CROSSING.

2. INSTALL EROSION AND SEDIMENTATION CONTROLS AS INDICATED.

3. CONSTRUCT TEMPORARY CONSTRUCTION ACCESS DRIVES AND STAGING AREAS.

4. INSTALL TEMPORARY FLOW DIVERSION BARRIERS AROUND DOWNSTREAM STAGING AREA AS INDICATED.

5. INSTALL TEMPORARY BYPASS PUMP AND CHECK DAM TO COLLECT AND PUMP BASE FLOW AS INDICATED - SEE SPECIAL PROVISIONS.

6. REMOVE SECTION OF EXISTING ENDWALL ON DOWNSTREAM SIDE PRIOR TO INSTALLATION OF TEMPORARY STEEL SHEET PILING.

7. INSTALL TEMPORARY STEEL SHEET PILING WITH OPENING FOR PIPE JACKING AND CONSTRUCT JACKING AND RECEIVING PITS (DESIGN TO BE PROVIDED BY CONTRACTOR).

8. MONITOR TRACKS PER AMTRAK REQUIREMENTS AND PROVIDE MONITORING DURING JACKING PROCEDURE.

9. JACK APPROXIMATELY 80 FEET OF TWIN 78" RCP CLASS V UNDER RAILROAD EMBANKMENT - SEE SPECIAL PROVISIONS.

10. CONSTRUCT FOOTINGS FOR SOUTHERN SECTION OF WALLS ON EITHER END OF PIPE JACKING WITH KEY-IN FOR HEADWALLS AND SUPPORT SECTION FOR TWIN 78" RCP END SECTIONS.

11. BACKFILL FOOTING HEELS WITH CRUSHED STONE AND INSTALL FINAL SECTIONS OF TWIN 78" RCP CLASS V.

12. INSTALL TEMPORARY DIVERSION BARRIERS ON UPSTREAM SIDE OF EXISTING TRIPLE ARCH PIPES AS SHOWN.

13. CONSTRUCT HEADWALL EXTENSIONS ON BOTH SIDES OF EXISTING SANITARY SEWER FOR SUPPORT OF CONCRETE WEIR.

14. CONSTRUCT SOUTH PORTIONS OF WING TYPE ENDWALL AND BRIDGE ABUTMENTS IN PLACE AROUND TWIN 78" RCP CLASS V.

15. INSTALL TEMPORARY 15" RCP THROUGH NEW ABUTMENT AND REMOVE BYPASS PUMP.

16. REMOVE JACKING AND RECEIVING PITS AND TEMPORARY STEEL SHEET PILING NOT NECESSARY FOR FLOW DIVERSION.

STAGE 2:

1. MAINTAIN OR REMOVE STAGE 1 EROSION CONTROL MEASURES AS REQUIRED. INSTALL ADDITIONAL EROSION & SEDIMENTATION CONTROLS AS INDICATED.

2. MAINTAIN AND REPAIR EXISTING ACCESS DRIVES AND STAGING AREAS FROM STAGE 1. CONSTRUCT ADDITIONAL TEMPORARY CONSTRUCTION ACCESS DRIVES AND STAGING AREAS AS INDICATED ON PLAN.

3. CONSTRUCT LOW-FLOW RIPRAP CHANNEL PARALLEL WITH EXISTING GRASSED SWALE ON DOWNSTREAM SIDE. PROVIDE ADDITIONAL FLOW DIVERSION BARRIERS, IF NECESSARY (NOT SHOWN), DURING EXCAVATION OF NEW CHANNEL.

4. INSTALL STANDARD RIPRAP CHANNEL LINING DOWNSTREAM PRIOR TO OPENING TWIN 78" RCP FOR USE.

5. INSTALL STAGE 2 TEMPORARY FLOW DIVERSION BARRIERS AS INDICATED AND REMOVE REMAINING STAGE 1 TEMPORARY STEEL SHEET PILING AND FLOW DIVERSION BARRIERS.

6. DIVERT UPSTREAM FLOWS TO NEW TWIN 78" RC PIPES.

7. REMOVE EXISTING UPSTREAM CULVERT HEADWALL. REMOVE PORTION OF CULVERT IF NECESSARY AND CAP EXISTING CULVERT END.

8. INSTALL DOGHOUSE MANHOLE ON EXISTING BOX CULVERT AS SHOWN, CAP WESTERN SECTION FROM MANHOLE WALL TO UPSTREAM END OF CULVERT AND FILL SECTION WITH FLOWABLE FILL.

9. REMOVE DOWNSTREAM HEADWALL AND INSTALL 24" PVC PIPE IN EASTERN SECTION OF EXISTING BOX CULVERT FROM NEW HEADWALL TO DOGHOUSE MANHOLE.

10. INSTALL TEMPORARY STEEL SHEET PILING AS INDICATED.

11. CONSTRUCT REMAINING PORTION OF WALL FOOTINGS, WING TYPE ENDWALL, BRIDGE ABUTMENT AND SUPERSTRUCTURE.

12. CONSTRUCT CONCRETE WEIR ACROSS SANITARY SEWER BERM FROM HEADWALL TO HEADWALL.

13. RELOCATE FLOW DIVERSION BARRIER ON UPSTREAM END OF EXISTING TRIPLE ARCH PIPES TO BLOCK FLOW AND PROVIDE BYPASS PUMP FOR BASE FLOW TO NEW 78" RCP. POUR 6" CONCRETE LINED CHANNEL AND REMOVE DIVERSION BARRIER AND PUMP WHEN CURED.

14. REMOVE TEMPORARY STEEL SHEET PILING AND DIVERSION BARRIERS, BACKFILL WALLS AND ABUTMENTS.

15. LEAVE TEMPORARY 15" RCP AND RCCE IN PLACE UNTIL CONSTRUCTION OF BUSWAY AND MUT BEGINS.

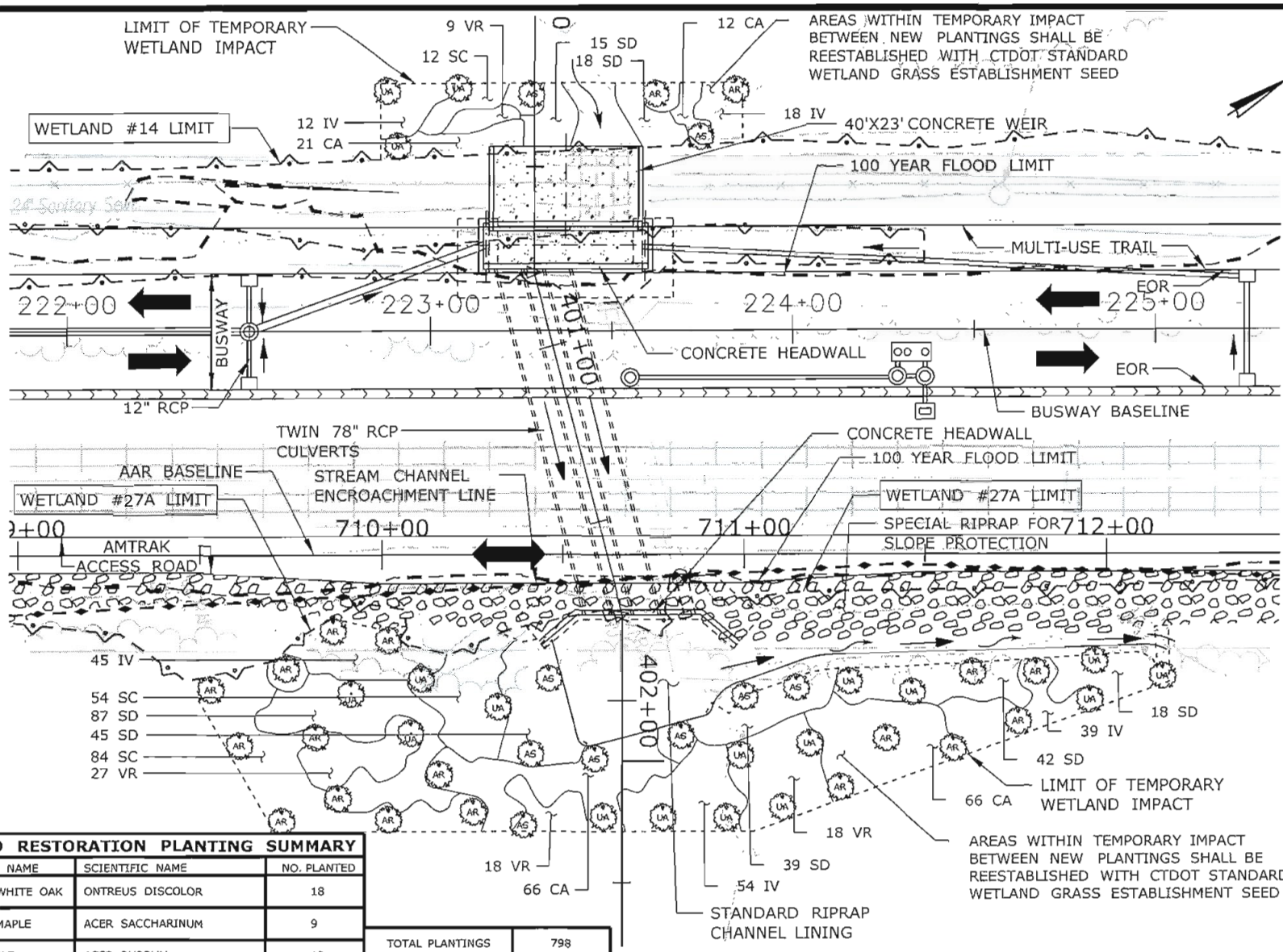
16. REMOVE TEMPORARY ACCESS ROAD AND STAGING AREA WHEN DIRECTED BY THE ENGINEER (SEE GENERAL NOTE 2).

17. REMOVE EROSION CONTROL MEASURES.

18. SEED AND PLANT TEMPORARILY IMPACTED AREAS AS REQUIRED.

19. REMOVE TEMPORARY GRADE CROSSING.

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 30E



WETLAND RESTORATION PLANTING SUMMARY

SYM.	COMMON NAME	SCIENTIFIC NAME	NO. PLANTED
UA	SWAMP WHITE OAK	ONTREUS DISCOLOR	18
AS	SILVER MAPLE	ACER SACCHARINUM	9
AR	RED MAPLE	ACER *RUBRUM*	18
SD	PUSSY WILLOW	SALIX DISCOLOR	273
IV	WINTERBERRY	ILEX VERTICILLATA	168
VR	NORTHERN ARROWWOOD	VIBURNUM RECOGNITUM	111
SC	ELDERBERRY	SAMBUCUS CANADENSIS	150
CA	SILKY DOGWOOD	CORNUS AMOMUM	51

TOTAL PLANTINGS	798

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

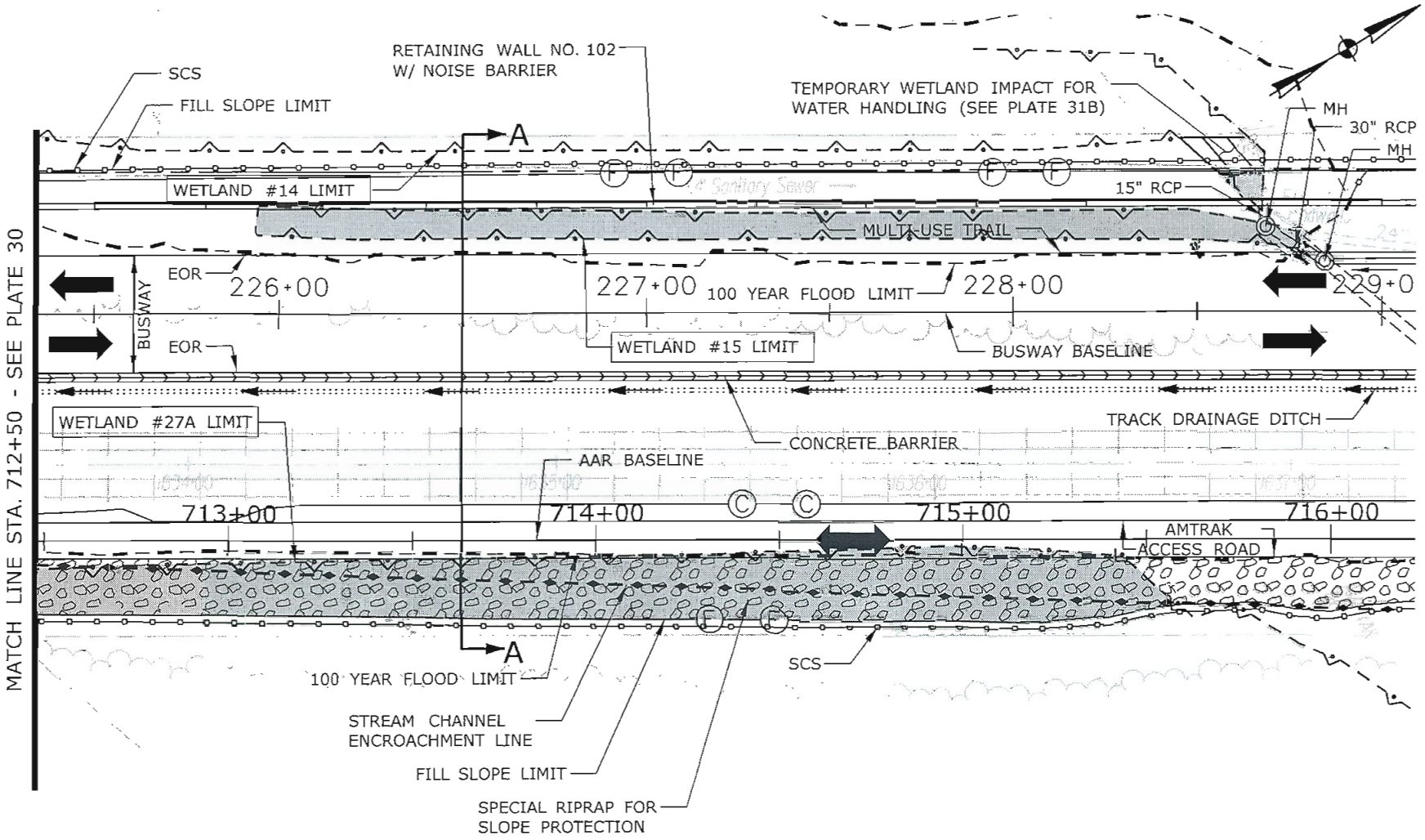
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 30F



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #14 IMPACT	8,887 S.F.
PERMANENT WETLAND #15 IMPACT	2,111 S.F.
PERMANENT WETLAND #27A IMPACT	9,587 S.F.
TEMPORARY WETLAND #14 IMPACT	2,025 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

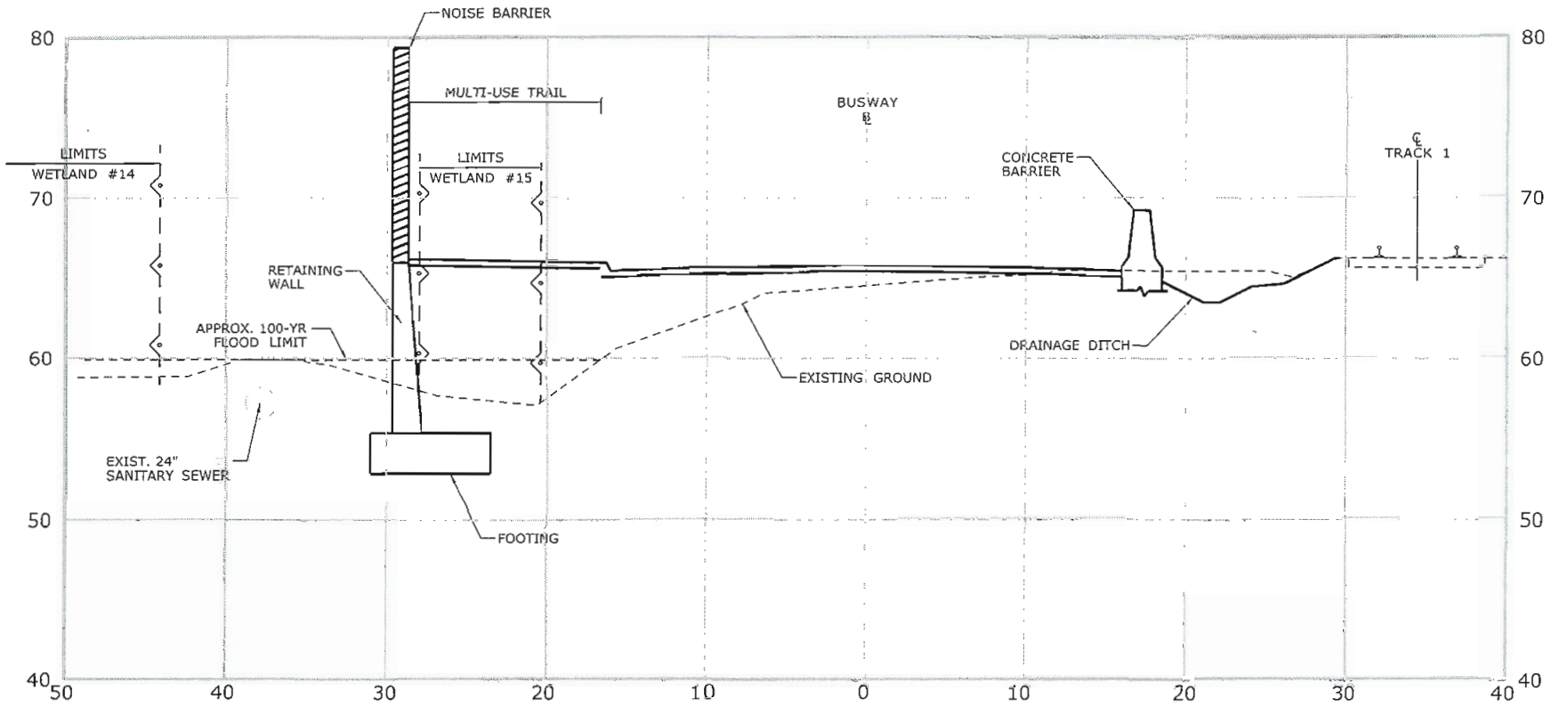
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

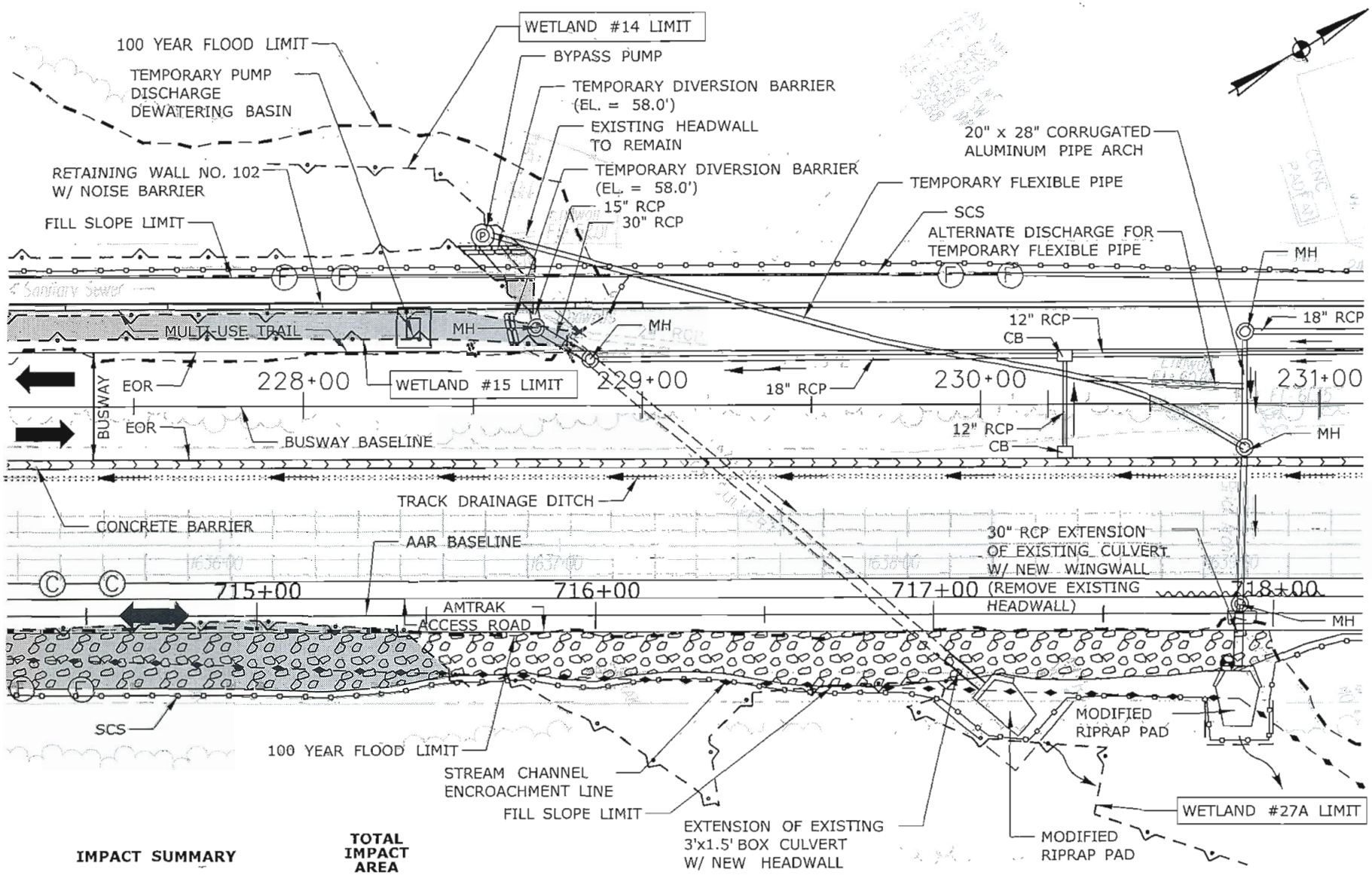
DATE: JULY 2010

PLATE NO. 31



SECTION A-A (SEE PLATE 31)

TYPICAL SECTION OF FILL FOR CONSTRUCTION OF MULTI-USE TRAIL	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 31A



IMPACT SUMMARY	TOTAL IMPACT AREA
TEMPORARY WETLAND #14 IMPACT	2,025 S.F.
PERMANENT WETLAND #14 IMPACT	8,887 S.F.
PERMANENT WETLAND #15 IMPACT	2,111 S.F.
PERMANENT WETLAND #27A IMPACT	9,587 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

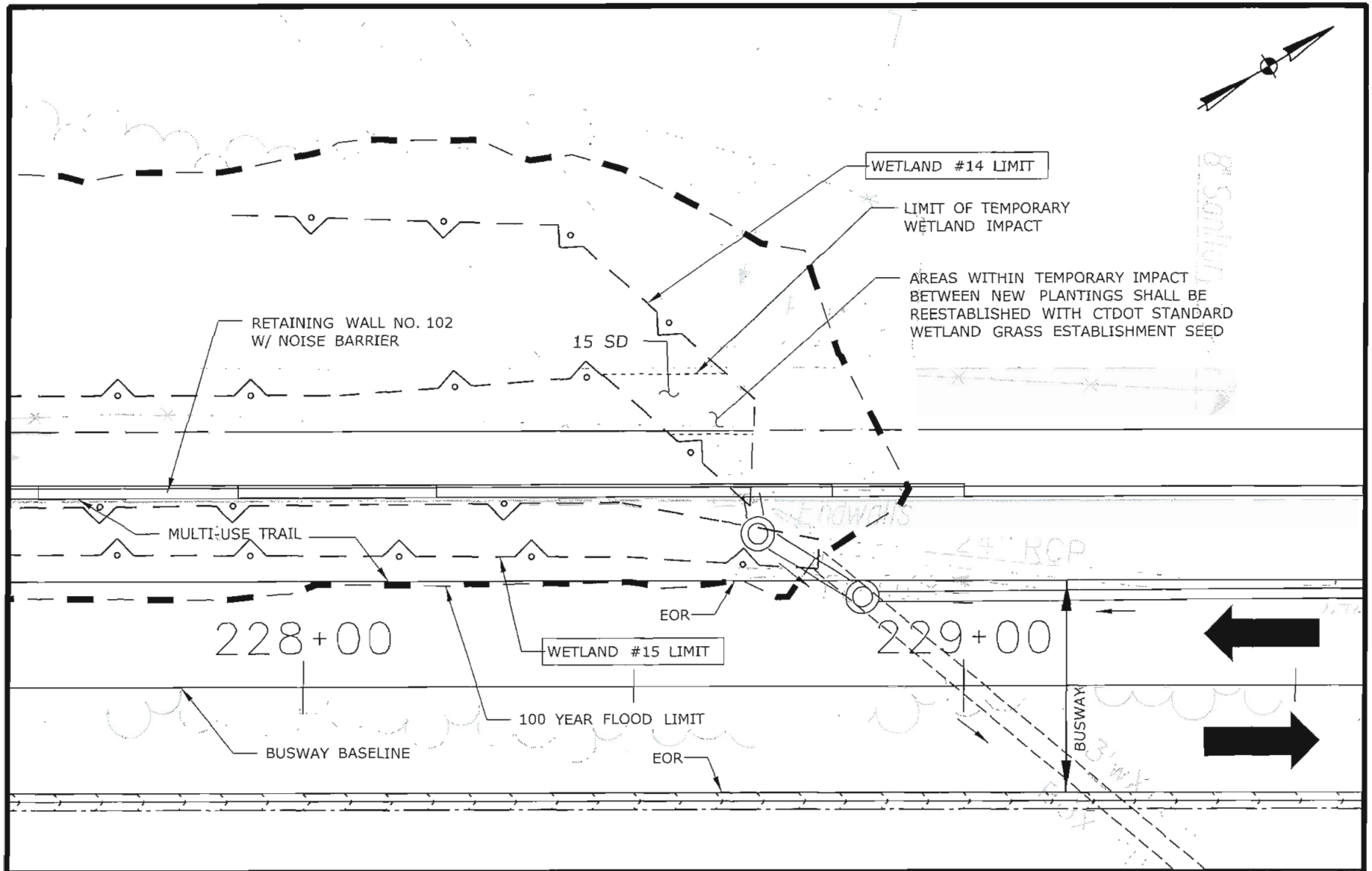
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 31B



WETLAND RESTORATION PLANTING SUMMARY			
SYM.	COMMON NAME	SCIENTIFIC NAME	NO. PLANTED
SD	PUSSY WILLOW	SALIX DISCOLOR	15
TOTAL PLANTINGS			15

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
20 10 0 20

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

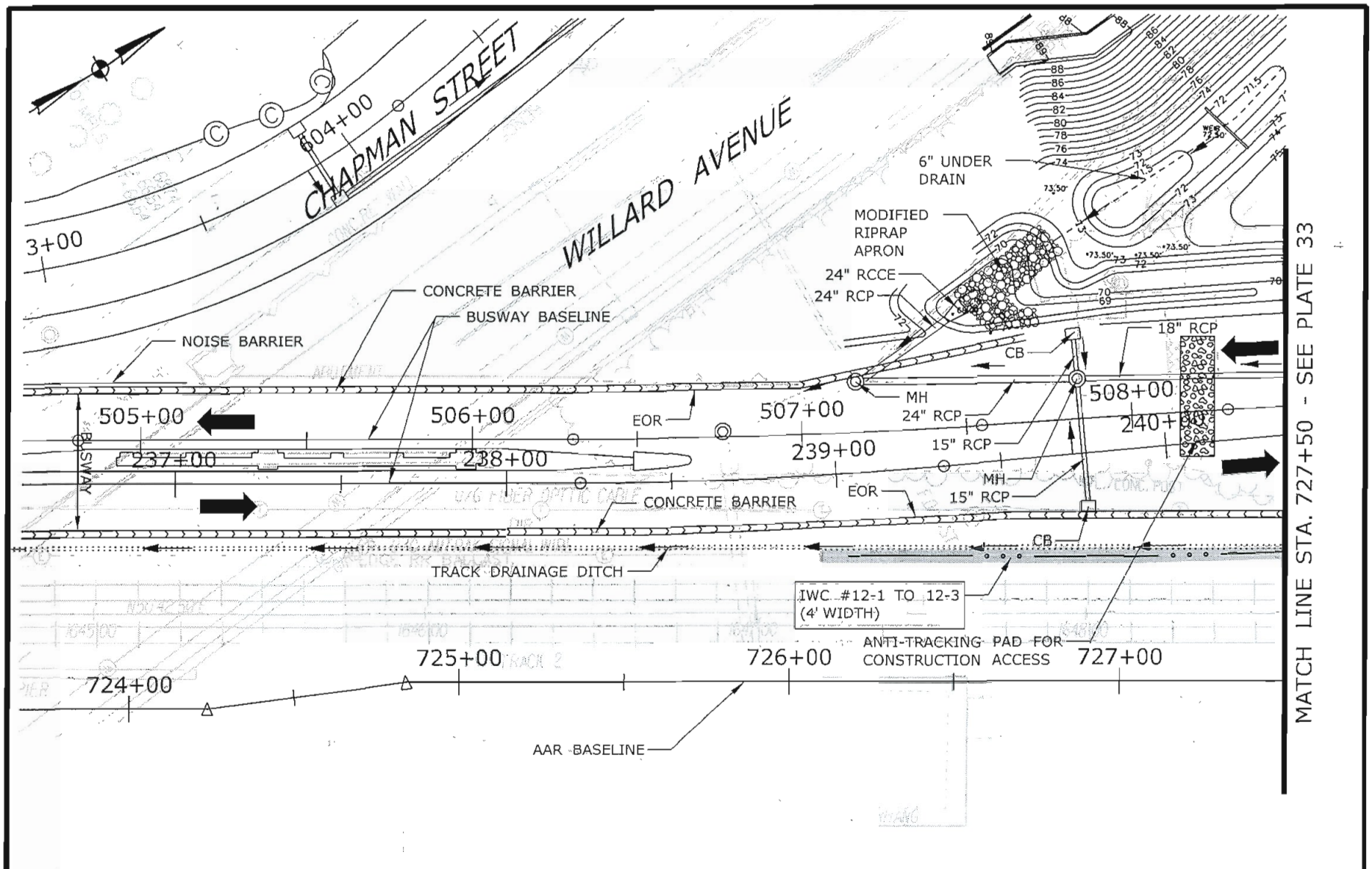
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

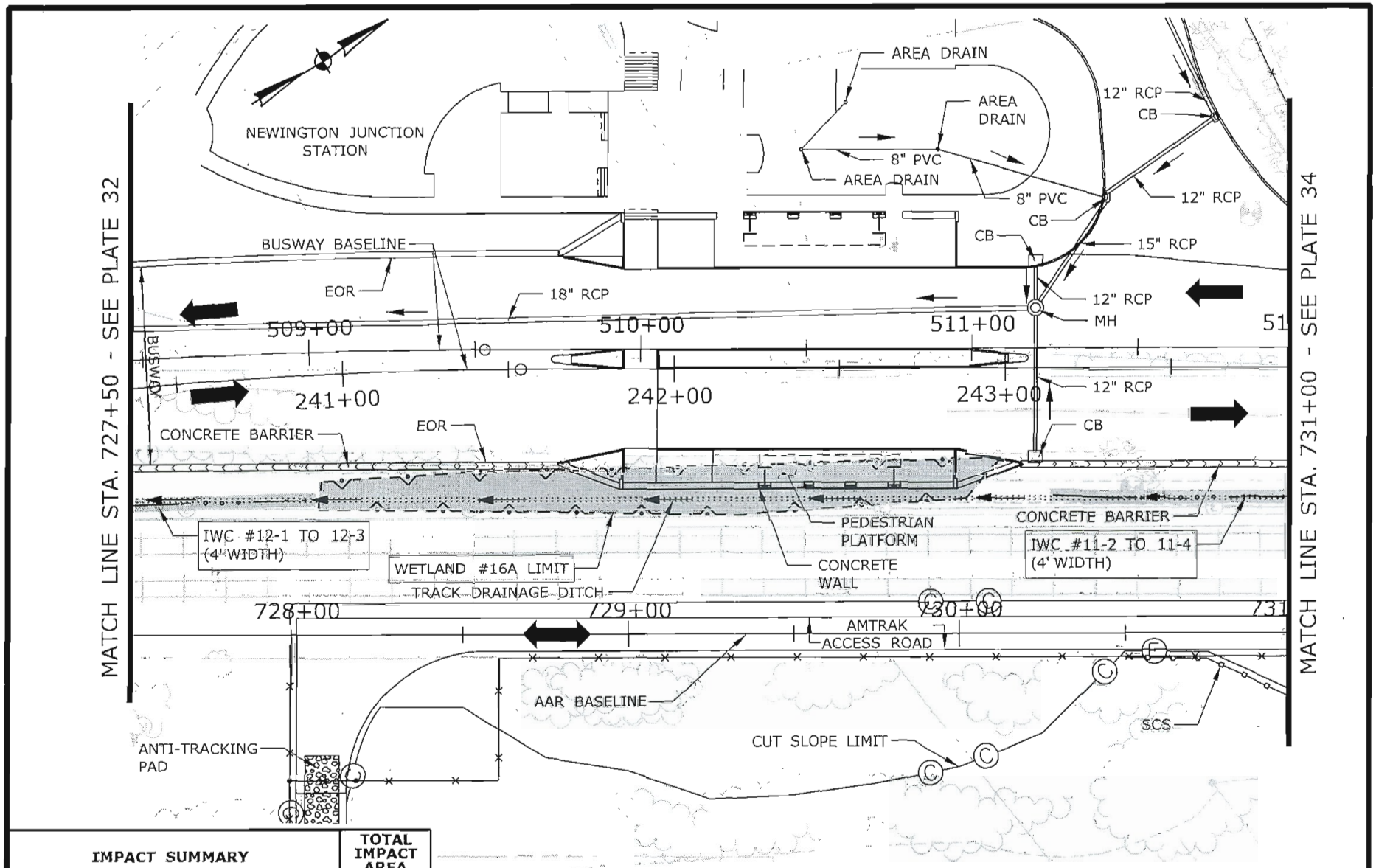
MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 31C



IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H046/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
PERMANENT IWC #12 IMPACT	196 L.F.	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 32



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #16A IMPACT	2,523 S.F.
PERMANENT IWC #12 IMPACT	196 L.F.
PERMANENT IWC #11 IMPACT	241 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

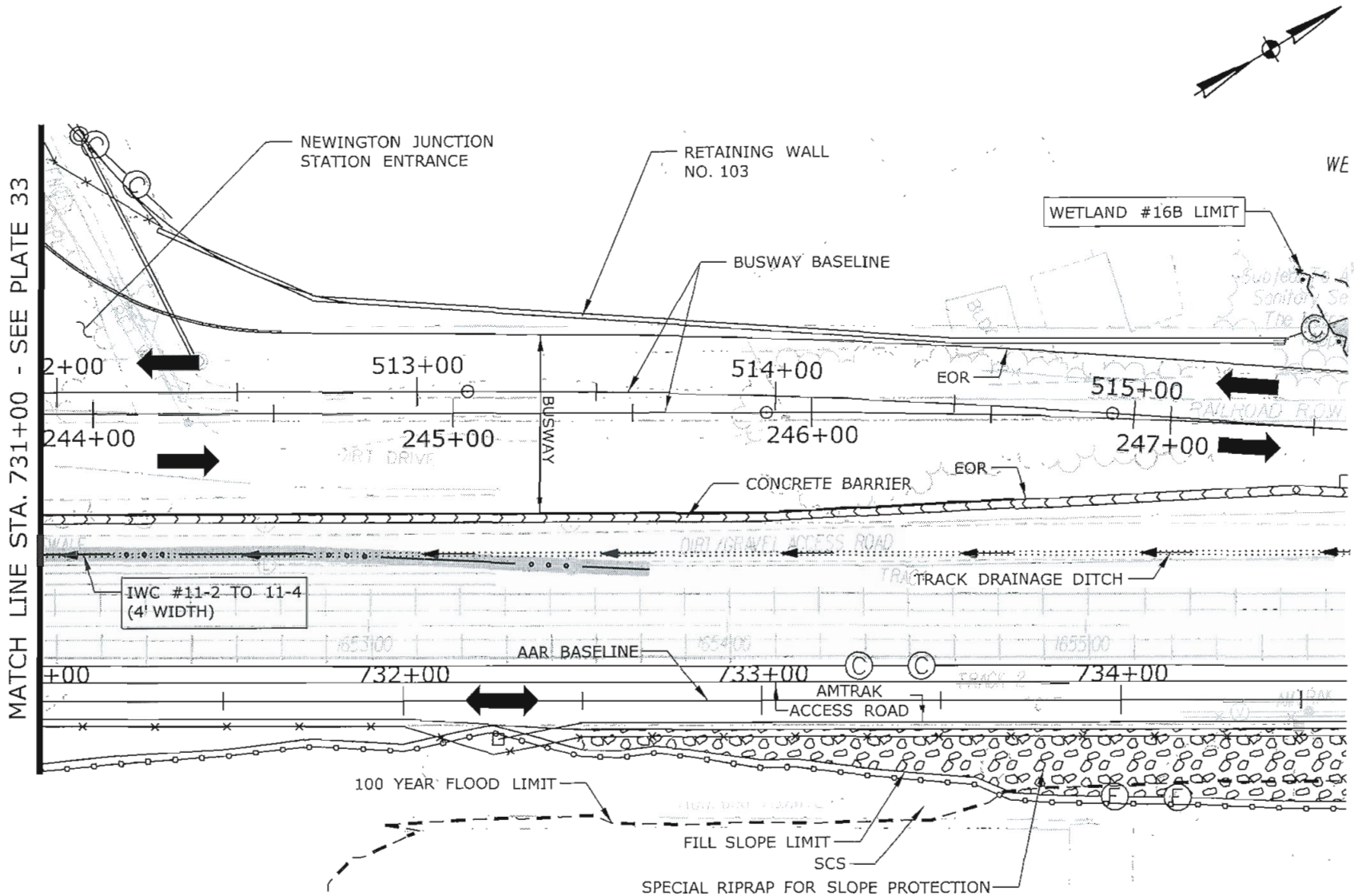
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 33



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #11 IMPACT	241 L.F.
PERMANENT WETLAND #16B IMPACT	1,698 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

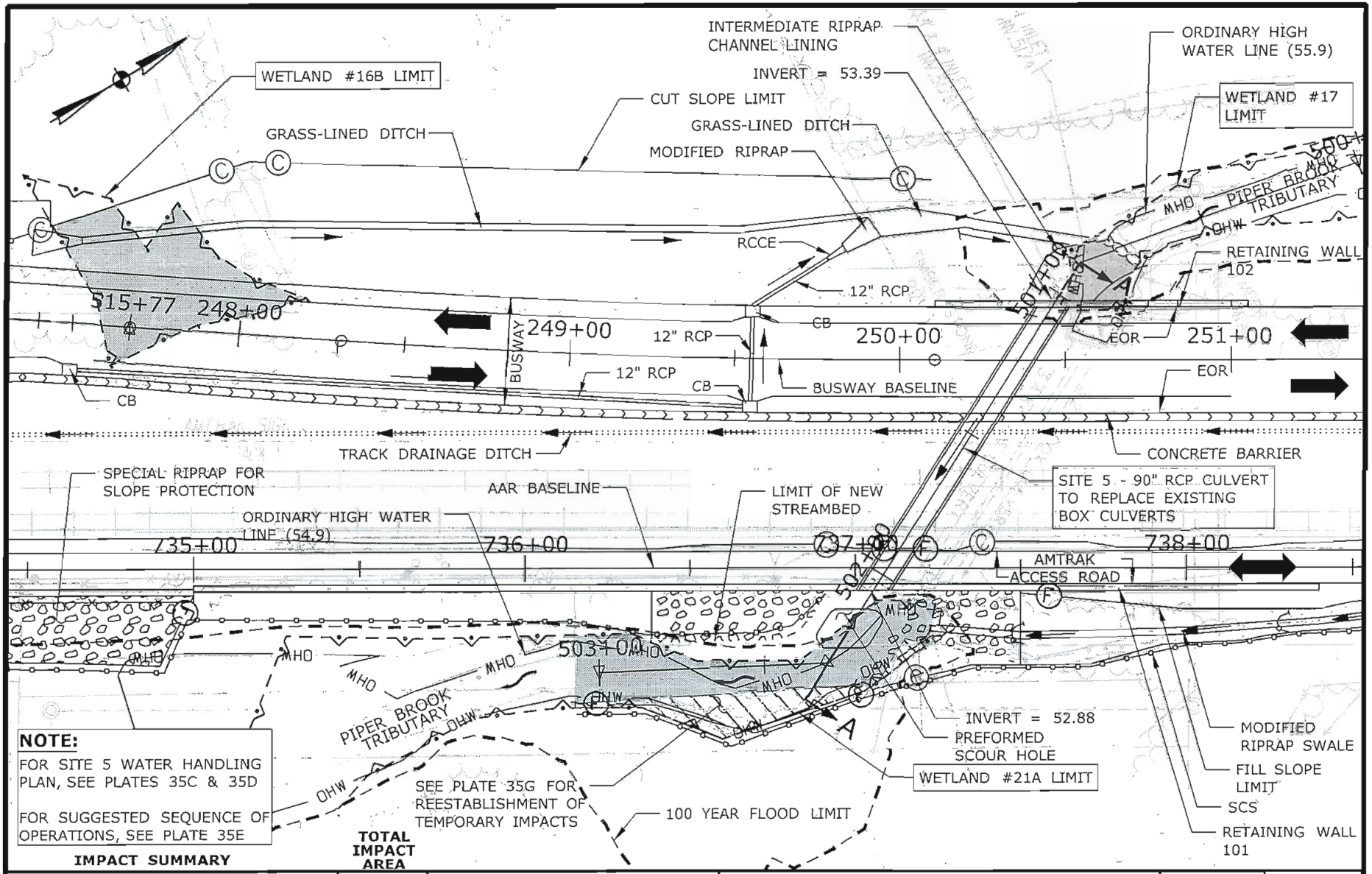
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 34



NOTE:

FOR SITE 5 WATER HANDLING PLAN, SEE PLATES 35C & 35D

FOR SUGGESTED SEQUENCE OF OPERATIONS, SEE PLATE 35E

IMPACT SUMMARY

	TOTAL IMPACT AREA
PERMANENT WETLAND #16B IMPACT	1,698 S.F.
PERMANENT WETLAND #17 IMPACT	351 S.F.
PERMANENT WETLAND #21A IMPACT	1,527 S.F.
TEMPORARY WETLAND #21A IMPACT	680 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

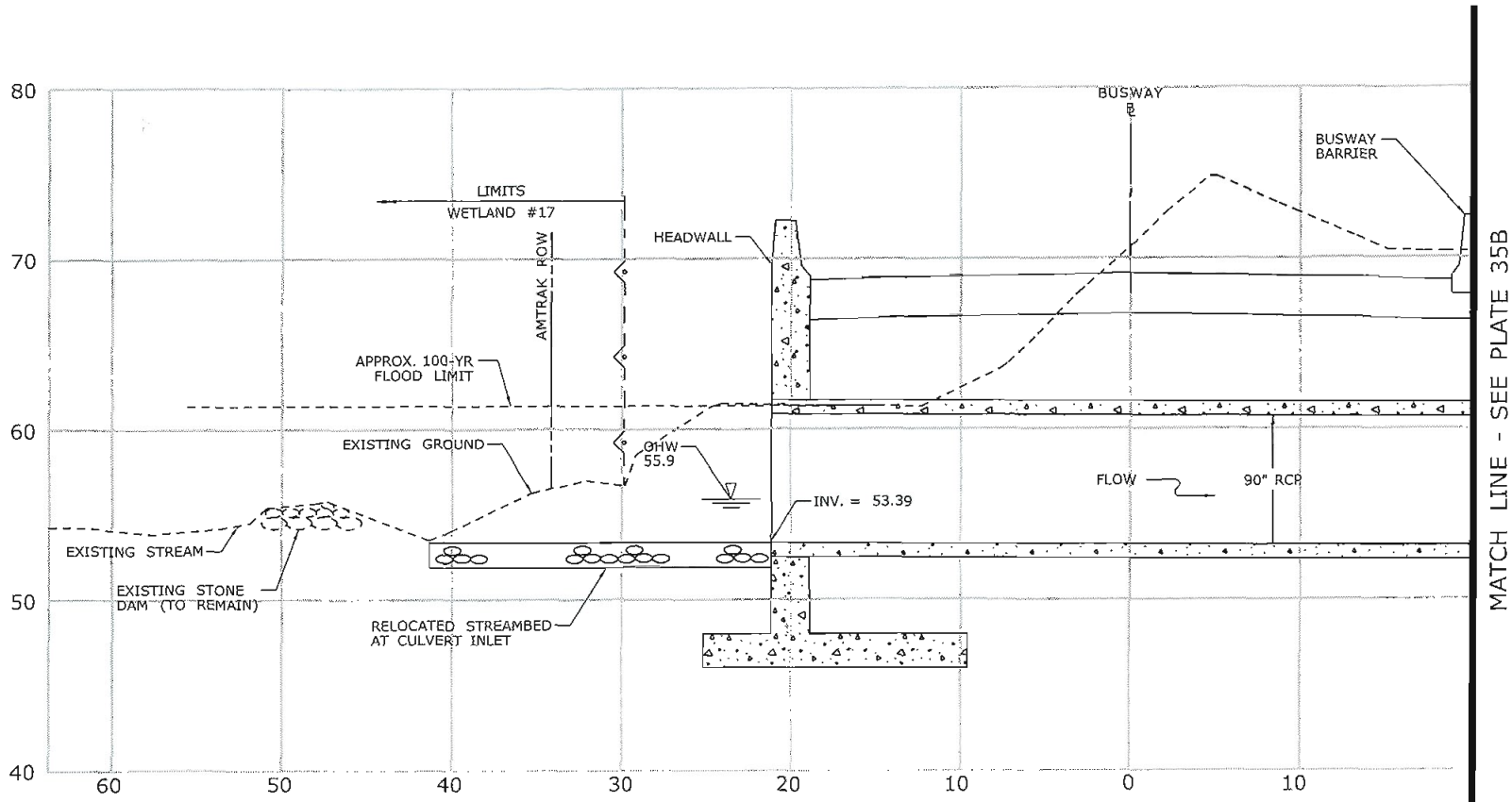
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

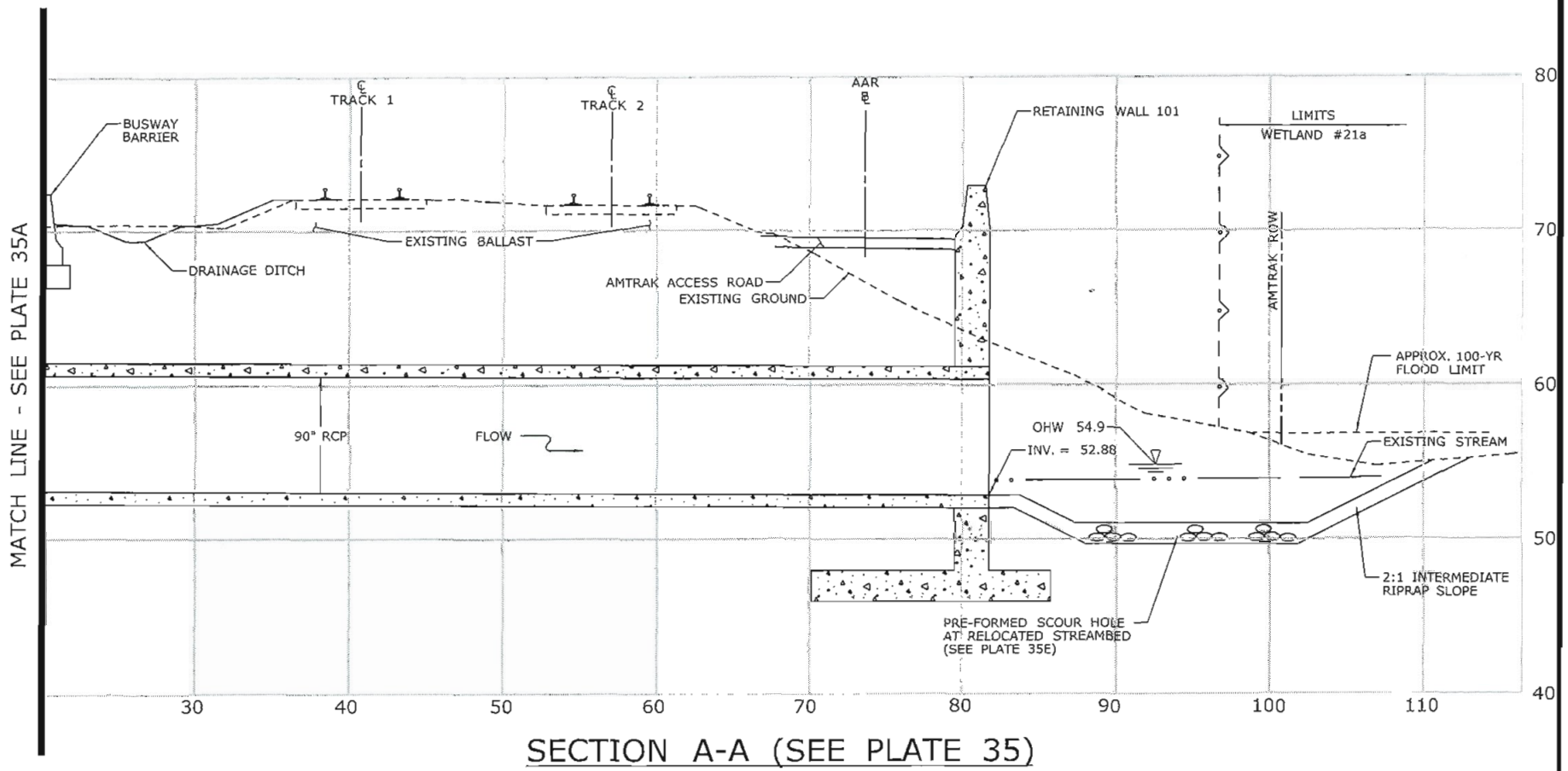
MICHAEL BAKER ENGINEERING

PLATE NO. 35



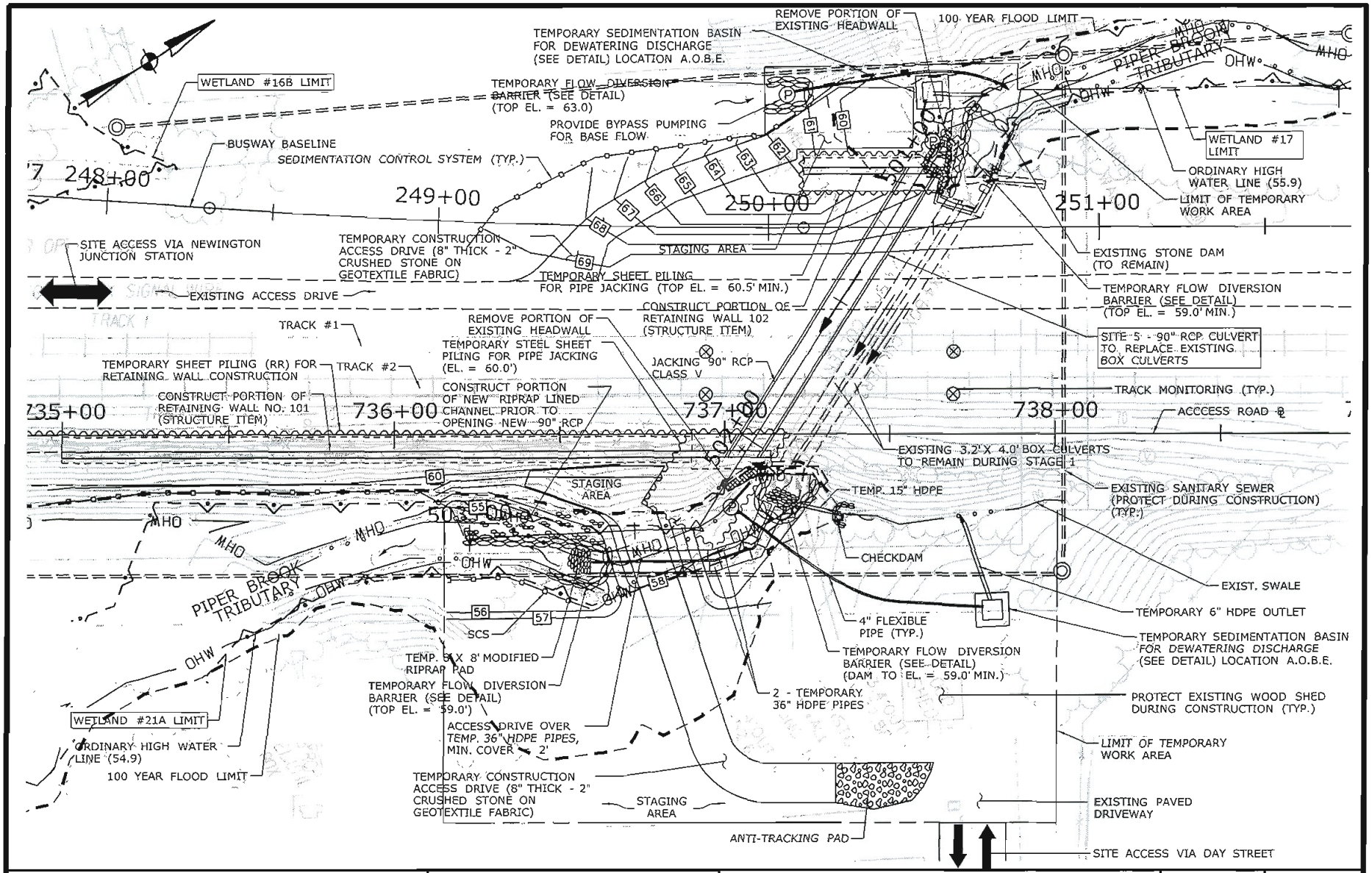
SECTION A-A (SEE PLATE 35)

SITE 5 CULVERT REPLACEMENT	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 35A

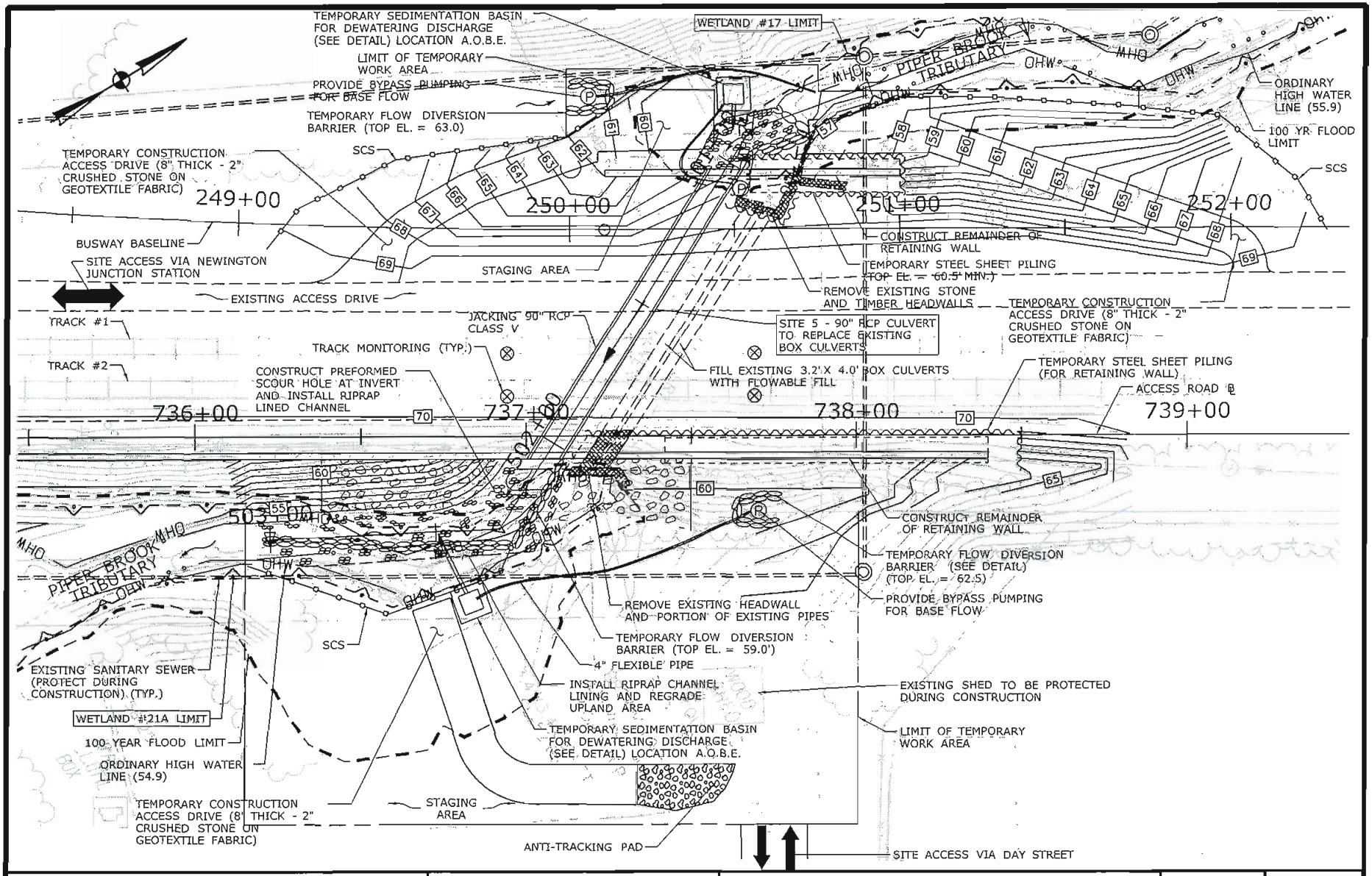


SECTION A-A (SEE PLATE 35)

SITE 5 CULVERT REPLACEMENT	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 35B



CONSTRUCTION STAGING AND WATER HANDLING PLAN FOR SITE 5 CULVERT REPLACEMENT	STATE PROJECT NO.: 171-305 CONTRACT NO.: H046/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
STAGE 1	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 35C



CONSTRUCTION STAGING AND WATER HANDLING PLAN FOR SITE 5 CULVERT REPLACEMENT	STATE PROJECT NO.: 171-305 CONTRACT NO.: H046/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
STAGE 2	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 35D

GENERAL NOTES:

1. THE CONTRACTOR SHALL BE LIMITED TO WORKING WITHIN THE TEMPORARY WORK AREAS AS INDICATED ON THE PLANS WHEN WORKING WITHIN A DELINEATED WETLAND BOUNDARY. THE TEMPORARY WORK AREAS WILL BE LOCATED AND STAKED IN THE FIELD BY THE CONTRACTOR PRIOR TO CLEARING AND GRUBBING OR THE COMMENCEMENT OF ANY OTHER CONSTRUCTION ACTIVITY. WORK OUTSIDE THE DELINATED IMPACT AREAS IS NOT PERMITTED. IF ANY MEANS AND METHODS CHOSEN BY THE CONTRACTOR REQUIRE ADDITIONAL WETLAND IMPACT, EITHER PERMANENT OR TEMPORARY, THE CONTRACTOR SHALL NOTIFY CTDOT IMMEDIATELY, AS THIS WILL REQUIRE ADDITIONAL REVIEW BY THE CTDOT OFFICE OF ENVIRONMENTAL PLANNING AND CTDEP AT THE CONTRACTOR'S EXPENSE.

2. ALL WETLAND AREAS TEMPORARILY IMPACTED FOR THE PURPOSES OF CONSTRUCTION, STAGING OR ACCESS SHALL BE REESTABLISHED BY THE CONTRACTOR IMMEDIATELY FOLLOWING THE USE OF THESE AREAS, PER CONNECTICUT DOT AND DEP STANDARDS. SEE SPECIAL PROVISIONS FOR INFORMATION ON MATERIAL REQUIREMENTS. SEE PLATE 30F FOR PLANTING PLAN. IMPACTED WETLAND AREAS BETWEEN SPECIFIED PLANTINGS SHALL BE REESTABLISHED WITH WETLAND ESTABLISHMENT SEED MIX. UPLAND AREAS TO BE STABILIZED WITH CTDOT CONSERVATION SEED MIX.

3. ALL WORK ASSOCIATED WITH THE TEMPORARY WATER DIVERSION, INCLUDING THE TEMPORARY BYPASS PIPE SHALL BE INCLUDED UNDER "HANDLING WATER".

4. A PUMP DISCHARGE AREA SHALL BE ESTABLISHED OUTSIDE OF THE WETLAND LIMITS, USING THE MODIFIED RIPRAP FILTERING SYSTEM SHOWN. THE LOCATION AND SIZE OF THE DEWATERING BASIN SHOWN IS APPROXIMATE. THE EXACT LOCATION MAY VARY BASED ON THE SIZE OF BASIN REQUIRED TO PROVIDE A STORAGE VOLUME CAPABLE OF RETAINING THE FIRST TWO HOURS OF PUMP DISCHARGE.

5. SEE PERMIT APPLICATION NARRATIVE FOR ADDITIONAL INFORMATION.

6. SEQUENCE OF OPERATIONS AND STAGING IS FOR DEMOSTRATION PURPOSES ONLY. THE CONTRACTOR SHALL SUBMIT A MEANS AND METHODS PROCEDURE PRIOR TO THE START OF CONSTRUCTION.

SUGGESTED CONSTRUCTION SEQUENCE:

STAGE 1:
1.INSTALL EROSION AND SEDIMENTATION CONTROLS AS INDICATED.

2. TEMPORARILY DIVERT DOWNSTREAM FLOW, UTILIZING FLOW DIVERSION BARRIERS AS REQUIRED, AND INSTALL TEMPORARY 36" HDPE PIPES, DAMS AND RIPRAP PADS.

3. CONSTRUCT TEMPORARY CONSTRUCTION ACCESS DRIVES AND STAGING AREAS.

4. INSTALL TEMPORARY FLOW DIVERSION BARRIERS AS INDICATED.

5. BYPASS PUMP BASE FLOW AS INDICATED - SEE SPECIAL PROVISIONS.

6. CONSTRUCT ACCESS DRIVE OVER TEMPORARY 36" PIPES.

7. REMOVE PORTION OF EXISTING UPSTREAM AND DOWNSTREAM WINGWALLS.

8. INSTALL TEMPORARY STEEL SHEET PILING AND CONSTRUCT JACKING PITS.

9. JACK 90" RCP CLASS V - SEE SPECIAL PROVISIONS.

10. CONSTRUCT FOOTINGS FOR SOUTHERN SECTION OF WALLS ON EITHER END OF PIPE JACKING WITH KEY-IN FOR HEADWALLS AND SUPPORT SECTION FOR 90" RCP END SECTIONS.

11. REMOVE TEMPORARY STEEL SHEET PILING AROUND JACKING AND RECEIVING PITS AND INSTALL TEMPORARY SHEET PILING (RAILROAD) FOR RETAINING WALL CONSTRUCTION.

12. CONSTRUCT SOUTHERN PORTION OF RETAINING WALL NO. 101 (SEE STRUCTURE DWGS).

13. CONDUCT FINAL GRADING AT BASE OF RETAINING WALL AND STABILIZE WITH SPECIAL RIPRAP SLOPE PROTECTION.

14. CONSTRUCT PORTION OF NEW RIPRAP CHANNEL LINING IN RELOCATED STREAMBED AT BASE OF SPECIAL RIPRAP SLOPE PROTECTION.

STAGE 2:
1. MAINTAIN OR REMOVE STAGE 1 EROSION CONTROL MEASURES AS REQUIRED. INSTALL ADDITIONAL EROSION & SEDIMENTATION CONTROLS AS INDICATED.

2. MAINTAIN AND REPAIR EXISTING ACCESS DRIVES AND STAGING AREAS FROM STAGE 1. CONSTRUCT ADDITIONAL TEMPORARY CONSTRUCTION ACCESS DRIVES AND STAGING AREAS AS INDICATED ON PLAN.

3. INSTALL PRE-FORMED SCOUR HOLE AND REMAINDER OF WESTERN PORTION OF RIPRAP CHANNEL LINING IN RELOCATED STREAMBED.

4. RELOCATE TEMPORARY FLOW DIVERSION BARRIERS AS INDICATED AND REMOVE STAGE 1 TEMPORARY STEEL SHEET PILING AND ANY UNNECESSARY FLOW DIVERSION BARRIERS.

5. DIVERT STREAM FLOWS TO NEW 90" RC PIPE AND REMOVE TEMPORARY 36" HDPE PIPES, DAMS AND UNNECESSARY DIVERSION BARRIERS.

6. FOLLOWING THE OPENING OF THE 90" RC PIPE TO FLOWS, PUMP ANY STANDING WATER IN THE DOWNSTREAM EASTERN PORTION OF RELOCATED STREAMBED INTO DEWATERING BASIN AND CONSTRUCT EASTERN PORTION OF THE RIPRAP CHANNEL LINING.

7. REMOVE REMAINDER OF EXISTING UPSTREAM AND DOWNSTREAM CULVERT HEADWALLS, FILL EXISTING 3.2'x4.0' BOX CULVERTS WITH FLOWABLE FILL, CAP EXISTING CULVERT ENDS AND BACKFILL.

8. INSTALL REMAINDER OF NEW RIPRAP CHANNEL LINING IN EASTERN PORTION OF UPSTREAM END.

9. INSTALL TEMPORARY SHEET PILING (RAILROAD) AS INDICATED FOR RETAINING WALL CONSTRUCTION.

10. CONSTRUCT REMAINING PORTION OF WALL FOOTINGS AND NORTHERN PORTION OF RETAINING WALLS.

11. REMOVE TEMPORARY ACCESS ROAD AND STAGING AREA WHEN DIRECTED BY THE ENGINEER (SEE NOTE 2).

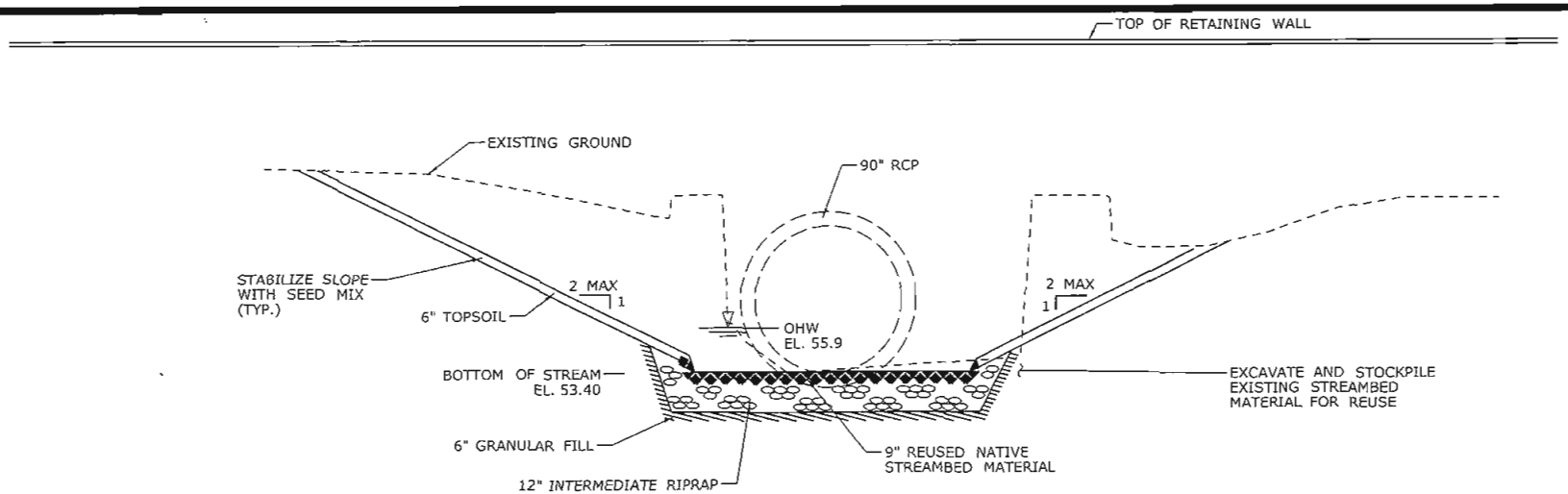
12. REMOVE EROSION CONTROL MEASURES.

13. SEED AND PLANT TEMPORARILY IMPACTED AREAS AS REQUIRED.

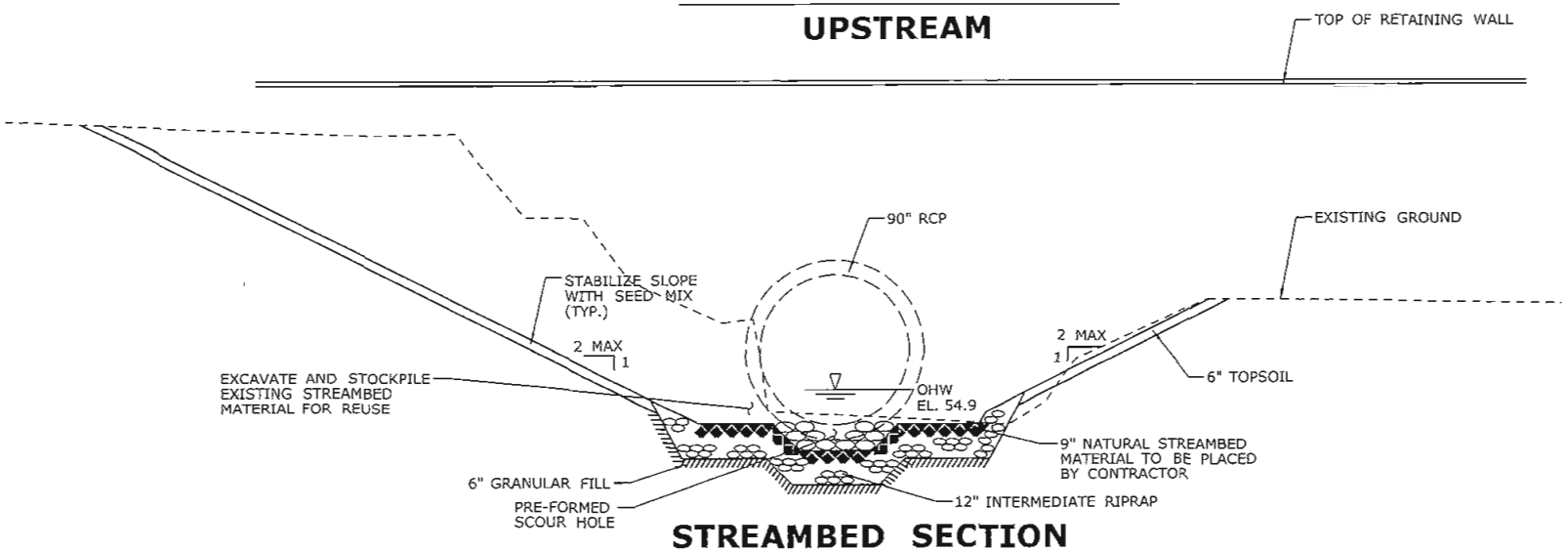
TABLE 3-3

AVERAGE DAILY FLOW (CFS)	1.5
AVERAGE SPRING FLOW (CFS)	3
2-YEAR FREQUENNCY DISCHARGE (CFS)	153
TEMPORARY DESIGN DISCHARGE (CFS)	124
TEMPORARY DESIGN FREQUENCY YEAR	1
TEMPORARY WATER SURFACE ELEV. UPSTREAM (FT)	59
TEMPORARY WATER SURFACE ELEV. DOWNSTREAM (FT)	58

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 35E

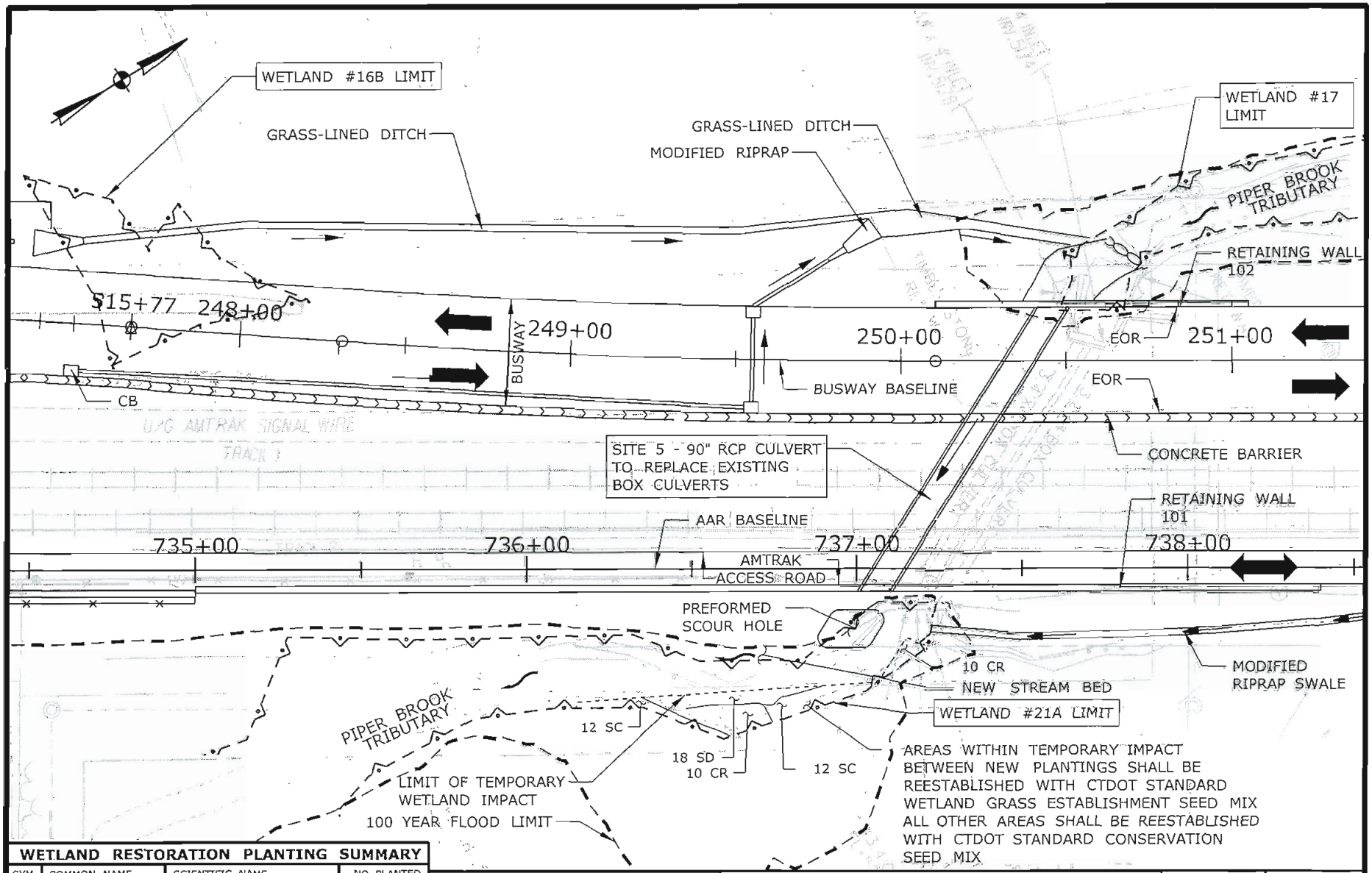


STREAMBED SECTION
UPSTREAM



STREAMBED SECTION
DOWNSTREAM

SITE 5 CULVERT REPLACEMENT STREAMBED RELOCATION DETAILS	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 35F



WETLAND RESTORATION PLANTING SUMMARY

SYM.	COMMON NAME	SCIENTIFIC NAME	NO. PLANTED
SD	PUSSY WILLOW	SALIX DISCOLOR	18
CR	GREY-STEM DOGWOOD	CORNUS RACEMOSA	18
SC	ELDERBERRY	SAMBUCUS CANADENSIS	18
TOTAL PLANTINGS			62

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

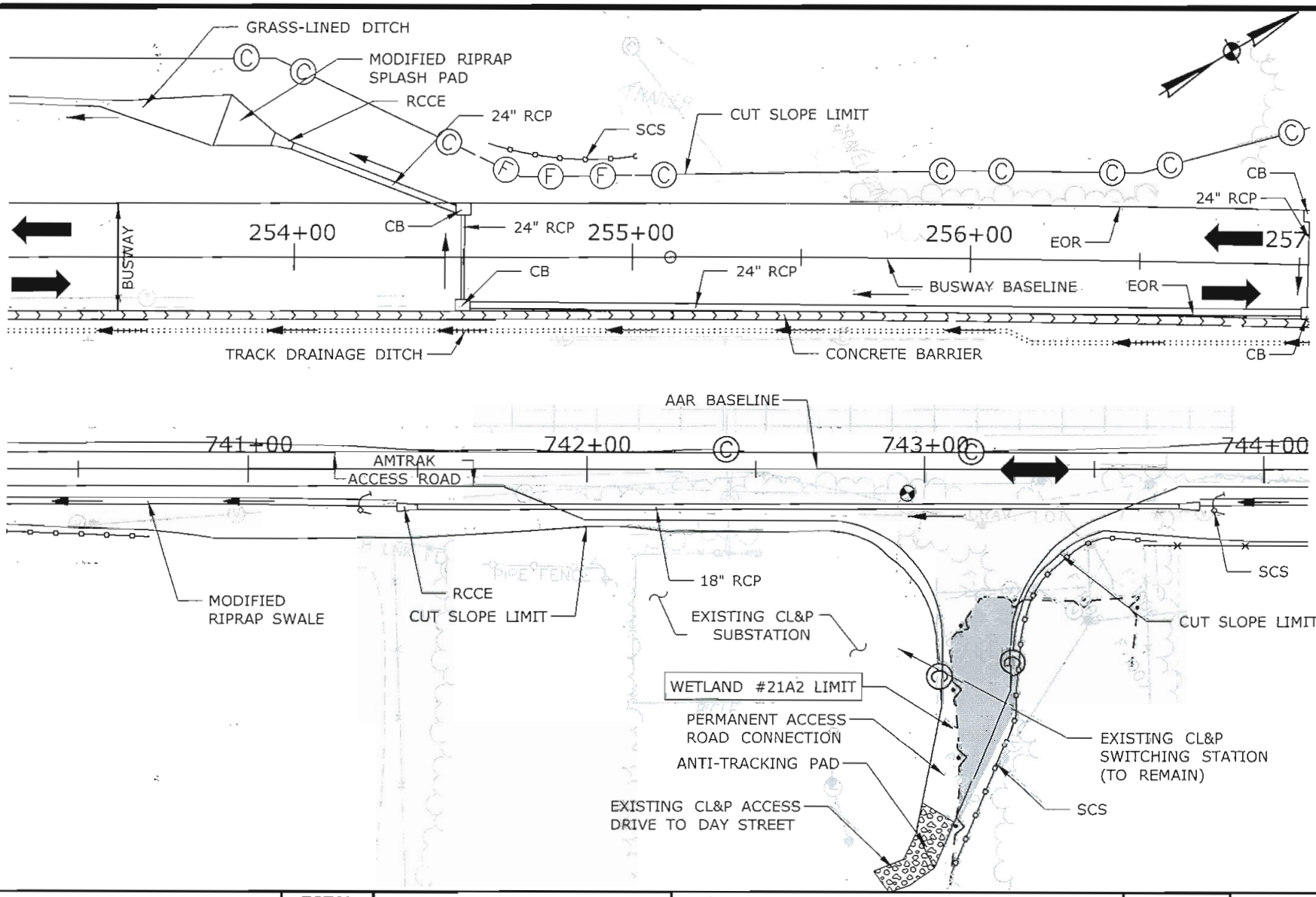
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 35G



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #21A2 IMPACT	847 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

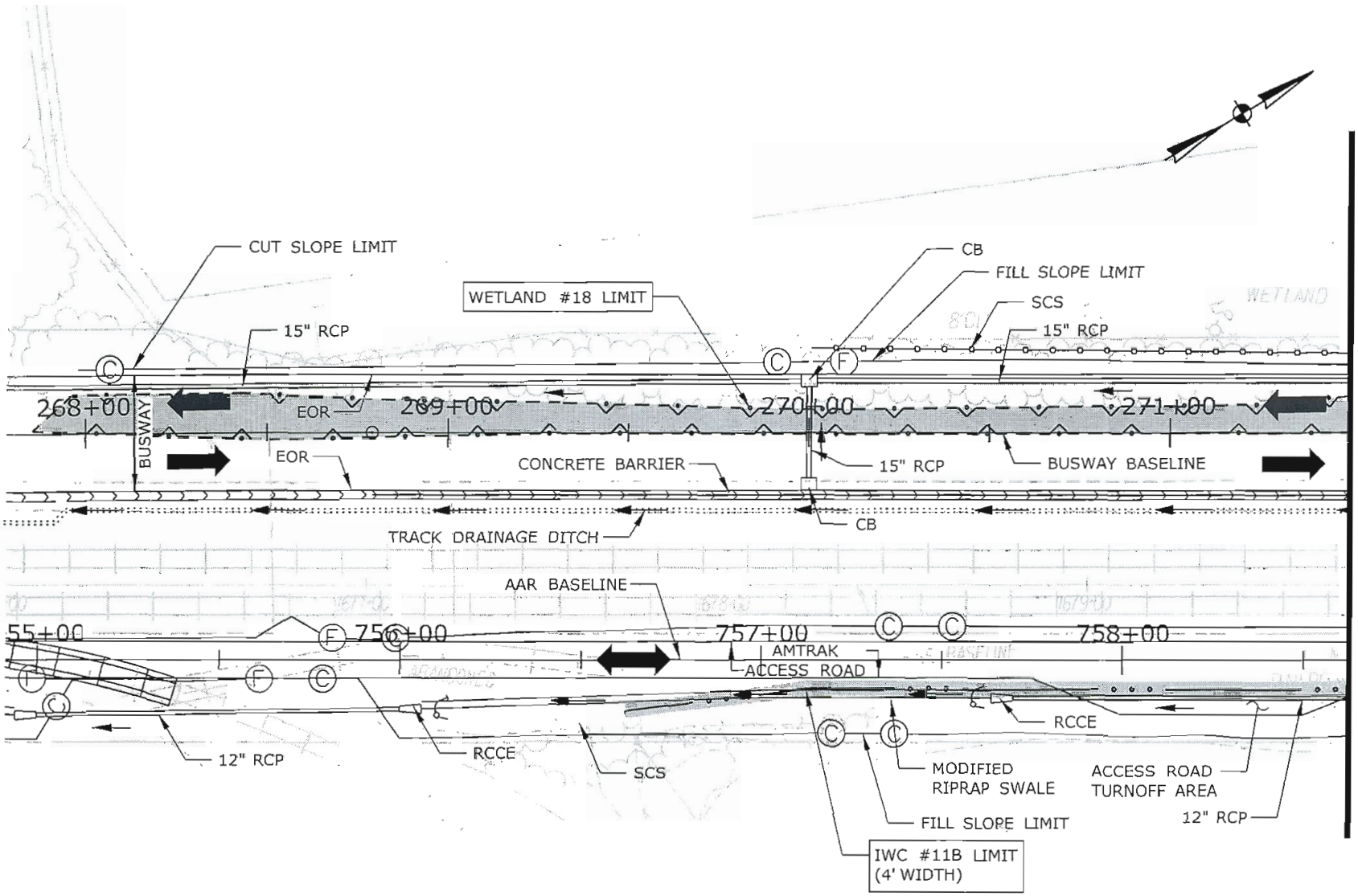
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 36



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #18 IMPACT	5,415 S.F.
PERMANENT IWC #11B IMPACT	271 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

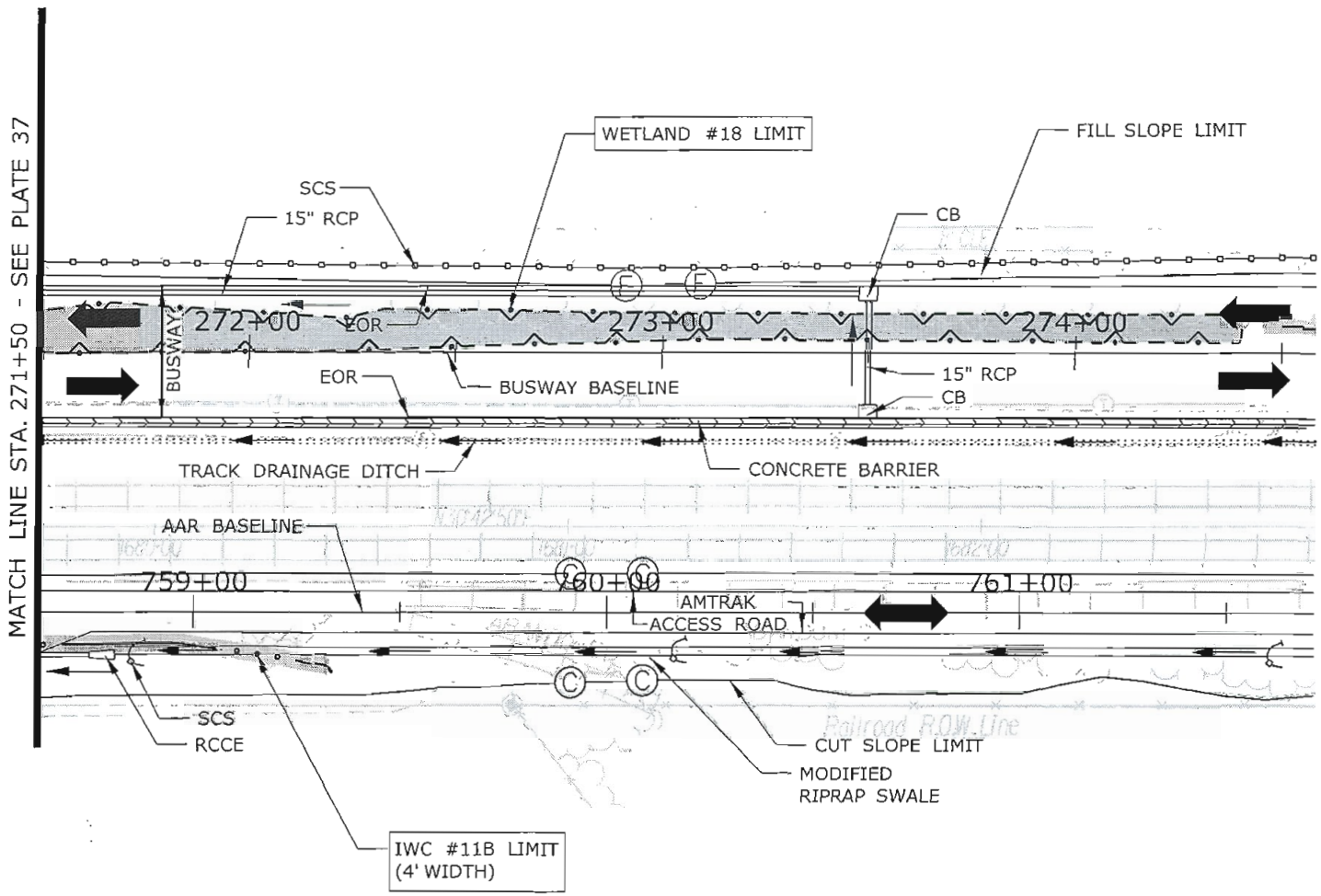
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 37



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #18 IMPACT	5,415 S.F.
PERMANENT IWC #11B IMPACT	271 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

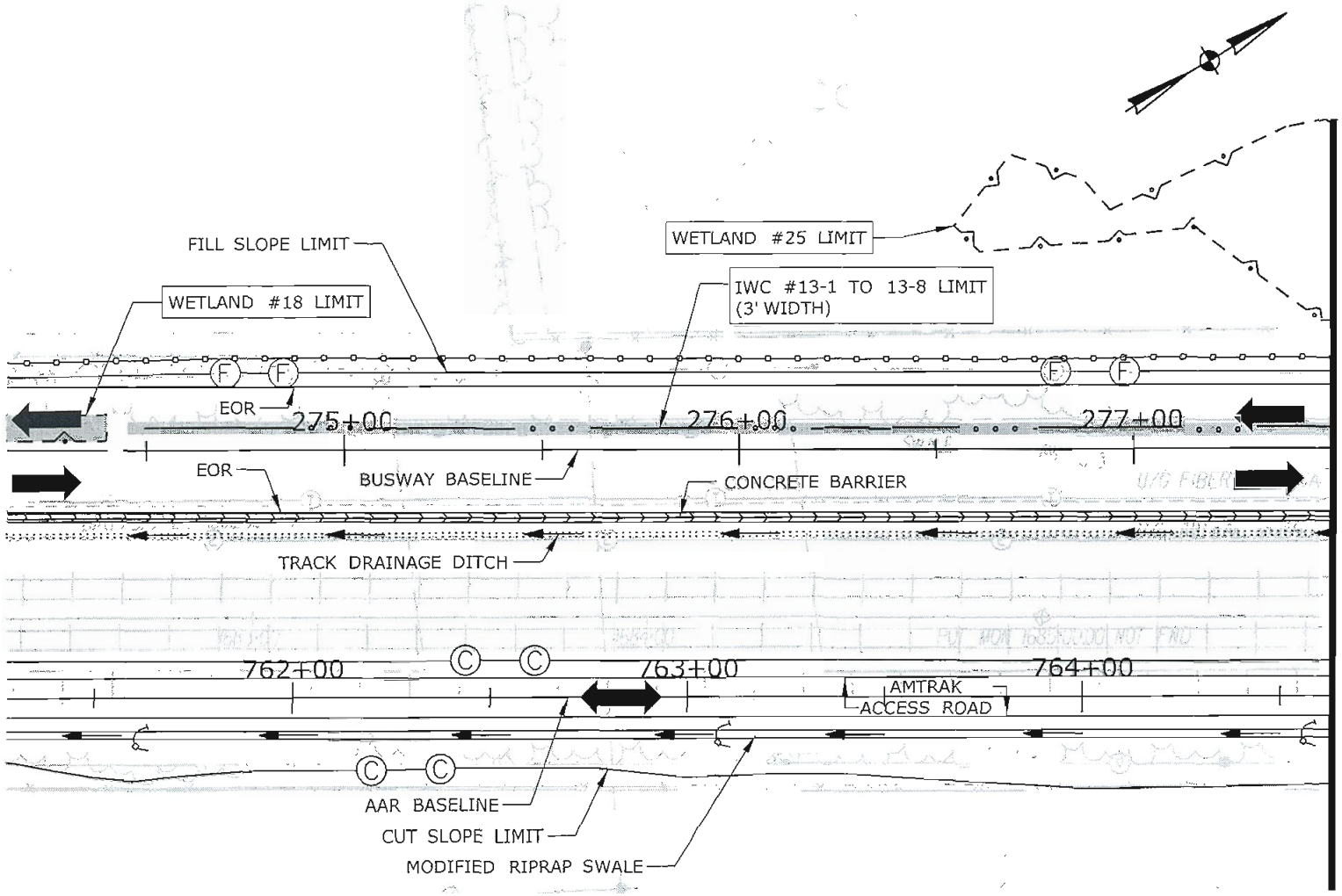
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 38



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #13 IMPACT	789 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

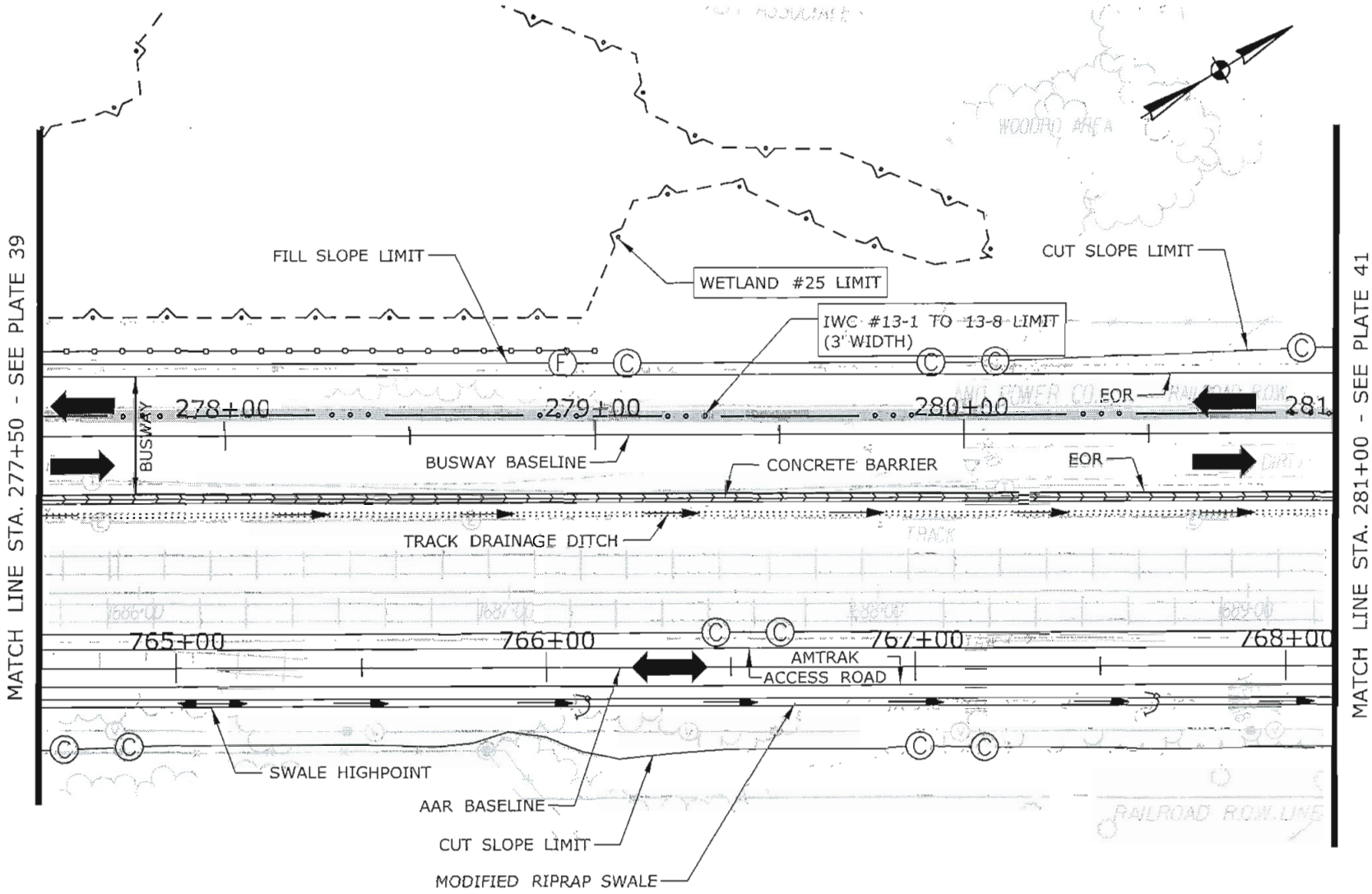
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 39



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #13 IMPACT	789 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

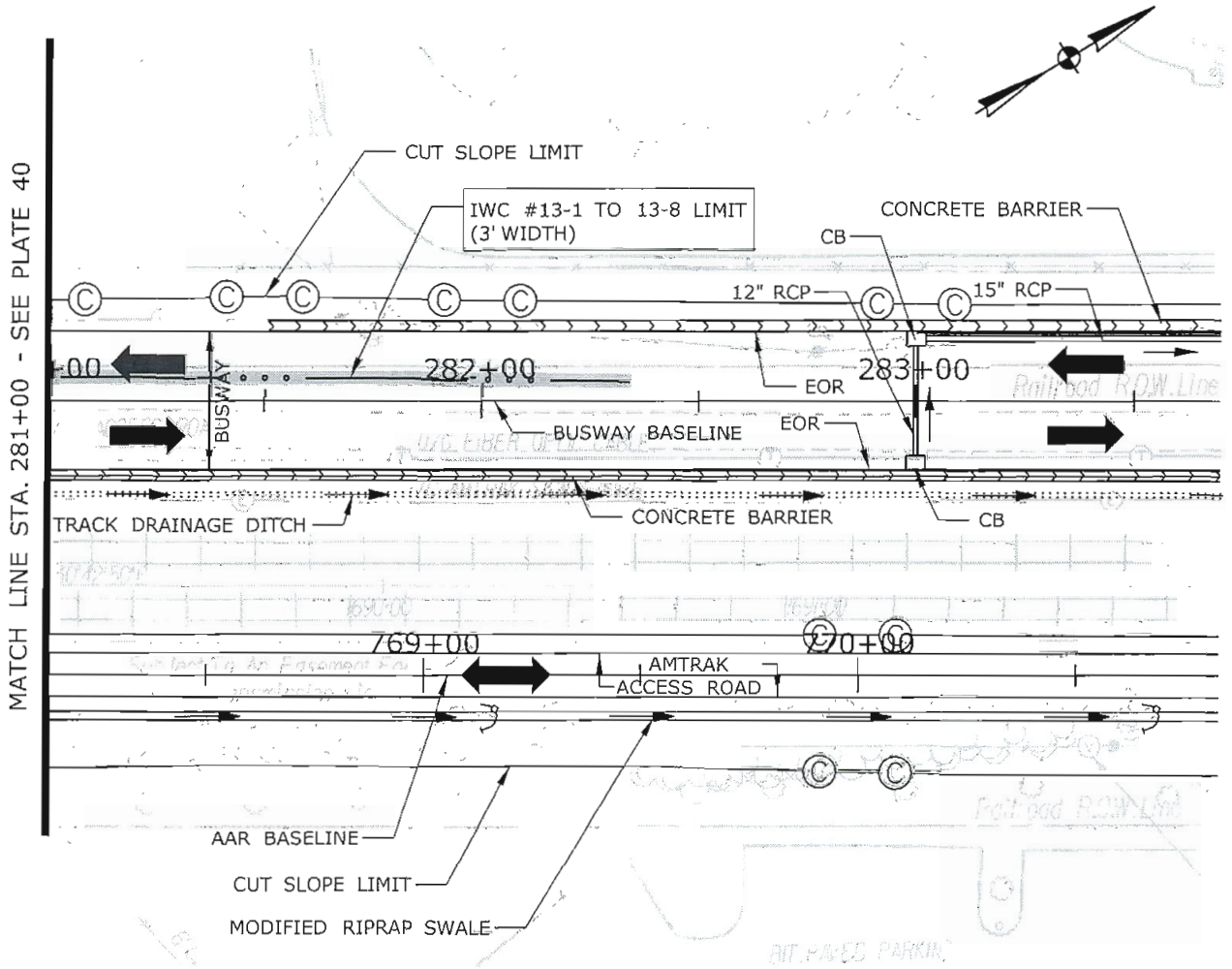
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

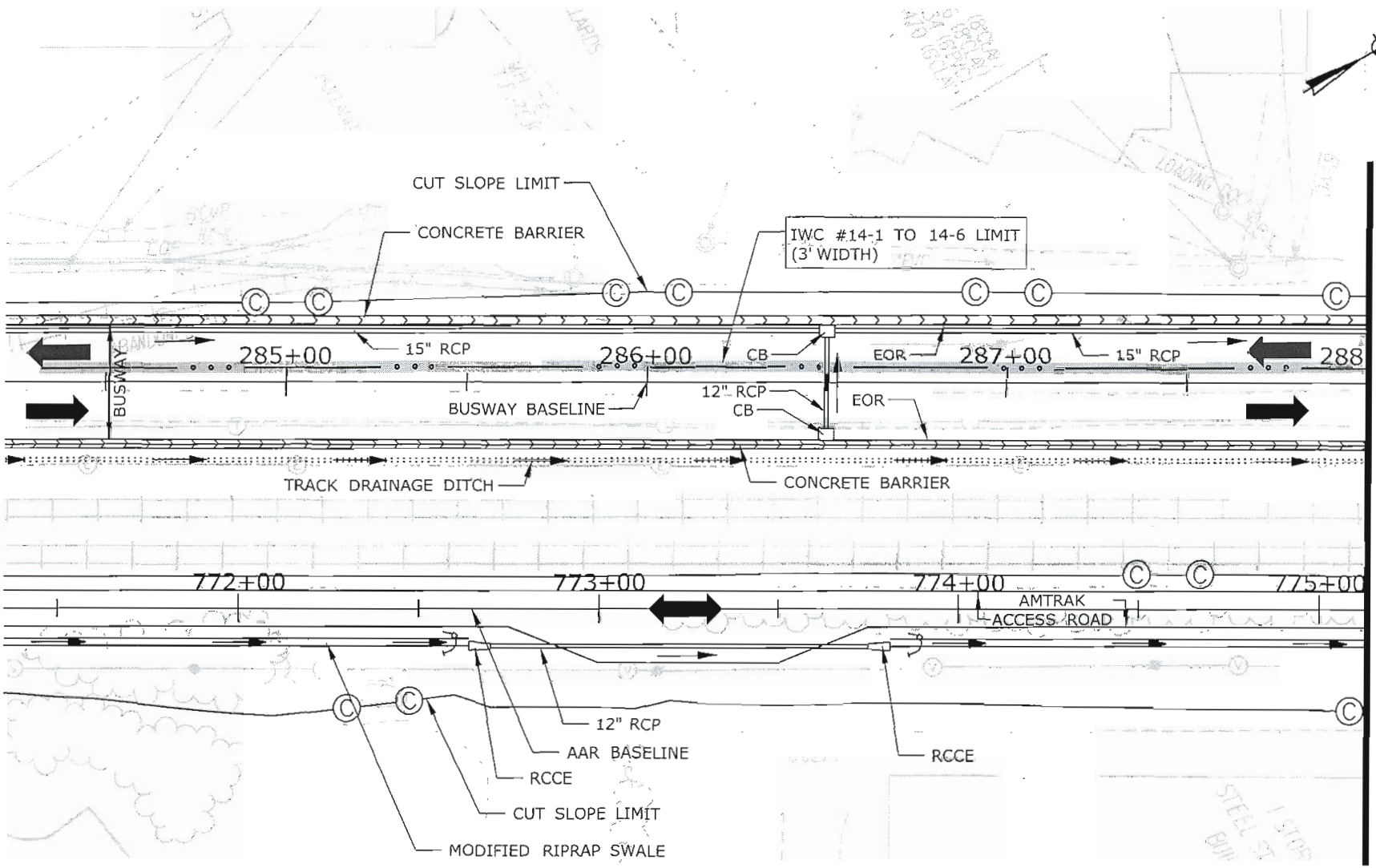
MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 40



IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H046/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
PERMANENT IWC #13 IMPACT	789 L.F.	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 41



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #14 IMPACT	817 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

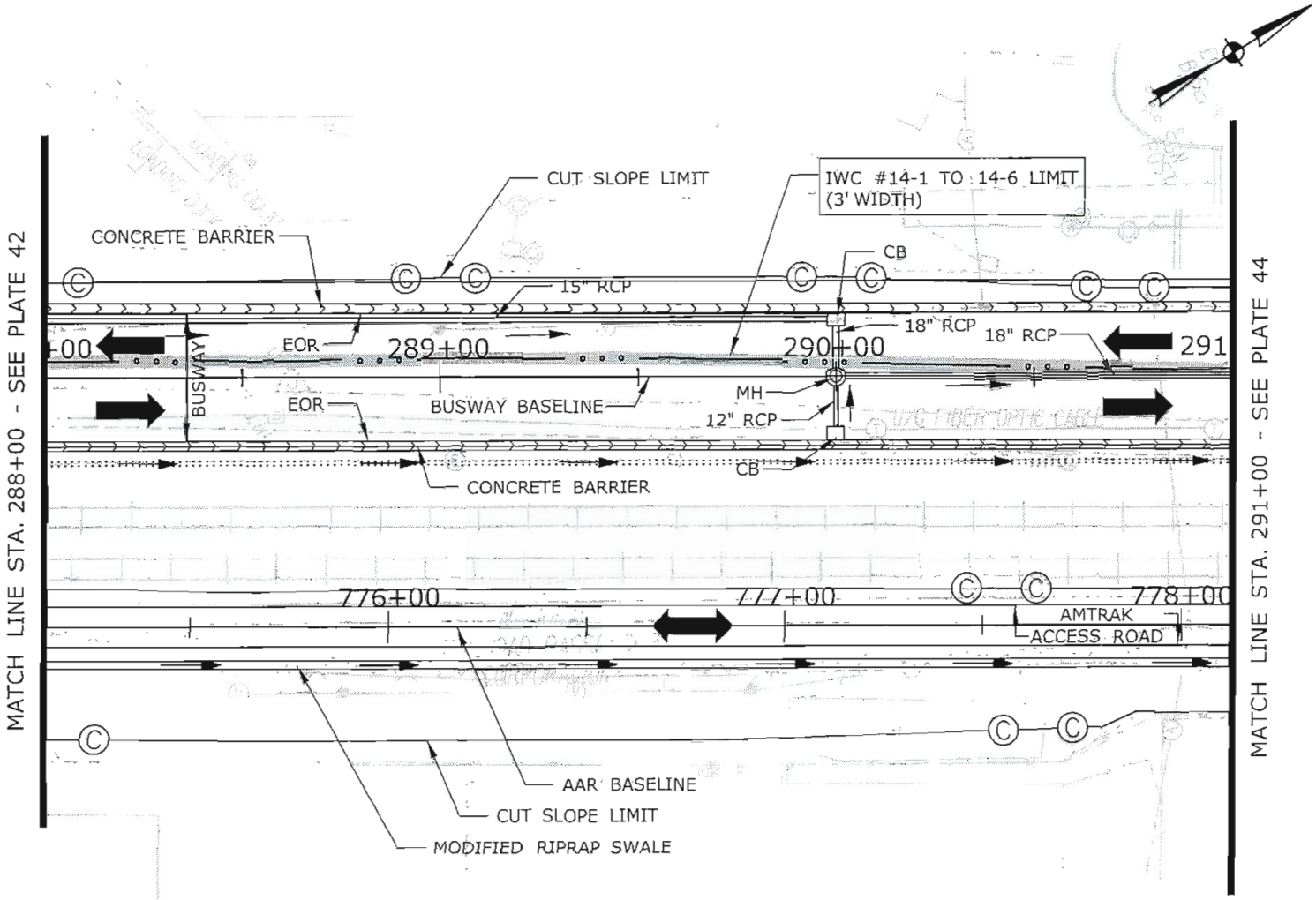
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 42



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #14 IMPACT	817 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

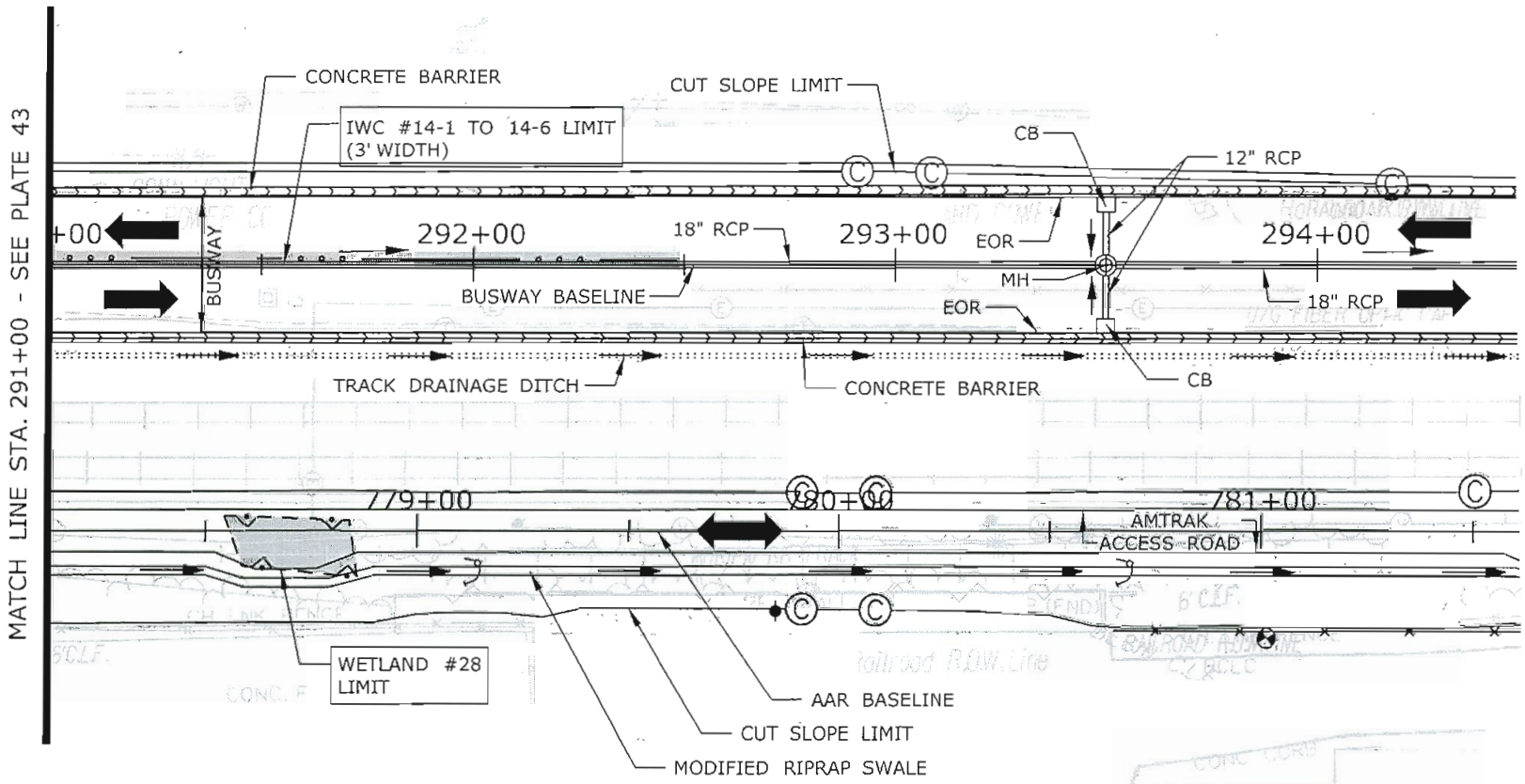
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 43



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #14 IMPACT	817 L.F.
PERMANENT WETLAND #28 IMPACT	352 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

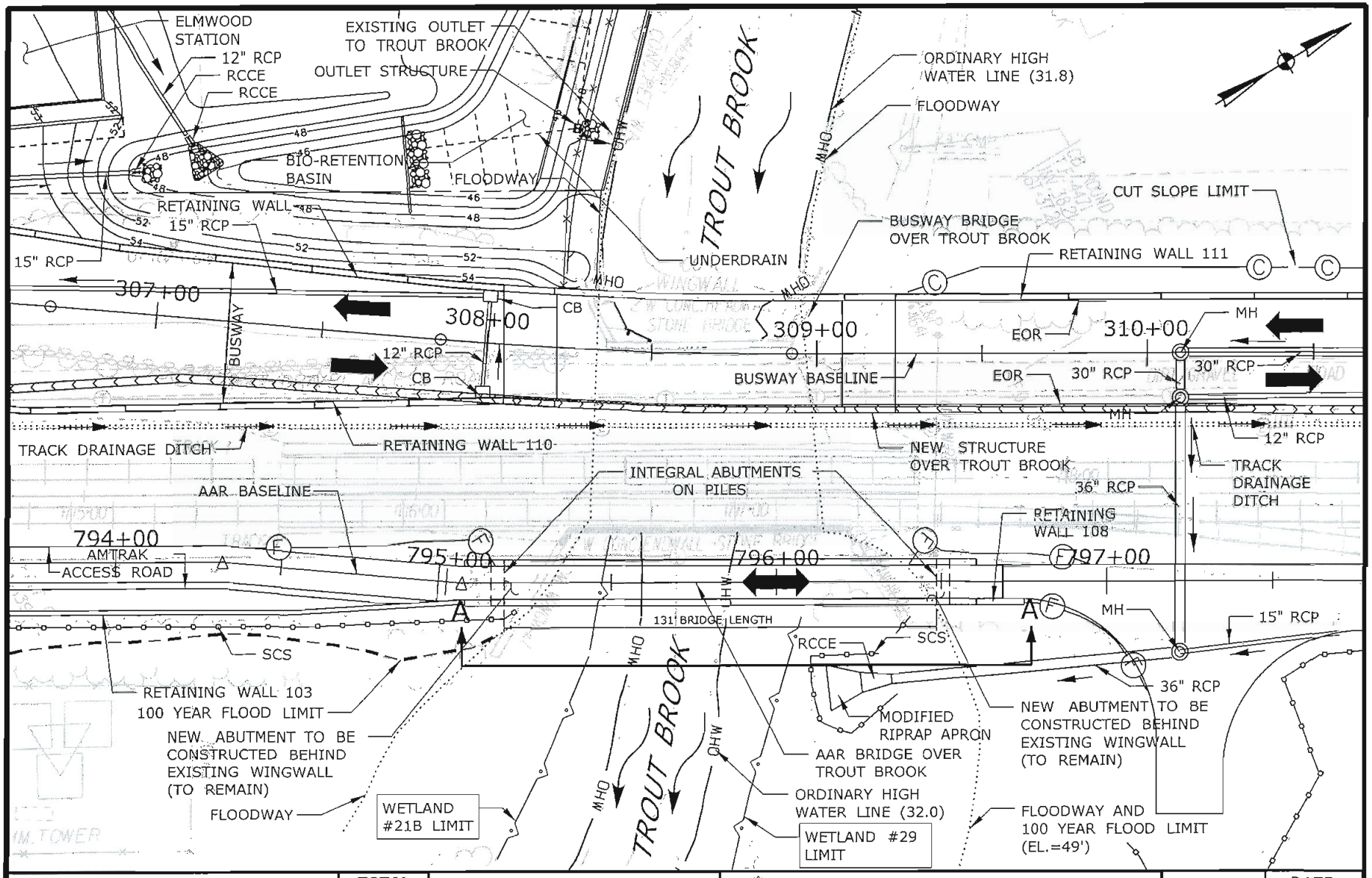
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

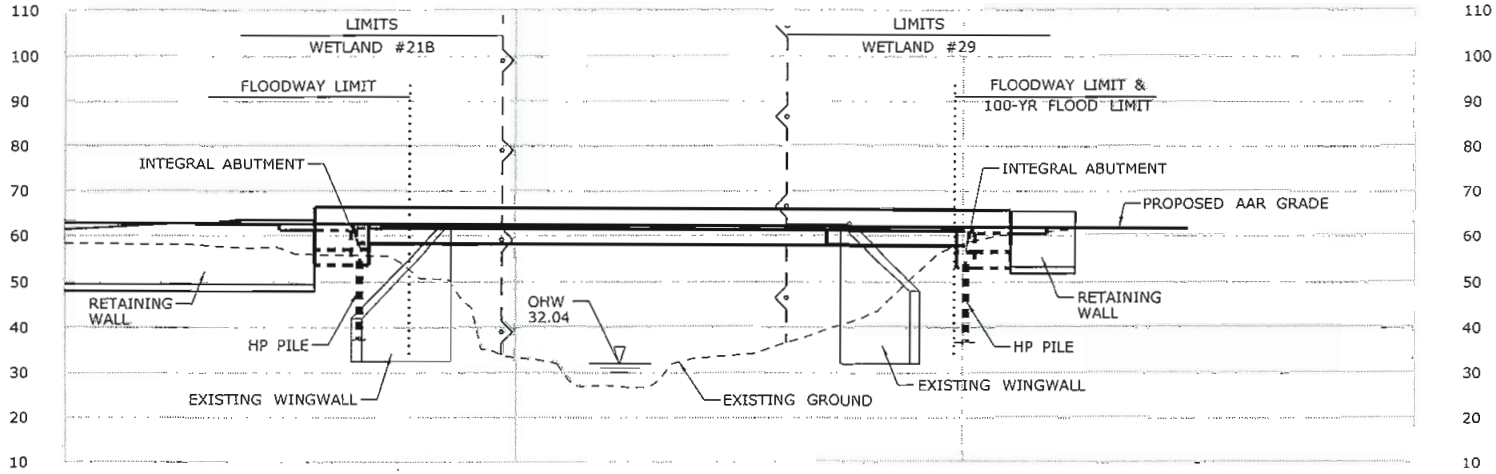
MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 44

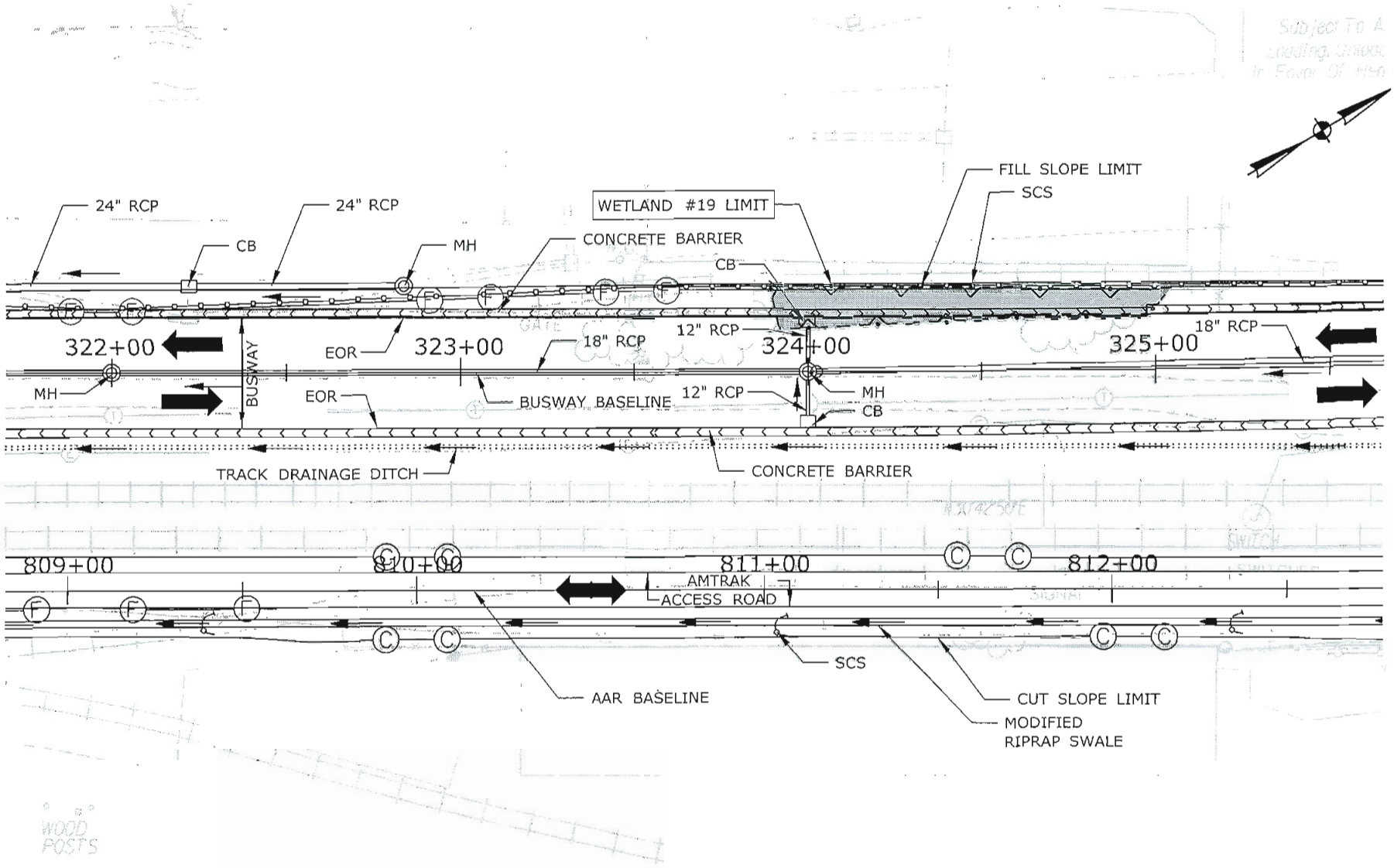


IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H046/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
NO WETLAND IMPACTS		SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 45



SECTION A-A (SEE PLATE 45)

ELEVATION AT AAR BRIDGE OVER TROUT BROOK LOOKING UPSTREAM (WEST)	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=10'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 45A



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #19 IMPACT	1,077 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

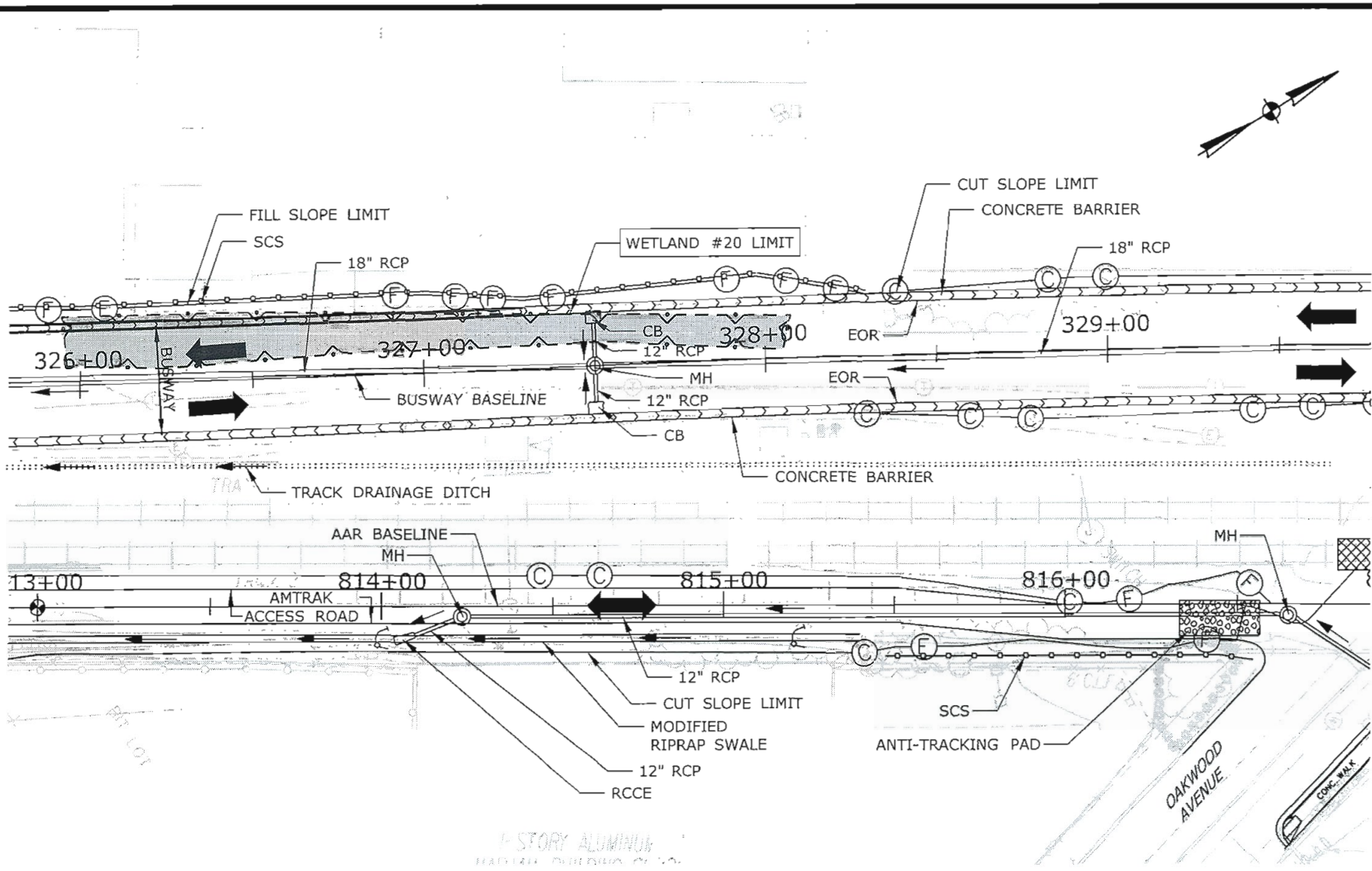
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

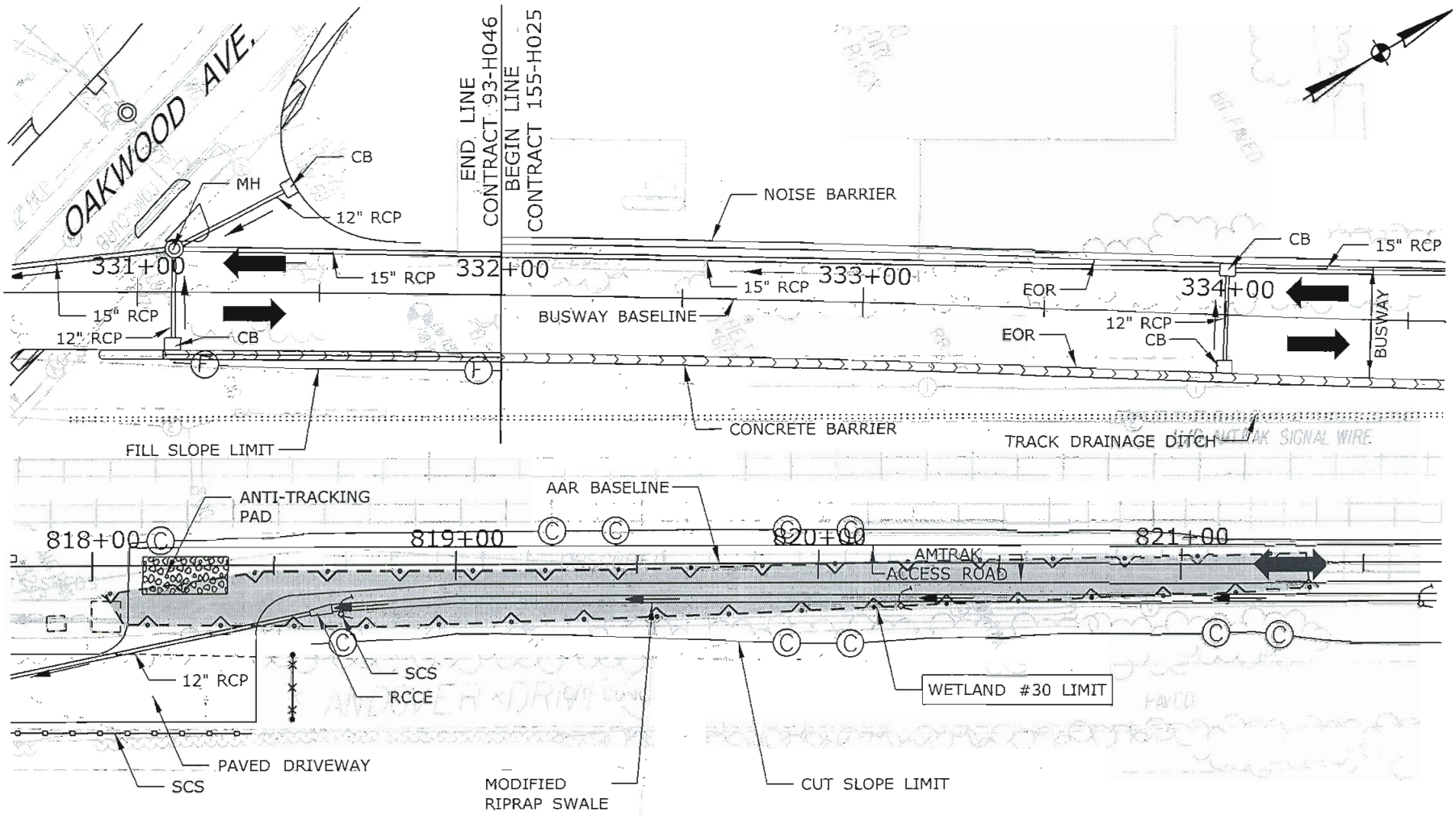
MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 46



IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H046/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
PERMANENT WETLAND #20 IMPACT	2,381 S.F.	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 47



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #30 IMPACT	4,068 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H046/H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

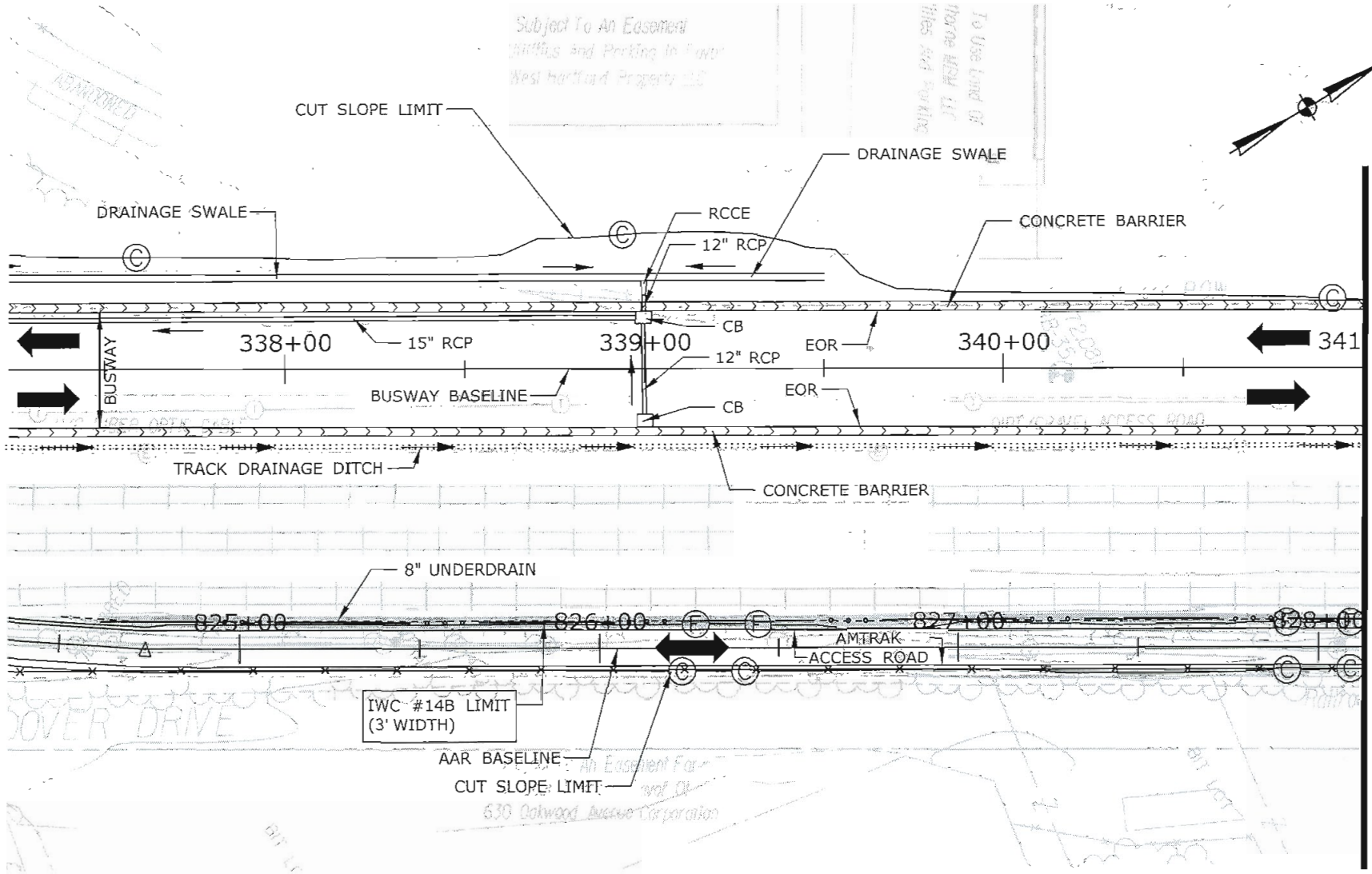
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

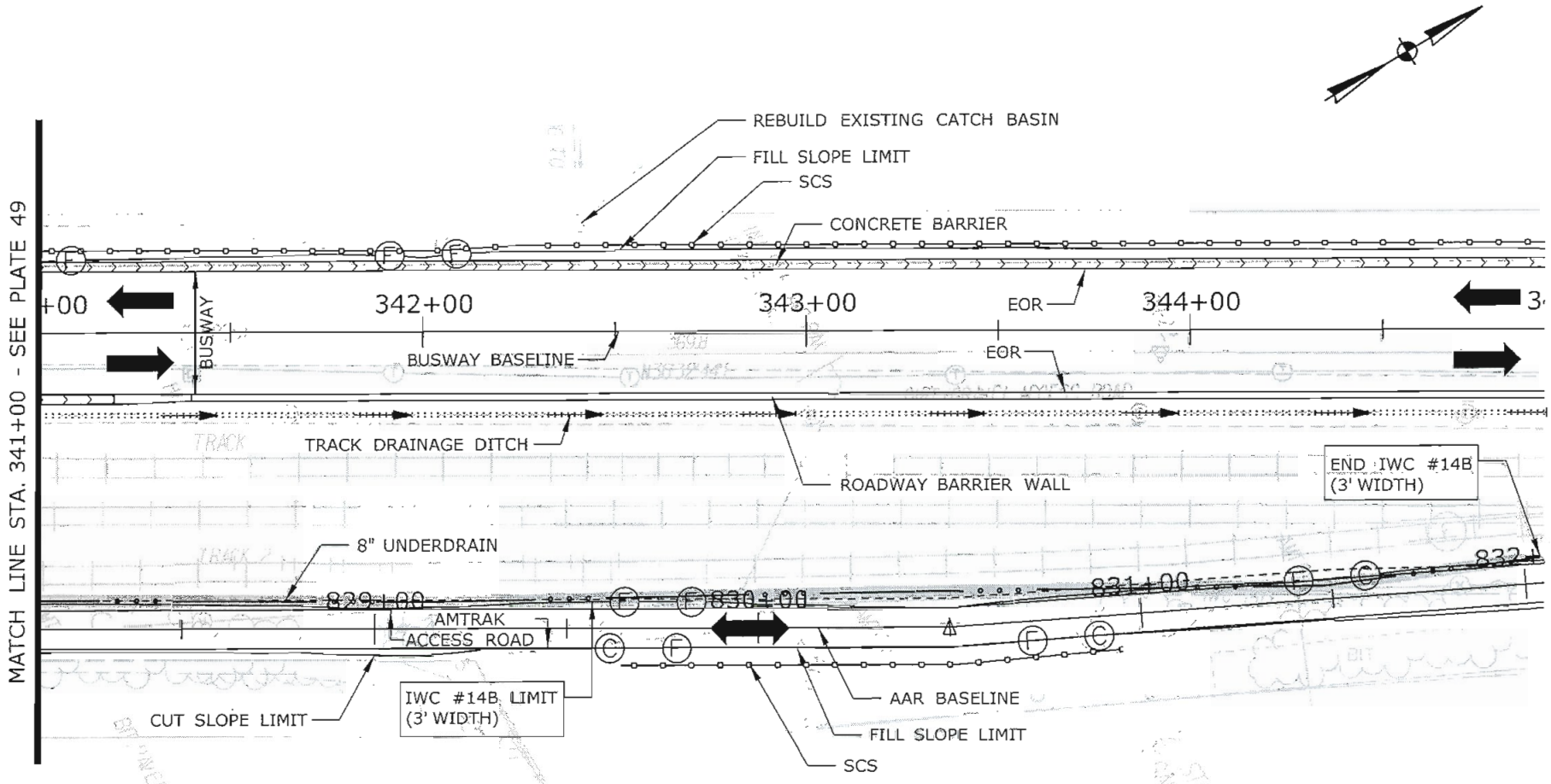
MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 48



LEGEND	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H025/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
PERMANENT IWC #14B IMPACT	742 L.F.	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 49



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #14B IMPACT	742 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

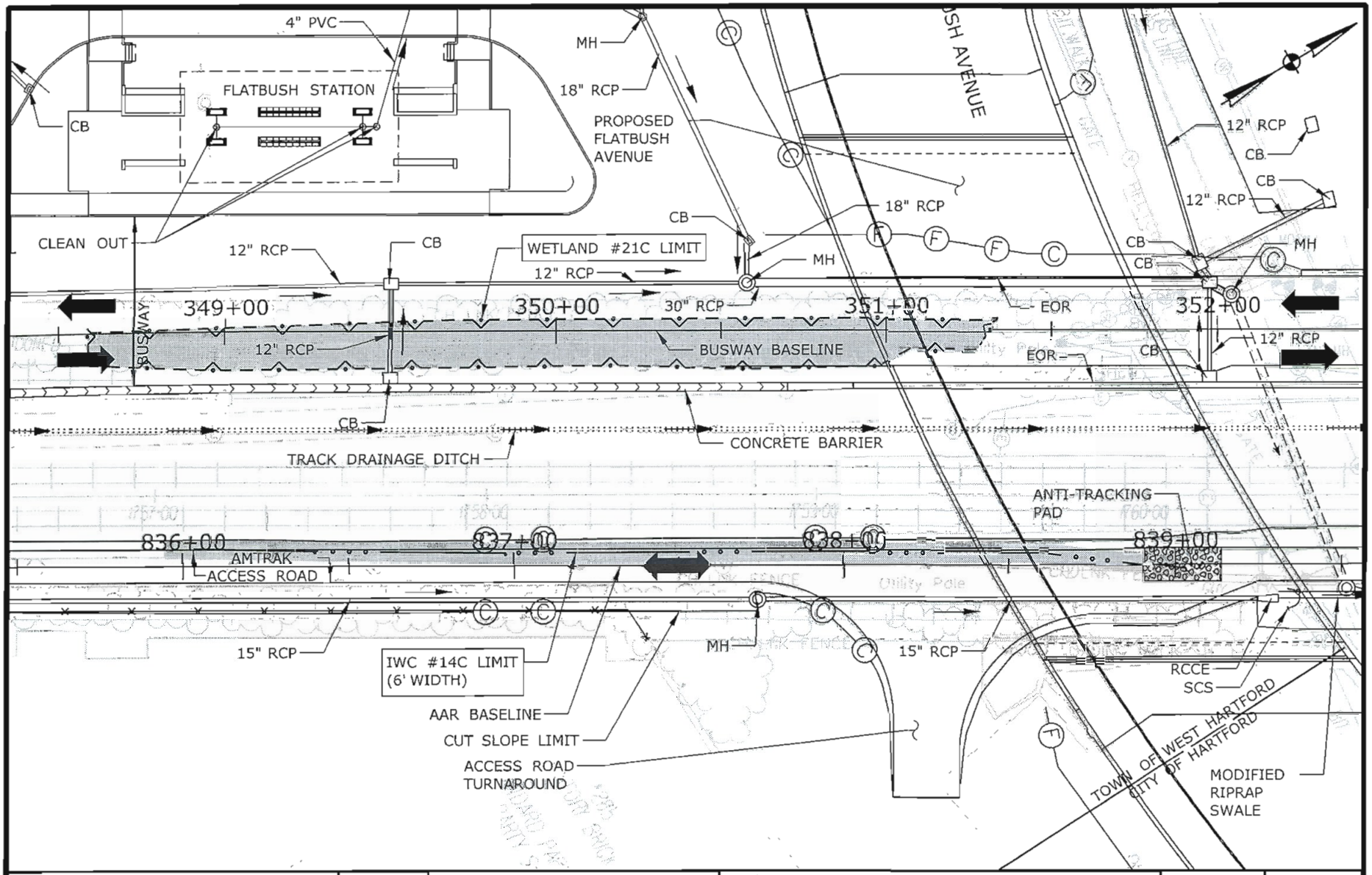
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 50



LEGEND	TOTAL IMPACT AREA
PERMANENT WETLAND #21C IMPACT	3,637 S.F.
PERMANENT IWC #14C IMPACT	309 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

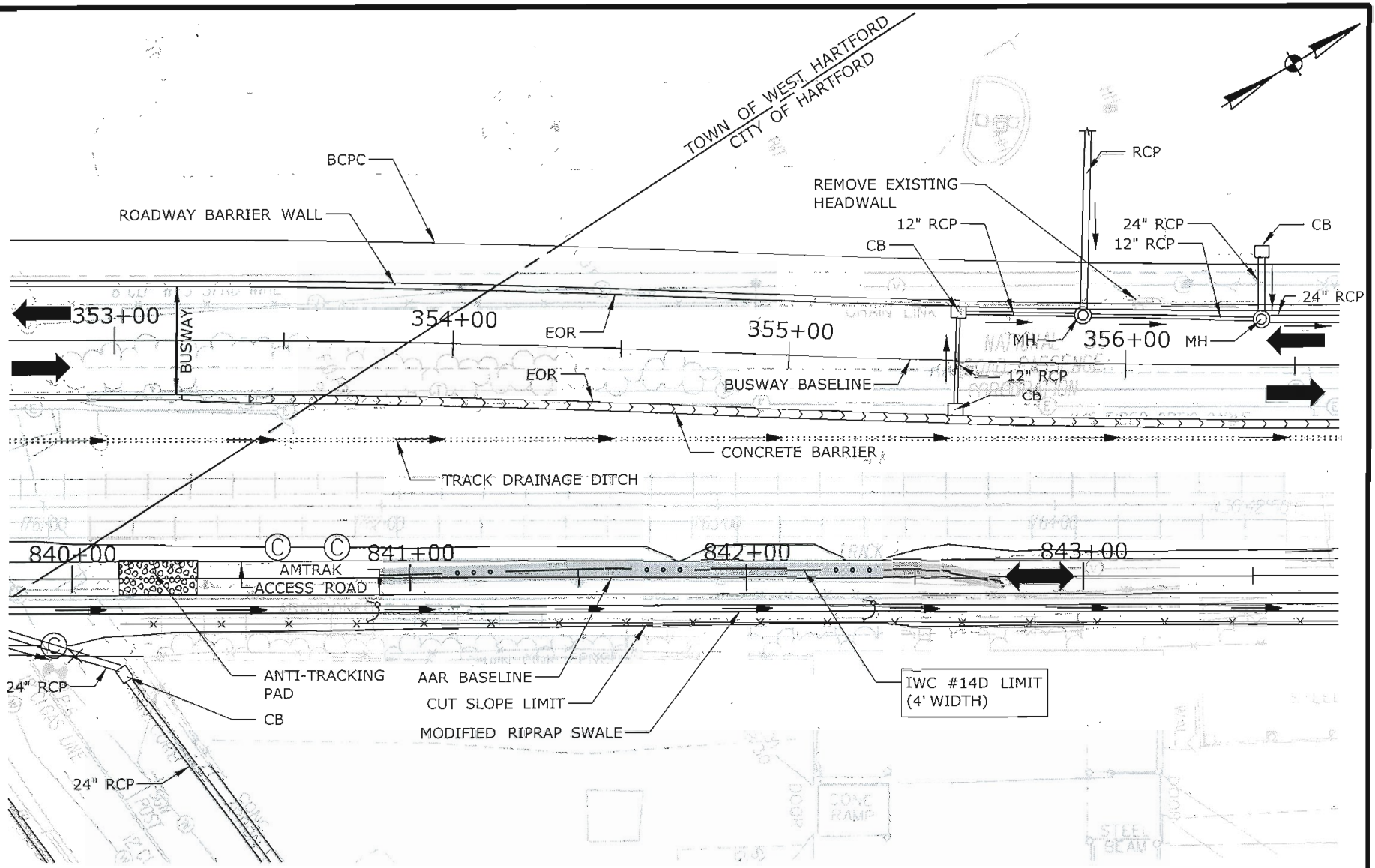
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 51



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #14D IMPACT	185 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

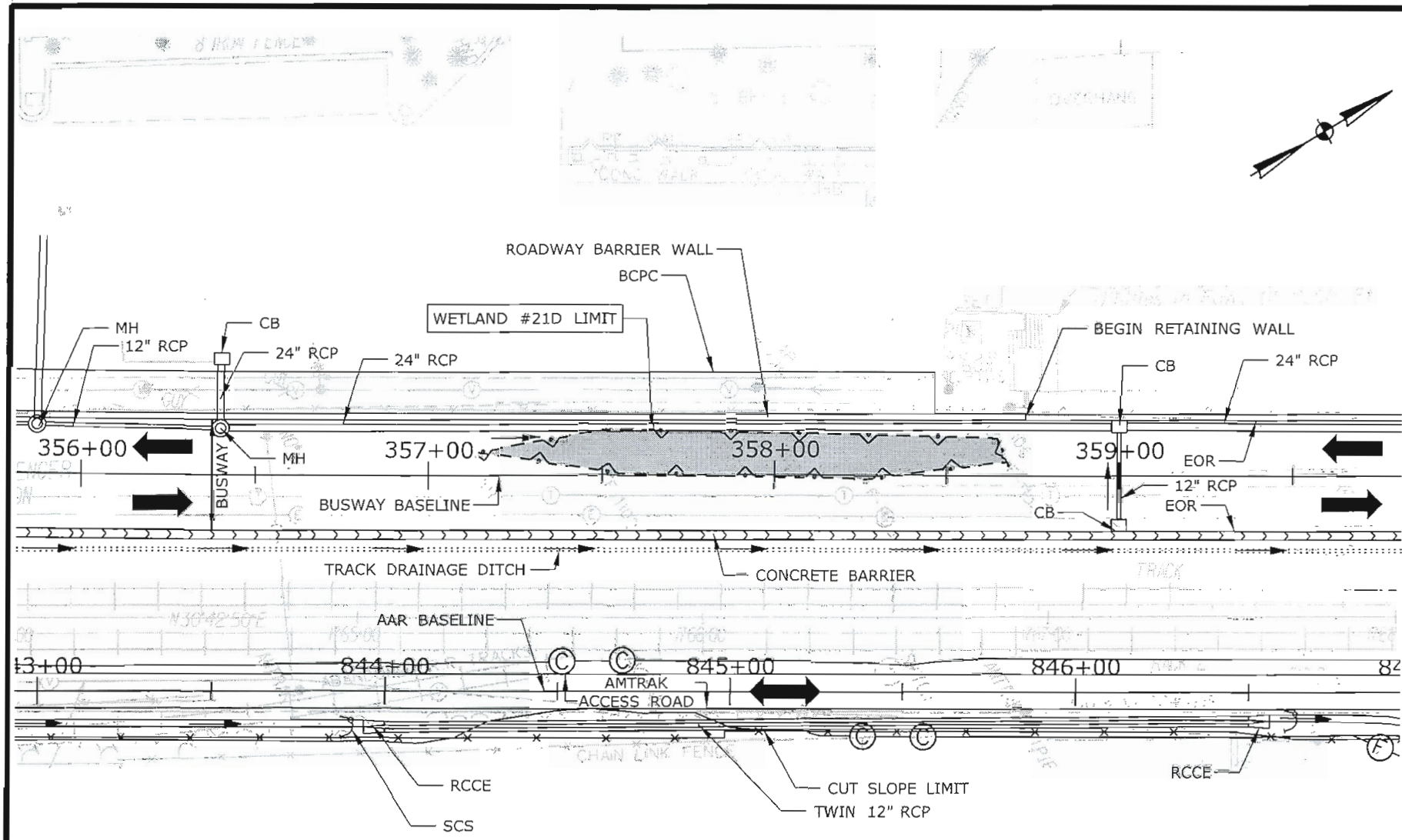
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 52



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #21D IMPACT	1,570 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

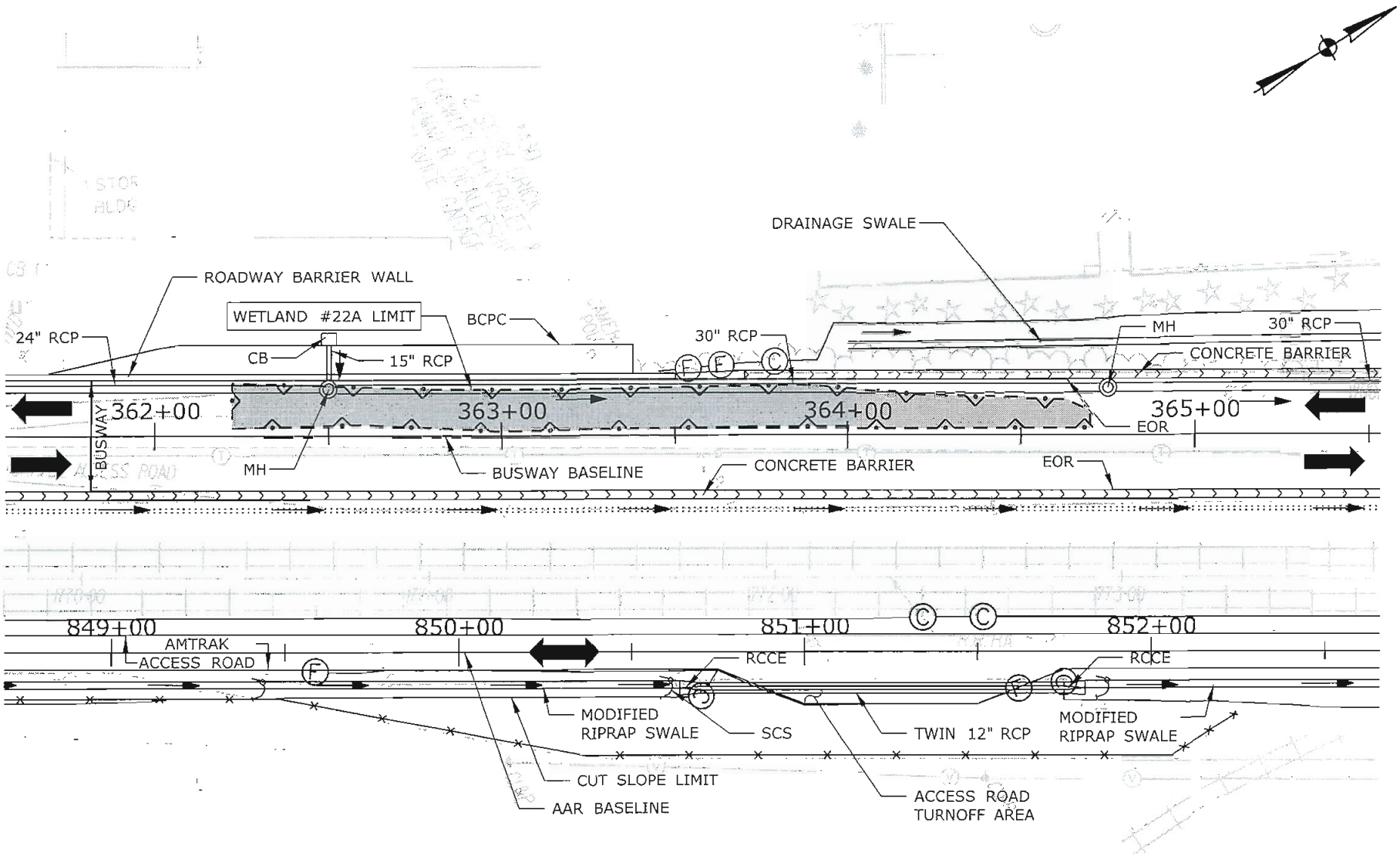
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 53



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #22A IMPACT	2,691 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

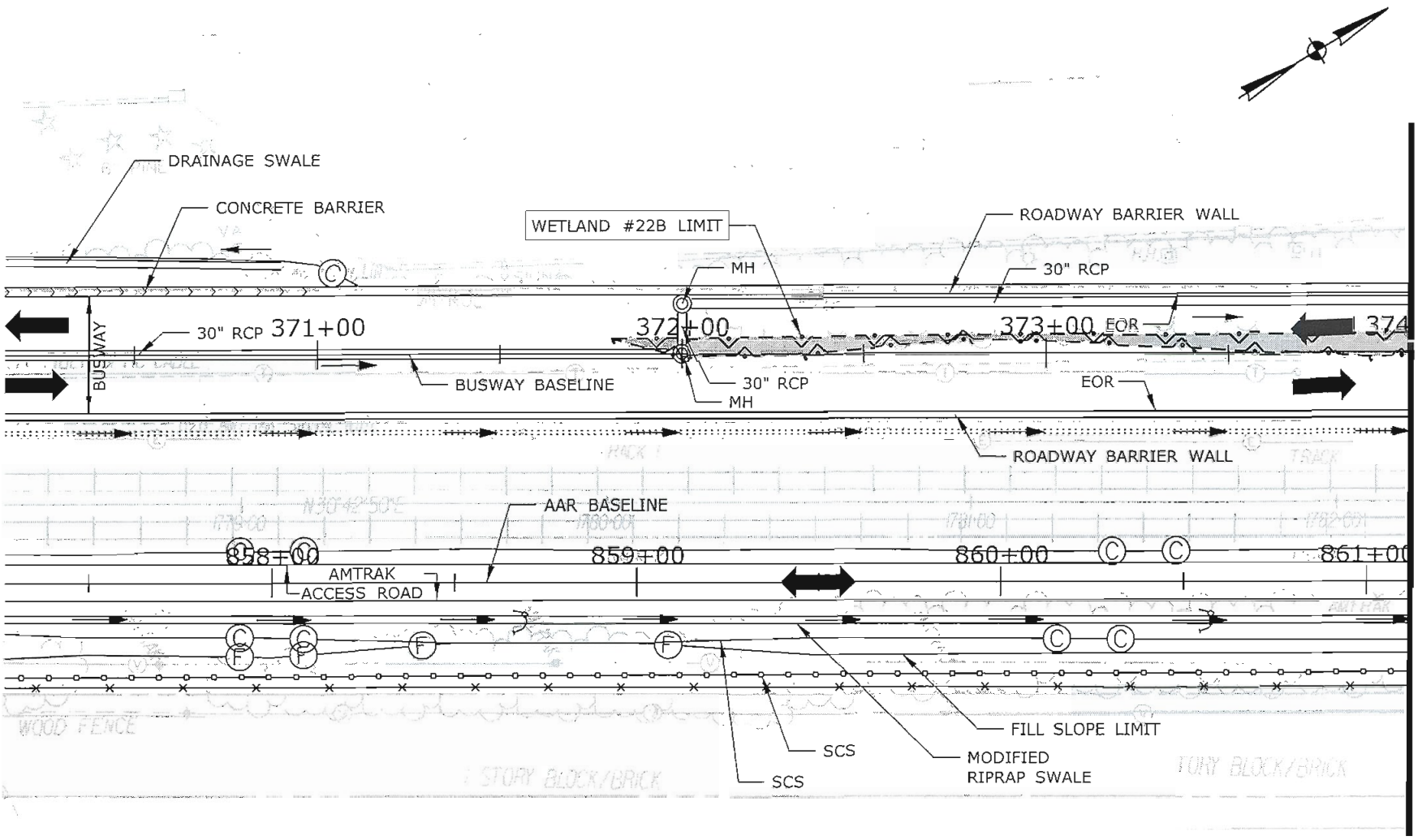
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 54



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #22B IMPACT	2,080 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

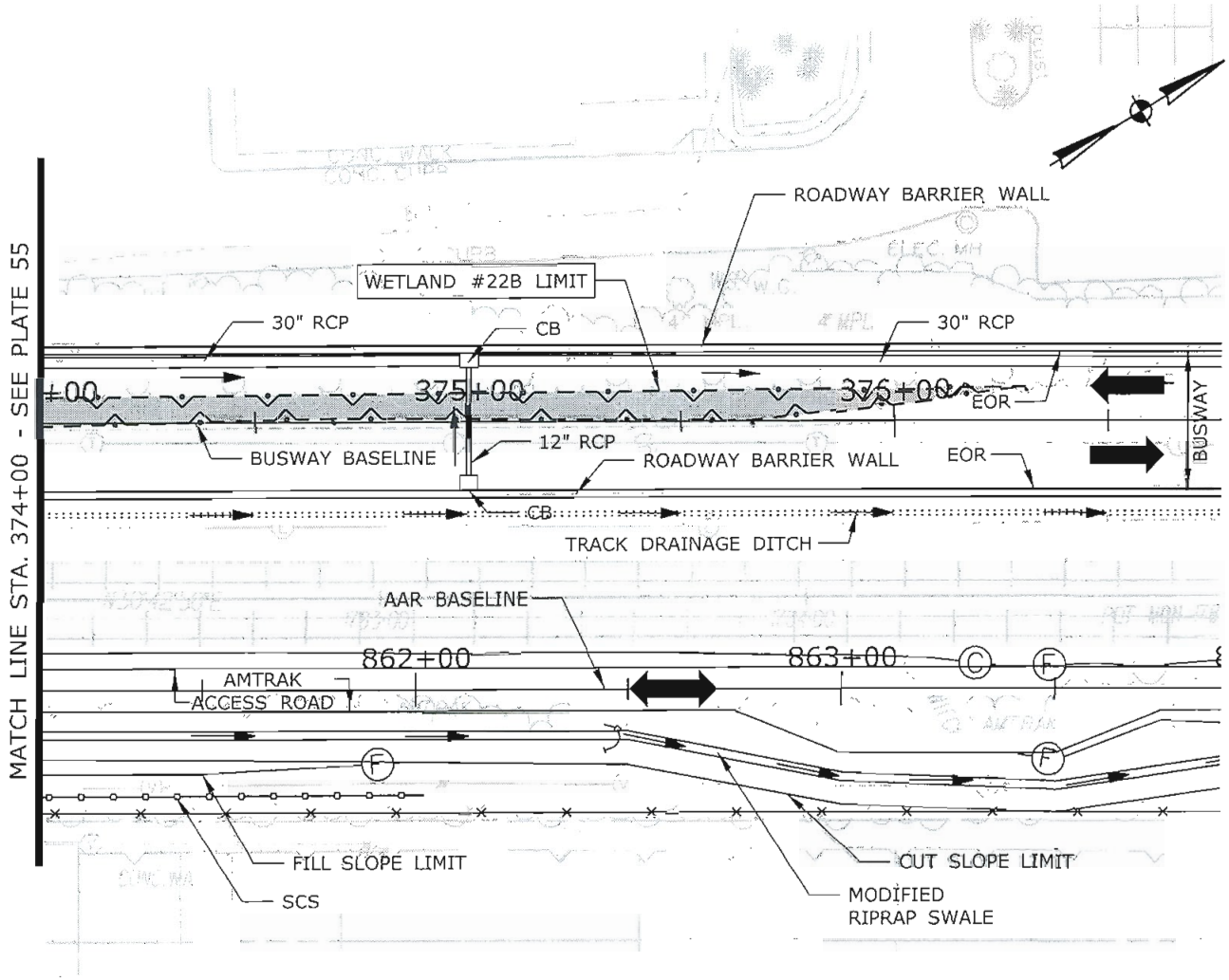
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

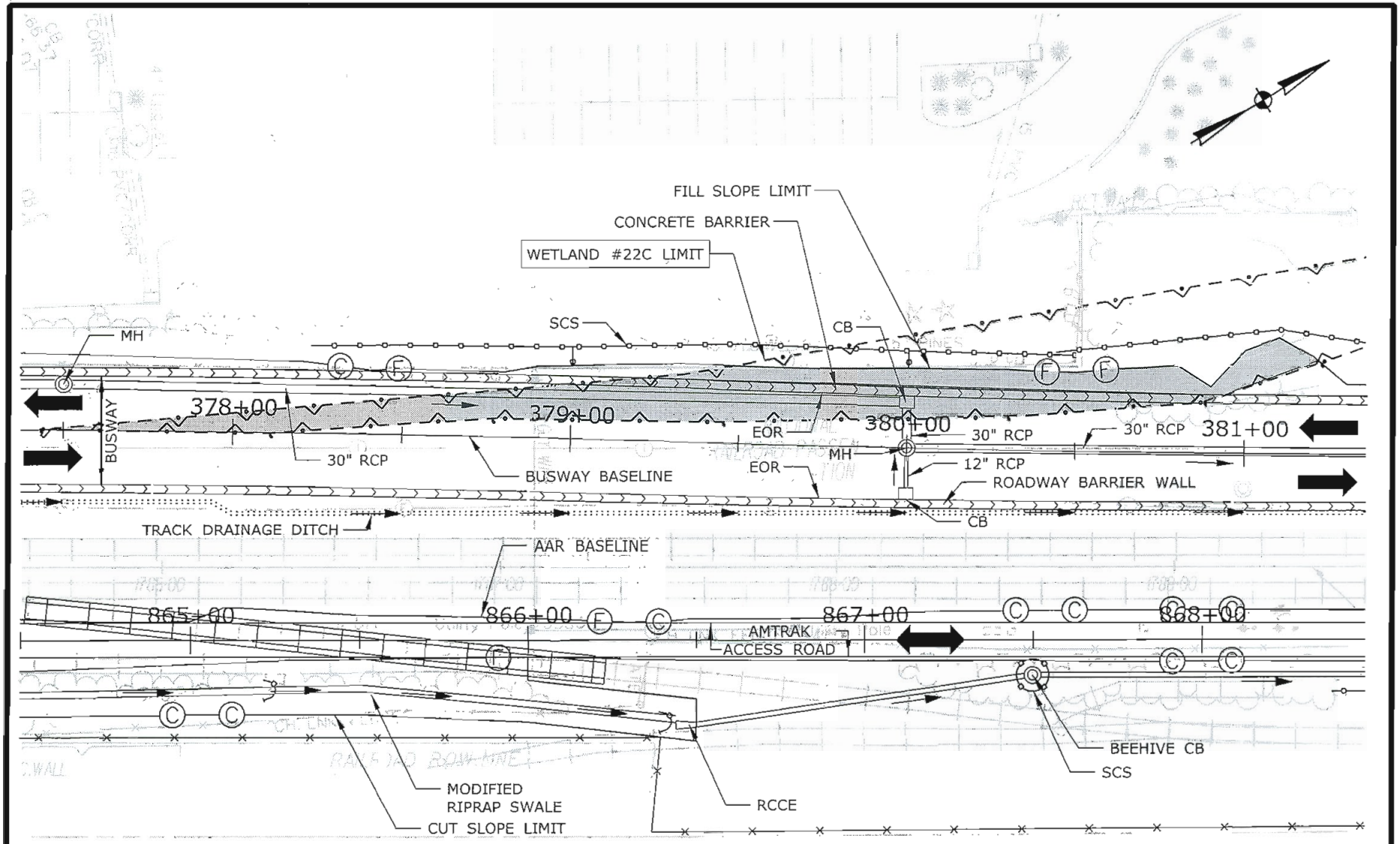
DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 55



IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H025/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
PERMANENT WETLAND #22B IMPACT	2,080 S.F.	SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 56



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT WETLAND #22C IMPACT	3,680 S.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

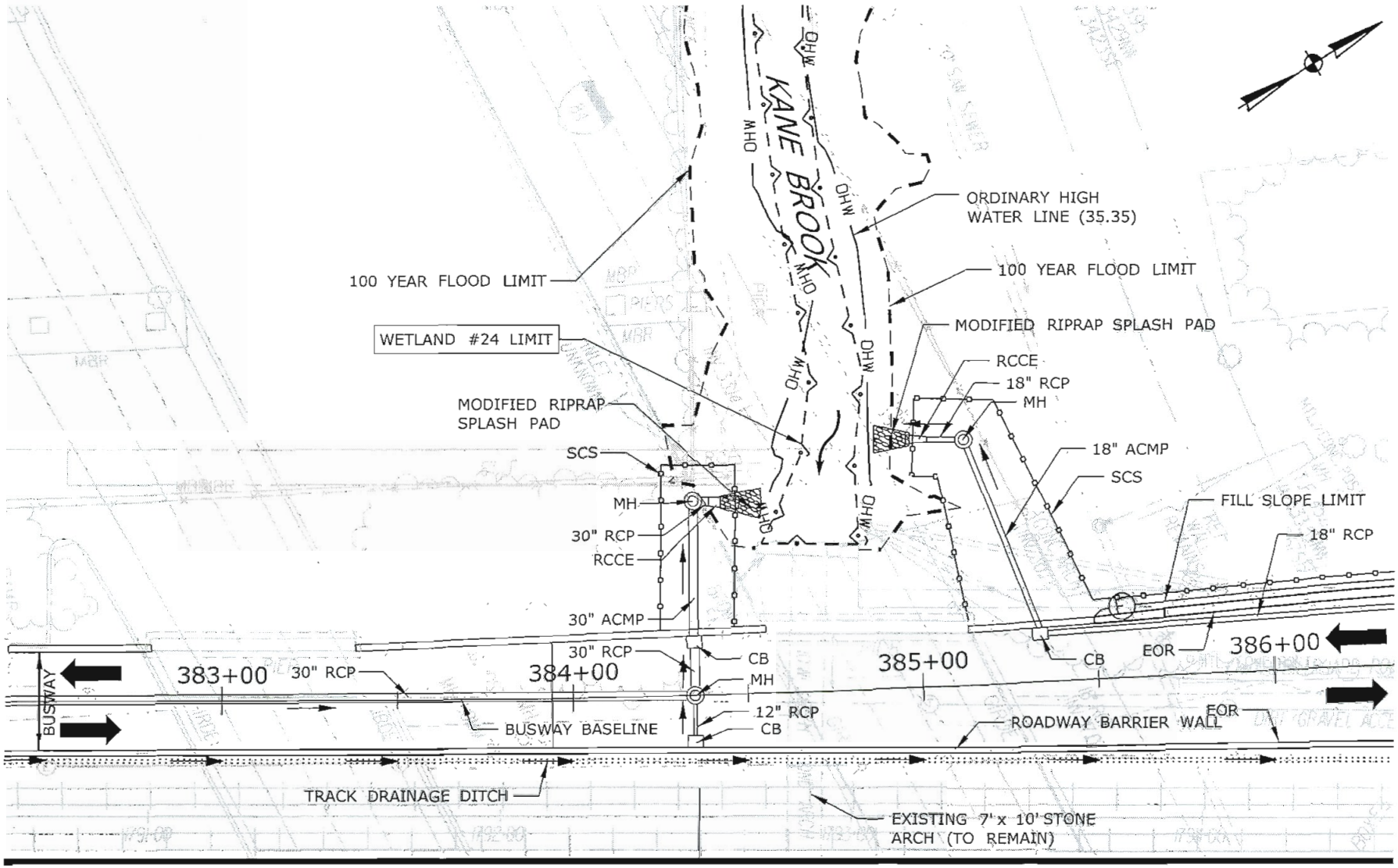
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

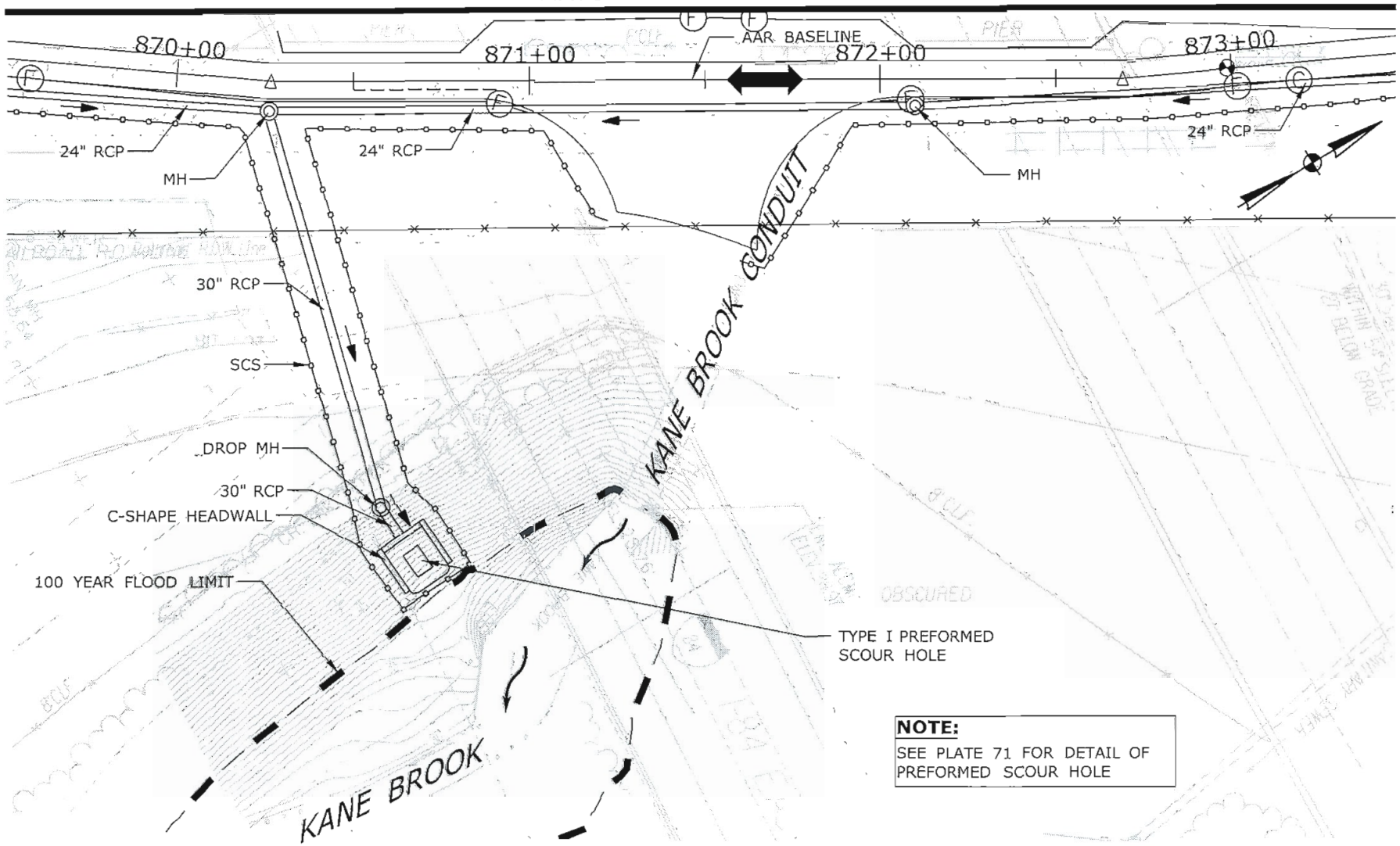
PLATE NO. 57



MATCH LINE - SEE PLATE 58A

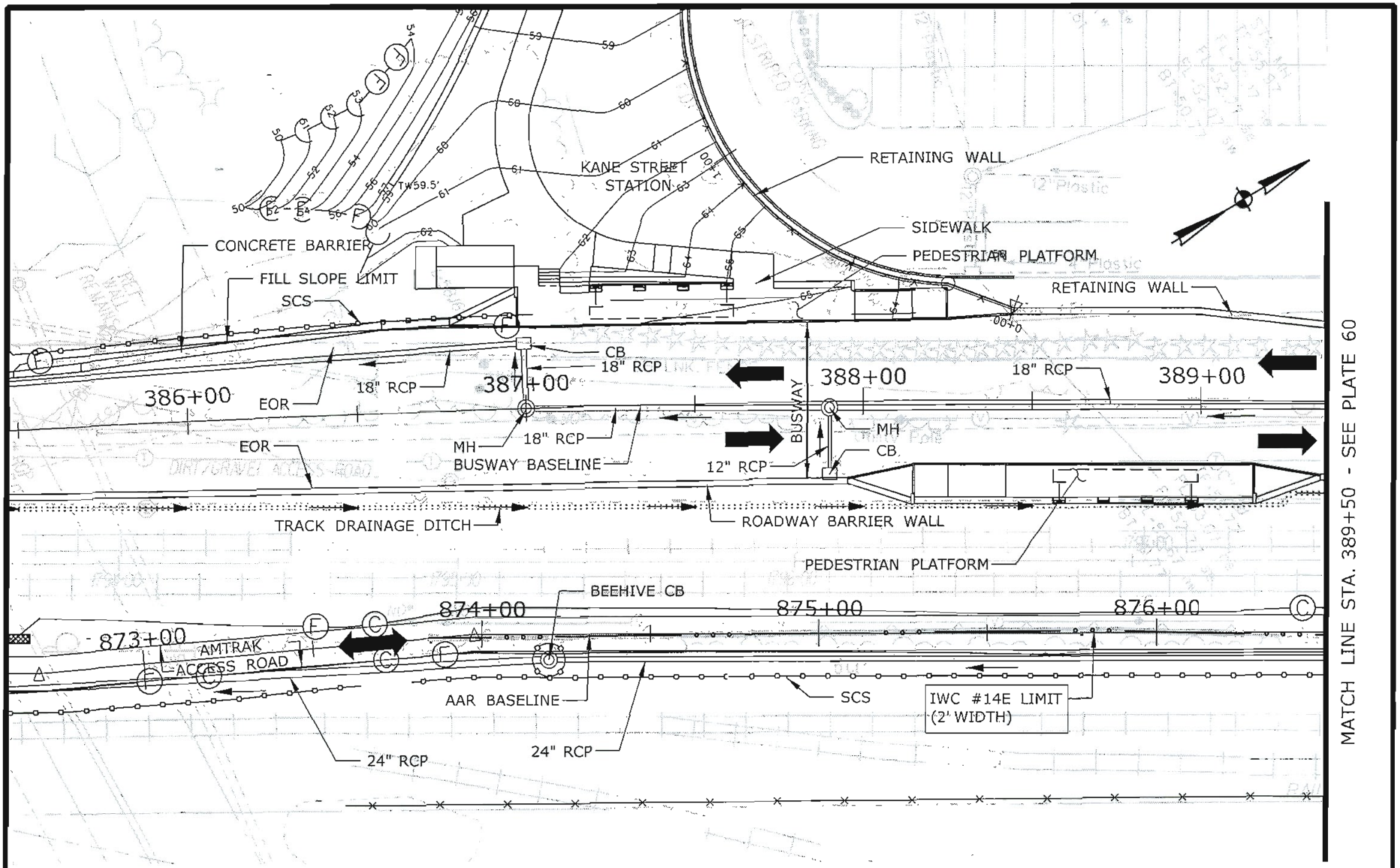
IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H025/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
NO WETLAND IMPACTS		SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 58

MATCH LINE - SEE PLATE 58



NOTE:
SEE PLATE 71 FOR DETAIL OF PREFORMED SCOUR HOLE

IMPACT SUMMARY	TOTAL IMPACT AREA	STATE PROJECT NO.: 171-305 CONTRACT NO.: H025/H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
NO WETLAND IMPACTS		SCALE 1" = 40' 40 20 0 40	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 58A



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #14E IMPACT	501 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H039/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

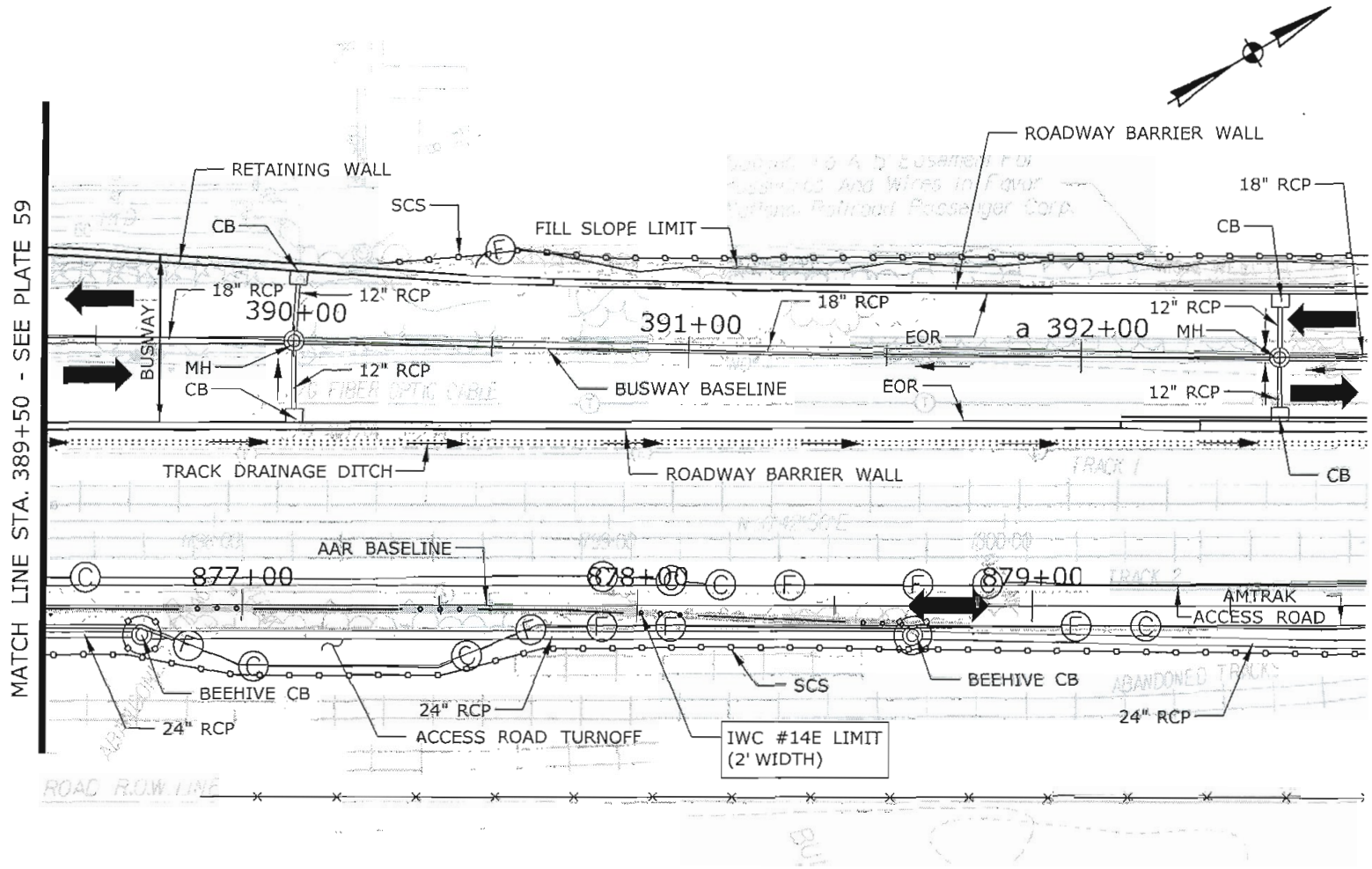
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

DATE: JULY 2010

MICHAEL BAKER ENGINEERING

PLATE NO. 59



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #14E IMPACT	501 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H039/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

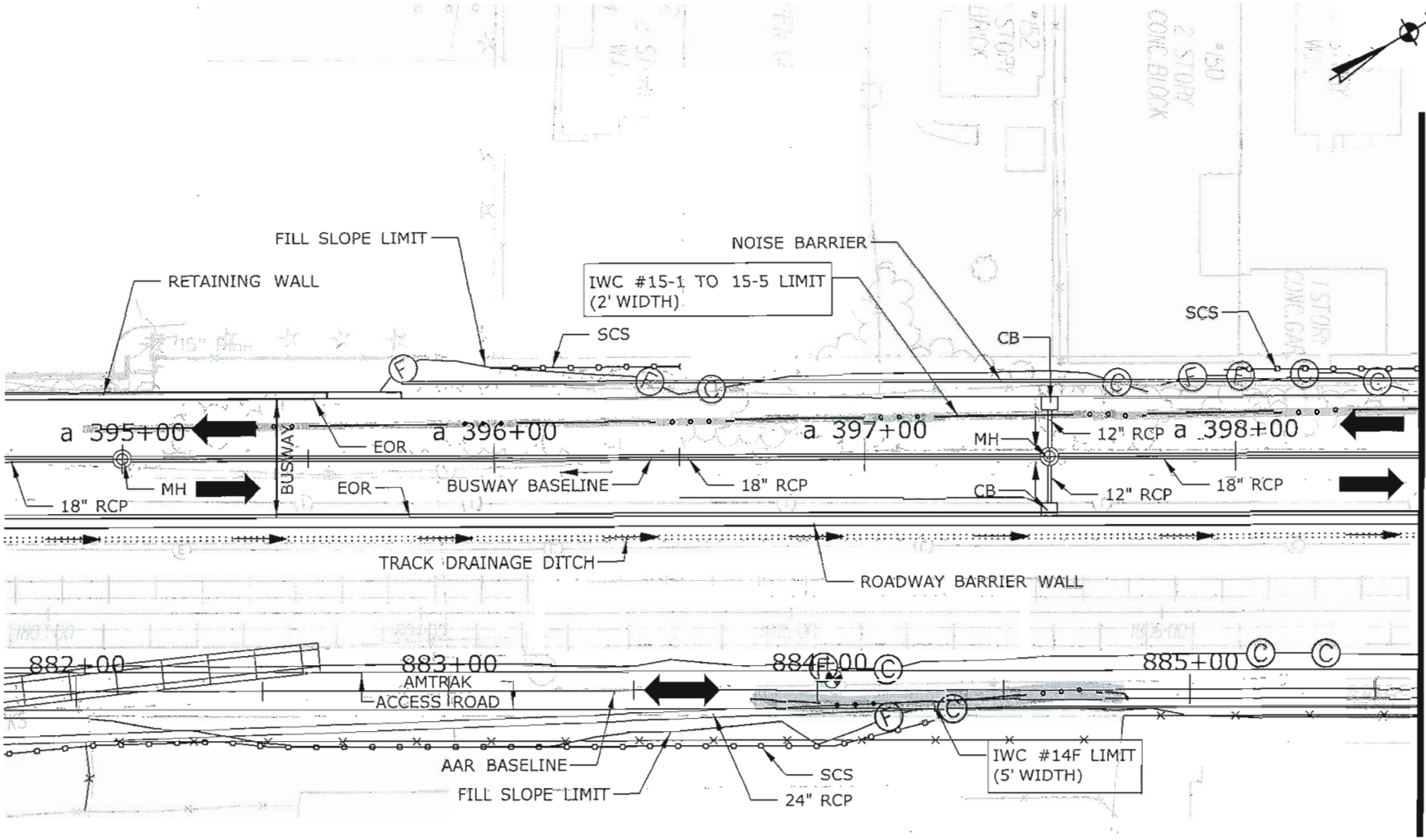
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 60



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #15 IMPACT	754 L.F.
PERMANENT IWC #14F IMPACT	101 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

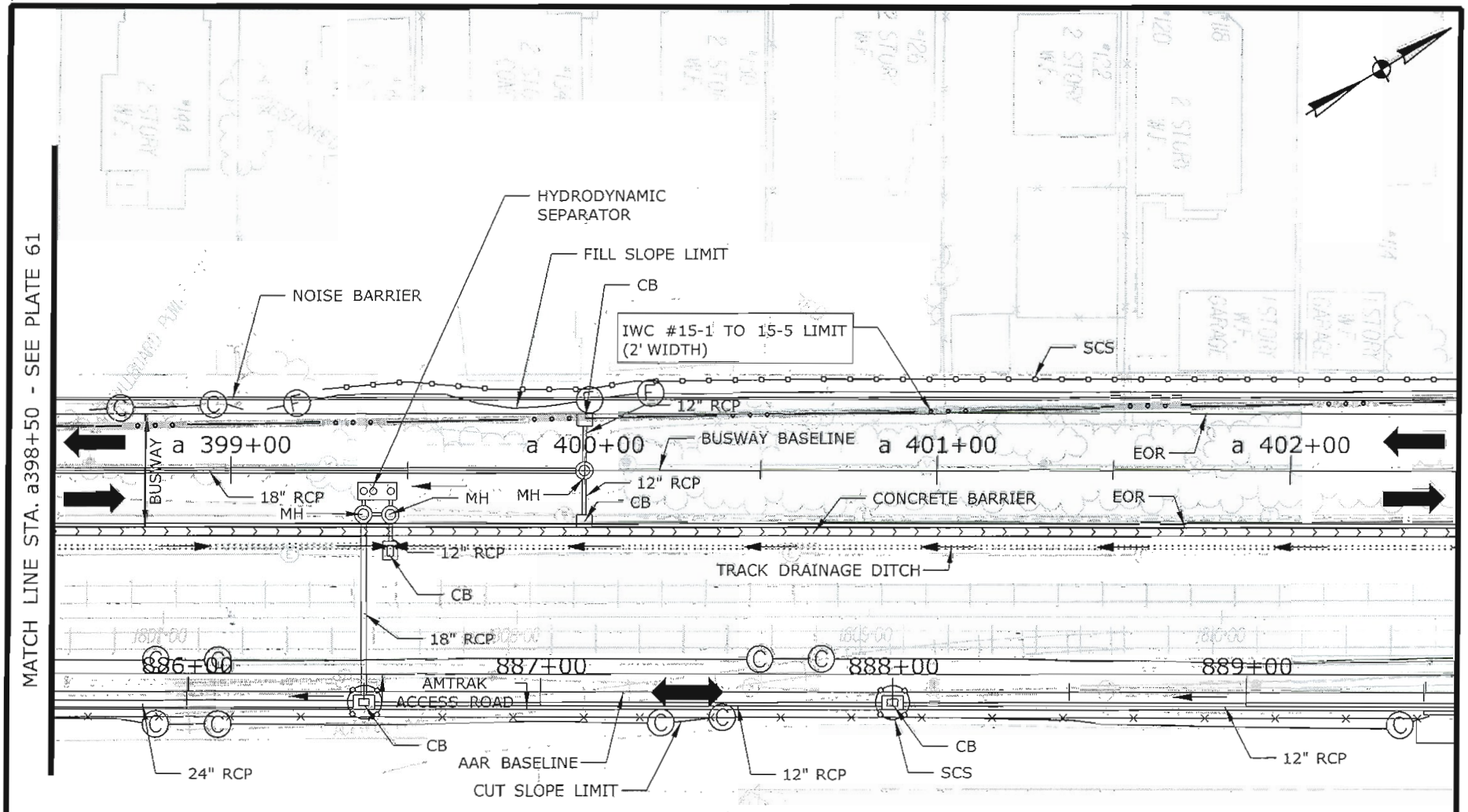
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 61



IMPACT SUMMARY	TOTAL IMPACT AREA
PERMANENT IWC #15 IMPACT	754 L.F.

STATE PROJECT NO.: 171-305
CONTRACT NO.: H025/H052

SCALE 1" = 40'
40 20 0 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

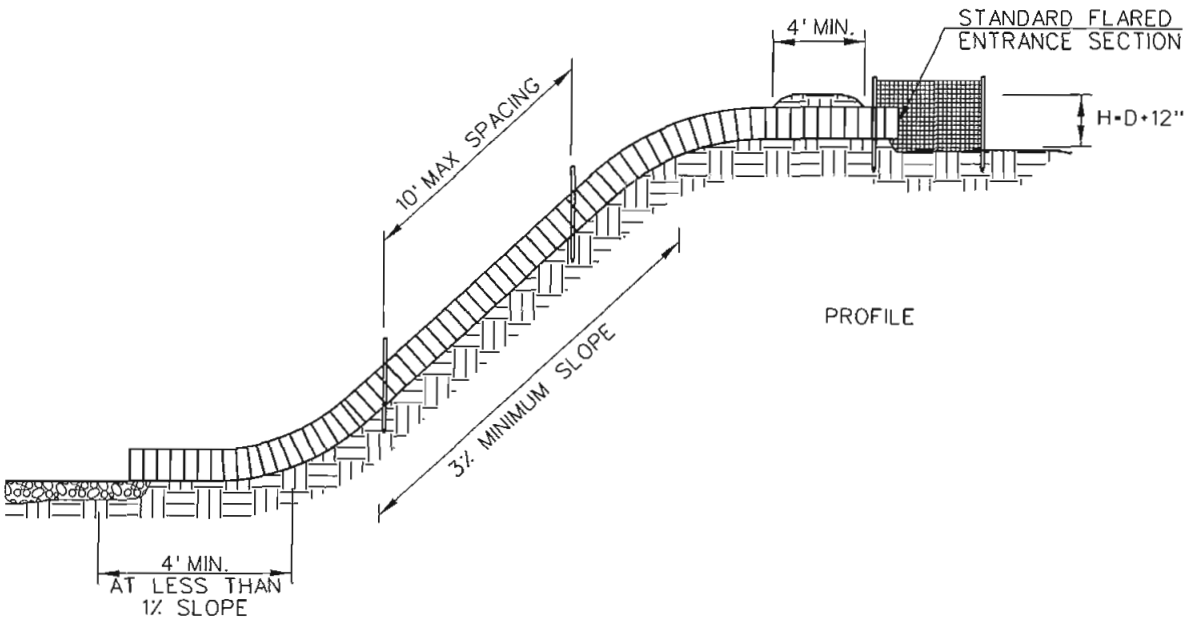
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

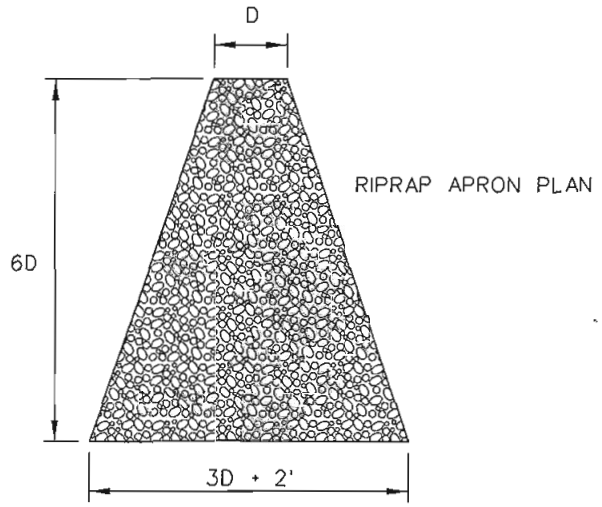
OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 62

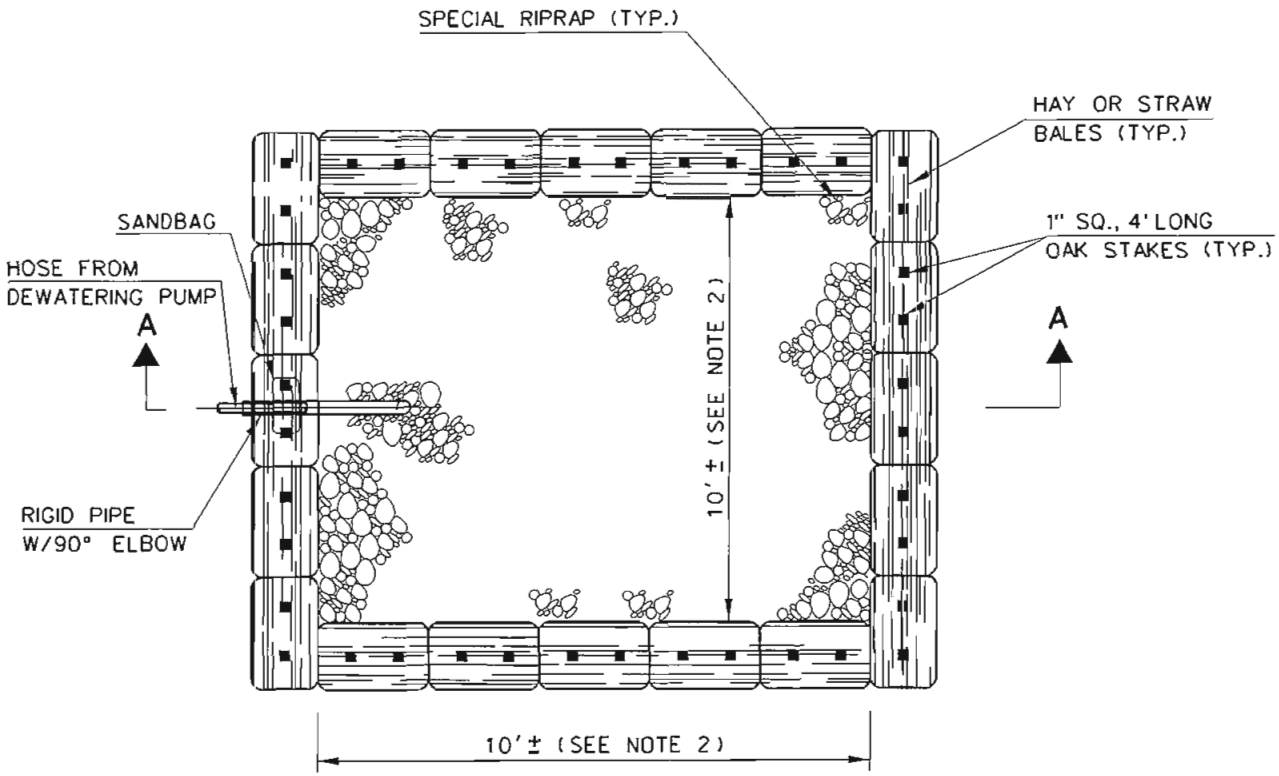




SLOPE DRAIN

1. THE PIPE SLOPE DRAIN SHALL HAVE A SLOPE OF 3% OR STEEPER.
2. TOP OF THE EARTH DIKE OVER THE INLET PIPE AND ALL DIKES CARRYING WATER TO THE PIPE SHALL BE AT LEAST 1 FOOT HIGHER THAN THE TOP OF THE PIPE.
3. ADD 0.3 FOOT TO DIKE HEIGHT FOR SETTLEMENT.
4. SOIL AROUND AND UNDER THE SLOPE PIPE SHALL BE HAND TEMPERED IN 4-INCH LIFTS.
5. THE PIPE SHALL BE PLASTIC OR CORRUGATED METAL PIPE WITH WATERTIGHT 12-INCH WIDE CONNECTING BANDS OR FLANGE CONNECTIONS.
6. PIPE ANCHORS TO BE PLACED AT 10-FOOT MAXIMUM SPACING.
7. RIPRAP TO BE 6 INCHES IN A LAYER AT LEAST 12 INCHES AND PRESSED INTO THE SOIL.
8. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 63



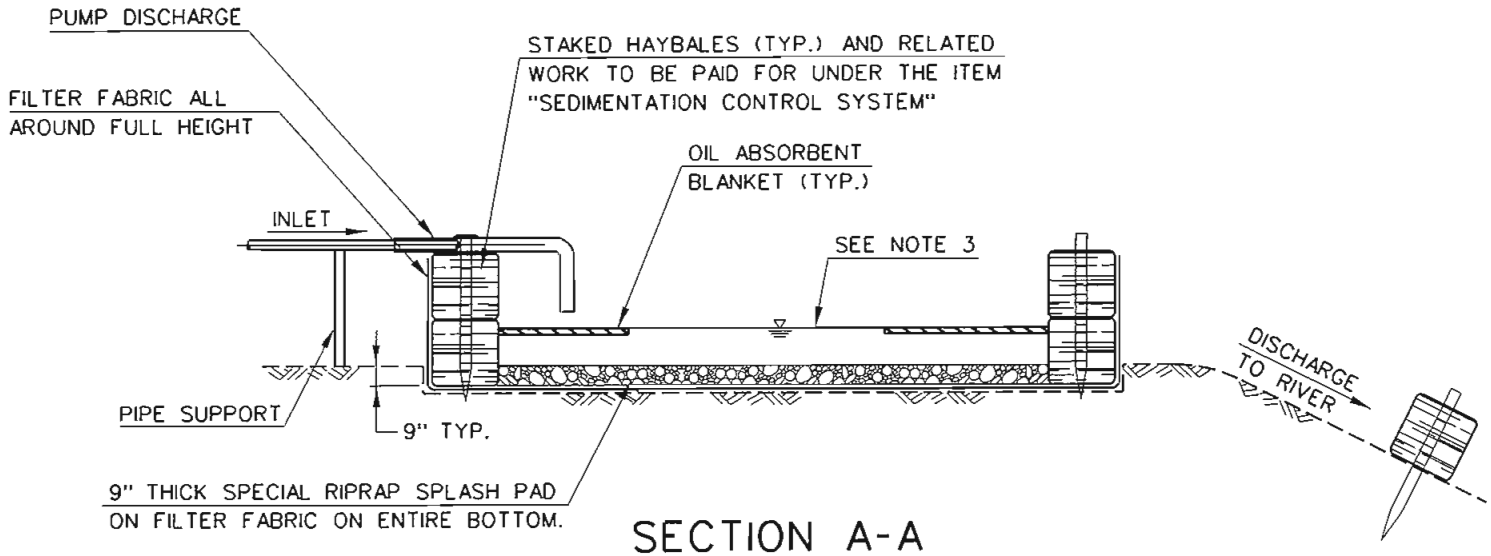
PLAN

TEMPORARY SEDIMENT BASIN FOR DEWATERING DISCHARGE

BASIN NOTES:

SEE PLATE 73 FOR NOTES

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 64



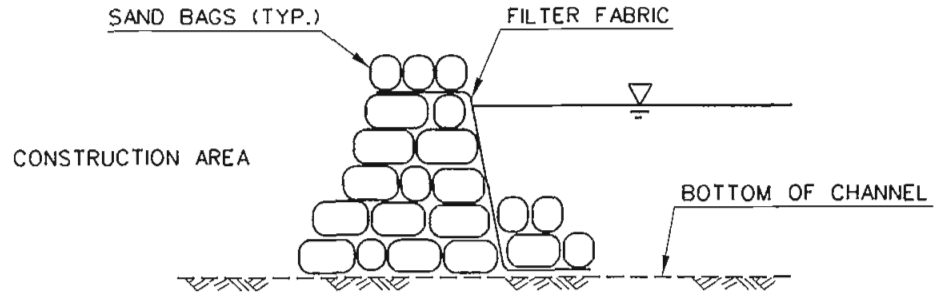
SECTION A-A

TEMPORARY SEDIMENT BASIN FOR DEWATERING DISCHARGE

BASIN NOTES:

1. CONTRACTOR TO BRACE HAY BALES AS REQUIRED FOR STABILITY.
2. DIMENSIONS TO VARY DEPENDENT UPON DE-WATERING RATE.
3. VOLUME OF BASIN IS EQUAL TO THE MAXIMUM VOLUME OF WATER CAPABLE OF BEING PUMPED OVER ONE HOUR. THIS VOLUME CAN BE DETERMINED BY PUMP MANUFACTURER'S SPECIFICATIONS. IF PUMPING VOLUME EXCEEDS BASIN CAPACITY, BASIN MAY BE USED IN TANDEM OR IN TIERS.
4. SPECIAL RIPRAP STONE SHALL CONFORM TO NO. 3 STONE AS SHOWN IN SECTION M.01.01 OF CONNDOT FORM 816.
4. SPECIAL RIPRAP STONE SHALL CONFORM TO NO. 3 STONE AS SHOWN IN SECTION M.01.01 OF CONNDOT FORM 816.
5. AT THE COMPLETION OF THE WORK, THE BASIN AND ALL RELATED MATERIALS SHALL BE REMOVED FROM THE SITE, AND THE AREA SHALL BE RETURNED TO ITS ORIGINAL CONDITION BY THE CONTRACTOR AS DIRECTED BY THE ENGINEER. THE COST OF THIS WORK WILL BE INCLUDED UNDER EACH ITEM, EXCEPT THE CLEAN-UP WHICH WILL NOT BE MEASURED FOR PAYMENT BUT INCLUDED IN THE GENERAL COST OF THE WORK.
6. THE TEMPORARY SEDIMENT BASIN SHALL BE DESIGNED IN ACCORDANCE WITH 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL

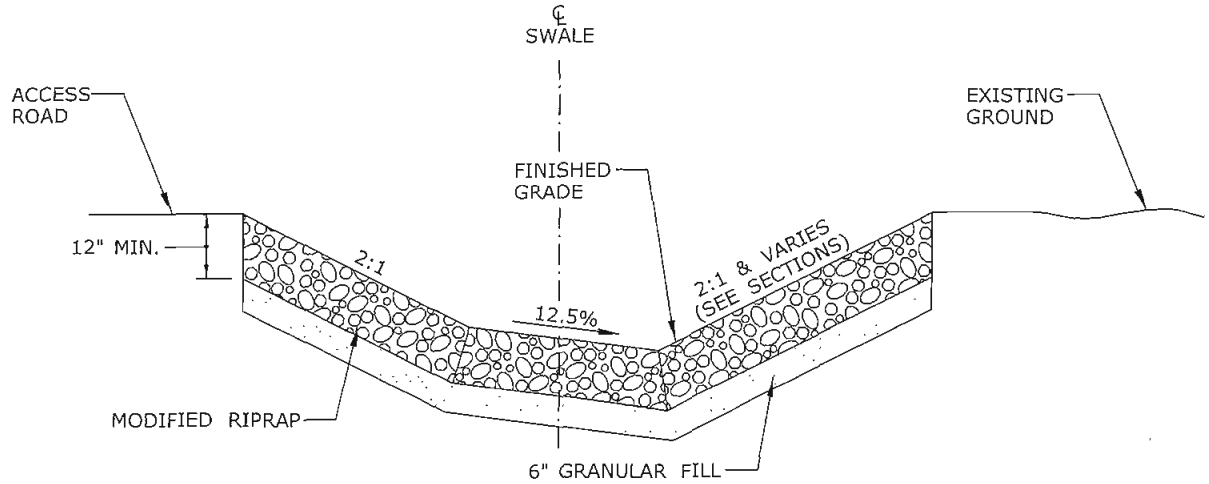
	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 65



NOTE: THE COST OF THIS WORK SHALL BE INCLUDED UNDER THE ITEM "HANDLING WATER". SEE SPECIAL PROVISIONS.

SUGGESTED FLOW DIVERSION BARRIER DETAIL

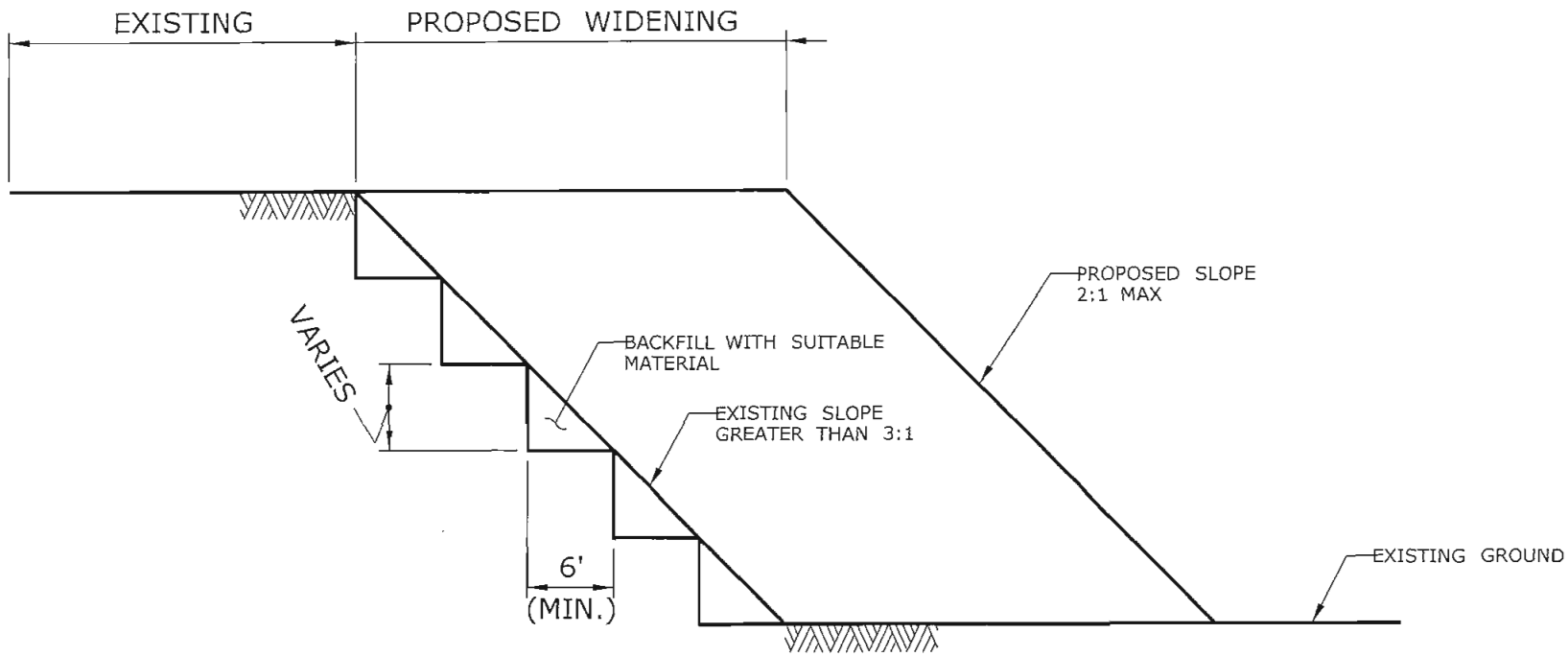
	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 66



MODIFIED RIPRAP SWALE

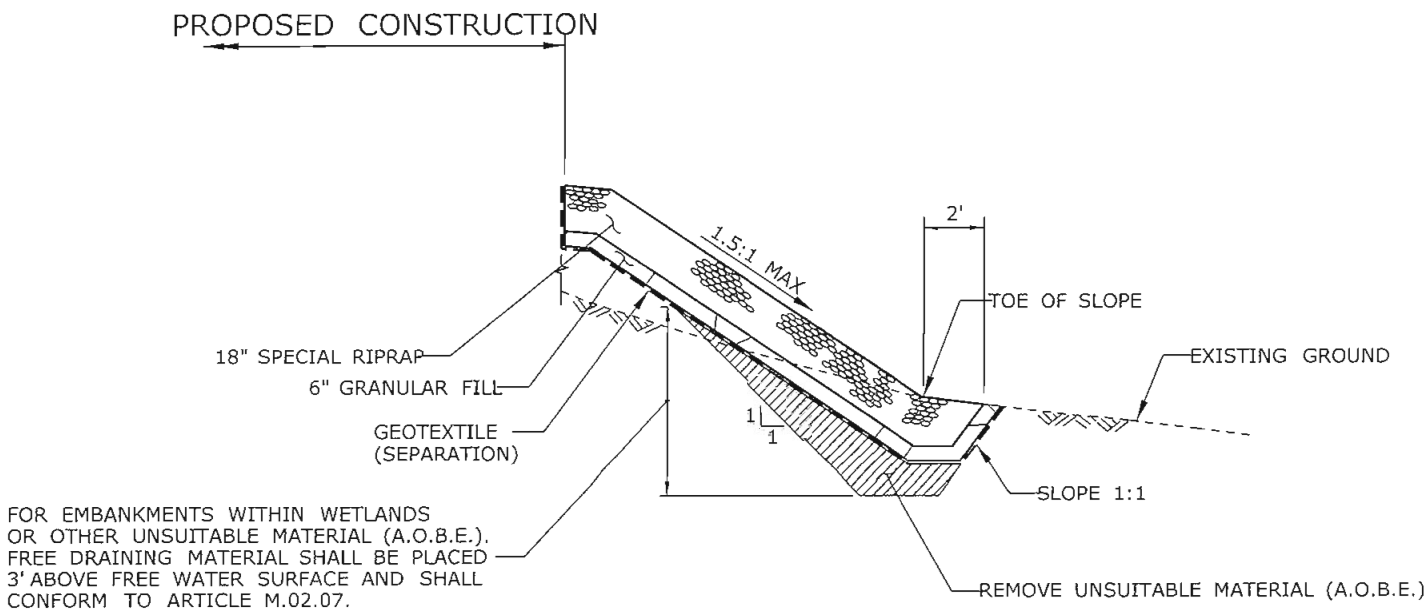
FOR AMTRAK ACCESS ROAD

	STATE PROJECT NO.: 171-305 CONTRACT NO: H052	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 67



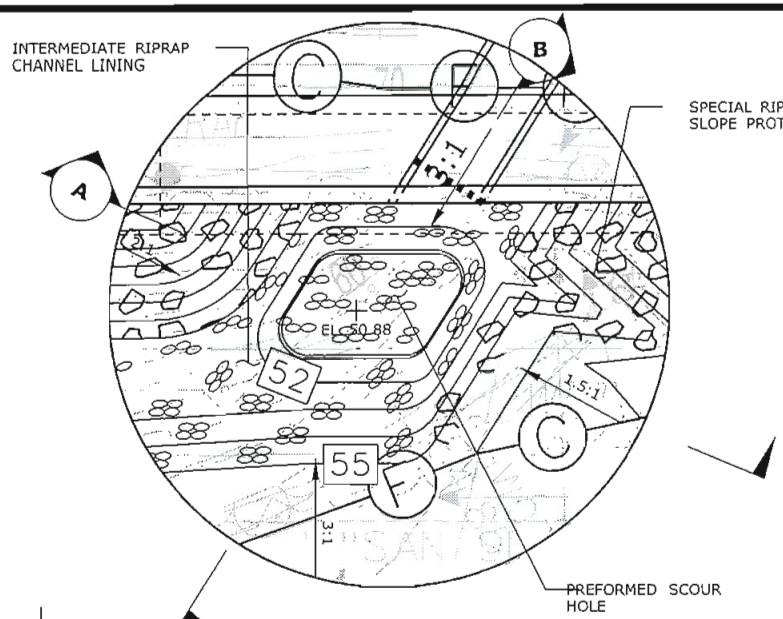
BENCHING DETAIL

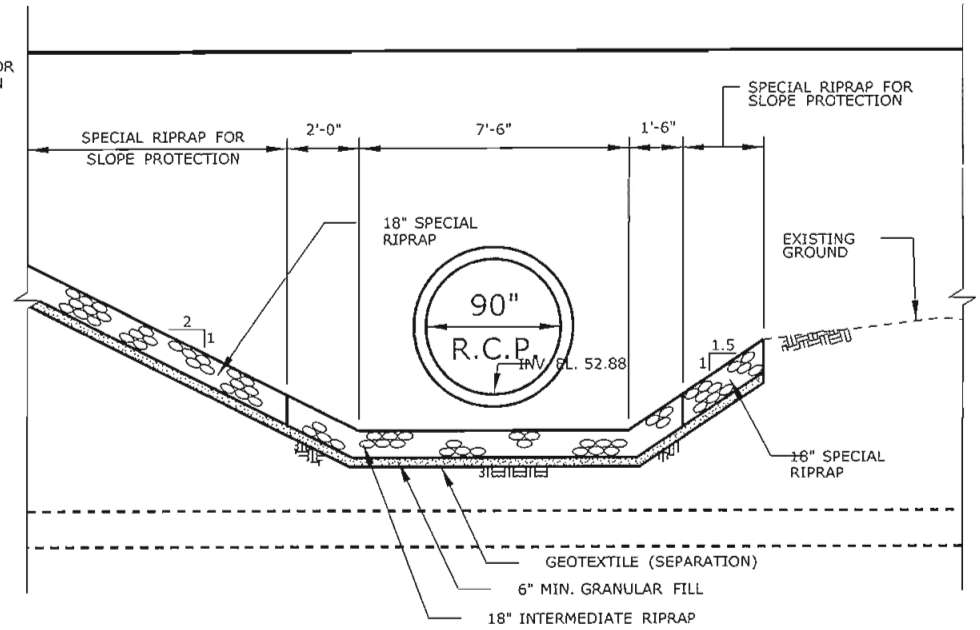
	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 68



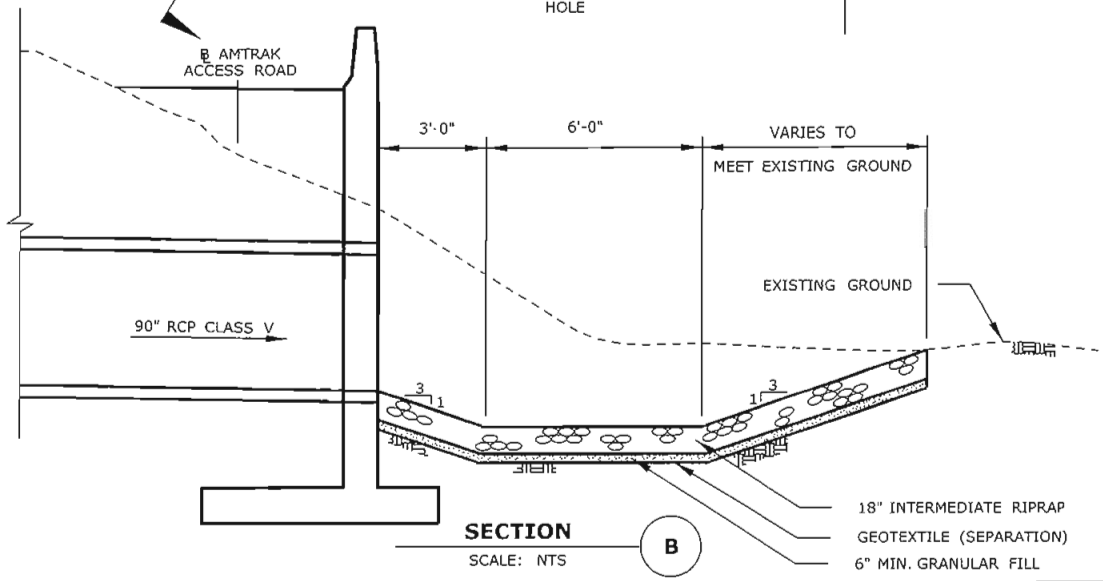
SPECIAL RIPRAP FOR SLOPE PROTECTION DETAIL
FOR AMTRAK ACCESS ROAD

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 69





SECTION A
SCALE: NTS



SECTION B
SCALE: NTS

TYPE I PREFORMED SCOUR HOLE
FOR SITE 5 HYDRAULIC CROSSING

STATE PROJECT NO.: 171-305
CONTRACT NO.: H034/H046

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

OFFICE OF ENGINEERING

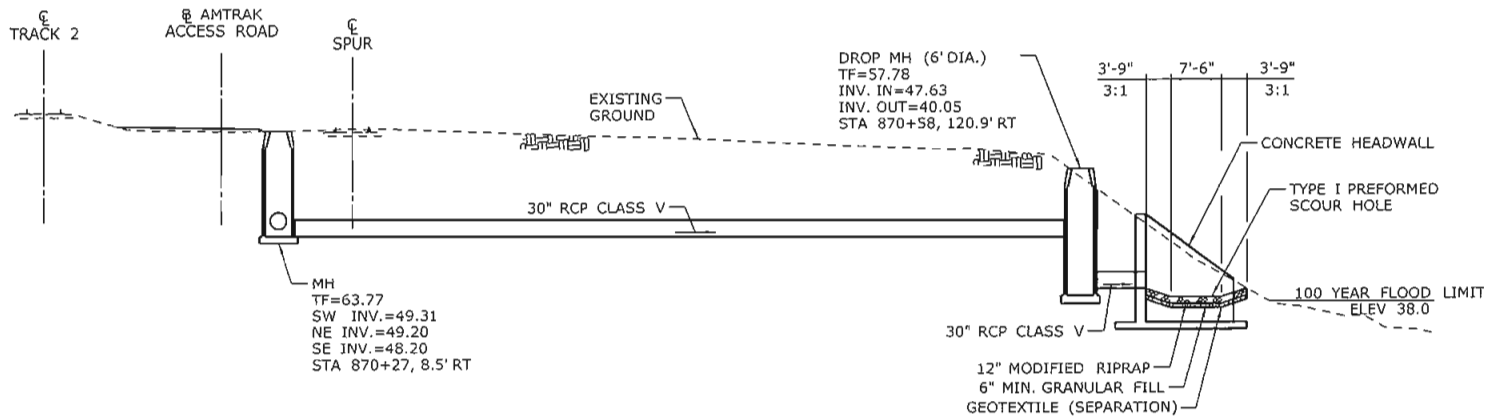
DATE: JULY 2010

SCALE 1" = 40'
40 20 0 40

NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

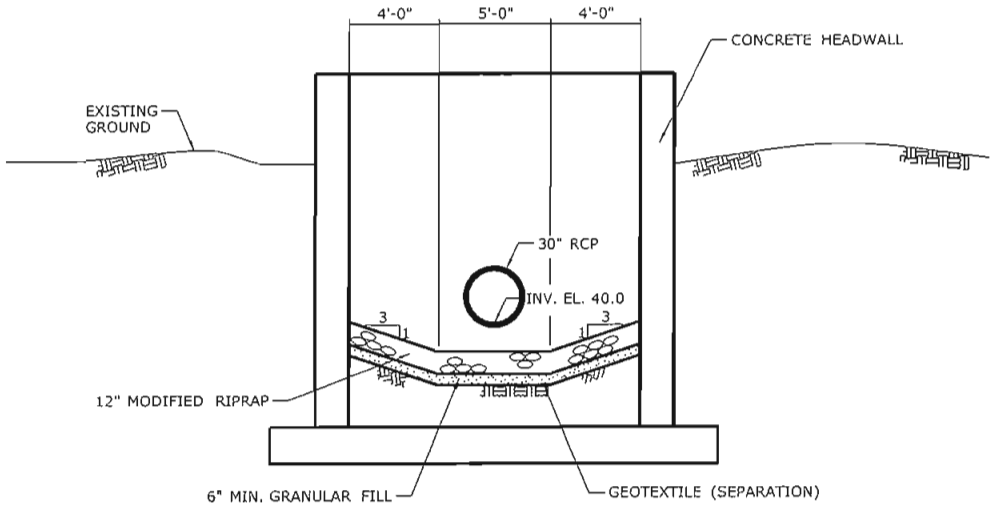
MICHAEL BAKER ENGINEERING

PLATE NO. 70



OUTFALL TO KANE BROOK SECTION **A**

SCALE: NTS



OUTFALL TO KANE BROOK SECTION **B**

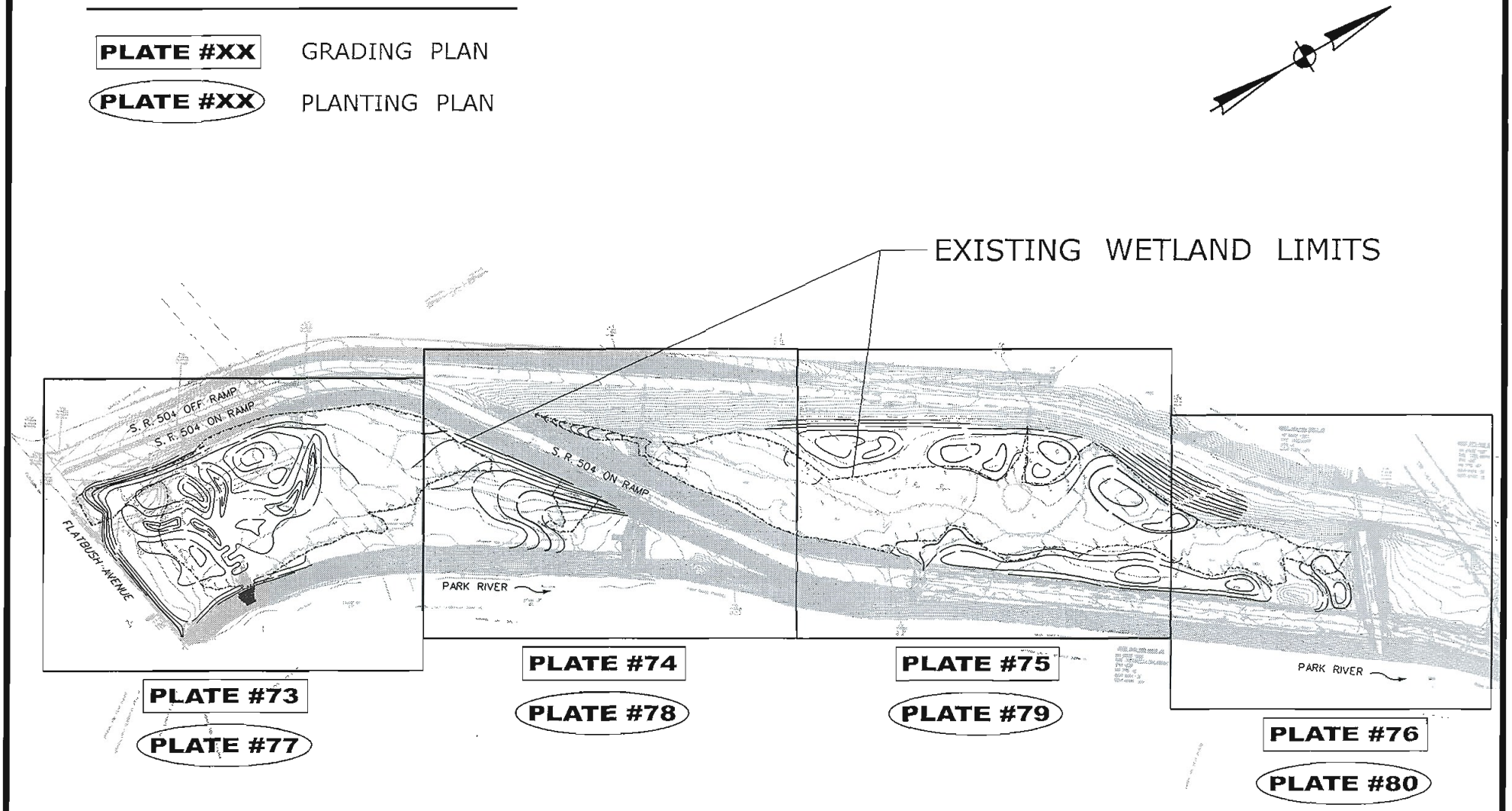
SCALE: NTS

	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 71

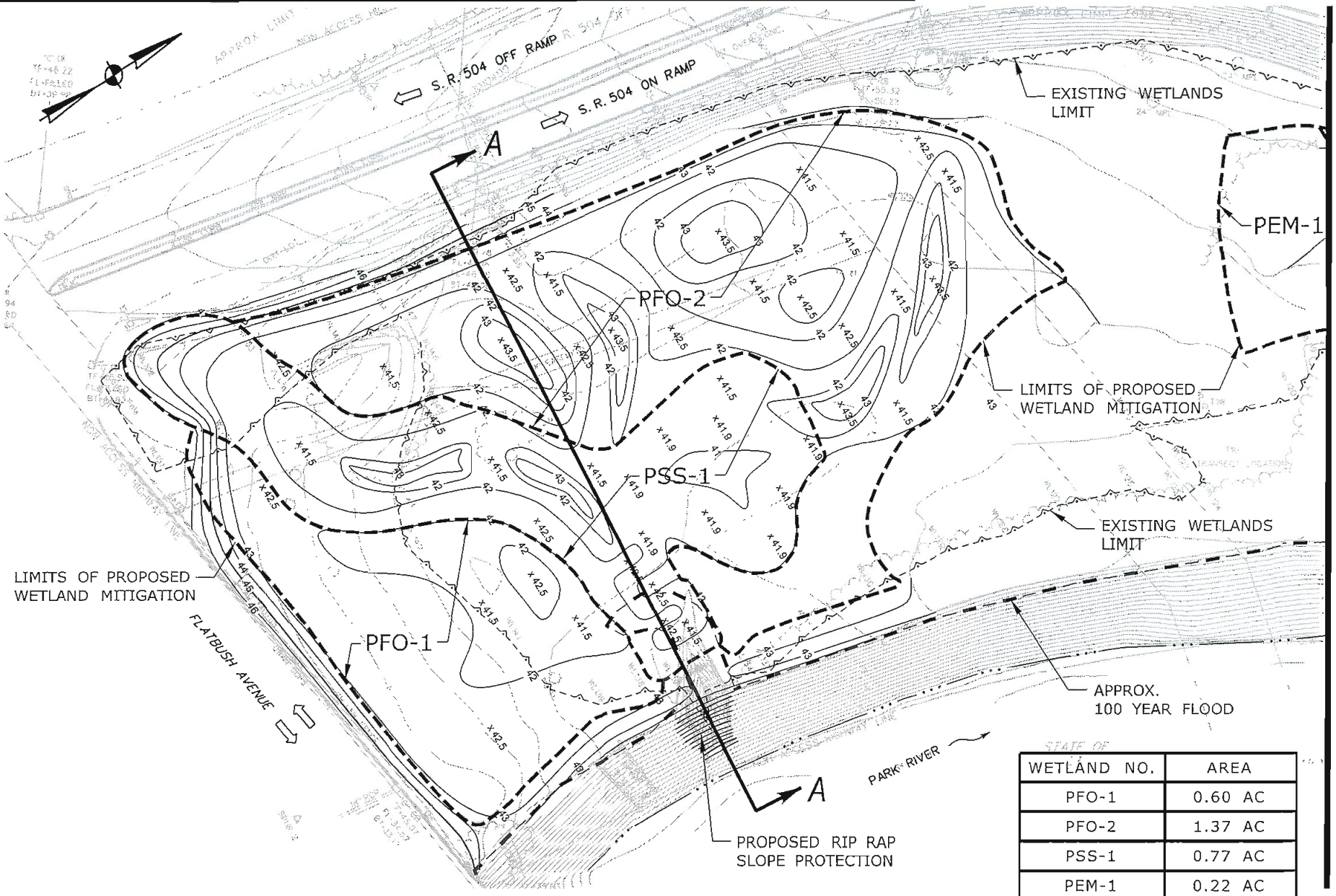
LEGEND

PLATE #XX GRADING PLAN

PLATE #XX PLANTING PLAN



SITE 13 - WETLANDS MITIGATION INDEX PLAN	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=300'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 72



WETLAND NO.	AREA
PFO-1	0.60 AC
PFO-2	1.37 AC
PSS-1	0.77 AC
PEM-1	0.22 AC

SITE 13 - WETLANDS MITIGATION GRADING PLAN

STATE PROJECT NO.: 171-305

SCALE: 1"=80'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

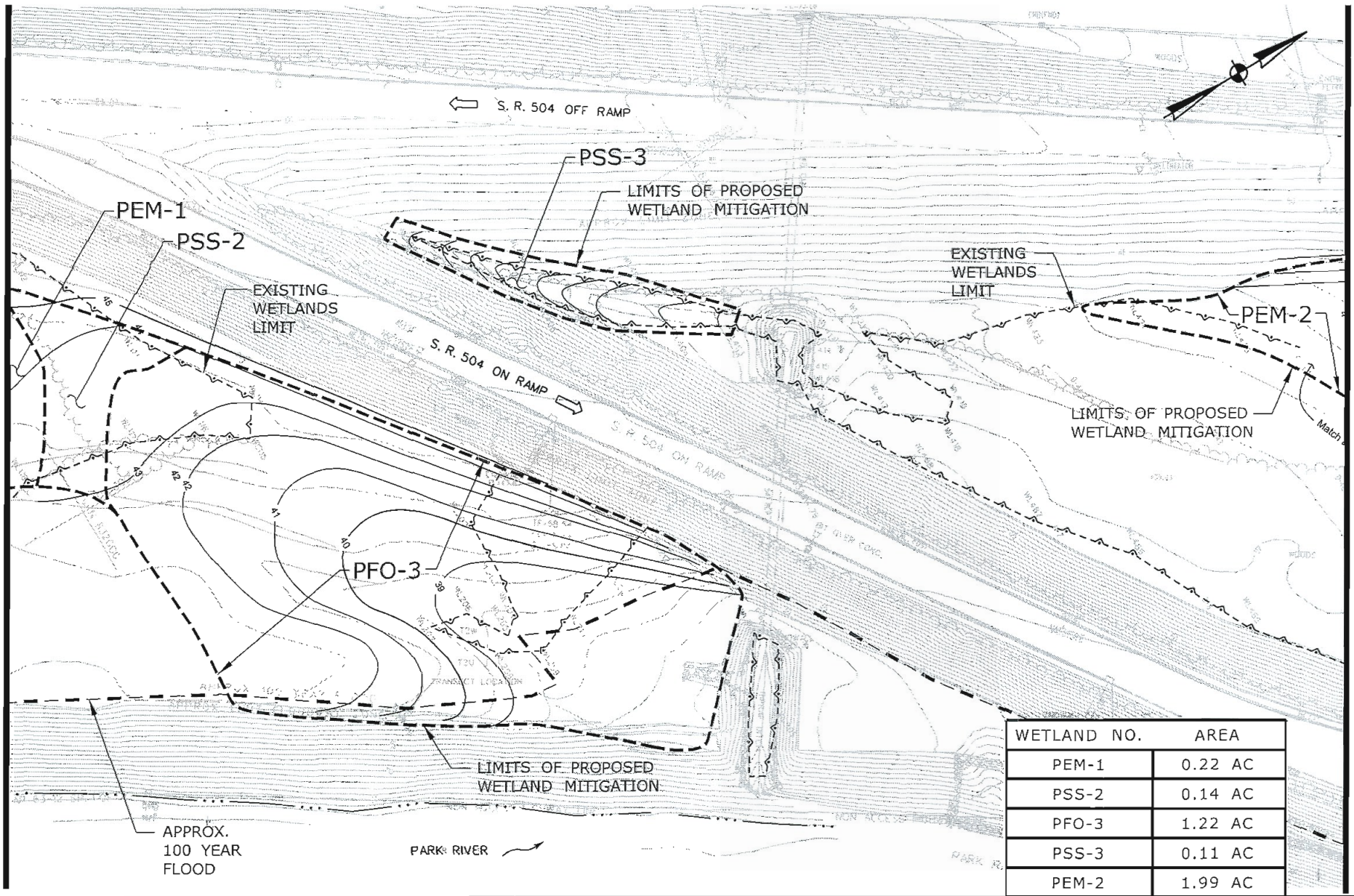
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 73



WETLAND NO.	AREA
PEM-1	0.22 AC
PSS-2	0.14 AC
PFO-3	1.22 AC
PSS-3	0.11 AC
PEM-2	1.99 AC

SITE 13 - WETLANDS MITIGATION GRADING PLAN

STATE PROJECT NO.: 171-305

SCALE: 1"=80'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

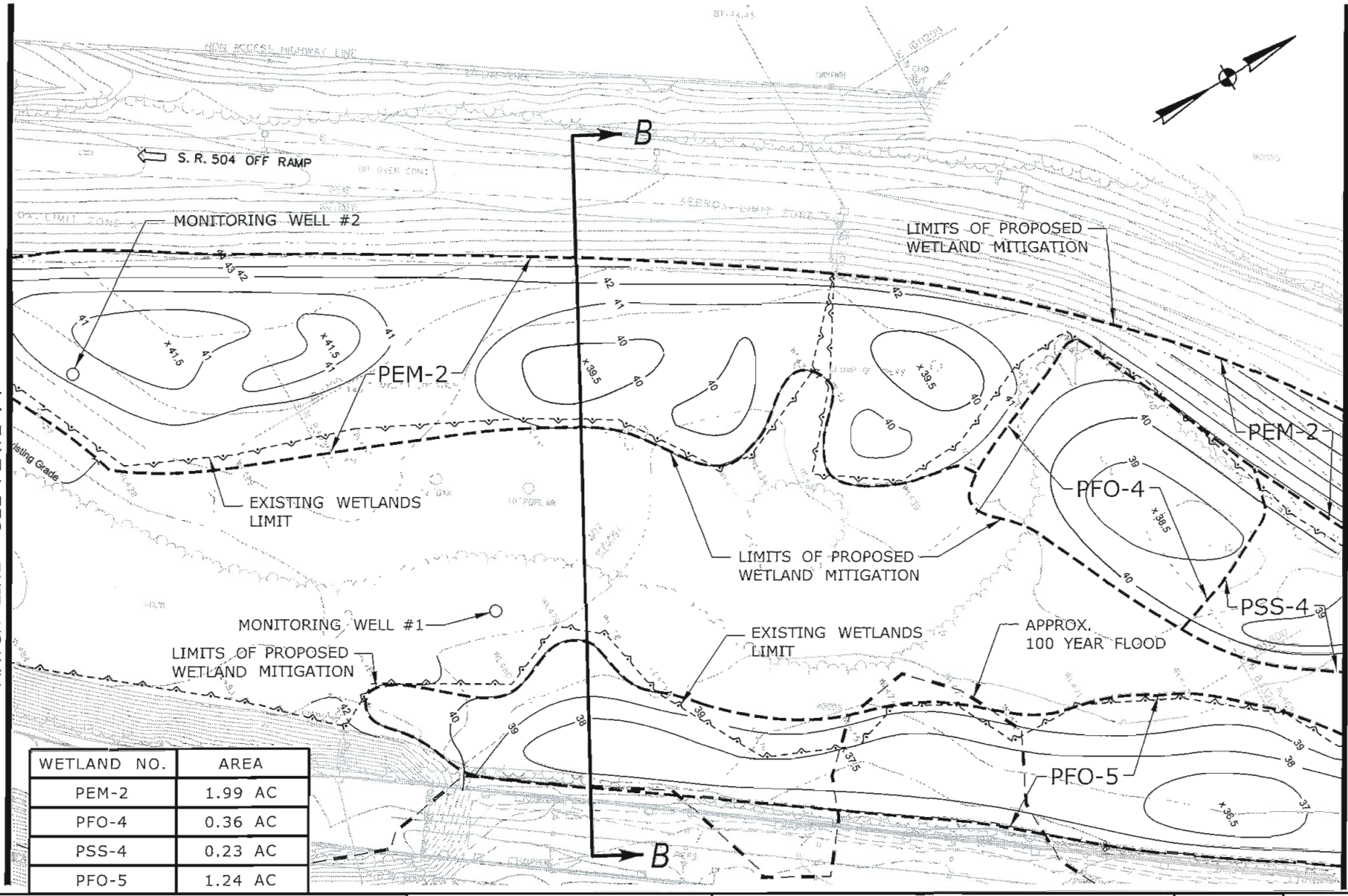
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 74



WETLAND NO.	AREA
PEM-2	1.99 AC
PFO-4	0.36 AC
PSS-4	0.23 AC
PFO-5	1.24 AC

SITE 13 - WETLANDS MITIGATION GRADING PLAN

STATE PROJECT NO.: 171-305

SCALE: 1"=80'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

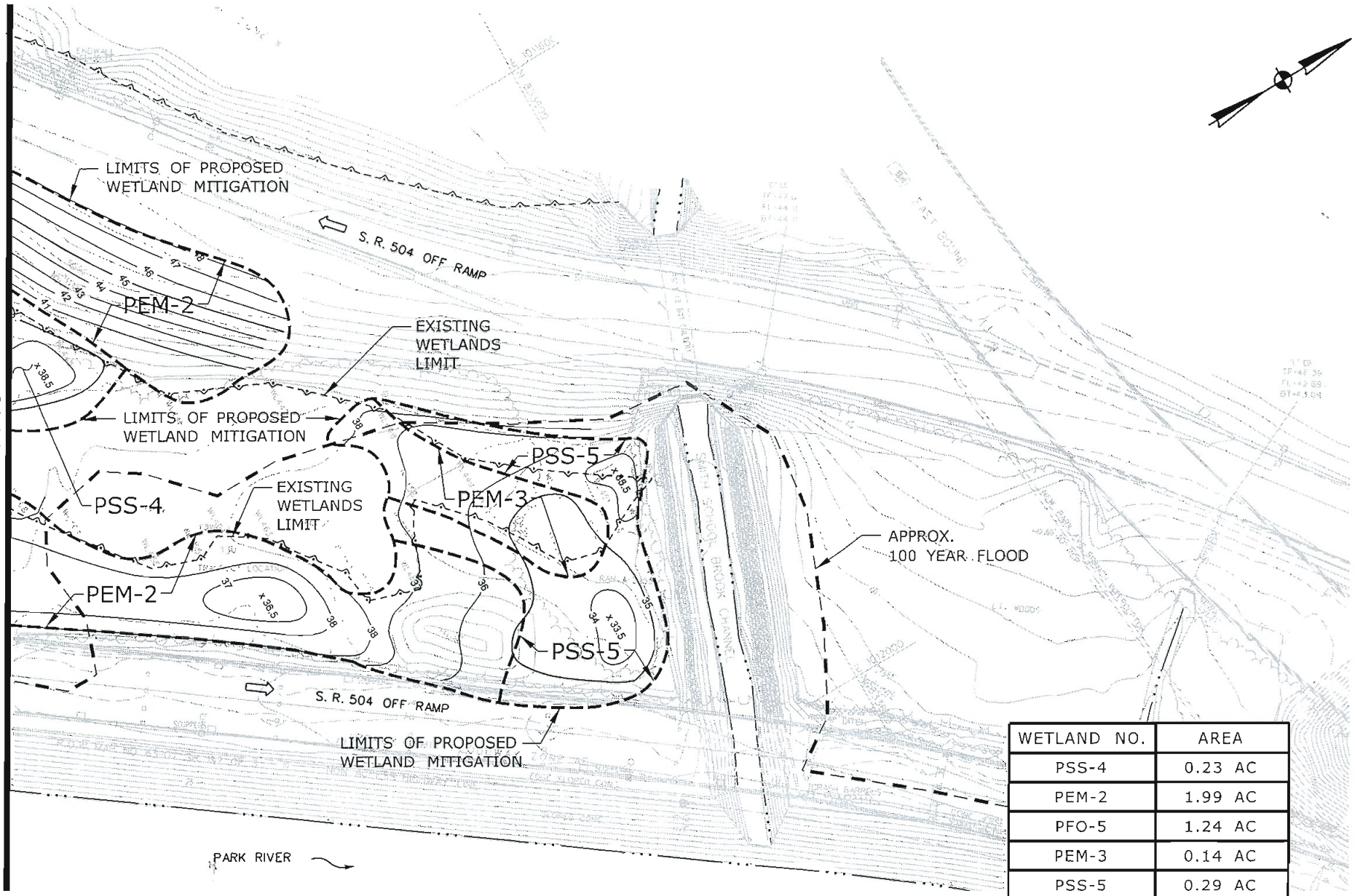
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 75



WETLAND NO.	AREA
PSS-4	0.23 AC
PEM-2	1.99 AC
PFO-5	1.24 AC
PEM-3	0.14 AC
PSS-5	0.29 AC

SITE 13 - WETLANDS MITIGATION GRADING PLAN

STATE PROJECT NO.: 171-305

SCALE: 1"=80'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

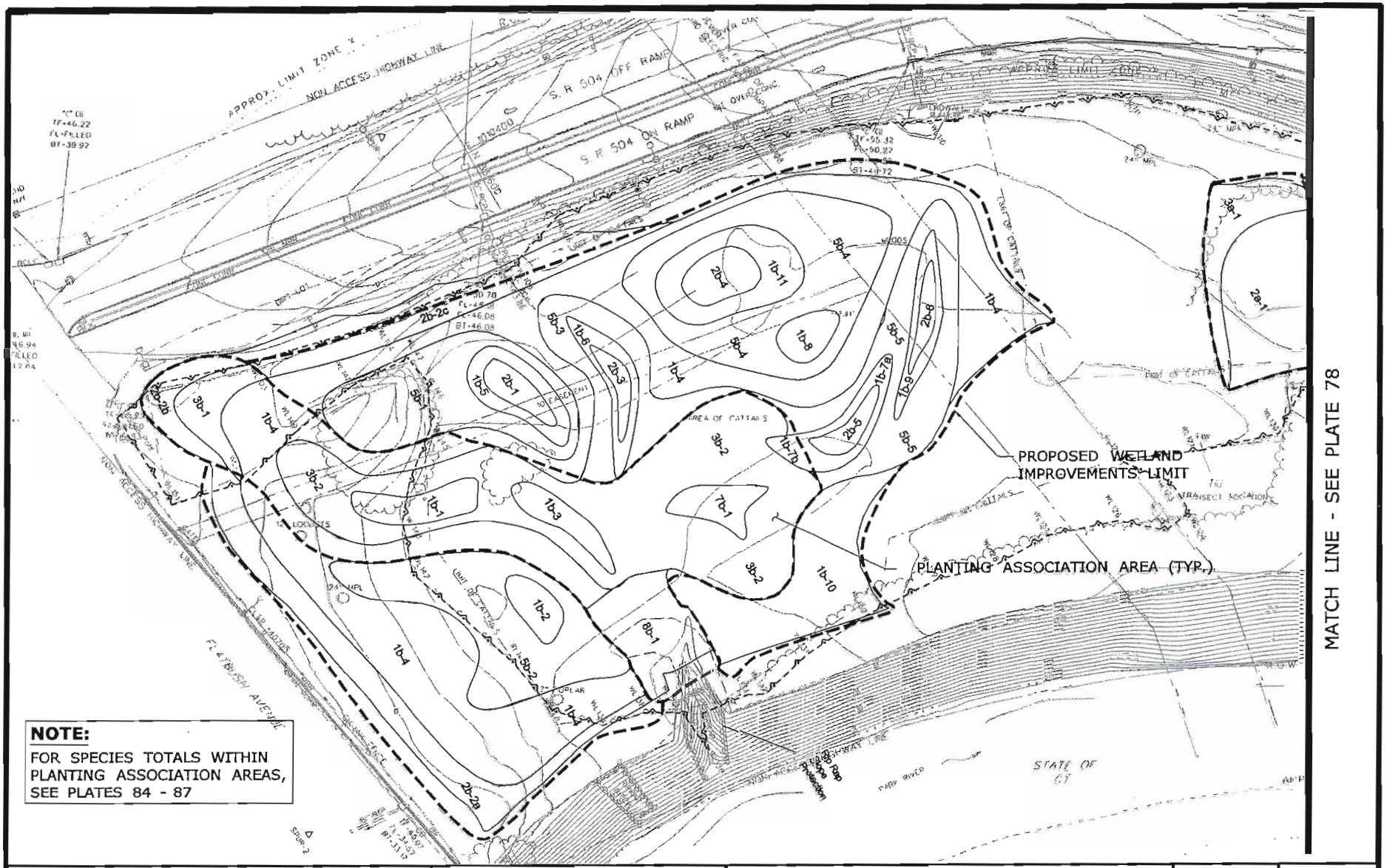
NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

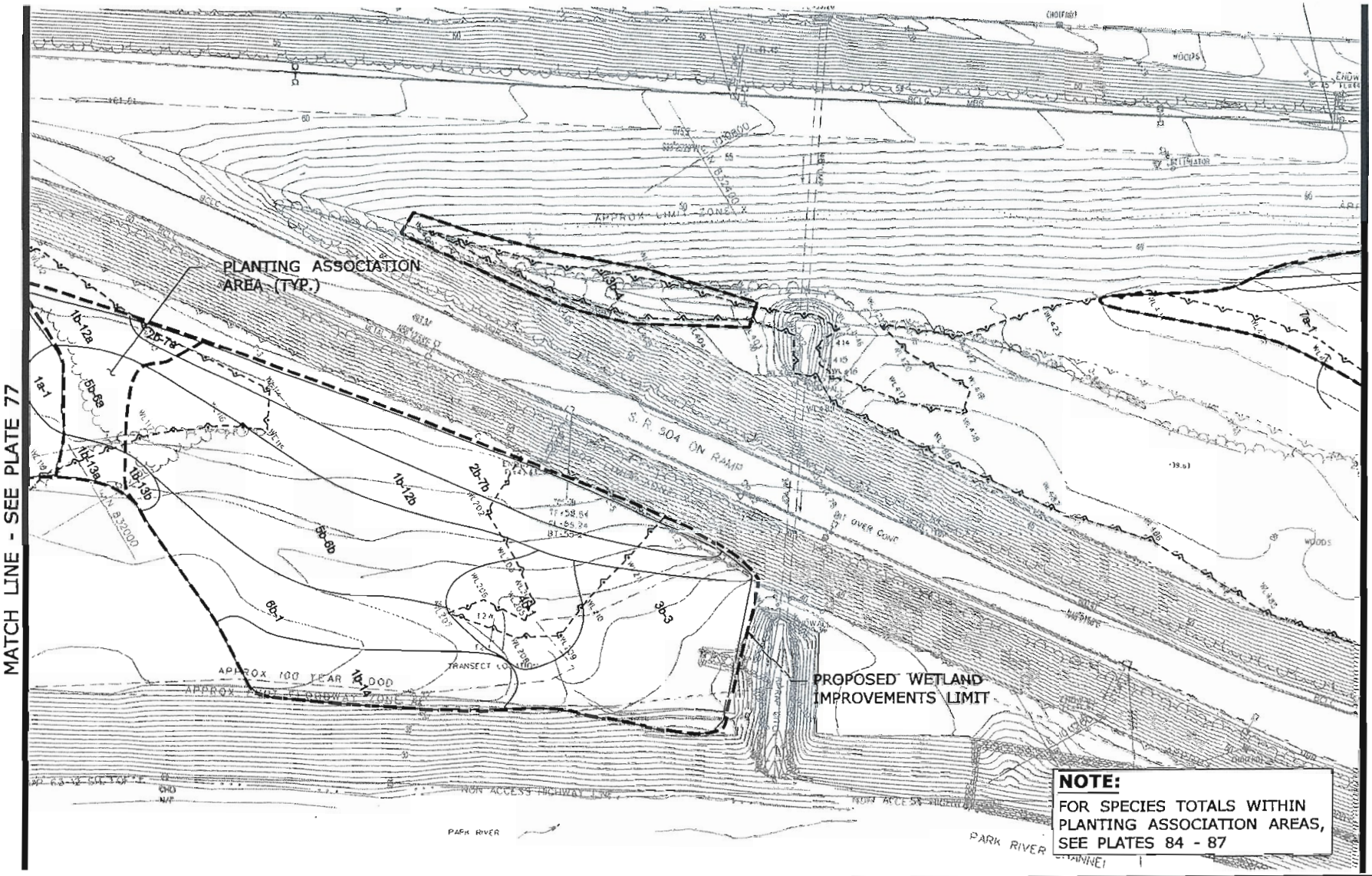
MICHAEL BAKER ENGINEERING

DATE: JULY 2010

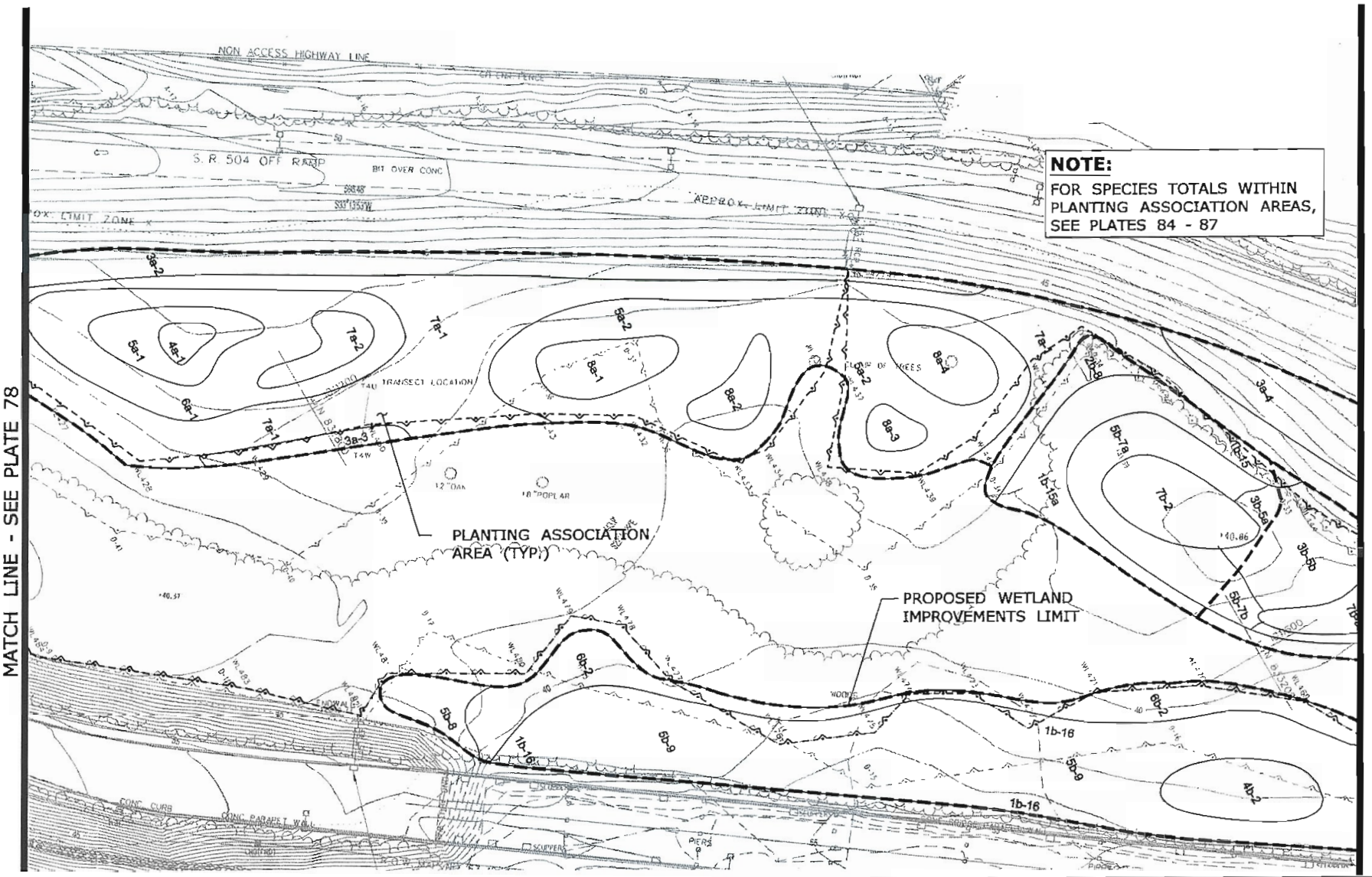
PLATE NO. 76



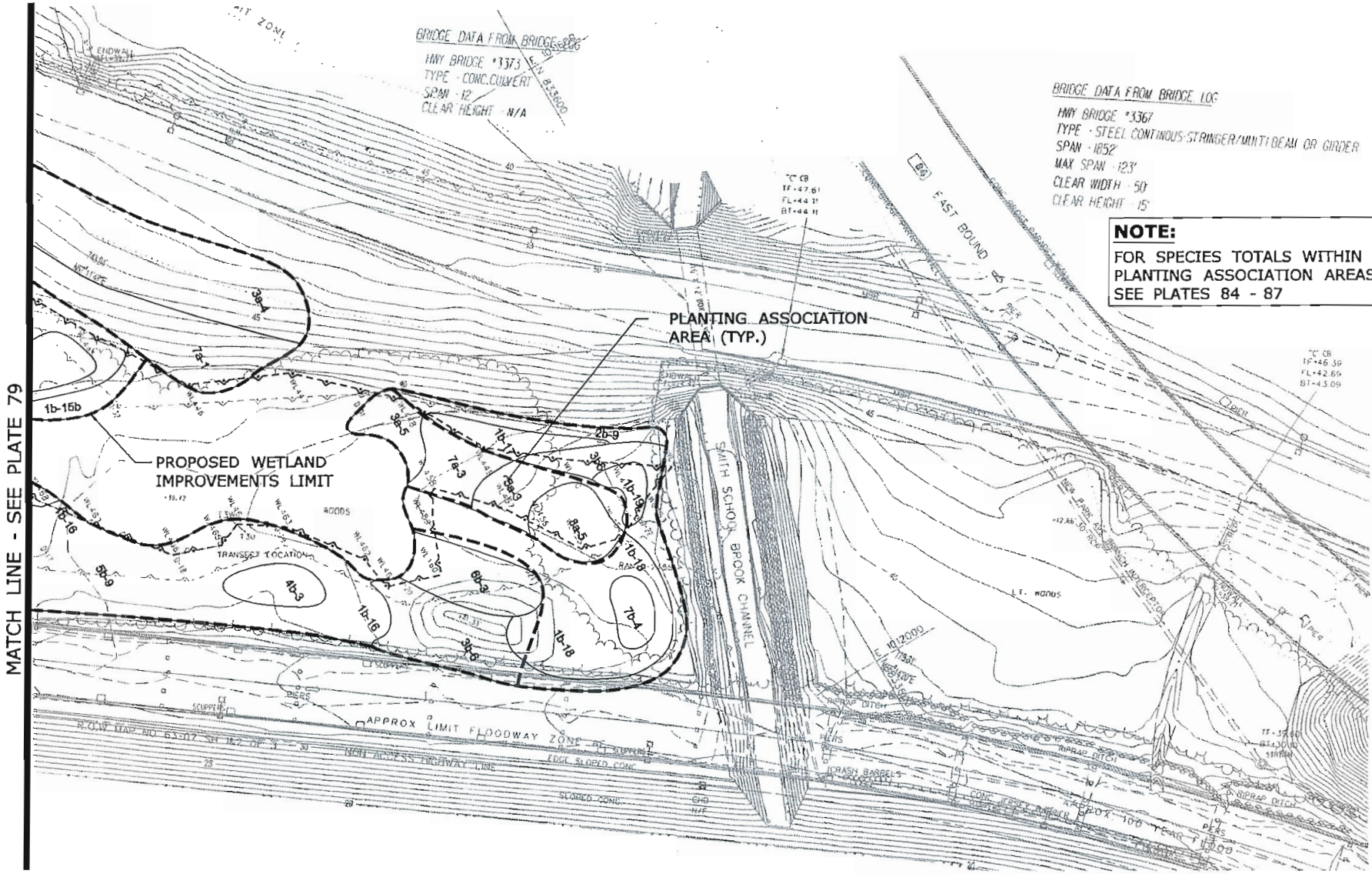
SITE 13 - WETLANDS MITIGATION PLANTING PLAN	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=80'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 77



SITE 13 - WETLANDS MITIGATION PLANTING PLAN	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=80'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 78

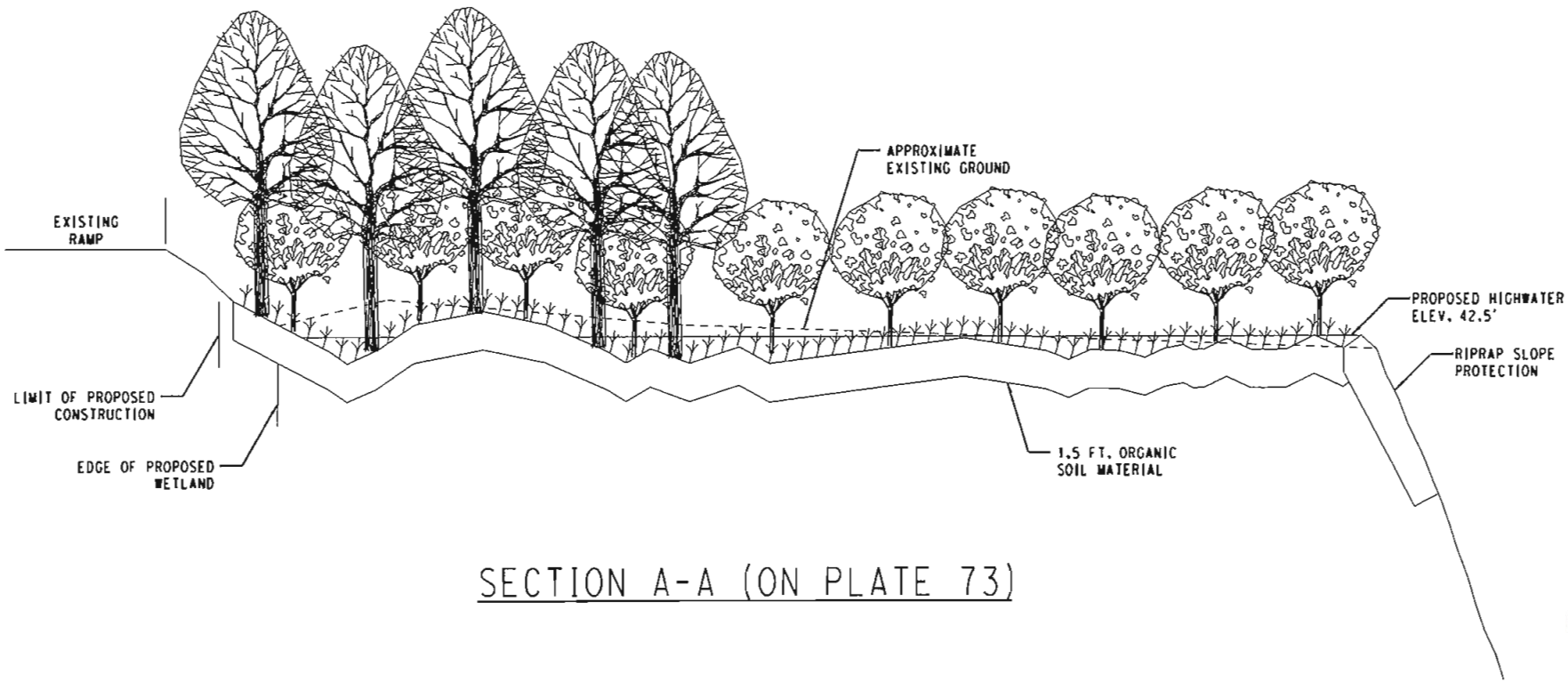


SITE 13 - WETLANDS MITIGATION PLANTING PLAN	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=80'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 79



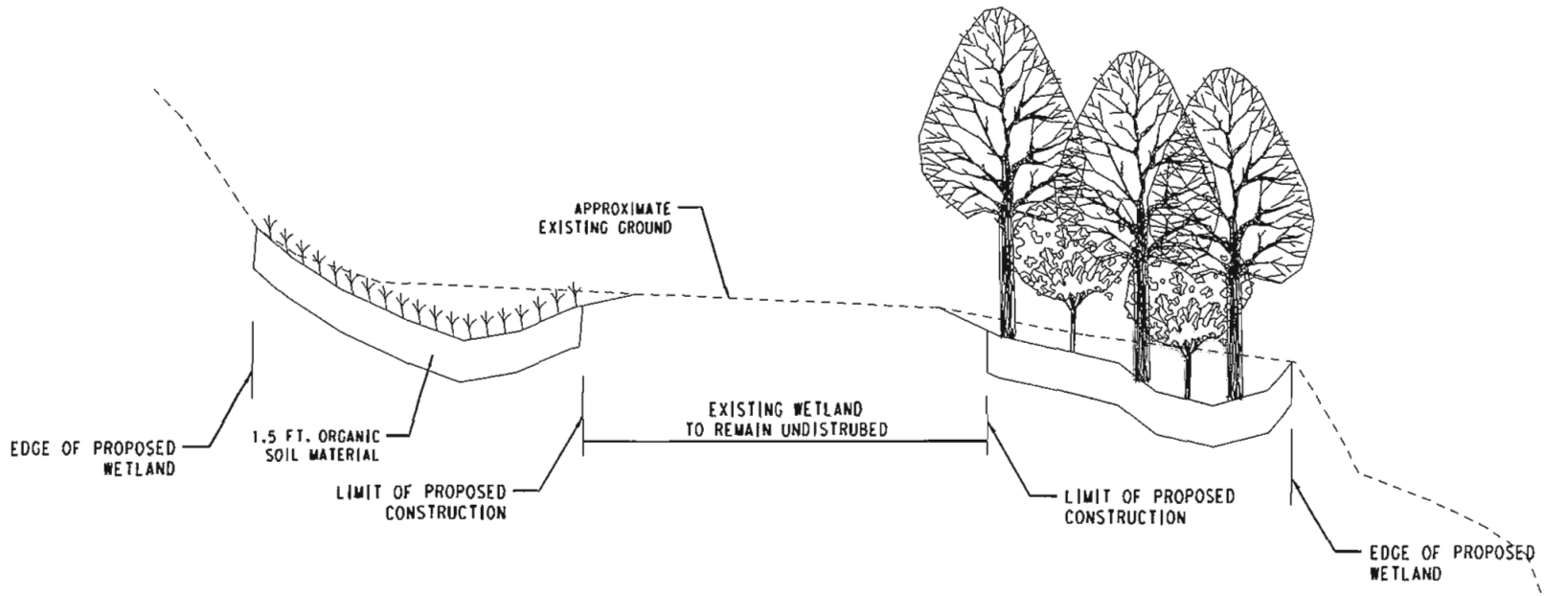
NOTE:
FOR SPECIES TOTALS WITHIN PLANTING ASSOCIATION AREAS, SEE PLATES 84 - 87

SITE 13 - WETLANDS MITIGATION PLANTING PLAN	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: 1"=80'	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 80



SECTION A-A (ON PLATE 73)

PROPOSED WETLAND MITIGATION TYPICAL GRADING AND PLANTING SECTION	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 81



SECTION B-B (ON PLATE 75)

PROPOSED WETLAND MITIGATION TYPICAL GRADING AND PLANTING SECTION	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	NOT TO SCALE	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 82

CONSTRUCTION NOTES

1. IDENTIFY CONSTRUCTION ACCESS POINTS AND TEMPORARY STOCKPILE AND STAGING LOCATIONS. INSTALL TEMPORARY SEDIMENTATION AND EROSION CONTROL MEASURES FOR THESE LOCATIONS.

2. INSTALL ORANGE CONSTRUCTION FENCE AND A SINGLE ROW OF HAY BALES (EROSION CONTROL BARRIER) ALONG THE BORDER OF WORK LIMITS AND ALONG THE BOUNDARIES OF EXISTING WETLANDS TO REMAIN AND EXISTING UPLAND VEGETATION TO REMAIN.

3. IDENTIFY, CLEAR, GRADE, AND STABILIZE ANY REQUIRED HAUL ROAD(S). CONSTRUCT HAUL ROADS IN A MANNER THAT MINIMIZES DISTURBANCE TO EXISTING VEGETATION.

4. REMOVE NUISANCE VEGETATION AND ALL INVASIVE PLANT SPECIES IDENTIFIED IN THE NOTICE TO CONTRACTOR * INVASIVE PLANT SPECIES FROM THE SITE AND AS SHOWN ON THE WETLAND MITIGATION PLAN.

5. WOODY DEBRIS (LOGS, STUMPS AND ROOT WADS) FROM THE CLEARING AND GRUBBING ACTIVITY ON UPLANDS (ONLY) SHALL BE SET ASIDE IN APPROVED UPLAND STOCKPILING LOCATIONS FOR USE IN THE WETLAND CREATION AREA. PLANT DEBRIS FROM EXISTING WETLANDS WHERE INVASIVE SPECIES REMOVAL ACTIVITIES OCCUR SHALL NOT BE RE-USED.

6. EXCAVATE WETLAND MITIGATION AREA TO A MINIMUM DEPTH OF 12 INCHES BELOW THE PROPOSED FINISHED GRADE, AS SHOWN ON THE WETLAND MITIGATION PLAN.

7. ALL SCRAPED SOILS MUST BE REMOVED FROM THE SITE AND LEGALLY DISPOSED OF. PRIOR TO DISPOSAL, ANY SOILS STOCKPILES MUST BE LOCATED OUTSIDE OF WETLANDS, IN APPROVED STOCKPILE AREAS.

8. THE CT DOT OEP MAY MAKE MINOR MODIFICATIONS TO THE GRADING PLAN IN THE FIELD.

9. IMPORT WETLAND TOPSOIL FROM CLEAN, WEED-FREE SOURCES, AS APPROVED BY CT DOT OEP.

10. PLACE TESTED AND APPROVED WETLAND TOPSOIL OVER APPROVED SUBGRADE TO THE FINAL GRADES SHOWN ON THE WETLAND MITIGATION PLAN. APPROVED WETLAND TOPSOIL MATERIAL WILL BE PLACED TO DEPTHS SHOWN ON THE WETLAND MITIGATION PLAN (MINIMUM DEPTH 1 FOOT) WITHIN ALL PROPOSED WETLAND AREAS, UTILIZING EQUIPMENT AND METHODOLOGY THAT DOES NOT COMPACT THE AMENDED TOPSOIL MATERIAL.

11. CREATE MICROTOPOGRAPHY (A GROUND SURFACE THAT IS NOT PERFECTLY SMOOTH) ON FINAL GRADES WITHIN THE CREATED WETLAND AREAS. THE MICROTOPOGRAPHY SHALL PROVIDE A SURFACE THAT VARIES BETWEEN APPROXIMATELY 6 INCHES (MAXIMUM) ABOVE AND BELOW THE FINISHED GRADE DEPICTED ON THE WETLAND MITIGATION PLAN.

12. ROCKS AND BOULDERS EXPOSED DURING EXCAVATION MAY BE LEFT IN PLACE PROVIDED THAT THEY DO NOT SIGNIFICANTLY DECREASE THE PLANTING AREA OF WETLAND CREATION ZONES.

13. ANY AREAS OF EXPOSED SOIL OR STOCKPILES THAT WILL REMAIN INACTIVE FOR MORE THAN 14 DAYS WILL BE COVERED WITH A LAYER OF SEED-FREE STRAW MULCH THAT WILL BE ANCHORED WITH A TACKING COAT (NON TAR) APPLIED BY A HYDROSEEDER.

14. ANY AREAS OF EXPOSED SOIL OR STOCKPILES THAT WILL REMAIN INACTIVE FOR MORE THAN 60 DAYS WILL BE SEEDED WITH AN APPROVED INDIGENOUS GRASS SEED MIX APPROVED BY CT DOT OEP AND COVERED WITH A LAYER OF SEED-FREE STRAW MULCH OR BONDED FIBER MATRIX.

15. PRIOR TO PLANTING IN WETLAND CREATION AREAS, DISTRIBUTE COARSE WOODY DEBRIS OVER THE SURFACE OF THE PROPOSED WETLANDS, AT THE DIRECTION OF CT DOT OEP.

16. ALL PLANTING WILL BE PERFORMED IN THE SPRING OR FALL.

17. PLANTING AND SEEDING SHALL FOLLOW THE WETLAND MITIGATION PLAN, PER THE PLANT SPECIES, SIZE, AND QUANTITY SHOWN IN THE PLANTING SCHEDULE. PLANT SOURCES AND ANY VARIATIONS FROM THE PLANTING PLAN OR SCHEDULE MUST BE APPROVED BY THE CT DOT OEP.

18. ALL PLANTINGS SHALL BE SPACED RANDOMLY AT THE DIRECTION OF THE DOT OEP TO SIMULATE NATURAL GROWTH PATTERNS, TO APPROXIMATE THE SPACING CALLED OUT IN THE PLANTING SCHEDULE.

19. UPON COMPLETION OF PLANTING, THE WETLAND CREATION AREAS SHALL BE MULCHED PER CONSTRUCTION SPECIFICATIONS.

20. EROSION CONTROL BARRIERS WILL BE DISASSEMBLED AND PROPERLY DISPOSED OF AFTER PLANTING AND STABILIZATION OF WETLAND MITIGATION AREAS. SEDIMENT COLLECTED BY THESE DEVICES SHALL BE REMOVED IN A FASHION THAT PREVENTS EROSION AND TRANSPORT TO A WATERWAY OR WETLAND AND LEGALLY DISPOSED OF. SEDIMENTS SHALL NOT BE REUSED.

INVASIVE PLANT REMOVAL

1. COMPLETE ERADICATION OF INVASIVE PLANTS WILL BE CONDUCTED PRIOR TO WETLAND CONSTRUCTION [SEE NOTICE TO CONTRACTOR * INVASIVE PLANT SPECIES.] THE REMOVAL AND ERADICATION OF ALL UNWANTED VEGETATION SHALL BE INITIATED AT THE BEGINNING OF CONSTRUCTION, UNLESS OTHERWISE DIRECTED BY THE ENGINEER. TREATMENT AND REMOVAL SHALL BE CONDUCTED ONLY AT TIMES AND UNDER CONDITIONS APPROVED BY THE ENGINEER. DURING THE PERFORMANCE OF THIS WORK, A CT DOT ENVIRONMENTAL INSPECTOR FROM THE CT DOT OEP WILL BE AVAILABLE TO VISIT THE SITE TO DIRECT THE CONSTRUCTION ACTIVITIES INVOLVED IN REMOVING INVASIVE SPECIES AND PLANTING THE WETLAND ENHANCEMENT SITE. THE CONTRACTOR SHALL ARRANGE THROUGH THE ENGINEER AT LEAST 10 DAYS PRIOR TO THE COMMENCEMENT OF THESE ACTIVITIES TO ENSURE THAT THE ENVIRONMENTAL INSPECTOR IS AVAILABLE.

2. THE ENGINEER WILL DESIGNATE ALL INVASIVE VEGETATION TO BE REMOVED, INCLUDING, BUT NOT LIMITED TO COMMON REED (PHRAGMITES AUSTRALIS, ALSO KNOWN AS PHRAGMITES), AS DEPICTED ON THE PLANS.

3. SPECIFICALLY FOR COMMON REED (PHRAGMITES AUSTRALIS), THE TREATMENT SHALL CONSIST OF SPRAYING THE STAND DURING THE GROWING SEASON (PREFERABLY LATE SUMMER) WITH RODEOTM OR EQUIVALENT. ALL APPLICATIONS SHALL BE MADE IN STRICT CONFORMANCE TO THE HERBICIDE MANUFACTURER'S RECOMMENDATION AND THE REQUIREMENTS OF REGULATORY AGENCIES. THE FORMULATION, CONCENTRATION, AREA TREATED, AND DATE FOR EACH APPLICATION SHALL BE REPORTED IN WRITING TO THE ENGINEER.

4. TWO TO THREE WEEKS FOLLOWING SPRAYING, THE STAND OF COMMON REED AS DEPICTED ON THE PLANS AND AS DIRECTED BY THE ENGINEER SHALL BE EXCAVATED TO REMOVE THE PLANT STALKS AND RHIZOMES. THE EXCAVATION OF THIS AREA SHALL BE TO A DEPTH OF AT LEAST 2 FEET, OR DEEPER, AS DIRECTED BY THE ENGINEER, TO ENSURE ALL RHIZOMES ARE REMOVED. ALL EXCAVATED MATERIAL MUST BE LEGALLY DISPOSED OF AND HANDLED PROPERLY AS TO NOT FURTHER SPREAD THIS SPECIES. FOLLOWING EXCAVATION, THE SITE SHALL BE INSPECTED BY THE OEP ENVIRONMENTAL INSPECTOR.

5. ANY RESPROUTING WITHIN ONE YEAR OF REMOVAL SHALL BE RE-TREATED AS NOTED ABOVE, UNTIL THE SITE IS CLEARED FOR CONSTRUCTION OF THE WETLAND MITIGATION AREAS.

SITE 13 - WETLANDS MITIGATION PLANTING ASSOCIATION TABLES AND NOTES	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: N.T.S.	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 83

Plant Association 1a

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION	TOTAL 1a
HERBACEOUS				1a-1	
				QTY.	QTY.
AREA (S.F.)				817	817
CAREX STRICTA	TUSSOCK SEDGE	2" plug	2' O.C.	1	1
ELEOCHARIS PALUSTRIS	SPIKE RUSH	2" plug	2' O.C.	1	1
SCHOENOPLECTUS	SOFT-STEM RUSH	2" plug	2' O.C.	1	1
JUNCUS EFFUSUS	SOFT RUSH	2" plug	2' O.C.	2	2
CAREX LUPULINA	HOP SEDGE	2" plug	2' O.C.	2	2
MIMULUS RINGENS	MONKEYFLOWER	2" plug	2' O.C.	1	1
CAREX COMOSA	BEARDED SEDGE	2" plug	2' O.C.	2	2
ASCLEPIAS INCARNATA	SWAMP MILKWEED	2" plug	2' O.C.	1	1
			TOTAL QTY=	12	12

Plant Association 2a

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION	TOTAL 2a
HERBACEOUS				2a-1	
				QUANTITY	QUANTITY
AREA (S.F.)				6630	6630
CAREX SCOPARIA	BROOM SEDGE	2" plug	2' O.C.	20	20
JUNCUS EFFUSUS	SOFT RUSH	2" plug	2' O.C.	20	20
VERBENA HASTATA	BLUE VERVAIN	2" plug	2' O.C.	20	20
SCIRPUS CYPERINUS	WOOLGRASS	2" plug	2' O.C.	20	20
			TOTAL QTY=	80	80

Plant Association 2b

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION												TOTAL 2b
TREE				2b-1	2b-2a	2b-2b	2b-2c	2b-3	2b-4	2b-5	2b-6	2b-7a	2b-7b	2b-8	2b-9	
				QUANTITY												QTY.
AREA (S.F.)				767	5211	1413	4922	496	1178	601	498	384	6941	1854	1198	26463
ULMUS AMERICANA	AMERICAN ELM	2" - 2.5" CALIPER	10' O.C.	1	10		9	1	3	1	1		13	4		43
SALIX NIGRA	BLACK WILLOW	2" - 2.5" CALIPER	10' O.C.	1	10		9	1	2	1	1		13	3		41
QUERCUS PALUSTRIS	PIN OAK	2" - 2.5" CALIPER	10' O.C.	2	10		9	1	2	2	1		13	3		43
CLETHRA ALNIFOLIA	SWEET PEPPERBUSH	2" - 2.5" CALIPER	10' O.C.	2	9		9	1	2	1	1		14	4		43
NYSSA SYLVATICA	BLACK GUM	2" - 2.5" CALIPER	10' O.C.	1	9		9	1	2	1	1		14	4		42
			TOTAL QTY=	7	48		45	5	11	6	5		64	18		211
SHRUB																
CORNUS AMOMUM	SILKY DOGWOOD	18" - 24"	5' O.C.	0	3	3	3	1	0	0	0	1	4	1	2	18
ARONIA ARBUTIFOLIA	RED CHOKEBERRY	18" - 24"	5' O.C.	1	4	3	3	1	1	0	0	1	4	1	2	21
AMELANCHIER	SERVICEBERRY	18" - 24"	5' O.C.	0	3	3	3	0	1	0	0	1	4	1	2	18
VIBURNUM LENTAGO	NANNYBERRY	18" - 24"	5' O.C.	1	3	3	3	0	1	0	0	1	4	1	2	19
ACER NEGUNDO	BOXELDER	18" - 24"	5' O.C.	1	3	3	3	0	1	0	0	1	4	1	2	19
CORNUS RACEMOSA	GREY-STEM DOGWOOD	18" - 24"	5' O.C.	1	4	3	4	0	1	0	0	1	4	2	2	22
HERBACEOUS																
OSMUNDA CINNAMOMEA	CINNAMON FERN	2" plug	2' O.C.	0	4	2	4	0	0	3	3	0	8	2	5	31
			TOTAL QTY=	4	24	20	23	2	5	3	3	6	32	9	17	148

Plant Association 1b

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION																										TOTAL 1b
TREES				1b-1	1b-2	1b-3	1b-4a	1b-4b	1b-4c	1b-5	1b-6	1b-7a	1b-7b	1b-8	1b-9	1b-10	1b-11	1b-12a	1b-12b	1b-13a	1b-13b	1b-14	1b-15a	1b-15b	1b-16	1b-17	1b-18	1b-19	
				QUANTITY																										
AREA (S.F.)				1332	865	1042	10149	7094	14613	1231	1017	976	316	832	904	6167	2650	1652	6955	911	446	5493	6904	6904	16142	1111	6671	593	102970
ULMUS AMERICANA	AMERICAN ELM	2" - 2.5" CALIPER	10' O.C.		1		10		14	2	0	1		1	1	6	2		6		1	6	6	6	15				76
ACER SACCARINUM	SILVER MAPLE	2" - 2.5" CALIPER	10' O.C.		1		10		14	1	1	1		1	1	6	2		6		0	6	6	6	15				74
SALIX NIGRA	BLACK WILLOW	2" - 2.5" CALIPER	10' O.C.		1		10		14	1	1	1		1	1	6	2		6		1	5	6	6	14				74
POPULUS DELTOIDES	COTTONWOOD	2" - 2.5" CALIPER	10' O.C.		1		9		13	1	1	1		1	1	6	2		6		0	5	6	6	14				71
PLATANUS OCCIDENTALIS	SYCAMORE	2" - 2.5" CALIPER	10' O.C.		1		9		13	1	1	1		0	1	6	2		6		1	5	6	6	15				72
QUERCUS PALUSTRIS	PIN OAK	2" - 2.5" CALIPER	10' O.C.		1		9		13	1	1	1		0	1	6	2		7		0	5	7	7	15				74
QUERCUS BICOLOR	SWAMP WHITE OAK	2" - 2.5" CALIPER	10' O.C.		1		9		13	1	1	1		1	1	6	3		7		0	5	7	7	15				76
ACER NEGUNDO	BOXELDER	2" - 2.5" CALIPER	10' O.C.		0		9		13	1	1	1		1	0	5	3		7		1	5	7	7	15				74
NYSSA SYLVATICA	BLACK GUM	2" - 2.5" CALIPER	10' O.C.		1		9		13	1	1	1		1	0	5	3		7		1	5	6	6	15				73
FRAXINUS PENNSYLVANICA	GREEN ASH	2" - 2.5" CALIPER	10' O.C.		0		9		13	1	1	1		1	1	5	3		6		0	5	6	6	15				71
			TOTAL QTY=		8		94		134	11	9	10		8	8	57	24		64		5	50	63	63	148				946
SHRUBS																														
VIBURNUM LENTAGO	NANNYBERRY	18" - 24"	5' O.C.	6	1	5	16	32	23	2	1	2	2	1	1	9	4	7	11	4	1	8	11	11	25	5	31	3	221
CLETHRA ALNIFOLIA	SWEET PEPPERBUSH	18" - 24"	5' O.C.	7	1	5	16	33	22	2	2	1	1	1	2	9	4	8	11	4	1	8	11	11	25	5	30	3	222
CORNUS RACEMOSA	GREY-STEM DOGWOOD	18" - 24"	5' O.C.	6	2	5	16	33	22	2	2	2	2	2	1	10	4	8	10	5	1	9	10	10	24	6	31	3	225
			TOTAL QTY=	19	4	15	47	98	67	6	5	5	6	4	4	28	12	23	32	13	3	25	32	32	74	16	92	9	669

SITE 13 - WETLANDS MITIGATION PLANTING ASSOCIATION TABLES

STATE PROJECT NO.: 171-305

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

OFFICE OF ENGINEERING

DATE: JULY 2010

SCALE: N.T.S.

NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

MICHAEL BAKER ENGINEERING

PLATE NO. 84

Plant Association 3a

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION					
HERBACEOUS				3a-1	3a-2	3a-3	3a-4	3a-5	TOTAL 3a
				QUANTITY					
	AREA (S.F.)			2437	8098	1082	7324	1171	20112
CAREX SCOPARIA	BROOM SEDGE	2" plug	2' O.C.	6	21	5	21	5	58
EUPATORIUM PERFOLIATUM	BONESET	2" plug	2' O.C.	6	21	5	21	5	58
VERBENA HASTATA	BLUE VERVAIN	2" plug	2' O.C.	6	24	5	21	5	61
SCIRPUS CYPERINUS	WOOLGRASS	2" plug	2' O.C.	6	24	5	18	5	58
EUPATORIUM MACULATUM	SPOTTED JOE PYE-WEED	2" plug	2' O.C.	9	21	5	21	5	61
			TOTAL QTY.=	33	111	25	102	25	296

Plant Association 4a

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION	
HERBACEOUS				4A-1	TOTAL 4a
				QTY.	
	AREA (S.F.)			546	546
ALISMA PLANTAGO-AQUATICA	WATER PLANTAIN	2" plug	2' O.C.	3	3
ELEOCHARIS PALUSTRIS	SPIKE RUSH	2" plug	2' O.C.	3	3
IRIS VERSICOLOR	BLUE FLAG IRIS	2" plug	2' O.C.	3	3
JUNCUS EFFUSUS	SOFT RUSH	2" plug	2' O.C.	3	3
PELTANDRA VIRGINICA	ARROW ARUM	2" plug	2' O.C.	3	3
CAREX VULPINOIDEA	FOX SEDGE	2" plug	2' O.C.	3	3
ASCLEPIAS INCARNATA	SWAMP MILKWEED	2" plug	2' O.C.	3	3
			TOTAL QTY.=	21	21

Plant Association 3b

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION							
TREES				3b-1	3b-2	3b-3	3b-4	3b-5a	3b-5b	3b-6	TOTAL 3b
				QUANTITY							
	AREA (S.F.)			1478	16068	9147	4499	607	5558	5918	43275
ACER SACCARINUM	SILVER MAPLE	2" – 2.5" CALIPER	10' O.C.			14		1			15
SALIX NIGRA	BLACK WILLOW	2" – 2.5" CALIPER	10' O.C.			14		1			15
POPULUS DELTOIDES	COTTONWOOD	2" – 2.5" CALIPER	10' O.C.			14		1			15
ACER NEGUNDO	BOXELDER	2" – 2.5" CALIPER	10' O.C.			14		1			15
NYSSA SYLVATICA	BLACK GUM	2" – 2.5" CALIPER	10' O.C.			14		1			15
FRAXINUS PENNSYLVANICA	GREEN ASH	2" – 2.5" CALIPER	10' O.C.			14		1			15
			TOTAL QTY=			84		6			90
SHRUBS											
CORNUS AMOMUM	SILKY DOGWOOD	18" – 24"	5' O.C.	2	25	4	7		7	8	53
ARONIA ARBUTIFOLIA	RED CHOKEBERRY	18" – 24"	5' O.C.	2	25	4	6		7	8	52
*ILEX VERTICILLATA**	WINTERBERRY	18" – 24"	5' O.C.	2	25	4	6		8	8	53
SAMBUCUS CANADENSIS	ELDERBERRY	18" – 24"	5' O.C.	2	25	4	6		8	8	53
AMELANCHIER ARBOREA	SERVICEBERRY	18" – 24"	5' O.C.	2	25	4	6		8	8	53
VIBURNUM LENTAGO	NANNYBERRY	18" – 24"	5' O.C.	2	25	4	6		8	8	53
VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	18" – 24"	5' O.C.	2	25	4	6		8	8	53
SPIRAEA TOMENTOSA	STEEPLEBUSH	18" – 24"	5' O.C.	2	25	4	7		8	8	54
CORNUS SERICEA	REDOSIER DOGWOOD	18" – 24"	5' O.C.	2	25	5	7		8	8	55
			TOTAL QTY=	18	225	37	57	0	70	72	479
SHRUBS											
OSMUNDA CINNAMOMEA	CINNAMON FERN	2" plug	2' O.C.	3	8	5	5	3	7	10	41
			TOTAL QTY=	3	8	5	5	3	7	10	41

Plant Association 4b

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION			
TREES				4b-1	4b-2	4b-3	TOTAL 4b
				QUANTITY			
	AREA (S.F.)			3962	2770	1163	7895
ULMUS AMERICANA	AMERICAN ELM	2" – 2.5" CALIPER	10' O.C.	6	4	2	12
ACER SACCARINUM	SILVER MAPLE	2" – 2.5" CALIPER	10' O.C.	6	4	2	12
SALIX NIGRA	BLACK WILLOW	2" – 2.5" CALIPER	10' O.C.	6	4	2	12
ACER NEGUNDO	BOXELDER	2" – 2.5" CALIPER	10' O.C.	6	4	1	11
NYSSA SYLVATICA	BLACK GUM	2" – 2.5" CALIPER	10' O.C.	6	4	2	12
FRAXINUS PENNSYLVANICA	GREEN ASH	2" – 2.5" CALIPER	10' O.C.	6	5	2	13
			TOTAL QTY=	36	25	11	72
SHRUBS							
*ILEX VERTICILLATA**	WINTERBERRY	18" – 24"	5' O.C.	2	2	1	5
SAMBUCUS CANADENSIS	ELDERBERRY	18" – 24"	5' O.C.	2	2	1	5
VACCINIUM	HIGHBUSH BLUEBERRY	18" – 24"	5' O.C.	3	2	1	6
LINDERA BENZOIN	COMMON SPICEBUSH	18" – 24"	5' O.C.	2	1	0	3
SPIRAEA TOMENTOSA	STEEPLEBUSH	18" – 24"	5' O.C.	3	2	0	5
RHODODENDRON	SWAMP AZALEA	18" – 24"	5' O.C.	3	2	1	6
CORNUS SERICEA	REDOSIER DOGWOOD	18" – 24"	5' O.C.	3	2	1	6
* = Winterberry male:female ratio 1:5			TOTAL QTY=	18	13	5	36

SITE 13 - WETLANDS MITIGATION PLANTING ASSOCIATION TABLES

STATE PROJECT NO.: 171-305

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STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 85

Plant Association 5a

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION			
HERBACEOUS				5a-1	5a-2	5a-3	TOTAL 5a
				QUANTITY			
				2462	11481	1593	15536
CAREX STRICTA	TUSSOCK SEDGE	2" plug	2' O.C.	6	21	3	30
ELEOCHARIS PALUSTRIS	SPIKE RUSH	2" plug	2' O.C.	3	18	3	24
SCHOENOPLECTUS TABERNAEMONTANI	SOFT-STEM RUSH	2" plug	2' O.C.	3	18	3	24
JUNCUS EFFUSUS	SOFT RUSH	2" plug	2' O.C	3	21	3	27
CAREX LUPULINA	HOP SEDGE	2" plug	2' O.C.	3	18	3	24
CAREX VULPINOIDEA	FOX SEDGE	2" plug	2' O.C.	3	21	3	27
CAREX COMOSA	BEARDED SEDGE	2" plug	2' O.C.	6	21	3	30
ASCLEPIAS INCARNATA	SWAMP MILKWEED	2" plug	2' O.C.	6	21	3	30
			TOTAL QTY.=	33	159	24	216

Plant Association 6a

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION	
HERBACEOUS				6a-1	TOTAL 6a
				QTY.	QTY
AREA (S.F.)				8307	8307
CAREX STRICTA	TUSSOCK SEDGE	2" plug	2' O.C.	18	18
SCHOENOPLECTUS	SOFT-STEM RUSH	2" plug	2' O.C.	18	18
JUNCUS EFFUSUS	SOFT RUSH	2" plug	2' O.C.	18	18
CAREX LUPULINA	HOP SEDGE	2" plug	2' O.C.	18	18
MIMULUS RINGENS	MONKEYFLOWER	2" plug	2' O.C.	18	18
CAREX VULPINOIDEA	FOX SEDGE	2" plug	2' O.C.	18	18
CAREX COMOSA	BEARDED SEDGE	2" plug	2' O.C.	18	18
			TOTAL QTY =	126	126

Plant Association 5b

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION											
TREE				5b-1	5b-2	5b-3	5b-4	5b-5	5b-6a	5b-6b	5b-7a	5b-7b	5b-8	5b-9	TOTAL 5b
				QUANTITY											
AREA (S.F.)				6551	7339	4180	9286	7003	2136	12649	4853	570	1547	18510	74624
ACER SACCARINUM	SILVER MAPLE	2" – 2.5" CALIPER	20' O.C.	9	10	5	12	10		16	6		2	24	94
SALIX NIGRA	BLACK WILLOW	2" – 2.5" CALIPER	20' O.C.	9	10	5	12	9		16	6		2	24	93
POPULUS DELTOIDES	COTTONWOOD	2" – 2.5" CALIPER	20' O.C	8	10	5	12	9		17	6		2	25	94
PLATANUS OCCIDENTALIS	SYCAMORE	2" – 2.5" CALIPER	20' O.C.	9	9	5	13	9		17	7		2	25	96
ACER NEGUNDO	BOXELDER	2" – 2.5" CALIPER	20' O.C.	9	9	6	12	9		17	7		2	24	95
NYSSA SYLVATICA	BLACK GUM	2" – 2.5" CALIPER	20' O.C.	8	9	6	12	9		17	7		2	24	94
FRAXINUS PENNSYLVANICA	GREEN ASH	2" – 2.5" CALIPER	20' O.C	8	10	6	12	9		17	6		2	24	94
			TOTAL QTY.=	60	67	38	85	64		117	45		14	170	660
SHRUB															
VIBURNUM DENTATUM	ARROWWOOD	18" – 24"	5' O.C	7	9	5	11	8	8	17	5	2	2	22	96
LINDERA BENZOIN	COMMON SPICEBUSH	18" – 24"	5' O.C.	8	8	4	11	8	8	17	6	2	1	22	95
RHODODENDRON	SWAMP AZALEA	18" – 24"	5' O.C.	8	8	5	10	8	7	18	6	2	2	23	97
CORNUS SERICEA	REDOSIER DOGWOOD	18" – 24"	5' O.C.	7	9	5	11	8	7	17	6	2	2	22	96
			TOTAL QTY.=	30	34	19	43	32	30	59	23	8	7	85	384

SITE 13 - WETLANDS MITIGATION PLANTING ASSOCIATION TABLES	STATE PROJECT NO.: 171-305	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	OFFICE OF ENGINEERING	DATE: JULY 2010
	SCALE: N.T.S.	NEW BRITAIN - HARTFORD BUSWAY ENVIRONMENTAL IMPACT PLATES	MICHAEL BAKER ENGINEERING	PLATE NO. 86

Plant Association 6b

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION			
TREES				6b-1	6b-2	6b-3	TOTAL 6b
				QUANTITY			
AREA (S.F.)				6394	7751	2409	16554
ACER SACCARINUM	SILVER MAPLE	2" – 2.5" CALIPER	10' O.C.	12	14	4	30
POPULUS DELTOIDES	COTTONWOOD	2" – 2.5" CALIPER	10' O.C.	12	14	4	30
PLATANUS OCCIDENTALIS	SYCAMORE	2" – 2.5" CALIPER	10' O.C.	12	14	4	30
ACER NEGUNDO	BOXELDER	2" – 2.5" CALIPER	10' O.C.	12	14	5	31
FRAXINUS PENNSYLVANICA	GREEN ASH	2" – 2.5" CALIPER	10' O.C.	11	15	5	31
			TOTAL QTY=	59	71	22	152
SHRUBS							
VIBURNUM OPULUS	CRANBERRY	18" – 24"	5' O.C.	9	12	3	24
ROSA PALUSTRIS	SWAMP ROSE	18" – 24"	5' O.C.	10	12	4	26
MYRICA GALE	SWEETGALE	18" – 24"	5' O.C.	10	12	4	26
			TOTAL QTY=	29	36	11	76

Plant Association 7a

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION			
HERBACEOUS				7a-1	7a-2	7a-3	TOTAL 7a
				QUANTITY			
AREA (S.F.)				28687	1352	1516	31555
CAREX SCOPARIA	BROOM SEDGE	2" plug	2' O C	78	6	6	90
EUPATORIUM PERFOLIATUM	BONESET	2" plug	2' O.C.	78	6	6	90
MIMULUS RINGENS	MONKEYFLOWER	2" plug	2' O.C.	78	6	6	90
VERBENA HASTATA	BLUE VERVAIN	2" plug	2' O.C.	78	6	6	90
SCIRPUS CYPERINUS	WOOLGRASS	2" plug	2' O.C.	78	6	6	90
			TOTAL QTY.=	390	30	30	450

Plant Association 7b

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION				
TREES				7b-1	7b-2	7b-3	7b-4	TOTAL 7b
				QUANTITY				
				1095	3195	1929	851	7070
QUERCUS PALUSTRIS	PIN OAK	2" – 2.5" CALIPER	10' O.C.		30			30
			TOTAL QTY.=		30			30
SHRUBS								
ALNUS INCANA	SPECKLED ALDER	18" – 24"	5' O.C.	4	4	6	3	17
CEPHALANTHUS	BUTTONBUSH	18" – 24"	5' O.C.	4	4	7	3	18
TOXICODENDRON	POISON SUMAC	18" – 24"	5' O.C.	4	4	7	3	18
HERBACEOUS								
DECADON VERTICILLATUS	WATER WILLOW	2" plug	2' O.C.	4	4	7	3	18
			TOTAL QTY.=	16	16	27	12	71

Plant Association 8a

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION				
HERBACEOUS				8a-1	8a-2	8a-3	8a-4	TOTAL 8a
				QUANTITY				
AREA (S.F.)				2222	1416	703	2039	6380
IRIS VERSICOLOR	BLUE FLAG IRIS	2" plug	2' O.C.	9	6	3	9	27
PELTANDRA VIRGINICA	ARROW ARUM	2" plug	2' O.C.	9	6	3	9	27
PONTEDERIA CORDATA	PICKERELWEED	2" plug	2' O.C.	9	6	3	9	27
			TOTAL QTY.=	27	18	9	27	81

Plant Association 8b

BOTANICAL NAME	COMMON NAME	SIZE	SPACING	LOCATION	
TREES				8b-1	TOTAL 8b
				QUANTITY	
AREA (S.F.)				2222	2222
SHRUBS					
ALNUS INCANA	SPECKLED ALDER	18" – 24"	5' O.C.	15	15
SALIX DISCOLOR	PUSSY WILLOW	18" – 24"	5' O.C.	16	16
			TOTAL QTY=	31	31

SITE 13 - WETLANDS MITIGATION PLANTING ASSOCIATION TABLES

STATE PROJECT NO.: 171-305

SCALE: N.T.S.

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

NEW BRITAIN - HARTFORD BUSWAY
ENVIRONMENTAL IMPACT PLATES

OFFICE OF ENGINEERING

MICHAEL BAKER ENGINEERING

DATE: JULY 2010

PLATE NO. 87

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 88-H035

Design Contract Name: New Britain Section

Date: May 28, 2010

Date of Pre-Application Attachment H: October 5, 2009

Changes From Pre-Application Submittal: See Attached Summary

Engineering Reports Pertinent to Attachment H

- New Britain – Hartford Busway, State Project No. 88-H035, Drainage Design Report, Date – Pending Final Revisions.
- Preliminary Hydraulic Report for State Project No. 171-301, Location: Piper Brook in New Britain, May 2003.
- Conceptual Drainage Design Evaluation Report, July 2007.

Summary of Changes From Pre-Application Submittal

1. Page 5A has a description of construction activities within the floodplain elevation.

2. Since Section I Question 4 is "No", the checkmarks under the second question or under 4a, 4b, 4c (on page 7 of 18) have been removed.

3. The narrative on the proposed drainage system portion has been revised since the Drainage Report, October 5, 2009, had been submitted due to the following reasons:
   - A new drainage system eight- Florence Street drainage system has been added in the proposed busway drainage system. The description of this system has been added in the latest drainage report.
   - Drainage System Six (In October 5, 2009 version) East Main Street drainage system has been finalized and documented in the latest drainage report. This drainage system has been renamed as drainage system seven.
   - Drainage System Seven (In October 5, 2009 version, Cemetery Drainage System) has been renamed as Drainage System Six.

4. Revisions in Appendix A have been done since Drainage Report, October 5, 2009, version had been submitted.
   - Road Side Grass Channel Design has been added in the Drainage report, latest version.
   - Drainage System network has been revised. Runoff collected by catch basins at station 23+75, 25+75, 27+00 and 28+25 will outlet to the grass channel separately by four outlet pipes.

5. Revisions in Appendix F have been done since Drainage Report, October 5, 2009, version had been submitted.
   - The drainage system had been finalized by coordinating with Project No.88-H039.
   - Proposed Southbound Station Area Conditions had been attached.

6. Revisions in Appendix G have been done since Drainage Report, October 5, 2009, version had been submitted.
   - Existing Bridge Deck Drainage System (Over Route 9) Map (As-built drawing) has been added in the latest drainage report.
   - Contents of this portion have been reorganized.
   - Hydraflow Hydrograph computations had been revised.

7. Revisions in Appendix I have been done since Drainage Report, October 5, 2009, version had been submitted. Water Depth above the CL Grate analysis sheet has been added in the back of this Appendix.

Summary of Changes From Pre-Application Submittal

8. Revisions in Appendix J have been done since Drainage Report, October 5, 2009, version had been submitted.
    - Outlet protection computations for station 23+75, 25+75, 27+00 and 28+25 have been done in the latest drainage report.

9. Revisions in Appendix K have been done since Drainage Report, October 5, 2009, version had been submitted. Drainage System Seven (East Street Drainage System) and Eight (Florence Street Drainage System) have been added in the Comparison of the Existing Condition and the Proposed Condition Sheet.

10. Drainage System Eight – Florence Street has been added in as Appendix G since Drainage Report October 5, 2009 version had been submitted. Therefore, the old Appendix G in the Drainage Report, October 5, 2009, version becomes Appendix H in the latest version, old Appendix H becomes I, and so on. The contents of this new Appendix G are:
    - Drainage Area Analysis
    - Initial Tailwater Estimation
    - Hydraulic Grade Line Analysis
    - Drainage Area Maps

11. In the new Attachment H submission the drainage system seven (East Main Street) will be finalized, and drainage system eight (Florence Street) will be added in the Piper Brook Watershed system Existing vs. Proposed table.

New Britain – Hartford Busway
ConnDOT Project No. 171-305
Contract No. 88-H035
DEP Pre-Application

Attachment H: Engineering Documentation

May 28, 2010

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
Section A-1	Description of the design storm frequency intensity, volume and duration
Sec A-2;Sec B-1	Watershed maps, existing and proposed
Sec A-3;Sec B-2	Computations for Tc
Sec A-4;Sec B-3	Imperviousness calculations
Section A-10	NRCS runoff curve numbers, volumetric runoff coefficients
Section A-4	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
Section A-5	Hydrograph routing calculations
Section A-6	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
NA	Infiltration rates
Sec A-7;Sec B-4	Documentation of sources
Section C-1	Computer disk containing input and output data and the associated program for all computer models used in the analyses
Section A-9	Hard copy of input and output data including input/output tables
NA	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
NA	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
NA	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
NA	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
NA	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
NA	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
NA	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
NA	Primary and emergency spillway and outlet structure erosion protection
NA	Dam breach analysis
NA	Geotechnical evaluation
NA	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
Section D-1	Narrative
Section E-1	Drawings
Section E-2	Details
Section A-8	Calculations for Engineered Measures

Supplemental Location Information

Section A

Drainage Design Report

May 2010

Sub-Sections	Description	Location within Report
A-1	Description of the design storm frequency intensity, volume and duration	Appendices A thru I
A-2	Watershed maps, existing and proposed	Appendices A thru H
A-3	Computations for Tc	Appendices A thru I
A-4	Computations used to determine peak runoff rates, and velocities for each watershed area: Stream channel protection (2-yr frequency), conveyance protection (10-yr frequency), peak runoff attenuation (2, 10, 100-yr frequency), Emergency outlet sizing (safely pass 100-yr frequency)	Appendices A thru I
A-5	Hydrograph routing calculations	Appendices A thru I
A-6.1	Description for drainage and stormwater management systems	Pages 1 thru 11
A-6.2	Schematics and calculations for drainage and stormwater management systems	Appendices A thru I
A-7	Documentation of sources, references, and calculations.	Pages 7 thru 11
A-8	Calculations for Engineered Measures	Appendices H & I
A-9	Hardcopy of input and output data	Appendices A thru K

Supplemental Location Information

Section B

Conceptual Drainage Design Evaluation Report

July 2007

Sub-Sections	Description	Location within Report
B-1	Watershed Map (Existing Conditions)	App. A
B-2	Computations for Tc (Existing Conditions)	App. B
B-3	Imperviousness Calculations (Existing Conditions)	App. B
B-4	Documentation of Sources	App. B

Supplemental Location Information

Section C

Input and Output Data for Computer Programs Used in Analyses

October 2009

Sub-Sections	Description
C-1	Computer disk with input/output data, associated programs for all computer models used in analyses

Supplemental Location Information

Section D

Semi-Final Highway Design Report

August 2008

Sub-Sections	Description	Location within Report
D-1	Narrative of Soil & Erosion Control Plan	Page 14

Supplemental Location Information

Section E

Sedimentation & Erosion Control Plan Set for New Britain-Hartford Busway (Contract No. 88-H035)

October 2009

Sub-Sections	Description	Location within Report
E-1	Soil erosion and sediment control drawings	SED sheets
E-2	Soil erosion and sediment control details	MDS-27, MDS-29, 30

Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant	Date
Name of Applicant (print or type)	Title (if applicable)
Signature of Professional Engineer	Date
Name of Professional Engineer (print or type)	P.E. Number (if applicable) Affix P.E. Stamp Here (if applicable)

Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

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   - b. *Nonintensive Floodplain Uses* 3
   - c. *National Flood Insurance Program (NFIP)* 3
   - d. *Municipal Regulations* 3

2. ***Flooding and Flood Hazards***
   - a. *Flooding* 4
   - b. *Flood Velocities* 4
   - c. *Flood Storage* 4
   - d. *Degrading or Aggrading Stream Beds* 4
   - e. *Ice Jams* 4
   - f. *Storage of Materials & Equipment* 5
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3. ***Standards for Structures in Floodplains or Coastal High Hazard Areas***
   - a. *Structures in Coastal High Hazard Areas* 5
   - b. *Structures in Floodplain Areas* 6
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c. Coastal Areas 7

5. Alterations of Watercourses

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b. Hydraulic Capacity 7
c. Aquatic Habitat 8

6. Culverts and Bridges

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b. Depressed Structural Floors 9
c. Multiple Openings 9
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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H035)**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☐ Yes ☒ No If yes, list the FEMA flood zone(s):

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☒ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management

Note to Reviewer:

The proposed project is the New Britain-Hartford Busway, State Project No. 171-305. This Attachment H: Engineering Documentation refers to the New Britain portion, Contract No. 88-H035, of the New Britain-Hartford Busway Project. The only floodplain located in the vicinity of Contract No. 88-H035 is associated with Piper Brook. At this location Piper Brook is conveyed in a "U" shaped concrete channel and the floodplain limits are confined within the concrete channel walls.

This portion of the Busway is located within the Piper Brook watershed. The City stormwater drainage system that serves this area was analyzed and determined to have insufficient hydraulic capacity to convey the design flows. It was determined that the stormwater run off associated with the Busway should be conveyed to Piper Brook through an independent system. The proposed Busway drainage system will outlet to Piper Brook via a pipe to be installed through the concrete channel wall.

The answers to questions regarding floodplains for Contract No. 88-H035 in "Section I: Floodplain Management" refers to the impacts to Piper Brook.

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☒ No

Explain:

Piper Brook is a "U" shaped concrete channel at the point at which the 24" RC Pipe will outfall. As a result, there will be no increase in velocity or depth to cause channel erosion or to pose any hazard to human life, health, or property due to the additional outfall.

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☐ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☒ Yes ☐ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Please see attached sheet.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☐ Yes ☒ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management

Subsection 2: Flooding and Flood Hazards

f. Storage of Materials & Equipment **– Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?**

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

The construction of the 24" R.C. pipe that will outfall into Piper Brook will require that a container be temporarily placed within the 500-year floodplain to catch debris due to construction. At the location of the proposed outfall into Piper Brook, the 500-year floodplain is confined to within the "U" shaped concrete channel walls. A container will be placed within the channel walls to catch debris while a hole is being cut through the channel wall in order to install the R.C. pipe. It is anticipated that this work should be accomplished within a period of days.

The container will be suspended above the water surface while it is located within Piper Brook. The container could be removed from the channel when the work is not actively being performed. Construction of the outfall will take place during a period when rainfall is anticipated to be at a minimum. Rainfall, flow velocity and flow depth will be monitored during the time that the container is placed within the channel. If heavy rainfall or flooding is anticipated during construction, the container will be removed from Piper Brook to prevent pollution or hazards to life and property.

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?

   ☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

   ☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

   ☐ Yes ☐ No

   The 500 year flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

   ☐ Yes ☐ No

   If yes, the structure will be: ☐ Elevated ☐ Floodproofed

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

   The structure is floodproofed to: ft. (Datum:)

   Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system?
   ☐ Yes ☐ No

   If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

   If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

   ☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

   ☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☐ Yes ☒ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☐ Yes ☒ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☒ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☒ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☒ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☐ Yes ☒ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☐ Yes ☐ No

The channel capacity is designed for the: year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☐ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☐ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☐ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☐ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☐ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☐ Yes ☒ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☐ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☐ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☐ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☐ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☐ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☐ Yes ☐ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage *Manual* and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☐ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications.* However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

☐ Tidal, minor

☐ Tidal, small

☐ Tidal, intermediate

☐ Tidal, large

☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☐ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☐ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☐ Yes ☐ No

   Explain:

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

- ☐ 1. the road is at or close to the floodplain grade
- ☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties
- ☐ 3. provisions are made to barricade the road when overtopped
- ☐ 4. the road or driveway is posted as being subject to flooding
- ☐ 5. the road or driveway has low traffic volume
- ☐ 6. alternate routes are available

The culvert or bridge has been designed to pass the: year frequency discharge with an underclearance of: feet.

Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: structure.

Section I: Floodplain Management (continued)

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☐ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☐ Yes ☐ No ☒ No temporary hydraulic facilities

If yes, the design flood frequency is the: year flood.

Describe the temporary facilities:

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H035)**

1. *Stormwater Runoff*

The proposed project will (check all that apply):

- ☒ Increase the area of impervious surfaces
- ☒ Increase runoff coefficients
- ☐ Alter existing drainage patterns
- ☒ Alter time of concentrations
- ☒ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☐ Yes ☒ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

Stormwater runoff from this construction contract will impact the Piper Brook and the Willow Brook watersheds. The contract includes connections to several existing storm drainage systems and the construction of a new system for a segment of the Busway roadway. The impacts to peak flow rates, timing of runoff, and volume of runoff at specific discharge points vary. At a common downstream point of each watershed the cumulative impacts of the proposed project contract are negligible. See attached sheets for descriptions of the drainage systems.

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	**Please see attached sheet.**	
10		
100		

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Peak discharges were developed for pre and post development conditions using the rational method and modified rational method. The storm duration was considered to be two (2) times the time of concentration (Tc). Please see attached sheet for the storm durations for each individual drainage system.

Section II: Stormwater Management

Subsection 1. *Stormwater Runoff*

Pre and Post Development Peak Flow Rates

Piper Brook Watershed

	Peak Discharges (CFS)					
	Return Frequency					
	2 Year		10 Year		100 Year	
Drainage System	Pre-Development	Post-Development	Pre-Development	Post-Development	Pre-Development	Post-Development
1	3.3	1.9	4.4	2.6	7.5	4.4
3	6.6	1.4	10.0	5.8	19.0	23.6
4 (1)	5.9	9.0	8.4	12.0	14.4	20.2
5 (3)	7.5	6.7	10.0	8.8	17.0	18.2
6	10.2	10.2	14.3	14.3	25.5	25.5
7 (2)	7.1	6.1	9.5	8.1	16	13.8
8	3.6	3.9	4.5	4.9	7.3	7.9
Totals	44.2	39.2	61.1	56.4	106.7	113.6

Willow Brook Watershed

	Peak Discharges (CFS)					
	Return Frequency					
	2 Year		10 Year		100 Year	
Drainage System	Pre-Development	Post-Development	Pre-Development	Post-Development	Pre-Development	Post-Development
2	5.9	5.6	7.9	7.5	13.4	12.7
9	3.8	3.9	5.1	5.7	8.6	9.3
Totals	9.7	9.5	13	13.2	22	22

NOTES:

(1) Discharges to abutting Busway segment. See Contract No. 88-H034.

(2) Discharges to City of New Britain municipal system. Grading of street pending final design of East Main Street Busway Station. Runoff to existing City system anticipated to be less than existing conditions as proposed Station will have less paved areas than the development.

(3) Peak discharge for 10 Year Return Frequency for this system reduced with use of 120'-48" RCP for detention.

(4) The totals shown for Pre and Post development are conservative values for the impacts as the Time of Concentrations (Tc) vary. See following sheet for Tc's.

Storm Duration Computations

Piper Brook Watershed

Drainage System 1: Proposed Busway Drainage (Sta. 19+00 to 22+00)

	AC	Time of Concentration (min)	Duration Storm (hr)	Return Frequency		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	0.92	10	0.33	3.3	4.4	7.5
Post-Development	0.54	10	0.33	1.9	2.6	4.4

Drainage System 3: Proposed Busway Drainage (Sta. 35+50 to 108+50)

	AC	Time of Concentration (min)	Duration Storm (hr)	Return Frequency		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	4.74	50	1.70	6.6	10.0	19.0
Post-Development	7.41	30	1.00	1.4	5.8	23.6

Drainage System 4: Proposed Busway Drainage (Sta. 108+50 to 118+00)

	AC	Time of Concentration (min)	Duration Storm (hr)	Return Frequency		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	2.10	15	0.50	5.9	8.4	14.4
Post-Development	2.49	10	0.33	9.0	12.0	20.2

Drainage System 5: Route 72 Eastbound Exit Ramp & Route 9 Southbound Entrance Ramp

	AC	Time of Concentration (min)	Duration Storm (hr)	Return Frequency (year)		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	2.09	10	0.33	7.5	10.0	17.0
Post-Development	2.29	10	0.33	6.7	8.8	18.2

Drainage System 6: Fairview Cemetery System

	AC	Time of Concentration (min)	Duration Storm (hr)	Return Frequency		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	4.10	21	0.70	10.2	14.3	25.5
Post-Development	4.10	21	0.70	10.2	14.3	25.5

Drainage System 7: East Main Street System

	AC	Time of Concentration (min)	Duration Storm (hr)	Return Frequency		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	1.97	10	0.33	7.1	9.5	16
Post-Development	1.70	10	0.33	6.1	8.1	13.8

Drainage System 8: Florence Street System

	AC	Time of Concentration (min)	Duration Storm (hr)	Return Frequency		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	0.75	5	0.17	3.6	4.5	7.3
Post-Development	0.83	5	0.17	3.9	4.9	7.9

Willow Brook Watershed

Drainage System 2: Proposed Busway Drainage (Sta. 22+00 to 28+85)

	AC	Time of Concentration (min)	Duration Storm (hr)	Return Frequency		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	1.65	10	0.33	5.9	7.9	13.4
Post-Development	1.56	10	0.33	5.6	7.5	12.7

Drainage System 9: Busway over Route 9 Bridge Deck Drainage System

	AC	Time of Concentration (min)	Duration Storm (hr)	Return Frequency (year)		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	1.03	10	0.33	3.8	5.1	8.6
Post-Development	1.18	10	0.33	3.9	5.7	9.3

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

Please see preceding attached sheet.

2. *Stormwater Detention Facilities*

Does the proposed project include the construction of any stormwater detention facilities?

☐ Yes ☒ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☐ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2			
10			
100			

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Describe the location of the design point and why this location was chosen:

Section II: Stormwater Management

Subsection 1: Stormwater Runoff

Describe the location of the design point and why this location was chosen:

Contract No. 88-H035 involves the construction of approximately 10,000 linear feet of roadway for the Busway project. Stormwater runoff from this construction contract will impact the Piper Brook and the Willow Brook watersheds. The contract includes connections to several existing storm drainage systems and the construction of a new system for a segment of the Busway roadway. The impacts at specific discharge points vary. A common downstream point of each watershed was selected to evaluate the cumulative impacts of the proposed project contract.

The channel crossing of East Street was selected for Piper Brook. This point in immediately below the outet for the proposed Busway drainage system and downstream of the convergence of the various subdrainage systems. The outlet to the existing drainage basin north of South street was selected for the Willow Brook Watershed. This is the outlet for the Route 9 drainage systems that convey the discharges from two of the project systems.

The individual roadway drainage systems that convey stormwater flows associated with this segment of the Busway Project are listed by the watershed they discharge into and are described as follows:

Piper Brook Watershed

Drainage System 1

Drainage system 1 is located at the very beginning of the busway (Sta. 19+00 to Sta. 22+00) and includes three catch basins. Two of the catch basins are located along the busway gutter lines and a third catch basin conveys runoff from a grass lined channel. These catch basins connect to the City system. This was done to maintain the existing drainage patterns at this location.

Drainage System 3

Drainage system 3 includes the proposed busway trunk line, which begins just east of the proposed Busway Bridge over Route 9 to the high point on the bridge over Allen and East Street (Sta. 35+50 to Sta. 108+50). The system is comprised of catch basins located along the gutter lines of the busway and multi-use trail. There are also grass lined ditches located intermittently on the side of the busway that convey runoff from the busway. The drainage in this area is conveyed to a water quality basin located at the low point in the busway (Sta. 98+00). This water quality basin outfalls into Piper Brook.

Drainage System 4

Drainage system 4 includes the proposed busway drainage at the north end of the project (Sta. 108+50 to 118+00). This system outfalls into a proposed roadway drainage system to be constructed under Contract No 88-H034 and was designed to maintain the drainage patterns. See Contract No. 88-H034 for more information.

Drainage System 5

Drainage system 5 includes the drainage from the Route 72 and Route 9 ramps. There are four different outlet points in this system in order to maintain the existing watershed divides. The systems are connected to the Route 9/72 trunk line through four existing catch basins located along the Route 72 eastbound shoulder. Three of these catch basins are located on the west side of Route 71 along the and one catch basin is located to the east. The peak discharge for 10 Year Return Frequency for this system was reduced with 120'-48" RCP intoduced between catch basins for detention.

Drainage System 6

Drainage system 6 includes the proposed system at Fairview Cemetery. The system includes a catch basin at the low point in the cemetery underpass and piping to convey runoff to a remnant of the old Piper Brook located at the northwest corner of Fairview Cemetery.

Drainage System 7

Drainage system 7 includes the drainage along East Main Street, which intersects the busway. Proposed catch basins will be connected to the existing city system along East Main Street so that the existing drainage pattern at this location is maintained.

Drainage System 8

Drainage system 8 includes the drainage along Florence Street, which intersects the Harvard Street. The drainage area for this system is approximately 1.24 acres in size. Two new catch basins will be constructed at low points in the vicinity of the proposed Florence Street/Harvard Steet intersection. Stormwater runoff intercepted by those catch basins will be discharged into an existing 48" RCP trunkline along Harvard Street.

Willow Brook Watershed

Drainage System 2

Drainage system 2 includes the proposed busway just west of the bridge over Route 9 (Sta. 22+00 to 28+85) and includes some runoff from the Route 9 entrance ramp. This system is comprised of catch basins along the busway gutter line that outlet into a grass lined channel on the left side of the busway. The grass channel carries the runoff from the busway in this location into an existing catch basin on Route 9, which is conveyed into the Route 9 South trunk line system. This system was designed to maintain the existing drainage pattern at this location, which is currently conveyed into the Route 9 South trunk line.

Drainage System 9

Drainage system 2 includes the proposed Busway Bridge over Route 9 (Sta. 28+85 to 35+50). This system is comprised of bridge scuppers located along the busway gutter line that outlet into the existing Route 9 roadway drainage system. The peak discharge for 10 Year Return Frequency for this system was reduced with 90'-36" RCP intoduced between catch basins for detention.

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☐ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☒ Yes ☐ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☒ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☒ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☒ Yes ☐ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

The proposed drainage area in the busway area includes a grass lined drainage channel and a water quality basin, which improve the quality of the stormwater runoff. The grass lined drainage channel is located just west of the Route 9 bridge on the left side of the busway and naturally cleans the stormwater runoff as it travels to the existing catch basin at the end of the channel. The water quality basin treats stormwater runoff for the majority of the busway, from just east of the bridge over Route 9 to just south of the Allen/East Street bridge. The water quality basin is designed to capture and treat 90% of the entire runoff volume of the average annual storm event.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

By implementing best management practices and erosion and sedimentation controls during construction and by installing new or upgraded drainage systems, the project will minimize construction impacts over the short-term and, over the long term, protect nearby natural resources. Hay bales will be installed at all catch basins near construction to avoid sediment transport or build up in the existing drainage systems.

Erosion will be kept to a minimum by providing temporary or permanent cover on surfaces exposed by construction activities in a timely manner. Sediment from erosion which does occur will be captured and kept on site by strategic placement of silt fencing and other sediment barriers. The barriers will be placed at the downhill end of exposed slopes and at intervals along temporary and permanent swales, ditches and channels.

Section III: State Grants and Loans

Name of Applicant:

Name of Proposed Project:

1. This Flood Management Certification concerns a: ☐ grant ☐ loan

2. Total amount of grant or loan: $

3. The recipient of the grant or loan will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Recipient Contact person:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

4. The recipient will use the grant or loan to (check all that apply):

   ☐ construct a structure, obstruction or encroachment or conduct other work within a floodplain or coastal high hazard area.

   ☐ construct a facility or develop a site affecting drainage and stormwater runoff.

   ☐ conduct a study or prepare a report concerning land use or land use planning affecting a floodplain, drainage or stormwater runoff.

5. If the grant or loan is for a study or report, describe the anticipated effects on floodplains, drainage or stormwater runoff if the recommendations are implemented:

6. Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development? ☐ Yes ☐ No

   Explain:

If the grant or loan is for construction of a structure, obstruction or encroachment or other work within a floodplain, or if it is for construction of a facility or development of a site that will affect drainage and stormwater runoff, Sections I and/or II of this Worksheet must be completed and the engineering report (Attachment H) and plans (Attachment G) must be provided as part of this application.

Section IV: Disposal of State Land

Name of Applicant:

Name of Proposed Project:

1. The grantee will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Contact Person: Phone:

2. Describe the current state of development and use of the land to be disposed.

3. Why is the agency disposing of the land?

4. Describe the grantee's intended use of the land.

5. Will the disposal of the land promote development in floodplains? ☐ Yes ☐ No

   Explain:

6. Will the grantee's use of the land be consistent with the state's flood management statutes and regulations?

   ☐ Yes ☐ No Explain:

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 88-HO34

Design Contract Name: New Britain-Hartford Busway – Newington (East St. Station to Sta. 213+00)

Date: MAY 12, 2010

Date of Pre-Application Attachment H (if applicable): AUGUST 2009

Changes From Pre-Application Submittal (if applicable): See Attached Summary

Engineering Reports Pertinent to Attachment H

SECTION A – New Britain-Hartford Drainage Design Report
Revised March 17, 2010
SECTION B – impact tables form 90% Design Report November 6, 2009
SECTION C – Preliminary Hydrology Report site 2b June 2003
SECTION D – Preliminary Hydrology Report site 3 March 2003

March 5, 2010

Changes from pre-application submission:

Attachment H – Part 2

- Name of applicant from Julie F. Georges, P.E. to Connecticut Department of Transportation.
- Name of proposed Project No. 88-H034 was added.
- Provided answer for question 4.b – No.
- Provided names of watercourses for Question No. 5.
- Called out designation on plan for cross-culvert locations Question No. 6.a.
- Provided explanation for Question No. 6.g.2.
- Provided explanation for Question No. 6.g.3.
- Question No. 7 added note "See Water Handling Plan for Temporary Facility at Site 3".
- Section II, Question 1. Summary Table is attached.
- Section II, Question 3.h. Explanation provided.
- Section III has been removed.

March 5, 2010

Section A

- Page 12 – 15 replaced, 10-year gutter flow with 25-year gutter flow, and added one manhole.
- Page 18 replaced, clogging factor add to CBS.
- Page 19 replaced, total flow for S8-9 changed.
- Page 25 replaced, 10-year gutter flow with 25-year.
- Page 26 replaced, total flow changed
- Page 35-38 replaced, added two manholes and two CBS.
- Page 43 replaced, total flow increased.
- Page 151 – 155 modified to account for additional flow from Cedar Street Station for the Q50 and Q100 flows.
- Appendix A – 4 included responses to Final 90% Design comments.
- Appendix D added special riprap and swale details.

Section B

- All tables have been updated.

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
A-1	Description of the design storm frequency intensity, volume and duration
A-2	Watershed maps, existing and proposed
A-3	Computations for Tc
A-4	Imperviousness calculations
N/A	NRCS runoff curve numbers, volumetric runoff coefficients
A-5	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
N/A	Hydrograph routing calculations
A-6, C,D	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
N/A	Infiltration rates
A-7	Documentation of sources
E	Computer disk containing input and output data and the associated program for all computer models used in the analyses
A-10	Hard copy of input and output data including input/output tables
N/A	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
N/A	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
N/A	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
N/A	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
N/A	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
N/A	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
N/A	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
N/A	Primary and emergency spillway and outlet structure erosion protection
N/A	Dam breach analysis
N/A	Geotechnical evaluation
N/A	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
A-8	Narrative
F	Drawings
F	Details
A-9	Calculations for Engineered Measures

Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant	Date
Name of Applicant (print or type)	Title (if applicable)
Cory Garro Signature of Professional Engineer	10/15/09 Date
Cory Garro Name of Professional Engineer (print or type)	CT 11820 P.E. Number (if applicable)

Affix P.E. Stamp Here
(if applicable)

Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

Contents:

Section I: Floodplain Management ***Page No.***

1. ***General Criteria***
   - a. *Critical Activity* 3
   - b. *Nonintensive Floodplain Uses* 3
   - c. *National Flood Insurance Program (NFIP)* 3
   - d. *Municipal Regulations* 3

2. ***Flooding and Flood Hazards***
   - a. *Flooding* 4
   - b. *Flood Velocities* 4
   - c. *Flood Storage* 4
   - d. *Degrading or Aggrading Stream Beds* 4
   - e. *Ice Jams* 4
   - f. *Storage of Materials & Equipment* 5
   - g. *Floodwater Loads* 5

3. ***Standards for Structures in Floodplains or Coastal High Hazard Areas***
   - a. *Structures in Coastal High Hazard Areas* 5
   - b. *Structures in Floodplain Areas* 6
   - c. *Residential Structures* 6
   - d. *Non-residential Structures* 6
   - e. *Utilities* 6
   - f. *Water Supply Systems* 6
   - g. *Sanitary Sewage Systems* 6
   - h. *Foundation Drains* 6

4. Topography Changes within Floodplains **Page No.**

a. No Regulatory Floodway 7
b. Floodway Encroachments 7
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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **Project No. 171-305, Contract No. 88-H034**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☒ Yes ☐ No If yes, list the FEMA flood zone(s):

Flood Zone AE

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☒ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☐ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☐ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☐ Yes ☒ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☒ Yes ☐ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?

   ☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

☐ Yes ☐ No

The 500 year flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

☐ Yes ☐ No

If yes, the structure will be: ☐ Elevated ☐ Floodproofed

The base flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

The structure is floodproofed to: ft. (Datum:)

Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system? ☐ Yes ☐ No

If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☒ Yes ☐ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☐ Yes ☒ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☒ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☒ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☒ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☒ Yes ☐ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection: Piper Brook and unnamed tributaries

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☒ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☒ Yes ☐ No

The channel capacity is designed for the: **50** year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☒ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☒ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☒ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☒ 5. straightening existing channels and thereby decreasing their length has been avoided;

☒ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☒ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☒ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

Box culvet has been buried 1-ft. and then backfilled with 1-ft. of native streambed material.

Note: A meeting was held on site with CTDOT and CTDEP on July 24, 2003, at which time CTDEP Fisheries had no concerns. Please see the meeting report in Attachment Q of the IWRD application.

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☒ Yes ☐ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☒ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

Box culvert buried 1-ft.

NOTE: There are three cross-culvert locations; Site 2B, Site 3 and Site 4A, all are unnamed tributaries to Piper Brook, only Site 3 has a base flow the others have intermittent flow.

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☒ Yes ☐ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☒ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☒ No ☐ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☒ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☒ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☒ Yes ☐ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☒ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

☐ Tidal, minor

☐ Tidal, small

☐ Tidal, intermediate

☐ Tidal, large

☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. *Will the proposed culvert or bridge increase upstream water surface elevations in the event of a* base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☒ Yes ☐ No

   If yes, is the increase in elevation more than one foot? Describe:

   Elevation of Piper Brook 25-yr. backwater at elevation 67.0 ft. Elevation of culvert WSEL at 68.24 ft. Proposed condition increase is 1.24 ft. However, there is an existing culvert at Site 3, which is being replaced with a large opening. The water surface elevation will actually be lower upstream during a storm event with the replaced cuvlert.

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☒ Yes ☐ No

   Explain:

   The three culverts are designed according to the Department Drainage manual. Flooding elevations will not increase and not overtop the roadway.

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

   ☐ 1. the road is at or close to the floodplain grade

   ☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

   ☐ 3. provisions are made to barricade the road when overtopped

   ☐ 4. the road or driveway is posted as being subject to flooding

   ☐ 5. the road or driveway has low traffic volume

   ☐ 6. alternate routes are available

   The culvert or bridge has been designed to pass the: **50** year frequency discharge with an underclearance of: **0.46** feet.

   Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: **small** structure.

Section I: Floodplain Management (continued)

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

Culvert designed to CTDOT standards.

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☒ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☒ Yes ☐ No ☐ No temporary hydraulic facilities

If yes, the design flood frequency is the: **2** year flood.

Describe the temporary facilities:

See water handling plan for temporary facility at Site 3.

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **Project No. 171-305, New Britain-Hartford Busway**

1. *Stormwater Runoff*

The proposed project will (check all that apply):

- ☒ Increase the area of impervious surfaces
- ☒ Increase runoff coefficients
- ☐ Alter existing drainage patterns
- ☒ Alter time of concentrations
- ☒ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☐ Yes ☒ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	*	*
10	*	*
100	*	*

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

***See attaced Discharge Summary Table.**

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

2. ***Stormwater Detention Facilities***

Does the proposed project include the construction of any stormwater detention facilities?

☐ Yes ☒ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☐ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2			
10			
100			

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Describe the location of the design point and why this location was chosen:

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☐ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☐ Yes ☒ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☒ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☒ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☒ Yes ☐ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

1. **One water quality basin**
2. **Vegetated swales**
3. **Vegetated filter strips**
4. **Deep sumps prior to discharge point**

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

The project will utilize sediment control fencing and hay bale check dams in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Seiment Control as the primary sediment control.

Discharge Summary Table

System	2-Year		10-Year		100-Year	
	Existing Discharge CFS	Proposed Discharge CFS	Existing Discharge CFS	Proposed Discharge CFS	Existing Discharge CFS	Proposed Discharge CFS
1	16.7	18.6	22.8	25.4	30.9	34.3
2	9.7	10.4	13.6	14.6	20.7	22.2
3	0.7	2.1	0.9	2.7	1.2	3.6
4	7.5	7.5	10.2	10.2	14.0	14.0
5	0.4	1.2	0.6	1.6	0.8	2.1
6	0.4	1.2	0.5	1.5	0.7	2.0
7	*	*	*	*	*	*
8	2.6	2.6	3.4	3.4	4.6	4.6
9	0.9	2.3	1.2	3.1	1.6	4.0
10	0.6	1.4	0.8	1.9	1.0	2.4
11	6.0	6.0	8.5	8.5	12.7	12.7
12	0.6	1.4	0.7	1.8	1.0	2.4
13	10.2	10.2	13.2	13.2	17.3	17.3
14	2.5	3.1	3.2	4.0	4.3	5.2

*This system watershed will not be developed therefore no change in runoff.

Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project:

BUSWAY FINAL DESIGN
NEWINGTON – WEST HARTFORD
PROJECT No. 93-H046

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☐ Yes ☒ No If yes, list the FEMA flood zone(s):

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☐ Yes ☒ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☒ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☐ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☐ Yes ☒ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☐ Yes ☒ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?

   ☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

   ☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

   ☐ Yes ☐ No

   The 500 year flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

   ☐ Yes ☐ No

   If yes, the structure will be: ☐ Elevated ☐ Floodproofed

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

   The structure is floodproofed to: ft. (Datum:)

   Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system?
   ☐ Yes ☐ No

   If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

   If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

   ☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

   ☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☒ Yes ☐ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☒ Yes ☐ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☐ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☒ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☒ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☐ Yes ☒ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☐ Yes ☐ No

The channel capacity is designed for the: year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☐ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☐ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☐ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☐ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☐ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

Section I: Floodplain Management (continued)

6. *Culverts and Bridges* *CULVERTS WILL BE CONSTRUCTED IN ACCESS ROAD PROJ. H-052*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☐ Yes ☒ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☐ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☒ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☒ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☒ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☒ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☒ Yes ☐ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☒ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

- ☐ Tidal, minor
- ☐ Tidal, small
- ☐ Tidal, intermediate
- ☐ Tidal, large
- ☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☒ Yes ☐ No

   If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☒ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☒ Yes ☐ No

   Explain:

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

   ☐ 1. the road is at or close to the floodplain grade

   ☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

   ☐ 3. provisions are made to barricade the road when overtopped

   ☐ 4. the road or driveway is posted as being subject to flooding

   ☐ 5. the road or driveway has low traffic volume

   ☐ 6. alternate routes are available

   The culvert or bridge has been designed to pass the: year frequency discharge with an underclearance of: feet.

   Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: SMALL structure.

Section I: Floodplain Management (continued)

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☐ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☐ Yes ☐ No ☒ No temporary hydraulic facilities

If yes, the design flood frequency is the: year flood.

Describe the temporary facilities:

Section II: Stormwater Management

Name of Applicant:

Name of Proposed Project:

1. *Stormwater Runoff*

The proposed project will (check all that apply):

- ☒ Increase the area of impervious surfaces
- ☒ Increase runoff coefficients
- ☒ Alter existing drainage patterns
- ☒ Alter time of concentrations
- ☒ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☐ Yes ☐ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2		
10		
100		

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

See attached discharge summary table.

PRE/POST CONDITION DRAINAGE

This report provides supporting documentation for Department of Environmental Protection (DEP) Attachment-H for a portion of the New Britain – Hartford Busway located in the towns of Newington and West Hartford (Sta. 203+00 to Sta. 332+00). The busway will be a dedicated Bus Rapid Transit (BRT) facility along a 9.4-mile corridor between downtown New Britain and downtown Hartford. The corridor for the busway follows and abandoned railroad right-of-way from New Britain to Newington Junction and lies mainly within the Amtrak right-of-way, essentially parallel to the active rail line, north of Newington Junction. The busway will be two lanes wide (one in each direction).

Summary:

Pre Condition Flows (in cfs);

System No.	2 YR Storm Event	10 YR Storm Event	100 YR Storm Event
#1 (A / B / C)	4.65 / 0.29 / 0.39	6.97 / 0.40 / 0.55	10.07 / 0.57 / 0.74
#2	4.69	6.49	8.70
#3 (Does not includes Bus Station flows)	0.69	0.97	1.38
#4	0.23	0.33	0.46
#5	0.55	0.82	1.21
#6	0.55	0.82	1.21
#7	0.56	0.80	1.10
#8	0.69	1.01	1.45

Post Condition Flows

System No.	2 YR *Storm Event*	10 YR *Storm Event*	100 YR *Storm Event*
#1 (A / B / C)	9.03 / 2.09 / 2.06	14.01 / 2.78 / 2.96	20.71 / 3.66 / 4.12
#2	5.26	7.90	11.60
#3 (Does not includes Bus Station flows)	2.76	4.43	6.75
#4	1.47	2.06	2.81
#5	2.78	4.46	6.90
#6	3.44	5.59	8.58
#7	2.94	4.34	6.14
#8 (Includes SPN. 155-H025 flows)	5.81	9.42	14.55

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

2. *Stormwater Detention Facilities*

Does the proposed project include the construction of any stormwater detention facilities?

☐ Yes ☒ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☐ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2			
10			
100			

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Describe the location of the design point and why this location was chosen:

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☐ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☐ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☐ Yes ☒ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☒ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☒ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☐ Yes ☒ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

By implementing best management practices and erosion and sedimentation controls during construction and installing new or upgraded systems, the project will minimize construction impacts over the short term and, over the long term, protect nearby natural resources. Erosion will be kept to a minimum by installing silt fences at the downward slopes of construction to avoid sedimentation buildup. Hay bales will be installed at all catch basins near construction to avoid sediment build up in the existing drainage.

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 155-H025;
63-643

Design Contract Name: New Britain-Hartford Busway Hartford-South Segment (Contract No. 155-H025);
Flatbush Avenue (Contract No. 63-643)

Date: May 14, 2010

Date of Pre-Application Attachment H (if applicable): November 2, 2009

Changes From Pre-Application Submittal (if applicable): See Attached Summary

Engineering Reports Pertinent to Attachment H

- New Britain to Hartford Busway, Hartford South Segment (155-H025) 90% Drainage Design Report. May 2010.
- New Britain to Hartford Busway, Hartford South Segment (155-H025) Pre/Post Condition Drainage Report. May 2010.
- Contract No. 63-643 - FLATBUSH AVENUE - 90% Drainage Design Submission. May 2010.
- Contract No. 63-643 - FLATBUSH AVENUE - Pre/Post Condition Drainage Report. May 2010.
- Flatbush Avenue Station Drainage Report for Permitting Submission. October 30, 2009.

- Parkville Station Drainage Report for Permitting Submission. October 30, 2009.
- Hartford-South 90% Highway Design Report (Contract No. 155-H025). December 2009.
- Flatbush Avenue 90% Highway Design Report (Contract No. 63-643, 155-H030). December 2009.

Summary of Changes from Pre-Application Submittal:

A portion of drainage System No. 2 has been re-routed to System No. 3. As a result, drainage System No. 2 now extends from Sta. 343+50 to Sta. 351+98 (previously from Sta. 343+50 to Sta. 363+00). Due to this change in system limits, System No. 2 will be reduced to six catch basins from eleven. Drainage System No. 3 has been revised to begin at Sta. 351+98 and end at Sta. 384+50 (previously from Sta. 363+00 to Sta. 384+50). Storm drain pipes have been revised as appropriate. The number of catch basins in System 3 has increase from ten to fifteen catch basins.

Various drainage pipe diameters within System No. 3 have been re-sized accordingly. The drainage design of outlets for System 3 & 4 at Sta. 384+50 and Sta. 384+89, respectively, have moved a slightly to eliminate excavation within the Ordinary High Water (OHW) line of Kane Brook.

Pre/Post Condition Drainage Reports and 90% Submission Drainage Design reports for New Britain – Hartford Busway Hartford South Segment (Contract No. 155-H025) and Flatbush Avenue (Contract No. 63-643) have been updated per the changes above.

The existing conditions model for the Flatbush Avenue drainage system has been revised to reflect additional existing condition information received subsequent to the Pre-Application Submittal. Specifically, the contribution of the Walmart shopping plaza drainage to the Flatbush Avenue system has been corrected to reflect the plaza drainage system as shown in record plans (resulting in a decreased contribution to the Flatbush system as compared to the pre-application).

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
A1B1C1D1E1F1	Description of the design storm frequency intensity, volume and duration
E2;F2;J1;K1	Watershed maps, existing and proposed
A2B2C2D2E3F3	Computations for Tc
A3B3C3D3E4F4	Imperviousness calculations
NA	NRCS runoff curve numbers, volumetric runoff coefficients
A4B4C4D4E8F8	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
Sec. B-5; D-5	Hydrograph routing calculations
A5B6C5D6E5F5	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
NA	Infiltration rates
A6B7C6D7E6F6	Documentation of sources
Section G-1	Computer disk containing input and output data and the associated program for all computer models used in the analyses
A7B8C7D8E7F7	Hard copy of input and output data including input/output tables
Sec. A-8; B-9	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
NA	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
NA	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
NA	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
NA	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
NA	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
NA	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
NA	Primary and emergency spillway and outlet structure erosion protection
NA	Dam breach analysis
NA	Geotechnical evaluation
NA	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
H1;I1;E10;F10	Narrative
E9;F9;L1;M1	Drawings
E9;F9;L2;M2	Details
A-9;C-8	Calculations for Engineered Measures

Supplemental Location Information

Section A

Contract No. 155-H025 – BUSWAY

90% Drainage Design Report

May 2010

Sub-Sections	Description	Location within Report
A-1	Description of the design storm frequency intensity, volume and duration	Appendix B
A-2	Computations for Tc	Appendices B & E
A-3	Imperviousness Calculations	Appendices B & E
A-4	Computations used to determine peak runoff rates, and velocities for each watershed area: Stream channel protection (2-yr frequency), conveyance protection (10-yr frequency), Emergency outlet sizing (safely pass 100-yr frequency)	Appendices B & E
A-5	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts	Pages 2 thru 5; Appendices B & G
A-6	Documentation of sources	Pages 1 thru 2
A-7	Hard copy of input and output data including input/output tables	Appendices B & E
A-8	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation	Appendix E
A-9	Calculations for Engineered Measures	Appendices B, C, D, & E

Connecticut Department of Transportation
New Britain-Hartford Busway
Hartford-South (Contract No. 155-H025)
Flatbush Avenue (Contract No. 63-643)

CT DEP IWRD Application
Attachment H: Engineering Documentation
Part 1: Engineering Report Checklist

Supplemental Location Information

Section B

Contract No. 155-H025 – BUSWAY

Pre/Post Condition Drainage Report

May 2010

Sub-Sections	Description	*Location within* Report
B-1	Description of the design storm frequency intensity, volume and duration	Appendices A, B, & C
B-2	*Computations for Tc*	Appendices A, B, & C
B-3	Imperviousness Calculations	Appendices A, B, & C
B-4	Computations used to determine peak runoff rates, and velocities for each watershed area: Stream channel protection (2-yr frequency), conveyance protection (10-yr frequency), peak runoff attentuation (2, 10, 100-yr frequency), Emergency outlet sizing (safely pass 100-yr frequency)	Appendices A, B, & C
B-5	Hydrograph routing calculations	*Appendix E*
B-6	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts	Page 1, & Appendices A, B, & C
B-7	*Documentation of sources*	Page 1, & Appendices A, B, & C
B-8	Hard copy of input and output data including input/output tables	Appendices A, B, & C
B-9	Detention basin analysis includig timing and duration of expected outflow, stream stability analysis and hydrograph summation	Appendices C, D, & E

Supplemental Location Information

Section C

Contract No. 63-643 - FLATBUSH AVENUE

90% Drainage Design Submission

May 2010

Sub-Sections	Description	Location within Report
C-1	Description of the design storm frequency intensity, volume and duration	Appendices B, D
C-2	Computations for Tc	Appendices B, D
C-3	Imperviousness Calculations	Appendices B, D
C-4	Computations used to determine peak runoff rates, and velocities for each watershed area: Stream channel protection (2-yr frequency), conveyance protection (10-yr frequency), Emergency outlet sizing (safely pass 100-yr frequency)	Appendices B, D
C-5	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts	Pages 2 thru 5; Appendices B, D & F
C-6	Documentation of sources	Pages 1 thru 2
C-7	Hard copy of input and output data including input/output tables	Appendices B, D
C-8	Calculations for Engineered Measures	Appendices B, C

Connecticut Department of Transportation
New Britain-Hartford Busway
Hartford-South (Contract No. 155-H025)
Flatbush Avenue (Contract No. 63-643)

CT DEP IWRD Application
Attachment H: Engineering Documentation
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Supplemental Location Information

Section D

Contract No. 63-643 - FLATBUSH AVENUE

Pre/Post Condition Drainage Report

May 2010

Sub-Sections	Description	Location within Report
D-1	Description of the design storm frequency intensity, volume and duration	Appendices A, B, & C
D-2	Computations for Tc	Appendices A, & B
D-3	Imperviousness Calculations	Appendices A, & B
D-4	Computations used to determine peak runoff rates, and velocities for each watershed area: Stream channel protection (2-yr frequency), conveyance protection (10-yr frequency), peak runoff attentuation (2, 10, 100-yr frequency), Emergency outlet sizing (safely pass 100-yr frequency)	Appendices A, B, & C
D-5	Hydrograph routing calculations	Appendix C
D-6	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts	Page 1, & Appendices A, & B
D-7	Documentation of sources	Page 1, & Appendices A, B, & C
D-8	Hard copy of input and output data including input/output tables	Appendices A & B

Connecticut Department of Transportation
New Britain-Hartford Busway
Hartford-South (Contract No. 155-H025)
Flatbush Avenue (Contract No. 63-643)

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Supplemental Location Information

Section E

Flatbush Avenue Station Drainage Report for Permitting Submission

October 30, 2009

Sub-Sections	Description	Location within Report
E-1	Description of the design storm frequency intensity, volume and duration	Pages 2 thru 7
E-2	Watershed maps, existing and proposed	Appendix B
E-3	Computations for Tc	Page 3; Appendix C
E-4	Imperviousness Calculations	Pages 3 thru 5; Appendix C
E-5	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts	Pages 4 thru 8; Appendices B & C
E-6	Documentation of sources	Pages 2 thru 3, 6, & 8
E-7	Hard copy of input and output data including input/output tables	Appendix C
E-8	Computations used to determine peak runoff rates, and velocities for each watershed area: Stream channel protection (2-yr frequency), conveyance protection (10-yr frequency), peak runoff attentuation (2, 10, 100-yr frequency), Emergency outlet sizing (safely pass 100-yr frequency)	Appendix C
E-9	Sedimentation & Erosion Control Plans & Details	Appendix D
E-10	Sedimentation & Erosion Control Narrative	Page 8

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Hartford-South (Contract No. 155-H025)
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Supplemental Location Information

Section F

Parkville Station Drainage Report for Permitting Submission

October 30, 2009

Sub-Sections	Description	Location within Report
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F-2	Watershed maps, existing and proposed	Appendix B
F-3	Computations for Tc	Page 3; Appendix C
F-4	Imperviousness Calculations	Pages 3 thru 4; Appendix C
F-5	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts	Pages 4 thru 5; Appendices B & C
F-6	Documentation of sources	Pages 2 thru 3
F-7	Hard copy of input and output data including input/output tables	Appendix C
F-8	Computations used to determine peak runoff rates, and velocities for each watershed area: Stream channel protection (2-yr frequency), conveyance protection (10-yr frequency), peak runoff attentuation (2, 10, 100-yr frequency), Emergency outlet sizing (safely pass 100-yr frequency)	Appendix C
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Connecticut Department of Transportation
New Britain-Hartford Busway
Hartford-South (Contract No. 155-H025)
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Supplemental Location Information

Section G

Input and Output Data for Computer Programs Used in Analyses

May 2010

Sub-Sections	Description
G-1	Computer disk with input/output data, associated programs for all computer models used in analyses

Supplemental Location Information

Section H

Hartford-South 90% Highway Design Report (Contract No. 155-H025)

December 2009

Sub-Sections	Description	Location within Report
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Supplemental Location Information

Section I

Flatbush Avenue 90% Highway Design Report

(Contract No. 63-643, 155-H030)

December 2009

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Supplemental Location Information

Section J

Hartford South Busway Watershed Maps (Contract No. 155-H025)

May 2010

Sub-Sections	Description	Location within Report
J-1	Watershed maps, existing and proposed	--

Supplemental Location Information

Section K

Flatbush Avenue Watershed Maps (Contract No. 155-H030, 63-643)

May 2010

Sub-Sections	Description	Location within Report
K-1	Watershed maps, existing and proposed	--

Supplemental Location Information

Section L

Hartford South Sedimentation & Erosion Control Plan Set for New Britain-Hartford Busway (Contract No. 155-H025)

December 2009

Sub-Sections	Description	Location within Report
L-1	Soil erosion and sediment control drawings	SED sheets
L-2	Soil erosion and sediment control details	MDS Sheets

Supplemental Location Information

Section M

Flatbush Avenue Sedimentation & Erosion Control Plan Set for New Britain-Hartford Busway (Contract No. 63-643, 155-H030)

December 2009

Sub-Sections	Description	Location within Report
M-1	Soil erosion and sediment control drawings	SED sheets
M-2	Soil erosion and sediment control details	MDS Sheets

Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant	Date
Name of Applicant (print or type)	Title (if applicable)
Signature of Professional Engineer	Date
Name of Professional Engineer (print or type)	P.E. Number (if applicable) Affix P.E. Stamp Here (if applicable)

Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

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   - b. *Nonintensive Floodplain Uses* 3
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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Htfd Busway, Proj No171-305(155-H025,63-643)**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☒ Yes ☐ No If yes, list the FEMA flood zone(s):

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☒ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

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Section I: Floodplain Management

Note to Reviewer:

The proposed project is the New Britain-Hartford Busway, State Project No. 171-305. This Attachment H: Engineering Documentation refers to the Hartford-South portion of the Busway (Contract No. 155-H025), including the Flatbush Avenue Station, the Parkville Avenue Station, and the reconstruction of Flatbush Avenue (Contract No. 63-643).

The only floodplain in the project area that will be impacted by these projects is Kane Brook. Two independent busway drainage systems are proposed to outfall into Kane Brook on the Northwest side of its crossing under the Busway. Each of these proposed independent drainage systems will outlet into Kane Brook via reinforced concrete culvert. Therefore, answers to questions regarding floodplains in "Section I: Floodplain Management" refer to the impacts to Kane Brook at this location.

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☒ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☒ Degrading ☐ Aggrading ☐ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☒ Yes ☐ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☒ Yes ☐ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Please see attached sheet.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☒ Yes ☐ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management

Subsection 2: Flooding and Flood Hazards

***f. Storage of Materials & Equipment* – Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?**

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

The construction of the 30" R.C. pipe drainage outlet (System 3) and the 18" R.C. pipe drainage outlet (System 4) are both located within the 500-year floodplain for the Kane Brook. It is possible that the construction of these two outfalls will require the storage of construction equipment such as excavators to be stored within the 500-year floodplain for Kane Brook for a short period of time.

All construction equipment required to construct these two outfalls could be removed from the channel when the work is not actively being performed. Construction of the outfalls will take place during a period when rainfall is anticipated to be at a minimum. Rainfall, flow velocity and flow depth will be monitored during the time that construction is ongoing in the floodplain. If heavy rainfall or flooding is anticipated during construction, the equipment will be removed from Kane Brook to prevent pollution or hazards to life and property.

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?

   ☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

   ☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

   ☐ Yes ☐ No

   The 500 year flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

   ☐ Yes ☐ No

   If yes, the structure will be: ☐ Elevated ☐ Floodproofed

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

   The structure is floodproofed to: ft. (Datum:)

   Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system?
   ☐ Yes ☐ No

   If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

   If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

   ☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

   ☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☒ Yes ☐ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☒ Yes ☐ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☐ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☒ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☒ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☐ Yes ☒ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☐ Yes ☐ No

The channel capacity is designed for the: year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☐ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☐ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☐ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☐ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☐ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☐ Yes ☒ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☐ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☐ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☐ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☐ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☐ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☐ Yes ☐ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☐ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

☐ Tidal, minor

☐ Tidal, small

☐ Tidal, intermediate

☐ Tidal, large

☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☐ Yes ☐ No

   If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☐ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☐ Yes ☐ No

   Explain:

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

☐ 1. the road is at or close to the floodplain grade

☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

☐ 3. provisions are made to barricade the road when overtopped

☐ 4. the road or driveway is posted as being subject to flooding

☐ 5. the road or driveway has low traffic volume

☐ 6. alternate routes are available

The culvert or bridge has been designed to pass the: year frequency discharge with an underclearance of: feet.

Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: structure.

Section I: Floodplain Management (continued)

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☐ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☐ Yes ☐ No ☒ No temporary hydraulic facilities

If yes, the design flood frequency is the: year flood.

Describe the temporary facilities:

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Htfd Busway, Proj No171-305(155-H025,63-643)**

1. *Stormwater Runoff*

The proposed project will (check all that apply):

- ☒ Increase the area of impervious surfaces
- ☒ Increase runoff coefficients
- ☐ Alter existing drainage patterns
- ☒ Alter time of concentrations
- ☒ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☐ Yes ☒ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

The contract includes construction of multiple drainage systems; two connecting to proposed adjacent Busway contracts' systems, three connecting to existing adjacent street storm drain systems, and two outfalling directly into Kane Brook. The impacts to peak flow rates, timing of runoff, and volume of runoff at specific discharge points vary. See attached sheets for descriptions of the drainage systems.

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	**Please see attached sheet.**	
10		
100		

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Drainage system design was completed using the Rational Method. All design was completed based on the basic Rational Method assumption that peak runoff occurs at the time of concentration of the watershed (or sub-watershed). Post development time of concentration ranged from 5 to 30 minutes within the project site watersheds.

Section II: Stormwater Management

Subsection 1. *Stormwater Runoff*

Drainage System 1: Proposed Busway Drainage (Sta. 332+00 to 343+50)

	10-year Storm Time of Concentration (min)	10-year Storm Duration (hr)	Return Frequency		
			2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	--	24	1.5	2.29	3.23
Post-Development (1)	22.9	0.38	2.48	3.73	5.48

NOTES: 1. System discharges into adjacent Busway Contract No. 93-H034 at Sta. 332+00.

Drainage System 2: Proposed Busway Drainage (Sta. 343+50 to 351+98)

		10-year Storm Time of Concentration (min)	10-year Storm Duration (hr)	Return Frequency		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	2-1 (Proposed Busway Drainage)	--	24	1.22	1.86	2.63
	2-2 (Flatbush Avenue Station)	5	0.08	9.18	11.98	15.57
	2-3 (Flatbush Avenue System)	--	24	14.4	22.71	32.12
Post-Development	2-1 (Proposed Busway Drainage) (1)	8	0.13	1.79	2.52	3.44
	2-2 (Flatbush Avenue Station) (2)	8	0.13	4.17	5.30	6.24
	2-3 (Flatbush Avenue System) (3)	27	0.45	11.22	19.72	30.40

NOTES: 1. System discharges into Flatbush Avenue Project (Contract No. 63-643, 155-H030) at Sta. 351+98.
2. Flatbush Station discharges into proposed busway system at Sta. 350+57.
3. Flatbush Avenue system ties into existing MDC system at Sta. 22+68.

Drainage System 3: Proposed Busway Drainage (Sta. 351+98 to 384+50)

	10-year Storm Time of Concentration (min)	10-year Storm Duration (hr)	Return Frequency		
			2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	--	24	3.75	5.72	8.09
Post-Development (1)	29.5	0.49	9.83	15.80	24.43

NOTES: 1. System discharges into Kane Brook at Sta. 384+50.

Drainage System 4: Proposed Busway Drainage (Sta. 384+50 to 404+00)

	10-year Storm Time of Concentration (min)	10-year Storm Duration (hr)	Return Frequency		
			2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	--	24	1.11	1.68	2.38
Post-Development (1)	15.4	0.26	3.82	6.11	9.23

NOTES: 1. System discharges into Kane Brook at Sta. 385+00.

Drainage System 5: Proposed Busway Drainage (Sta. 404+00 to 418+00)

		10-year Storm Time of Concentration (min)	10-year Storm Duration (hr)	Return Frequency		
				2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	5-1 (Proposed Busway Drainage)	--	24	0.85	1.29	1.82
	5-2 (Parkville Station)	5	0.08	9.85	12.84	16.69
Post-Development	5-1 (Proposed Busway Drainage) (1), (2)	10.8	0.18	3.73	5.45	7.59
	5-2 (Parkville Station)	5	0.08	4.40	5.75	7.47

NOTES: 1. System discharges into existing MDC drainage system on Francis Avenue (Left of Sta. 412+75).
2. The Busway drainage system will outlet into a proposed underground detention system located to the left of the Busway at Sta. 412+75 just prior to discharging into the existing MDC system.

Drainage System 6: Proposed Busway Drainage (Sta. 418+00 to 439+25)

	10-year Storm Time of Concentration (min)	10-year Storm Duration (hr)	Return Frequency		
			2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	--	24	1.76	2.67	3.78
Post-Development (1)	31.2	0.52	3.14	5.11	7.43

NOTES: 1. System discharges into existing MDC drainage system on Park Road (Sta. 418+00)

Drainage System 7: Proposed Busway Drainage (Sta. 439+25 to 450+00)

	10-year Storm Time of Concentration (min)	10-year Storm Duration (hr)	Return Frequency		
			2-year (CFS)	10-year (CFS)	100-year (CFS)
Pre-Development	--	24	3.30	5.02	7.11
Post-Development (1)	29.8	0.5	4.32	6.62	9.91

NOTES: 1. System discharges into adjacent Busway project at Sta. 405+00 (Contract No. 63+H137)

Section II: Stormwater Management

Subsection 1: Stormwater Runoff

Describe the location of the design point and why this location was chosen:

Contract No. 155-H025 and 63-643 involves the construction of approximately 11,800 linear feet of roadway for the Busway project through the towns of West Hartford and Hartford, CT and the reconstruction of Flatbush Avenue in West Hartford, CT. The contract includes connections to several existing storm drainage systems and the construction of new systems for the Busway roadway. Two of the proposed system outfall in the Kane Brook.

The following is a description of the seven drainage systems, their design point and why the design point location was chosen:

Drainage System 1

Drainage system 1 is located at the very beginning of the Busway (Sta. 332+00 to 343+50) and includes four new catch basins and a drainage ditch on the west side of the Busway. This system is proposed to outlet into the adjacent project (Contract No. 93-H046) at Sta. 332+00 which was chosen as the design point for this submission. The system eventually discharges into Trout Brook. Please see Contract No. 93-H046 for more information.

Drainage System 2

Drainage system 2 includes the proposed busway drainage system (Sta. 343+50 to 351+98) and the proposed Flatbush Avenue Station drainage system (Contract No. 88-H039). This system connects to the proposed Flatbush Avenue drainage system (Contract No. 63-643) at Sta. 351+98. The Flatbush Avenue Station drainage connects to the proposed Busway system at Sta. 350+57.70 and includes a series of yard drains and catch basins. The runoff from the Flatbush Avenue Station goes through a hydrodynamic separator prior to entering the Busway system. The proposed Busway system includes six catch basins. The proposed Flatbush Avenue drainage system consists of a series of catch basins located along the realigned New Park Avenue and Flatbush Avenue intersection. The proposed Flatbush Avenue system connects to an existing 30" reinforced concrete pipe within Flatbush Avenue just east of the Busway. This existing system discharges into the Park River adjacent to Flatbush Avenue. The discharge into Park River was chosen as the design point for this submission.

The MDC has been sent pre- and post-development flows and is reviewing. A developer's permit is necessary at this location.

Drainage System 3

Drainage system 3 includes the proposed busway drainage system (Sta. 351+98 to 384+50) and consists of a series of catch basins located along the Busway line and a drainage ditch located on the west side of the Busway. The system outlets into Kane Brook on the west side of the busway at Sta. 384+50 via a 30" reinforced concrete culvert end, which was chosen as the design point. A riprap splash pad will be provided where the system outlets into Kane Brook.

Drainage System 4

Drainage system 4 includes the proposed Busway drainage system (Sta. 384+50 to Sta. 404+00) and consists of a series of catch basins along the Busway line. The system outlets into Kane Brooke on the west side of the busway at Sta. 385+00 via an 18" reinforced concrete culvert end, which was chosen as the design point. A riprap splash pad will be provided where the system outlets into Kane Brook.

Drainage System 5

Drainage system 5 includes the proposed Busway drainage system (Sta. 404+00 to Sta. 418+00) and the Parkville Station drainage system located on the west side of the busway just prior to its crossing with Park Street. The proposed Busway drainage in this area consists of a series of catch basins and connects to a proposed underground detention basin at Sta. 412+75. The detention basin will be located under the proposed Parkville Station parking lot.

The Parkville Station drainage consists of a series of catch basins and yard drains. The proposed site design will significantly increase the amount of pervious area on the site. The majority of the runoff in the parking and plaza areas at the Station will connect directly to the proposed underground detention facility via two connection points.

The proposed underground detention basin consists of 8-170'-48" HDPE pipes. Runoff discharging from the detention facility will enter the existing MDC system at Francis Avenue via a 30" R.C. pipe, which was selected as the design point. The stormwater will eventually reach the Park River Conduit just east of the busway corridor.

The MDC has been forwarded the pre-and post-development flows and detention system calculations and has indicated that the flow rates appear acceptable. This system will require obtaining a lateral connection permit during construction.

Drainage System 6

Drainage system 6 includes the proposed busway drainage system (Sta. 418+00 to 439+25) which consists of a series of catch basins and drainage ditch located to the west of the busway. This drainage system ties into the existing MDC system at Sta. 431+80, which was chosen as the design point. This system is conveyed to the Park River Conduit just east of the Busway via a 66" R.C. pipe.

The MDC has been forwarded pre- and post-development flows and will be reviewing. A determination is not expected until after their citywide modelling efforts is complete. This system will require obtaining a lateral connection permit during construction.

Drainage System 7

Drainage system 7 includes the proposed busway drainage system at the northerly end of this contract (Sta. 439+25 to 450+00). The proposed system consists of a series of catch basins and a ditch located to the west of the busway. This system is proposed to outlet into the adjacent Contract No. 63-H137 located to the north of this project at Sta. 450+00, which was chosen as the design point for this submission. The adjacent system ultimately outlets into the Park River Conduit. Please refer to Contract No. 63-H137 for more information.

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

Please see preceding attached sheet.

2. *Stormwater Detention Facilities*

Does the proposed project include the construction of any stormwater detention facilities?

☒ Yes ☐ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☒ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2	0	4.35	0.33
10	0	7.08	0.97
100	0	8.39	2.77

The above peak discharges were computed utilizing the: **24** hour duration storm. This duration storm was selected because:

A 24-hour storm duration was used to calculated the above peak discharges as required by the Connecticut Department of Transportation.

Describe the location of the design point and why this location was chosen:

The design point for the detention basin is located under the proposed Parkville Station. This location was chosen as this is where the proposed Busway drainage system will connect to the existing MDC system along Francis Avenue. Additionally, the proposed Parkville Station was designed with the intentions that the detention basin would be located under the site.

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

The proposed detention basin discharges into the existing MDC system along Francis Street and eventually outlets into the Park River Conduit. At this oulet location, the Park River Conduit is a concrete channel. Additionally, the peak flow rates for the detention system will not coincide with the peak flow rates for the Park River Conduit. Therefore, it is not anticipated that the increases in peak flow rates will impact downstream areas.

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☒ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☒ Yes ☐ No

Explain:

The detention facility will be an underground facility located at the site of the proposed Parkville Station.

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☒ Yes ☐ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☒ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☒ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☒ Yes ☐ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

Grass lined drainage ditches and channels are provided intermittently along the Busway line to improve the quality of the stormwater runoff.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

By implementing best management practices and erosion and sedimentation controls during construction and by installing new or upgraded drainage systems, the project will minimize construction impacts over the short-term and, over the long term, protect nearby natural resources. Hay bales will be installed at all catch basins near construction to avoid sediment transport or build up in the existing drainage systems.

Erosion will be kept to a minimum by providing temporary or permanent cover on surfaces exposed by construction activities in a timely manner. Sediment from erosion which does occur will be captured and kept on site by strategic placement of silt fencing and other sediment barriers. The barriers will be placed at the downhill end of exposed slopes and at intervals along temporary and permanent swales, ditches and channels.

Section III: State Grants and Loans

Name of Applicant:

Name of Proposed Project:

1. This Flood Management Certification concerns a: ☐ grant ☐ loan

2. Total amount of grant or loan: $

3. The recipient of the grant or loan will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Recipient Contact person:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

4. The recipient will use the grant or loan to (check all that apply):

   ☐ construct a structure, obstruction or encroachment or conduct other work within a floodplain or coastal high hazard area.

   ☐ construct a facility or develop a site affecting drainage and stormwater runoff.

   ☐ conduct a study or prepare a report concerning land use or land use planning affecting a floodplain, drainage or stormwater runoff.

5. If the grant or loan is for a study or report, describe the anticipated effects on floodplains, drainage or stormwater runoff if the recommendations are implemented:

6. Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development? ☐ Yes ☐ No

   Explain:

If the grant or loan is for construction of a structure, obstruction or encroachment or other work within a floodplain, or if it is for construction of a facility or development of a site that will affect drainage and stormwater runoff, Sections I and/or II of this Worksheet must be completed and the engineering report (Attachment H) and plans (Attachment G) must be provided as part of this application.

Section IV: Disposal of State Land

Name of Applicant:

Name of Proposed Project:

1. The grantee will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Contact Person: Phone:

2. Describe the current state of development and use of the land to be disposed.

3. Why is the agency disposing of the land?

4. Describe the grantee's intended use of the land.

5. Will the disposal of the land promote development in floodplains? ☐ Yes ☐ No

   Explain:

6. Will the grantee's use of the land be consistent with the state's flood management statutes and regulations?

   ☐ Yes ☐ No Explain:

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation
Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 63-H137

Design Contract Name: New Britain – Hartford Busway Hartford North Segment

Date: May 17, 2009

Date of Pre-Application Attachment H (if applicable): Not Applicable

Changes From Pre-Application Submittal (if applicable): Not Applicable

Engineering Reports Pertinent to Attachment H

- 90 % Drainage Report New Britain- Hartford Busway- Hartford North Project as revised, Prepared by H.W. Lochner Inc. June 2009

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Attachment H Engineering Documentation

1.1 Introduction

1.1.1 Background

The Connecticut Department of Transportation (ConnDOT) retained H. W. Lochner, Inc. (LOCHNER) to prepare a Flood Management Certification Attachment H for a segment of a dedicated bus rapid transit facility from New Britain to Hartford.

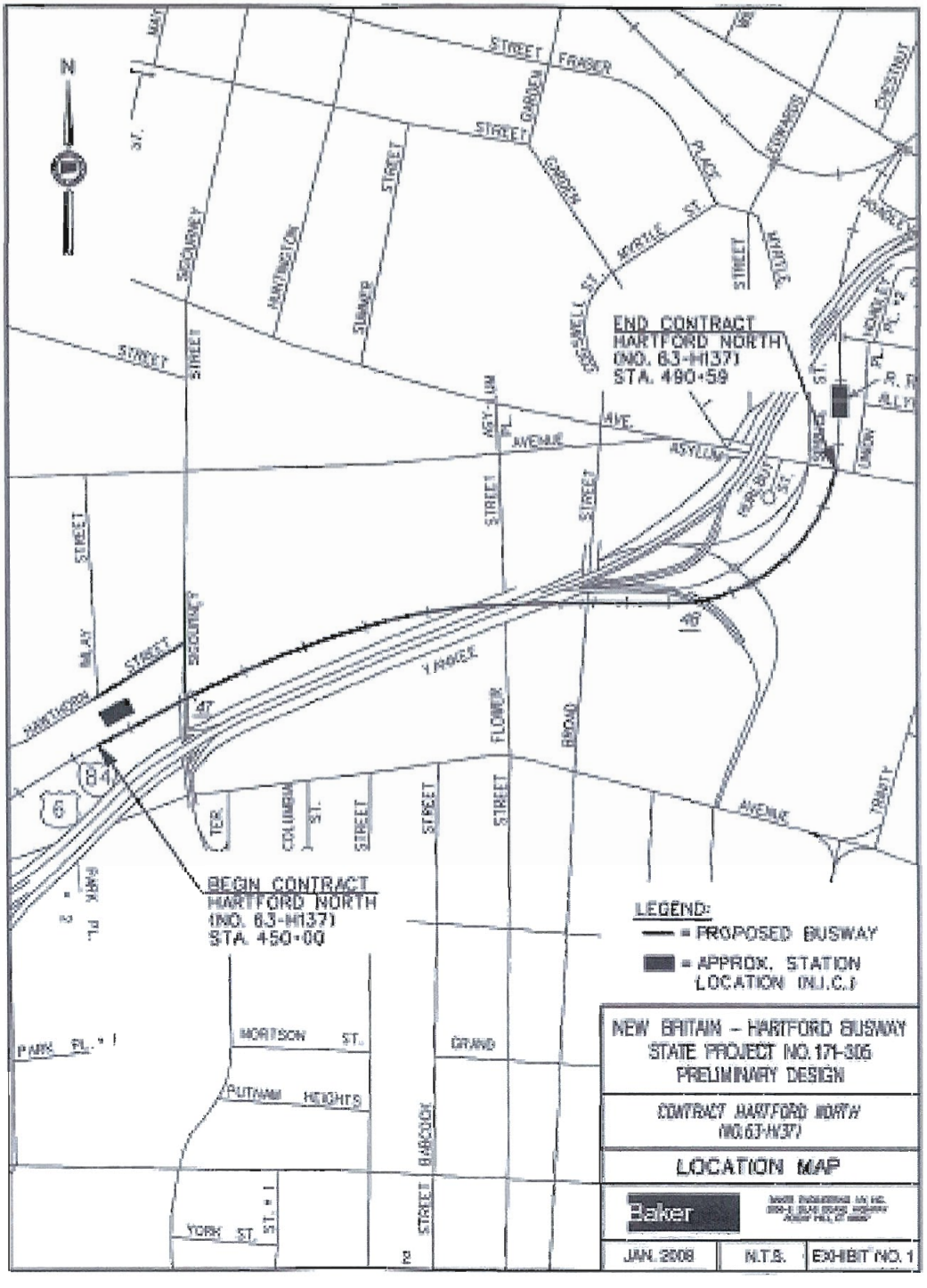
The Preliminary Engineering led to decisions to break the 9.4 mile long busway into five separate line contracts to be developed in the Final Design Phase. Lochner has been assigned the Final Design (FD) Phase for the northernmost section in Hartford – designated Project 63-H137 (Hartford-North Section), see Exhibit 1 for the project location.

The Hartford North segment begins at station 450+00, approximately 725 feet south of the proposed Sigourney Station, and ends at 490+55, matching the existing grade at Asylum Street. The resulting project length, along the baseline, is 4,055 feet or 0.77 miles.

The project also includes the reconfiguration of the intersection of Sigourney and Hawthorn Streets, and the reconstruction the State of Connecticut Department of Public Works (DPW) parking lot.

The Hawthorn work starts at the intersection of Imlay Street and Hawthorn Street and runs east to its terminus with Sigourney Street. The Sigourney work starts approximately 100 feet north of the existing Aetna Service Road and ends at the Sigourney Street Bridge over I-84 to the south. The DPW parking lot is located on Capitol Avenue between Flower and Broad Street. The parking lot is also bounded by the Hartford Courant property.

All drainage associated with the Hartford North Contract (No. 63-H137) will be directed to the Park River via gate structures. The Park River from Farmington Avenue to the Connecticut River is contained within twin cell box culverts known as the Park River Conduit.


END CONTRACT
HARTFORD NORTH
(NO. 63-H137)
STA. 490+59
BEGIN CONTRACT
HARTFORD NORTH
(NO. 63-H137)
STA. 450+00
LEGEND:
= PROPOSED BUSWAY
= APPROX. STATION LOCATION (N.I.C.)
NEW BRITAIN – HARTFORD BUSWAY
STATE PROJECT NO. 171-305
PRELIMINARY DESIGN
CONTRACT HARTFORD NORTH
(NO.63-H137)
LOCATION MAP
Baker
JAN. 2008
N.T.S.
EXHIBIT NO. 1

1.1.2 Flood Plain Management

The Hartford North Contract (No. 63-H137) does not involve a structure, an obstruction, an encroachment or work in a watercourse, floodplain, or coastal high hazard area; Therefore Part II Section I Floodplain Management does not apply to this project.

1.1.3 Inland Wetlands

All wetlands located within the Busway corridor were field delineated and none were identified within the limits of the Hartford North contract. Therefore, no wetlands impacts are anticipated.

1.1.4 Stormwater Runoff

The Hartford North contract (No. 63-H137) is located in a highly-developed urban area. The storm water conveyance system within the area includes a complex arrangement of both storm sewer and combined sewer systems. As part of drainage evaluation, Lochner met with the City of Hartford Flood Commission (City of Hartford) and the Metropolitan District Commission (MDC). The City of Hartford and the MDC provided as-built drawings and reports related to high and low level interior drainage that discharge to several gate chambers, which eventually discharges to the Park River Conduit System. They have also provided to Lochner, original Park River Conduit Design and Construction Drawings.

According to the City of Hartford, there are approximately thirty gate chambers. Lochner identified nine gate structures and one alternate connection point (man- hole at intersection of Capital Avenue and Flower Street adjacent to DPW Parking Lot) within the project limits. The Gate Chambers are identified as Gate Chambers Numbers 6, 7 8, 9, 10, 11, 12, the Gully Brook Gate and the Armory Pump Station Flap Gate. These chambers convey storm water from I-84 and local street drainage and include mechanically operated sluice gates within a Special Manhole. The pipes entering the chamber are also equipped with flap gates to prevent the back water from both the Park River and the Connecticut River from surging up the storm water system. With regard to the alternate connection point adjacent to DPW Parking Lot, this man-hole conveys stormwater runoff to the Park River Condit via the Pope Park Pump Station located in the vicinity of Park Street and Capital Avenue. It is our understating that the Gates and Pump Stations are operated by the City of Hartford, and the drainage systems that are connected to the

Gates and Pump Stations are owned by a combination of the City of Hartford, the MDC, or the State.

It is noted that two gate structures were not considered for Busway flow; Gates 7 and 12 due to their location relative to the Busway. Gate 7 is located in the green island to the rear of the Armory and it discharges to the south side Park River Conduit. Gate 12 is located along the southwest side of Sigourney Street and along the eastbound side of I-84.

Coordination between Lochner, the City of Hartford and the MDC is ongoing related to drainage and utility conflicts.

1.1.5 Stormwater Treatment

The following storm water treatment measures are proposed:

Busway

- Off-line system
- Standard DOT Catch basins with 2 foot sumps
- Standard DOT Catch basins with 4 foot sumps (last catch basin in run)

Sigourney and Hawthorn Streets and the DPW Parking Lot

- Standard DOT or City of Hartford Catch Basins with 2 foot sumps and hoods

Part 1: Engineering Report Checklist

Attachment H: Engineering Documentation
Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
Below Section 1.2	Description of the design storm frequency intensity, volume and duration
Appendix C of the Drainage Report	Watershed maps, existing and proposed
Appendix D of the Drainage Report	Computations for Tc
See Table 2 of the Drainage Report	Imperviousness calculations
NA	NRCS runoff curve numbers, volumetric runoff coefficients
NA	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
NA	Hydrograph routing calculations
Drainage Report	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
NA	Infiltration rates
Appendix G of the Drainage Report	Documentation of sources
Appendix H of the Drainage Report	Computer disk containing input and output data and the associated program for all computer models used in the analyses
Appendix D of the Drainage Report	Hard copy of input and output data including input/output tables
NA	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
NA	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
NA	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
NA	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
NA	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
NA	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
NA	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
NA	Primary and emergency spillway and outlet structure erosion protection
NA	Dam breach analysis
NA	Geotechnical evaluation
NA	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
Section 5 of the Drainage Report	Narrative
Plans in the of the Drainage Report	Drawings
Plans in the of the Drainage Report	Details
Appendix D of the Drainage Report	Calculations for Engineered Measures

Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

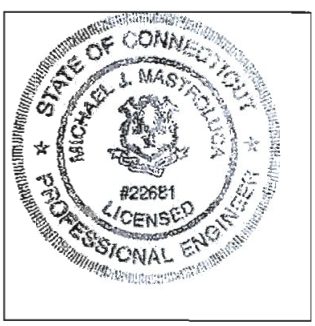
"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant	Date
Name of Applicant (print or type)	Title (if applicable)
Signature of Professional Engineer	12/17/09 Date
Michael J. Mastroluca, P.E. Name of Professional Engineer (print or type)	0022681 P.E. Number (if applicable)

Affix P.E. Stamp Here
(if applicable)



1.2 Design Methodology

In accordance with the ConnDOT Drainage Manual, peak flows to the design points were estimated using the Rational Method.

1.2.1 Rational Method Parameters

1.2.1.1 Drainage Areas

Lochner delineated the drainage areas using topographical mapping provided by the City of Hartford and the Metropolitan District Commission (MDC). Existing and Proposed Drainage Area Maps are included in Appendix C of the Drainage Report.

1.2.1.2 Runoff Coefficient

The following runoff coefficients (C) were used:

Surface Cover	C value
Impervious Surfaces (paved, roof, gravel, etc)	0.90
Grass	0.23
Woods	0.13
Commercial	0.89

1.2.1.3 Rainfall Intensity

Lochner used the Intensity/Duration/Frequency (IDF) curve from the ConnDOT Drainage Manual to determine rainfall intensities.

1.2.1.4 Time of Concentration

Depending on the size of the drainage area, Tc's were either assumed to be 5 minutes for small paved areas, with a minimum value of 10 minutes used for areas that are all or mostly unpaved, as well as roof areas where water can be stored. Calculations related to the Tc's are included in Appendix D of the Drainage Report.

Part II: Hydrologic and Hydraulic Consistency Worksheet

Part II Section I Flood Plain Management

The proposed busway project does not involve a structure, an obstruction, an encroachment or work in a watercourse, floodplain, or coastal high hazard area; Therefore Part II Section I Floodplain Management does not apply to this project and is not included in this application.

Part II Section II Stormwater Management

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain Hartford Busway - Hartford North (Contract No. 63-H137)**

1. *Stormwater Runoff*

The proposed project will (check all that apply):

- ☒ Increase the area of impervious surfaces
- ☒ Increase runoff coefficients
- ☐ Alter existing drainage patterns
- ☒ Alter time of concentrations
- ☒ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☒ Yes ☐ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

Hartford North Contract (No. 63-H137) includes the construction of a two-lane Busway from the contract interface with Hartford South (No. 155-H025) to just east of the existing Sigourney Street Bridge; a one-lane Busway from that point to the intersection with Flower Street; a two-lane Busway from Flower Street to the Busway terminus at Asylum Street; and the reconstruction of a portion of Sigourney and Hawthorn Streets in the vicinity of Sigourney Street Station. Construction consists of the Busway itself, two (2) bridges, fourteen (14) retaining walls, travel/drop-off lanes for stations, and reconstruction of the I-84 westbound entrance ramps from both Asylum Street and Capitol Avenue, and reconstruction of the I-84 eastbound exit ramp to Asylum Street. This contract is the last (from south to north) of five (5) Busway line contracts that will form the New Britain – Hartford Busway. As discussed in the drainage report, there are nine design points, which consists of a manhole from the CTDPW Parking Lot, five numbered gate structures, the Armory Pump Station (36-Inch and 48-inch), and the Gully Brook Conduit, which all convey storm water to the Park River Conduit. The proposed conditions will cause an increase in five of the seven outfalls. These increases will not cause adverse flooding impacts upstream due to the increases in discharge.

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	See pages 26- 28	See pages 26-28
10	See pages 26-28	See pages 26-28
100	See pages 26-28	See pages 26-28

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

The existing and proposed discharges were calculated using the rational method. A summary of drainage areas, times of concentrations, and intensities are summarized on pages 29 through page 33. A duration of 2 times the tc was used.

Peak Discharges

As discussed in the drainage report, there are nine design points, which include:

- A manhole on Flower Street from the CTDPW Parking Lot
- Five numbered gate structures (Gates 6, 8, 9, 10 and 11)
- Armory Pump Station (48-inch and 36 inch)
- Gully Brook Conduit Gate (36-inch Sluice Gate)

The design points all convey stormwater from existing areas adjacent to the Busway as well as the proposed Busway to the Park River Conduit. Below is a summary of the 2, 10 and 100 year discharges for the pre and post conditions.

Gate 6		
Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	15.57	4.02
10	21.36	6.08
100	28.43	9.57

Gate 8		
Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	25.96	23.05
10	35.90	32.75
100	45.44	44.38

Gate 9		
Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	12.83	15.60
10	18.00	21.74
100	19.12	24.16

Gate 10		
Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	7.99	10.62
10	10.96	14.52
100	14.64	18.99

Gate 11		
Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	22.00	34.95
10	32.00	50.01
100	46.35	60.91

ARMORY PUMP STATION 36 -INCH		
Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	32.76	32.77
10	47.08	47.04
100	66.63	66.63

ARMORY PUMP STATION 48 -INCH		
Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	3.49	4.38
10	5.31	6.17
100	7.16	7.23

GULLY BROOK GATE		
Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	48.06	11.33
10	66.16	16.99
100	92.12	24.69

DPW PARKING LOT TO MH ON FLOWER STREET		
Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	8.95	11.44
10	11.94	14.92
100	16.17	19.40

Drainage Tables

Gate 6		
	Pre-Development	Post-Development
Area (acres)	7.610	9.178
% impervious	61%	58%
Runoff Coef.	0.61	0.55
Time of Concentration (min)	11.71	104.30
Duration (hrs)	0.39	3.48
2 yr intensity (inches/hr)	3.30	0.80
10 yr intensity (inches/hr)	4.50	1.30
100 yr intensity (inches/hr)	6.10	1.90
Gate 8		
	Pre-Development	Post-Development
Area (acres)	11.684	12.823
% impervious	62%	72%
Runoff Coef.	0.64	0.65
Time of Concentration (min)	12.02	18.10
Duration (hrs)	0.40	0.60
2 yr intensity (inches/hr)	3.30	2.70
10 yr intensity (inches/hr)	4.50	3.80
100 yr intensity (inches/hr)	6.10	5.30

Gate 9		
	Pre-Development	Post-Development
Area (acres)	3.172	4.007
% Impervious	100%	100%
Runoff Coef.	0.90	0.90
Time of Concentration (min)	8.62	8.65
Duration (hrs)	0.29	0.29
2 yr intensity (inches/hr)	3.80	3.80
10 yr intensity (inches/hr)	5.10	5.10
100 yr intensity (inches/hr)	6.70	6.70
Gate 10		
	Pre-Development	Post-Development
Area (acres)	4.177	4.945
% impervious	66%	72%
Runoff Coef.	0.56	0.61
Time of Concentration (min)	11.37	11.06
Duration (hrs)	0.38	0.37
2 yr intensity (inches/hr)	3.40	3.40
10 yr intensity (inches/hr)	4.70	4.70
100 yr intensity (inches/hr)	6.30	6.30

GATE 11		
	Pre-Development	Post-Development
Area (acres)	18.858	21.600
% impervious	69%	73%
Runoff Coef.	0.61	0.66
Time of Concentration (min)	31.06	28.41
Duration (hrs)	1.04	0.95
2 yr intensity (inches/hr)	1.90	2.00
10 yr intensity (inches/hr)	2.80	3.00
100 yr intensity (inches/hr)	4.00	4.30
Amory 36 inch		
	Pre-Development	Post-Development
Area (acres)	15.051	15.051
% impervious	91%	91%
Runoff Coef.	0.84	0.84
Time of Concentration (min)	18.08	18.07
Duration (hrs)	0.60	0.60
2 yr intensity (inches/hr)	2.70	2.70
10 yr intensity (inches/hr)	3.80	3.80
100 yr intensity (inches/hr)	5.30	5.30

Armory 48 inch		
	Pre-Development	Post-Development
Area (acres)	12.806	12.426
% impervious	44%	44%
Runoff Coef.	0.43	0.45
Time of Concentration (min)	164.96	164.21
Duration (hrs)	5.50	5.47
2 yr intensity (inches/hr)	0.60	0.60
10 yr intensity (inches/hr)	0.90	0.90
100 yr intensity (inches/hr)	1.30	1.30
Gully Brook		
	Pre-Development	Post-Development
Area (acres)	17.808	17.669
% impervious	94%	93%
Runoff Coef.	0.88	0.87
Time of Concentration (min)	13.23	134.94
Duration (hrs)	0.44	4.50
2 yr intensity (inches/hr)	3.10	0.70
10 yr intensity (inches/hr)	4.30	1.10
100 yr intensity (inches/hr)	5.90	1.60

DPW Parking Lot		
	Pre-Development	Post-Development
Area (acres)	2.763	2.763
% impervious	100%	100%
Runoff Coef.	0.90	0.90
Time of Concentration (min)	10.00	5.00
Duration (hrs)	0.33	0.17
2 yr intensity (inches/hr)	3.60	4.60
10 yr intensity (inches/hr)	4.80	6.00
100 yr intensity (inches/hr)	6.50	7.80

Below is a table summarizing discharges, treatment to the receiving waters.

Stormwater Drainage &Receiving Waters
New Britain- Hartford Busway
State Project No. 171-305
Contract No. 063-H137

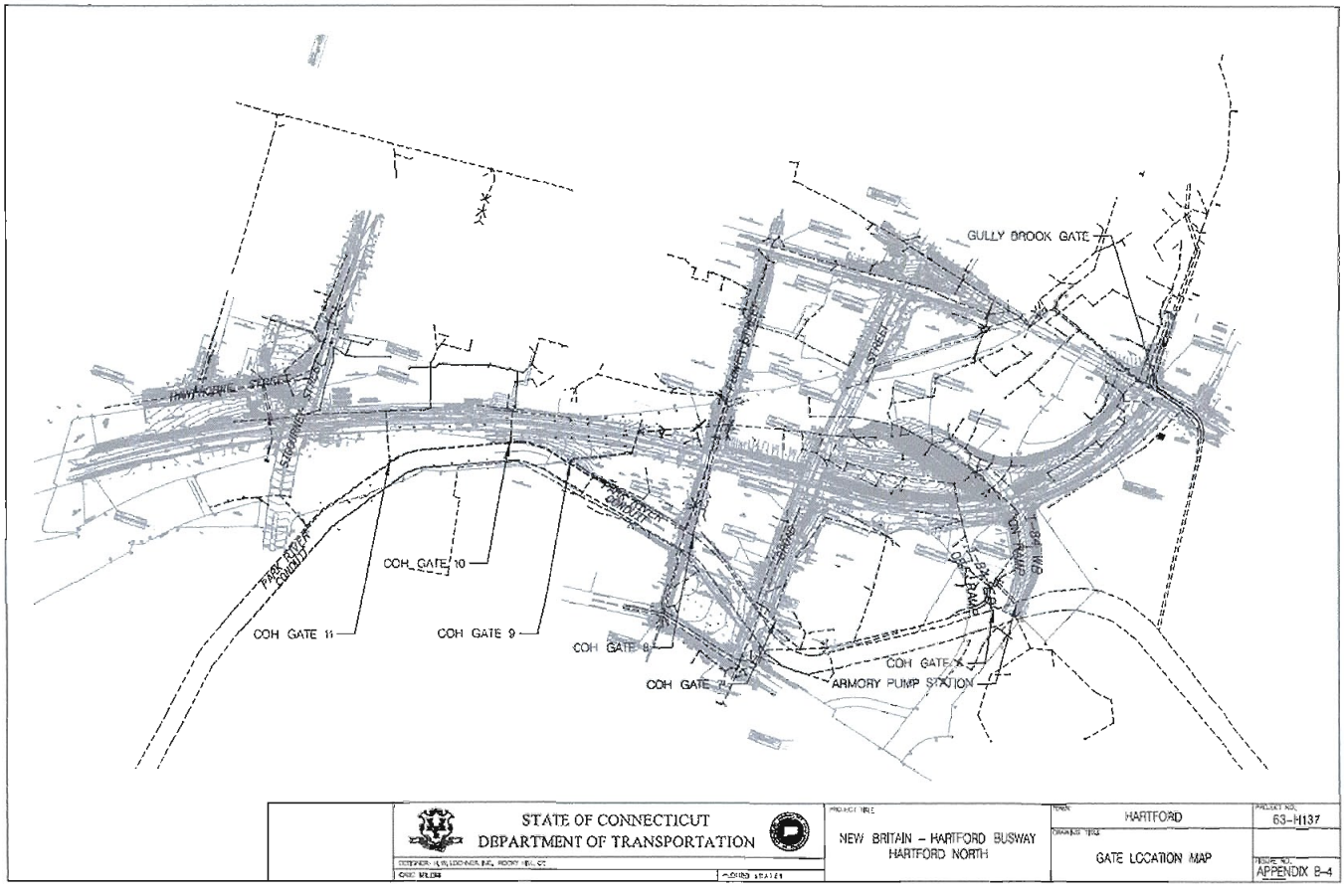
Drainage System Number/ Description (Station)	Wetland Impact Site Number	Receiving Waters (Name)	Outlet Protection	# of Proposed Catch Basins	10 Year Peak Discharges (CFS)		Existing Contributing Drainage Area (Acres)	Proposed Contributing Drainage Area (Acres)	Treatment	Notes
					Existing	Proposed				
6 481+64.6	N/A	Park River Conduit	N/A	6	21.36	6.08	7.610	9.178	Catch basins with 2-foot sumps	
8 471+98.02	N/A	Park River Conduit	N/A	8	35.90	32.75	11.684	12.823	Catch basins with 2-foot sumps and last CB with a 4 foot sump	
9 468+62.19	N/A	Park River Conduit	N/A	3	18.00	21.74	3.172	4.007	Catch basins with 2-foot sumps	Includes flows routed from scuppers
10 462+00.00	N/A	Park River Conduit	N/A	6	10.96	14.52	4.177	4.945	Catch basins with 2-foot sumps and last CB with a 4 foot sump	
11 458+49.30	N/A	Park River Conduit	N/A	27	32.00	50.01	18.858	21.600**	--	Combined Drainage to Gate 11
11A	N/A	Park River Conduit	N/A	20	--	46.35	--	15.977	Hooded Catch Basins	Sigourney Street and Hawthorn Street Drainage
11B	N/A	Park River Conduit	N/A	7	--	27.05	--	5.6229	Off Line System with CBs with 2-foot sumps	Busway Drainage
Armory 36	N/A	Park River Conduit	N/A	0	47.08	47.04	15.051	15.051	N/A	
Armory 48	N/A	Park River Conduit	N/A	8	5.31	6.17	12.806	12.426	Catch basins with 2-foot sumps and last CB with a 4 foot sump	
Gully Brook I-84 WB 206+33.97	N/A	Park River Conduit	N/A	12	66.16	16.99	17.808	17.669	Catch basins with 2-foot sumps and last CB with a 4 foot sump	

Stormwater Drainage &Receiving Waters (Cont)
New Britain- Hartford Busway
State Project No. 171-305
Contract No. 063-H137

Drainage System Number/ Description (Station)	Wetland Impact Site Number	Receiving Waters (Name)	Outlet Protection	# of Proposed Catch Basins	10 Year Peak Discharges (CFS)		Existing Contributing Drainage Area (Acres)	Proposed Contributing Drainage Area (Acres)	Treatment	Notes
DPW Parking Lot Between Flower and Broad Street	N/A	Park River Conduit	N/A	2	11.94	14.92	2.763	2.763	Hooded Catch Basins	Parking lot discharges to Park River via a 42-inch pipe

** Includes area and flow from Hartford South, and an area that was entering a combined sewer system that know will go to this gate

The proposed conditions will cause an increase in five of the nine outfalls. These increases will not cause adverse flooding impacts upstream due to the increases in discharge. When comparing the total areas as a whole there is an approximately 10 acres of increase in area from existing to the proposed with the maximum increase in area of 7 acres, occurring at Gate 11. This increase is primarily due to redirecting drainage from a 3.7 acres residential area that currently enters the combined sewer and approximately 3.22 acres of proposed Busway from Hartford South's System 7 drainage system. The other increases at the other gates are due to the proposed Busway and I-84 scupper outlets above the Busway. Below are summary tables comparing existing and proposed drainage areas. The CONNDOT evaluated options to reduce the increase at Gate 11; one of the options included the rerouting of the Hartford South Drainage to Gate 12. Due to the location of Gate 12 to the Busway, a pipe would need to be jacked under Amtrak and this option was found to be cost prohibitive.


GULLY BROOK GATE
COH GATE 10
COH GATE 11
COH GATE 9
COH GATE 8
COH GATE 7
COH GATE 6
ARMORY PUMP STATION
PARK RIVER
STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
NEW BRITAIN – HARTFORD BUSWAY
HARTFORD NORTH
HARTFORD
63-H137
GATE LOCATION MAP
APPENDIX B-4

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

As discussed in the drainage report, there are nine design points, which consists of a manhole from the CT DPW Parking Lot, five numbered gate structures, the Armory Pump Station (36-Inch and 48-inch), and the Gully Brook Conduit, which all convey storm water to the Park River Conduit. The locations of the outlet (design) points were chosen because of their proximity to the proposed busway. See Gate location Map included in Appendix A of the Drainage Report.

2. *Stormwater Detention Facilities*

Does the proposed project include the construction of any stormwater detention facilities?

☐ Yes ☒ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☐ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2			
10			
100			

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Describe the location of the design point and why this location was chosen:

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☐ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☐ Yes ☒ No

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☒ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☒ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☐ Yes ☒ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

The following storm water treatment measures are proposed:

Busway

- **Off-line system**
- **Standard DOT Catch basins with 2 foot sumps**
- **Standard DOT Catch basins with 4 foot sumps (last catch basin in run)**

Sigourney and Hawthorn Streets and the DPW Parking Lot

- **Standard DOT or City of Hartford Catch Basins with 2 foot sumps and hoods**

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

The goal of erosion and sedimentation controls is to remove 80 percent removal of sediment. Erosion and Sedimentation (E&S) controls such as inlet protection will be placed around catch basin structures and pipe outlets during construction phases as appropriate. In addition to inlet controls, temporary and permanent erosion and sedimentation control measures such as check dams, dewatering basins and sandbags to divert flow will be incorporated into the project.

All activities shall strictly conform to the following documents:

- **Connecticut Guidelines for Soil Erosion and Sediment Control (Guidelines), Connecticut Department of Environmental Protection (CTDEP) Bulletin 34, 2002 and supplements thereto**
- **Connecticut Department of Transportation's CTDOT Standard Specifications for Roads, Bridges, and Incidental Construction, Form 816, 2004 and supplements thereto (Form 816). Section 1.10 Environmental Compliance and Section 2.10 Water Pollution Control are herein referenced for their significance to the purpose of this plan.**
- **CTDOT "On-Site Mitigation for Construction Activities," as revised.**
- **CTDOT Drainage Manual, October 2000 and supplements thereto**

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 093-H052

Design Contract Name: Amtrak Access Road

Date: May 19, 2010

Date of Pre-Application Attachment H (if applicable): November 13, 2009

Changes From Pre-Application Submittal (if applicable): See Attached Summary.

Engineering Reports Pertinent to Attachment H

- Amtrak Access Road - Drainage Report Final Design for Review 90% Submission. May, 2010
- Final Hydraulic Design for Site-4 Busway Station 223+50. September, 2009. Rev. April, 2010.
- Final Hydraulic Design for Site-5 Busway Station 250+40. September, 2009. Rev. January, 2010.

Summary of Changes from Pre-Application Submittal:

- **Updated Amtrak Access Road Final Drainage Report to include Track Drainage calculations.**

- **Updated Attachment H to include Track Drainage calculations.**

Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Section I: Floodplain Management

Name of Applicant: **State of Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Amtrak Access Road**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☒ Yes ☐ No If yes, list the FEMA flood zone(s):

Zone AE

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☒ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☒ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☒ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☐ Yes ☒ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☐ Yes ☐ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?
☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?
☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?
☐ Yes ☐ No

The 500 year flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?
☐ Yes ☐ No

If yes, the structure will be: ☐ Elevated ☐ Floodproofed

The base flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

The structure is floodproofed to: ft. (Datum:)

Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system?
☐ Yes ☐ No

If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?
☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?
☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☒ Yes ☐ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☒ Yes ☐ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☐ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☒ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☒ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☒ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☒ Yes ☐ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☒ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☒ Yes ☐ No

The channel capacity is designed for the: **100** year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☒ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☐ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☐ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☐ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☐ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

The unnamed tributaries to the Piper Brook have not been identified by DEP Fisheries (field visit 7/24/03) as acquatic habitats. Therefore, these design criteria have not been explored at the Site 4 and Site 5 stream channel relocations.

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☒ Yes ☐ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☐ Yes ☒ No

If yes, describe the specific design provisions for fish passage:

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☒ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☒ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☒ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☒ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☒ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☐ Yes ☒ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☐ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

- ☐ Tidal, minor
- ☐ Tidal, small
- ☐ Tidal, intermediate
- ☐ Tidal, large
- ☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☒ Yes ☐ No

   If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☒ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☒ Yes ☐ No

   Explain:

   The Amtrak Access Road over Trout Brook bridge will have a bottom of girder elevation above the flood elevation, making this concern non-applicable.

   The culvert replacements at Site 4 and Site 5 have been designed to handle a 100 year storm event (see Site 4 and Site 5 hydraulic analysis reports under separate cover)

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

   ☐ 1. the road is at or close to the floodplain grade

   ☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

   ☐ 3. provisions are made to barricade the road when overtopped

   ☐ 4. the road or driveway is posted as being subject to flooding

   ☐ 5. the road or driveway has low traffic volume

   ☐ 6. alternate routes are available

   The culvert or bridge has been designed to pass the: **100** year frequency discharge with an underclearance of: **0** feet.

   Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: structure.

Section I: Floodplain Management (continued)

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☒ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☒ Yes ☐ No ☐ No temporary hydraulic facilities

If yes, the design flood frequency is the: **100** year flood.

Describe the temporary facilities:

The existing culverts at Site 4 and Site 5 will serve as temporary hydraulic facilities during the construction of the new culverts. Water handling plans have been developed showing the diversion of the upstream and downstream channels as necessary during construction.

Section II: Stormwater Management

Name of Applicant: **State of Connecticut Department of Transportation**

Name of Proposed Project: **093-H052 Amtrak Access Road**

1. *Stormwater Runoff*

The proposed project will (check all that apply):

- ☐ Increase the area of impervious surfaces
- ☐ Increase runoff coefficients
- ☐ Alter existing drainage patterns
- ☐ Alter time of concentrations
- ☐ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☐ Yes ☒ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

No impacts are anticipated because the existing and proposed conditions are essentially the same in terms of surface cover. The site is currently pervious - similar to a railroad yard. Following construction of the Amtrak Access Road, the surface will be identical to the existing conditions within the vicinity of the tracks and access road.

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	See attached Table	
10		
100		

Stormwater Drainage & Receiving Waters

New Britain-Hartford Busway --- State Project No. 171-305 (Contract No. 093-H052)

Drainage System Number/ Description (Station)	Wetland Impact Site Number	Receiving Waters (Name)	Outlet Protection Type	# of Catch Basins	Existing Flows (Q) 100-year (cfs)***	Proposed Flows (Q) 100-year (cfs)	Contributing Drainage Area (SQ. FT.)	Treatment	Notes
Track Discharge 1	27A	Unnamed Tributary to Piper Brook	Standard Riprap Channel Lining	1	5.65-cfs	5.65-cfs	2.9 acres	Pervious Site Cover (ballasted tracks), Ballast Ditch, HDS	System designed for the 100-year flow event
AAR System 1 765+50 to 737+50	21A	Unnamed Tributary to Piper Brook	Modified Riprap lined swale	0	8.3-cfs	8.3-cfs	4.27 acres	Pervious Site Cover (ballasted tracks), Riprap-lined open channel	System designed for the 100-year flow event
AAR/Track Discharge 2	28	Connection to 093-H046 Drainage at New Britain Ave.	N/A	1	6.50-cfs*	6.50-cfs*	3.33 acres	Perv. Site Cover, Riprap Channel, Ballast Ditch, HDS	System Designed for the 100-year flow event
AAR/Track Discharge 3	29, 30	Connection to 093-H046 Drainage at Trout Brook	Riprap apron	1	8.8-cfs*	8.8-cfs*	4.5 acres	Perv. Site Cover Riprap Channel, *Modified* Riprap Pad, HDS	System Designed for the 100-year flow event
AAR/Track Discharge 4	None	Kane Brook	Type I Preformed Scour Hole	12	24.6 cfs	24.6 cfs	12.5 acres	Perv. Site Cover Riprap apron/overland flow to Kane Brook, 2' min. sumps, HDS	System Designed for the 100-year flow event
AAR System 5 927+00 to 937+37	None	Ex. Drainage System – Connection to Aetna system	N/A	2	3.16 cfs	3.16 cfs	1.62 acres	Perv. Site Cover 2' min. sumps in Drainage Structures	System Designed for the 100-year flow event
Track Discharge 5A	None	Low area below I-84	Modified Riprap pad	1	1.5-cfs	1.5-cfs	0.77 acres	Pervious Site Cover (ballasted tracks), Ballast Ditch	System designed for the 100-year flow event
Track Discharge 5	None	Connection to 063-H137 Drainage	N/A	1	1.03-cfs	1.03-cfs	1.6 acres	Pervious Site Cover, Ballast Ditch	System designed for the 100-year flow event
Track Discharge 6	None	None	N/A	1	1.0-cfs**	1.0-cfs**	0.54 acres	Pervious Site Cover, Ballast Ditch, Infiltration	System designed for the 100-year flow event

*Note: Flow given is only representative of the AAR drainage system design. At these discharge locations, the AAR drainage system connects to a proposed trunk line from the 093-H046 Busway section designed by Amman & Whitney. Please see 093-H046 final drainage analysis and report for final design discharges.

**Note: Track Drainage will be conveyed into the ground via an infiltration trench along the RRR project.

***Note: For design purposes, it is assumed that the proposed land use and drainage areas are consistent with the existing use and areas, as the ground cover will remain stone ballast and the topography of the track corridor will generally remain the same. Therefore it is assumed there is no net change in flows from pre to post conditions for the AAR.

Section II: Stormwater Management

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Due to the highly pervious and uniform character of the project site with the majority of the drainage areas consisting of stone ballast material, global parameters for hydrologic design were implemented that would increase conservatism in the design of the independent systems. Specifically, a time of concentration of 10 minutes was used (CDOT Drainage Manual - minimum time of concentration for pervious surfaces) without taking into account the travel time for runoff from the hydraullically most remote point of each drainage area. This would allow for the greatest rainfall rate to be used in the rational method of runoff computation. Additionally, a runoff coefficient of 0.3 was selected globally following the recommendation for railroad yard areas (CDOT Drainage Manual).

093-H052 Amtrak Access Road Drainage Narrative: The existing drainage patterns for each proposed System currently reach their discharge point via overland flow or infiltration to groundwater tables. The proposed Systems will convey these discharges to concentrated outfalls by either swale or discharge pipe and therefore, the proposed condition of each System discharge will vary:

Track Discharge 1 will convey track drainage via a stone ballast ditch to a low point at STA. 711+50 where it will enter a catch basin, be treated by a hydrodynamic separator unit and be conveyed underground to a "doghouse" style manhole to be constructed on the existing 3.2'x3' box culvert at Hydraulic Site 4. The proposed flow to this connection is 5.65 cfs for the 100 year storm. The existing box culvert will be slip-lined with a Schedule 40 PVC pipe and outletted through the proposed wing-type endwall on the downstream side of Site 4, where the stormwater will discharge into the Standard riprap-lined channel. Stormwater is then conveyed into Wetland 27A through a low-flow modified riprap channel, which flows into an existing grassed swale before discharging to Wetland 27A.

AAR System 1 will convey water from STA. 765+00 in a southwest direction with discharge from a proposed open channel directly to an existing tributary of Piper Brook near the outlet of the Site 5 culvert at STA. 737+50. The proposed flow at this discharge point will be 8.3 cfs for the 100 year storm event. Currently, stormwater enters this existing system via overland flow and infiltration. The use of the proposed channel and conveyance system will alleviate existing local ponding problems caused by poor drainage topography and will convey stormwater ahead of the western collection areas that stream through the Site 5 culvert.

AAR/ Track Discharge 2 will convey water from both the AAR drainage system 2 and the Track Drainage system 2 into manholes proposed under Project 093-H046 on either end of a 36" jacked RCP just south of the New Britain Avenue underpass. The Track Drainage stormwater will be captured by a catch basin and treated with a hydrodynamic separator before combining with the 093-H046 system west of the tracks. Once combined with stormwater from 093-H046, the system will discharge to the existing New Britain Avenue drainage system via a connection proposed under 093-H046. The AAR/Track Drainage total contribution to this combined system will be 6.50 cfs for the 100 year storm (see 093-H046 for Busway-related flows and final discharge design).

AAR/Track Discharge 3 has been designed to convey stormwater from both the AAR drainage system 3 and the Track Drainage system 3 to a proposed outfall at the Trout Brook. Shortly before outfall, the AAR drainage will combine with a drainage pipe jacked under the railroad from Busway section H046. The Track Drainage will be captured by a catch basin, treated by a hydrodynamic separated and then connect to the 093-H046 system via a manhole to the west of the tracks, before the system goes under the railroad tracks. The AAR/Track Drainage total contribution will be 8.8 cfs at the outfall (see 093-H046 for Busway-related flows and final outfall design).

AAR/Track Discharge 4 is the largest drainage system associated with the Amtrak Access Road project. The first section of System 4 conveys water in a northeast direction through a series of riprap lined ditches and connection pipes from STA. 833+00 approximately 3,800 linear feet to outfall at the Kane Brook, south of the I-84 overpass. The second section of this system is a combination of swale flow and

a subsurface system with 11 inlet structures along 2,300 linear feet of pipe, with an additional endwall inlet at STA. 893+50 that collects runoff from STA. 904+00 southerly to Hamilton Avenue. The Track Drainage component of this system flows south from Hamilton Ave. and north from STA. 823+50 to a low point and catch basin at STA. 886+50, where the stormwater is treated via a hydrodynamic separator prior to crossing under the tracks and connecting to the AAR underground system. The two branches of the underground system combine at a manhole structure at STA. 870+25 and conveyed to the outfall at Kane Brook through a 30" RCP to a drop manhole that discharges through a new C-shape headwall and into a Type I preformed scour hole before. In larger storm events, stormwater will flow over the lip of the scour hole and down a moderate slope to the Kane Brook. The outfall pipe construction is designed to be outside the floodplain and 100 year flood limit. No wetlands were found near this section of Kane Brook. Total discharge from this 30" outfall is calculated to be 24.6 cfs.

AAR System 5 is the only drainage system that discharges to an existing private system. This system is at the end of the AAR project and collects an area from STA. 927+00 to 937+37, roughly 1.62 acres. Agreements with the system owner, Aetna, are already in place and the discharge to this system will be 3.16 cfs for the 100 year storm event.

Track Discharge 5A has been designed to capture flow from the Track Drainage Ditch at a low point at STA. 922+50 via a catch basin and discharge the water under the railroad tracks to a low lying area to the north of Interstate 84. Discharge to this outfall will be 1.5 cfs for the 100 year storm.

Track Discharge 5 will convey Track Drainage stormwater from a lowpoint at Busway STA. 477+00 via a catch basin that will be directly connected to the 063-H137 drainage system, which in turn ties to an existing MDC structure and 48" pipe in Flower Street around Busway STA. 472+00. Discharge to the 063-H137 from the Track Drainage Ditch will be 1.03 cfs for the 100 year storm with a time of concentration at 86 minutes, well after the 063-H137 system peak time of 6.5 minutes (see final drainage report for 063-H137).

Track Discharge 6 will collect stormwater from between the Busway and the Relocated Railroad Tracks (063-H157) portion of the project (RRR). The stormwater will be conveyed to an underground infiltration trench alongside the RRR. Computed runoff volume to be maintained by the infiltration trench is 637 cubic feet, with a maximum detention time of 72 hours (based on 0.3 in/hr infiltration rate). The dimensions of the trench will be 2' wide by 2' deep and 445' long.

NFIP Regulated Base Flood Area Encroachments: At several locations along the Amtrak Access Road project, the design impacts areas within NFIP regulated zones. Below is a breakdown of the areas and the impacts in each.

Fill Slope, AAR Turnaround and Site 4 - Twin Jacking Culvert Replacement: The proposed fill slope will run within the NFIP regulated zone from STA. 704+00 to 718+25 and at times will also cross the Piper Brook Channel Encroachment Line. The AAR turnaround is necessary for Amtrak operations and was placed at STA. 707+50 specifically because it would be outside of Wetland #27. However, it will still impact both the regulated flood zone and the Channel Encroachment Line. Located at AAR STA. 710+60 and Busway STA. 223+50, it was determined necessary to replace the existing, undersized 3.2'x3' box culvert that conveys stormwater from developed areas northwest under the railroad and into an unnamed tributary of the Piper Brook. The replacement culvert has been designed as a twin 72" RCP system that will require jacking under the railroad tracks. Because of the size of the pipes, this jacking requires a significant equipment pit and staging area on the downstream (southeast) side of the tracks and a receiving pit on the upstream side. Both of these areas will be partially or completely within the NFIP regulated zones as well as the Channel Encroachment Line for the Piper Brook. While the majority of the impacts will be temporary and will require no topographic changes there will be some permanent impacts. The permanent impacts include a fill slope on the downstream side of the culverts for support of the AAR. This will fill approximately 2,000 cubic yards of volume within the base flood limits. However, this fill volume is not considered detrimental to the floodplain as it is on the downstream side of the culverts and will not cause a decrease in storage on the upstream side. Upon completion of the culvert replacement, the existing stream will need to be diverted to the inlet and outlet of the new culvert on both the upstream and downstream sides. This will require filling a portion of the existing streambed. However, this volume will be recovered by the creation of the new streambeds.

Extension of Existing Culverts at STA. 717+00 and 718+00: Two existing drainage culverts that convey stormwater under the railroad will require extensions to beyond the fill slope limit of the AAR. The fill slope is necessary for support of the AAR in this area, but will be within the NFIP base flood zone. Similar to Site 4, this fill slope will be on the downstream side of the crossing and will not affect storage on the upstream side. Following the construction of the culvert extensions and new endwalls, riprap dissipation pads will be installed at each outfall. The fill slope impacts are part of the previously stated calculations and there will be no additional permanent impact by the culvert extensions.

Site 5 Jacking Culvert Replacement: The existing 3.4'x4' and 3.2'x4' box culverts at AAR STA. 737+00 currently convey stormwater from developed areas north and west under the railroads and are being called for replacement by a new, single 90" RCP to be jacked under the railroad. The outlet of these culverts discharges to an unnamed Piper Brook tributary. Both the inlet and outlet of this culvert is within the NFIP regulated zone for the base flood. Similar to Site 4, the size of the proposed pipe jacking will require a large jacking pit and staging area on the downstream side and a receiving pit on the upstream side. These staging areas will require temporary impacts to the regulated zone during construction. Permanent impacts will be limited by the construction of a 340-foot long retaining wall on

the downstream side that will be installed outside the base flood limits and a headwall on the upstream side that will avoid the flood limits by being adjacent to the existing culvert headwall. Excavation within the flood limits will be required for the footings of these walls, but this impact will be temporary as the topography will be returned to existing elevation upon completion of the walls. A volume of 33 cubic yards will be lost on the downstream side between STA. 733+00 and 735+00 for a fill slope supporting the Access Road and grading tie-ins at the beginning of the retaining wall. As with the Site 4 replacement, the existing stream bed at the inlet and outlet will require relocation, but the net volume difference between pre and post conditions will be negligible. According to FIRM Map 09003C0503F, there does not appear to be a regulated flood zone on the upstream side of the Site 5 culvert (see included FIRM maps)

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

Please see attached narrative of the designed Drainage Systems

2. *Stormwater Detention Facilities*

Does the proposed project include the construction of any stormwater detention facilities?

☐ Yes ☒ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☐ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2			
10			
100			

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Describe the location of the design point and why this location was chosen:

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☐ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☒ Yes ☐ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☒ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☒ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☐ Yes ☒ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

The treatment train for most systems will include three phases: Stormwater will first infiltrate through the site cover comprised of pervious stone ballast for its first treatment, minimum 2' sumps in collection basins will allow for settlement of fines during low level storms and finally, the use of open riprap-lined swales for conveyance to the discharge points will provide additional treatment.
For the Track Drainage between the Busway and railroad tracks, hydrodynamic separators have been added to the treatment train at 4 of the 6 discharge points to treat the first inch of runoff.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

Sedimentation Control Systems will be installed on the downslopes at all construction locations, inlet protections will be provided during construction and permanent outlet protection will be installed at all discharge points in the form of riprap dissipation pads and level spreaders. Throughout construction of the conveyance channels, checkdams will be installed and maintained.

Section III: State Grants and Loans

Name of Applicant:

Name of Proposed Project:

1. This Flood Management Certification concerns a: ☐ grant ☐ loan

2. Total amount of grant or loan: $

3. The recipient of the grant or loan will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Recipient Contact person:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

4. The recipient will use the grant or loan to (check all that apply):

   ☐ construct a structure, obstruction or encroachment or conduct other work within a floodplain or coastal high hazard area.

   ☐ construct a facility or develop a site affecting drainage and stormwater runoff.

   ☐ conduct a study or prepare a report concerning land use or land use planning affecting a floodplain, drainage or stormwater runoff.

5. If the grant or loan is for a study or report, describe the anticipated effects on floodplains, drainage or stormwater runoff if the recommendations are implemented:

6. Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development? ☐ Yes ☐ No

   Explain:

If the grant or loan is for construction of a structure, obstruction or encroachment or other work within a floodplain, or if it is for construction of a facility or development of a site that will affect drainage and stormwater runoff, Sections I and/or II of this Worksheet must be completed and the engineering report (Attachment H) and plans (Attachment G) must be provided as part of this application.

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 88-H039

Design Contract Name: New Britain Hartford Busway Stations
Downtown New Britain

Date: May 17, 2010

Date of Pre-Application Attachment H (if applicable): Not Applicable

Changes From Pre-Application Submittal (if applicable): Not Applicable

Engineering Reports Pertinent to Attachment H

- New Britain – Hartford Busway Permitting Submission New Britain Station. December 18, 2009.

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
2.0	Description of the design storm frequency intensity, volume and duration
5.0 Appendix B	Watershed maps, existing and proposed
N/A	Computations for Tc
3.0.1/3.0.2	Imperviousness calculations
N/A	NRCS runoff curve numbers, volumetric runoff coefficients
6.0 Appendix C	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
N/A	Hydrograph routing calculations
3.0.1/3.0.	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
N/A	Infiltration rates
2.0	Documentation of sources
6.0 Appendix C	Computer disk containing input and output data and the associated program for all computer models used in the analyses
6.0 Appendix C	Hard copy of input and output data including input/output tables
N/A	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
N/A	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
N/A	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
N/A	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
N/A	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
N/A	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
N/A	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
N/A	Primary and emergency spillway and outlet structure erosion protection
N/A	Dam breach analysis
N/A	Geotechnical evaluation
N/A	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
3.0.4	Narrative
7.0 Appendix D	Drawings
7.0 Appendix D	Details
N/A	Calculations for Engineered Measures

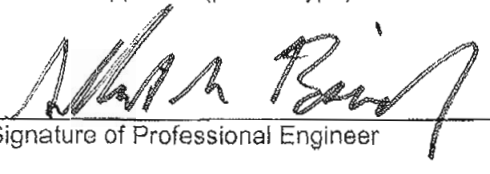
Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

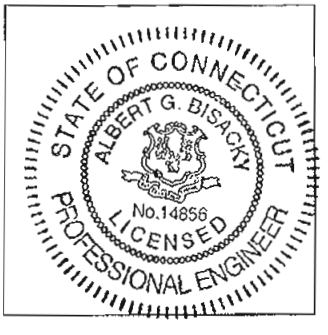
"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant	Date
CT Department of Transportation Name of Applicant (print or type)	Title (if applicable)
 Signature of Professional Engineer	12/17/09 Date
Al Bisacky Name of Professional Engineer (print or type)	14856 P.E. Number (if applicable)

Affix P.E. Stamp Here
(if applicable)



Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

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   - b. *Nonintensive Floodplain Uses* 3
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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H039)**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☐ Yes ☒ No If yes, list the FEMA flood zone(s):

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☐ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☐ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☐ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☐ Yes ☒ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☐ Yes ☒ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?

☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

☐ Yes ☐ No

The 500 year flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

☐ Yes ☐ No

If yes, the structure will be: ☐ Elevated ☐ Floodproofed

The base flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

The structure is floodproofed to: ft. (Datum:)

Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system?
☐ Yes ☐ No

If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☐ Yes ☒ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☐ Yes ☐ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☐ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☐ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☐ Yes ☒ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☐ Yes ☐ No

The channel capacity is designed for the: year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☐ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☐ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☐ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☐ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☐ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☐ Yes ☒ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☐ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☐ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☐ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☐ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☐ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☐ Yes ☐ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☐ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

☐ Tidal, minor

☐ Tidal, small

☐ Tidal, intermediate

☐ Tidal, large

☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☐ Yes ☐ No

   If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☐ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☐ Yes ☐ No

   Explain:

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

   ☐ 1. the road is at or close to the floodplain grade

   ☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

   ☐ 3. provisions are made to barricade the road when overtopped

   ☐ 4. the road or driveway is posted as being subject to flooding

   ☐ 5. the road or driveway has low traffic volume

   ☐ 6. alternate routes are available

   The culvert or bridge has been designed to pass the: year frequency discharge with an underclearance of: feet.

   Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: structure.

Section I: Floodplain Management (continued)

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☐ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☐ Yes ☐ No ☒ No temporary hydraulic facilities

If yes, the design flood frequency is the: year flood.

Describe the temporary facilities:

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H039)**

1. ***Stormwater Runoff***

The proposed project will (check all that apply):

- ☐ Increase the area of impervious surfaces
- ☐ Increase runoff coefficients
- ☒ Alter existing drainage patterns
- ☒ Alter time of concentrations
- ☐ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☐ Yes ☒ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2		
10	SEE PAGE 13A	
100		

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Section II: Stormwater Management
1. *Stormwater runoff*

Pre-Development and Post-Development Comparison

	Return Frequency Discharge (cfs)					
	2 Year		10 Year		100 Year	
	Pre-Development	Post-Development	Pre-Development	Post-Development	Pre-Development	Post-Development
To the 96-inch RCP	16.44	15.09	21.90	20.93	30.49	29.89

To the 96-inch RCP from the station site

	Area (ac)	Rational Method C value
Pre-Development	4.29	0.80
Post-Development	4.64	0.65

One design point is relevant in this hydrologic analysis of the development area. An existing 96-inch storm drain collects flow from the proposed site along with a portion of Contract No. 88-H035. The values above reflect the impact to the 96-inch storm drain for both the site development and a portion the busway development.

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

2. *Stormwater Detention Facilities*

Does the proposed project include the construction of any stormwater detention facilities?

☐ Yes ☒ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☐ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2			
10			
100			

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Describe the location of the design point and why this location was chosen:

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☐ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☒ Yes ☐ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☐ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☐ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☐ Yes ☐ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

The proposed design includes provisions to provide secondary treatment by installation of an offline hydrodynamic separator.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

The Erosion and Sedimentaion Control plans are designed presuming that the busway will be built prior to the station site. By implementing best management practices during construction, the project will minimize construction impacts.

Erosion will be minimized by providing temporary or permanent cover on surfaces exposed by construction activities. Sediment from erosion which does occur will be captured and kept on site by perimeter sediment barriers.

Section III: State Grants and Loans

Name of Applicant:

Name of Proposed Project:

1. This Flood Management Certification concerns a: ☐ grant ☐ loan

2. Total amount of grant or loan: $

3. The recipient of the grant or loan will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Recipient Contact person:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

4. The recipient will use the grant or loan to (check all that apply):

   ☐ construct a structure, obstruction or encroachment or conduct other work within a floodplain or coastal high hazard area.

   ☐ construct a facility or develop a site affecting drainage and stormwater runoff.

   ☐ conduct a study or prepare a report concerning land use or land use planning affecting a floodplain, drainage or stormwater runoff.

5. If the grant or loan is for a study or report, describe the anticipated effects on floodplains, drainage or stormwater runoff if the recommendations are implemented:

6. Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development? ☐ Yes ☐ No

   Explain:

If the grant or loan is for construction of a structure, obstruction or encroachment or other work within a floodplain, or if it is for construction of a facility or development of a site that will affect drainage and stormwater runoff, Sections I and/or II of this Worksheet must be completed and the engineering report (Attachment H) and plans (Attachment G) must be provided as part of this application.

Section IV: Disposal of State Land

Name of Applicant:

Name of Proposed Project:

1. The grantee will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Contact Person: Phone:

2. Describe the current state of development and use of the land to be disposed.

3. Why is the agency disposing of the land?

4. Describe the grantee's intended use of the land.

5. Will the disposal of the land promote development in floodplains? ☐ Yes ☐ No

   Explain:

6. Will the grantee's use of the land be consistent with the state's flood management statutes and regulations?

   ☐ Yes ☐ No Explain:

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 88-H039

Design Contract Name: New Britain Hartford Busway Stations
Cedar Street

Date: May 17, 2010

Date of Pre-Application Attachment H (if applicable): Not Applicable

Changes From Pre-Application Submittal (if applicable): Not Applicable

Engineering Reports Pertinent to Attachment H

- New Britain – Hartford Busway Permitting Submission Cedar Street Station. February 2010.

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
2.0	Description of the design storm frequency intensity, volume and duration
5.0 Appendix B	Watershed maps, existing and proposed
6.0 Appendix C	Computations for Tc
3.3.1/3.3.2	Imperviousness calculations
N/A	NRCS runoff curve numbers, volumetric runoff coefficients
6.0 Appendix C	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
N/A	Hydrograph routing calculations
3.3.2/3.0.	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
N/A	Infiltration rates
2.0	Documentation of sources
6.0 Appendix C	Computer disk containing input and output data and the associated program for all computer models used in the analyses
6.0 Appendix C	Hard copy of input and output data including input/output tables
6.0 Appendix C	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
N/A	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
N/A	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
N/A	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
N/A	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
N/A	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
N/A	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
N/A	Primary and emergency spillway and outlet structure erosion protection
N/A	Dam breach analysis
N/A	Geotechnical evaluation
N/A	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
3.3.	Narrative
7.0 Appendix D	Drawings
7.0 Appendix D	Details
N/A	Calculations for Engineered Measures

Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

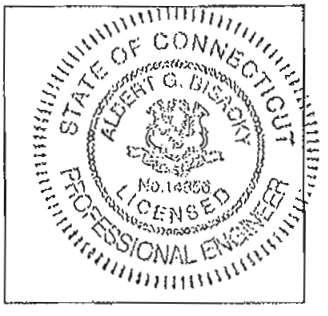
"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant	Date
CT Department of Transportation Name of Applicant (print or type)	Title (if applicable)
Albert G. Bisacky Signature of Professional Engineer	1/13/10 Date
Al Bisacky Name of Professional Engineer (print or type)	14856 P.E. Number (if applicable)

Affix P.E. Stamp Here
(if applicable)



Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H039)**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☐ Yes ☒ No If yes, list the FEMA flood zone(s):

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☒ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☐ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☐ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☐ Yes ☒ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☐ Yes ☐ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?

   ☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

   ☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

   ☐ Yes ☐ No

   The 500 year flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

   ☐ Yes ☐ No

   If yes, the structure will be: ☐ Elevated ☐ Floodproofed

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

   The structure is floodproofed to: ft. (Datum:)

   Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system?
   ☐ Yes ☐ No

   If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

   If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

   ☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

   ☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☐ Yes ☒ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☐ Yes ☐ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☐ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☐ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☐ Yes ☒ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☐ Yes ☐ No

The channel capacity is designed for the: year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☐ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☐ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☐ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☐ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☐ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☐ Yes ☒ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☐ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☐ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☐ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☐ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☐ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☐ Yes ☐ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual *and* all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☐ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

☐ Tidal, minor

☐ Tidal, small

☐ Tidal, intermediate

☐ Tidal, large

☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☐ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☐ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☐ Yes ☐ No

   Explain:

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

☐ 1. the road is at or close to the floodplain grade

☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

☐ 3. provisions are made to barricade the road when overtopped

☐ 4. the road or driveway is posted as being subject to flooding

☐ 5. the road or driveway has low traffic volume

☐ 6. alternate routes are available

The culvert or bridge has been designed to pass the: year frequency discharge with an underclearance of: feet.

Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: structure.

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☐ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☐ Yes ☐ No ☒ No temporary hydraulic facilities

If yes, the design flood frequency is the: year flood.

Describe the temporary facilities:

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway Proj. No. 171-035 (88-H039)**

1. ***Stormwater Runoff***

The proposed project will (check all that apply):

- ☒ Increase the area of impervious surfaces
- ☒ Increase runoff coefficients
- ☐ Alter existing drainage patterns
- ☒ Alter time of concentrations
- ☐ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☒ Yes ☐ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

The post-development design consists of a detention basin. See Section II, 2. The detention basin design reduces the peak discharge for the 2, 10, and 25 year storms as required by the CTDOT Drainage Manual.

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	2.13	53.74
10	7.94	65.42
100	19.63	85.84

The above peak discharges were computed utilizing the: **24** hour duration storm. This duration storm was selected because:

24 hour duration is recommended by the CTDOT Drainage Manual.

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

See Section II, 2.

2. *Stormwater Detention Facilities*

Does the proposed project include the construction of any stormwater detention facilities?

☒ Yes ☐ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☒ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2	2.13	53.74	1.41
10	7.94	65.42	7.43
100	19.63	85.84	26.45

The above peak discharges were computed utilizing the: **24** hour duration storm. This duration storm was selected because:

24 hour duration is recommended by the CTDOT Drainage Manual.

Describe the location of the design point and why this location was chosen:

The design point is located at an existing 36-inch metal pipe. This point is relevant in the hydrologic analysis of the development area. Both the pre-developed and post-developed areas discharge to this exisiting pipe.

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

The proposed project decreases the peak discharges for the 2 and the 10 year storms, but increases the peak discharge for the 100 year storm. The CTDOT Drainage Manual only requires capacity to safely pass the 100 year storm. Discharge from the system will pass through a replaced culvert under the proposed busway, by others, to the 100 year floodplain. No adverse impacts downstream are anticipated.

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☒ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☒ Yes ☐ No

Explain:

The stormwater for pre-development flows to an existing 36-inch metal pipe. The stormwater for post-development will continue follow the existing drainage pattern. The location of the detention basin does not adversly effect the peak discharge to the design point.

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☐ Yes ☒ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☒ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☒ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☐ Yes ☒ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

The stormwater that will be discharged to Piper Brook will be treated in an on-site detention basin. The detention basin is designed for primary treatment. The basin has adequate capacity for the water quality volume and includes a forebay that has the capacity for 25% of the water quality volume.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

The Erosion and Sedimentaion Control plans are designed presuming that the busway will be built prior to the station site. By implementing best management practices during construction, the project will minimize construction impacts.

Erosion will be minimized by providing temporary or permanent cover on surfaces exposed by construction activities. Sediment from erosion which does occue will be captured and kept on site by perimeter sediment barriers.

Section III: State Grants and Loans

Name of Applicant:

Name of Proposed Project:

1. This Flood Management Certification concerns a: ☐ grant ☐ loan

2. Total amount of grant or loan: $

3. The recipient of the grant or loan will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Recipient Contact person:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

4. The recipient will use the grant or loan to (check all that apply):

   ☐ construct a structure, obstruction or encroachment or conduct other work within a floodplain or coastal high hazard area.

   ☐ construct a facility or develop a site affecting drainage and stormwater runoff.

   ☐ conduct a study or prepare a report concerning land use or land use planning affecting a floodplain, drainage or stormwater runoff.

5. If the grant or loan is for a study or report, describe the anticipated effects on floodplains, drainage or stormwater runoff if the recommendations are implemented:

6. Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development? ☐ Yes ☐ No

   Explain:

If the grant or loan is for construction of a structure, obstruction or encroachment or other work within a floodplain, or if it is for construction of a facility or development of a site that will affect drainage and stormwater runoff, Sections I and/or II of this Worksheet must be completed and the engineering report (Attachment H) and plans (Attachment G) must be provided as part of this application.

Section IV: Disposal of State Land

Name of Applicant:

Name of Proposed Project:

1. The grantee will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Contact Person: Phone:

2. Describe the current state of development and use of the land to be disposed.

3. Why is the agency disposing of the land?

4. Describe the grantee's intended use of the land.

5. Will the disposal of the land promote development in floodplains? ☐ Yes ☐ No

   Explain:

6. Will the grantee's use of the land be consistent with the state's flood management statutes and regulations?

   ☐ Yes ☐ No Explain:

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation
Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 88-H039

Design Contract Name: New Britain Hartford Busway Stations
Elmwood

Date: May 17, 2010

Date of Pre-Application Attachment H (if applicable): Not Applicable

Changes From Pre-Application Submittal (if applicable): Not Applicable

Engineering Reports Pertinent to Attachment H

- New Britain – Hartford Busway Permitting Submission Elmwood Station. December 4, 2009.

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
2.0	Description of the design storm frequency intensity, volume and duration
5.0 Appendix B	Watershed maps, existing and proposed
N/A	Computations for Tc
3.0.1/3.0.2	Imperviousness calculations
N/A	NRCS runoff curve numbers, volumetric runoff coefficients
6.0 Appendix C	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
N/A	Hydrograph routing calculations
3.0.1/3.0.	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
N/A	Infiltration rates
2.0	Documentation of sources
6.0 Appendix C	Computer disk containing input and output data and the associated program for all computer models used in the analyses
6.0 Appendix C	Hard copy of input and output data including input/output tables
N/A	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
N/A	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
N/A	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
N/A	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
N/A	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
N/A	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
N/A	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
N/A	Primary and emergency spillway and outlet structure erosion protection
N/A	Dam breach analysis
N/A	Geotechnical evaluation
N/A	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
3.0.4	Narrative
7.0 Appendix D	Drawings
7.0 Appendix D	Details
N/A	Calculations for Engineered Measures

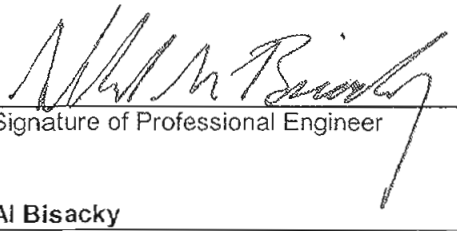
Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant	Date
CT Department of Transportation Name of Applicant (print or type)	Title (if applicable)
 Signature of Professional Engineer	12/4/09 Date
Al Bisacky Name of Professional Engineer (print or type)	14856 P.E. Number (if applicable)
	Affix P.E. Stamp Here (if applicable)

Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H039)**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☐ Yes ☒ No If yes, list the FEMA flood zone(s):

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☒ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☐ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☐ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☐ Yes ☒ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☐ Yes ☒ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?
   ☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

☐ Yes ☐ No

The 500 year flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

☐ Yes ☐ No

If yes, the structure will be: ☐ Elevated ☐ Floodproofed

The base flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

The structure is floodproofed to: ft. (Datum:)

Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system?
☐ Yes ☐ No

If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☐ Yes ☒ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☐ Yes ☐ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☐ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☐ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☐ Yes ☒ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☐ Yes ☐ No

The channel capacity is designed for the: year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☐ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☐ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☐ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☐ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☐ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☐ Yes ☒ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☐ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☐ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☐ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☐ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☐ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☐ Yes ☐ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☐ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

☐ Tidal, minor

☐ Tidal, small

☐ Tidal, intermediate

☐ Tidal, large

☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☐ Yes ☐ No

   If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☐ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must *still* meet the standards of the NFIP.) ☐ Yes ☐ No

   Explain:

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

   ☐ 1. the road is at or close to the floodplain grade

   ☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

   ☐ 3. provisions are made to barricade the road when overtopped

   ☐ 4. the road or driveway is posted as being subject to flooding

   ☐ 5. the road or driveway has low traffic volume

   ☐ 6. alternate routes are available

   The culvert or bridge has been designed to pass the: year frequency discharge with an underclearance of: feet.

   Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: structure.

Section I: Floodplain Management (continued)

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☐ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☐ Yes ☐ No ☒ No temporary hydraulic facilities

If yes, the design flood frequency is the: year flood.

Describe the temporary facilities:

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway Proj. No. 171-035 (88-H039)**

1. *Stormwater Runoff*

The proposed project will (check all that apply):

- ☒ Increase the area of impervious surfaces
- ☐ Increase runoff coefficients
- ☒ Alter existing drainage patterns
- ☒ Alter time of concentrations
- ☐ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☒ Yes ☐ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	**Please see attached sheet.**	
10		
100		

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Peak discharges for the busway and site discharges were developed for pre and post development conditions using the rational method. The storm duration was considered to be two (2) times the time of concentration (Tc).

Section II: Stormwater Management
1. ***Stormwater runoff***

Pre-Development and Post-Development Comparison

	Return Frequency Discharge (cfs)					
	2 Year		10 Year		100 Year	
	Pre-Development	Post-Development	Pre-Development	Post-Development	Pre-Development	Post-Development
To New Britain Avenue systems	3.00	0.80	3.92	1.02	5.09	1.27
To New Park Avenue system	2.79	1.99	3.64	2.59	4.73	3.37
Through Trout Brook flood wall	4.04	6.25	5.27	8.62	6.84	11.62

To New Britain Systems

	Area (ac)	Rational Method C value
Pre-Development	0.92	0.71
Post-Development	0.42	0.52

To New Park Systems

	Area (ac)	Rational Method C value
Pre-Development	0.69	0.88
Post-Development	0.48	0.90

Through Trout Brook Flood Wall

	Area (ac)	Rational Method C value
Pre-Development	1.17	0.75
Post-Development	2.13	0.73

Three design points are relevant in this hydrologic analysis of the development area. Existing drainage systems within New Britain Avenue and New Park Avenue collect flow from the proposed site. Each system was selected to compare the site development impact.

Additionaly, an existing discharge through the Trout Brook flood wall collects a portion of the proposed bus station site. A bioretention basin is proposed to discharge through the existing pipe and was analyzed as a third design point.

System 7, part of the busway construction, will discharge to the proposed Bioretention basin. These flow rates are included in the analysis above.

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

Please see attached sheet.

2. ***Stormwater Detention Facilities***

Does the proposed project include the construction of any stormwater detention facilities?

☐ Yes ☒ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☐ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2			
10			
100			

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Describe the location of the design point and why this location was chosen:

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☐ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☒ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☒ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☐ Yes ☒ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☒ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☒ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☒ Yes ☐ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

The stormwater that will be discharged to Trout Brook will be treated in an on-site bioretention basin. The basin contains a volume in excess of the 10-year storm volume. The design is in accordance with the 2002 Guidelines.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

The Erosion and Sedimentaion Control plans are designed presuming that the busway will be built prior to the station site. By implementing best management practices during construction, the project will minimize construction impacts.

Erosion will be minimized by providing temporary or permanent cover on surfaces exposed by construction activities. Sediment from erosion which does occue will be captured and kept on site by perimeter sediment barriers.

Section III: State Grants and Loans

Name of Applicant:

Name of Proposed Project:

1. This Flood Management Certification concerns a: ☐ grant ☐ loan

2. Total amount of grant or loan: $

3. The recipient of the grant or loan will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Recipient Contact person:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

4. The recipient will use the grant or loan to (check all that apply):

   ☐ construct a structure, obstruction or encroachment or conduct other work within a floodplain or coastal high hazard area.

   ☐ construct a facility or develop a site affecting drainage and stormwater runoff.

   ☐ conduct a study or prepare a report concerning land use or land use planning affecting a floodplain, drainage or stormwater runoff.

5. If the grant or loan is for a study or report, describe the anticipated effects on floodplains, drainage or stormwater runoff if the recommendations are implemented:

6. Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development? ☐ Yes ☐ No

   Explain:

If the grant or loan is for construction of a structure, obstruction or encroachment or other work within a floodplain, or if it is for construction of a facility or development of a site that will affect drainage and stormwater runoff, Sections I and/or II of this Worksheet must be completed and the engineering report (Attachment H) and plans (Attachment G) must be provided as part of this application.

Section IV: Disposal of State Land

Name of Applicant:

Name of Proposed Project:

1. The grantee will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Contact Person: Phone:

2. Describe the current state of development and use of the land to be disposed.

3. Why is the agency disposing of the land?

4. Describe the grantee's intended use of the land.

5. Will the disposal of the land promote development in floodplains? ☐ Yes ☐ No

   Explain:

6. Will the grantee's use of the land be consistent with the state's flood management statutes and regulations?

   ☐ Yes ☐ No Explain:

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 88-H039

Design Contract Name: New Britain Hartford Busway Stations
Kane Street

Date: May 17, 2010

Date of Pre-Application Attachment H (if applicable): Not Applicable

Changes From Pre-Application Submittal (if applicable): Not Applicable

Engineering Reports Pertinent to Attachment H

- New Britain – Hartford Busway Permitting Submission Kane Street Station. October 30, 2009.

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
2.0	Description of the design storm frequency intensity, volume and duration
Appendix B	Watershed maps, existing and proposed
N/A	Computations for Tc
3.0.1/3.0.2	Imperviousness calculations
N/A	NRCS runoff curve numbers, volumetric runoff coefficients
6.0	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
N/A	Hydrograph routing calculations
N/A	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
N/A	Infiltration rates
2.0	Documentation of sources
N/A	Computer disk containing input and output data and the associated program for all computer models used in the analyses
6.0	Hard copy of input and output data including input/output tables
N/A	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
N/A	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
N/A	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
N/A	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
N/A	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
N/A	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
N/A	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
N/A	Primary and emergency spillway and outlet structure erosion protection
N/A	Dam breach analysis
N/A	Geotechnical evaluation
N/A	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
3.0.4	Narrative
7.0	Drawings
7.0	Details
N/A	Calculations for Engineered Measures

Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

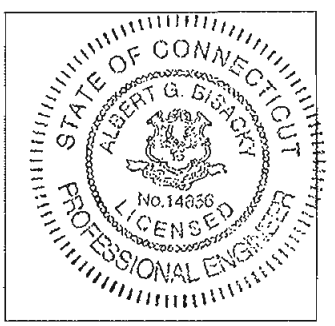
"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant	Date
Name of Applicant (print or type)	Title (if applicable)
Albert G. Biscky	11/5/09
Signature of Professional Engineer	Date
Albert G. Biscky	14856
Name of Professional Engineer (print or type)	P.E. Number (if applicable)

Affix P.E. Stamp Here
(if applicable)



Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H039**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☐ Yes ☒ No If yes, list the FEMA flood zone(s):

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☒ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☐ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☒ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, hazardous, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☐ Yes ☒ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☐ Yes ☐ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 (***Topography Changes within Floodplain***).

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and structure attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?

   ☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

   ☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

   ☐ Yes ☐ No

   The 500 year flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

   ☐ Yes ☐ No

   If yes, the structure will be: ☐ Elevated ☐ Floodproofed

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest floor, including basement, is: ft. (Datum:)

   The structure is floodproofed to: ft. (Datum:)

   Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system? ☐ Yes ☐ No

   If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

   If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

   ☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

   ☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☐ Yes ☒ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☐ Yes ☐ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☐ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☐ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☐ Yes ☒ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☐ Yes ☐ No

The channel capacity is designed for the: year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☐ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☐ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☐ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☐ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☐ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☐ Yes ☒ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☐ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☐ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☐ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☐ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☐ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☐ Yes ☐ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☐ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They shall be designed* to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

☐ Tidal, minor

☐ Tidal, small

☐ Tidal, intermediate

☐ Tidal, large

☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☐ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☐ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☐ Yes ☐ No

   Explain:

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

   ☐ 1. the road is at or close to the floodplain grade

   ☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

   ☐ 3. provisions are made to barricade the road when overtopped

   ☐ 4. the road or driveway is posted as being subject to flooding

   ☐ 5. the road or driveway has low traffic volume

   ☐ 6. alternate routes are available

   The culvert or bridge has been designed to pass the: year frequency discharge with an underclearance of: feet.

   Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: structure.

Section I: Floodplain Management (continued)

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☐ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☐ Yes ☐ No ☒ No temporary hydraulic facilities

If yes, the design flood frequency is the: year flood.

Describe the temporary facilities:

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H039**

1. *Stormwater Runoff*

The proposed project will (check all that apply):

- ☒ Increase the area of impervious surfaces
- ☒ Increase runoff coefficients
- ☐ Alter existing drainage patterns
- ☐ Alter time of concentrations
- ☐ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☐ Yes ☒ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2	See attached sheet.	
10		
100		

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

2. ***Stormwater Detention Facilities***

Does the proposed project include the construction of any stormwater detention facilities?

☐ Yes ☒ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☐ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2			
10			
100			

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Describe the location of the design point and why this location was chosen:

Section II: Stormwater Management
1. *Stormwater runoff*

Pre-Development and Post-Development Comparison

	Return Frequency Discharge (cfs)					
	2 Year		10 Year		100 Year	
	Pre-Development	Post-Development	Pre-Development	Post-Development	Pre-Development	Post-Development
To New Park Avenue system	3.55	3.32	4.63	4.33	6.01	5.63
Sheet flow to Trout Brook	4.88	3.84	6.36	5.01	8.27	6.51

To New Park Avenue System

	Area (ac)	Rational Method C value
Pre-Development	1.01	0.76
Post-Development	0.83	0.87

Sheet Flow to Kane Brook

	Area (ac)	Rational Method C value
Pre-Development	2.65	0.40
Post-Development	2.32	0.36

Two design points are relevant in this hydrologic analysis of the development area. An existing drainage system within New Park Avenue collects flow from the proposed site and a portion of the site sheet flows to Kane Brook. Each design point was selected to compare the site development impact.

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☐ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☐ Yes ☒ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☐ Yes ☐ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☐ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☐ Yes ☐ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☐ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☐ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☐ Yes ☐ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☐ Yes ☐ No

Explain:

Section III: State Grants and Loans

Name of Applicant:

Name of Proposed Project:

1. This Flood Management Certification concerns a: ☐ grant ☐ loan

2. Total amount of grant or loan: $

3. The recipient of the grant or loan will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Recipient Contact person:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

4. The recipient will use the grant or loan to (check all that apply):

   ☐ construct a structure, obstruction or encroachment or conduct other work within a floodplain or coastal high hazard area.

   ☐ construct a facility or develop a site affecting drainage and stormwater runoff.

   ☐ conduct a study or prepare a report concerning land use or land use planning affecting a floodplain, drainage or stormwater runoff.

5. If the grant or loan is for a study or report, describe the anticipated effects on floodplains, drainage or stormwater runoff if the recommendations are implemented:

6. Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development? ☐ Yes ☐ No

   Explain:

If the grant or loan is for construction of a structure, obstruction or encroachment or other work within a floodplain, or if it is for construction of a facility or development of a site that will affect drainage and stormwater runoff, Sections I and/or II of this Worksheet must be completed and the engineering report (Attachment H) and plans (Attachment G) must be provided as part of this application.

Section IV: Disposal of State Land

Name of Applicant:

Name of Proposed Project:

1. The grantee will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Contact Person: Phone:

2. Describe the current state of development and use of the land to be disposed.

3. Why is the agency disposing of the land?

4. Describe the grantee's intended use of the land.

5. Will the disposal of the land promote development in floodplains? ☐ Yes ☐ No

   Explain:

6. Will the grantee's use of the land be consistent with the state's flood management statutes and regulations?

   ☐ Yes ☐ No Explain:

NEW BRITAIN – HARTFORD BUSWAY

State Project Number 171-305

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist
Part 2: Hydrologic and Hydraulic Consistency Worksheet

Design Contract Number: 88-H039

Design Contract Name: New Britain Hartford Busway Stations
Union Station

Date: May 17, 2010

Date of Pre-Application Attachment H (if applicable): November 16, 2009

Changes From Pre-Application Submittal (if applicable): Not Applicable

Engineering Reports Pertinent to Attachment H

- New Britain – Hartford Busway Permitting Submission Union Station. November 13, 2009.

Attachment H: Engineering Documentation

Part 1: Engineering Report Checklist

The following is a checklist of requirements that need to be completed, included and submitted as part of the Engineering Report. Please complete this checklist by identifying where each requirement listed is addressed in the Engineering Report (report title and page numbers). If an item is not applicable, place "NA" in the box. Attach the completed checklist as the cover sheet to engineering reports, as applicable, which fully describe the design of the proposed facilities or other actions and the hydraulic and hydrologic effects thereof. The application instructions (DEP-IWRD-INST-100) should be consulted for a complete description of each item listed. This checklist is required to be signed and sealed by a professional engineer licensed in the State of Connecticut.

Stormwater Management

Location of Item	Item Description
2.0	Description of the design storm frequency intensity, volume and duration
5.0 Appendix B	Watershed maps, existing and proposed
N/A	Computations for Tc
3.0.1/3.0.2	Imperviousness calculations
N/A	NRCS runoff curve numbers, volumetric runoff coefficients
6.0 Appendix C	Computations used to determine peak runoff rates, and velocities for each watershed area (24-hour storm): • Stream Channel Protection: 2-year frequency ("over-control" of 2-year storm) • Conveyance Protection: 10-year frequency • Peak Runoff Attenuation: 2-year, 10-year, and 100-year frequency • Emergency Outlet Sizing: safely pass the 100-year frequency or larger storm
N/A	Hydrograph routing calculations
N/A	Description, schematics, and calculations for drainage and stormwater management systems, bridges and culverts
N/A	Infiltration rates
2.0	Documentation of sources
N/A	Computer disk containing input and output data and the associated program for all computer models used in the analyses
6.0 Appendix C	Hard copy of input and output data including input/output tables
N/A	Detention basin analysis including timing and duration of expected outflow, stream stability analysis and hydrograph summation

Flood Plain Assessment

Location of Item	Item Description
N/A	Description or simulation of existing and proposed conditions upstream and downstream of the proposed activity
N/A	(For SCEL applications only) A determination of the effect of the proposed activity on flooding and flood hazards together with an equivalent encroachment on the opposite bank for the flood event establishing the encroachment lines
N/A	For any bridge or culvert placement or replacement with a drainage area of 100 acres or more, plan sheets showing the existing and proposed inundation area for the 2, 10, 25, 50, and 100 year discharges, carried to convergence
N/A	A description and analysis of the floodplain modifications required to restore any flood conveyance and flood storage capacity
N/A	Demonstration that backwater from the proposed activity will not impact an existing dam, dike, or similar structure
N/A	Backup data and complete hydraulic analysis for proposed modifications to the floodplain including location plan and plot for sections, profile sheet, summary sheet

Dams, Dikes, Diversion Channels, Similar Structures

Location of Item	Item Description
N/A	Primary and emergency spillway and outlet structure erosion protection
N/A	Dam breach analysis
N/A	Geotechnical evaluation
N/A	Construction Specifications for foundation preparation, embankment material, outlet structure, and construction inspection

Soil Erosion and Sediment Control Plan

Location of Item	Item Description
3.0.4	Narrative
7.0 Appendix D	Drawings
7.0 Appendix D	Details
N/A	Calculations for Engineered Measures

Professional Certification

For any Engineering Report submitted as part of the IWRD permit application, the following certification must be signed and sealed by a professional engineer licensed to practice in Connecticut and submitted with the Engineering Report Checklist and Report.

"I certify that in my professional judgement, each requirement listed in the Engineering Report Checklist has been addressed in the Engineering Report submitted as part of the IWRD permit application as Attachment H, Part 1 and that the information is true, accurate and complete to the best of my knowledge and belief.

This certification is based on my review of the Engineering Report.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes."

Signature of Applicant	Date
CT Department of Transportation Name of Applicant (print or type)	Title (if applicable)
 Signature of Professional Engineer	11/9/09 Date
Al Bisacky Name of Professional Engineer (print or type)	14856 P.E. Number (if applicable)
	Affix P.E. Stamp Here (if applicable)

Attachment H: Engineering Documentation

Part 2: Hydrologic and Hydraulic Consistency Worksheet

Inland Water Resources Division Permit Activities

This worksheet has four sections; only complete the section(s) applicable to the proposed project. Where a question requires a "Yes" or "No" answer, select the appropriate response and explain your response, if required, in the space provided.

Section I: **Floodplain Management** *(if the proposed project involves a structure, obstruction, encroachment or work in a watercourse, floodplain, or coastal high hazard area)*

Section II: **Stormwater Management** *(if the proposed project involves stormwater drainage or stormwater runoff)*

Sections III: **State Grants and Loans** and **Section IV: Disposal of State Land** *(only if the applicant is a state agency seeking flood management certification approval for state grants and loans or disposal of state land)*

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Definitions of terms used in these worksheets are found in Section 25-68b of the Connecticut General Statutes and Section 25-68h-1 of the Regulations of Connecticut State Agencies and in the National Flood Insurance Program Regulations (44 CFR, Chapter 1, Subchapter B, Part 59.1).

Section I: Floodplain Management

Section I: Floodplain Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H039)**

1. General Criteria

a. *Critical Activity* - Does the proposed project involve the treatment, storage and disposal of hazardous waste or the siting of hospitals, housing for the elderly, schools or residences, in the 0.2 per cent [500 year] floodplain? ☐ Yes ☒ No

If yes, the base flood for the critical activity shall have a recurrence interval equal to the 500 year flood event; if no, the base flood for the activity shall have a recurrence interval equal to the 100 year flood event.

b. *Nonintensive Floodplain Uses* - Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development?

☐ Yes ☒ No

Explain:

c. *National Flood Insurance Program* (NFIP) - Will the proposed project be located within an area of special flood hazard designated by the Federal Emergency Management Agency (FEMA)?

☐ Yes ☒ No If yes, list the FEMA flood zone(s):

Does the proposed project meet the NFIP minimum standards established in 44 CFR, Chapter 1, Subchapter B, Part 60.3, floodplain management criteria for flood-prone areas?

☐ Yes ☐ No

d. *Municipal Regulations* - Has the municipality in which the proposed project is to be located adopted floodplain regulations containing requirements that are more restrictive than the NFIP floodplain management criteria for flood-prone areas? ☐ Yes ☒ No

If yes, describe the more restrictive requirements:

Does the proposed project comply with the more restrictive standards of the municipality?

☐ Yes ☐ No

Section I: Floodplain Management (continued)

2. *Flooding and Flood Hazards*

a. *Flooding* - Will the proposed project pose any hazard to human life, health or property in the event of a base flood? ☐ Yes ☒ No

If yes, explain:

b. *Flood Velocities* - Will the proposed project cause an increase in flow velocity or depth during the base flood discharge? ☐ Yes ☒ No

If yes, the increase in velocity is: fps
and/or the increase in depth is: ft.

Will such increase in velocity or depth cause channel erosion or pose any hazard to human life, health or property? ☐ Yes ☐ No

Explain:

c. *Flood Storage* - Will the proposed project affect the flood storage capacity or flood control value of the floodplain? ☐ Yes ☒ No

If yes, describe the effects:

d. *Degrading or Aggrading Stream Beds* - Is the streambed currently degrading or aggrading?

☐ Degrading ☐ Aggrading ☒ Neither

Has the project design addressed degrading or aggrading streambed conditions?

☐ Yes ☐ No

e. *Ice Jams* - Is the watercourse prone to ice jams or floods due to ice? ☐ Yes ☒ No

Has the project design considered ice jams or floods due to ice? ☐ Yes ☒ No

Section I: Floodplain Management (continued)

f. *Storage of Materials & Equipment* - Will the construction or use of the proposed project involve the storage of materials below the 500 year flood elevation that are buoyant, *hazardous*, flammable, explosive, soluble, expansive or radioactive, or the storage of any other materials which could be injurious to human, animal or plant life in the event of a flood?

☐ Yes ☒ No

If yes, describe the materials and how such materials will be protected from flood damage, secured or removed from the floodplain to prevent pollution and hazards to life and property.

Storage of materials that could be injurious to human health or the environment in the event of flooding is prohibited below the elevation of the 500 year flood. Other material or equipment may be stored below the 500 year flood elevation provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

g. *Floodwater Loads* - Will structures, facilities and stored materials be anchored or otherwise designed to prevent floatation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy? ☐ Yes ☒ No

3. *Standards for Structures in Floodplains or Coastal High Hazard Areas*

Does the proposed project involve a new or substantially improved structure or facility located within a floodplain or coastal high hazard area? ☐ Yes ☒ No

If yes, complete this subsection; if no, skip to subsection 4 ***(Topography Changes within Floodplain)***.

a. *Structures in Coastal High Hazard Areas* - Will the structure or facility be located within an NFIP coastal high hazard area? ☐ Yes ☐ No

If no, skip to paragraph 3(b); if yes:

1. Will the structure or facility be located landward of the reach of mean high tide?

   ☐ Yes ☐ No

2. Will a new structure or facility be located on an undeveloped coastal barrier beach designated by FEMA? ☐ Yes ☐ No

3. If the structure or facility is/will be located within a coastal high hazard area, the structure or facility must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood level and the pile or column foundation and *structure* attached thereto must be anchored to resist floatation, collapse and lateral movement due to the effects of wind, velocity waters, hurricane wave wash, and base flood water loads acting simultaneously on all building components.

   Does the proposed structure or facility meet these standards? ☐ Yes ☐ No

   The base flood elevation is: ft. (Datum:)

   The elevation of the lowest horizontal structural member is: ft. (Datum:)

Section I: Floodplain Management (continued)

4. Will the space below the lowest floor be either free of obstruction or constructed with non-supporting breakaway walls? ☐ Yes ☐ No

5. Will fill be used for structural support of any buildings within coastal high hazard areas?

☐ Yes ☐ No

b. *Structures in Floodplain Areas* - Are the structures residential or nonresidential?

☐ Residential ☐ Nonresidential If *nonresidential*, skip to paragraph 3(d) below.

c. *Residential Structures* - If the structure or facility is for human habitation will the lowest floor of such structure or facility, including its basement, be elevated one foot above the level of the 500 year flood?

☐ Yes ☐ No

The 500 year flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

d. *Non-residential Structures* - If the structure or facility is not intended for residential uses, will the lowest floor of such structure or facility, including its basement, be elevated to or above the 100 year flood height or be floodproofed to that height, or in the case of a critical activity, the 500 year flood height?

☐ Yes ☐ No

If yes, the structure will be: ☐ Elevated ☐ Floodproofed

The base flood elevation is: ft. (Datum:)

The elevation of the lowest floor, including basement, is: ft. (Datum:)

The structure is floodproofed to: ft. (Datum:)

Note: for insurance purposes nonresidential structures must be floodproofed to at least one foot above the base flood elevation. DEP strongly encourages that the height of floodproofing incorporate one foot of freeboard.

e. *Utilities* - Will service facilities such as electrical, heating, ventilation, plumbing, and air conditioning equipment be constructed at or above the elevation of the base flood or floodproofed with a passive system? ☐ Yes ☐ No

f. *Water Supply Systems* - Does the proposed project include a new or replacement water supply system?
☐ Yes ☐ No

If yes, is the water supply system designed to prevent floodwaters from entering and contaminating the system during the base flood? ☐ Yes ☐ No

g. *Sanitary Sewage Systems* - Does the proposed project include a new or replacement sanitary sewage or collection system? ☐ Yes ☐ No

If yes, is the sanitary sewage system designed to minimize or eliminate the infiltration of flood waters into the systems and discharges from the systems into flood waters during the base flood?

☐ Yes ☐ No

h. *Foundation Drains* - Are foundation drains of buildings designed to prevent backflow from the 100 year frequency flood into the building?

☐ Yes ☐ No ☐ No foundation drains

Section I: Floodplain Management (continued)

4. *Activity within Floodplain*

Does the proposed project involve activity in a floodplain including but not limited to filling, dumping, construction, excavating, or grading?

☐ Yes ☒ No If no, skip to subsection 5 ***(Alterations of Watercourses)***.

If yes, does the proposed project include encroachments, including fill, new construction, substantial improvements, or other development within a NFIP adopted regulatory floodway?

☐ Yes ☐ No If yes, skip to paragraph 4(b) below.

a. *No Regulatory Floodway* - The NFIP requires that until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point. (If no regulatory floodway has been adopted, project impacts may be evaluated by considering an equivalent conveyance loss on the opposite side of the river from the proposed project.)

Is the proposed project consistent with this requirement? ☐ Yes ☐ No

b. *Floodway Encroachments* - Will the proposed encroachment into the floodway result in any increase in flood levels during either the 100 year or 10 year discharges?

100 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

If yes, has the applicant received approval of such increase in accordance with 44 CFR, Chapter 1, Subchapter B, Part 65.12? ☐ Yes ☐ No

10 year: ☐ Yes; the increase is: (in 1/100ths of a foot) ☐ No

c. *Coastal Areas* - Flood hazard potential in coastal areas shall be evaluated considering surface profiles of the combined occurrence of tides, storm surges, and peak runoff. The starting water surface elevation for the base flood in watersheds with time of concentrations of over 6 hours shall be the 10 year frequency tidal surge level.

If the proposed project is in a coastal area, have the hydraulic analyses incorporated these criteria?

☐ Yes ☐ No ☐ Not in Coastal Area

5. *Alterations of Watercourses*

Does the proposed project include the construction or alteration to a natural perennial watercourse or man-made channel?

☐ Yes ☒ No If no, skip to subsection 6 ***(Culverts and Bridges)***; if yes, complete the following subsection:

a. *Topography Change* - Is the watercourse or channel located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

b. *Hydraulic Capacity* - Does the channel have a minimum flow capacity of a flood equal to at least the 25 year frequency flood? ☐ Yes ☐ No

The channel capacity is designed for the: year flood.

Does the channel have an inner channel with a capacity of a 2 year frequency flood? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

c. *Aquatic Habitat* - Channel alterations should be designed to create aquatic habitats suitable for fisheries, including suitable habitat for maintaining fish populations and to enable fish passage, and to maintain or improve water quality, aesthetics, and recreation.

Has the applicant had any pre-application meetings or correspondence with DEP Fisheries?

☐ Yes ☐ No

Check each of the following criteria that have been incorporated into the project design:

☐ 1. artificial channel linings have been avoided;

☐ 2. the channel will encourage ecological productivity and diversity;

☐ 3. the channel and its banks will be compatible with their surroundings;

☐ 4. the channel will vary in its width, depth, invert elevations, and side slopes to provide diverse aquatic habitat;

☐ 5. straightening existing channels and thereby decreasing their length has been avoided;

☐ 6. the channel will not create barriers to upstream and downstream fish passage;

☐ 7. the channel will contain pools and riffles and a low flow channel to concentrate seasonal low water flows;

☐ 8. the channel will contain flow deflectors, boulders and low check dams to enhance aquatic habitat;

☐ 9. stream bank vegetation will be preserved where feasible and disturbed stream bank areas will be replanted with suitable vegetation;

☐ 10. clean natural stream bed materials of a suitable size will be incorporated in the new channel; and

☐ 11. construction of the proposed project will be scheduled to minimize conflicts with spawning, stocking, and recreational fishing seasons.

Describe how the above aquatic habitat design criteria have been incorporated into the project design:

Section I: Floodplain Management (continued)

6. *Culverts and Bridges*

Does the proposed project involve the repair or new construction of a culvert or bridge?

☐ Yes ☒ No If no, go to subsection 7 ***(Temporary Hydraulic Facilities)***.

If yes, complete this subsection:

a. *Fish Passage* - Does the culvert design allow for the passage of fish? ☐ Yes ☐ No

If yes, describe the specific design provisions for fish passage:

b. *Depressed Structural Floors* - Is the rigid structural floor of the culvert or bridge depressed below the normal stream bed to allow a natural stream bed to form over the floor?

☐ Yes ☐ No ☐ No rigid structural floor

c. *Multiple Openings* - The use of a single large culvert or bridge opening is preferred over the use of multiple small openings. Has the design minimized the use of multiple small openings?

☐ Yes ☐ No

If no, explain:

d. *Sag Vertical Curves* - Does the design utilize solid parapet walls in the sag part of a vertical curve?

☐ Yes ☐ No ☐ Not located in a sag vertical curve

e. *Debris Blockage* - Is the culvert or bridge prone to blockage by debris? ☐ Yes ☐ No

If yes, has the project design incorporated measures to minimize the potential for debris blockage?

☐ Yes ☐ No

f. *Topography Change* - Is the culvert or bridge located within a regulatory floodway or Zone A1-30 or AE as designated by the NFIP? ☐ Yes ☐ No

Section I: Floodplain Management (continued)

g. *State Highways* - Does the watercourse pass under a state roadway?

☐ Yes ☒ No If no, skip to paragraph 6(g)(2).

If yes, culverts and bridges for state highways shall be designed in accordance with the Connecticut Department of Transportation (DOT) Drainage Manual and all applicants should refer to it for specific design criteria. In general, however, the Drainage Manual requires the following:

(Place a check mark for all applicable criteria utilized)

☐ *Minor Structures* - Minor structures have a drainage area of less than one square mile in which there is no established watercourse. They shall be designed to pass the 25 year frequency discharge.

☐ *Small Structures* - Small structures have a drainage area of less than one square mile in which there is an established watercourse. *They* shall be designed to pass the 50 year frequency discharge.

☐ *Intermediate Structures* - Intermediate structures have a drainage area greater than one square mile and less than 10 square miles. They *shall* be designed to pass the 100 year frequency discharge with reasonable underclearance.

☐ *Large Structures* - Large structures have a drainage area greater than 10 square miles and less than 1000 square miles. They shall be designed to pass the 100 year frequency discharge with an underclearance not less than two feet.

☐ *Monumental Structures* - Monumental structures *have* a drainage area greater than 1000 square miles. They shall be designed to meet the requirements of the Connecticut Department of Environmental Protection, U.S. Army Corps of Engineers, and the U.S. Coast Guard.

☐ *Tidal Structures* - Tidal structures are subject to tidal action and shall be classified as minor, small, intermediate, etc. depending on their drainage area. These structures shall be designed in accordance with the previously listed *classifications*. However if the highway is subject to frequent tidal flooding, the design storm may be made consistent with the frequency of flooding by tidal action. The proposed culvert or bridge is classified as:

☐ Tidal, minor

☐ Tidal, small

☐ Tidal, intermediate

☐ Tidal, large

☐ Tidal, monumental

1. Has the structure been designed in accordance with the criteria established in the DOT Drainage Manual? ☐ Yes ☐ No

   If no, describe the lower design standards and the reasons for not complying with the DOT Drainage Manual:

Section I: Floodplain Management (continued)

2. Will the proposed culvert or bridge increase upstream water surface elevations in the event of a base flood above that which would have been obtained in the natural channel if the highway embankment were not constructed? ☐ Yes ☐ No

   If yes, is the increase in elevation more than one foot? Describe:

3. Will the proposed culvert or bridge be designed so that flooding during the design discharge does not endanger the roadway or cause damage to upstream developed property? (NOTE: The design discharge for culverts and bridges on state highways should be that which was determined by FEMA. If the applicant judges that the FEMA discharge is inappropriate, the project should be analyzed for both the applicant's computed flow and the FEMA discharge. The project, however, must still meet the standards of the NFIP.) ☐ Yes ☐ No

   Explain:

h. *Local Roads & Driveways* - Local roads (not state highways) and driveways may be designed for flood frequencies and underclearances less stringent than those specified in the DOT Drainage Manual when (check all that have been incorporated into the project design):

   ☐ 1. the road is at or close to the floodplain grade

   ☐ 2. water surface elevations are not increased by more than one foot nor cause damage to upstream properties

   ☐ 3. provisions are made to barricade the road when overtopped

   ☐ 4. the road or driveway is posted as being subject to flooding

   ☐ 5. the road or driveway has low traffic volume

   ☐ 6. alternate routes are available

   The culvert or bridge has been designed to pass the: year frequency discharge with an underclearance of: feet.

   Utilizing the DOT Drainage Manual classifications listed under paragraph 6(g) above, the culvert or bridge is classified as a: structure.

h. If the culvert or bridge is designed to standards lower than which is stipulated in the DOT Drainage Manual, list such standards and the reasons for the lower design standards:

i. *Downstream Peak Flows* - Will the proposed culvert or bridge increase downstream peak flows by decreasing existing headwater depths during flooding events? ☐ Yes ☐ No

If yes, describe the selected design criteria and the impacts to downstream properties:

7. *Temporary Hydraulic Facilities*

Temporary hydraulic facilities include all channels, culverts or bridges which are required for haul roads, channel relocations, culvert installations, bridge construction, temporary roads, or detours. They are to be designed with the same care which is used for the primary facility.

If the proposed activity involves a temporary hydraulic facility(s), has such facility been designed in accordance with Chapter 6, Appendix F, "Temporary Hydraulic Facilities," of the DOT Drainage Manual?

☐ Yes ☐ No ☒ No temporary hydraulic facilities

If yes, the design flood frequency is the: year flood.

Describe the temporary facilities:

Section II: Stormwater Management

Name of Applicant: **Connecticut Department of Transportation**

Name of Proposed Project: **New Britain-Hartford Busway, Proj. No. 171-305 (88-H039)**

1. ***Stormwater Runoff***

The proposed project will (check all that apply):

- ☐ Increase the area of impervious surfaces
- ☐ Increase runoff coefficients
- ☐ Alter existing drainage patterns
- ☐ Alter time of concentrations
- ☐ Change the timing of runoff in relation to adjacent watersheds

Will the proposed project impact downstream areas by increasing peak flow rates, the timing of runoff, or the volume of runoff? ☐ Yes ☒ No

If yes, describe the downstream impacts for the 2, 10 and 100 year frequency discharges:

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)	
	Pre-Development	Post-Development
2		
10		
100		

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Section II: Stormwater Management (continued)

Describe the location of the design point and why this location was chosen:

2. *Stormwater Detention Facilities*

Does the proposed project include the construction of any stormwater detention facilities?

☐ Yes ☒ No If no, skip to subsection 3 ***(Storm Drainage Systems)***.

If yes, has the DEP determined whether a dam construction permit is required? ☐ Yes ☐ No

The pre and post development peak flow rates at the downstream design point are as follows:

Return Frequency (Year)	Peak Discharges (CFS)		
	Pre-Development	Post-Development (without detention)	Post-Development (with detention)
2			
10			
100			

The above peak discharges were computed utilizing the: hour duration storm. This duration storm was selected because:

Describe the location of the design point and why this location was chosen:

Section II: Stormwater Management (continued)

If the proposed project increases peak flow rates for the 2, 10 or 100 year frequency discharges, describe the impacts to downstream areas:

Will the detention facility aggravate erosion along the downstream channel? ☐ Yes ☐ No

In certain situations, detention of stormwater aggravates downstream flooding. This occurs when the discharge from a subwatershed is delayed by a detention facility so that it adds to the peak discharge from another subwatershed. Adding the hydrographs of the two subwatersheds results in a higher peak discharge over that which would occur if detention were not present.

Is the location of the detention facility within the watershed suitable for detention? ☐ Yes ☐ No

Explain:

3. *Storm Drainage Systems*

Does the proposed project include the construction of subsurface storm drainage systems?

☒ Yes ☐ No If no, you have completed Section II of the worksheets.

If yes, complete this subsection:

a. *DOT Standards* - Is the proposed storm drainage system designed in accordance with the Connecticut Department of Transportation's (DOT) Drainage Manual? ☐ Yes ☒ No

If no, describe the lower design standards and the reasons for not complying with the Drainage Manual:

The proposed design is for the relocation of an existing 12" RCP. Modifications to the hydraulic conditions of the system are not proposed.

b. *Design Storm* - Is the storm drainage system designed for a ten year frequency storm without closing the use of the facility? ☐ Yes ☐ No

c. *Future Development* - Has the design of the system considered future development of adjacent properties? ☐ Yes ☐ No

Section II: Stormwater Management (continued)

d. *Outlet Protection* - Have the outlets from the system been designed to minimize the potential for downstream erosion? ☐ Yes ☐ No

e. *Overland Flow* - Has the use of curbing been minimized to encourage overland dispersed flow through stable vegetated areas? ☐ Yes ☐ No

f. *Vegetated Filter Strips* - Has the design incorporated the use of vegetated filter strips or grass swales to improve the quality of water outletting from the storm drainage system? ☐ Yes ☐ No

g. *Stormwater Treatment* - Describe features of the stormwater collection system intended to improve the quality of stormwater runoff prior to its discharge to surface waters.

h. *E & S Control Plan* - Has the design and installation of the storm drainage system been coordinated with the soil erosion and sediment control plan prepared in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control? ☒ Yes ☐ No

Explain:

Section III: State Grants and Loans

Name of Applicant:

Name of Proposed Project:

1. This Flood Management Certification concerns a: ☐ grant ☐ loan

2. Total amount of grant or loan: $

3. The recipient of the grant or loan will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Recipient Contact person:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

4. The recipient will use the grant or loan to (check all that apply):

   ☐ construct a structure, obstruction or encroachment or conduct other work within a floodplain or coastal high hazard area.

   ☐ construct a facility or develop a site affecting drainage and stormwater runoff.

   ☐ conduct a study or prepare a report concerning land use or land use planning affecting a floodplain, drainage or stormwater runoff.

5. If the grant or loan is for a study or report, describe the anticipated effects on floodplains, drainage or stormwater runoff if the recommendations are implemented:

6. Will the proposed project promote development in floodplains or will utilities servicing the project be located so as to enable floodplain development? ☐ Yes ☐ No

   Explain:

If the grant or loan is for construction of a structure, obstruction or encroachment or other work within a floodplain, or if it is for construction of a facility or development of a site that will affect drainage and stormwater runoff, Sections I and/or II of this Worksheet must be completed and the engineering report (Attachment H) and plans (Attachment G) must be provided as part of this application.

Section IV: Disposal of State Land

Name of Applicant:

Name of Proposed Project:

1. The grantee will be:

   Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Phone: ext. Fax:

   Contact Person: Phone:

2. Describe the current state of development and use of the land to be disposed.

3. Why is the agency disposing of the land?

4. Describe the grantee's intended use of the land.

5. Will the disposal of the land promote development in floodplains? ☐ Yes ☐ No

   Explain:

6. Will the grantee's use of the land be consistent with the state's flood management statutes and regulations?

   ☐ Yes ☐ No Explain:

Connecticut Department of Transportation
State Project No. 171-305, New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain

Attachment I: Flood Contingency

Construction Operation Plan - During construction, the Contractor is bound by the conditions set forth in CTDOT's "*Standard Specifications for Roads, Bridges and Incidental Construction*", Form 816 (2004). Specifically Section 1.10 - Environmental Compliance addresses the need for the Contractor to maintain a stable work area and to coordinate with the National Oceanic and Atmospheric Administration (N.O.A.A.) weather service for information pertaining to storms. These provisions are fully described under Items 9 and 10 of the "Best Management Practices."

Storage of materials that could be injurious to human health or the environment in the event of flooding will be located outside of the 100-year flood zone. Other material or equipment may be stored below the 500-year flood elevation such that the material or equipment is not subject to major damage by floods, and that such material or equipment will be firmly anchored, restrained or enclosed to prevent it from floating away or that such material or equipment can be removed prior to flooding.

CTDOT will have construction inspection personnel assigned to the project in order to oversee the Contractor's operations to insure compliance with the provisions of the *Standard Specifications*. The inspection personnel will be assigned through the CTDOT Office of Construction, District 1, 1107 Cromwell Avenue, Rocky Hill, CT 06067 (860-258-4601).

Additionally, the CTDOT Office of Environmental Planning (860-594-2001) will assign personnel to review the Contractor's erosion and sedimentation control plans which are mandatory for all construction projects. CTDOT can invoke the "24-Hour Rule" as prescribed in Section 1.10 of the *Standard Specifications* in order to force the Contractor to correct any deficiencies found on the project affecting environmental issues. The Office of Environmental Planning will oversee the Contractor for the life of the contract as necessary to insure compliance with all environmental requirements.

Project Work in Flood-Prone Areas

Construction of the Busway will occur primarily from the rail ROW, which is elevated above the 100-year floodplain elevation. The chief elements of the project that will be constructed in flood-prone areas are the four cross-culvert installations, at the locations known as Site 2B (Plate 17), Site 3 (Plate 20), Site 4 (Plate 30), and Site 5 (Plate 35).

> Site 2B: the culvert replacement operation at Site 2B will take place primarily from the rail ROW. This site is located in the abandoned section of the ROW, allowing a rapid cut-and-cover operation for culvert replacement. Unless a precipitation event is in progress, the existing pipe -- which equalizes water levels between two wetlands -- is dry. (There is no positive stream flow, no channel, and no OHW.) The culvert removal and installation can be done in dry periods and is estimated to take approximately 2 days. If rain is anticipated or there is a flash storm during the

installation, such that water levels may rise, stone will be dumped into the open cut to create stable soils for water passage. There will be stone/rip-rap on site during construction which could be used for this purpose. In addition, hay bales will be established at the upstream end of the trench excavation, which will minimize flows through the work area during construction and minimize potentially damaging flows in the event of a precipitation event.

Site 3: the culvert replacement operation at Site 3 will take place from the (abandoned) rail ROW, which is elevated above the 100-year floodplain elevation. At this site – an unnamed tributary to Piper Brook -- a temporary bypass pipe will be installed prior to culvert removal/installation to divert stream flows and cofferdams will protect the culvert removal and installation site. OHW rests at approximately 64.6, while the top of cofferdam is proposed to rest at 67.78. The cofferdams will protect the exposed work area from rising waters in the case of precipitation events, and water collected within the cofferdams will be pumped to an upland location for discharge. If rain is anticipated or there is a flash storm during the installation, such that water levels may rise, stone will be dumped into the open cut to create stable soils for water passage. There will be stone/rip-rap on site during construction which could be used for this purpose.

Site 4: the culvert replacement operation at Site 4 will take place at ground level next to the active rail line. At Site 4, intermittent drainage flows are conveyed through the existing culvert from upslope into the downstream floodplain of Piper Brook. Unless a precipitation event is in progress or recently occurred, the existing pipe is dry. (There is no continual stream flow, no channel, and no OHW.) A multi-stage water handling plan has been developed to ensure that flows will be appropriately handled during construction, which will involve pipe jacking the new culverts under the tracks. At least one culvert will be operable at all times to convey flows. Sheet piling constructed around the work areas on both ends of the culvert will protect any exposed work areas from rising waters in case of precipitation. Sheet piling on the upstream side will have a top elevation of 60.7 feet minimum, compared to the 100-year flood elevation of just below 60 feet in this location. Sheet piling on the downstream side will have a top elevation of 59.0 feet minimum, compared to the 100-year flood elevation of approximately 60 feet in this location. Water collected within the cofferdams will be pumped to temporary sedimentation basins for dewatering discharge.

Site 5: the culvert replacement operation at Site 5 will take place at ground level next to the active rail line. At Site 5, an unnamed tributary to Piper Brook flows through existing culverts (to be replaced). Like Site 4, Site 5 will require pipe jacking for installation of the new pipe. A multi-stage water handling plan has been developed to ensure that flows will be appropriately handled during construction. At least one culvert will be operable at all times to convey flows. The OHW level is approximately 55.9 feet on the west (upstream) side of the tracks and 54.85 feet on the downstream side. Sheet piling constructed around the work areas on both ends of the culvert will protect any exposed work areas from rising waters in case of flooding events. Sheet piling on the upstream side will have a top elevation of 60.5 feet minimum, compared to the 100-year flood elevation of approximately 61 feet in this location. Sheet piling on the downstream side will have a top elevation of 60.0 feet, well above the 100-year flood elevation of 56-57 feet this location. Water collected

within the cofferdams will be pumped to temporary (upland) sedimentation basins for discharge.

Post Construction Operation Plan – CTDOT will maintain responsibility for the integrity of the facility after completion of the project. If there are environmental issues that need to be addressed, the Office of Environmental Planning (860-594-2001) should be contacted in order to coordinate any remedial action involving regulated activities. For routine maintenance, CTDOT's Office of Maintenance, District 1, Rocky Hill, should be contacted (860-258-4601).

NEW BRITAIN – HARTFORD BUSWAY
New Britain, Newington, West Hartford, Hartford, Connecticut

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment J: Soil Scientist Report

State Project 171-305

Prepared under contract to:

Michael Baker Engineering, Inc.

For:

CONNECTICUT DEPARTMENT OF TRANSPORTATION

By:

FITZGERALD & HALLIDAY, INC.
72 Cedar Street
Hartford, CT 06106

August 2010

ATTACHMENT J: SOIL SCIENTIST REPORT

The New Britain-Hartford Busway project area was field-surveyed for wetlands and watercourses during three separate wetland delineation efforts: 2003, 2007, and 2009. The survey limits centered on the former and current rail lines between New Britain and Hartford, Connecticut (refer to Figure 1).

The first two wetland investigations were conducted by Connecticut Ecosystems LLC (CE) during the summers of 2003 and 2007. CE field-delineated and documented inland wetlands and intermittent watercourses (IWCs) within the project limits. During the summer of 2009, Fitzgerald & Halliday, Inc. (FHI) field-verified CE's delineated boundaries and wetland function-value assessments, and conducted supplemental field-delineation, function-value assessments, and wetland documentation (transects).

The wetland delineations were conducted according to both the federal and State of Connecticut definitions. Criteria used to support the wetland boundary determinations included: Natural Resources Conservation Service (NRCS) mapping; *Field Indicators of Hydric Soils in the United States – Version 6.0* (NRCS, 2006); *Field Indicators for Identifying Hydric Soils in New England – Version 3* (New England Hydric Soils Technical Committee, 2004); and the *Corps of Engineers Wetland Delineation Manual* (U.S. Army Corps of Engineers [ACOE], Waterways Experiment Station, 1987). Additionally, FHI conducted a function and value assessment for each of the delineated wetlands per the guidance set forth in *The Highway Methodology Workbook Supplement – Wetland Functions and Values – A Descriptive Approach* (ACOE – New England Division, November 1995).

The CE 2003 and 2007 field-delineation efforts resulted in the delineation of 36 inland wetland systems and 17 IWCs, each designated by a unique flag series. CE reported that state-only and federal/state wetland types generally coincide within the study area corridor.

The FHI field-delineation confirmed the previously delineated boundaries and, in several cases, extended these boundaries. FHI flagged the boundaries of 15 additional wetlands and 6 IWCs, each identified by a separate flag series number. There were five instances where wetlands qualified under the state definition but not the federal definition; these areas were flagged as state-only (Connecticut) wetland systems. In some cases, two or more of the wetlands were hydraulically connected but were flagged with different series numbers because the connection takes place beyond the project's surveyed limits or via culverts that run beneath existing roadways. Although some of the flagged wetlands are very small (only a few square feet), some of the wetland systems are very large and extend beyond the survey limits.

Although the wetland delineation efforts distinguished the differences between state only and state and federal wetlands for the purpose of jurisdictional determination, it has been decided by the Connecticut Department of Transportation (CTDOT) that all impacted wetlands will be mitigated on the same basis. Because of this decision all of the wetlands are listed below and are addressed in the same fashion.

Because the survey limits are primarily within a heavily urbanized area, the majority of the soils in the project corridor are classified by the NRCS as Udorthents and Urban Land Complexes (refer to Figures 2 and 3). The urban soils encountered within the survey limits are typical of urban developed lands and infrastructures in Connecticut and are usually imported from adjacent or nearby sources of well-drained fill.

Study Area Soils

Aquents (including fluvaquents)

These soil types consist of areas that generally have been altered by excavations or other disturbance to the soil diagnostic horizons rendering the top 20 inches or more no longer discernable. The material in these areas is variable depending on the disturbance that created this unit. Some of these areas occur in uplands or on flood plains, and within areas of poorly drained and very poorly drained soils. Included with this unit in mapping may be small areas of soils that have not been cut or filled.

Bash

The Bash series consists of very deep, somewhat poorly drained soils formed in recent alluvial deposits derived from reddish, acidic sandstone, siltstone, and shale. They are nearly level soils on floodplains. These soils may be flooded in the spring each year.

Berlin

The Berlin series consists of very deep, moderately well drained and somewhat poorly drained soils formed in silty and clayey glaciolacustrine deposits. They are nearly level to moderately steep soils on slightly elevated positions on lacustrine terraces. Slope ranges from 0 to 25 percent. Typically, the soils are on slightly elevated knolls on the landscape. Steeper areas are mainly on terrace risers or on short sideslopes along drainageways. Moderately well drained and somewhat poorly drained. Surface runoff is medium to rapid. Saturated hydraulic conductivity is moderately high or high in the surface layer and upper subsoil, low to moderately high in the lower substratum, and moderately low or low in the substratum. Berlin soils have a seasonal high water table and are slow to dry out.

Brancroft

The Brancroft series consists of very deep, moderately well drained soils formed in silty and clayey glacial lacustrine deposits. They are nearly level to moderately steep soils on slightly elevated positions on lacustrine terraces. Slope ranges from 0 to 15 percent. Moderately well drained. Surface runoff is medium to rapid. Saturated hydraulic conductivity is moderately low or moderately high in the surface layer and upper part of the subsoil, low to moderately high in the lower subsoil, and very low in the substratum.

Cheshire

The Cheshire series consists of very deep, well drained loamy soils formed in supraglacial till on uplands. They are nearly level through very steep soils on till plains and hills. Slope ranges from 0 through 60 percent. The soils formed in acid glacial till derived mostly from reddish sandstone, shale, and conglomerate with some basalt. Well

drained. Surface runoff is medium to rapid. Saturated hydraulic conductivity is moderately high or high throughout.

Elmridge

The Elmridge series consists of very deep, moderately well drained soils formed in loamy over clayey sediments. They are nearly level to moderately steep soils on glacial lacustrine and marine terraces, and on lake plains. Slope ranges from 0 to 25 percent. The soils formed in loamy and clayey glacial lacustrine and marine deposits. The soils diagnostic horizons include an Ochric epipedon (0 to 6 inches (Ap horizon), and a cambic horizon (6 to 25 inches (Bw horizon).

Hartford

The Hartford series consists of very deep, somewhat excessively drained soils formed in sandy glacial outwash. They are nearly level to strongly sloping soils on plains and terraces. Slope ranges from 0 to 8 percent. The soils formed in sandy and gravelly glaciofluvial materials derived mainly from red sedimentary rocks and basalt. Somewhat excessively drained. Surface runoff is negligible to medium.

Holyoke

The Holyoke series consists of shallow, well drained and somewhat excessively drained soils formed in a thin mantle of till derived mainly from basalt and red sandstone, conglomerate, and shale. They are nearly level to very steep soils on bedrock controlled ridges and hills. Slope ranges from 0 to 50 percent. Some pedons have been modified by silty windblown deposits. The underlying bedrock is primarily basalt but includes red sandstone, conglomerate, or shale. Rock outcrops range from few to many. Well drained and somewhat excessively drained. Surface runoff is medium to very rapid. Saturated hydraulic conductivity is moderately high to very high.

Limerick and Lim Complex

The Limerick series consists of very deep, poorly drained soils on flood plains. They formed in loamy alluvium. Limerick soils are on the flood plains of major rivers and their larger tributaries. In some places they are on the flood plains of small streams. They may be on broad flat areas or in shallow depressions. The soils formed in recent alluvial deposits that are dominantly silt and very fine sand.

The Lim series consists of very deep, poorly drained loamy soils formed in alluvial sediments. They are nearly level soils on flood plains and are subject to frequent flooding. Slope ranges from 0 to 3 percent.

Ludlow

The Ludlow series consists of moderately well drained soils formed in loamy lodgment till. They are very deep to bedrock and moderately deep to a densic contact. They are nearly level to strongly sloping soils on till plains, hills, and drumlins. Slope ranges from 0 to 15 percent. The soils formed in acid till derived mostly from reddish sandstone, shale, and conglomerate with some basalt. Moderately well drained. Surface runoff is negligible to high. Saturated hydraulic conductivity is moderately high or high in the

solum and low to moderately high in the substratum. Ludlow soils have a seasonal high water table.

Manchester

The Manchester series consists of very deep, excessively drained soils formed in sandy and gravelly glacial outwash and stratified drift. They are nearly level to steep soils on outwash plains, terraces, kames, deltas and eskers. Slope ranges from 0 to 45 percent. The soils formed in sandy and gravelly glaciofluvial materials and stratified drift derived mainly from a red sedimentary rocks and basalt. Diagnostic horizons in this pedon include an Ochric epipedon from 0 to 9 inches, a sandy-skeletal particle-size control section from 10 to 40 inches and no diagnostic subsoil.

Saco

Saco soils are nearly level soils on flood plains, along rivers and streams. They are in depressed areas. Slope ranges from 0 to 2 percent. The soils formed in recent silty alluvium derived mostly from granite, gneiss, schist, shale and sandstone. In places water is ponded on the surface from late fall through early spring. Permeability is moderate in the silty layers and rapid or very rapid in the underlying sandy materials. These soils flood in the spring and after periods of heavy rainfall.

Scarboro

The Scarboro series consists of very deep, very poorly drained soils in sandy glaciofluvial deposits on outwash plains, deltas, and terraces. The slope of this soil unit is less than 3 percent. The soils are formed in sandy glaciofluvial deposits. The soils diagnostic horizons include a histic epipedon (Oi and Oa horizons). Thickness of this epipedon is 8 inches and consists of organic soil materials. Aquic conditions occur within the zone from 19 to 22 inches.

Scitico, Shaker, and Maybrid Complex

The Scitico series consists of very deep, poorly drained soils formed in silty and clayey sediments. They are nearly level to very gently sloping soils in low-lying positions of glaciolacustrine and marine terraces. Slope ranges from 0 to 5 percent. Permeability is moderate or moderately slow in the surface layer, moderately slow or slow in the upper part of the subsoil, slow or very slow in the lower part of the subsoil, and very slow in the substratum. Scitico soils have a water table at or near the surface much of the year.

The Shaker series consists of very deep, poorly drained soils formed in loamy over clayey sediments. They are nearly level to gently sloping soils in low-lying positions on glaciolacustrine and marine terraces. Poorly drained. Surface runoff is negligible to slow. Saturated hydraulic conductivity is high in the upper loamy horizons and low to moderately high in the underlying clayey horizons. Shaker soils have a water table at or near the surface much of the year.

The Maybid series consists of very deep, very poorly drained soils formed in lacustrine or marine sediments. They are nearly level or level soils on lowlands. Slope ranges from 0 to 3 percent. Very poorly drained. Internal drainage is very slow. Permeability is slow or very slow. Saturated hydraulic conductivity is moderately high or high in the surface

layer very low to moderately high in the subsoil and substratum. The soil is intermittently ponded or has very low runoff.

Udorthent/Urban Lands

Udorthent units consist of well drained material that has been altered by cutting or filling. Slopes are mainly 25 to 70 percent. This material occurs on escarpments and is mostly loamy. The properties and characteristics of this unit are variable, and the unit requires onsite investigation and evaluation for most uses. This unit is not assigned to a capability subclass.

Urban Land units consist of areas where urban structures cover more than 85 percent of the surface. Examples of such structures are roads, parking lots, shopping and business centers, and industrial parks. Most areas are in the towns of Bridgeport, Danbury, Fairfield, Norwalk, Shelton, Stamford, and Stratford. The areas are commonly rectangular and range from 5 to 500 acres. Slopes range from 0 to 8 percent but are dominantly less than 5 percent. Included with this unit in mapping are small areas of Udorthents and areas of excessively drained Hinckley soils; somewhat excessively drained Hollis soils; well drained Agawam, Charlton, and Paxton soils; and moderately well drained Ninigret and Sutton soils. Included areas make up about 15 percent of this map unit. This unit requires onsite investigation and evaluation for most uses.

Wethersfield

The Wethersfield series consists of very deep, well drained loamy soils formed in dense glacial till on uplands. The soils are moderately deep to dense basal till. They are nearly level to steep soils on till plains, low ridges, and drumlins. Permeability is moderately rapid or moderate in the solum and slow or very slow in the dense substratum. Slope ranges from 0 to 35 percent. The soils formed in acid glacial till derived mostly from reddish sandstone, shale, and conglomerate with some basalt. Well drained. Surface runoff is negligible to high.

Wilbraham

The Wilbraham series consists of poorly drained loamy soils formed in subglacial till. Wilbraham soils are nearly level to gently sloping and are in depressions and drainageways on glaciated hills. Slope commonly is less than 5 percent, but the range includes 0 to 8 percent. The soils formed in acid till derived mainly from reddish sandstone, shale, and conglomerate with some basalt. Diagnostic horizons and features recognized in this pedon includes an ochric epipedon (0 to 4 inches (A horizon)), a cambic horizon 4 to 20 inches (Bw1 and Bw2 horizons and aquic features (low chroma iron depletions within a 24 inch depth (Bw1, Bw2, and Cd horizons).

Yalesville

The Yalesville series consists of moderately deep, well drained soils formed in a loamy till. They are nearly level to moderately steep soils on hills and ridges. Slope ranges from 0 to 50 percent. Permeability is moderate or moderately rapid in the surface layer and subsoil, and moderately rapid in the substratum. The soils formed in acid till derived mostly from red sandstone, shale, and conglomerate with some basalt. Well drained.

Surface runoff is negligible to very high. Permeability is moderate to moderately rapid in the solum and moderately rapid in the substratum.

The larger wetland systems, which extend beyond the delineation limits, are typically associated with broad floodplain areas connected to Piper Brook and Bass Brook. These soil types are predominantly Limerick and Lim soil complexes; Saco silt loam; Scitico, Shaker, and Maybrid soil complexes; Fluvaquent and Udifluvent soil complexes; and Scarboro mucky loamy sand.

Table 1 (below) shows a matrix of delineation results for the project. The table includes the current wetland numbers, the Busway engineering design contract (contract number) within which the wetland falls, flag sequence numbers, previous wetland numbers (if relevant), wetland report date, and wetland type.

Referenced documents in this report include the following:

1. Wetland Report 2003: Connecticut Ecosystems LLC. Wetland Report: New Britain-Hartford Busway (July 7, 2003)

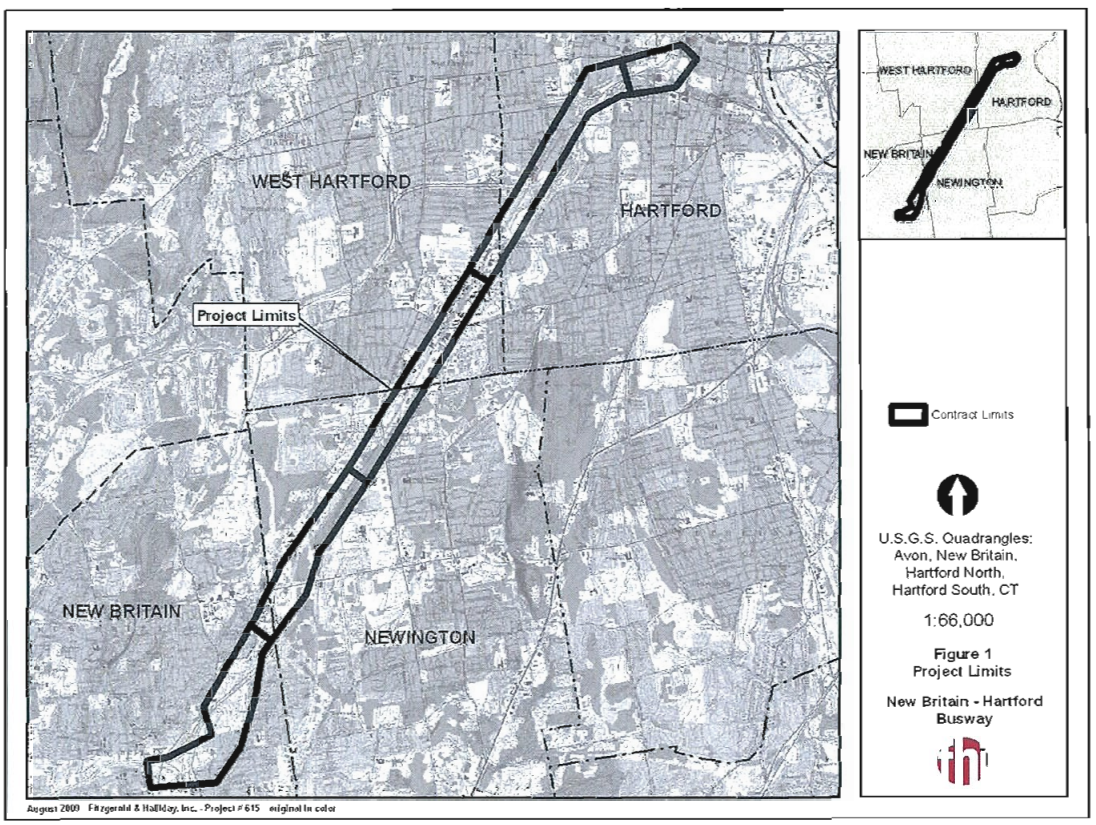
2. Wetland Report 2007: Connecticut Ecosystems LLC. Addendum to Wetlands Report: New Britain-Hartford Busway (April 16, 2007)

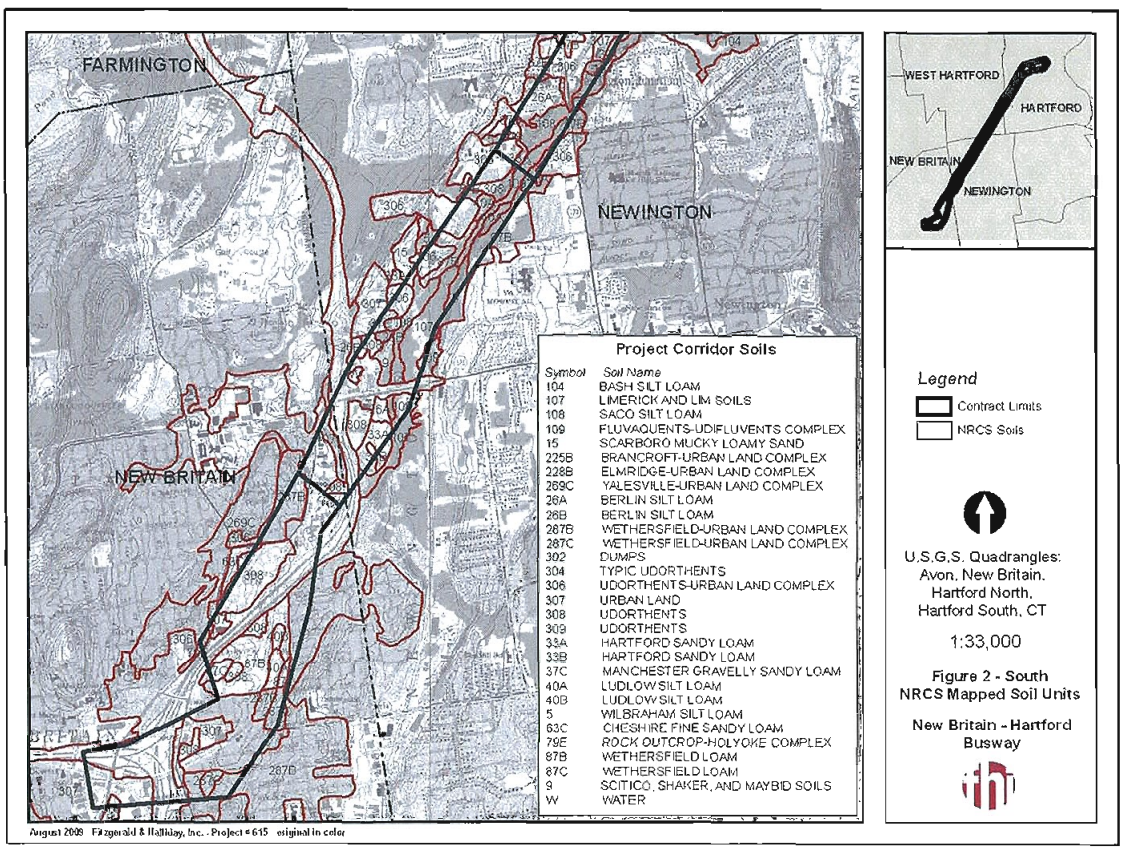
3. Wetland Report 2009: Fitzgerald & Halliday Inc. New Britain - Hartford Busway: Wetland Field Investigation and Delineation (September 2009)

Respectfully submitted,

David Laiuppa

David Laiuppa
Certified Soil Scientist
Fitzgerald & Halliday, Inc.


WEST HARTFORD
HARTFORD
Project Limits
NEW BRITAIN
NEWINGTON
WEST HARTFORD
HARTFORD
NEW BRITAIN
NEWINGTON
Contract Limits
U.S.G.S. Quadrangles:
Avon, New Britain,
Hartford North,
Hartford South, CT
1:66,000
Figure 1
Project Limits
New Britain - Hartford
Busway
August 2009 Fitzgerald & Halliday, Inc. - Project # 615 original in color


FARMINGTON
NEWINGTON
NEW BRITAIN
WEST HARTFORD
HARTFORD
NEW BRITAIN
NEWINGTON
Project Corridor Soils
Symbol Soil Name
104 BASH SILT LOAM
107 LIMERICK AND LIM SOILS
108 SACO SILT LOAM
109 FLUVAQUENTS-UDIFLUVENTS COMPLEX
15 SCARBORO MUCKY LOAMY SAND
225B BRANCROFT-URBAN LAND COMPLEX
228B ELMRIDGE-URBAN LAND COMPLEX
269C YALESVILLE-URBAN LAND COMPLEX
26A BERLIN SILT LOAM
26B BERLIN SILT LOAM
267B WETHERSFIELD-URBAN LAND COMPLEX
267C WETHERSFIELD-URBAN LAND COMPLEX
302 DUMPS
304 TYPIC UDORTHENTS
306 UDORTHENTS-URBAN LAND COMPLEX
307 URBAN LAND
308 UDORTHENTS
309 UDORTHENTS
33A HARTFORD SANDY LOAM
33B HARTFORD SANDY LOAM
37C MANCHESTER GRAVELLY SANDY LOAM
40A LUDLOW SILT LOAM
40B LUDLOW SILT LOAM
5 WILBRAHAM SILT LOAM
63C CHESHIRE FINE SANDY LOAM
79E ROCK OUTCROP-HOLYOKE COMPLEX
87B WETHERSFIELD LOAM
87C WETHERSFIELD LOAM
9 SCITICO, SHAKER, AND MAYBID SOILS
W WATER
Legend
Contract Limits
NRCS Soils
U.S.G.S. Quadrangles:
Avon, New Britain,
Hartford North,
Hartford South, CT
1:33,000
Figure 2 - South
NRCS Mapped Soil Units
New Britain - Hartford
Busway
August 2008 Fitzgerald & Halliday, Inc. - Project # 615 original in color

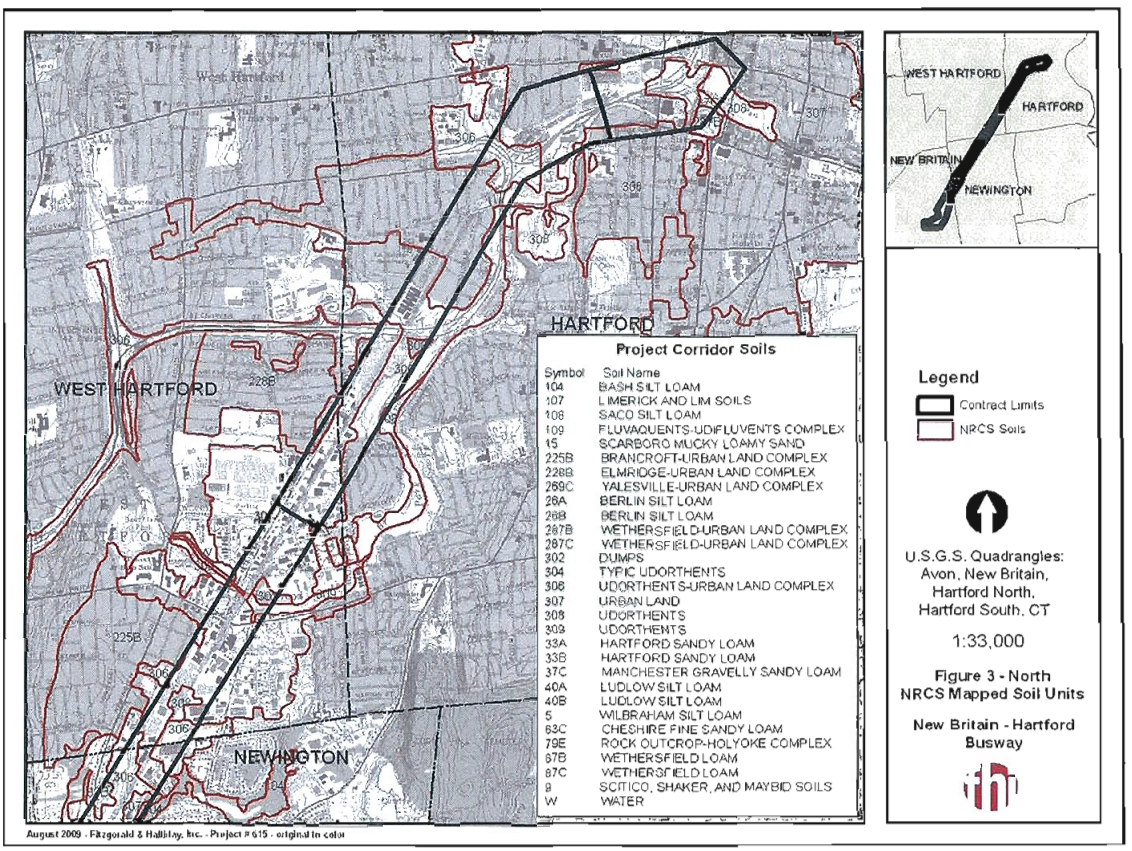

West Hartford
HARTFORD
WEST HARTFORD
NEWINGTON
306
308
307
228B
225B
Project Corridor Soils
Symbol Soil Name
104 BASH SILT LOAM
107 LIMERICK AND LIM SOILS
108 SACO SILT LOAM
109 FLUVAQUENTS-UDIFLUVENTS COMPLEX
15 SCARBORO MUCKY LOAMY SAND
225B BRANCROFT-URBAN LAND COMPLEX
228B ELMRIDGE-URBAN LAND COMPLEX
259C YALESVILLE-URBAN LAND COMPLEX
26A BERLIN SILT LOAM
26B BERLIN SILT LOAM
287B WETHERSFIELD-URBAN LAND COMPLEX
287C WETHERSFIELD-URBAN LAND COMPLEX
302 DUMPS
304 TYPIC UDORTHENTS
306 UDORTHENTS-URBAN LAND COMPLEX
307 URBAN LAND
308 UDORTHENTS
309 UDORTHENTS
33A HARTFORD SANDY LOAM
33B HARTFORD SANDY LOAM
37C MANCHESTER GRAVELLY SANDY LOAM
40A LUDLOW SILT LOAM
40B LUDLOW SILT LOAM
5 WILBRAHAM SILT LOAM
63C CHESHIRE FINE SANDY LOAM
79E ROCK OUTCROP-HOLYOKE COMPLEX
87B WETHERSFIELD LOAM
87C WETHERSFIELD LOAM
9 SCITICO, SHAKER, AND MAYBID SOILS
W WATER
WEST HARTFORD
HARTFORD
NEW BRITAIN
NEWINGTON
Legend
Contract Limits
NRCS Soils
U.S.G.S. Quadrangles:
Avon, New Britain,
Hartford North,
Hartford South, CT
1:33,000
Figure 3 - North
NRCS Mapped Soil Units
New Britain - Hartford
Busway
August 2009 - Fitzgerald & Halliday, Inc. - Project # 615 - original in color

TABLE 1
NEW BRITIAN – HARTFORD BUSWAY
STATE PROJECT NO. 171-305
WETLAND DELINEATION MATRIX

Current Wetland Number	Soil Type	Contract Number	Flag Sequence *	Old Wetland Number	Wetland Report **	Wetland/IWC Type
1	Udorthent	88-H035	CE-1-1 to CE-1-11	1	2003	State and Federal
IWC 2-1 to 2-7	Udorthent	88-H035	IWC 2-1 to 2-7		2003	IWC
2a	Udorthent	88-H035	CE-2-1 to CE-2-14	2	2003	State and Federal
IWC 1-1 to 1-4	Udorthent	88-H035	IWC 1-1 to 1-4		2003	IWC
2b	Udorthent	88-H034	F101 to F112		2009	State and Federal
2c	Udorthent	88-H034	F201 to F210		2009	State and Federal
2d	Udorthent	88-H034	F501 to F508		2009	State and Federal
3	Udorthent & Limerick/Lim	88-H034	CE-3-1 to CE-3-12 (2003) & F401 to F417 (2009)	3	2003 & 2009	State and Federal
4	Udorthent & Limerick/Lim	88-H034	CE-4-1 to CE-4-17 (2003) & IWC-4-12 to IWC-4-17 (2003) & F301 to F331 (2009)	4	2003 & 2009	State and Federal
IWC 4a	Udorthent	88-H034	IWC101 to IWC103		2009	IWC
5	Udorthent	88-H034	CE-5-1 to CE-5-14	5	2003	State and Federal
IWC 3a	Udorthent	88-H034	IWC201 to IWC212		2009	IWC
6a	Udorthent	88-H034	CE-6-1 to CE-6-13	6	2003	State and Federal
6b	Udorthent	88-H034	IWC-3-5 to IWC-3-10 (2003) & CTDOT redelineation		2003	State and Federal
6c	Udorthent & Scitico/Shaker/Maybrid	88-H034	S101 to S105		2009	State Only
6d	Scitico/Shaker/Maybrid	88-H034	F701 to F726		2009	State and Federal
6e	Scitico/Shaker/Maybrid	88-H034	S201 to S206		2009	State Only
6d	Scitico/Shaker/Maybrid	88-H034	F801 to F810		2009	State and Federal
7a	Scitico/Shaker/Maybrid & Saco	88-H034	CE-7-1 to CE-7-9 & redelineation S301 to S311 (2009)	7	2003 & 2009	State Only
7b	Scitico/Shaker/Maybrid & Saco	88-H034	CE-8-1 to CE-8-9 & redelineation S401 to S408 (2009)	7	2003 & 2009	State Only
8a	Udorthent	88-H034	Unknown (surveyed 2003)		2003	State and Federal
8b	Udorthent	88-H034	Unknown (surveyed 2003)		2003	State and Federal
8c	Scitico/Shaker/Maybrid	88-H034	CE-12-1 to CE-12-27 (2003) & F601 to F620 (2009)	8	2003 & 2009	State and Federal
7c	Saco	88-H034	CE-9-1 to CE-9-30	7	2003	State and Federal
9a	Saco & Udorthent	88-H034	CE-13-1 to CE-13-31	9	2003	State and Federal
9b	Wethersfield & Udorthent	88-H034	Unknown (surveyed 2003)		2003	State and Federal
7d	Saco & Limerick/Lim	88-H034	CE-10-1 to CE-10-34	7	2003	State and Federal
IWC 3-2 to 3-3	Udorthent	88-H034	IWC 3-1 to 3-3		2003	IWC
10	Udorthent	88-H034	CE-14-1 to CE-14-9	10	2003	State and Federal
11	Udorthent	88-H034	CE-15-1 to CE-15-14	11	2003	State and Federal
7e	Fluvaquent & Ludlow	88-H034	CE-11-1 to CE-11-34	7	2003	State and Federal

IWC 4-1 to 4-11	Ludlow & Udorthent	88-H034	IWC 4-1 to 4-11		2003	IWC
7f	Ludlow & Udorthent	88-H034	IWC-9-1 to IWC-9-11		2003	State and Federal
7g	Udorthent	88-H034	IWC-7-1 to IWC-7-6		2003	State and Federal
IWC 5-1 to 5-5	Udorthent	88-H034	IWC 5-1 to 5-5		2003	IWC
12	Udorthent	88-H034	CE-19-1 to CE-19-14	12	2003	State and Federal
13	Udorthent	88-H034	CE-16-1 to CE-16-18	13	2003	State and Federal
IWC 6-8 to 6-2	Udorthent	88-H034	IWC-6-1 to IWC-6-8		2003	IWC
IWC 8-28 to 8-8	Udorthent	88-H034	IWC 8-8 to 8-28		2003	IWC
IWC 10-2 to 10-7	Hartford & Udorthent	88-H034 & 93-H046	IWC 10-2 to 10-7		2003	IWC
27a	Fluvaquent & Saco	93-H046	CE-50-1 to CE-50-75	27	2007	State and Federal
14	Saco	93-H046	CE-17-1 to CE-17-44	14	2003	State and Federal
15	Saco	93-H046	CE-18-1 to CE-18-17	15	2003	State and Federal
27b	Bash & Udorthent	93-H046	S501 to S519		2009	State Only
IWC 12-1 to 12-3	Udorthent	93-H046	IWC 12-1 to 12-3		2003	IWC
16a	Udorthent	93-H046	CE-20-1 to CE-20-9	16	2003	State and Federal
IWC 11-1 to 11-4	Udorthent	93-H046	IWC 11-1 to 11-4		2003	IWC
16b	Udorthent	93-H046	F901 to F912		2009	State and Federal
21a	Udorthent	93-H046	CE-51-1 CE-51-21	21	2007	State and Federal
17	Udorthent	93-H046	CE-21-1 to CE-21-19	17	2003	State and Federal
21a2	Udorthent	93-H046	F1001 to F1007		2009	State and Federal
18	Udorthent	93-H046	CE-22-1 to CE-22-24	18	2003	State and Federal
IWC 11b	Udorthent	93-H046	IWC301 to IWC306		2009	IWC
25	Udorthent	93-H046	CE-4-1 to CE-4-30	26	2007	State and Federal
IWC 13-1 to 13-8	Udorthent	93-H046	IWC 13-1 to 13-8		2003	IWC
IWC 14-1 to 14-6	Udorthent	93-H046	IWC 14-1 to 14-6		2003	IWC
28	Udorthent	93-H046	CE-52-1 to CE-52-5	28	2007	State and Federal
21b	Udorthent	93-H046	CE-54-1 to CE-54-5	21	2007	State and Federal
29	Udorthent	93-H046	CE-53-1 to CE-53-4	29	2007	State and Federal
19	Udorthent	93-H046	WF-24-1 to WF-24-7	19	2003	State and Federal
20	Udorthent	93-H046	WF-23-1 to WF-23-10	20	2003	State and Federal
30	Udorthent	93-H046 & 155-H025	CE-53-1 to CE-53-13 (CE-53-1, 53-12, 53-13 filled by Amtrak)	30	2007	State and Federal
IWC 14b	Udorthent	155-H025	IWC401 to IWC408		2009	IWC
21c	Udorthent	155-H025	CE-25-1 to CE-25-12	21	2003	State and Federal
IWC 14c	Udorthent	155-H025	IWC601 to IWC605		2009	IWC
IWC 14d	Udorthent	155-H025	IWC501 to IWC504		2009	IWC
21d	Udorthent	155-H025	F1101 to F1105		2009	State and Federal
22a	Udorthent	155-H025	CE-28-1 to CE-28-14	22	2003	State and Federal
22b	Udorthent	155-H025	F1201 to F1210		2009	State and Federal
22c	Udorthent	155-H025	F1301 to F1310		2009	State and Federal
24	Udorthent	155-H025	CE-27-1 to CE-27-26	24	2003	State and Federal
26	Udorthent	155-H025	CE-26-1 to CE-26-5	25	2003	State and Federal
IWC 14e	Udorthent	155-H025	IWC701 to IWC705		2009	IWC
Included in 2009 as 22b	Udorthent	155-H025	CE-29-1 to CE-29-12	23	2003	Plotted in wrong location (ignore)
IWC 14f	Udorthent	155-H025	IWC801 to IWC805		2009	IWC

IWC 15-5 to 15-1	Udorthent	155-H025	IWC 15-1 to 15-5		2003	IWC

* Flag sequences with unknown record = no record of wetland or flagging sequence in reports (wetland perimeter mapped as 2003 delineation)

** Wetland Report 2003 = Connecticut Ecosystems LLC. Wetland Report: New Britain-Hartford Busway (July 7, 2003)
Wetland Report 2007 = Connecticut Ecosystems LLC. Addendum to Wetlands Report: New Britain-Hartford Busway (April 16, 2007)
Wetland Report 2009 = Fitzgerald & Halliday Inc. New Britain - Hartford Busway: Wetland Field Investigation and Delineation (September 2009)

NEW BRITAIN – HARTFORD BUSWAY
New Britain, Newington, West Hartford, Hartford, Connecticut

Connecticut Department of Environmental Protection
Inland Water Resources Permit Application

Attachment K: Environmental Report

State Project 171-305

Prepared under contract to:

Michael Baker Engineering, Inc.

For:

CONNECTICUT DEPARTMENT OF TRANSPORTATION

By:

FITZGERALD & HALLIDAY, INC.
72 Cedar Street
Hartford, CT 06106

August 2010

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Connecticut Department of Transportation
State Project No. 171-305, New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain

Attachment K: Environmental Report

1.0 INTRODUCTION

Environmental conditions in the project area have been studied and documented through numerous efforts. Investigations included literature research, reference to Connecticut Department of Environmental Protection (CTDEP) data, agency coordination, and field observations. The major studies included the following:

- *Draft Environmental Impact Statement (EIS) and Section 4(f) Evaluation – New Britain-Hartford Busway, New Britain, Newington, West Hartford, and Hartford, Connecticut*, dated March, 2001
- *Final Draft Environmental Impact Statement (EIS) and Section 4(f) Evaluation – New Britain-Hartford Busway, New Britain, Newington, West Hartford, and Hartford, Connecticut*, dated December 2001
- Supplemental EIS approved by FTA in June 2006, with a Federal Record of Decision (ROD) issued in March 2002
- *Wetland Report: New Britain-Hartford Busway* (July 7, 2003), Connecticut Ecosystems LLC
- *Addendum to Wetlands Report: New Britain-Hartford Busway* (April 16, 2007), Connecticut Ecosystems LLC
- *Vernal Pool Survey* (May 2007). Connecticut Ecosystems LLC.
- *New Britain - Hartford Busway Wetland Field Investigation and Delineation* (November 2009), Fitzgerald & Halliday Inc.

Extensive field investigations have been conducted to characterize wetland and water resources in the Busway project corridor. Wetland and watercourse conditions were extensively investigated in 2003, 2007 and again in 2009. The investigations in spring-summer 2009 verified or updated the wetland delineations and function-value assessments from 2003 and 2007. Wetland delineation efforts documented 53 wetland systems and 21 intermittent watercourses. Changes and updates are documented in the 2009 wetland delineation report (Fitzgerald & Halliday, Inc.) The wetland numbering system used in this permit application was finalized in 2009 after all wetlands, perennial watercourses and intermittent watercourses (IWCs) were confirmed in the field (see Table 1 in Attachment J). Appendices A, B, and C of this attachment contain wetland documentation from these field studies including federal wetland transect information and wetland function and value forms. A vernal pool survey was conducted in May 2007, which found no vernal pools in the areas of interest (see Appendix D of this attachment).

This report provides a description of the existing wetland, watercourse, and habitat resources in the project area, detailed descriptions of the impacts associated with the proposed Busway, and the proposed mitigation for each impacted resource within the project area. Detailed tabulation of impacts to wetlands, IWCs, floodplains, stream channel encroachment lines (SCELs), and ordinary high water (OHW) are tabulated by each impact location in Tables 1 through 4.

NEW BRITAIN - HARTFORD BUSWAY

STATE PROJECT NO. 171-305

TABLE 1

WETLAND AND INTERMITTENT WATERCOURSE (IWC) IMPACTS

Wetland No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Temporary Impact		Permanent Impact		Description	Wetland Classification	Functions & Values of Impacted Area	Proposed Design/Construction Impact
						(ft^2)	(Acre)	(ft^2)	(Acre)				
Federal/State Wetlands													
2A	8	H035	113+05	114+72	LT			2,888	0.066	Small track-side depression with *Phragmites*	**Palustrine Emergent**	Sed/tox retention	Retaining Wall
2B	9	H034	117+78	118+50	RT	188	0.004	302	0.007	Small wetland between developed parcels	**Palustrine Shrub-shrub**	GW recharge, sed/tox retention	Busway Fill and Retaining Wall
2C	10	H039	120+55	121+23	LT			728	0.017	Depression within upland forest	**Palustrine Shrub-shrub**	GW recharge	East Street Station
2D	10A	H034	120+45	121+23	RT			1,160	0.027	Small emergent wetland depression	**Palustrine Emergent**	GW discharge	Maintenance road at CCSU Facility
3	11	H034	123+75	125+05	RT	634	0.015	0	0.000	Small forested floodplain forest along segmented Bass Brook	**Palustrine Forested**	GW recharge, sed/tox retention, wildlife habitat	Retaining Wall construction
6A	14	H034	144+60	145+50	RT			2,080	0.048	Corner of larger wetland in area disturbed by vehicles	**Palustrine Shrub-shrub**	GW recharge, sed/tox retention	Drainage Channel
6A	14	H034	145+95	146+00	RT	128	0.003	0	0.000	Corner of larger wetland in area disturbed by vehicles	**Palustrine Shrub-shrub**	GW recharge, sed/tox retention	Bridge construction haul road
6B	14	H034	145+40	147+40	LT			3,152	0.072	Narrow degraded finger under Route 9; disturbance has caused obstruction of flow path	**Palustrine Emergent**	GW discharge, sed/tox retention	Fill for Busway and Trail
6D	15	H034	150+10		RT			60	0.001	Part of extensive Piper Brook floodplain forest	**Palustrine Forested**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap apron for outfall
6D	15	H034	151+00	152+60	RT			949	0.022	Part of extensive Piper Brook floodplain forest	**Palustrine Forested**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
6D	16	H034	154+00	154+40	RT			48	0.001	Part of extensive Piper Brook floodplain forest	**Palustrine Forested**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
6D	16	H034	155+30		RT			45	0.001	Part of extensive Piper Brook floodplain forest	**Palustrine Forested**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
6E	16	H034	155+30	156+15	RT			1,126	0.026	Piper Brook floodplain - upland forest/ shrub/ herbaceous vegetation	**Palustrine Forested**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
7B	17	H034	158+30		RT			59	0.001	Piper Brook floodplain with drainage to Piper Brook - upland forest / shrub/ herbaceous	**Palustrine Forested**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap scour hole
7C	20	H034	171+65		RT			175	0.004	Part of extensive Piper Brook floodplain, receives flow from w. of tracks (Wetland 9A)	**Palustrine Forested**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap scour hole

Wetland No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Temporary Impact		Permanent Impact		Description	Wetland Classification	Functions & Values of Impacted Area	Proposed Design/Construction Impact
						(ft^2)	(Acre)	(ft^2)	(Acre)				
7C	20	H034	173+80	174+50	RT			125	0.003	Part of extensive Piper Brook floodplain, receives flow from w. of tracks (Wetland 9A)	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway Fill
7C	20	H034	174+65	175+00	RT			846	0.019	Part of extensive Piper Brook floodplain, receives flow from w. of tracks (Wetland 9A)	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap scour hole
7C	20	H034	174+25	174+95	RT	1,640	0.038			Part of extensive Piper Brook floodplain, receives flow from w. of tracks (Wetland 9A)	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Temporary water handling
7E	24	H034	194+00		RT			192	0.004	Riparian zone of Piper Brook	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Riprap scour hole
7F	26	H034	200+70	200+95	RT			66	0.002	depression	Palustrine Forested	Sed/tox retention	Busway Fill
8A	18	H039	151+00	151+50	390 ft LT			285	0.007	Tiny wetland within uplands	Palustrine Emergent	GW recharge, sed/tox retention	Driveway to Cedar St Station
8B	18	H039	152+00	152+50	390 ft LT			241	0.006	Tiny wetland within uplands	Palustrine Shrub-shrub	GW recharge, sed/tox retention	Driveway to Cedar St Station
8C	16-17	H034	154+80	160+80	LT			12,001	0.276	Linear finger west of tracks, draining (under	Palustrine Forested	GW recharge, floodflow alteration, sed/tox	Drainage Channel, Fill for Trail
8C	18A	H039	156+25		LT			21	0.000	Linear finger west of tracks, draining (under	Palustrine Forested	GW recharge, floodflow alteration, sed/tox	Drainage Channel, Fill for Trail
9A	19-20	H034	168+20	175+00	LT	5,449	0.125	7,230	0.166	Flows from this wetland collect along west side of tracks piped to east though existing culvert	Palustrine Forested/ Palustrine Emergent	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Retaining wall construction (temporary & permanent impacts)
9B	21-22	H034	176+00	180+50	LT			1,987	0.046	Narrow linear forested wetland parallel to tracks	Palustrine Forested	Sed/tox retention, wildlife habitat	Busway Fill
10	23	H034	183+60	184+90	LT			1,710	0.039	Created bio-swale	Palustrine Emergent	Sed/tox retention	Trail and Busway Fill
14	30	AAR	710+00	711+00	LT	1,863	0.043			Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by utility berm parallel to	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, sed/tox retention, wildlife habitat	Temporary disturbance for weir and headwall construction
14	29-30	H046	218+62	224+35	LT			8,827	0.203	Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by utility berm parallel to	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, sed/tox retention, wildlife habitat	Fill for Busway and Trail; Headwall
14	31	H046	228+52	228+65	LT			60	0.001	Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by utility berm parallel to	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, sed/tox retention, wildlife habitat	Fill for Trail
14	31	H046	228+50	228+70	LT	162	0.004			Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by utility berm parallel to	Palustrine Forested/ Palustrine Scrub-shrub	GW recharge, sed/tox retention, wildlife habitat	Temporary water handling

Wetland No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Temporary Impact		Permanent Impact		Description	Wetland Classification	Functions & Values of Impacted Area	Proposed Design/Construction Impact
						(ft^2)	(Acre)	(ft^2)	(Acre)				
15	31	H046	225+94	228+78	LT			2,111	0.048	Track-side linear depression	**Palustrine Forested**	GW recharge, sed/tox retention	Fill for Trail; Manhole
16A	33	H046	240+90	243+00	RT			2,523	0.058	Degraded track-side ditch	**Palustrine Emergent**	Sed/tox retention	Pedestrian Platform (Newington Jct Station)
16B	35	H046	247+42	248+19	LT & RT			1,698	0.039	Small depression w/ degrading vegetation	**Palustrine Shrub-shrub**	GW recharge/discharge, sed/tox retention	Busway Fill
17	34-35	AAR	737+62	738+03	LT	0	0.000	351	0.008	Unnamed tributary to Piper Brook	**Palustrine Forested**	**None** (eroded banks, fill debris)	Culvert replacement; stream reconstruction (perm & temporary); temporary water handling
18	37-39	H046	267+85	274+41	LT			5,415	0.124	Degraded track-side ditch	**Palustrine Emergent**	Sed/tox retention	Busway Fill
19	46	H046	323+91	325+05	LT			1,077	0.025	Degraded track-side ditch	**Palustrine Emergent**	Sed/tox retention	Busway Fill
20	47	H046	325+95	328+08	LT			2,381	0.055	Degraded track-side ditch	**Palustrine Emergent**	Sed/tox retention	Busway Fill
21A	35	AAR	736+19	737+15	RT	680	0.016	1,527	0.035	Unnamed tributary to Piper Brook	**Palustrine Shrub-shrub**	Sed/tox retention	Culvert replacement; stream reconstruction (perm & temp); temporary water handling and jacking pit
21A2	36	AAR	743+00	743+28	RT			847	0.019	Small track-side depression	**Palustrine Emergent**	Sed/tox retention	Access Road Fill
21C	51	H025	348+58	351+34	LT & RT			3,637	0.083	Track-side linear depression	**Palustrine Emergent**	Sed/tox retention	Busway Fill
21D	53	H025	357+14	358+68	LT			1,570	0.036	Track-side linear depression	**Palustrine Emergent**	Sed/tox retention	Busway Fill
22A	54	H025	362+23	364+71	LT			2,691	0.062	Track-side linear depression	**Palustrine Emergent**	GW recharge, sed/tox retention	Busway Fill
22B	55-56	H025	371+80	376+35	LT			2,080	0.048	Track-side linear depression	**Palustrine Emergent**	GW recharge, sed/tox retention	Busway Fill
22C	57	H025	377+45	381+25	LT			3,680	0.084	Track-side linear depression	**Forested and emergent**	GW recharge, sed/tox retention, wildlife habitat	Busway Fill
27A	30	AAR	709+50	712+15	RT	9,256	0.212	0	0.000	Part of extensive Piper Brook floodplain forest	**Palustrine Forested/ Palustrine Scrub-shrub**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Water handling and staging area for pipe jacking
27A	30	AAR	709+88	710+06	RT			96	0.002	Part of extensive Piper Brook floodplain forest	**Palustrine Forested/ Palustrine Scrub-shrub**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Busway fill.
27A	30-31	AAR	710+30	715+60	RT			9,491	0.218	Part of extensive Piper Brook floodplain forest	**Palustrine Forested/ Palustrine Scrub-shrub**	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	Stream reconstruction and Busway fill.
28	44	AAR	778+55	778+86	RT			352	0.008	Tiny track-side depression	**Palustrine Emergent**	Sed/tox retention	Access Road Fill
30	48	AAR	818+00	821+40	LT & RT			4,068	0.093	Linear track-side depression	**Palustrine Emergent**	Sed/tox retention	Access Road Fill
Subtotal Federal/State Wetland Impacts						20,000	0.459	91,958	2.111				

Intermittent Watercourses (IWCs)											
IWC No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Width (ft)	Linear Feet of Impact	Description		Functions & Values of Impacted Area	Proposed Design/Construction Impact
1-1 to 1-4	9	H035	115+66	117+40	LT	7	174	Degraded track-side ditch with debris, sparsely vegetated edges (hydrophytic herbs and upland trees/ shrubs)	**	Sed/tox retention	Busway Fill
3-2 to 3-3	22-23	H034	182+44	183+65	LT	4	121	Track-side ditch, veg. edges (sparse hydrophytic emergents / shrubs and upland herbs)	**	Sed/tox retention	Trail and Busway Fill
3A	13-14	H034	140+80	145+33	LT	5	454	Track-side drainage ditch, vegetated edges (sparse hydrophytic herbs & shrubs)	**	GW recharge, sed/tox retention	Busway Fill
4-1 to 4-11	24-26	H034	194+08	203+58	LT	2	950	Track-side drainage ditch, vegetated edges (upland trees & shrubs)	**	Sed/tox retention	Busway Fill
4A	12	H034	130+14	130+31	LT	4	21	Ditch along base of Rt. 9 slope, vegetated edges (hydrophytic trees & shrubs)	**	GW recharge, sed/tox retention	Trail and Busway Fill
5-1 to 5-5	27	H046	203+76	207+83	LT	4	405	Track-side drainage ditch, vegetated edges (upland trees & shrubs)	**	Sed/tox retention	Busway Fill
10-2 to 10-7	28	H046	213+40	214+05	RT	5	77	Degraded track-side ditch	**	None (degraded)	Busway Fill
11B	37-38	AAR	756+62	759+33	RT	4	271	Degraded track-side ditch w/ debris, sparse emerg veg	**	None (degraded)	Access Road Fill
11-2 to 11-4	33-34	H046	243+15	245+55	RT	4	241	Degraded track-side ditch w/ debris, oil	**	None (eroded banks, fill, debris)	Busway Fill
12-1 to 12-3	32-33	H046	238+90	240+90	RT	4	196	Degraded track-side ditch w/ debris, oil	**	None (eroded banks, fill, debris)	Busway Fill
13-1 to 13-8	39-41	H046	274+47	282+35	LT	3	789	Track-side drainage ditch, veg. edges (sparse emergent & upland herbs)	**	GW recharge, sed/tox retention	Busway Fill
14-1 to 14-6	42-44	H046	284+32	292+49	LT	3	817	Track-side drainage ditch, veg. edges (sparse upland herbs)	**	GW recharge, sed/tox retention	Busway Fill
14B	49-50	AAR	824+60	832+04	LT	3	742	Vegetated drainage ditch (sparse emergent)	**	GW discharge, sed/tox retention	Access Road Fill
14C	51	AAR	835+95	839+03	LT & RT	6	309	Degraded track-side ditch, vegetated edges (sparse emergent)	**	None (degraded)	Access Road Fill
14D	52	AAR	840+91	842+76	LT & RT	4	185	Vegetated drainage ditch (emergent)	**	GW discharge, sed/tox retention	Access Road Fill
14E	59-60	AAR	873+84	878+84	LT & RT	2	501	Vegetated drainage ditch (emergent)	**	GW discharge, sed/tox retention	Access Road Fill

Intermittent Watercourses (IWCs) [Continued]											
IWC No.	Plate No.	Contract No.	Approx. Start Station	Approx. End Station	Offset	Width (ft)	Linear Feet of Impact	Description		Functions & Values of Impacted Area	Proposed Design/Construction Impact
14F	61	AAR	883+82	884+83	LT & RT	5	101	Degraded track-side ditch, vegetated edges (sparse emergent)	**	None (degraded)	Access Road Fill
15-1 to 15-5	61-62	H025	394+90	402+44	LT	2	754	Track-side drainage ditch, vegetated edges (upland shrubs)	**	GW recharge, sed/tox retention	Busway Fill
Subtotal State-Only IWC Impacts						----	7,108				

** Federal wetland type not applicable to state-only wetlands and IWCs
Note: Widths of Intermittent Water Courses (IWC) were measured in the field by FHI.

SUMMARY	Temporary Impact (ft^2)	(Acre)	Permanent Impact (ft^2)	(Acre)	Linear Feet (IWCs only)
Federal/State Wetland Impacts	20,000	0.459	91,958	2.111	0
IWC Impacts	0	0	0	0	7,108
TOTAL	20,000	0.459	91,958	2.111	7,108

NEW BRITAIN - HARTFORD BUSWAY

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TABLE 2

FLOODPLAIN IMPACTS

Amtrak Access Road					
Plate No.	**Floodplain Description**	**Volume of Excavation (yd^3)**	**Volume of Fill (yd^3)**	**Area (acres)**	**Purpose**
29	Piper Brook tributary - AAR 704+40 to 705+70 RT	0	28	0.026	Fill for access road
29-31B	Piper Brook tributary - AAR 706+50 to 718+00 RT	181.4	1,173.3	0.303	Fill for access road
34-35	Piper Brook tributary - AAR 733+70 to 734+90 RT	0	16.3	0.013	Fill for access road
35	Piper Brook tributary - AAR 736+15 to 737+40 RT	28.7	22.5	0.023	Culvert replacement
Contract H034					
Plate No.	**Floodplain Description**	**Volume of Excavation (yd^3)**	**Volume of Fill (yd^3)**	**Area (acres)**	**Purpose**
11	Piper Brook tributary - 122+60 to 126+00 RT	302	344	0.24	Install Retaining Wall, Water Quality Basin
11	Piper Brook tributary - 125+40 to 126+00 LT	0	14	0.01	Busway Fill
19	Piper Brook tributary - 168+80 to 171+00 LT	510	0	0.03	Retaining Wall
20	Piper Brook tributary - 171+65 RT	10	0	0.003	Install Scour Hole
20	Piper Brook tributary - 171+90 to 176+00 LT	1,244	0	0.076	Install Retaining Wall, Swale
20	Piper Brook tributary - 173+50 to 175+20 RT	259	0	0.047	Install Scour Hole
20	Piper Brook tributary - 174+50	14	0	0.021	Riprap Pad (temp)
24	Piper Brook tributary - 193+35 RT	13	0	0.004	Install Scour Hole
24	Piper Brook tributary - 194+00 RT	13	0	0.005	Install Scour Hole
Contract H046					
Plate No.	**Floodplain Description**	**Volume of Excavation (yd^3)**	**Volume of Fill (yd^3)**	**Area (acres)**	**Purpose**
29-31	Piper Brook tributary - 221+25 to 228+90 LT	0	3,060	0.51	Busway Fill, Trail
Contract H025					
Plate No.	**Floodplain Description**	**Volume of Excavation (yd^3)**	**Volume of Fill (yd^3)**	**Area (acres)**	**Purpose**
58	Kane Brook - 384+27 to 385+11 LT	28	5	0.005	Two Outfalls
	TOTALS	2,603	4,663	1.32	
	NET CHANGE		2,060		

NEW BRITAIN - HARTFORD BUSWAY

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TABLE 3

STREAM CHANNEL ENCROACHMENT LINE (SCEL) IMPACTS

Amtrak Access Road					
Plate No.	SCEL Description	Volume of Excavation (yd^3)	Volume of Fill (yd^3)	Area (acres)	Purpose
29-31	Piper Brook tributary- 707+10 to 716+76	0	831		Fill Slope
Contract H034					
Plate No.	SCEL Description	Volume of Excavation (yd^3)	Volume of Fill (yd^3)	Area (acres)	Purpose
12	Bass Brook - Sta. 125+00 to 129+00	381	3,753	0.589	Busway Fill
20	Piper Brook tributary- 171+65 RT	13.14	0	0.004	Install Scour Hole
20	Piper Brook tributary- 174+80 RT	104	0	0.025	Install Scour Holes
	PROJECT TOTALS	498	4,584	0.62	
	NET CHANGE		4,086		

NEW BRITAIN - HARTFORD BUSWAY

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TABLE 4

EXCAVATION AND FILL BELOW ORDINARY HIGH WATER

Contract H034									
Plate No.	**Wetland No.**	**Waterway Name / Location**	**Cross-Culvert Installation Site No.**	**Volume of Excavation (yd^3)**	**Volume of Fill (yd^3)**	**Net Fill (yd^3)**	**Permanent Impact Area (ft^2)***	**Temporary Impact Area (ft^2)***	**Purpose**
20, 20A	Wetland 9A (west side tracks) and 7C (east side tracks)	Unnamed Tributary to Piper Brook / Busway Sta. 174+90	Site 3	133.9	63.24	-70.66	568	1,488.0	Culvert replacement
Amtrak Access Road									
Plate No.	**Wetland No.**	**Waterway Name / Location**		**Volume of Excavation (yd^3)**	**Volume of Fill (yd^3)**	**Net Fill (yd3)**	**Permanent Impact Area (ft^2)***	**Temporary Impact Area (ft^2)***	**Purpose**
35, 35A-35B	Wetland 17 (west side tracks) and 21A (east side tracks)	Unnamed Tributary to Piper Brook / AAR Sta. 736+20 to 737+30	Site 5	5.5	68.3	62.8	732	1,137.0	Culvert replacement
	PROJECT TOTALS			139	132	-8	1,300	2,625	

** Impact areas are included in wetland impact calculations (Table 1)but note that OHW areas are only a portion of the total wetland impacts at each site*

2.0 OVERVIEW OF ENVIRONMENTAL SETTING AND RELEVANT RESOURCES

The proposed New Britain-Hartford Busway (Busway) corridor runs generally in a south to north direction from downtown New Britain to Union Station in downtown Hartford. The Busway will be located within existing abandoned right-of-way (ROW) from Downtown New Britain to Newington Junction, and in active Amtrak ROW from Newington Junction to downtown Hartford. Although there are some pockets of residential development adjacent to the Busway corridor in New Britain and Newington, the project corridor can be characterized as urban, with large, industrial developments located on both sides of the alignment.

This report focuses on the environmental resources that occur within the project area. These include wetlands, watercourses and stream flows, floodplains, fish and wildlife, and stream channel encroachment lines (SCELs). The following environmental resources do not occur within or adjacent to the project area and no adverse project effects are anticipated to them:

- Agriculture
- State or federal endangered or threatened species, or species of special concern (DEP GIS NDDB 12/01/2009)
- Water-based recreation
- Use of or construction of wastewater treatment plants
- Private or public water supply wells
- Public water supply sources -- No public or community water supply sources or aquifer protection areas exist within the project area. The study area, however, is underlain by a large stratified drift aquifer with a groundwater classification of GB, unsuitable for drinking water. There is a small area in New Britain beginning in the vicinity of St. Mary's Cemetery north to the second crossing of Route 9 (traveling from south to north) which has a groundwater quality classification of GA. Ground water in this area is deemed, at a minimum, suitable for drinking or other domestic uses without treatment. Since the project will not affect groundwater, none of these potential future water supply areas will be adversely affected.

3.0 BIOLOGICAL, ECOLOGICAL AND GEOLOGICAL CHARACTERISTICS OF THE PROJECT AREA AND POTENTIAL PROJECT EFFECTS

3.1 Wetlands

3.1.1 Existing Conditions

The proposed Busway corridor lies within a well developed setting with very few undisturbed areas. There are a few isolated areas, particularly in the southern end of the corridor, which contain vegetated wetland pockets. Most of the wetlands are located east of the Busway, but wetlands span both sides of the rail ROW in some locations. Located north of Cedar Street in Newington is the Piper Brook floodplain, which is the largest undisturbed wetland area within the corridor. This floodplain contains the meandering Piper Brook, which is flanked by a series of state and federal wetlands interspersed with upland islands. The vegetation and wetland density quickly thins out north of the Piper Brook floodplain. From here north in West Hartford and Hartford are

primarily linear swale-type wetlands and intermittent watercourses (IWCs), running parallel to the existing rail corridor. The wetlands, IWCs, and associated habitat areas are portrayed on Figures 1a – 1e. Pictures of each wetland can be found in Appendix E of this report.

Wetland Delineations and Methodology

Wetland delineation efforts, which spanned the years of 2003, 2007, and 2009, revealed 53 wetland systems and 21 IWCs (see Figures 1a – 1e). For the purposes of this application, all wetlands and IWCs are considered to be under both state and federal jurisdiction. Wetland documentation forms (transects) were prepared for impacted federal/state wetlands in representative locations. Although some of the flagged wetlands are very small (only a few square feet), some of the wetland systems are very large and extend beyond the survey limits. Wetland data, including maps of the transect locations, USACE transect forms, and wetland function-value assessment forms, are included in this attachment in Appendices A, B, and C.

Since the survey limits are primarily within a heavily urbanized area, the majority of the soils in the project corridor are classified by the NRCS as Udorthents and Urban Land Complexes. The urban soils encountered within the survey limits are typical of urban developed lands and infrastructures in Connecticut and are usually imported from adjacent or nearby sources of well-drained fill. See Attachment J, Soil Scientist Report, for more detailed information on the soils within the project area.

The larger wetland systems, which extend beyond the delineation limits, are typically associated with broad floodplain areas connected to Piper Brook and Bass Brook. These soil types are predominantly Limerick and Lim soil complexes, Saco silt loam, Scitico, Shaker, and Maybrid soil complexes, Fluvaquent and Udifluvent soil complexes, and Scarboro mucky loamy sand.

Wetland Classification

Wetland types were assigned based on the national wetlands inventory ("NWI") classifications as described in Cowardin et al., 1979. This classification is a hierarchical system comprised of five basic wetland classes: palustrine (freshwater wetland), riverine (stream), or lacustrine (lake) systems, tidal and estuarine. Two of these wetland classes, palustrine and riverine, were identified within the project corridor. No lacustrine, estuarine or tidal wetlands exist within the corridor. There are three basic types of palustrine wetlands within the project corridor, which are distinguished by the type of dominant vegetative layer: palustrine forested; palustrine scrub-shrub; and palustrine emergent. The general characteristics of the palustrine and riverine systems in the project corridor are summarized below.

Palustrine Forested Wetlands ("PFO")

On a broad scale, the majority of the wetlands within the project corridor are PFO wetlands. These wetlands typically occur in areas where topography is low and flat or along waterbodies and extend beyond the project limits. In areas where PFO wetlands abut development or disturbed areas, edge habitat is created where wetland types are typically dominated by other classes. Portions of wetlands 6D, 6E,

New Britain - Hartford Busway

Wetland and Habitat Overview Maps

Figure 1a

Saint Mary's Cemetery

Fairview Cemetery

NEW BRITAIN

NEWINGT

Legend

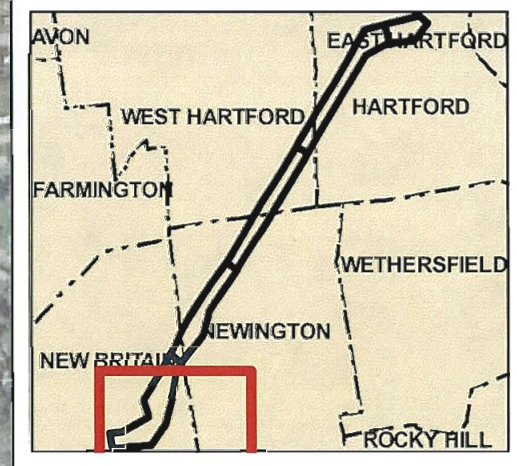
- Non-Wetland Habitat
- Floodplain Wetland Habitat
- 4 Function Wetlands
- 3 Function Wetlands
- 2 Function Wetlands
- 1 Function Wetlands
- Negligible Function Wetlands
- Intermittent Watercourse (IWC)

Delineated Wetland Classification

- Palustrine Forested
- Palustrine Scrub-Shrub
- Palustrine Emergent
- Project Baseline
- State Only Wetland

0 0.05 0.1 0.15 0.2 0.25

Miles



2/17/2010

Original in Color FHI

New Britian - Hartford Busway

Wetland and Habitat Overview Maps

Figure 1b

IWC 4-1 To 4-11
Wetland # 7f
Wetland # 10
Wetland # 7e
IWC 3-2 To 3-3
Wetland # 9b
Wetland # 9a
Wetland # 7c
Wetland # 7b
Wetland # 6d
Wetland # 8b
Wetland # 6e
Wetland # 8a
Wetland # 6d
Wetland # 6b
Wetland # 6a
IWC-3a
Disturbed Grass Shrub Area
IWC 4a
Piper Brook Floodplain
Wetland # 2c
Wetland # 3
Flat Meadow
IWC 1-1 To 1-4
Wetland # 2d
Wetland # 2b
Wetland # 2a

NEW BRITAIN
NEWINGTON
Cedar Street
Stanley Golf Course
Two Jima Park
Central Connecticut State University
High School Athletic Field
Indian Hill Country Club
Mill Pond Park

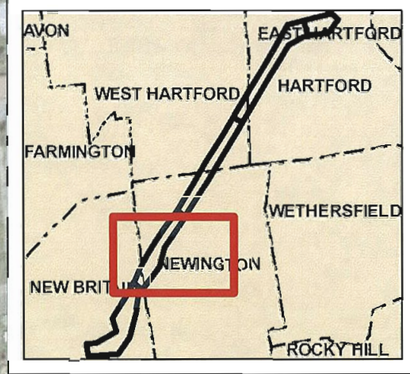
Legend

- Non-Wetland Habitat
- Floodplain Wetland Habitat
- 4 Function Wetlands
- 3 Function Wetlands
- 2 Function Wetlands
- 1 Function Wetlands
- Negligible Function Wetlands
- Intermittent Watercourse (IWC)

Delineated Wetland Classification

- Palustrine Forested
- Palustrine Scrub-Shrub
- Palustrine Emergent
- Project Baseline
- State Only Wetland

0 0.05 0.1 0.15 0.2 0.25
Miles



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Original in Color FHI

New Britain - Hartford Busway

Wetland and Habitat Overview Maps

Figure 1c

Legend

- Non-Wetland Habitat
- Floodplain Wetland Habitat
- 4 Function Wetlands
- 3 Function Wetlands
- 2 Function Wetlands
- 1 Function Wetlands
- Negligible Function Wetlands
- Intermittent Watercourse (IWC)

Delineated Wetland Classification

- Palustrine Forested
- Palustrine Scrub-Shrub
- Palustrine Emergent
- Project Baseline
- State Only Wetland

0 0.05 0.1 0.15 0.2 0.25

Miles

2/17/2010

Original in Color FHI

New Britain - Hartford Busway

Wetland and Habitat Overview Maps

Figure 1d

Legend

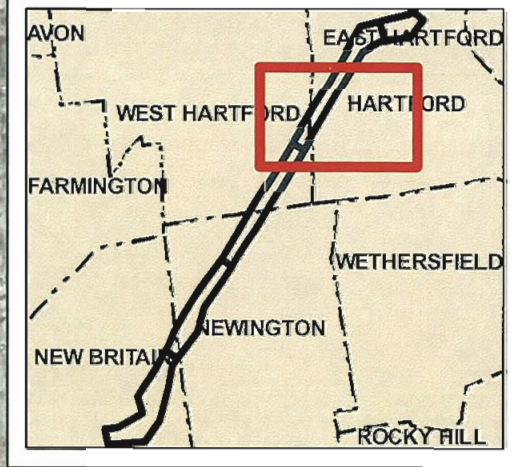
- Non-Wetland Habitat
- Floodplain Wetland Habitat
- 4 Function Wetlands
- 3 Function Wetlands
- 2 Function Wetlands
- 1 Function Wetlands
- Negligible Function Wetlands
- Intermittent Watercourse (IWC)

Delineated Wetland Classification

- Palustrine Forested
- Palustrine Scrub-Shrub
- Palustrine Emergent
- Project Baseline
- State Only Wetland

0 0.05 0.1 0.15 0.2 0.25

Miles



IWC 15-1 To 15-5
IWC-14f
IWC-14e
Wetland # 24
Wetland # 22c
Wetland # 22b
Wetland # 22a
IWC-14d
Wetland # 21d
IWC-14c
Wetland # 21c
IWC-14b
Wetland # 30
Wetland # 20
Wetland # 19
WEST HARTFORD
HARTFORD
Fiatbush Avenue
John F Kennedy Memorial Park
Sterling Field
Mt Zion Cemetery
Trinity
Thomas J Hyland Memorial Park

2/17/2010

Original in Color PH

New Britain - Hartford Busway

Wetland and Habitat Overview Maps

Figure 1e

Legend

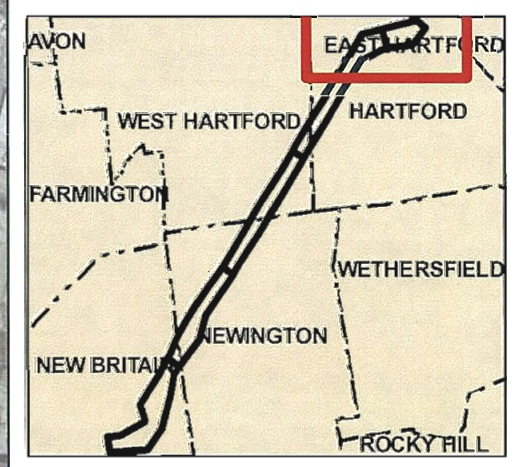
- Non-Wetland Habitat
- Floodplain Wetland Habitat
- 4 Function Wetlands
- 3 Function Wetlands
- 2 Function Wetlands
- 1 Function Wetlands
- Negligible Function Wetlands
- Intermittent Watercourse (IWC)

Delineated Wetland Classification

- Palustrine Forested
- Palustrine Scrub-Shrub
- Palustrine Emergent
- Project Baseline
- State Only Wetland

0 0.05 0.1 0.15 0.2 0.25

Miles



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Original in Color FHI

7B, 7C, 7E, 9A, 27A, 3, 14, 22C, 9B, 15, 24, 7F, and 17 contain forested wetland communities.

Forested wetland cover types are dominated by trees and shrubs that have developed a tolerance to a seasonal high water table. In order to be characterized as forested, a wetland must be dominated by trees and shrubs that are at least 20 feet tall (Cowardin et. al. 1979). Forested wetlands typically have a mature tree canopy which, depending upon the species and density, can have a broad range of understory and groundcover community components.

Palustrine Scrub-Shrub Wetlands ("PSS")

The PSS wetland cover type includes areas that are dominated by saplings and shrubs that typically form a low and compact structure less than 20 feet tall (Cowardin et. al. 1979). The structure and composition of the vegetation within this cover type may be influenced by the water regime. Most of these communities are seasonally flooded and often saturated to the surface. Wetlands through the project corridor characterized by the PSS community type include wetland 27A, 14, 2B, 6A, 8B, 16B, 2C, and 21A.

Palustrine Emergent Wetlands ("PEM")

The PEM cover type is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens (Cowardin et. al. 1979). The freshwater emergent wetlands within the Project area include areas commonly referred to as marshes or wet meadows. The PEM wetland type exists on its own as well as in conjunction with other wetland types, creating a more heterogeneous wetland system.

Freshwater emergent wetlands are often associated with transportation and utility ROWs, abandoned agricultural areas, and open waterbodies. Vegetation in these wetland types consists of a variety of submergent, emergent and other rooted herbaceous species. Wetlands 22C, 6B, 8A, 22A, 22B, 2A, 2D, 10, 16A, 18, 19, 20, 21A2, 21C, 21D, 28, and 30 are dominated by herbaceous hydrophytic vegetation.

Streams and Watercourses (Riverine "R")

Riverine systems include all wetlands contained within a linear channel, not dominated by vegetation. These systems contain water that is usually, but not always, flowing. Portions of wetlands 2C, 3, 6D, 7C, 7E, 8C, 9A, 14, 17, 21A, 24, 27A, 6E, and 7B are riverine in nature.

Wetland Function and Value Assessments

The impacted wetland resources within the Busway project area were assessed for their functions and values, as defined by "The Highway Methodology Workbook Supplement" (USACE, 1999). Wetland function-value assessment forms were prepared for each impacted wetland during the wetland delineation efforts. The forms are included in this attachment in Appendix C.

Only four of the wetland functions identified in the guidance document have been verified to occur in wetlands within the Busway project area. These include groundwater recharge/discharge, floodflow alteration, sediment/toxicant/pathogen retention, and wildlife habitat. No fish habitat was observed within the project area. None of the wetlands within the project area were assessed to have any of the five wetland values.

Many of the wetlands and IWCs that will be impacted by the Busway project are narrow and linear in nature, parallel to the rail corridor, squeezed between existing urban and transportation land uses. Most if not all of these linear resources formed in the drainage flows from urban and rail lands. Because the rail ROW is very level, there are multiple small pockets where runoff collects. These small pockets, barely noticeable as depressions, are repeatedly subject to inflows of sediments and toxicants, along with urban refuse/debris, which inhibit vegetative development and, over time, have diminished their capacity to perform even minimal filtration for water quality purposes. The water that collects in the IWCs and small tributaries along the rail ROW is visibly degraded.

While some of these small IWC areas have wetland vegetation, it is generally very sparse. Some of them have only a monoculture of *Phragmites*. The linear configurations with trees and/or shrubs are quite narrow so the vegetation is essentially a single row, with minimal vegetative buffers around them. The IWCs generally occur where impervious surfaces of the surrounding urban properties drain off after storm events, forming eroded channels which periodically hold water. The IWCs in level or basin-shaped areas may hold water and contribute to groundwater (GW) recharge. Otherwise they serve a very minor function of sediment/toxicant retention.

The primary exception to the low-functioning wetlands noted throughout the corridor is the extensive Piper Brook wetland system, which roughly coincides with the Piper Brook 100-year floodplain. The bulk of this wetland system is east of the rail ROW. The wetland has an undeveloped core, contains the sinuous Piper Brook, and supports relatively diverse vegetative communities. The existing rail ROW transects the Piper Brook floodplain and has thus previously caused filling and fragmentation of the wetlands. Small portions of the formerly connected floodplains/wetlands remain on the west side, connected hydraulically to the east side through a number of culverts. The quality of the wetlands on the west side is lower than the east side due to their fragmentation, modification of hydrology, and urban encroachment up to their edges.

3.1.2 Wetland Impacts

This section provides an overview of how and why the project causes impacts to wetlands. Impact quantities in square feet and acres are listed in Table 5 within this attachment and detailed descriptions of impacts to each wetland area are presented in section 3.1.3 of this attachment. It should be noted that OHW surface area impacts (0.09 acres) are included in the total wetland impact area of 2.111 acres. Table 5 presents the wetland impact areas sorted by the number of functions exhibited by each. This was done to give an indication of how the functions range between impact areas within the project. This table also corresponds to Figures 1a – 1e, which color-codes each wetland area to indicate the number of functions it exhibits.

NEW BRITAIN - HARTFORD BUSWAY

STATE PROJECT NO. 171-305

TABLE 5

PERMANENT WETLAND IMPACTS BY FUNCTION

WETLAND NO.	Plate No.	Permanent Impact (ft^2)	Permanent Impact (Acre)	Description	Wetland Class Impacted	Functions & Values of Impacted Area
WETLANDS WITH 4 FUNCTIONS						
6D	15 -16	1,102	0.025	Part of extensive Piper Brook floodplain forest	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
6E	16	1,126	0.026	Piper Brook floodplain - upland forest/ shrub/ herbaceous vegetation	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
7B	17	59	0.001	Piper Brook floodplain with drainage to Piper Brook - upland forest / shrub/ herbaceous	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
7C	20	1,146	0.026	Part of extensive Piper Brook floodplain, receives flow from west of tracks (Wetland 9A)	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
7E	24	192	0.004	Riparian zone of Piper Brook	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
8C	16-17	12,001	0.276	Linear finger west of tracks, draining under tracks toward Piper Brook	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
9A	19-20	3,931	0.090	Flows from this forested wetland collect along west side of tracks piped to east though existing culvert	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
		3,299	0.076		Palustrine Emergent	
27A	30-31	2,421	0.056	Part of extensive Piper Brook floodplain forest	Palustrine Forested	GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
		7,166	0.165		Palustrine Scrub-Shrub	
TOTAL		**32,443**	**0.745**			
WETLANDS WITH 3 FUNCTIONS						
14	29-30	7,542	0.173	Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by utility berm parallel to tracks.	Palustrine Forested	GW recharge, sed/tox retention, wildlife habitat
		1,345	0.031		Palustrine Scrub-Shrub	
22C	57	2,822	0.065	Track-side linear depression	Palustrine Forested	GW recharge, sed/tox retention, wildlife habitat
		858	0.020		Palustrine Emergent	
TOTAL		**12,567**	**0.288**			

WETLAND NO.	Plate No.	Permanent Impact (ft^2)	Permanent Impact (Acre)	Description	Wetland Class Impacted	Functions & Values of Impacted Area
WETLANDS WITH 2 FUNCTIONS						
2B	9	302	0.007	Small wetland between developed parcels	Palustrine Scrub-Shrub	GW recharge, sed/tox retention
6A	14	2,080	0.048	Corner of larger wetland in area disturbed by vehicles	Palustrine Scrub-Shrub	GW recharge, sed/tox retention
6B	14	3,152	0.072	Narrow degraded finger under Route 9; disturbance has caused obstruction of flow path	Palustrine Emergent	GW discharge, sed/tox retention
8A	18	285	0.007	Tiny wetland within uplands	Palustrine Emergent	GW recharge, sed/tox retention
8B	18	241	0.006	Tiny wetland within uplands	Palustrine Scrub-Shrub	GW recharge, sed/tox retention
9B	21-22	1,987	0.046	Narrow linear forested wetland parallel to tracks	Palustrine Forested	Sed/tox retention, wildlife habitat
15	31	2,111	0.048	Track-side linear depression	Palustrine Forested	GW recharge, sed/tox retention
16B	35	1,698	0.039	Small depression w/ degrading vegetation	Palustrine Scrub-Shrub	GW recharge/discharge, sed/tox retention
22A	54	2,691	0.062	Track-side linear depression	Palustrine Emergent	GW recharge, sed/tox retention
22B	55-56	2,080	0.048	Track-side linear depression	Palustrine Emergent	GW recharge, sed/tox retention
TOTAL		**16,627**	**0.381**			
WETLANDS WITH 1 FUNCTION						
2A	8	2,888	0.066	Small track-side depression with *Phragmites*	Palustrine Emergent	Sed/tox retention
2C	10	728	0.017	Depression within upland forest	Palustrine Scrub-Shrub	GW recharge
2D	10A	1,160	0.027	Small emergent wetland depression	Palustrine Emergent	GW recharge
7F	26	66	0.002	depression	Palustrine Forested	Sed/tox retention
10	23	1,710	0.039	Created bio-swale	Palustrine Emergent	Sed/tox retention
16A	33	2,523	0.058	Degraded track-side ditch	Palustrine Emergent	Sed/tox retention
18	37-38	5,415	0.124	Degraded track-side ditch	Palustrine Emergent	Sed/tox retention
19	46	1,077	0.025	Degraded track-side ditch	Palustrine Emergent	Sed/tox retention

WETLAND NO.	Plate No.	Permanent Impact (ft^2)	Permanent Impact (Acre)	Description	Wetland Class Impacted	Functions & Values of Impacted Area
20	47	2,381	0.055	Degraded track-side ditch	Palustrine Emergent	Sed/tox retention
21A	35	1,527	0.035	Unnamed tributary to Piper Brook	Palustrine Scrub-Shrub	Sed/tox retention
21A2	36	847	0.019	Small track-side depression	Palustrine Emergent	Sed/tox retention
21C	51	3,637	0.083	Track-side linear depression	Palustrine Emergent	Sed/tox retention
21D	53	1,570	0.036	Track-side linear depression	Palustrine Emergent	Sed/tox retention
28	44	352	0.008	Tiny track-side depression	Palustrine Emergent	Sed/tox retention
30	48	4,068	0.093	Linear track-side depression	Palustrine Emergent	Sed/tox retention
TOTAL		**29,949**	**0.688**			
WETLANDS WITH NEGLIGIBLE FUNCTIONS						
17	35	351	0.008	Unnamed tributary to Piper Brook	Palustrine Forested	None (eroded banks, fill debris)

SUMMARY OF PERMANENT IMPACTS - PROJECT TOTALS	
(ft^2)	(Acre)
91,937	**2.111**

Permanent impacts to wetlands will occur from the following activities at the locations indicated:

- The cut, fill, and footprint for the Busway
- Installation of access ramps and driveways
- Cut and fill for the proposed Amtrak Access road
- Development of a multi-use trail
- Construction of retaining walls and concrete barriers
- Structures to convey surface water and drainage (including grass-lined ditches, water quality channels, reinforced concrete piping, and new and replacement culverts)

Temporary impacts to wetlands will result from grading activities, installation (and removal) of sheeting during construction of retaining walls, staging areas, water handling, and pipe-jacking activities to install culverts and reinforced concrete piping.

Throughout the project area, potential impacts from erosion and sedimentation resulting from potentially increased runoff flows will be avoided through the project's drainage design, which includes rip-rap outfall aprons, level spreaders, and hydraulically appropriate culvert designs. Potential diminishment of existing water quality renovation will be replaced by the project's drainage design, which includes grass-lined swales/ditches, rip-rap swales, detention ponds, and water quality basins.

The impacts to wetland resources by class were calculated for the Busway project. The results indicate that approximately 0.925 acres of PEM wetland, 0.840 acres of PFO wetland, and 0.346 acres of PSS wetland will be impacted, totaling 2.111 acres.

The functions and values of the wetland areas and their respective impact areas were tabulated and the total permanent impact area for each function was determined for the project area. Of the 13 functions and values outlined in the *USACE Highway Methodology Supplement* (1999), only four (4) occurred as principal functions within the project wetlands. These functions were groundwater discharge/recharge, floodflow alteration, sediment/toxicant retention and transformation, and wildlife habitat. Of the four principal functions, impacts to the sediment/toxicant retention function were the greatest, with 2.06 ac distributed within 34 wetland areas. Impacts to the groundwater recharge/discharge function were the second highest, with 1.413 ac of impact distributed over 22 wetlands. The wildlife habitat function had 1.06 ac of impact distributed over 12 wetlands, and the floodflow alteration function had 0.745 ac of impact distributed over eight wetland areas.

To further assess potential impacts to functions and values of existing wetlands within the project area, factors were considered such as overall wetland size, proximity to existing development, degree of existing anthropogenic impact, invasive vegetation dominance, and degree to which the wetland contributes to functions and values within the watershed. Based on field observations, all wetlands within the project area have been previously impacted to some degree and exhibit existing anthropogenic effects. Generally, wetlands that will be totally impacted are narrow linear areas or small depressions where drainage collects, and do not provide important ecological or social values because of their very small (narrow) size and shape and sparse vegetation.

An analysis of the wetland impacts within the project area reveals that no single impact causes a substantial loss of important wetland functions or values. The majority of impacts consist of long, narrow impacts along the edge of larger wetlands, where the remaining wetland (e.g., Piper Brook floodplain) is so large that these narrow impacts will not impair the functions of the wetland as a whole.

The combined impacts to the low-quality wetlands in the project area will be mitigated through creation and enhancement of a large contiguous wetland system, where a greater range of wetland functions-values can be sustained in perpetuity. Considering that the majority of the impacted wetlands are scattered remnants between built lots or narrow fringe impacts to larger wetlands, the provision of a mitigation area that can offer replacement functions and higher function-values is deemed an appropriate and beneficial mitigation proposal for the project's impacts to wetland resources. A Mitigation Plan has been developed to address the reduction of wetland acreage and the functions they cumulatively perform (see Section 3.1.4 and Attachment L.)

3.1.3 Detailed Wetland Impact Descriptions

The following text describes in detail each wetland impact area associated with the proposed Busway project. The wetland impacts have been arranged by wetland system to better portray the impacts to each system within the project area. Regulated activities are presented generally from south (New Britain) to north (Hartford), similar to the ordering of the plates (Attachment G.) The contract area and station (Sta.) numbering are provided to allow easy cross-reference to the plates and the summary impact tables (Tables 1 and 5).

[Note: Station numbering for the Amtrak Access Road (AAR) differs from the Busway and is indicated by "AAR."]

Isolated Wetland

Wetland 2A – Plate 8 (H035 – Busway Sta. 113+05 to 114+72 LT)

Permanent impacts to wetland 2A will result from the installation of the Busway, multiuse trail, grass-lined ditch, and retaining wall number 112. This PEM wetland is dominated by common reed grass (*Phragmites australis*) and displays a single wetland function, sediment/toxicant retention. The excavation, cutting, filling, grading, and paving of the Busway and multiuse trail will result in the removal of this entire wetland.

Isolated Wetland

Wetland 2B – Plate 9 (H034 – Busway Sta. 118+30 to 118+50 RT)

This PSS wetland has two functions, groundwater recharge and sediment/toxicant retention. The Busway lanes widen at this point near the East Street Station to allow buses to pass. Wetland vegetation is dominated by red maple (*Acer rubrum*), multiflora rose (*Rosa multiflora*), spicebush (*Lindera benzoin*), redosier dogwood (*Cornus sericea*), and southern arrowwood (*Viburnum dentatum*). A portion of this wetland will be filled by the Busway

retaining wall number 111 and fill slope to the east of the Busway. There will also be narrow linear temporary impacts to this wetland from construction of a retaining wall.

Isolated Wetland

Wetland 2C – Plate 10 (H039 – Busway Sta. 120+55 to 121+23 LT)

This PSS wetland, dominated by red maple, staghorn sumac (*Rhus typhina*), multiflora rose, and redosier dogwood, has only one wetland function, groundwater recharge. Permanent impacts to this wetland will occur from the filling of this depression to construct the East Street Station off-ramp. Busway drainage will be conveyed through this wetland to a basin on the station site.

Isolated Wetland

Wetland 2D – Plate 10A (H034 – Busway Sta. 120+25 to 121+35 RT)

Wetland 2D is located to the east of the proposed Busway between the rail line and the base of the Route 9 western fill slope. This small PEM wetland appears to originate from a hillside seep located northeast of Lester Street. The wetland is dominated by wetland grasses, rushes (*Juncus* spp.), and sedges (*Carex* spp.), and has only one wetland function, groundwater recharge. Permanent impacts to this wetland are anticipated from a future project proposed by others (Central Connecticut State University – Maintenance Facility.) Grading for the building pad, an access road, and the final fill slope are expected to result in permanent impacts to a portion of this wetland

Bass Brook Wetland System

Wetland 3 – Plate 11 (H034 – Busway Sta. 123+85 to 124+30 RT)

This PFO wetland exhibits three functions: groundwater recharge, sediment/toxicant retention, and wildlife habitat. Predominant vegetation includes red maple, silver maple (*Acer saccharinum*), boxelder (*Acer negundo*), multiflora rose, oriental bittersweet, various wetland grass species, and skunk cabbage (*Symplocarpus foetidus*). This wetland is adjacent to and north of the outfall discharging to Water Quality Basin 1. The original design encroached on Wetland 3 for temporary construction access; however, this impact has been eliminated. Temporary impacts will still occur in this wetland from construction of Busway retaining wall number 104. It is not anticipated that any functions will be lost as a result of this impact.

Piper Brook Wetland System

Wetland 6A – Plate 14 (H034 – Busway Sta. 144+60 to 145+50 RT)

This PSS wetland, dominated by redosier dogwood, multiflora rose, and oriental bittersweet, exhibits two wetland functions: groundwater recharge and sediment/toxicant retention. This wetland, located just south of Route 175 (Cedar

Street), will be permanently impacted by the installation of a grass-lined water quality channel that extends from two Busway drainage culvert outlets. This channel is required in order to provide positive drainage for runoff conveyed to this low point along the Busway. The proposed vegetated channel will essentially carry out the two impacted functions at this location, as it will remain pervious and will filter runoff. Due to the highly constrained nature of this area and the necessity for a drainage outlet, this wetland impact could not be avoided; however, impacts have been minimized to the extent practicable.

Wetland 6B – Plate 14 (H034 – Busway Sta. 145+40 to 147+40 LT)

This PEM wetland exhibits two wetland functions: groundwater discharge and sediment/toxicant retention. It is dominated by broadleaf cattail (*Typha latifolia*), purple loosestrife (*Lythrum salicaria*), and Pennsylvania smartweed (*Polygonum pensylvanicum*). This wetland will be entirely filled by the Busway, multiuse trail, underdrain, and bridge abutment. Grading will take place to the west of the multiuse trail. All wetland function will be lost due to this impact.

Wetland 6D – Plates 15-16 (H034 – Busway Sta. 150+00 to 150+20, 150+90 to 152+60 RT, 154+00 to 154+20 RT, 155+40 to 156+15 RT)

This PFO floodplain wetland is dominated by red maple, jewelweed, skunk cabbage, and multiflora rose. It exhibits four wetland functions: groundwater recharge, floodflow alteration, sediment/toxicant retention, and wildlife habitat. Wetland 6D is an easterly portion of the extensive wetland and floodplain associated with Piper Brook and is impacted in three locations. At one location (in the vicinity of Station 150+10) it will be permanently impacted to the east of the Busway by the installation of a stormwater pipe discharge apron. This is a minor impact and is not anticipated to negatively impact wetland functions.

At the second location (between Stations 150+90 and 152+60), a narrow strip of Wetland 6D will be permanently impacted by fill associated with the widening of the northbound Busway lane near the Cedar Street Station. Functions will be lost in this small impact area.

At the third location (between Stations 154+00 and 154+20), a tiny triangle of Wetland 6D will be permanently impacted by the fill slope near the Cedar Street Station. Fill will extend into this wetland to the southeast of the proposed pedestrian platform, which causes the Busway width to expand at the station. Due to the minute size of this impact, no loss of function is anticipated here.

Wetland 6E – Plate16 (H034 – Busway Sta. 155+40 to 156+15 RT)

This PFO floodplain wetland is dominated by red maple and multiflora rose. It exhibits four wetland functions: groundwater recharge, floodflow alteration, sediment/toxicant retention, and wildlife habitat and is classified as a State wetland only. Wetland 6E will be permanently impacted by the fill slope near the Cedar Street Station (between Stations 155+40 and 156+15). The fill slope will extend into this wetland and the 100-year floodplain of Piper Brook.

Wetland 7B – Plate 17 (H034 – Busway Sta. 158+20 to 158+40 LT)

This PFO floodplain wetland is dominated by red maple, skunk cabbage, and multiflora rose. It exhibits four wetland functions: groundwater recharge, floodflow alteration, sediment/toxicant retention, and wildlife habitat and is classified as a State wetland only. Wetland 7B will be permanently impacted by grading and the installation of a scour hole of modified riprap. The small portion of the scour hole in the wetland is such a minor impact, it is not anticipated that any functions would be lost.

Wetland 8C – Plates 16-17 (H034 – Busway Sta. 154+80 to 160+80 LT)

This PFO floodplain wetland is dominated by red maple, skunk cabbage, and multiflora rose. It exhibits four wetland functions: groundwater recharge, floodflow alteration, sediment/toxicant retention, and wildlife habitat. A narrow finger of this wetland, on the west side of the Busway at the Cedar Street Station, occurs within the footprint of the new station and the multi-use trail to the north, and will thus be totally filled. North of the station, a broader portion of the wetland will be permanently impacted by cut, fill, and grading for the Busway, multiuse trail, and a side slopes. A grass-lined ditch will be constructed along the west edge of the permanent impact area, conveying flows to the southwest toward the new cross-culvert (next paragraph.). Modified riprap will be provided along the western side of the ditch for slope protection. The wetland impacts at this location will result in a total loss of functions.

The culvert replacement activity at Station 158+20 LT, at a location called Site 2B, will impact Wetland 8C within the broader impact area of the Busway and trail side slopes (previous paragraph). The new culvert will convey water from Wetland 8C through a new 36" reinforced concrete pipe (RCP) under the Busway and an existing 36" metal pipe will be removed. The outfall will discharge on the east side of the Busway to Wetland 7B.

The large wetland impact to Wetland 8C from Station 158+50 to 160+80 is a function of the installation of the multiuse trail. The trail extends to the west of the existing rail ROW into wetland 8C. To provide a means for drainage, a substantial cut was required in the wetland. Impacts have been minimized through the use of a steep slopes with slope protection.

Wetland 9A – Plates 19, 20 (H034 – Busway Sta. 168+30 to 175+00 LT)

This partial PFO and PEM wetland impact area is a long, narrow impact area possessing four wetland functions: groundwater recharge, floodflow alteration, sediment/toxicant retention, and wildlife habitat. The PFO portion of the wetland is dominated by red maple, oriental bittersweet, and multiflora rose. The PEM portion of the wetland is dominated by common reed grass, skunk cabbage, and a fringe of redosier dogwood. Although retaining wall number 103 is used to minimize impacts to the wetland along the Busway and multiuse trail, an edge strip of this relatively large wetland will be permanently impacted by construction. A very small additional area will be impacted by the culvert replacement at Site 3 (described under wetland 7C below). A portion of the wetland will be filled for the

installation of the up-gradient end of the new 6'x6' box culvert at Site 3, which will provide cross-flow of an un-named tributary to Piper Brook. A retaining wall along the west side of the trail was used to minimize horizontal extent of fill and therefore reduce impacts to the wetland; however, temporary impacts will occur during construction of the retaining wall, in a long narrow strip on the west side of the retaining wall. Additional temporary impacts associated with the replacement of the culvert and the installation of a temporary 48" by-pass pipe for water handling during construction will occur. Work at the Site 3 culvert replacement will take place below OHW and below the 100-year flood elevation.

Wetland 7C – Plate 20 (H034 – Busway Sta. 171+65 RT, 174+00 to 174+50 RT, 174+80 RT)

This PFO wetland area possesses four wetland functions: groundwater recharge, floodflow alteration, sediment/toxicant retention, and wildlife habitat. The wetland is dominated by red maple, skunk cabbage, redosier dogwood, and common reed grass. Impacts to Wetland 7C occur in three locations. At the first location (at Station 171+65 RT), a drainage outfall will be constructed partially within the wetland, as drainage from the Busway will be collected and conveyed under the Busway via a new 12" pipe. Due to side slope and invert requirements, this culvert can not be constructed at a higher position to avoid the wetland. Outfall protection will be provided by a scour hole and modified riprap. The wetland limits largely coincide with the 100-year floodplain and SCEL at this point, which is the rail embankment's toe of slope, therefore this activity will affect the floodplain and SCEL of an unnamed tributary to Piper Brook.

At the second location (at Station 174+00 to 174+50), a very narrow portion of the wetland edge will be filled by the Busway side slope.

At the third location, temporary impacts will result from culvert replacement work within Wetland 7C at culvert Site 3 (Station 174+80). The existing culvert will be removed and replaced by a 60 foot long 6'x6' concrete box culvert. In addition to the outfall, work will include the installation of concrete wingwalls and a Type I scour hole with intermediate riprap. This activity will also affect the 100-year floodplain and SCEL of an unnamed tributary of Piper Brook at the outfall. Temporary impacts associated with the replacement of the culvert and the installation of a temporary by-pass pipe for water handling during construction will also occur at Site 3 in Wetland 7C. All temporary wetland impacts will be restored as shown on Plate 20D, and detailed in Attachment L.

Wetland 9B – Plates 21, 22 (H034 – Busway Sta. 176+00 to 180+20 LT)

This PFO wetland is flanked by a forested overstory of red oaks (*Quercus rubra*) and dominated by red maple, oriental bittersweet, and multiflora rose. It possesses two wetland functions: sediment/toxicant retention and wildlife habitat. Drainage on the west side of the Busway will be conveyed in the direction of wetland 9B from the north through a grass-lined channel to Wetland 9B. Wetland impacts will occur from the cut slope west of retaining wall number 103, the installation of a grass-lined channel and modified riprap apron for drainage, and grading at the intersection of the channel and the wetland.

Wetland 10 – Plate 23 (H034 – Busway Sta. 183+50 to 184+90 LT)

This PEM wetland, dominated by broadleaf cattail, purple loosestrife, and Pennsylvania smartweed, possesses only one wetland function: sediment/toxicant retention. This wetland will be totally filled by the multiuse trail and the fill slope to its west. Drainage from this wetland will be directed to the grass-lined swale between Stations 185 +00 and 194+00, which eventually drains to the Piper Brook tributary at culvert Site 3.

Wetland 7E – Plate 24 (H034 – Busway Sta. 194+00 RT)

This PFO wetland area, located in the riparian zone of Piper Brook, possesses four wetland functions: groundwater recharge, floodflow alteration, sediment/ toxicant retention, and wildlife habitat. The wetland is dominated by red maple, oriental bittersweet, and multiflora rose. An existing culvert will be replaced at Station 194+00 by a 15" reinforced concrete pipe that will discharge to the east of the Busway into Wetland 7E. Impacts to Wetland 7E include the installation of a modified riprap scour hole at the outfall with associated grading and fill. The eastern side of the culvert end will also impact the 100-year floodplain of a tributary of Piper Brook, which coincides with the existing rail embankment. A type I modified scour hole will be placed at the culvert end within the floodplain.

Wetland 14 – Plates 29, 30 (H046 – Busway Sta. 218+62 to 224+35 LT, H052 – AAR Sta. 710+37 to 710+88 LT)

This partial PFO and PSS wetland impact area is a long, narrow impact area possessing three wetland functions: groundwater recharge, sediment/toxicant retention, and wildlife habitat. The PFO portion of the wetland is dominated by red maple, oriental bittersweet, and multiflora rose. The PSS portion of the wetland is dominated by redosier dogwood, southern arrowwood, and multiflora rose. Wetland 14 is a relatively large wetland associated with Piper Brook, although separated from the brook by the existing rail corridor. This wetland will be impacted on the west side of the Busway by installation of the 10' wide multiuse trail. The fill slope from the trail will extend into the wetland. The trail is placed very close to the Busway at this point, separated only by a chain link fence, to minimize westward encroachment into the wetland. The fill slope and multiuse trail also encroach on the 100-year floodplain in this area.

The multiuse trail requires construction of a bridge over a tributary to Piper Brook (Station 223+40) and its abutments will be within Wetland 14. A drainage outfall to the tributary will be installed through the abutment of the new bridge.

Wetland 14 is also the location of a culvert replacement, at the site designated culvert Site 4. This is one of the two pipe jacking sites in the Busway project; although the jacking pit will be within Wetland 27A, a receiving pit for the jacking operation will be constructed within Wetland 14. This receiving pit will eventually become a concrete-line channel conveying stormwater from the existing triple-arch pipes to the new twin 78" pipes that will be jacked. The culverts will be

pitched slightly down-gradient from wetland 14 to achieve proper flow into wetland 27A on the opposite (eastern) side of the access road.

Wetland 27A – Plate 30 (H052 – AAR Sta. 708+80 to 717+04 RT)

This partial PFO and PSS wetland impact area is a long, narrow impact area possessing four wetland functions: groundwater recharge, floodflow alteration, sediment/toxicant retention, and wildlife habitat. The PFO portion of the wetland is dominated by red maple and skunk cabbage. The PSS portion of the wetland is dominated by redosier dogwood, southern arrowwood, multiflora rose, and broadleaf cattail. Permanent impacts to wetland 27A will result from several different construction activities. Cut and fill to create the new Amtrak access road will affect a linear swath from approximately AAR Sta. 708+80 to 717+04, as well as a second, smaller patch of the wetland (at Station 710+00). This activity will also impact the stream channel encroachment line of Piper Brook.

The Site 4 culvert replacement (described under Wetland 14 above) involves a jacking pit located within the limits of Wetland 27A (at Station 710+50). The existing culvert and headwall at Wetland 27A will be replaced by the new twin culverts, abutment, concrete headwall, and splash pad. In addition to permanent impacts from these elements, temporary wetland disturbance will result from the construction area required for pipe-jacking (under the Busway, the Amtrak tracks, and the AAR.) At this site there will be an installation of twin 78" RCPs. These elements plus a riprap swale and new riprap fill slope will protrude into the wetland, as well as the stream channel encroachment line of Piper Brook. The culverts will be pipe-jacked into place and stabilized with flowable fill after installation. This culvert will provide drainage towards Wetland 27A from Wetland 15 on the opposite side of the Busway and access road. A portion of the existing culvert will be sliplined with a PVC pipe to allow stormwater between the tracks and Busway to discharge into the riprap swale.

Wetland 15 – Plate 31 (H046 – Busway Sta. 225+94 to 228+78 LT)

This PFO wetland, dominated by red maple and oriental bittersweet, possesses only one wetland function: sediment/toxicant retention. Wetland 15 will be permanently impacted by construction of the multiuse trail. At Station 228 + 70 LT, the existing 36" reinforced pipe will be replaced. The entire wetland will be filled.

Wetland 16A – Plate 33 (H046 – Busway Sta. 242+55 to 242+99 RT)

This PEM wetland, dominated by reed canary grass (*Phalaris arundinacea*), possesses only one wetland function: sediment/toxicant retention. This degraded wetland is located within the footprint of the Newington Junction Station. As a result, the entire wetland will be graded and filled for Busway and station construction.

Wetlands 17 and 21A – Plate 35 (H052 – AAR Sta. 736+19 to 737+15 RT)

Impacts to these federal and state jurisdiction wetlands and perennial watercourse occur at culvert replacement "Site 5", where a culvert will be installed by pipejacking under the railroad bed. The wetland and watercourse is delineated by flagline 21A on the downstream and flagline 17 on the upstream end of the existing culvert. Wetland 17 is a PFO forest dominated by silver maple and Norway maple (*Acer platanoides)*, and Wetland 21A is a PSS wetland dominated by multiflora rose, Japanese barberry (*Berberis thunbergii)*, and Norway maple. Wetland 17 has negligible functions, while Wetland 21A exhibits the sediment/toxicant retention function. This function will be impacted due to the proposed permanent impacts. Impacts to Wetland 17 include the installation and removal of a receiving pit for the jacking operation to install the new 90" culvert and the relocation of the existing streambed inlet to the south at the new inlet. Elements affecting Wetland 21A, which is located on the east side of the AAR, are the jacking pit installation and removal, installation of the new culvert and concrete retaining wall number 101, and the relocation of existing streambed at the outlet to its new location and the addition of a preformed scour hole at the outlet. During construction temporary twin 36" pipes will be used to divert the stream flow around the jacking pit operation. The new 90" culvert will maintain the existing east-flowing drainage pattern from Wetland 17 on the west side of the rail corridor, which is part of the same Piper Brook wetland system, into Wetland 21A. The tributary of Piper Brook streambed will be reconfigured to accommodate the piping and retaining wall number 102. There will be temporary disturbance to the wetland and streambed from pipe-jacking operation, which include a temporary access construction road and staging area and temporary water handling activities. Work at this location will take place below the 100-year flood elevation and below OHW within the watercourse.

Isolated Wetland

Wetland 8A – Plate 18 (H039 – Busway Sta. 151+00 to 152+00 LT)

This PEM wetland is dominated by broadleaf cattail, common reed grass, and mixed sedge (*Carex spp.*) and rush (*Scirpus spp.*) species. It possesses two wetland functions: groundwater recharge and sediment/toxicant retention. This wetland has no vernal pool characteristics. Located west of the Busway, this small wetland pocket will be totally filled for construction of the Cedar Street Station access drive. All wetland functions will be lost.

Isolated Wetland

Wetland 8B – Plate 18 (H039 – Busway Sta. 151+00 to 152+00 LT)

This PSS wetland is dominated by common reed grass, multiflora rose, and willow (*Salix spp.*) saplings. It possesses two wetland functions: groundwater recharge and sediment/toxicant retention. This wetland has no vernal pool characteristics. Located west of the Busway, this small wetland pocket will be completely filled for construction of the Cedar Street Station access drive and a

36" RCP conveying drainage from the south side of the access driveway to the north side.

Isolated Wetland

Wetland 7F – Plate 26 (H034 – Busway Sta. 200+80 to 200+90 LT)

This PFO wetland area, located in the riparian zone of Piper Brook, possesses only one wetland function: sediment/ toxicant retention. The wetland is dominated by red maple and southern arrowwood. This western edge of this wetland will be permanently impacted by the fill slope from the Busway. The wetland function will not be impacted by this minor fill.

Isolated Wetland

Wetland 16B – Plate 34, 35 (H046 – Busway Sta. 247+42 to 248+19 LT)

This PSS wetland area possesses two wetland functions: groundwater recharge/ discharge, and sediment/ toxicant retention. The wetland is dominated by red maple, silver maple, Norway maple, redosier dogwood, and Japanese knotweed (*Polygonum cuspidatum*). This wetland will be almost entirely filled by the Busway with its associated fill slope and a grass-lined ditch. Virtually all functions will be lost as a result of the impact.

Isolated Wetland

Wetland 21A2 – Plate 36 (H052 – AAR Sta. 743+08 to 743+28 RT)

This PEM wetland area possesses only one wetland function: sediment/ toxicant retention. The wetland is dominated by common reed grass. Permanent impacts will occur in the southwest corner of this wetland from cutting and grading for the installation of a gravel access road and anti-tracking pad for construction access. This access will remain after the temporary construction period to provide access from Day Street. The cut associated with this work will be shallow, and will not cause drainage of the remaining wetland area. This is an existing CL&P access road to a switching station located adjacent to the railroad ROW. The access road must be expanded to the north (partially into Wetland 21A2) to provide a slightly wider access road, and to provide a sufficient turning radius onto the Busway while avoiding interference with the existing switching station.

Isolated Wetland

Wetland 18 – Plates 37, 38, 39 (H046 – Busway Sta. 267+85 to 274+41 LT)

This degraded ditch PEM wetland area possesses only one wetland function: sediment/ toxicant retention. The wetland is dominated by broadleaf cattail and rush. Wetland 18, an existing swale configuration, will be entirely filled, as it is in the footprint of the proposed Busway.

Isolated Wetland

Wetland 28 – Plate 44 (H052 – AAR Sta. 778+55 to 778+86 RT)

This degraded PEM wetland depression possesses only one wetland function: sediment/ toxicant retention. The wetland is dominated by reed canary grass and other wetland grasses. Permanent impacts to this wetland will result from the installation of the Amtrak Access Road. The excavation, filling, grading, and paving of the new access road will result in the complete removal of this wetland, which will be replaced by a modified riprap swale.

Isolated Wetland

Wetland 19 – Plate 46 (H046 – Busway Sta. 323+91 to 324+99 LT)

This degraded ditch PEM wetland area possesses only one wetland function: sediment/ toxicant retention. The wetland is dominated by reed canary grass and other wetland grasses. Wetland 19 consists of a vegetated swale and will be completely filled and paved by the construction of the Busway and a concrete barrier.

Isolated Wetland

Wetland 20 – Plate 47 (H046 – Busway Sta. 325+95 to 328+08 LT)

This degraded ditch PEM wetland area possesses only one wetland function: sediment/ toxicant retention. The wetland is dominated by wetland grasses and sedge species. Wetland 20 consists of a vegetated swale and will be completely filled and paved by the Busway, a concrete barrier, catch basin, and drainage pipe.

Isolated Wetland

Wetland 30 – Plate 48 (H052 – AAR Sta. 817+90 to 821+36 LT & RT)

This degraded ditch PEM wetland area possesses only one wetland function: sediment/ toxicant retention. The wetland is dominated by common reed grass. Permanent impacts to this entire wetland will result from construction of the Amtrak Access Road. The excavation, cutting, filling, grading, and paving of the new access road will result in the complete removal of this wetland. It will be replaced by a modified riprap swale and 12" reinforced concrete pipe which will convey drainage away from the AAR.

Isolated Wetland

Wetland 21C – Plate 51 (H025 – Busway Sta. 348+58 to 351+34 RT)

This degraded ditch PEM wetland area possesses only one wetland function: sediment/ toxicant retention. The wetland is dominated by broadleaf cattail and wetland grasses. This wetland will be entirely filled within the footprint of the

Busway and catch basins will be installed on either side of the wetland and a 12" reinforced concrete pipe installed to convey drainage from the east side of the Busway to the west side.

Isolated Wetland

Wetland 21D – Plate 53 (H025 – Busway Sta. 357+14 to 358+68 LT)

This degraded ditch PEM wetland area possesses only one wetland function: sediment/ toxicant retention. The wetland is dominated by purple loosestrife, mixed wetland grasses, sedges, rushes, and common reed grass. This wetland will be entirely filled within the footprint of the Busway.

Isolated Wetland

Wetland 22A – Plate 54 (H025 – Busway Sta. 362+23 to 364+71 LT)

This degraded linear depression PEM wetland area possesses two wetland functions: groundwater recharge and sediment/ toxicant retention. The wetland is dominated by purple loosestrife, mixed wetland grasses, sedges, rushes, and common reed grass. This wetland will be entirely filled within the footprint of the Busway. Catch basins and 15" reinforced concrete pipe will be installed to collect and convey drainage.

Trout Brook Wetland System

Wetland 22B – Plates 55, 56 (H025 –Sta. 371+80 to 376+35 LT)

This degraded linear depression PEM wetland area possesses two wetland functions: groundwater recharge and sediment/ toxicant retention. The wetland is dominated by mixed wetland grasses, sedges, and rushes. This wetland will be entirely filled within the footprint of the Busway.

Wetland 22C – Plate 57 (H025 –Sta. 377+45 to 380+90 LT)

This linear depression PFO wetland area possesses three wetland functions: groundwater recharge, sediment/ toxicant retention and wildlife habitat. The wetland is dominated by gray birch (*Betula populifolia*), staghorn sumac, mixed wetland grasses, sedges, and rushes. This wetland will be partially filled by the footprint of the Busway and the cut and fill required for the concrete barrier and installation of a 24" reinforced concrete pipe.

3.1.4 Compensatory Wetland Mitigation

Given that the existing rail ROW – an existing transportation facility -- is the most logical and least-impact alternative for developing a much-needed transit option between New Britain and Hartford, the impacts resulting from the Busway are unavoidable. CTDOT has developed a Mitigation Plan to compensate for the acreage and functions and values of wetlands impacted by the project. Mitigation types, and the acres of each, have been determined based on the U. S. Army Corps of Engineers (USACE) 2007

Compensatory Mitigation Addendum. This document provides guidance on suggested mitigation ratios, considering both wetland type and mitigation method (i.e., restoration, creation, enhancement, and preservation). Refer to the Mitigation Report in Attachment L for detailed information on the proposed compensatory mitigation.

3.2 Perennial Watercourses

3.2.1 Existing Conditions

The project area is located in five drainage basins. The designated basins are Piper Brook, Bass Brook, Trout Brook, Park River, and North Branch of the Park River. The predominant surface water within the study area is Piper Brook, which defines the Piper Brook drainage basin. Other major surface waters in the study area include Bass Brook, which is actually a tributary to Piper Brook, and Trout Brook. Because much of the Park River and North Branch of the Park River have been piped underground, there are no surface waters associated with these basins within the bounds of the Busway's physical footprint.

Within the contract limits of the proposed New Britain/Hartford Busway project there are several perennial watercourses that either cross the alignment or flow parallel to it. According to the "2006 Impaired Waters List: CT Waterbodies Not Meeting Water Quality Standards" (CTDEP 2006), some of these watercourses are categorized as impaired waters. The following text provides a description of the existing conditions for each perennial watercourse within, or connected to wetlands within, the Busway project limits. Stream segments on the impaired waters list are noted.

Piper Brook

In New Britain, Piper Brook is primarily a channelized or culverted stream that has been altered by development and the construction of Route 9. North of the rail line's crossing of the channel near downtown New Britain, Piper Brook is generally located to the east of the right of way and parallel, flowing northeasterly from New Britain into Newington. Piper Brook is a shallow stream, ranging in width from approximately 10 to 20 feet. According to the CTDEP's most recent water quality classifications mapping (updated in 2006), Piper Brook is classified as having surface water quality "A" through New Britain to just south of Cedar Street in Newington. Class "A" waters are considered of excellent quality and have the potential to serve as drinking water supply, support fish and wildlife habitat and recreational use. North of Cedar Street to where it meets Trout Brook to form the South Branch Park River, Piper Brook is has a "B" classification, which means the water meets most federal water quality standards and is safe for all recreational use. Within Newington, Piper Brook is relatively isolated from land development and basically inaccessible to the public on account of fairly extensive wetlands along the brook. Through Newington, the brook is in a relatively meandering condition and is surrounded by level red maple forested wetland floodplains. Several unnamed tributaries to Piper Brook cross under the existing railroad ROW from west to east and are thus directly within the Busway project area.

Two segments of Piper Brook within the project area are listed as impaired. They are: 1) Piper Brook – 01 (Waterbody Segment ID CT4402-00_01) which is impaired for fish habitat, other aquatic life and wildlife, and recreation, and; 2) Piper Brook – 02 (Waterbody Segment ID CT4402-00_02) which is impaired for fish habitat, other aquatic life and wildlife, and recreation.

Bass Brook

Bass Brook, which has a water quality classification of "A," receives drainage from areas northwest of the study area and is a tributary to Piper Brook. Bass Brook flows in a southeasterly direction and flows into Piper Brook after passing under Route 9, in Newington. An unnamed tributary to the brook, which also has a water quality classification of "A," joins it shortly before it meets Route 9. West of the rail line, the brook is in a fairly naturalistic condition, with adjacent wetland zones including emergent grasses and sedges, a zone of scrub-shrub habitat, and a zone of red maple-ash forested wetland. The brook is culverted in the vicinity where the abandoned rail line, Route 9, and the brook converge. Bass Brook is not classified as impaired water.

Trout Brook

Farther north is Trout Brook, which flows southeast under the rail ROW in West Hartford, just before it joins Piper Brook to form the South Branch of the Park River. Trout Brook, with a water quality classification of "B," has been channelized to the west of the ROW but remains non-channelized on the east side. Between Park Avenue and the rail line, the brook is conveyed through a concrete channel that extends under the bridge carrying the tracks over the brook. East of the rail line, the channel has steep fill embankments that have limited opportunity for vegetative growth.

One segment of Trout Brook within the project area is listed as impaired: Trout Brook – 01 (Waterbody Segment ID CT4403-00_01) which is impaired for fish habitat, other aquatic life and wildlife, and recreation.

Kane Brook

Kane Brook, which has a water quality classification of "A," is culverted under the rail right of way near New Park Avenue and Kane Street in Hartford, beneath the I-84 viaducts. This tributary of the Park River is culverted under both the Amtrak corridor and New Park Avenue but runs through an open channel in between these two crossings. The level of the brook is very depressed within its banks and in relation to the surrounding area, which has been substantially altered by a variety of land clearing activities, highway construction, and local development. A narrow band of forest, dominated by box elder trees, surrounds the brook. Kane Brook is not classified as impaired water.

3.2.2 Perennial Watercourse Impacts

Project activities in close proximity to and/or affecting perennial watercourses are described below, by watercourse. Tables 2 and 3 provide a summary of impacts to the

100-year floodplain and SCELs, respectively. Where regulatory ordinary high water (OHW) lines occur within these work areas, they are noted and shown on the plates. Table 4 provides a tabular summary of impacts to perennial watercourses below the OHW line within the project area. It should be noted that OHW impacts (0.09 acres) are included in the total wetland impact area of 2.111 acres. Overall, the project will have a positive impact on Piper Brook. Significant improvements will be made to improve water quality from the railroad ROW as well as hydraulic improvements which will reduce the potential for erosion.

Piper Brook

One outfall to Piper Brook is proposed in New Britain (Sta. 123+00). This will be a pipe installed in the existing concrete channel wall of an engineered section of Piper Brook. The pipe will be flush with the concrete wall and will not entail any fill within the channel itself. The installation will occur above the regulatory elevations of the floodway, 100-year floodplain, and OHW, and will not result in any fill within the channel. Since this outfall will be located in a concrete channel, there will be no negative ecological or hydraulic impacts to Piper Brook.

Perennial (Unnamed) Tributaries to Piper Brook

Two culvert replacements (Sites 3 and 5) along perennial tributaries to Piper Brook are proposed by the project, described below. Water handling plans and erosion and sedimentation control plans have been developed to minimize potential harm to water quality (refer to detailed descriptions in Attachment C). Standard CTDOT construction contract documents will include specifications for environmental inspection during construction, environmental compliance, and monitoring.

Site 3

An existing culvert will be replaced with a longer one to accommodate the additional width of the Multi-use Trail at Busway Sta. 174+90 (known as "Site 3"). As shown on Plate 20, the existing (and replacement) culvert connects perennial flows from the expansive wetlands (Wetland 9A) on the west with the Piper Brook floodplain wetlands (Wetland 7C) to the east. Due to the very level terrain and broad basin shape of these wetlands, they collect a significant amount of water during rainy periods, and water flows from the west side of the tracks to the east side through the existing culvert. The culvert replacement will occur within the 100-year floodplain and within regulated wetlands. The replacement culvert will be buried with one foot of natural streambed material.

The installation of a new culvert a Site 3 will require both permanent and temporary impacts to the un-named perennial tributary to Piper Brook. Although the pipe will be extended and a type 1 scour hole installed at the outfall location, the impacts are considered to be minimal as little aquatic habitat will be impacted. Work at the culvert inlet will consist of construction of a retaining wall (no. 103) through which the new culvert pipe will be installed.

The temporary disturbance to the channel upstream of the retaining wall will be restored to the existing condition, or better, through regrading, natural soil installation and native plantings. The temporary impacts at the culvert outlet will also be restored to their original condition, or better, through regrading, natural soil installation and native plantings. The permanent impacts at the outlet will include a type 1 scour hole, which will ultimately provide important erosion control at the outfall area and dissipate energy. In addition, the culvert will be buried by one foot of natural streambed material. Since there is no aquatic habitat at this location and temporary channel impacts will be restored, no adverse impacts are anticipated to the tributary.

Site 5

A set of existing twin box culverts will be replaced with a longer culvert to accommodate the additional width of the Busway and the AAR at AAR Sta. 736-737 (Plate 35). This is culvert replacement site known as Site 5. The new culvert will be jacked under the railroad, so construction requires a temporary jacking pit. The watercourse here is an unnamed tributary to Piper Brook (pictured below). This watercourse drains from an industrial/residential area northwest of the rail line, through the culvert and southeast into a channel (Wetland 21A) that flows toward Piper Brook. The culvert replacement will occur within the 100-year floodplain and within regulated wetlands / watercourse.

The installation of a new culvert at Site 5 causes both permanent and temporary impacts to the un-named perennial tributary to Piper Brook. The pipe will be extended and a short portion, approximately 15 feet, of the existing channel on the upstream side of the proposed Busway will be filled. The new pipe will be installed through retaining walls (numbers 101 and 102) to be constructed on both sides of the Busway in this section. The retaining wall on the downstream end of the pipe will be constructed flush with the existing culvert, so little existing stream channel will be lost. To facilitate a smooth hydraulic transition from the new pipe to the existing channel on the upstream and downstream ends, the existing channel will be relocated to the south, and a portion of the existing channel will be restored as inland wetland, rather than stream channel. The temporary disturbance to the channel upstream and downstream of the retaining walls will be restored to the existing condition, or better, through regrading, natural soil installation and native plantings. Due to the benefits associated with the erosion control measures at this location, the lack of aquatic habitat, the restoration of temporary channel impacts, and the construction of a new channel, it is not anticipated that this would be an adverse impact to the tributary or its aquatic habitat.

Trout Brook

Several project activities are proposed in close proximity to Trout Brook. These are described below.

A new bridge over Trout Brook is proposed for the Busway (Sta. 308+00 to 309+00) and a new bridge over Trout Brook is proposed for the Amtrak Access Road (AAR Sta. 795+00 to 797+00). These have been designed to span and/or avoid all regulated areas and will therefore not impact the floodway, 100-year floodplain, SCEL, watercourse, or wetlands.

A new bridge over Trout Brook is also proposed for the Amtrak Access Road on the east side of the railroad tracks. The abutments of this bridge have been deliberately set outside the wetland, floodway and the 100 year floodplain so that the bridge will span all three without impacting them.

An outfall to Trout Brook, from a detention basin associated with the Elmwood Station, is proposed at Busway Sta. 308+40 (Plate 45). This will be a pipe installed flush with the existing concrete channel wall (flood control structure) of Trout Brook. The installation will occur above the regulatory elevations of the floodway, 100-year floodplain, and ordinary high water (OHW), and will not result in any fill within the channel.

A new stormwater outfall pipe will be located within both the mapped floodway and 100-year floodplain resources of Trout Brook at Busway Sta. 309+20 (see Plate 45). A 36" RCP, RCCE, and modified rip rap apron will be installed within regulatory floodway and 100-year floodplain boundaries. These impacts are shown in Table 2. There are no wetlands at the outfall location; it is an upland location outside of the river channel.

Since no work will be conducted in the channel of Trout Brook and no aquatic habitat will be impacted, the work associated with these stormwater outfalls and bridge construction will not adversely impact Trout Brook.

Kane Brook

Two outfalls are proposed to Kane Brook in Hartford west of the Busway on the upstream side of the Kane Brook Conduit that runs under the railroad tracks (Plate 58 - Sta. 384+27 to 385+11). The two drainage outfalls will be constructed upslope of the channel of this small stream and upland of Wetland 24. Work will take place within the 100-year floodplain but no work will occur below OHW.
A third outfall will be constructed near the downstream side of the Kane Brook conduit where no wetlands were observed. The outfall will be significantly up gradient of Kane Brook and will include a level spreader to dissipate discharge flows.

Since no work will be conducted in the channel of Kane Brook and no aquatic habitat will be impacted, the work associated with these two stormwater outfalls will not adversely impact Kane Brook.

Culvert Openness

The two perennial streams in the Busway project area where culvert replacement/alteration will occur do not provide fish habitat. This assessment was confirmed by CTDEP Fisheries Division during a site inspection (see Report of Meeting in Appendix F). The drainage area of each of these culverts is less than one square mile. Although the openness ratio does not have to be met for culverts with a drainage area less than one square mile, they were calculated for information purposes.

Site 3

The culvert Openness Ratio for culvert replacement Site No. 3 (unnamed perennial stream, tributary to Piper Brook on Plate 20) is 0.15m. The watershed size for this culvert is 0.315 square miles. The watershed is small and the stream was not observed to support fisheries during the Busway wetland field work. The CTDEP Fisheries Division did not have any fisheries concerns during their site visit. The new culvert will be larger (i.e., greater openness) than the existing culvert and buried with one foot of natural streambed material.

Site 5

The culvert Openness Ratio for culvert replacement Site No. 5 (unnamed perennial stream, tributary to Piper Brook on Plate 35) is 0.13m. The watershed of this culvert is less than one square mile. At this site, the existing twin 3x4' box culverts will be replaced by one 90-inch RCP culvert.

3.2.3 Mitigation

The installation of new culverts at Sites 3 and 5 will cause both permanent and temporary impacts to un-named perennial tributaries to Piper Brook. Through the restoration of temporary impact areas and reconfiguration and reconstruction of realigned channel, these impacts will be mitigated. The existing channels at these locations exhibit little to no aquatic habitat; therefore, the reconstruction of the channels at these locations is anticipated to provide equal or better aquatic habitat than currently exists.

No long-term impacts to water quality or stream functions are expected. In many areas, post-construction conditions will be more stable than pre-construction conditions, minimizing long-term erosion and sedimentation and improving water quality.

3.3 Intermittent Watercourses

3.3.1 Existing Conditions

The many wetlands and IWCs that occur in the project area can typically be characterized as "depressions" and "ditches". While some of these small areas have wetland vegetation, it is generally very sparse. Some of them have only a monoculture of *Phragmites*. The linear configurations with trees and/or shrubs are quite narrow so the vegetation is essentially a single row, with minimal vegetative buffers around them.

Some of IWCs have hydrophytic vegetation but none meets all three parameters of the federal wetlands definition. The IWCs generally occur where impervious surfaces of the surrounding urban properties drain off after storm events, forming eroded channels which periodically hold water. The IWCs in level or basin-shaped areas may hold water and contribute to groundwater (GW) recharge. Otherwise they serve a very minor function of sediment/toxicant retention.

3.3.2 Intermittent Watercourse Impacts

Impact quantities in linear feet are listed in Table 1 of this attachment. Permanent impacts to intermittent watercourses (IWCs) will result from:

- The cut, fill, and footprint for the Busway
- The Amtrak access road
- Development of a multi-use trail
- Construction of retaining walls and concrete barriers
- Structures to convey surface water and drainage (including grass-lined ditches, water quality channels, reinforced concrete piping, and new and replacement culverts)

There are two culvert replacements at stream crossings over intermittent (unnamed) Tributaries to Piper Brook. These are locations where a large wetland, when bisected by the tracks, was connected hydraulically by culverts to allow/maintain water movement between the separated wetlands. In these cases, there are no defined stream channels leading to / from the culverts, although water may pool up on the upslope (west) side of the ROW after storm events. The two locations are the following:

Site 2B

An existing culvert will be replaced with a longer one to accommodate the additional width of the Busway and Multi-use Trail at Sta. 158+30 (known as "Site 2B"). This work consists of the installation of a new 36" RCP to replace an existing 36" metal pipe which connects intermittent flows between wetlands. This site is a cut-and-cover installation, possible here because it is located in the abandoned rail ROW. Work will be done in the dry. No impacts to floodplains or SCELS will occur. Minor impacts to the intermittent watercourse will occur as a result of the culvert extension.

The intermittent watercourse associated with this culvert crossing is low quality and of little extent. Due to their minimal size and disturbed condition, the intermittent watercourse has little function. Flow through the culvert is intermittent and typically ponds at either end, but does not flow to other wetland systems. Therefore, the work proposed at this location, especially the minimal disturbance at the outfall pipe in Wetland 7B, will have no negative impact on intermittent watercourses. Impacts to wetlands will be greater on the northern side of the Busway, however, a new grass-lined ditch will be installed and connected to the new culvert inlet. This new grass-lines ditch will help to improve water quality.

Site 4

An existing culvert will be replaced with longer (twin) culverts to accommodate the additional width of the Busway, Multi-use Trail, and AAR at AAR Sta.710+00 to 711+00 (known as "Site 4"). The existing culvert here collects flows from the sloping wetlands west of the track (Wetland 14), which reach the culvert via a linear ditch along the tracks. When conveyed to the east side, the water diffuses into the expansive level wetlands/floodplains of Piper Brook (Wetland 27A). There is a short channel on the downstream side of the existing culvert, which dissipates a short distance from the discharge point and becomes disperse flow over the Piper Brook floodplain. There are periods where no water is running through the culvert. This is one of the two culvert replacement sites along the Busway that require a jacking pit for installation of the new pipes. The jacking pit and equipment access will cause temporary impacts to the wetlands on both sides of the ROW. A new discharge to the existing 3.2x3 ft box culvert will be constructed to collect stormwater from the ditch between the existing track and the proposed Busway (see Plate 30). A catch basin will collect water, which will be treated by an offline hydrodynamic separator under the Busway and will then flow through a RCP to a new manhole installed on top of the existing culvert. The upstream end of the culvert will be plugged and the western portion filled while the downstream end will be sliplined with a PVC pipe and remain open to convey the ditch drainage to the east of the tracks.

There will be a relatively large temporary impact associated with the installation of the Site 4 culverts due primarily to the pipe-jacking operation. Upon completion of culvert installation, water from the culverts will be re-routed to the north, parallel to the tracks in a riprap ditch, and will discharge to the Piper Brook floodplain at a similar location. The minor erosion currently taking place in the existing channel at the discharge point will be alleviated by the new culvert and ditch and channel protection. The wetlands and remaining intermittent watercourse where temporary impacts occur will be restored to pre-construction conditions with appropriate seeding and plantings. No adverse impacts are anticipated to occur to the intermittent watercourse as a result of the work at Site 4.

3.3.3 Detailed Description of Intermittent Watercourse Impacts

Intermittent watercourses (IWCs) are located throughout the project area, typically in long linear ditches adjacent to the existing railroad ROWs. Many of these IWCs are located in existing railroad ballast and are degraded. The following text describes the impacts to these degraded, albeit regulated, resources.

IWC 1-1 to 1-4 – Plate 9 (H035 – Busway Sta. 115+66 to 117+40 LT)

Permanent impacts to this intermittent watercourse will result from the installation of the Busway and multiuse trail. The excavation, cutting, filling, grading, and paving of the Busway and trail will result in the total removal of this IWC. The conveyance function of this IWC will be replaced by a new drainage system.

IWC 3A – Plates 13, 14 (H034 – Busway Sta. 140+80 to 145+33 LT)

This intermittent watercourse lies within the footprint of the paved Busway and will be eliminated.

IWC 3-2 to 3-3 – Plate 23 (H034 – Busway Sta. 182+44 to 183+65 LT)

This intermittent watercourse will be permanently impacted by the fill slope for the multiuse trail.

IWC 4-1 to 4-11 -- Plates 24, 25, 26 (H034 – Busway Sta. 194+08 to 203+58 LT)

IWC-4 will be filled for the Busway and multiuse trail construction from Station 194+08 to 203+58. The conveyance function will be replaced by new drainage features. At Station 197+00, the flow along with drainage from paved areas of the Busway will be discharged to a Type 2 modified scour hole.

IWC 4A and Stream Channel Encroachment Line – Plate 12 (H034 – Busway Sta. 130+14 to 130+31 LT)

Permanent impacts to this intermittent watercourse occur from the installation of a 24" reinforced concrete pipe and associated fill and grading. The placement of this pipe also impacts the SCEL associated with Bass Brook.

IWC 5-1 to 5-5 – Plate 27 (H034 – Busway Sta. 203+76 to 207+31 LT)

This intermittent watercourse will be graded and its elevation lowered for the proposed multiuse trail. Catch basins will be installed between the Busway and the multiuse trail, and runoff will be conveyed to the northeast via an 18" reinforced concrete pipe.

IWC 10-2 to 10-7 – Plate 28 (H046 – Busway Sta. 213+40 to 214+00 RT)

All of this intermittent watercourse will be filled by the Busway and grading associated with the Busway and concrete barrier which is close to this intermittent watercourse.

IWC 11 – Plates 33, 34 (H046 – Busway Sta. 243+15 to 245+55 RT)

In the vicinity of the Newington Junction Station, this intermittent watercourse will be graded and filled for Busway construction and its flow will be replaced by the new drainage system.

IWC 11B – Plates 37, 38 (H052 – AAR Sta. 756+62 to 759+33 RT)

This intermittent watercourse will be cut, filled, and graded for the AAR and AAR turnoff area. The intermittent watercourse will be replaced with a modified riprap swale and 12" reinforced concrete pipe.

IWC 12 – Plate 32, 33 (H046 – Busway Sta. 239+00 to 240+90 RT)

In the vicinity of the Newington Junction Station, this intermittent watercourse will be graded and filled for Busway construction and its flow will be replaced by the new drainage system.

IWC 13-1 to 13-8 – Plates 39, 40, 41 (H046 – Busway Sta. 274+47 to 282+35 LT)

IWC-13 is a ditch that conveys runoff to Wetland 18. It will be graded and filled completely. Drainage is conveyed by sheet flow on the east side of the Busway (constrained by a concrete wall) until Station 283+00 where there is a catch basin. Drainage is collected there and conveyed from the east side to the west side of the Busway via a 12" reinforced concrete pipe.

IWC 14-1 to 14-6 – Plates 42, 43, 44 (H046 – Busway Sta. 284+32 to 292+49 LT)

The conveyance ditch IWC-14 will be replaced by a 15" reinforced concrete pipe

IWC 14B – Plates 49, 50 (H052 – AAR Sta. 824+75 to 826+00 LT) and (H052 – AAR Sta. 830+85 to 832+04 LT)

This IWC will be filled and graded within the footprint of the new access road and an 8" under drain.

IWC 14C – Plate 51 (H052 – AAR Sta. 835+95 to 839+03 LT & RT)

This IWC will be filled and graded within the footprint of the new access road and an anti-tracking pad.

IWC 14D – Plate 52 (H052 – AAR Sta. 840+91 to 842+76 LT & RT)

This IWC will be filled and graded within the footprint of the new access road.

IWC 14E – Plates 59, 60 (H052 – AAR Sta. 873+84 to 878+84 LT & RT)

This IWC will be filled and graded within the footprint of the new access road.

IWC 15-1 to 15-5 – Plates 61, 62 (H025 – Busway Sta. 394+90 to 402+44 LT)

This IWC will be filled and graded within the footprint of the Busway and replaced by a 15" reinforced concrete pipe for conveying drainage.

IWC 14F – Plate 61 (H052 – AAR Sta. 883+82 to 884+83 LT & RT)

This IWC will be filled and graded within the footprint of the new access road.

3.3.4 Mitigation

Where impacted to construct new culverts or swales, intermittent watercourse channels will be restored to provide a continuous connection with the new elements of the project, as needed. This includes areas at the Sites 2B and 4 culvert crossings. Regrading of the channels will take place to connect the remaining IWCs to the new elements of the project to ensure a seamless connection.

Mitigation for impacted IWCs will be achieved by the use of grass-lined swales and treatment of the Phragmites-infested linear swale adjacent to the wetland mitigation site. As shown in Table 1, a total of 7,108 linear feet of IWCs will be impacted as a result of the proposed project; although not all IWCs are believed to necessarily fall under federal jurisdiction, they have all been counted as impact. Approximately 11,132 linear feet of new grass-lined swales are proposed throughout the project area. It is therefore anticipated that the new grass-lined swales will provide sufficient mitigation for these impacts. These swales are expected to perform at a higher level than the existing IWCs to provide improved sediment/toxicant retention – (the function with the greatest impact as a result of the proposed project). These swales will also promote groundwater recharge and stormwater retention.

3.4 Floodplains and Stream Channel Encroachment Lines

3.4.1 Existing Conditions

National Flood Insurance Rate Maps (FIRMs) were utilized to identify the location of the flood zones. The FIRMs available for the entire corridor were most recently updated in September of 2008.

Floodplain areas are located within the study area in association with Piper Brook, Bass Brook, Trout Brook, and Kane Brook. Floodplains associated with Bass Brook, Trout Brook, and Kane Brook have been modified over the years due to incremental development, whereas the Piper Brook floodplain has been less impacted.

The majority of the existing rail bed is above the 100-year flood elevation. A small portion of the rail bed is below the 100-year flood elevation within New Britain close to the Newington town line. Areas of the ROW that do not contain fill (originally used to construct the rail bed) are within the 100-year flood zone.

Stream channel encroachment lines (SCEL), all associated with Piper Brook, are located west of and parallel to the Busway, beginning north of Cedar Street in Newington to the northeast. Piper Brook and its associated SCEL meander out of and back into the Busway corridor in Newington south of Willard Avenue. There is also a SCEL associated with Piper Brook that crosses under the Busway; this SCEL is located where Bass Brook meets Piper Brook.

The City of New Britain and the Towns of Newington and West Hartford have expressed concerns about flooding associated with Piper Brook and Bass Brook systems because of existing potentially undersized culverts that cross either the abandoned rail ROW or existing Amtrak ROW. The new culvert crossings at Sites 4 and 5 have been designed

to accommodate a 100-yr storm event. West Hartford has also cited flooding problems at Jacobs Brook, which periodically floods an industrial and residential area near the Newington/West Hartford border. The City of Hartford has identified drainage and flooding problems at Kane Brook.

3.4.2 Floodplain Impacts

Impacts to floodplains are shown on Table 2. On the east side of the Busway, permanent impacts to the 100-year floodplain associated with Piper Brook tributaries result from the Busway and AAR roadways, associated cut and fill for side slopes, concrete retaining walls, culvert replacement, and scour holes. Temporary impacts to the 100-year floodplain result from water handling during installation of culverts.

On the west side of the Busway, permanent impacts to the 100-year floodplain associated with Piper Brook tributaries are from cut and fill, construction of retaining walls, swales, and a concrete headwall for twin 78" reinforced concrete pipes. Permanent and temporary impacts to the 100-year floodplain also result from construction of the multi-use trail. Very minor permanent impacts to the 100-year floodplain associated with Kane Brook are from two outfall structures.

The total Busway project will result in a fill within 100-year floodplains of 4,663 cubic yards and an excavation of 2,603 cubic yards, over an area of 1.32 acres. This will result in a net fill of 2,060 cubic yards. Almost all of the impacts are within the Piper Brook floodplain. Given the project's drainage improvements, which will improve drainage from developed properties surrounding the Busway, and the large size of the Piper Brook floodplain, the net effect of the project on flooding and flooding risks is not anticipated to be significant.

3.4.3 SCEL Impacts

Impacts to SCELs are shown on Table 3. Permanent impacts to SCELs associated with Bass Brook and Piper Brook tributaries are from the Busway and AAR roadways, associated cut and fill for side slopes, an access road turnaround, and the installation of preformed scour holes. There are permanent and temporary SCEL impacts from pipe-jacking of twin 78" reinforced concrete pipe culverts, construction of a concrete headwall and installation of an intermediate riprap outlet protection pad. The Busway project will result in a total net fill of approximately 4,086 cubic yards within SCELS.

3.4.4 Mitigation

Although there will be impacts within the 100-year floodplain and SCELs in the Busway project area, none have been identified as significant. Therefore, no mitigation is proposed.

3.5 Wildlife and Fish Habitat

3.5.1 Existing Conditions

The overall landscape of the railroad corridor is developed and urbanized, consisting of a mixture of commercial, industrial, and residential land uses. Due to their protected status and unfavorable development conditions, wetlands have often been left alone, therefore providing habitat refuges to fish and wildlife in the study area. Figures 1a through 1e depict the major habitat areas that remain within the project area. The following text describes these areas in greater detail.

Wildlife Habitat

Undeveloped natural upland areas within the project corridor are primarily small pieces of early-stage successional habitats that have developed within the last 50 years after clearing and abandonment. These areas primarily support either aggressive native pioneer species, or non-native invasive species. If these areas continue to be undisturbed, native upland vegetation may eventually become established if there is a proximal seed source and the conditions allow. In addition, residential properties offer some habitat to backyard wildlife through plantings and small patches of woods that are left undisturbed.

Areas that provide wildlife habitat are limited to portions of the corridor between Fairview Cemetery and just south of Newington Junction. From Newington Junction northward, the corridor is heavily urbanized in nature, and provides marginal, if any, wildlife habitat. The primary habitat areas, as identified by the Busway EIS and confirmed by the field work for the wetland delineation tasks, are the following:

- The most substantial areas of wildlife habitat available to wildlife in the project corridor are wetlands that have remained undeveloped and allowed to mature. Of these wetland areas, the most extensive intact fish and wildlife habitats in the project study areas are the riparian habitat and forested floodplain wetland associated with the Piper Brook system, which provide for small and large mammals, songbirds, and waterfowl in open water pockets, raptors, and common amphibians (green frogs, spring peepers) and reptiles (snapping turtle). No vernal pool obligate amphibian species were identified during the 2007 vernal pool survey provided in Appendix D of this attachment.
- The well-manicured Fairview and Saint Mary's cemeteries have limited wildlife habitat value. These open, quiet spaces have landscaped shrubs and a few trees that are primarily used by backyard wildlife such as songbirds, squirrel, mice, raccoon, skunk, and opossum. Some birds of prey may use the treetops for resting or as perches for hunting.
- Located between the Busway ROW and Lester Street, on the New Britain-Newington line, the southern portion of this site is a flat meadow with hardy grasses and scattered non-native shrubs. Further north, the meadow has been left to develop with a few trees and shrubs. This area offers some habitat for songbirds, grassland bird species, and small, burrowing mammals such as mice, voles, and snakes, which will be good food sources for larger predators (e.g., birds of prey, foxes, and coyote) that may occasionally occur.

- A disturbed, grass-shrub area is located between the northbound off-ramp of Route 9 and Cedar Street. It is a fairly flat, open, dry area with light-tolerant, hardy, mostly non-native grasses and shrubs. Ridges and bumps in the substrate indicate recent disturbance in the area. This area offers some habitat for songbirds, grassland bird species, and small, burrowing mammals such as mice, voles, and snakes, which will comprise a food source for larger predators (e.g., raptors, foxes, and coyote) that may frequent the area.
- The area located south of the Cedar Street overpass (CCSU property) is a wide, flat, open meadow with regions of frequent groundwater discharge. Dried herbaceous vegetation left from the previous growing season consists of tall grasses and hardy wildflower species such as goldenrod and Queen Anne's lace. Despite the evidence that all terrain vehicles or dirt bikes use the area, the area is potential habitat for songbirds, deer, turkey, small mammals, and predators that feed on these wildlife.

Fish Habitat

Fish habitat in the project area is restricted to major water bodies and stream courses. Surveys of Piper Brook by the CTDEP from 1987 to 1989 indicate that Piper Brook's fishery included blacknose dace, white sucker, fallfish, tessellated darter, rock bass, American eel, largemouth bass, fallfish, longnose dace, common shiner, and bluegill sunfish. No information was taken on Bass Brook, but the CTDEP Western Fisheries Division indicated that Bass Brook probably supports similar fish populations as Piper Brook, and that the Piper Brook Pond potentially supports lake-dwelling fish populations such as perch, sunfish, and bluegill.

Trout Brook is an east-flowing watercourse that crosses beneath the Amtrak ROW just north of New Britain Avenue. Historically, it probably supported a trout population, as its name suggests. The majority of the brook in the study area, however, has been channelized, leaving little habitat to support fish populations besides the rounded cobble of the streambed. Within the study area, both banks of the brook are adjacent to developed land uses, including a landfill-turned composting facility on the northeastern bank. For approximately 150 feet on the immediate west side of the existing rail bridge over the brook, the brook is constricted between two concrete retaining walls (flood control structure). Further upstream and downstream, the brook retains a narrow band of riparian vegetation consisting of grasses and low shrubs.

3.5.2 Wildlife and Fish Habitat Impacts

Due to the urbanized context of the Busway corridor, the project will not greatly reduce the amount of natural habitat in the study area. The rail corridor, where the alignment will be placed, is a rock-gravel berm structure that does not provide wildlife habitat. Almost all of the station sites are previously disturbed or developed lands. The two that are least developed, East Street and Cedar Street, contain or are adjacent to wetlands, and therefore have higher habitat values. Both sites, however, have been previously disturbed, are directly adjacent to heavily developed areas, and do not, in themselves, represent high quality habitat. Surface waters supporting fish habitats (Piper Brook, Trout Brook, Piper Brook Pond, and Bass Brook) are either beyond the limits of the project or not directly affected, so there will be no effects on fish populations or

communities. This assessment was confirmed by CTDEP Fisheries Division during a site inspection (see Report of Meeting in Appendix F.) The following provides a description of the potential impacts to the primary habitat areas, as identified above:

- Impacts to the patches of forest associated with the Piper Brook floodplain habitat areas are limited to narrow removal of vegetation directly adjacent to the Busway corridor, and will not bisect any of these patches.
- In the vicinity of Fairview and Saint Mary's cemeteries, the Busway will impact some vegetation adjacent to the ROW, however, there will be no negative impact to the habitat within the cemetery. The majority of the existing trees and shrubs adjacent to the Busway ROW in this area will remain.
- There will be very minor impacts to vegetation at the flat meadows located between the Busway ROW and Lester Street. This area, located to the south of the proposed Busway, is a meadow community, with a narrow band of edge habitat adjacent to the Busway ROW. The Busway will impact some of the trees, shrubs and herbaceous vegetation immediately adjacent to the Busway; however, the primary meadow community will not be negatively impacted.
- The disturbed grass-shrub area located between the northbound off-ramp of Route 9 and Cedar Street would remain relatively intact, with only minor impacts to shrubs, and some trees, adjacent to the Busway ROW. This will not have a negative impact on the habitat provided in this area.
- The disturbed area located south of the Cedar Street overpass (CCSU property) would also remain relatively intact, with only minor impacts to shrubs, and some trees, adjacent to the Busway ROW. This will not have a negative impact on the habitat provided in this area.

Any long, linear project raises issues of potential forest or habitat fragmentation. Although the Busway project is a long linear project, it will not result in forest fragmentation because it is an existing ROW and there are no large blocks of forest spanning the railroad corridor. The existing patches of contiguous forest are the red maple swamps of the Piper Brook system, which are all east of the proposed alignment. Impacts to these patches of forest are limited to narrow removal of vegetation directly adjacent to the Busway corridor, and will not bisect any of these patches.

The greatest possible adverse impact to natural resources from the implementation of the Busway is the restriction of wildlife movement across the rail ROW. The Busway will be a physical barrier to wildlife, since it incorporates walls and barriers on both sides. The extent of this impact on the distribution and abundance of wildlife is expected to be minor since connections between the sides of the tracks have already been disrupted. It is likely that most existing wildlife movement is parallel to the Busway along the major stream corridors (e.g., Piper Brook floodplain corridor), rather than across the Busway corridor.

In the northern corridor segment (West Hartford and Hartford), due to the intensity of development, there are no discernable habitat blocks between which wildlife may be moving. In the southern corridor segment (Newington and New Britain), the substantial habitats are the Piper Brook wetlands and vacant lands to the east of the abandoned rail corridor. There is very little remaining potential habitat west of the rail corridor, although the several tributary streams might provide some habitat and cover for wildlife

movement. Given the level of development and the already fragmented habitats throughout the Route 9 and Fenn Road area, it is unlikely that there are any notable east-west wildlife movements at ground level. Other than common urban songbirds, no sign of wildlife was noted along the Busway during the numerous visits for wetland investigations. Therefore, the Busway project is not expected to impede wildlife movements.

3.5.3 Mitigation

No mitigation measures relative to fish habitat are proposed. Minor impacts to wildlife habitat associated with wetland impacts will be mitigated through the project's wetland mitigation plan (see Attachment L).

4.0 REFERENCES

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USACE (United States Army Corps of Engineers). 1993. The Highway Methodology Workbook: Integrating Corps Section 404 Permit Requirements with Highway Planning and Engineering and the NEPA EIS Process. New England Division. Publication no. NEDEP-360-1-30. October 1993. 28 pp.

USACE 1999. Highway Methodology Workbook Supplement: Wetland Functions and Values - A Descriptive Approach. New England Division. Publication no. NAEEP-360-1-30a. November 1995. 32 pp.

USACE. 2007. Addendum to New England District Compensatory Mitigation Guidance: Compensation for Impacted Aquatic Resource Functions. December 18, 2007. NAE-2006-3648.

New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain
State Project No. 171-305

ATTACHMENT K: ENVIRONMENTAL REPORT

APPENDIX - WETLAND DOCUMENTATION

Maps of Wetland Transect Locations

USACE Transect Forms

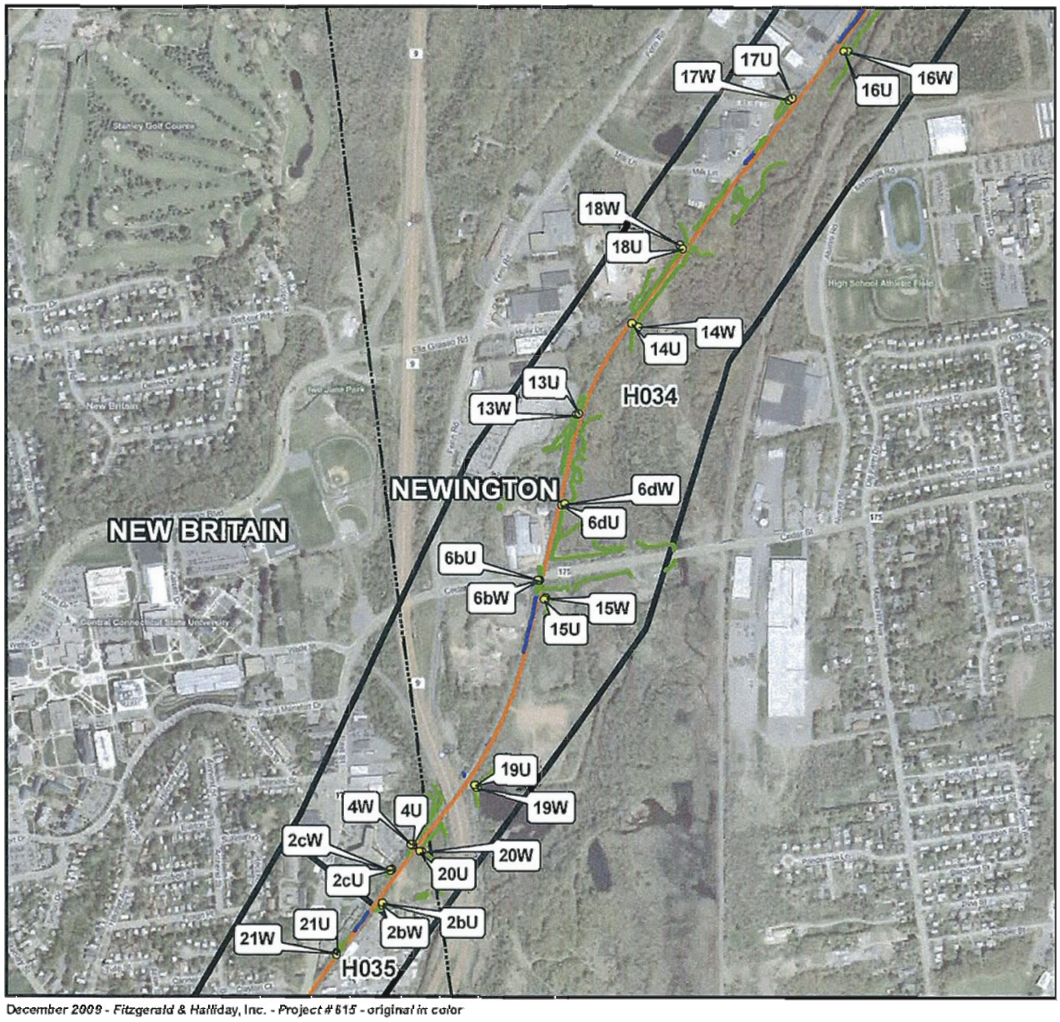
Federal/State Wetland Function-Value Assessment Forms

Vernal Pool Survey

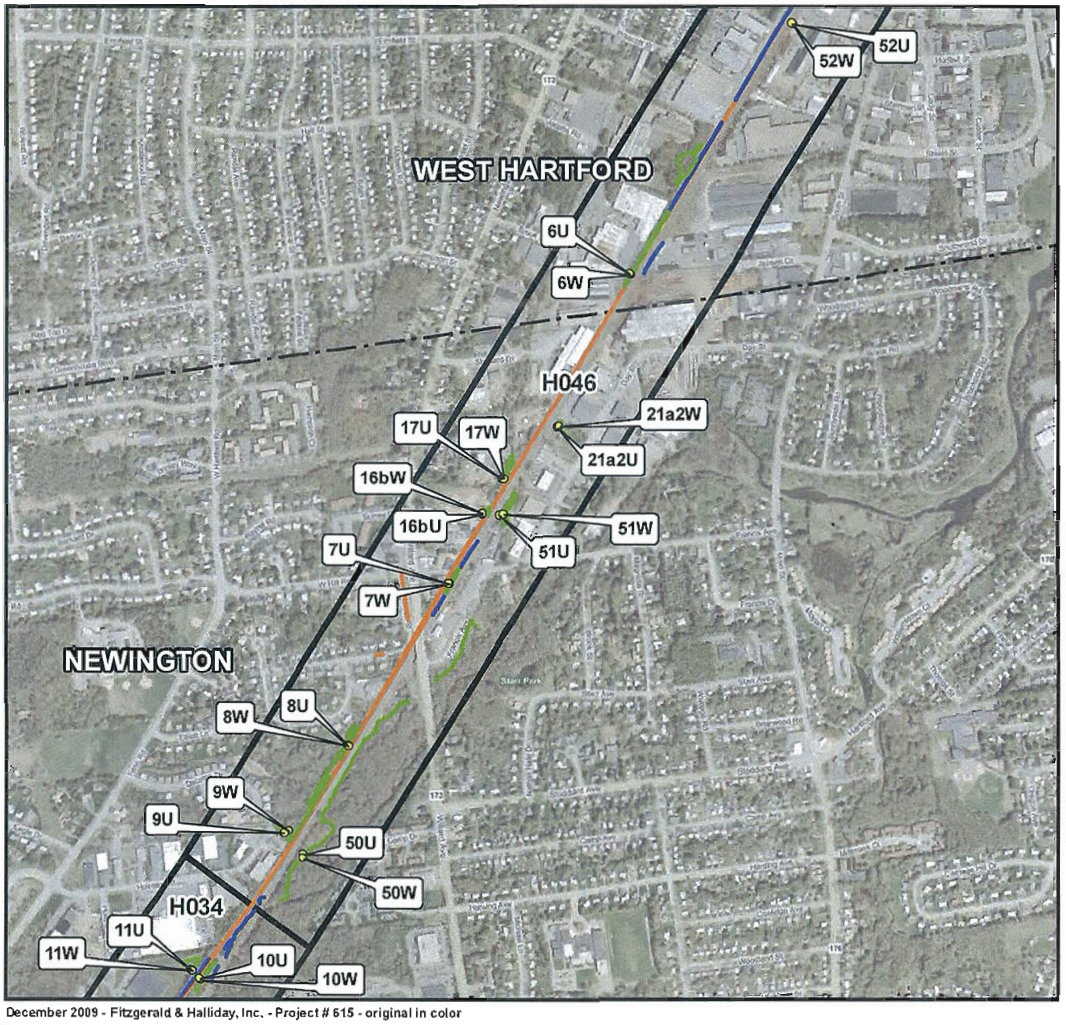
State Wetland Function-Value (F-V) Assessment Forms

Intermittent Watercourse (IWC) F-V Assessment Forms

APPENDIX A – MAPS OF TRANSECT LOCATIONS



December 2009 - Fitzgerald & Halliday, Inc. - Project # 615 - original in color



- Transect Locations
- Delineated Wetlands
- Delineated IWCs
- Project Baseline
- Busway Contract Areas

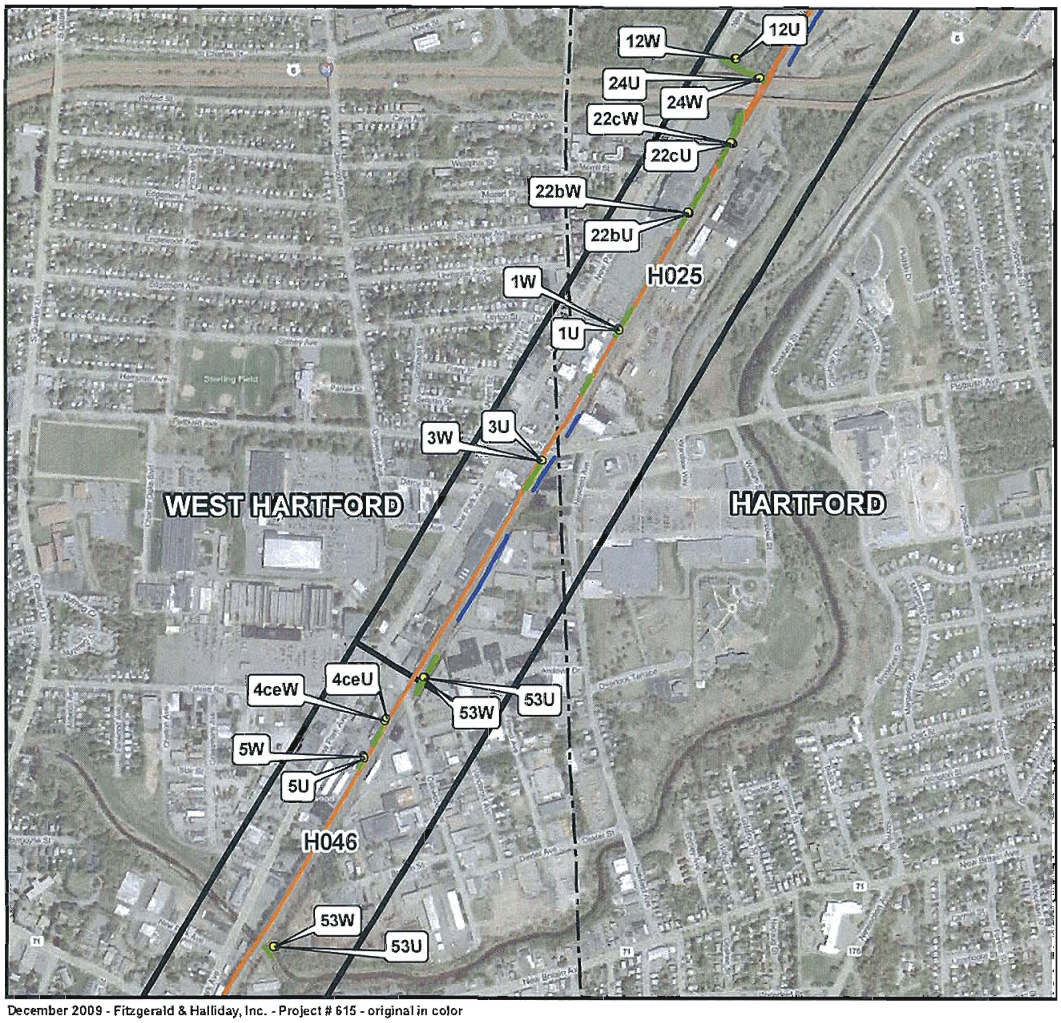
0 750 1,500

Feet

Wetland Transect Locations
Central Transects

New Britain Hartford Busway
State Project # 171-305

December 2009 - Fitzgerald & Halliday, Inc. - Project # 615 - original in color



Transect Locations
Delineated Wetlands
Delineated IWCs
Project Baseline
Busway Contract Areas

0 750 1,500
Feet

Wetland Transect Locations
Northern Transects

New Britain Hartford Busway
State Project # 171-305

December 2009 - Fitzgerald & Halliday, Inc. - Project # 615 - original in color

APPENDIX B – USACE TRANSECTS

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 1 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 22

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Rhus typhina	10.5/10.5	100%	NI (UPL)
Herbs	Juncus effusus	38/48.5	78%	FACW+
	Phragmites australis	10.5/48.5	22%	FACW

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	2	0	0	0	0	1

Hydrophytes SUBTOTAL: 2 NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 2/3 = 67%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

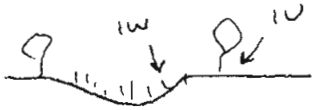
- ☐ RECORDED DATA
  - Stream, lake or tidal gage — Identification: _____
  - Aerial Photograph — Identification: _____
  - Other — Identification: _____
- ☒ NO RECORDED DATA
- ☐ OBSERVATIONS:

Depth to Free Water: 0"
Depth to Saturation (including capillary fringe): 0"
Describe Altered Hydrology:

☒ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	A	10YR 2/1		gravelly sandy fill, saturated

HYDRIC SOIL INDICATOR(S) IV.

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

ITCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

CENED-CO-RANmjt Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 1 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 1 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 22

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Herbs	Andropogon Scoparius	3/23.5	—	—
	Grasses	20.5/23.5	87%	— UPL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	0	0	0	0	1

Hydrophytes SUBTOTAL: 0 NON-hydrophytes SUBTOTAL: 1

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 0/1 = 0\%$$

HYDROLOGY
1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	A	10YR 3/2		gravelly sandy fill

HYDRIC SOIL INDICATOR(S) REFERENCE:

OPTIONAL SOIL DATA: REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

ITCHS HYDRIC SOIL CRITERION:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No		Yes	No
Greater than 50% Hydrophytes?	☐	☒	IS THIS DATAPOINT WITHIN A WETLAND?	☐	☒
Hydric Soils Criterion Met?	☐	☒	REMARKS:		
Wetland Hydrology Met?	☐	☒			

ENED-CO-RA/WRA Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 1 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 3 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 21

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Elaeagnus angustifolia	10.5/16.5	64.1.	FACU
Herbs	Typha latifolia	38/38	100.1.	OBL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
1	0	0	0	0	1	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 1/2 = 50.1.

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- ☒ Other — Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 0"

Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☒ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18	A	10YR2/1	oxidized rhizospheres	gravelly sand, fill, saturated

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

ITCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS: Disturbed ditch, hydrophytes dominant in ditch.

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 3 PLOT: 1W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 3 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 21

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Elaeagnus angustifolia	10.5/10.5	100%	FACU
Herbs	Andropogon scoparius	3/9	33%	NI (UPL)
	Solidago sp.	3/9	33%	—
	Oenothera biennis	3/9	33%	NI (UPL)

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	0	0	0	1	2

Hydrophytes SUBTOTAL: 0 NON-hydrophytes SUBTOTAL: 3

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 0/3 = 0%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe): 0"
Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	A	10YR 2/1		gravelly sand, fill, saturated

HYDRIC SOIL INDICATOR(S) REFERENCE:

OPTIONAL SOIL DATA: REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

CENED-OD-RA/mrp Version 1AUG80 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 3 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 4 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 20

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Salix discolor	10.5/10.5	100%	FACW
Herbs	Juncus effusus	38/69	55%	FACW+
	Carex sp.	20.5/69	30%	OBL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
1	2	0	0	0	0	0

Hydrophytes SUBTOTAL: 3 NON-hydrophytes SUBTOTAL: 0

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 3/3 = 100\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 0"

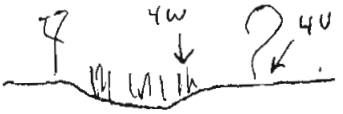
Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☒ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-6	C1	10YR4/4		Sand, Saturated
6-18	C2	10YR2/1		gravelly sand, fill

HYDRIC SOIL INDICATOR(S): TV

REFERENCE:

OPTIONAL SOIL DATA:

REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

TCHS HYDRIC SOIL CRITERION:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 4 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 4 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 20

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Cornus amomum	85.5/88.5	97%	FACW
Herbs	Rudbeckia Serotina	10.5/48.5	22%	FACU-
	Daucus Carota	38/48.5	78%	NI (UPL)

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	1	0	0	0	1	1

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 2

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 1/3 = 33%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18	C1	10YR2/1		gravelly sand, fill

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

ITCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 4 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 5 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 19

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Saplings	Populus tremuloides	38/38	100%	FACU
Shrubs	Populus tremuloids	3/6	50%	FACU
	Cornus amomum	3/6	50%	FACW
Herbs	Typha latifolia	38/41	93%	OBL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

1 OBL	1 FACW	0 FAC	0 *OTHER HYDROPHYTES	0 FAC-	2 FACU	0 UPL

Hydrophytes SUBTOTAL: 2 NON-hydrophytes SUBTOTAL: 2

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 2/4 = 50%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 0"

Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☒ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18	Cg	10YR5/1	mottles, many	silt loam, saturated

HYDRIC SOIL INDICATOR(S) IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS: Disturbed swale with stagnant water, blocked drainage.

CENED-OD-RAN/Rpt Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 5 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 5 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 19

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Saplings	Betula populifolia	3/41	7%	—
	Populus tremuloides	38/41	93%	FACU
Shrubs	Betula populifolia	10.5/10.5	100%	FAC
				—
Herbs	Solidago sp.	98/98	100%	

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	1	0	0	1	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 1/2 = 50%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☑ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	10YR2/1		gravelly Sand, fill

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

CENED-CO-RANmpl Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 5 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 6 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 18

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Saplings	Acer rubrum	20.5/31	66%	FAC
	Sassafras albidum	10.5/31	34%	FACU-
Shrubs	Juniperus virginia	3/3	100%	FACU
Herbs	Scirpus cyperinus	38/48.5	78%	OBL
	Juncus effusus	10.5/48.5	22%	FACW+

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
1	1	1	0	0	2	0

Hydrophytes SUBTOTAL: 3 NON-hydrophytes SUBTOTAL: 2

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 3/5 = 60\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 0"

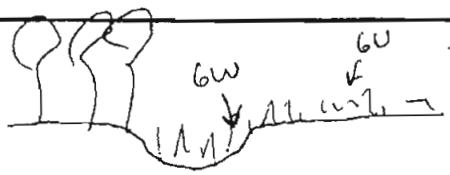
Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☒ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	7.5YR 4/3		gravelly sand, saturated

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

TCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 6 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 6 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 18

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Saplings	Sassafras albidum	10.5/21	50%	FACU-
	Acer rubrum	10.5/21	50%	FAC
Herbs	Solidago sp.	3/6	50%	-
	Andropogon scoparius	3/6	50%	FACU-

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	1	0	0	2	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 2

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 1/3 = 33%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	–	–	rip-rap fill

HYDRIC SOIL INDICATOR(S) REFERENCE:

OPTIONAL SOIL DATA: REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

CENED-CD-RA\Hmjs Version 1AUG85 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 6 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 7 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 16

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Quercus rubra	867.4/867.4	100%	FACU-
Shrubs	Cornus amomum	10.5/10.5	100%	FACW
Herbs	Lythrum salicaria	38/41	93%	FACW+

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	2	0	0	0	1	0

Hydrophytes SUBTOTAL: 2 NON-hydrophytes SUBTOTAL: 1

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 2/3 = 67\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

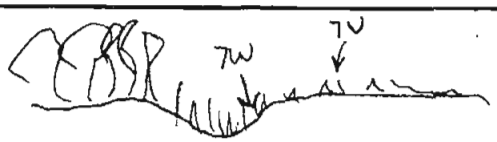
Depth to Free Water: 0"
Depth to Saturation (including capillary fringe): 0"
Describe Altered Hydrology:

☒ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

CENED-OD-RA/Wet Version 1AUG95 Page 1

SOIL	Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	10YR2/1		gravelly sand, fill, saturated

HYDRIC SOIL INDICATOR(S) IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

CENED-CO-RAN/mjs Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 7 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 7 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 16

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Herbs	Lythrum salicaria	3/3	100%	FACW+

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	1	0	0	0	0	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 0

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 1/1 = 100%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:

Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18	C	2.5Y 4/3		gravelly sand, saturated, fill

YDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

AXONOMIC SUBGROUP :

OIL DRAINAGE CLASS:

EPTH TO ACTIVE WATER TABLE:

TCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

ONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS: Located outside of Swale

ENED-00-RAN/mjs Version 1/4/98 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 7 PLOT: 11

PROJECT TITLE: New Britain - Hartford Busway | TRANSECT: B | PLOT: W

DELINEATOR(S): E.M. Pawlak | DATE: 3/27/03 | Wetland 15

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Acer rubrum	285.4/977.2	29%	~~FAC~~
	Populus deltoides	668/977.2	68%	~~FAC~~
Saplings	Acer rubrum	10.5/10.5	100%	~~FAC~~
Shrubs	Rosa multiflora	38/38	100%	~~FACU~~

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	3	0	0	1	0

Hydrophytes SUBTOTAL: 3 | NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 3/4 = 75%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

- ☐ RECORDED DATA
  - Stream, lake or tidal gage — Identification:
  - Aerial Photograph — Identification:
  - Other — Identification:
- ☒ NO RECORDED DATA
- ☐ OBSERVATIONS:

Depth to Free Water: 0"

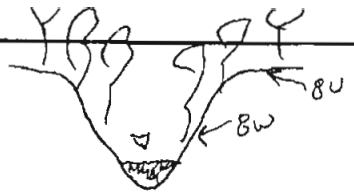
Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☒ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-4	A	10YR2/1		fine sandy loam, saturated
4-10	B	5YR4/4		fine sandy loam, saturated
10-18	C	5YR3/2		fine sandy loam, saturated

HYDRIC SOIL INDICATOR(S) IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

CENED-OD-RAN/mjs Version 1AUG98 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 8 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway | TRANSECT: B | PLOT: U

DELINEATOR(S): E.M. Pawlak | DATE: 3/27/03 | Wetland 15

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Populus deltoides	1012.7/1321.9	77%	FAC
	Acer rubrum	285.4/1321.9	22%	FAC
Saplings	Acer rubrum	10.5/10.5	100%	FAC
Shrubs	Rosa multiflora	10.5/40	26%	FACU
	Pyrus malus	20.5/40	51%	NI (UPL)

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	3	0	0	1	1

Hydrophytes SUBTOTAL: 3

NON-hydrophytes SUBTOTAL: 2

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 3/5 = 50%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:

Depth to Saturation (including capillary fringe):

Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	5YR4/3		silt loam, fill

HYDRIC SOIL INDICATOR(S) REFERENCE:

OPTIONAL SOIL DATA: REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No		Yes	No
Greater than 50% Hydrophytes?	☐	☒	IS THIS DATAPOINT WITHIN A WETLAND?	☐	☒
Hydric Soils Criterion Met?	☐	☒	REMARKS:		
Wetland Hydrology Met?	☐	☒			

CENED-CO-RAnnqs Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 8 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 9 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 14

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Quercus alba	683.5/1673.3	41%	FACU
	Carya ovata	989.8/1673.3	59%	FACU
Shrubs	Cornus amomum	10.5/31	34%	FACW
	Rosa multiflora	20.5/31	66%	FACU
Herbs	Symplocarpus foetidus	10.5/13.5	78%	OBL
	Impatiens capensis	3/13.5	22%	FACW

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
1	2	0	0	0	3	0

Hydrophytes SUBTOTAL: 3 NON-hydrophytes SUBTOTAL: 3

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 3/6 = 50\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 0"

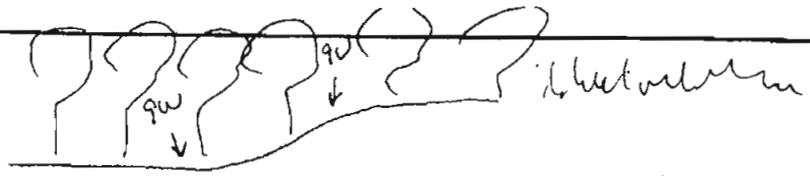
Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☒ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-12"	A	10YR2/1		fine sandy loam, saturated
12-18"	C	7.5YR3/2		fine sandy loam, saturated

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

TCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 9 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 9 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 14

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Carya ovata	1673.3/2356.8	71%	FACU
	Quercus alba	683.5/2356.8	29%	FACU
Saplings	Carya ovata	3/3	100%	FACU
Shrubs	Acer rubrum	10.5/19.5	54%	FAC

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	1	0	0	3	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 3

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 1/4 = 25\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-3"	A	10YR2/1		fine sandy loam
3-18"	B	5YR4/4		fine sandy loam

HYDRIC SOIL INDICATOR(S) REFERENCE:

OPTIONAL SOIL DATA: REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

TCHS HYDRIC SOIL CRITERION:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No		Yes	No
Greater than 50% Hydrophytes?	☐	☒	IS THIS DATAPOINT WITHIN A WETLAND?	☐	☒
Hydric Soils Criterion Met?	☐	☒	REMARKS:		
Wetland Hydrology Met?	☐	☒			

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 9 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 10 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 12

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Quercus palustris	437.3/986.9	44%	FACW
	Prunus serotina	213.7/986.9	22%	FACU
	Acer rubrum	311.7/986.9	32%	FAC
Saplings	Prunus serotina	3/6	50%	FACU
	Betula populifolia	3/6	50%	FAC
Shrubs	Rhamnus frangula	3/3	100%	FAC
Herbs	Osmunda cinnamomea	3/3	100%	FACW

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	2	3	0	0	2	0

Hydrophytes SUBTOTAL: 5 NON-hydrophytes SUBTOTAL: 7

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 5/7 = 71\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 0"

Depth to Saturation (including capillary fringe): 0"

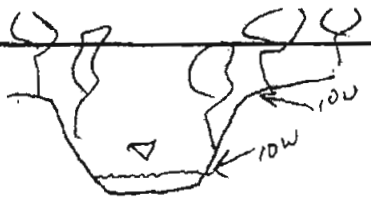
Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL

Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-9"	A	10YR2/1		fine Sandy loam, Saturated
9-18"	C	5YR4/4		fine Sandy loam, Saturated

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 10 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 10 PLOT: 0

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 12

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Quercus palustris	398.5/540.8	74.1%	FACW
Saplings	Prunus serotina	3/6	50%	FACU
	Betula populifolia	3/6	50%	FAC
Shrubs	Rhamnus frangula	3/9	33.1%	FAC
	Fraxinus americana	3/9	33.1%	FACU
	Viburnum prunifolium	3/9	33.1%	FACW
Herbs	grasses	10.5/10.5	100.1%	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	2	2	0	0	2	0

Hydrophytes SUBTOTAL: 4 NON-hydrophytes SUBTOTAL: 2

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 4/6 = 67.1%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification: _____
- Aerial Photograph — Identification: _____
- Other — Identification: _____

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: _____
Depth to Saturation (including capillary fringe): _____
Describe Altered Hydrology: _____

☐ Inundated ☐ Saturated in upper 12 Inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-9"	A	10YR 2/1		Sand, fill
9-18"	C	5YR 4/4		Sand, fill

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 10 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 11 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 13

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
	Herbs Typha latifolia	38/38	100%	OBL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
1	0	0	0	0	0	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 0

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 1/1 = 100\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 0"

Depth to Saturation (including capillary fringe): 0"

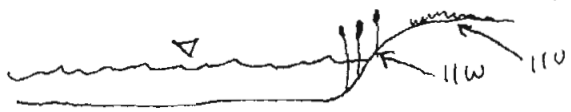
Describe Altered Hydrology:

☒ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL

Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	5YR4/2		fine sandy loam, saturated

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 11 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 11 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 13

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Herbs	lawn grass	98/98	100%	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	0	0	0	0	1

Hydrophytes SUBTOTAL: _____ NON-hydrophytes SUBTOTAL: _____

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 0/1 = 0.0

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification: _____
- Aerial Photograph — Identification: _____
- Other — Identification: _____

☑ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: _____
Depth to Saturation (including capillary fringe): _____
Describe Altered Hydrology: _____

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	5YR 4/3		fine sandy loam, fill

HYDRIC SOIL INDICATOR(S) | REFERENCE:

OPTIONAL SOIL DATA: | REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

ITCHS HYDRIC SOIL CRITERION:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway | TRANSECT: 11 | PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 12 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 25

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
	Herbs Lythrum Salicaria	98/98	100%	FACW+

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	1	0	0	0	0	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 0

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 1/1 = 100\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 0"

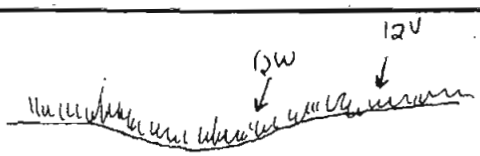
Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-6"	C1	10YR 3/1		gravelly fine sandy loam, fill, saturated
6-18"	C2	5YR 4/3		gravelly fine sandy loam, fill, saturated

HYDRIC SOIL INDICATOR(S) IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

ITCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

ENED-CD-RAN/mg Version 1AUG86 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 12 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 12 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 3/27/03 Wetland 25

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Hyla	lawn grasses	98/98	100%	UPL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	0	0	0	0	1

Hydrophytes SUBTOTAL: 0 NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 0/1 = 0%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☑ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	10YR3/1		gravelly fine sandy loam, fill

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

ITCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 12 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 13 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 5/14/03 Wetland 8

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Salix nigra	10.5/10.5	100%	FACW+
Herbs	Lythrum salicaria	98/129	76%	FACW+

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	2	0	0	0	0	0

Hydrophytes SUBTOTAL: 2 NON-hydrophytes SUBTOTAL: 0

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 2/2 = 100\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

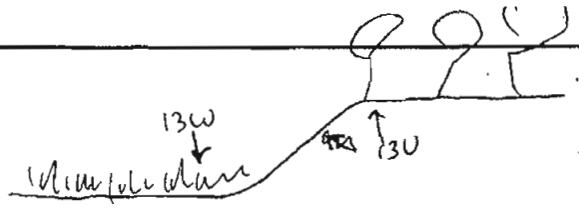
☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☒ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-12"	A	7.5YR4/3		silt loam
12-18"	B	7.5YR 4/4		silt loam

HYDRIC SOIL INDICATOR(S) IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

CENED-CO-RAN/hgs Version 1AUG85 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 13 PLOT: W

PROJECT TITLE: New Britain.-Hartford Busway TRANSECT: 13 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/14/03 Wetland B

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Carya ovata	103.9/103.9	100.1.	FACU
Shrubs	Cornus amomum	20.5/44	47.1.	FACW
	Rhamnus frangula	20.5/44	47.1.	FAC
Herbs	Solidago sp.	38/38	100%	—
Vines	Clematis virginiana	20.5/20.5	100.1.	FAC

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	1	2	0	0	1	0

Hydrophytes SUBTOTAL: 3 NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 3/4 = 75.1.

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- ☑ Other — Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-12"	A	7.5YR4/3		silt loam
12-18"	B	7.5YR4/4		silt loam

HYDRIC SOIL INDICATOR(S) REFERENCE:

OPTIONAL SOIL DATA: REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

CENED-CO-RANRM Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 13 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 14 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 7

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Acer rubrum	175.3/422.3	42%	FAC
	Quercus palustris	247/422.3	58%	FACW
Saplings	Acer rubrum	38/38	100%	FAC
Shrubs	Lindera benzoin	63/73.5	86%	FACW
Herbs	Symplocarpus foetidus	38/41	93%	OBL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
1	2	2	0	0	0	0

Hydrophytes SUBTOTAL: 5 NON-hydrophytes SUBTOTAL: 0

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 5/5 = 100\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 6"

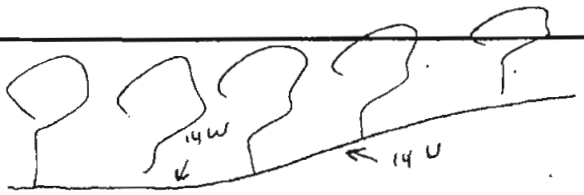
Depth to Saturation (including capillary fringe):

Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☒ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-12"	A	7.5YR 2/1		fine sandy loam
12-18"+	B	5YR 4/4		fine sandy loam

HYDRIC SOIL INDICATOR(S) IV

REFERENCE:

OPTIONAL SOIL DATA:

REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

CENED-OD-RAN/mjt Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 14 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 14 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Quercus palustris	437.7/699.8	62%	FACW
	Acer rubrum	190.7/699.8	27%	FAC
Saplings	Fagus grandifolia	10.5/21	50%	FACU
	Quercus rubra	10.5/21	50%	FACU-
Shrubs	Prunus serotina	10.5/24	44%	FACU
	Rhamnus frangula	10.5/24	44%	FAC
Herbs	Maianthemum canadense	63/83.5	75%	FAC
	Prunus serotina	20.5/83.5	25%	FAC

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	1	4	0	0	3	0

Hydrophytes SUBTOTAL: 5 NON-hydrophytes SUBTOTAL: 3

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 5/8 = 63\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-3"	A	7.5YR3/1		fine sandy loam
3-18"	B	5YR4/4		fine sandy loam

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 14 PLOT: U

PROJECT TITLE: New Britain.-Hartford Busway TRANSECT: 15 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 5/14/03 Wetland 6

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Rosa multiflora	10.5/21	50%	FACU
	Cornus foemina	10.5/21	50%	~~FAC~~
Herbs	Grasses	98/129	76%	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	1	0	0	1	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 1/2 = 50%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☐ NO RECORDED DATA

☐ OBSERVATIONS:

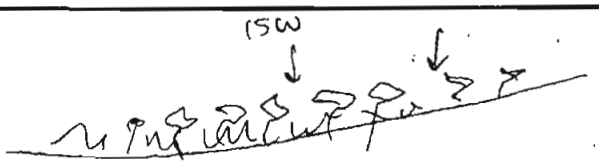
Depth to Free Water: 1"
Depth to Saturation (including capillary fringe): 0"
Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☒ Drainage Patterns within Wetland

☐ OTHER (explain):

156

SOIL | Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	B	5YR4/3		fine sandy loam, saturated

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☑
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 15 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 15 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/14/03 Wetland 6

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Rosa multiflora	20.5/31	66%	FACU
	Cornus amomum	10.5/31	34%	FACW
Herbs	grasses	98/118.5	83%	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	1	0	0	0	1	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 1

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 1/2 = 50\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: >18"

Depth to Saturation (including capillary fringe):

Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-16	A	7.5YR3/2		fine Sandy loam
16-18"	B	7.5YR 4/4		fine Sandy loam

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 15 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 16 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 7

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Acer rubrum	388.6/947	41%	FAC
	Ulmus americana	240.5/947	25%	FACW-
	Quercus alba	317.9/947	34%	FACU
Shrubs	Lindera benzoin	20.5/20.5	100%	FACW
Herbs	Symplocarpus foetidus	98/110.5	90%	OBL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
1	2	1	0	0	1	0

Hydrophytes SUBTOTAL: 4 NON-hydrophytes SUBTOTAL: 1

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 4/5 = 80\%$$

HYDROLOGY
1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
Stream, lake or tidal gage Identification:
Aerial Photograph Identification:
Other Identification:

☒ NO RECORDED DATA

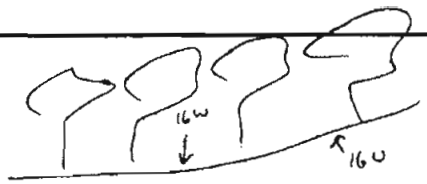
☐ OBSERVATIONS:

Depth to Free Water: 0"
Depth to Saturation (including capillary fringe): 0"
Describe Altered Hydrology:

☒ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	O	10YR 2/1		muck; Saturated

HYDRIC SOIL INDICATOR(S): III A.

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 16 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 16 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 7

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Quercus alba	1682.1/1904.5	88%	FACU
Saplings	Betula lenta	20.5/20.5	100%	FACU
Shrubs	Betula lenta	20.5/23.5	87%	FACU
Herbs	Acer Saccharum	38/76	50%	FACU
	Erythronium americanum	38/76	50%	FAC

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	1	0	0	5	0

Hydrophytes SUBTOTAL: 1 NON-hydrophytes SUBTOTAL: 5

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 1/6 = 17\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-4"	A	5YR 2.5/1		fine sandy loam
4-18"	B	5YR 5/4		fine sandy loam

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 16 PLOT: U

ROJECT TITLE: New Britain - Hertford Busway TRANSECT: 17 PLOT: W

ELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 11

EGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Herbs	Typha latifolia	38/79	48%	OBL
	Juncus effusus	20.5/79	26%	FACW+
	Eleocharis sp.	20.5/79	26%	OBL

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

TE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
2	1	0	0	0	0	0

Hydrophytes SUBTOTAL: 3 NON-hydrophytes SUBTOTAL: 0

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 3/3 = 100\%$$

HYDROLOGY
1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

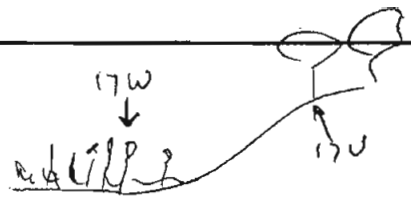
☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☒ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	5YR 4/4		fine sandy loam, moist

HYDRIC SOIL INDICATOR(S) IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

CENED-OD-RA/mjs Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 17 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 17 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Prunus serotina	103.9/318.4	33%	FACU
	Quercus rubra	166.9/318.4	52%	FACU-
Saplings	Carya ovata	10.5/24	44%	FACU
	Quercus rubra	10.5/24	44%	
Shrubs	Prunus serotina	20.5/20.5	100%	FACU
Herbs	Erythronium americanum	20.5/41	50%	FACU-
	Smilacina racemosa	20.5/41	50%	FACU-

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	0	0	0	6	0

Hydrophytes SUBTOTAL: 0 NON-hydrophytes SUBTOTAL: 6

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 0/6 = 0\%$$

HYDROLOGY
1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-12"	A	7.5YR 2.5/2		fine sandy loam
12-18"	B	7.5YR 4/4		fine sandy loam

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 17 PLOT: U

ROJECT TITLE: New Britain - Hartford Busway TRANSECT: 18 PLOT: W

ELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 9

EGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Acer rubrum	368.9/368.9	100%	FAC
Saplings	Carpinus Caroliniana	20.5/52	39%	FAC
	Fagus grandifolia	10.5/52	20%	FACU
	Acer rubrum	10.5/52	20%	FAC
	Ostrya virginiana	10.5/52	20%	NI(UPL)
Shrubs	Carya ovata	10.5/10.5	100%	FACU
Herbs	Symplocarpus fostidus	20.5/79	26%	OBL
	Erythronium americanum	38/79	48%	FAC
	Onoclea sensibilis	20.5/79	26%	FACW

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

OTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
1	1	4	0	0	2	1

Hydrophytes SUBTOTAL: _____ NON-hydrophytes SUBTOTAL: _____

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 6/9 = 67\%$$

HYDROLOGY
1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification: _____
- Aerial Photograph Identification: _____
- Other Identification: _____

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 9"

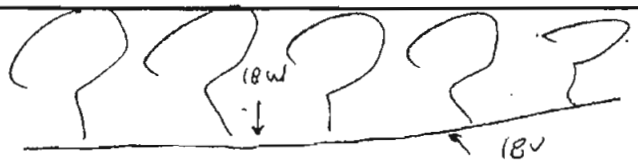
Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-9"	A	7.5YR 4/2		fine sandy loam, saturated
9-18"+	B	7.5YR 4/4		fine sandy loam, saturated

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	X	
Hydric Soils Criterion Met?	X	
Wetland Hydrology Met?	X	

IS THIS DATAPOINT WITHIN A WETLAND? Yes X No

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 10 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 1B PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 9

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Acer rubrum	473.9/518.1	91.1%	FAC
Saplings	Acer rubrum	10.5/34.5	30.1%	FAC
	Prunus serotina	3/34.5	9.1%	—
	Carya ovata	10.5/34.5	30.1%	FACU
	Carpinus caroliniana	10.5/34.5	30.1%	FAC
Shrubs	Ilex verticillata	38/38	100.0%	FACW+
Herbs	Impatiens capensis	3/6	100.0%	FACW
	Eutrochium purpureum	3/6	100.0%	FAC

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	2	4	0	0	1	0

Hydrophytes SUBTOTAL: 6 NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 6/7 = 86.1%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification: _____
- Aerial Photograph Identification: _____
- Other Identification: _____

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: _____
Depth to Saturation (including capillary fringe): _____
Describe Altered Hydrology: _____

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-9"	A	5YR 4/3		fine sandy loam, moist
9-18"+	B	5YR 4/6		fine sandy loam, moist

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

ITCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

CENED-CO-RAN/mt Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 18 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 19 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 5

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Salix nigra	231.6/755.4	91%	FACW+
Saplings	Acer saccharinum	20.5/31	66%	FACW
	Populus deltoides	10.5/31	34%	FAC
Shrubs	Acer saccharinum	10.5/31	34%	FACW
	Salix nigra	20.5/31	66%	FACW+
Herbs	Lythrum salicaria	38/61.5	62%	FACW+
	Equisetum sp.	20.5/61.5	33%	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	5	1	0	0	0	0

Hydrophytes SUBTOTAL: 6 NON-hydrophytes SUBTOTAL: 0

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 6/6 = 100\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 0"

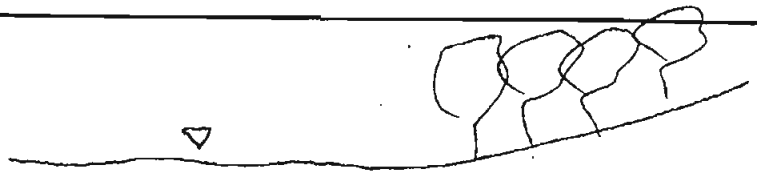
Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☒ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☒ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	5YR 4/4		fine sandy loam, stratified

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 19 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 19 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 5

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Salix nigra	231.6/279.2	83%	FACW+
		38/69.5	55%	FACW
Saplings	Acer saccharinum	10.5/10.5	100%	FACW
Shrubs	Cornus amomum	10.5/13.5	78%	FAC
Herbs	Toxicodendron radicans	3/13.5	22%	—
	Equisetum sp.			

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	3	1	0	0	0	0

Hydrophytes SUBTOTAL: 4 NON-hydrophytes SUBTOTAL: 0

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 4/4 = 100%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-3"	A	2.5YR 3/2		fine sandy loam
3-18"	C	2.5YR 4/4		fine sandy loam

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

TCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 19 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway | TRANSECT: 19 | PLOT: W

DELINEATOR(S): E.M. Pawlak | DATE: 5/16/03 | Wetland 5

VEGETATION Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees: Salix nigra	231.6/255.4	91%	FACW+
Saplings: Acer Saccharinum	20.5/31	66%	FACW
Saplings: Populus deltoides	10.5/31	34%	FAC
Shrubs: Acer Saccharinum	10.5/31	34%	FACW
Shrubs: Salix nigra	20.5/31	66%	FACW+
Herbs: Lythrum Salicaria	38/61.5	62%	FACW+
Herbs: Equisetum sp.	20.5/61.5	33%	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	5	1	0	0	0	0

Hydrophytes SUBTOTAL: 6 | NON-hydrophytes SUBTOTAL: 6

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 6/6 = 100%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

- ☐ RECORDED DATA
  - Stream, lake or tidal gage — Identification:
  - Aerial Photograph — Identification:
  - Other — Identification:
- ☒ NO RECORDED DATA
- ☐ OBSERVATIONS:

Depth to Free Water: 0"

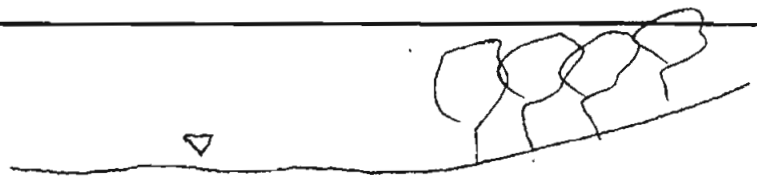
Depth to Saturation (including capillary fringe): 0"

Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☒ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☒ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	5YR 4/4		fine sandy loam, Stratified

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	X	
Hydric Soils Criterion Met?	X	
Wetland Hydrology Met?	X	

IS THIS DATAPOINT WITHIN A WETLAND? Yes X No

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 19 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 19 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 5

VEGETATION — Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees Salix nigra	231.6/279.2	83%	FACW+
Saplings Acer saccharinum	38/69.5	55%	FACW
Shrubs Cornus amomum	10.5/10.5	100%	FACW
Forbs Toxicodendron radicans	10.5/13.5	78%	FAC
Equisetum sp.	3/13.5	22%	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	3	1	0	0	0	0

Hydrophytes SUBTOTAL: 4 NON-hydrophytes SUBTOTAL: 0

100 x Subtotal Hydrophytes / (Subtotal Hydrophytes + Subtotal Non-hydrophytes) = PERCENT HYDROPHYTES = 4/4 = 100%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification: _____
- Aerial Photograph — Identification: _____
- Other — Identification: _____

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: _____
Depth to Saturation (including capillary fringe): _____
Describe Altered Hydrology: _____

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain): _____

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-3"	A	2.5YR 3/2		fine sandy loam
3-18"	C	2.5YR 4/4		fine sandy loam

HYDRIC SOIL INDICATOR(S) REFERENCE:

OPTIONAL SOIL DATA: REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

TCHS HYDRIC SOIL CRITERION:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No		Yes	No
Greater than 50% Hydrophytes?	X		IS THIS DATAPOINT WITHIN A WETLAND?		X
Hydric Soils Criterion Met?		X	REMARKS:		
Wetland Hydrology Met?		X			

ENED-CO-RA/Wpd Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 19 PLOT: U

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 20 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 3

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Acer rubrum	10.5/19.5	54%	FAC
Herbs	Carex vulpinoidea	38/96.5	39%	OBL
	Juncus effusus	20.5/96.5	21%	FACW+
	Grasses	38/96.5	39%	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
1	1	1	0	0	0	0

Hydrophytes SUBTOTAL: 3 NON-hydrophytes SUBTOTAL: 0

$$\frac{100 \times \text{Subtotal Hydrophytes}}{\text{Subtotal Hydrophytes} + \text{Subtotal Non-hydrophytes}} = \text{PERCENT HYDROPHYTES} = 3/3 = 100\%$$

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification:
- Aerial Photograph Identification:
- Other Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: 12"

Depth to Saturation (including capillary fringe):

Describe Altered Hydrology:

☐ Inundated ☒ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-9"	A	2.5YR 2.5/2		fine Sandy loam
9-18"	B	2.5YR 4/4	faint mottles	fine Sandy loam

HYDRIC SOIL INDICATOR(S) IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

CENED-OD-RAnnins Version 1AUG85 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 20 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 20 PLOT: ~~20~~ U

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 3

VEGETATION Stratum and Species (Dominants Only)		Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs	Prunus serotina	38/59	64%	FACU
Herbs	Solidago rugosa	20.5/96.5	21%	FAC
	Prunus serotina	38/96.5	39%	FACU

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL

Hydrophytes SUBTOTAL: _____ NON-hydrophytes SUBTOTAL: _____

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = _____

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification: _____
- Aerial Photograph — Identification: _____
- Other — Identification: _____

☒ NO RECORDED DATA

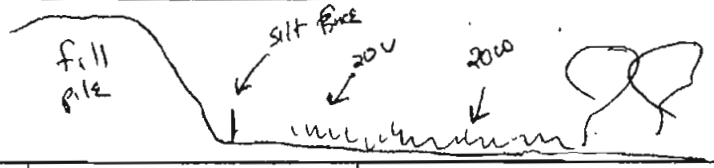
☐ OBSERVATIONS:

Depth to Free Water: _____
Depth to Saturation (including capillary fringe): _____
Describe Altered Hydrology: _____

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-4"	A	5YR2.51		fine Sandy loam
4-18"	B	5YR4/4		fine Sandy loam

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

REFERENCES:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

NEIWPCC, 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

CENED-OD-RAN/mjs Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 20 PLOT: 1

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 21 PLOT: W

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 2

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Catalpa speciosa	23.8/58	31.%	FAC
	Ulmus americana	44.2/58	69.%	FACW-
Saplings	Acer negundo	10.5/10.5	100.%	FAC+
Shrubs	Cornus amomum	20.5/20.5	100.%	FACW
Herbs	Phragmites australis	98/129	76.%	FACW

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	3	2	0	0	0	0

Hydrophytes SUBTOTAL: 5 NON-hydrophytes SUBTOTAL: 0

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 5/5 = 100.%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:

Depth to Saturation (including capillary fringe):

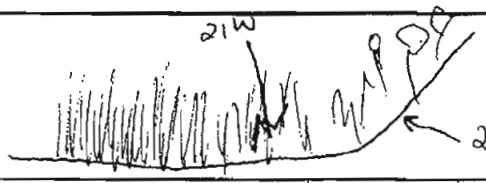
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☒ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL

Sketch Landscape Position



DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-9"	A	5YR4/2		fine sandy loam, moist
9-18"	B	5YR4/3		fine sandy loam, moist

HYDRIC SOIL INDICATOR(S): IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 21 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 21 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 2

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Trees	Ulmus americana	103.9/127.7	81.%	FACW-
Saplings	Ulmus americana	38/38	100.%	FACW-
Shrubs	Juniperus virginiana	20.5/47.5	43%	FAC U
	Ulmus americana	10.5/47.5	22.%	FACW-
	Cornus amomum	10.5/47.5	22.%	FACW
Herbs	Toxicodendron radicans	38/38	100.%	FAC

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	4	1	0	0	1	0

Hydrophytes SUBTOTAL: 5 NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 5/6 = 83.%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage Identification: _____
- Aerial Photograph Identification: _____
- Other Identification: _____

☐ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: _____
Depth to Saturation (including capillary fringe): _____
Describe Altered Hydrology: _____

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	C	—		traprock basalt fill on slope

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☐

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 21 PLOT: 1

PROJECT TITLE: New Britain - Hartford Busway | TRANSECT: 22 | PLOT: W

DELINEATOR(S): E.M. Pawlak | DATE: 5/16/03 | Wetland 1

VEGETATION Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Shrubs Populus deltoides	3/3	100.1	FAC
Herbs Juncus effusus	38.5/77	50.1	FACW+
Grasses	38.5/77	50.1	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	1	1	0	0	0	0

Hydrophytes SUBTOTAL: 2 | NON-hydrophytes SUBTOTAL: 0

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 2/2 = 100.1

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water:
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12 inches ☒ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☒ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL	Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-18"	A	10YR3/3		fine sandy loam, moist; fill?

HYDRIC SOIL INDICATOR(S) IV

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

REMARKS:

CENED-CO-RA/rms Version 1AUG95 Page 2

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 22 PLOT: W

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 22 PLOT: U

DELINEATOR(S): E.M. Pawlak DATE: 5/16/03 Wetland 1

VEGETATION	Stratum and Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI STATUS
Herbs	Plantago lanceolata	38/101	38%	NI (UPL)
	lawn grasses	63/101	62%	—

NOTE 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology. Plants recorded with asterisks should be considered as "other hydrophytes" in the tally below.

NOTE 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL	FACW	FAC	*OTHER HYDROPHYTES	FAC-	FACU	UPL
0	0	0	0	0	0	1

Hydrophytes SUBTOTAL: 0 NON-hydrophytes SUBTOTAL: 1

100 x Subtotal Hydrophytes / Subtotal Hydrophytes + Subtotal Non-hydrophytes = PERCENT HYDROPHYTES = 0/1 = 0%

HYDROLOGY

1. Hydrology is often the most difficult feature to observe.
2. Interpretation must consider the validity of the observation in light of the season, recent weather conditions, watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ RECORDED DATA
- Stream, lake or tidal gage — Identification: _____
- Aerial Photograph — Identification: _____
- Other — Identification: _____

☒ NO RECORDED DATA

☐ OBSERVATIONS:

Depth to Free Water: _____
Depth to Saturation (including capillary fringe): _____
Describe Altered Hydrology: _____

☐ Inundated ☐ Saturated in upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns within Wetland

☐ OTHER (explain):

SOIL | Sketch Landscape Position

DEPTH	HORIZON	MATRIX COLOR	REDOXIMORPHIC FEATURES Color, Abundance, Size & Contrast	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-9"	A	7.5YR 4/3		fine sandy loam
9-18"	C	7.5YR 4/4		medium sand, fill

HYDRIC SOIL INDICATOR(S)

REFERENCE:

OPTIONAL SOIL DATA:

TAXONOMIC SUBGROUP :

SOIL DRAINAGE CLASS:

DEPTH TO ACTIVE WATER TABLE:

NTCHS HYDRIC SOIL CRITERION:

REFERENCES:

NEIWPCC. 1998. Field Indicators for Identifying Hydric Soils in New England.

CONCLUSIONS

	Yes	No
Greater than 50% Hydrophytes?	☐	☒
Hydric Soils Criterion Met?	☐	☒
Wetland Hydrology Met?	☐	☒

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☒

REMARKS:

PROJECT TITLE: New Britain - Hartford Busway TRANSECT: 22 PLOT: U

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT:*50* PLOT:*W*
DELINEATOR: *Edward M. Pawlak, PWS* DATE:*12/15/06*

VEGETATION				
Stratum	Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Trees	*Acer rubrum*	1466/1570	93%	FAC
Saplings	*Ulmus americana*	10.5/21	50%	FACW
	Carya ovata	10.5/21	50%	FACU
Shrubs	*Lindera benzoin*	38/38	100%	FACW
Herbs	*Symplocarpus foetidus*	3/3	100%	OBL

Note 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology, which should be considered as "other hydrophytes" in the tally below.
Note 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL:1 FACW:2 FAC:1 Other Hydrophytes: FAC-: FACU:1 UPL:

Hydrophytes Subtotal:4 Non-hydrophytes Subtotal:1

100 x Subtotal Hydrophytes

Subtotal Hydrophytes + Subtotal Non-hydrophytes = Percent Hydrophytes = 4/5=80%

HYDROLOGY

__ RECORDED DATA
- Stream, lake or tidal gate Identification:
- Aerial photograph Identification:
- Other Identification:

_x__ NO RECORDED DATA

___ OBSERVATIONS:
- Depth to Free Water: 2"
- Depth to Saturation (including capillary fringe):
- Describe Altered Hydrology:

___ Inundated __x_ Saturated in upper 12" ___ Water Marks ___ Drift Lines
___ Sediment Deposits ___ Drainage Patterns in Wetland ___ Other:

SOIL
Sketch Landscape Position

Depth (inches)	Horizon	Matrix Color	Redoximorphic Features	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-12	A	5YR 2/1		Fine sandy loam; saturated
12-20	C	5YR 4/2	10YR 4/6 mottles; prominent, common	Silt loam; saturated

HYDRIC SOIL INDICATOR(S): XIB
REFERENCE: NEHSTC. 2004, Version 3. Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission. Wilmington, MA. pp 76.

Optional Soil Data
Taxonomic Subgroup:
Soil Drainage Class:
Depth to Active Water Table:
NTCHS Hydric Soil Criterion:

References:

CONCLUSIONS
Greater than 50% Hydrophytes? yes
Hydric Soils Criterion Met? yes
Wetland Hydrology Met? yes

Is this datapoint a wetland? yes

Remarks/Plot Location: This transect characterizes the boundary of the wetland delineated by the "50-" flags. Plot is located 15 feet on a 144 degree bearing from flag 50-14.

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT: 50 PLOT:W

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT:*50* PLOT:*U*
DELINEATOR: *Edward M. Pawlak, PWS* DATE:*12/15/06*

VEGETATION				
Stratum	Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Trees	*Acer rubrum*	1062/1305	81%	
Saplings	*Quercus rubra*	10.5/10.5	50%	FACU
	Carya ovata	10.5/10.5	50%	FACU
Shrubs	*Lindera benzoin*	20.5/26.5	77%	FACW

Note 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology, which should be considered as "other hydrophytes" in the tally below.
Note 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL: FACW:1 FAC: Other Hydrophytes: FAC-: FACU:2 UPL:

Hydrophytes Subtotal:1 Non-hydrophytes Subtotal:2

100 x Subtotal Hydrophytes

Subtotal Hydrophytes + Subtotal Non-hydrophytes = Percent Hydrophytes = 1/3=33%

HYDROLOGY

__ RECORDED DATA
- Stream, lake or tidal gate Identification:
- Aerial photograph Identification:
- Other Identification:

_x__ NO RECORDED DATA

___ OBSERVATIONS:
- Depth to Free Water:
- Depth to Saturation (including capillary fringe):
- Describe Altered Hydrology:

___ Inundated ___ Saturated in upper 12" ___ Water Marks ___ Drift Lines
___ Sediment Deposits ___ Drainage Patterns in Wetland ___ Other:

SOIL
Sketch Landscape Position

Depth (inches)	Horizon	Matrix Color	Redoximorphic Features	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-4	A	5YR 2/1		Fine sandy loam
4-20	B	5YR 4/6		Silt loam

HYDRIC SOIL INDICATOR(S):
REFERENCE: NEHSTC. 2004, Version 3. Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission. Wilmington, MA. pp 76.

Optional Soil Data
Taxonomic Subgroup:
Soil Drainage Class:
Depth to Active Water Table:
NTCHS Hydric Soil Criterion:

References:

CONCLUSIONS
Greater than 50% Hydrophytes? no
Hydric Soils Criterion Met? no
Wetland Hydrology Met? no

Is this datapoint a wetland? no

Remarks/Plot Location: This transect characterizes the boundary of the wetland delineated by the "50-" flags. Plot is located 25 feet on a 320 degree bearing from Plot 50W.

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT:50 PLOT:U

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT: *51* PLOT: *W*
DELINEATOR: *Edward M. Pawlak, PWS* DATE: *12/20/06*

VEGETATION				
Stratum	Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Trees	*Quercus palustris*	104/104	100%	FACW
Saplings	*Ailanthus altissima*	38/59	64%	NI (UPL)
Shrubs	*Cornus amomum*	20.5/61.5	33%	FACW
	Rosa multiflora	38/61.5	62%	FACU
Herbs	*Phragmites australis*	10.5/10.5	100%	FACW

Note 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology, which should be considered as "other hydrophytes" in the tally below.
Note 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL: FACW:3 FAC: Other Hydrophytes: FAC-: FACU:1 UPL:1

Hydrophytes Subtotal: Non-hydrophytes Subtotal:

100 x Subtotal Hydrophytes

Subtotal Hydrophytes + Subtotal Non-hydrophytes = Percent Hydrophytes = 3/5=60%

HYDROLOGY

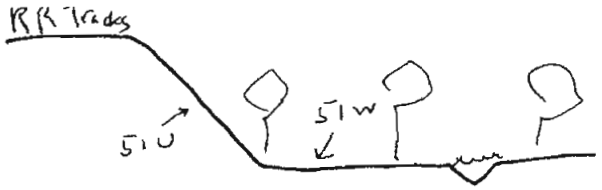
___ RECORDED DATA
- Stream, lake or tidal gate Identification:
- Aerial photograph Identification:
- Other Identification:

_x__ NO RECORDED DATA

___ OBSERVATIONS:
- Depth to Free Water: >20"
- Depth to Saturation (including capillary fringe):
- Describe Altered Hydrology:

___ Inundated ___ Saturated in upper 12" ___ Water Marks ___ Drift Lines
___ Sediment Deposits __x_ Drainage Patterns in Wetland ___ Other:

SOIL
Sketch Landscape Position



Depth (inches)	Horizon	Matrix Color	Redoximorphic Features	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-20	C	5YR 4/4		Silt loam; fill

HYDRIC SOIL INDICATOR(S): XIII
REFERENCE: NEHSTC. 2004, Version 3. Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission. Wilmington, MA. pp 76.

Optional Soil Data
Taxonomic Subgroup:
Soil Drainage Class:
Depth to Active Water Table:
NTCHS Hydric Soil Criterion:

References:

CONCLUSIONS
Greater than 50% Hydrophytes? yes
Hydric Soils Criterion Met? yes
Wetland Hydrology Met? yes

Is this datapoint a wetland? yes

Remarks/Plot Location: This transect characterizes the boundary of the wetland delineated by the "51-" flags. Plot is located 15 feet on a 71 degree bearing from flag 51-18.

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT:51 PLOT:W

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT:*51* PLOT:*U*
DELINEATOR: *Edward M. Pawlak, PWS* DATE:*12/20/06*

VEGETATION				
Stratum	Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Trees	*Ailanthus altissima*	68/68	100%	NI (UPL)
Saplings	*Ailanthus altissima*	38/48.5	78%	NI (UPL)
	Salix nigra	10/48.5	22%	FACW
Shrubs	*Rubus allegheniensis*	10.5/21	50%	FACU
	Berberis thunbergii	10.5/21	50%	FACU

Note 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology, which should be considered as "other hydrophytes" in the tally below.
Note 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL: FACW:1 FAC: Other Hydrophytes: FAC-: FACU:2 UPL:2

Hydrophytes Subtotal:1 Non-hydrophytes Subtotal:4

100 x Subtotal Hydrophytes

Subtotal Hydrophytes + Subtotal Non-hydrophytes = Percent Hydrophytes =1/5=20%

HYDROLOGY

___ RECORDED DATA
- Stream, lake or tidal gate Identification:
- Aerial photograph Identification:
- Other Identification:

_x__ NO RECORDED DATA

___ OBSERVATIONS:
- Depth to Free Water: >20"
- Depth to Saturation (including capillary fringe):
- Describe Altered Hydrology:

___ Inundated ___ Saturated in upper 12" ___ Water Marks ___ Drift Lines
___ Sediment Deposits ___ Drainage Patterns in Wetland ___ Other:

SOIL
Sketch Landscape Position

Depth (inches)	Horizon	Matrix Color	Redoximorphic Features	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-20	C	10YR 2/1		Fine sandy loam; fill

HYDRIC SOIL INDICATOR(S):
REFERENCE: NEHSTC. 2004, Version 3. Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission. Wilmington, MA. pp 76.

Optional Soil Data
Taxonomic Subgroup:
Soil Drainage Class:
Depth to Active Water Table:
NTCHS Hydric Soil Criterion:

References:

CONCLUSIONS
Greater than 50% Hydrophytes? no
Hydric Soils Criterion Met? no
Wetland Hydrology Met? no

Is this datapoint a wetland? no

Remarks/Plot Location: This transect characterizes the boundary of the wetland delineated by the "51-" flags. Plot is located 30 feet on a 274 degree bearing from Plot 51W.

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT: 51 PLOT: U

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT:*52* PLOT:*W*
DELINEATOR: *Edward M. Pawlak, PWS* DATE:*12/20/06*

VEGETATION				
Stratum	Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Vines	*Celastrus orbicuatus*	20.5/20.5	100%	NI (UPL)
Herbs	*Typha latifolia*	38/76	50%	OBL
	Lythrum salicaria	38/76	50%	FACW

Note 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology, which should be considered as "other hydrophytes" in the tally below.
Note 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL:1 FACW:1 FAC: Other Hydrophytes: FAC-: FACU: UPL:1

Hydrophytes Subtotal:2 Non-hydrophytes Subtotal:1

100 x Subtotal Hydrophytes

Subtotal Hydrophytes + Subtotal Non-hydrophytes = Percent Hydrophytes =2/3=67%

HYDROLOGY

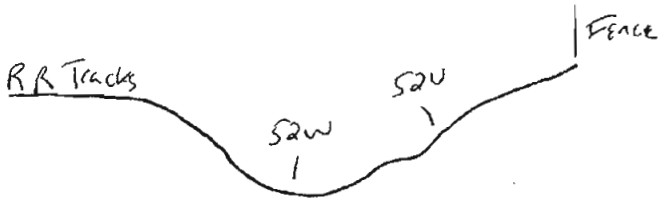
__ RECORDED DATA
- Stream, lake or tidal gate Identification:
- Aerial photograph Identification:
- Other Identification:

_x__ NO RECORDED DATA

___ OBSERVATIONS:
- Depth to Free Water: 0"
- Depth to Saturation (including capillary fringe):
- Describe Altered Hydrology:

___ Inundated ___ Saturated in upper 12" ___ Water Marks ___ Drift Lines
___ Sediment Deposits ___ Drainage Patterns in Wetland ___ Other:

SOIL
Sketch Landscape Position



Depth (inches)	Horizon	Matrix Color	Redoximorphic Features	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-20	C	10YR 2/1		Fine sandy loam; saturated; fill

HYDRIC SOIL INDICATOR(S): XIII
REFERENCE: NEHSTC. 2004, Version 3. Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission. Wilmington, MA. pp 76.

Optional Soil Data
Taxonomic Subgroup:
Soil Drainage Class:
Depth to Active Water Table:
NTCHS Hydric Soil Criterion:

References:

CONCLUSIONS
Greater than 50% Hydrophytes? yes
Hydric Soils Criterion Met? yes
Wetland Hydrology Met? yes

Is this datapoint a wetland? yes

Remarks/Plot Location: This transect characterizes the boundary of the wetland delineated by the "52-" flags. Plot is located six feet on a 57 degree bearing from flag 52-1.

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT: 52 PLOT: W

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT:*52* PLOT:*U*
DELINEATOR: *Edward M. Pawlak, PWS* DATE:*12/20/06*

VEGETATION				
Stratum	Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Vines	*Celastrus orbiculatus*	38/38	100%	NI (UPL)
Herbs	*Solidago sp.*	38/41	93%	---

Note 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology, which should be considered as "other hydrophytes" in the tally below.
Note 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL: FACW: FAC: Other Hydrophytes: FAC-: FACU: UPL: 1

Hydrophytes Subtotal: 0 Non-hydrophytes Subtotal: 1

100 x Subtotal Hydrophytes

Subtotal Hydrophytes + Subtotal Non-hydrophytes = Percent Hydrophytes = 0/1=0%

HYDROLOGY

__ RECORDED DATA
Stream, lake or tidal gate Identification:
Aerial photograph Identification:
Other Identification:

_x__ NO RECORDED DATA

___ OBSERVATIONS:
Depth to Free Water: >20"
Depth to Saturation (including capillary fringe):
Describe Altered Hydrology:

___ Inundated ___ Saturated in upper 12" ___ Water Marks ___ Drift Lines
___ Sediment Deposits ___ Drainage Patterns in Wetland ___ Other:

SOIL
Sketch Landscape Position

Depth (inches)	Horizon	Matrix Color	Redoximorphic Features	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-20	C	10YR 3/2		Stony fine sandy loam; fill

HYDRIC SOIL INDICATOR(S):
REFERENCE: NEHSTC. 2004, Version 3. Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission. Wilmington, MA. pp 76.

Optional Soil Data
Taxonomic Subgroup:
Soil Drainage Class:
Depth to Active Water Table:
NTCHS Hydric Soil Criterion:

References:

CONCLUSIONS
Greater than 50% Hydrophytes? no
Hydric Soils Criterion Met? no
Wetland Hydrology Met? no

Is this datapoint a wetland? no

Remarks/Plot Location: This transect characterizes the boundary of the wetland delineated by the "52-" flags. Plot is located 8 feet on a 136 degree bearing from Plot 52W.

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT: 52 PLOT: U

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT:*53* PLOT:*W*
DELINEATOR: *Edward M. Pawlak, PWS* DATE:*12/20/06*

VEGETATION				
Stratum	Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Saplings	*Ailanthus altissima*	38/38	100%	NI (UPL)
Herbs	*Lythrum salicaria*	98/98	100%	FACW

Note 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology, which should be considered as "other hydrophytes" in the tally below.
Note 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL: FACW: 1 FAC: Other Hydrophytes: FAC-: FACU: UPL: 1

Hydrophytes Subtotal: 1 Non-hydrophytes Subtotal: 1

100 x Subtotal Hydrophytes

Subtotal Hydrophytes + Subtotal Non-hydrophytes = Percent Hydrophytes = ½=50%

HYDROLOGY

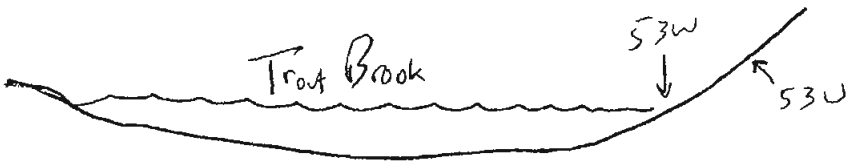
___ RECORDED DATA
- Stream, lake or tidal gate Identification:
- Aerial photograph Identification:
- Other Identification:

_x__ NO RECORDED DATA

___ OBSERVATIONS:
- Depth to Free Water: <12"
- Depth to Saturation (including capillary fringe):
- Describe Altered Hydrology:

___ Inundated ___ Saturated in upper 12" ___ Water Marks ___ Drift Lines
___ Sediment Deposits ___ Drainage Patterns in Wetland ___ Other:

SOIL
Sketch Landscape Position



Depth (inches)	Horizon	Matrix Color	Redoximorphic Features	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-1	C1	10YR 2/1		Fine sandy loam; alluvium; saturated
1-20	C2	---		Rip rap stones

HYDRIC SOIL INDICATOR(S): XIII
REFERENCE: NEHSTC. 2004, Version 3. Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission. Wilmington, MA. pp 76.

Optional Soil Data
Taxonomic Subgroup:
Soil Drainage Class:
Depth to Active Water Table:
NTCHS Hydric Soil Criterion:

References:

CONCLUSIONS
Greater than 50% Hydrophytes? no
Hydric Soils Criterion Met? yes
Wetland Hydrology Met? yes

Is this datapoint a wetland? yes

Remarks/Plot Location: This transect characterizes the boundary of the wetland delineated by the "53-" flags (Trout Brook). Plot is located 15 feet on a 312 degree bearing from flag 53-2.

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT: 53 PLOT: W

SOIL
Sketch Landscape Position

Depth (inches)	Horizon	Matrix Color	Redoximorphic Features	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-20	C	10YR 2/1		Fine sandy loam; fill; saturated

HYDRIC SOIL INDICATOR(S): XIII
REFERENCE: NEHSTC. 2004, Version 3. Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission. Wilmington, MA. pp 76.

Optional Soil Data
Taxonomic Subgroup:
Soil Drainage Class:
Depth to Active Water Table:
NTCHS Hydric Soil Criterion:

References:

CONCLUSIONS
Greater than 50% Hydrophytes? no
Hydric Soils Criterion Met? yes
Wetland Hydrology Met? yes

Is this datapoint a wetland? yes

Remarks/Plot Location: This transect characterizes the boundary of the wetland delineated by the "53-" flags (swale located north of Oakwood Avenue). Plot is located 6 feet on a 160 degree bearing from flag 53-4.

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT: 53 PLOT: W

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT:*53* PLOT:*U*
DELINEATOR: *Edward M. Pawlak, PWS* DATE:*1/9/07*

VEGETATION				
Stratum	Species (Dominants Only)	Dominance Ratio	Percent Dominance	NWI Status
Trees	*Quercus alba*	24/24	100%	FACU
Saplings	*Acer rubrum*	10.5/21	50%	FAC
	Quercus rubra	10.5/21	50%	FACU
Shrubs	*Prunus serotina*	10.5/10.5	100%	FACU

Note 1: Use asterisk * to indicate plants with observed adaptations to wetland hydrology, which should be considered as "other hydrophytes" in the tally below.
Note 2: Species with NA or NI status are reported, but are not calculated in the tally below.

OBL: FACW: FAC: 1 Other Hydrophytes: FAC-: FACU: 3 UPL:

Hydrophytes Subtotal: 1 Non-hydrophytes Subtotal: 3

100 x Subtotal Hydrophytes

Subtotal Hydrophytes + Subtotal Non-hydrophytes = Percent Hydrophytes = ¼=25%

HYDROLOGY

__ RECORDED DATA
- Stream, lake or tidal gate Identification:
- Aerial photograph Identification:
- Other Identification:

_x__ NO RECORDED DATA

___ OBSERVATIONS:
- Depth to Free Water: >20%
- Depth to Saturation (including capillary fringe):
- Describe Altered Hydrology:

___ Inundated ___ Saturated in upper 12" ___ Water Marks ___ Drift Lines
___ Sediment Deposits ___ Drainage Patterns in Wetland ___ Other:

SOIL
Sketch Landscape Position

Depth (inches)	Horizon	Matrix Color	Redoximorphic Features	USDA Texture; and nodules, concretions, masses, pore linings, restrictive layers, root distribution, soil water, etc.
0-20 .	C	10YR 3/2		Fine sandy loam; fill

HYDRIC SOIL INDICATOR(S):
REFERENCE: NEHSTC. 2004, Version 3. Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission. Wilmington, MA. pp 76.

Optiontal Soil Data
Taxonomic Subgroup:
Soil Drainage Class:
Depth to Active Water Table:
NTCHS Hydric Soil Criterion:

References:

CONCLUSIONS
Greater than 50% Hydrophytes? no
Hydric Soils Criterion Met? no
Wetland Hydrology Met? no

Is this datapoint a wetland? no

Remarks/Plot Location: This transect characterizes the boundary of the wetland delineated by the "53-" flags (swale north of Oakwood Avenue). Plot is located 15 feet on a 94 degree bearing from Plot 53W.

PROJECT TITLE: *New Britain-Hartford Busway* TRANSECT: 53 PLOT: U

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: New Britain/Hartford Sampling Date: 5/26/09

Applicant/Owner: CTDOT State: CT Sampling Point: 2BW

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): slight concave

Slope (%): Lat: Long: Datum: F104

Soil Map Unit Name: Udorthent NWI classification: PFO/PSS/PEM

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✔] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [✔] No [ ]

Hydric Soil Present? Yes [✔] No [ ]

Wetland Hydrology Present? Yes [✔] No [ ]

Is the Sampled Area within a Wetland? Yes [✔] No [ ]

If yes, optional Wetland Site ID: 2B

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	50	Y	FAC
2.			
3.			
4.			
5.			
	50	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Acer rubrum	10	N	FAC
2. Rosa multiflora	5	N	FACU
3. Lindera benzoin	15	Y	FACW-
4. Cornus sericea	25	Y	FACW+
5. Viburnum dentatum	5	N	FAC
	60	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Scirpus validus	5	N	OBL
2. Solidago spp.	5	N	
3. Graminae spp. (wetland species)	15	Y	
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	40	x 2 =	80
FAC species	65	x 3 =	195
FACU species	5	x 4 =	20
UPL species		x 5 =	
Column Totals:	115 (A)		300 (B)

Prevalence Index = B/A = 2.6

Hydrophytic Vegetation Indicators:

- [✔] Rapid Test for Hydrophytic Vegetation
- [✔] Dominance Test is >50%
- [✔] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [✔] No [ ]

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

SOIL

Sampling Point: 2BW

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	75	10YR 4/6	25	C	M	fSL	
3-12	10YR 4/1	65	10YR 3/3	25	C	M	fSL	
			7.5YR 6/1	10	D	M	fSL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☑ No ☐

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☑ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: New Britain/Hartford Sampling Date: 5/26/09

Applicant/Owner: CTDOT State: CT Sampling Point: 2BU

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): None

Slope (%): Lat: Long: Datum: F104

Soil Map Unit Name: Udorthent NWI classification:

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [ ]	No [✓]	
Wetland Hydrology Present?	Yes [ ]	No [✓]	If yes, optional Wetland Site ID:

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus rubra	75	Y	FACU-
2.			
3.			
4.			
5.			
	75 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Elaeagnus umbellate	5	N	FACU
2. Rosa multiflora	25	Y	FACU
3. Lindera benzoin	10	N	FACW-
4.			
5.			
	40 = Total Cover		
Herb Stratum (Plot size: 5 ft)			
1. Graminae spp. (upland species)	5	N	
2. Solidago spp.	5	N	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	10 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	105	x 4 =	420
UPL species	0	x 5 =	0
Column Totals:	115 (A)		440 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

SOIL

Sampling Point: 2BU

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/4	100					fSL	
8-12	7.5YR 4/3	100					fSL	
12-24+	10YR 4/4	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (*Explain in Remarks*)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: New Britain/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 2cW

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): slight concave

Slope (%): Lat: Long: Datum: F206

Soil Map Unit Name: Udorthent NWI classification: PFO/PSS/PEM

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

Are Vegetation No, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ☐ No ☑

Are Vegetation No, Soil No, or Hydrology No 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 ☑	No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐
Hydric Soil Present?	Yes ☑	No ☐	
Wetland Hydrology Present?	Yes ☑	No ☐	If yes, optional Wetland Site ID: 2c

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

Excessive amount of water coming out of the ground - in line with two manholes (source of groundwater may be broken utility line).

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	25	Y	FAC
2. Quercus rubra	10	N	FACU-
3.			
4.			
5.			
	50	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Acer rubrum	5	N	FAC
2. Elaeagnus umbellata	5	N	
3. Cornus sericea	10	N	FACW+
4.			
5.			
	20	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Symphyotrichum novae-angliae	10	N	FACW-
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	10	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= 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	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	30	x 3 =	90
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	60 (A)		170 (B)

Prevalence Index = B/A = 2.8

Hydrophytic Vegetation Indicators:

- ☑ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☑ Prevalence Index is ≤3.0[1]
- ☐ 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.

Hydrophytic Vegetation Present? Yes ☑ No ☐

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

SOIL

Sampling Point: 2cW

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
3-0	Leaf Litter							
0-2	5YR 3/3	80	5YR 2/1	20	C	M	SL	
2-6	5YR 4/1	75	5YR 3/4	25	D	M	SL	
6-18+	2.5YR 4/4	100					gSL	25% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) (Drop in LRR R?)
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ✔ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ☐

Remarks:

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 ☐ Depth (inches): 2

Water Table Present? Yes ✔ No ☐ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✔ No ☐ Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: New Britain/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 2cU

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): hillside slope Local relief (concave, convex, none): convex

Slope (%): Lat: Long: Datum: F206

Soil Map Unit Name: Udorthent NWI classification:

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ☑ No ☐

Are Vegetation No, Soil No, or Hydrology No 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 ☐ No ☑

Hydric Soil Present? Yes ☐ No ☑

Wetland Hydrology Present? Yes ☐ No ☑

Is the Sampled Area within a Wetland? Yes ☐ No ☑

If yes, optional Wetland Site ID:

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Prunus virginiana	10	N	FACU
2. Quercus rubra	50	Y	FACU-
3.			
4.			
5.			
	60	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	25	Y	FACU
2.			
3.			
4.			
5.			
	25	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	85	x 4 =	340
UPL species	0	x 5 =	0
Column Totals:	85 (A)		340 (B)

Prevalence Index = B/A = 4.0

Hydrophytic Vegetation Indicators:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ 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.

Hydrophytic Vegetation Present? Yes ☐ No ☑

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

SOIL

Sampling Point: 2cU

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
2-0	Leaf Litter							
0-4	5YR 3/3	100					fSL	
4-12	2.5YR 4/4	100					fSL	
12-18+	5YR 3/4	100					gSL	25% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ✔ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: New Britain/Hartford Sampling Date: 5/26/09

Applicant/Owner: CTDOT State: CT Sampling Point: 4W

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): linear depression into floodplain Local relief (concave, convex, none): linear concave

Slope (%): Lat: Long: Datum: F328

Soil Map Unit Name: Udorthent, Limerick/Lim NWI classification: PFO

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [✓] No [ ]

Hydric Soil Present? Yes [✓] No [ ]

Wetland Hydrology Present? Yes [✓] No [ ]

Is the Sampled Area within a Wetland? Yes [✓] No [ ]

If yes, optional Wetland Site ID: 4

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	75	Y	FAC
2.			
3.			
4.			
5.			
	75	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Acer rubrum	10	N	FAC
2. Rosa multiflora	5	N	FACU
3.			
4.			
5.			
	15	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Symphyotrichum novae-angliae	5	N	
2. Solidago spp.	5	N	
3. Graminae spp. (wetland species)	15	Y	
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25	= Total Cover	
Woody Vine Stratum (Plot size: 15 ft)			
1. Celastrus orbiculata	10	N	FACU
2. Vitis spp.	5	N	
	15	= 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	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	85	x 3 =	255
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	100 (A)		315 (B)

Prevalence Index = B/A = 3.15

Hydrophytic Vegetation Indicators:

- [✓] Rapid Test for Hydrophytic Vegetation
- [✓] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [✓] No [ ]

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

SOIL

Sampling Point: 4W

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/2	80	10YR 6/2	20	C	M	SiL	
3-18	7.7YR 4/2	75	10YR 4/4	20	C	M	SiL	
			7.5YR 5/4	5	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☑ No ☐

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☑ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: New Britain/Hartford Sampling Date: 5/26/09

Applicant/Owner: CTDOT State: CT Sampling Point: 4U

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): hillside slope Local relief (concave, convex, none): convex

Slope (%): Lat: Long: Datum: F328

Soil Map Unit Name: Udorthent, Limerick/Lim NWI classification:

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [ ] No [✓]

Hydric Soil Present? Yes [ ] No [✓]

Wetland Hydrology Present? Yes [ ] No [✓]

Is the Sampled Area within a Wetland? Yes [ ] No [✓]

If yes, optional Wetland Site ID:

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus rubra	75	Y	FACU-
2. Acer rubrum	10	N	FAC
3.			
4.			
5.			
	85	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	15	Y	FACU
2.			
3.			
4.			
5.			
	15	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Celastrus orbiculata	10	N	FACU
2. Vitis spp.	5	N	
	15	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	110 (A)		430 (B)

Prevalence Index = B/A = 3.9

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

SOIL

Sampling Point: 4U

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/3	100					SiL	
8-16	7.5YR 4/4	100					SiL	
16-24+	5Y 4/3	100					SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 6bW

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): slight concave

Slope (%): Lat: Long: Datum:

Soil Map Unit Name: Udorthent NWI classification: PEM

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

Are Vegetation No, Soil No, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes [ ] No [✔]

Are Vegetation Yes, Soil No, or Hydrology No 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 [✔]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✔] No [ ]
Hydric Soil Present?	Yes [✔]	No [ ]	
Wetland Hydrology Present?	Yes [✔]	No [ ]	If yes, optional Wetland Site ID: 6b

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

Northern portion of this wetland seems to be unnaturally dammed resulting in water flowing over and across Busway alignment. Some of the dominant vegetation is invasive.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft)			
1. Typha latifolia	33	Y	OBL
2. Lythrum salicaria	25	Y	FACW+
3. Phalaris arundinacea	25	Y	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	83 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	33	x 1 =	33
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	83 (A)		133 (B)

Prevalence Index = B/A = 1.6

Hydrophytic Vegetation Indicators:

- [✔] Rapid Test for Hydrophytic Vegetation
- [✔] Dominance Test is >50%
- [✔] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [✔] No [ ]

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

SOIL

Sampling Point: 6bW

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/1	80	10YR 5/2	20	D	M	gSL	25% gravel
5-18+	10YR 4/2	75	10YR 3/2	25	C	M	gSL	30% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ___

Remarks:

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 ___ Depth (inches): 3

Water Table Present? Yes ✔ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No ___

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 6bU

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): hillside slope Local relief (concave, convex, none): convex

Slope (%): Lat: Long: Datum:

Soil Map Unit Name: Udorthent NWI classification:

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [ ]	No [✓]	
Wetland Hydrology Present?	Yes [ ]	No [✓]	If yes, optional Wetland Site ID:

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Robinia pseudoacacia	50	Y	FACU-
2. Prunus virginiana	25	Y	FACU
3.			
4.			
5.			
	75	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Cornus sericea	5	N	FACW+
2. Rosa multiflora	5	N	FACU
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Solidago spp.	5	N	
2. Cirsium vulgare	5	N	FACU-
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	10	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Celastrus orbiculata	10	N	FACU
2. Vitis spp.	25	Y	
	35	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	0	x 3 =	0
FACU species	95	x 4 =	380
UPL species	0	x 5 =	0
Column Totals:	100 (A)		390 (B)

Prevalence Index = B/A = 3.9

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

SOIL

Sampling Point: 6bU

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
1-0	Leaf Litter							
0-4	10YR 3/3	100					gSL	25% gravel
4-11	5YR 3/4	100					gSL	30% gravel
11-18+	5YR 4/3	100					gSL	30% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 6/01/09

Applicant/Owner: CTDOT State: CT Sampling Point: 6dW

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): flat

Slope (%): Lat: Long: Datum: F719

Soil Map Unit Name: Scitico, Shaker, Maybrid NWI classification: PFO/PSS/PEM

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [✓] No [ ]

Hydric Soil Present? Yes [✓] No [ ]

Wetland Hydrology Present? Yes [✓] No [ ]

Is the Sampled Area within a Wetland? Yes [✓] No [ ]

If yes, optional Wetland Site ID: 6d

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	75	Y	FAC
2.			
3.			
4.			
5.			
	75	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	10	N	FACU
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= 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	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	85 (A)		265 (B)

Prevalence Index = B/A = 3.1

***Hydrophytic* Vegetation Indicators:**

- [✓] Rapid Test for Hydrophytic Vegetation
- [✓] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [✓] 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.

Hydrophytic Vegetation Present? Yes [✓] No [ ]

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

Buttressed roots on trees

SOIL

Sampling Point: 6dW

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	7.5YR 3/2	75	5Y 7/1	25	D	M	fSL	
6-16+	10YR 2/2	75	10R 5/8	20	D	M	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ☐

Remarks:

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 ✔ Depth (inches): _____

Water Table Present? Yes ✔ No ☐ Depth (inches): 6

Saturation Present? (includes capillary fringe) Yes ✔ No ☐ Depth (inches): 4

Wetland Hydrology Present? Yes ✔ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 6/01/09

Applicant/Owner: CTDOT State: CT Sampling Point: 6dU

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): edge of floodplain Local relief (concave, convex, none): convex

Slope (%): Lat: Long: Datum: F719

Soil Map Unit Name: Scitico, Shaker, Maybrid NWI classification:

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [ ] No [✓]

Hydric Soil Present? Yes [ ] No [✓]

Wetland Hydrology Present? Yes [ ] No [✓]

Is the Sampled Area within a Wetland? Yes [ ] No [✓]

If yes, optional Wetland Site ID:

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	15	Y	FAC
2. Quercus rubra	65	Y	FACU-
3.			
4.			
5.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	25	Y	FACU
2.			
3.			
4.			
5.			
	25	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= 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: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	80	x 4 =	320
UPL species	0	x 5 =	0
Column Totals:	95 (A)		365 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

SOIL

Sampling Point: 6dU

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR 3/4	100					fSL	
4-12	10YR 3/3	100					fSL	
12-24+	10YR 4/4	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 6/01/09

Applicant/Owner: CTDOT State: CT Sampling Point: 16bW

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): slight concave

Slope (%): Lat: Long: Datum: F909

Soil Map Unit Name: Udorthent NWI classification: PSS

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [✓] No [ ]

Hydric Soil Present? Yes [✓] No [ ]

Wetland Hydrology Present? Yes [✓] No [ ]

Is the Sampled Area within a Wetland? Yes [✓] No [ ]

If yes, optional Wetland Site ID: 16b

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	10	N	FAC
2. Acer saccharinum	10	N	FACW
3. Acer platanoides	5	N	UPL
4.			
5.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	10	N	FACU
2. Acer rubrum	5	N	FAC
3. Cornus sericea	65	Y	FACW+
4. Polygonum cuspidatum	5	N	FACU-
5.			
	85	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= 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	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	15	x 3 =	45
FACU species	15	x 4 =	60
UPL species	5	x 5 =	25
Column Totals:	110 (A)		280 (B)

Prevalence Index = B/A = 2.5

Hydrophytic Vegetation Indicators:

- [✓] Rapid Test for Hydrophytic Vegetation
- [✓] Dominance Test is >50%
- [✓] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [✓] No [ ]

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

SOIL

Sampling Point: 16bW

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	75	10YR 6/1	25	D	M	fSL	
6-11	10YR 5/1	75	10YR 3/4	25	C	M	fSL	
12-18+	10YR 5/2	65	10YR 3/1	25	C	M	SL	
			10YR 5/6	10	D	M	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ☐

Remarks:

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 ✔ Depth (inches): _____

Water Table Present? Yes ✔ No ☐ Depth (inches): 10

Saturation Present? (includes capillary fringe) Yes ✔ No ☐ Depth (inches): 8

Wetland Hydrology Present? Yes ✔ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 6/01/09

Applicant/Owner: CTDOT State: CT Sampling Point: 16bU

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): flat

Slope (%): Lat: Long: Datum: F909

Soil Map Unit Name: Udorthent NWI classification:

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [ ]	No [✓]	
Wetland Hydrology Present?	Yes [ ]	No [✓]	If yes, optional Wetland Site ID:

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	5	N	FAC
2. Acer saccharinum	5	N	FACW
3. Acer platanoides	25	Y	UPL
4.			
5.			
	35	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	10	N	FACU
2. Acer rubrum	5	N	FAC
3. Cornus sericea	5	N	FACW+
4. Polygonum cuspidatum	50	Y	FACU-
5.			
	70	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	10	x 3 =	30
FACU species	60	x 4 =	240
UPL species	25	x 5 =	125
Column Totals:	105 (A)		415 (B)

Prevalence Index = B/A = 3.9

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

SOIL

Sampling Point: 16bU

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/4	100					SL	
8-12	10YR 5/3	100					SL	
12-24+	10YR 5/3	100					LS	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☑ No ☐

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 17W

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): bank of stream Local relief (concave, convex, none): slight concave

Slope (%): Lat: Long: Datum: CE-21-14

Soil Map Unit Name: Udorthent NWI classification: PFO

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	If yes, optional Wetland Site ID: 17
Wetland Hydrology Present?	Yes [✓]	No [ ]	

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer platanoides	10	N	UPL
2. Ulmus americana	5	N	FACW-
3. Acer saccharum	25	Y	FACU-
4. Populus deltoides	50	Y	FAC
5.			
	90	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	10	N	FACU
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Symphyotrichum novae-angliae	25	Y	FACW-
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= 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: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	30	x 2 =	60
FAC species	50	x 3 =	150
FACU species	35	x 4 =	140
UPL species	10	x 5 =	50
Column Totals:	125 (A)		400 (B)

Prevalence Index = B/A = 3.2

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [✓] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [✓] 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.

Hydrophytic Vegetation Present? Yes [✓] No [ ]

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

Buttressed roots of trees in floodplain area of stream

SOIL

Sampling Point: 17W

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
3-0	Leaf Litter							
0-2	7.5YR 3/2	100					fSL	
2-4	7.5YR 4/3	90	7.5YR 5/6	10	C	M	fSL	
4-10	7.5YR 4/2	80	7.5YR 4/6	20	C	M	fSL	
10-18+	7.5YR 5/3	90	7.5YR 3/2	10	C	M	gSL	25% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☑ No ☐

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☑ No ☐ Depth (inches): 15

Saturation Present? (includes capillary fringe) Yes ☑ No ☐ Depth (inches): 10

Wetland Hydrology Present? Yes ☑ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 17U

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): hillside slope Local relief (concave, convex, none): convex

Slope (%): Lat: Long: Datum: CE-21-14

Soil Map Unit Name: Udorthent NWI classification:

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [ ]	No [✓]	
Wetland Hydrology Present?	Yes [ ]	No [✓]	If yes, optional Wetland Site ID:

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer platanoides	25	Y	UPL
2. Ulmus americana	10	N	FACW-
3. Quercus rubra	50	Y	FACU-
4. Populus deltoides	5	N	FAC
5.			
	90	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	25	Y	FACU
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
		= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	5	x 3 =	15
FACU species	75	x 4 =	300
UPL species	25	x 5 =	125
Column Totals:	115 (A)		460 (B)

Prevalence Index = B/A = 4.0

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

Buttressed roots of trees in floodplain area of stream

SOIL

Sampling Point: 17U

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 %	Type[1]	Loc[2]	Texture	Remarks
3-0	Leaf Litter							
0-4	7.5YR 3/4	100					fSL	
4-12	7.5YR 4/3	100					fSL	
12-18+	7.5YR 5/3	100					gSL	30% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 6/01/09

Applicant/Owner: CTDOT State: CT Sampling Point: 21a2W

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): slight concave

Slope (%): Lat: Long: Datum: F1003

Soil Map Unit Name: Udorthent NWI classification: PSS

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

Are Vegetation Yes, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [ ] No [✓]

Are Vegetation No, Soil No, or Hydrology No 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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	If yes, optional Wetland Site ID: 21a2

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

Site is dominated by *Phragmites australis*

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	5	N	FACU
2. Phragmites australis	75	Y	FACW
3. Cornus sericea	10	N	FACW+
4.			
5.			
	90 = Total Cover		
Herb Stratum (Plot size: 5 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= 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	0	x 1 =	0
FACW species	85	x 2 =	170
FAC species	0	x 3 =	0
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	90 (A)		190 (B)

Prevalence Index = B/A = 2.1

Hydrophytic Vegetation Indicators:

- [✓] Rapid Test for Hydrophytic Vegetation
- [✓] Dominance Test is >50%
- [✓] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [✓] No [ ]

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

SOIL

Sampling Point: 21a2W

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
0-2	10YR 3/1	100					fSL	
2-18+	10YR 6/1	75	10YR 3/4	25	C	M	fSL	
12-18+	10YR 5/2	75	10YR 3/1	25	C	M	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☑ No ☐

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☑ No ☐ Depth (inches): 8

Saturation Present? (includes capillary fringe) Yes ☑ No ☐ Depth (inches): 6

Wetland Hydrology Present? Yes ☑ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 6/01/09

Applicant/Owner: CTDOT State: CT Sampling Point: 21a2U

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): flat

Slope (%): Lat: Long: Datum: F1003

Soil Map Unit Name: Udorthent NWI classification:

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [ ] No [✓]

Are Vegetation No, Soil No, or Hydrology No 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 [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [ ]	No [✓]	
Wetland Hydrology Present?	Yes [ ]	No [✓]	If yes, optional Wetland Site ID:

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

Site is dominated by *Phragmites australis*

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rosa multiflora	5	N	FACU
2. Graminae spp. (mixed upland lawn)	95	Y	
3.			
4.			
5.			
	100 = Total Cover		
Herb Stratum (Plot size: 5 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	5 (A)		20 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

SOIL

Sampling Point: 21a2U

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
0-6	10YR 3/3	100					fSL	
6-11	10YR 4/2	100					fSL	
11-18+	10YR 5/2	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Hartford/Hartford Sampling Date: 6/19/09

Applicant/Owner: CTDOT State: CT Sampling Point: 22bW

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): flat

Slope (%): Lat: Long: Datum: F1204

Soil Map Unit Name: Udorthent NWI classification: PEM

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

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes [ ] No [✓]

Are Vegetation No, Soil No, or Hydrology No 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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	If yes, optional Wetland Site ID:

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

Site is a linear depression along the base of rail ballast

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Elaeagnus umbellate	15	Y	FACU
2. Populus deltoides	25	Y	FAC
3. Cornus sericea	5	N	FACW+
4.			
5.			
	45 = Total Cover		
Herb Stratum (Plot size: 5 ft)			
1. Typha latifolia	50	Y	OBL
2. Phragmites australis	25	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	75 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	30	x 2 =	60
FAC species	25	x 3 =	75
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	120 (A)		245 (B)

Prevalence Index = B/A = 2.0

Hydrophytic Vegetation Indicators:

- [✓] Rapid Test for Hydrophytic Vegetation
- [✓] Dominance Test is >50%
- [✓] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [✓] No [ ]

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

SOIL

Sampling Point: 22bW

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10R 2/1	75	7.5YR 5/1	25	D	M	fSL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ☐

Remarks:

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 ☐ Depth (inches): 2

Water Table Present? Yes ✔ No ☐ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✔ No ☐ Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Hartford/Hartford Sampling Date: 6/19/09

Applicant/Owner: CTDOT State: CT Sampling Point: 22bU

Investigator(s): David Laiuppa Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): flat

Slope (%): _____ Lat: _____ Long: _____ Datum: F1204

Soil Map Unit Name: Udorthent NWI classification: _____

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

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes [ ] No [✓]

Are Vegetation No, Soil No, or Hydrology No 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 [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [ ]	No [✓]	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes [ ]	No [✓]	

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

Site is adjacent to a linear depression along the base of rail ballast

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft)			
1. Andropogon virginicus	50	Y	UPL
2. Verbascum Thapsus	10	N	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	60	x 5 =	300
Column Totals:	60 (A)		300 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

SOIL

Sampling Point: 22bU

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
0-18	10R 3/3	100					gS	15% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 22cW

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): linear depression Local relief (concave, convex, none): linear concave

Slope (%): Lat: Long: Datum: F1303

Soil Map Unit Name: Udorthent NWI classification: PFO/PEM

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [✓] No [ ]

Hydric Soil Present? Yes [✓] No [ ]

Wetland Hydrology Present? Yes [✓] No [ ]

Is the Sampled Area within a Wetland? Yes [✓] No [ ]

If yes, optional Wetland Site ID: 22c

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus tremuloides	25	Y	NI
2.			
3.			
4.			
5.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Solidago spp.	5	N	
2. Juncus spp.	5	N	
3. Carex spp.	5	N	
4. Bidens vulgata	10	N	NI
5.			
6.			
7.			
8.			
9.			
10.			
	25	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- [✓] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [✓] No [ ]

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

SOIL

Sampling Point: 22cW

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
1-0	Leaf Litter							
0-6	10YR 3/2	100					SL	
6-12	2.5Y 3/3	75	10YR 3/3	10		M	SL	
			2.5Y 5/6	15	D	M	SL	
12+	Restrictive Layer	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Ballast

Depth (inches): 12

Hydric Soil Present? Yes ☑ No ☐

Remarks:

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 ☑ Depth (inches): ___

Water Table Present? Yes ☐ No ☑ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ☑ No ☐ Depth (inches): 10

Wetland Hydrology Present? Yes ☑ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 22cU

Investigator(s): David Laiuppa Section, Township, Range: _____

Landform (hillslope, terrace, etc.): edge ballast Local relief (concave, convex, none): none

Slope (%): _____ Lat: _____ Long: _____ Datum: F1303

Soil Map Unit Name: Udorthent NWI classification: _____

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [ ] No [✓]

Are Vegetation No, Soil No, or Hydrology No 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 [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [ ]	No [✓]	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes [ ]	No [✓]	

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

Edge of rail ballast.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Juniperus virginiana	5	N	FACU
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 5 ft)			
1. Andropogon virginicus	25	Y	FACU
2. Verbascum Thapsus	10	N	NI
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	35 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column Totals:	30 (A)		120 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

SOIL

Sampling Point: 22cU

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 3/3	100					S	ballast and fill
3+	Restrictive Layer	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Ballast

Depth (inches): 3

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): ___

Water Table Present? Yes ☐ No ☑ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): ___

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 24W

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): bank of stream Local relief (concave, convex, none): slight concave

Slope (%): Lat: Long: Datum: CE-27-25

Soil Map Unit Name: Udorthent NWI classification: PFO/PSS

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [✓] No [ ]

Hydric Soil Present? Yes [✓] No [ ]

Wetland Hydrology Present? Yes [✓] No [ ]

Is the Sampled Area within a Wetland? Yes [✓] No [ ]

If yes, optional Wetland Site ID: 24

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer platanoides	50	Y	UPL
2. Acer rubrum	25	Y	FAC
3.			
4.			
5.			
	75	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Cornus sericea	5	N	FACW+
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Boehmeria cylindrica	25	Y	FACW+
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		= 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: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	30	x 2 =	60
FAC species	25	x 3 =	75
FACU species	0	x 4 =	0
UPL species	50	x 5 =	250
Column Totals:	105 (A)		385 (B)

Prevalence Index = B/A = 3.7

Hydrophytic Vegetation Indicators:

- [✓] Rapid Test for Hydrophytic Vegetation
- [✓] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [✓] No [ ]

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

SOIL

Sampling Point: 24W

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 %	Type[1]	Loc[2]	Texture	Remarks
0-2	5Y 3/2	80	5Y 5/4	20	D	M	S	
2-8	10YR 4/2	90	10YR 3/1	10	C	M	S	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ No ☐

Remarks:

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 ✔ Depth (inches): _____

Water Table Present? Yes ✔ No ☐ Depth (inches): 6

Saturation Present? (includes capillary fringe) Yes ✔ No ☐ Depth (inches): 4

Wetland Hydrology Present? Yes ✔ No ☐

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

Insert text here...

Remarks:

reset

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region (DRAFT)

Project/Site: New Britain Hartford Busway City/County: Newington/Hartford Sampling Date: 11/10/09

Applicant/Owner: CTDOT State: CT Sampling Point: 24U

Investigator(s): David Laiuppa Section, Township, Range:

Landform (hillslope, terrace, etc.): bank of stream Local relief (concave, convex, none): convex

Slope (%): Lat: Long: Datum: CE-27-25

Soil Map Unit Name: Udorthent NWI classification:

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

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes [✓] No [ ]

Are Vegetation No, Soil No, or Hydrology No 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 [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [ ]	No [✓]	If yes, optional Wetland Site ID:
Wetland Hydrology Present?	Yes [ ]	No [✓]	

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

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer platanoides	50	Y	UPL
2. Ulmus americana	10	N	FACW-
3. Populus deltoides	25	Y	FAC
4.			
5.			
	85	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Toxicodendron radicans	25	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Celastrus orbiculata	5	N	FACU
2. Vitis spp.	25	Y	
	30	= 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	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	50	x 3 =	150
FACU species	5	x 4 =	20
UPL species	50	x 5 =	250
Column Totals:	115 (A)		440 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

- [ ] Rapid Test for Hydrophytic Vegetation
- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] 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.

Hydrophytic Vegetation Present? Yes [ ] No [✓]

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

SOIL

Sampling Point: 24U

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/3	100					fSL	
5-12	10YR 5/4	100					SL	
12-18+	10YR 4/3	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3) **(except MLRA 143)**
- ___ 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) **(Drop in LRR R?)**
- ___ Dark Surface (S7) **(MLRA 149B of LRR S)**
- ___ Polyvalue Below Surface (S8) **(LRR R, S)**
- ___ Thin Dark Surface (S9) **(LRR R, S)**
- ___ 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, S)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12)
- ___ Piedmont Floodplain Soils (F19)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:

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 ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

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

Insert text here...

Remarks:

APPENDIX C - FEDERAL/STATE WETLAND FUNCTION & VALUE ASSESSMENT FORMS

Wetland #: 2

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			MA

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			MA

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	dense phrag
PRINCIPAL FUNCTION? yes no			

Wetland #: 2

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	RR, condos
Buffer width		✓	narrow
Connectivity with other wetlands		NO	
Size of landscape block in which wetland is located		small	
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low None	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	WM
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)		✓	H
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		None	
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		None	
Abundance of invasive exotic flora? (give examples)	none/low	high	Phrag
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	Dense Phrag
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 3 Project: Busway Photograph(s):
Inspection Date: 5/16/03 Weather: Cloudy 55° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			N/A

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	--	fill
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			likely in spring

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			N/A

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 3

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	mod.
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	?
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			? outlet?

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)			
PRINCIPAL FUNCTION? yes no			

Wetland #: 5

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	sediments
Wetland fragmentation by development	little or none	moderate to high	R+S, fill pile
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	
Buffer width		✓	
Connectivity with other wetlands		✓	
Size of landscape block in which wetland is located		small	
Wildlife food sources in wetland	abundant	few	mod.
Interspersion of vegetation & open water	high	low	none
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	WS, WM
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		T, S, SH, H, LL
Wetland plant species diversity	high	low	mod.
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	WM/WS
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		✓	
Abundance of invasive exotic flora? (give examples)	none/low	high	
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	mod.
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	steep adjacent fill slopes
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+		Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 4 Project: Busway Photograph(s):
Inspection Date: 5/16/03 Weather: Cloudy 55° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes (no)			too narrow

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	- ✓	
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	?
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	Culvert
Wetland vegetation density	high	low	mod.
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 4

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	mod. (riffle, run)
Channel alterations (channelization, islands or point bars)	absent or few	numerous	large island
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	likely
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			although impaired

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	mod.
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			too narrow

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	mod.
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			too narrow

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	brambles
PRINCIPAL FUNCTION? yes no			

Wetland #: 4

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	debris
Wetland fragmentation by development	little or none	moderate to high	Rt 9
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	Rt 9
Buffer width		✓	narrow
Connectivity with other wetlands			?
Size of landscape block in which wetland is located			?
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	WS
Vegetation density	high	low	mod.
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		T, SH, H
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	OW/WS
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		✓	
Abundance of invasive exotic flora? (give examples)	none/low	high	Rose
PRINCIPAL FUNCTION? yes no			urban, Rd

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	mod.
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	Rt 9
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	rosebushes
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 5 Project: Broway Photograph(s):
Inspection Date: 5/16/03 Weather: Cloudy 55° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	fill
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			likely

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	—	fill
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			likely in spring

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively ____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	?
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	impervious (Rt 9)
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes likely	no	
% of pond covered by submerged or emergent vegetation	15-40%	other <10%	
Direct stormwater discharge via culvert?	no	yes	?
Sandbar present at inlet(s)	no	yes	?
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			although water quality appears impaired

Wetland #: 5

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	?
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes likely	no	
PRINCIPAL FUNCTION? yes no			

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	mucky soils
PRINCIPAL FUNCTION? yes no			

Wetland #: 5

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	Pond appears aerated
Wetland fragmentation by development	little or none	moderate to high	Rt 9
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		Rt 9	
Buffer width		narrow	
Connectivity with other wetlands			?
Size of landscape block in which wetland is located	large		
Wildlife food sources in wetland	abundant	few	mod
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	mod. (ws/ow)
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		T, SH, H
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	ow/ws
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		✓	
Abundance of invasive exotic flora? (give examples)	none/low	high	mod. (Phrag, Lythrum)
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	mod.
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	mucky soils
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 6 Project: Busway Photograph(s):
Inspection Date: 5/14/03 Weather: Partly Cloudy, 60° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	—	
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			Likely in spring

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 6

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			NA

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	silt loam
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			NA

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)			
PRINCIPAL FUNCTION? yes no			

Wetland #: 6

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	ATV trail
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)	F, S		
Buffer width	wide		
Connectivity with other wetlands		NO	
Size of landscape block in which wetland is located			
Wildlife food sources in wetland	abundant		
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low SS, WM	
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)		SH, H	
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		E	
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		S	
Abundance of invasive exotic flora? (give examples)	none/low	high	Lythrum, Phragmites, Myriophyllum
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	F, S
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)			
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 7 Project: Busway Photograph(s):
Inspection Date: 5/14/03 Weather: Partly cloudy 60° Inspector: E.M. Pawlak
5/16/03

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	till, alluvial
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	— ✓	
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			at toe of slope

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 7

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	few
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	run, riffle, pool
Channel alterations (channelization, islands or point bars)	absent or few	numerous	islands
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	?
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	Caddisflies
PRINCIPAL FUNCTION? yes no			altho impaired

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	likely
PRINCIPAL FUNCTION? yes no			

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	soft mucky areas
PRINCIPAL FUNCTION? yes no			

Wetland #: 7

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	Phrag in ROW
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)	F		
Buffer width			0 - >100'
Connectivity with other wetlands			?
Size of landscape block in which wetland is located	large		
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	WS
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		T, SH, H, LL
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	road line
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		✓	L
Abundance of invasive exotic flora? (give examples)	none/low	high	Phrag, buckthorn
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+		Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	F
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	mucky mb
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+		Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 8 Project: Busway
Inspection Date: 5/14/03 Weather: Partly cloudy, 55°
Photograph(s):
Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	fill
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge		fill
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 8

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	wet loam
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	minimal
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	dense veg.
PRINCIPAL FUNCTION? yes no			

Wetland #: 8

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	Commercial development
Buffer width		✓	narrow
Connectivity with other wetlands		✓ no	
Size of landscape block in which wetland is located		small	
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low M, WS	
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)		H, T, SH	
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		low	
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		✓	
Abundance of invasive exotic flora? (give examples)	none/low	high	
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	Aerial obj.
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 9 Project: Busway Photograph(s):
Inspection Date: 5/16/03 Weather: Partly cloudy 55° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	Organic
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	---	Organic
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	mod.
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	mod.
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 9

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	mod.
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	mucky soils
PRINCIPAL FUNCTION? yes no			

Wetland #: 9

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	industrial, RR
Buffer width		✓	
Connectivity with other wetlands			?
Size of landscape block in which wetland is located	✓		
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	mod.
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	mod. (WS, OW)
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		T, S, SH, H
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	low (WS, OW)
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)	✓		S, L,
Abundance of invasive exotic flora? (give examples)	none/low	high	mod (phrag)
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	mod
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	industrial, RR
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	soft mucky soils
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 10, 11 Project: Brown Photograph(s):
Inspection Date: 5/16/03 Weather: Partly cloudy 55° Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	fill
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge		fill
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes None	no	
Wetland vegetation density	high	low	mod
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no #11 only			det. basin

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 10/11

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	mod.
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes partially	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			N/A

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)			
PRINCIPAL FUNCTION? yes no			

Wetland #: 10/11

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	created wetland
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		developed	
Buffer width		narrow	
Connectivity with other wetlands			
Size of landscape block in which wetland is located		small	
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	WM
Vegetation density	high	low	mod
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)			H
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)			
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		None	
Abundance of invasive exotic flora? (give examples)	none/low	high	
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)			
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 13 Project: Brewing Photograph(s):
Inspection Date: 3/27/03 Weather: Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	? till
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	—	? till
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	?
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	mod.
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			NA

Wetland #: 13

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			NA

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	mod.
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	mod.
Vegetation density	high	low	mod.
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	low
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			NA

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	open water
PRINCIPAL FUNCTION? yes no			

Wetland #: 13

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	created detent in basin
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		Lawn	
Buffer width		✓	narrow
Connectivity with other wetlands		✓	no
Size of landscape block in which wetland is located		✓	small
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	OW
Vegetation density	high	low	mod.
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)		✓	H
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	OW/L
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		✓	no
Abundance of invasive exotic flora? (give examples)	none/low	high	
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	open water
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 14 Project: Busway Photograph(s):
Inspection Date: 3/27/03 Weather: Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	Till ?
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	---	?
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	?
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	Blocked Culverts
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 14

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	mucky waterlogged soils, dense brush
PRINCIPAL FUNCTION? yes no			

Wetland #: 14

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	residential development
Buffer width		✓	narrow
Connectivity with other wetlands			?
Size of landscape block in which wetland is located	✓		large
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	WS, WM, SS
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		T, SH, H
Wetland plant species diversity	high	low	mod
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)	✓		WS/WM/SS
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		✓	
Abundance of invasive exotic flora? (give examples)	none/low	high	
PRINCIPAL FUNCTION? yes no			altho impaired

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	development
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)	✓		soft mucky soils, dense brush
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 17 Project: Brown Photograph(s):
Inspection Date: 3/27/03 Weather: Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	Fill
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	—	Fill
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	culvert
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			Too narrow to retain significant storm flows

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			NA

Wetland #: 17

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			not narrow

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	?
PRINCIPAL FUNCTION? yes no			

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	steep slope
PRINCIPAL FUNCTION? yes no			

Wetland #: 17

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	development
Buffer width		✓	narrow
Connectivity with other wetlands		✓	
Size of landscape block in which wetland is located		✓	
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low none	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low WS	
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)		T, SH	
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		✓	
Abundance of invasive exotic flora? (give examples)	none/low	high	
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	steep slopes
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

16, 15, 12
18, 19, 20, 21,
Wetland #: 22, 23 Project: Brown Photograph(s):
Inspection Date: 3/27/03 Weather: Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	Till
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	—	Till
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no NO outlet	
Wetland vegetation density	high	low	mod
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			too small

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

16, 15, 12
18, 19, 20, 21, 22, 23
Wetland #:

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	mod.
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

→ except Wetland 12

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			N/A

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)			
PRINCIPAL FUNCTION? yes no			

16, 15, 12
18, 19, 20, 21,
Wetland #: 22, 23

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	
Buffer width		✓	
Connectivity with other wetlands		✓	
Size of landscape block in which wetland is located		✓	
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	mod.
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	M
Vegetation density	high	low	mod.
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)		✓	SH, H
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		✓	
Abundance of invasive exotic flora? (give examples)	none/low	high	Phrag
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)			
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 24 Project: Busway Photograph(s):
Inspection Date: 3/27/03 Weather: Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	Till, alluvial
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	-	Till, alluvial
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	Culvert
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			Flat, narrow, steep

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			N/A

Wetland #: 24

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	mod
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	mod.
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	mod.
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			for Lunar

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	steep side slopes
PRINCIPAL FUNCTION? yes no			

Wetland #: 24

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	L
Buffer width		✓	narrow
Connectivity with other wetlands		✓	NO
Size of landscape block in which wetland is located		✓	small
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	WS
Vegetation density	high	low	mod
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)		✓	T
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	WS/L
Water regime	wetter	drier ✓	
Habitat features (S=snags L=fallen logs S=seep/spring)			
Abundance of invasive exotic flora? (give examples)	none/low	high	
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	L
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		X	steep slope, fence
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland #: 25 Project: Busway Photograph(s):
Inspection Date: 3/27/03 Weather: Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	fill?
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			for small

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	—	fill?
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	
Wetland outlet constricted?	yes	no NO outlet	
Wetland vegetation density	high	low	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			for small

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			NP

Wetland #: 25

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			N/A

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	fill?
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			Too small

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			N/A

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)			
PRINCIPAL FUNCTION? yes no			

Wetland #: 25

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	L
Buffer width		✓	narrow
Connectivity with other wetlands		✓	no
Size of landscape block in which wetland is located		✓	small
Wildlife food sources in wetland	abundant	few	
Interspersion of vegetation & open water	high	low NONE	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	WM
Vegetation density	high	low	
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)		✓	H
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs S=seep/spring)		NO	
Abundance of invasive exotic flora? (give examples)	none/low	high	
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	WM
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	L
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)	✓		
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland Data Sheet

Project Busws Date 12/15/06 Wetland # 50 – flags (Wetland #27)
Weather 8 cloudy 50-55 F Time Start _____ Stop _____
Recent Precipitation: Below average Average Above average

Wildlife Investigation Method(s)
Cover search Dip netting Auditory songs/calls Scat Tracks Minnow traps

Wetland Type(s) (Golet 1973 classification)

Class	Subclass
Open Water	Vegetated Non-vegetated
Deep Marsh	Dead woody Shrub Sub-shrub Robust Narrow-leaved Broad-leaved
Shallow Marsh	Robust Narrow-leaved Broad-leaved Floating-leaved
Seasonally Flooded Flats	Emergent Shrub
Wet Meadow	Ungrazed Grazed
Shrub Swamp	Sapling Bushy Compact Aquatic
Wooded Swamp	Deciduous Evergreen
Bog	Compact shrub Bushy shrub Wooded Emergent

Water Regime(s)
Permanently Flooded (water covers land surface throughout year in all years)
Intermittently Exposed (surface water present throughout year except in years of extreme drought)
Semipermanently Flooded (surface water persists throughout growing season in most years)
Seasonally Flooded (surface water present for extended periods, especially early in growing season, but is absent by end of season in most years)
Seasonally Saturated (soils saturated to surface, especially early in growing season, but are unsaturated by end of season in most years; surface water absent except for ground water seepage and overland flow)
Temporarily Flooded (surface water present for brief periods during growing season, but water table usually lies well below soil surface for most of the season)
Intermittently Flooded (substrate usually exposed, but surface water is present for variable periods without detectable seasonal periodicity)
Artificially Flooded (amount/duration of flooding controlled by dikes, dams, pumps, etc.)

Hydrology
Ground water discharges present? yes no
Surface water depth: 0-2 " average 2 " maximum

Soils
Drainage Class(es): Well Moderately Poorly Very Poorly
Parent Material(s): Glacial till Outwash Glaciolacustrine Alluvial Organic

Slope Nearly level Gentle Moderate Steep

Upland Review Area (URA)
Slope: Nearly level Gentle Moderate Steep Road, Retaining wall
Cover Type(s): Mature forest Sapling forest Shrub thicket Meadow Mowed lawn Farm
Vegetation density: Trees____ Saplings____ Shrubs____ Herbs____ Grass✓
Leaf litter: Well-developed Moderately well-developed Absent
Cover objects: Logs___ Bark___ Boulders/Rocks___
Evidence of erosion? No Yes (explain) from Rt 6 embankment

Wetland #: #27 Project: Photograph(s):
Inspection Date: Weather: Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			low groundwater

GROUNDWATER DISCHARGE

Criteria	+ fine sand silt	-	Comments
Soils	hardpan, shallow ledge	---	
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively _____.	large	small	
Amount of impervious surface in wetland watershed	large	small	
Wetland slope	gentle	steep	
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	?
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	mod
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			

Wetland #: 27

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	?
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	
Bank stability	stable mostly	unstable, eroding	
Bank vegetative cover	high (trees, shrubs)	low	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor Phrag	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no	pot important		

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	mod
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	Si/O
Wetland basin topographic gradient	low	high	
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	
Vegetation density	high	low	mod
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	
PRINCIPAL FUNCTION? yes no			

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)			
PRINCIPAL FUNCTION? yes no			

Wetland #: 27

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	
Buffer width		✓	
Connectivity with other wetlands			?
Size of landscape block in which wetland is located		✓	
Wildlife food sources in wetland	abundant	few	?
Interspersion of vegetation & open water	high	low	
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	
Vegetation density	high	low	mod
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)	✓		
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)			SM/SS, SS/WS
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs SE=seep/spring)			
Cover objects (L=logs/branches R=rocks B=bark)	abundant	few	
Flat rocks in/near watercourse (stream salamanders)	present	absent	
Sphagnum hummocks next to shallow pools?	present	absent	
Bare well drained sandy soils near wetland (turtle nest site)	present	absent	
Abundance of invasive exotic flora? (give examples)	none/low	high	mod (rose)
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	?
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		?	Unstable soils
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	?
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

Wetland Data Sheet

Project Busway Date 12/20/06 Wetland # 29 (53- & 54- Flags)
Weather _____ Time Start _____ Stop _____
Recent Precipitation: Below average Average (Above average)

Wildlife Investigation Method(s)
(Cover search) Dip netting (Auditory songs/calls) (Scat) (Tracks) Minnow traps

Wetland Type(s) (Golet 1973 classification)

Class	Subclass
Open Water	Vegetated Non-vegetated
Deep Marsh	Dead woody Shrub Sub-shrub Robust Narrow-leaved Broad-leaved
Shallow Marsh	Robust Narrow-leaved Broad-leaved Floating-leaved
Seasonally Flooded Flats	Emergent Shrub
Wet Meadow	Ungrazed Grazed
Shrub Swamp	~~Sapling~~ Bushy Compact Aquatic
Wooded Swamp	(Deciduous) Evergreen
Bog	Compact shrub Bushy shrub Wooded Emergent

Water Regime(s)
Permanently Flooded (water covers land surface throughout year in all years)
Intermittently Exposed (surface water present throughout year except in years of extreme drought)
Semipermanently Flooded (surface water persists throughout growing season in most years)
Seasonally Flooded (surface water present for extended periods, especially early in growing season, but is absent by end of season in most years)
Seasonally Saturated (soils saturated to surface, especially early in growing season, but are unsaturated by end of season in most years; surface water absent except for ground water seepage and overland flow)
Temporarily Flooded (surface water present for brief periods during growing season, but water table usually lies well below soil surface for most of the season)
Intermittently Flooded (substrate usually exposed, but surface water is present for variable periods without detectable seasonal periodicity)
Artificially Flooded (amount/duration of flooding controlled by dikes, dams, pumps, etc.)

Hydrology
Ground water discharges present? yes (no)
Surface water depth: 0 " average 0 " maximum

Soils
Drainage Class(es): Well Moderately (Poorly) Very Poorly
Parent Material(s): Glacial till Outwash Glaciolacustrine (Alluvial) Organic

Slope Nearly level Gentle (Moderate) Steep

Upland Review Area (URA)
Slope: Nearly level Gentle ~~Moderate~~ (Steep)
Cover Type(s): Mature forest (Sapling forest) (Shrub thicket) Meadow Mowed lawn Farm
Vegetation density: Trees____ Saplings✓ Shrubs____ Herbs✓ Grass____
Leaf litter: Well-developed Moderately well-developed (Absent)
Cover objects: Logs___ Bark___ Boulders/Rocks___
Evidence of erosion? (No) Yes (explain)

Wetland #: 29 Project: Busway Photograph(s):
Inspection Date: 12/20/06 Weather: Inspector: E.M. Pawlak

GROUNDWATER RECHARGE (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Soils	sand/gravel outwash	hardpan, tight fine-grained soils, shallow ledge	
Wetland associated with perennial or seasonal watercourse?	yes	no	
Slope	gentle	moderate or steep	
PRINCIPAL FUNCTION? yes no			

GROUNDWATER DISCHARGE

Criteria	+	-	Comments
Soils	hardpan, shallow ledge	alluvial	
Seeps, springs observed?	yes	no	
Wetland microrelief	well developed	none/poorly developed	
Wetland contains an outlet but no inlet?	yes	no	
PRINCIPAL FUNCTION? yes no			

FLOODFLOW ALTERATION (Excluding Condition: Slope Wetland)

Criteria	+	-	Comments
Area of wetland is relatively ____.	large	small	narrow but long
Amount of impervious surface in wetland watershed	large very	small	
Wetland slope	gentle	steep	moderate
Wetland characterized by variable water level?	yes	no	
Wetland in floodplain of adjacent watercourse?	yes	no	
Valuable properties, structures or resources located in or near floodplain downstream from wetland?	yes	no	
Watershed has a history of economic loss due to flooding?	yes	no	
Wetland outlet constricted?	yes	no	
Wetland vegetation density	high	low	moderate
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

FINFISH HABITAT: PONDS/LAKES (Excluding Condition: Wetland not associated with a pond or lake)

Criteria	+	-	Comments
Dominant land use adjacent to waterbody	forest, shrub, meadow	lawn	
Shallow littoral zone with emergent vegetation present?	yes	no	
Waterbody at least 10' deep?	yes	no	
% of pond covered by submerged or emergent vegetation	15-40%	other	
Direct stormwater discharge via culvert?	no	yes	
Sandbar present at inlet(s)	no	yes	
Water transparency	high	low	
Significant nutrient sources (fertilizers, waterfowl) present in watershed?	no	yes	
Pond size ≥ 0.5 acre?	yes	no	
Pond experiences dense algal blooms, nuisance aquatic vegetation, or duckweed?	no	yes	
PRINCIPAL FUNCTION? yes no			

Wetland #: 29

FINFISH HABITAT: STREAMS/RIVERS (Excluding Condition: Wetland not associated with perennial stream)

Criteria	+	-	Comments
Channel shaded by riparian trees and/or shrubs?	yes	no	
Gravel spawning areas present?	yes	no	
Barriers to anadromous fish (dams, high culverts) present in stream reach?	no	yes	
Dominant bottom substrate	gravel/cobbles	sand/silt	
Substrate embeddedness by sand & silt	low	high	
Instream habitat diversity (riffle, run, pool, shallow, deep)	high	low	
Channel alterations (channelization, islands or point bars)	absent or few	numerous	upstream of bridge
Bank stability	stable	unstable, eroding	w/ rip rap
Bank vegetative cover	high (trees, shrubs)	few trees	
Cover objects (fallen logs, boulders, undercut banks)	many	absent or few	
Riparian zone	wide	narrow	
Watershed development	low	high	
Water quality	good	poor likely	
Pollution tolerance of benthic macroinvertebrate taxa	mostly intolerant	mostly tolerant	
PRINCIPAL FUNCTION? yes no			But likely highly impacted

SEDIMENT, POLLUTANT & NUTRIENT REMOVAL

Criteria	+	-	Comments
Duration of water retention in wetland	long	short	
Wetland edge broad & intermittently aerobic?	yes	no	
Drainage ditches constructed in wetland?	no	yes	
Water flow through wetland	diffuse	channelized	
Vegetation density	high	low	moderate
Evidence of sediment trapping in wetland?	yes	no	
Ponded water present in wetland?	yes	no	
Alluvial soils present?	yes	no	
Soil type	organic/high clay content	sand/gravel	
Wetland basin topographic gradient	low	high	moderate
Wetland microrelief	well developed	none/poorly developed	
PRINCIPAL FUNCTION? yes no			

PRODUCTION EXPORT (Excluding Condition: No outlet)

Criteria	+	-	Comments
Wildlife food sources in wetland	abundant	few	moderate
Vegetation density	high	low	moderate
Nutrients flushed out of wetland into watercourse?	yes	no	
Evidence of wildlife use in wetland?	yes	no	
Fish or shellfish develop/occur in wetland?	yes	no	likely
PRINCIPAL FUNCTION? yes no			wetland very narrow

RECREATION

Criteria	+	-	Comments
Wetland is part of a recreation area, park, refuge, etc.	yes	no	
Fishing is available in or from the wetland	yes	no	
Hunting is permitted in wetland	yes	no	
Hiking occurs or has potential to occur in wetland	yes	no	
Wetland is a valuable wildlife habitat	yes	no	
Wetland has high visual/aesthetic quality	yes	no	
Boating or canoeing feasible in wetland	yes	no	
Off-road public parking near wetland available	yes	no	
Safety hazards (if present, list them)		✓	steep banks
PRINCIPAL FUNCTION? yes no			

Wetland #: 29

WILDLIFE HABITAT

Criteria	+	-	Comments
Wetland degradation by human activity	little or none	moderate to high	
Wetland fragmentation by development	little or none	moderate to high	
Buffer (F=forest M=meadow S=sapling/shrub thicket L=lawn A=agricultural)		✓	
Buffer width		✓	narrow to the south
Connectivity with other wetlands			?
Size of landscape block in which wetland is located		✓	
Wildlife food sources in wetland	abundant	few	moderate
Interspersion of vegetation & open water	high	low	none
Upland islands	present	absent	
Wetland class diversity (WS=wooded swamp SS=shrub swamp M=marsh WM=wet meadow OW=open water)	high	low	
Vegetation density	high	low	moderate
Vegetation strata (T=tree S=sapling SH=shrub V=vine H=herbaceous LL=leaf litter)		✓	
Wetland plant species diversity	high	low	
Vernal pool?	yes	no	
Edge diversity (list types, including upland cover types)		✓	WS/F
Water regime	wetter	drier	
Habitat features (S=snags L=fallen logs SE=seep/spring)		✓	
Cover objects (L=logs/branches R=rocks B=bark)	abundant	few	
Flat rocks in/near watercourse (stream salamanders)	present	absent	
Sphagnum hummocks next to shallow pools?	present	absent	
Bare well drained sandy soils near wetland (turtle nest site)	present	absent	
Abundance of invasive exotic flora? (give examples)	none/low	high	purple loosestrife
PRINCIPAL FUNCTION? yes no			

EDUCATIONAL/SCIENTIFIC VALUE

Criteria	+	-	Comments
Wetland contains listed species	yes	no	
Wetland provides valuable wildlife habitat	yes	no	
Wetland class diversity	high	low	
Adjacent upland cover types (F=forest M=meadow S=sapling/shrub thicket A=agricultural)	high	low	
Off-road parking near wetland available	yes	no	
Proximity to schools	near	far	
Wetland contains perennial watercourse	yes	no	
Wetland contains pond/lake	yes	no	
Safety hazards (if present, list them)		✓	steep slope
Site currently used for educational/scientific purposes	yes	no	
PRINCIPAL FUNCTION? yes no			

UNIQUENESS/HERITAGE

Criteria	+		Comments
Wetland contains listed species	yes	no	
Wetland identified as exemplary natural community	yes	no	
Wetland locally/regionally significant (explain)			
PRINCIPAL FUNCTION? yes no			

Notes

New Britain-Hartford Busway
WETLANDS EVALUATION

WETLAND FUNCTION-VALUE ASSESSMENTS

WETLAND I.D. 6E

Prepared by: David Laiuppa DATE: 06/01/09

TOTAL APPROXIMATE AREA OF WETLAND: 0.011 ac IS WETLAND PART OF A WILDLIFE CORRIDOR? Yes OR A "HABITAT ISLAND"? No

ADJACENT LAND USE? Abandoned rail/industrial buildings/active r MAN MADE? No DISTANCE TO NEAREST ROADWAY OR OTHER DEVELOPMENT ~15 feet

DOMINANT WETLAND SYSTEMS PRESENT State only regulated forested floodplain, primarily upland vegetation CONTIGUOUS UNDEVELOPED BUFFER ZONE PRESENT Yes

IS THE WETLAND A SEPARATE HYDRAULIC SYSTEM? Yes IF NOT, WHERE DOES THE WETLAND LIE IN THE DRAINAGE BASIN? _____

HOW MANY TRIBUTARIES CONTRIBUTE TO THE WETLAND? 0 AQUATIC DIVERSITY/ABUNDANCE No VEGETATIVE DIVERSITY/ABUNDANCE Yes

WILDLIFE DIVERSITY/ABUNDANCE No ANTICIPATED IMPACTS Yes WETLAND AREA IMPACTED: noted in permit application

FUNCTION	Occurrence Y	Occurrence N	Rationale (NUMBER)	Principal Function(s)	Comments	ACOE
Groundwater Recharge/Discharge	X		6,8,15	X	Evidence of recharge	
Floodflow Alteration	X		3,4,5,6,7,8,9,10,11,14,15,16	X	Wetlad is the floodplain area west of Piper Brook	
Sediment/Shoreline Stabilization		X	1,2,6,9,14		delineated portion of wetland far removed from Piper Brook channel	
Sediment/Toxicant Retention	X		1,2,4,5,6,8,10,12	X	Neraby sources of sediments and toxicants	
Nutrient Removal (Retention/Transformation)		X	7,8,12		Few upslope sources of nutrients	
Production Export (Nutrient)		X	7		No food producing plants	
Fish & Shellfish Habitat		X			No perennial source of water within delineated area	
Wildlife Habitat	X		3,5,6,7,9,10,11,13,14,15	X	Large area, plenty of cover and water	
Endangered Species Habitat		X			No endangered species (per DEP 2009)	
Visual Quality/Aesthetics		X	1,3,6,11,12		No public access	
Educational Scientific Value		X	14		No public access	
Recreation ((Non)Consumptive)		X	12		No public access	
Uniqueness/Heritage		X			Not unique or historic	

NOTES:

New Britain-Hartford Busway
WETLANDS EVALUATION

WETLAND FUNCTION-VALUE ASSESSMENTS

WETLAND I.D. 7B

Prepared by: David Laiuppa DATE: 06/01/09

TOTAL APPROXIMATE AREA OF WETLAND: > 100 ac IS WETLAND PART OF A WILDLIFE CORRIDOR? Yes OR A "HABITAT ISLAND"? No

ADJACENT LAND USE? Abandoned rail/industrial buildings/active r MAN MADE? No DISTANCE TO NEAREST ROADWAY OR OTHER DEVELOPMENT ~15 feet

DOMINANT WETLAND SYSTEMS PRESENT State only regulated forested floodplain, primarily upland vegetation CONTIGUOUS UNDEVELOPED BUFFER ZONE PRESENT Yes

IS THE WETLAND A SEPARATE HYDRAULIC SYSTEM? No IF NOT, WHERE DOES THE WETLAND LIE IN THE DRAINAGE BASIN? Middle

HOW MANY TRIBUTARIES CONTRIBUTE TO THE WETLAND? 1 AQUATIC DIVERSITY/ABUNDANCE No VEGETATIVE DIVERSITY/ABUNDANCE Yes

WILDLIFE DIVERSITY/ABUNDANCE No ANTICIPATED IMPACTS Yes WETLAND AREA IMPACTED: noted in permit application

FUNCTION	Occurrence Y	Occurrence N	Rationale (NUMBER)	Principal Function(s)	Comments	ACOE
Groundwater Recharge/Discharge	X		6,7,8,15	X	Evidence of recharge	
Floodflow Alteration	X		3,4,5,6,7,8,9,10,11,14,15,16	X	Wetlad is the floodplain area west of Piper Brook	
Sediment/Shoreline Stabilization		X	1,2,6,9		vegetation density low along stream banks	
Sediment/Toxicant Retention	X		1,2,4,5,6,8,10	X	Neraby sources of sediments and toxicants	
Nutrient Removal (Retention/Transformation)		X	7,8,12		Few upslope sources of nutrients	
Production Export (Nutrient)		X	7		No food producing plants	
Fish & Shellfish Habitat		X			No perennial source of water within delineated area	
Wildlife Habitat	X		3,5,6,7,9,10,11,13,14,15	X	Large area, Plenty of cover and water	
Endangered Species Habitat		X			No endangered species (per DEP 2009)	
Visual Quality/Aesthetics		X	1,3,6,11,12		No public access	
Educational Scientific Value		X	14		No public access	
Recreation ((Non)Consumptive)		X	12		No public access	
Uniqueness/Heritage		X			Not unique or historic	

NOTES:

New Britain-Hartford Busway
WETLANDS EVALUATION

WETLAND FUNCTION-VALUE ASSESSMENTS

WETLAND I.D. Various IWCs - see notes

Prepared by: David Laiuppa DATE: 06/19/09

TOTAL APPROXIMATE AREA OF WETLAND: _____ IS WETLAND PART OF A WILDLIFE CORRIDOR? No OR A "HABITAT ISLAND"? No

ADJACENT LAND USE? Active rail MAN MADE? No DISTANCE TO NEAREST ROADWAY OR OTHER DEVELOPMENT ~5 to 10 feet

DOMINANT WETLAND SYSTEMS PRESENT _____ CONTIGUOUS UNDEVELOPED BUFFER ZONE PRESENT No

IS THE WETLAND A SEPARATE HYDRAULIC SYSTEM? Yes IF NOT, WHERE DOES THE WETLAND LIE IN THE DRAINAGE BASIN? _____

HOW MANY TRIBUTARIES CONTRIBUTE TO THE WETLAND? 0 AQUATIC DIVERSITY/ABUNDANCE No VEGETATIVE DIVERSITY/ABUNDANCE No

WILDLIFE DIVERSITY/ABUNDANCE No ANTICIPATED IMPACTS Yes WETLAND AREA IMPACTED: See impact table

FUNCTION	Occurrence Y	Occurrence N	Rationale (NUMBER)	Principal Function(s)	Comments	ACOE
Groundwater Recharge/Discharge	X		4,6,8,15	X	Evidence of groundwater recharge	
Floodflow Alteration		X	4,5,7,9		Minimal collection from surroundings, too small, no watercourse	
Sediment/Shoreline Stabilization		X	3		no watercourse	
Sediment/Toxicant Retention	X		1,2,4,5	X	Potential sediment & toxicant source at active rail	
Nutrient Removal (Retention/Transformation)		X	3,7		Few upslope sources of nutrients	
Production Export (Nutrient)		X			No food producing plants	
Fish & Shellfish Habitat		X			No perennial source of water	
Wildlife Habitat		X			Lots of nearby traffic/noise, very small area, no food, no cover	
Endangered Species Habitat		X			No endangered species (per DEP 2009)	
Visual Quality/Aesthetics		X	6,11		Located on edge of rail - excessive noise - no public access	
Educational Scientific Value		X	14		No public access	
Recreation ((Non)Consumptive)		X	12		No public access	
Uniqueness/Heritage		X			Not unique or historic	

NOTES:

This form is representative of IWCs 2-1to2-7, 4a, 3a, 6-8 to 6-2, 8-28 to 8-8, 10-2 to 10-7, 13-1 to 13-8, 14-1 to 14-6, 14b, 14d, 14e, 15-5 to 15-1

New Britain-Hartford Busway
WETLANDS EVALUATION

WETLAND FUNCTION-VALUE ASSESSMENTS

WETLAND I.D. Various IWCs - see notes

Prepared by: David Laiuppa DATE: 06/19/09

TOTAL APPROXIMATE AREA OF WETLAND: _____ IS WETLAND PART OF A WILDLIFE CORRIDOR? No OR A "HABITAT ISLAND"? No

ADJACENT LAND USE? Active rail MAN MADE? No DISTANCE TO NEAREST ROADWAY OR OTHER DEVELOPMENT ~5 to 10 feet

DOMINANT WETLAND SYSTEMS PRESENT _____ CONTIGUOUS UNDEVELOPED BUFFER ZONE PRESENT No

IS THE WETLAND A SEPARATE HYDRAULIC SYSTEM? Yes IF NOT, WHERE DOES THE WETLAND LIE IN THE DRAINAGE BASIN? _____

HOW MANY TRIBUTARIES CONTRIBUTE TO THE WETLAND? 0 AQUATIC DIVERSITY/ABUNDANCE No VEGETATIVE DIVERSITY/ABUNDANCE No

WILDLIFE DIVERSITY/ABUNDANCE No ANTICIPATED IMPACTS Yes WETLAND AREA IMPACTED: See impact table

FUNCTION	Occurrence Y	Occurrence N	Rationale (NUMBER)	Principal Function(s)	Comments	ACOE
Groundwater Recharge/Discharge		X	4,6		No evidence of recharge or discharge	
Floodflow Alteration		X	4,5,7,9		Minimal collection from surroundings, too small, no watercourse	
Sediment/Shoreline Stabilization		X	3		no watercourse	
Sediment/Toxicant Retention	X		1,2,4,5	X	Potential sediment & toxicant source at active rail	
Nutrient Removal (Retention/Transformation)		X	3,7		Few upslope sources of nutrients	
Production Export (Nutrient)		X			No food producing plants	
Fish & Shellfish Habitat		X			No perennial source of water	
Wildlife Habitat		X			Lots of nearby traffic/noise, very small area, no food, no cover	
Endangered Species Habitat		X			No endangered species (per DEP 2009)	
Visual Quality/Aesthetics		X	6,11		Located on edge of rail - excessive noise - no public access	
Educational Scientific Value		X	14		No public access	
Recreation ((Non)Consumptive)		X	12		No public access	
Uniqueness/Heritage		X			Not unique or historic	

NOTES:

This form is representative of IWCs 1-1 to 1-4, 3-2 to 3-3, 4-1 to 4-11, 5-1 to 5-5

New Britain-Hartford Busway
WETLANDS EVALUATION

WETLAND FUNCTION-VALUE ASSESSMENTS

WETLAND I.D. Various IWCs - see notes

Prepared by: David Laiuppa DATE: 06/19/09

TOTAL APPROXIMATE AREA OF WETLAND: _____ IS WETLAND PART OF A WILDLIFE CORRIDOR? No OR A "HABITAT ISLAND"? No

ADJACENT LAND USE? Active rail MAN MADE? No DISTANCE TO NEAREST ROADWAY OR OTHER DEVELOPMENT ~5 to 10 feet

DOMINANT WETLAND SYSTEMS PRESENT _____ CONTIGUOUS UNDEVELOPED BUFFER ZONE PRESENT No

IS THE WETLAND A SEPARATE HYDRAULIC SYSTEM? Yes IF NOT, WHERE DOES THE WETLAND LIE IN THE DRAINAGE BASIN? _____

HOW MANY TRIBUTARIES CONTRIBUTE TO THE WETLAND? 0 AQUATIC DIVERSITY/ABUNDANCE No VEGETATIVE DIVERSITY/ABUNDANCE No

WILDLIFE DIVERSITY/ABUNDANCE No ANTICIPATED IMPACTS Yes WETLAND AREA IMPACTED: See impact table

FUNCTION	Occurrence Y	Occurrence N	Rationale (NUMBER)	Principal Function(s)	Comments	ACOE
Groundwater Recharge/Discharge		X	4,6		No evidence of recharge or discharge	
Floodflow Alteration		X	4,5,7,9		Minimal collection from surroundings, too small, no watercourse	
Sediment/Shoreline Stabilization		X	3		no watercourse	
Sediment/Toxicant Retention		X	4,5		System too degraded to retain toxicants or sediment	
Nutrient Removal (Retention/Transformation)		X	3,7		Few upslope sources of nutrients	
Production Export (Nutrient)		X			No food producing plants	
Fish & Shellfish Habitat		X			No perennial source of water	
Wildlife Habitat		X			Lots of nearby traffic/noise, very small area, no food, no cover	
Endangered Species Habitat		X			No endangered species (per DEP 2009)	
Visual Quality/Aesthetics		X	6,11		Located on edge of rail - excessive noise - no public access	
Educational Scientific Value		X	14		No public access	
Recreation ((Non)Consumptive)		X	12		No public access	
Uniqueness/Heritage		X			Not unique or historic	

NOTES:

This form is representative of IWCs 12-1 to 12-3, 11-1 to 11-4, 11b, 14c, 14f
These systems are all degraded by debris fill and/or pollutants

APPENDIX D – VERNAL POOL SURVEY

Connecticut Ecosystems LLC
• Wetland Delineation • Wetland & Aquatic Evaluation • Mitigation
• Natural Resource Inventory • Permit Assistance • Expert Testimony

January 4, 2008

Baker Engineering
Attn.: Mr. Tony Morelli
2096-B Silas Deane Highway
Rocky Hill, CT 06067

Re: ***New Britain-Hartford Busway***
State Project No. 171-305
Vernal Pool Survey

Dear Tony:

On May 2, 2007 I conducted a vernal pool and mitigation site survey of a section of the proposed New Britain-Hartford Busway corridor. The survey was requested by the U.S. Army Corps of Engineers and other Federal resource agencies at a coordination meeting held on April 19, 2007. Per their instructions, the survey was limited to wetlands that lie within 300± feet of the Busway corridor between Route 9, just north of the East Street Station and Route 173 (Willard Avenue), just south of the Newington Junction Station (see sketch map). The resource agencies judged that the landscape of the remaining Busway corridor was too fragmented to support vernal pool species.

The Army Corps of Engineers Programmatic General Permit defines a vernal pool as:

> *"an often temporary body of water occurring in a shallow depression of natural or human origin that fills during spring rains and snow melt and typically dries up during summer months. Vernal pools support populations of species specially adapted to reproducing in these habitats. Such species may include wood frogs, mole salamanders (Ambystoma sp.), fairy shrimp, fingernail clams, and other amphibians, reptiles and invertebrates. Vernal pools lack breeding populations of fish."*

At the time of my inspection vernal pools in central Connecticut still contained unhatched spotted salamander egg masses, and wood frog eggs had recently hatched, but very small tadpoles were evident. Thus, the survey was conducted at a time when vernal pool identification was feasible. The survey methodology consisted of wading in the shallow waters of any wetlands in the study area that were inundated, and searching for obligate species both visually and by sampling with an aquatic net.

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A total of seven wetlands or watercourse contained sufficient inundation to warrant investigation (see sketch map and Table 1). Two are permanent ponds (#5 and 9) and the remainder are areas of swamp characterized by shallow springtime inundation. A thorough search revealed no vernal pool obligate species in any of these resources. Thus, none of these were determined to be vernal pools. This is not surprising, since even if these areas are inundated for 2-3 months (which is unlikely for the five swamp areas), the surrounding landscape is highly fragmented and likely incompatible with the habitat requirements of vernal pool amphibians. Additionally, most of these inundated areas exhibited water quality impairments (e.g., very high turbidity, algal blooms, anoxic sediments) that may preclude most amphibian species from colonizing them.

Descriptions and photographs of the wetlands that I surveyed are attached. Additional information on these wetlands is found in reports previously prepared by Connecticut Ecosystems in 2003 and 2007.

Please do not hesitate to contact me if you have any questions regarding this correspondence.

Very truly yours,

Connecticut Ecosystems LLC

Edward M. Pawlak
Registered Soil Scientist
Certified Professional Wetland Scientist

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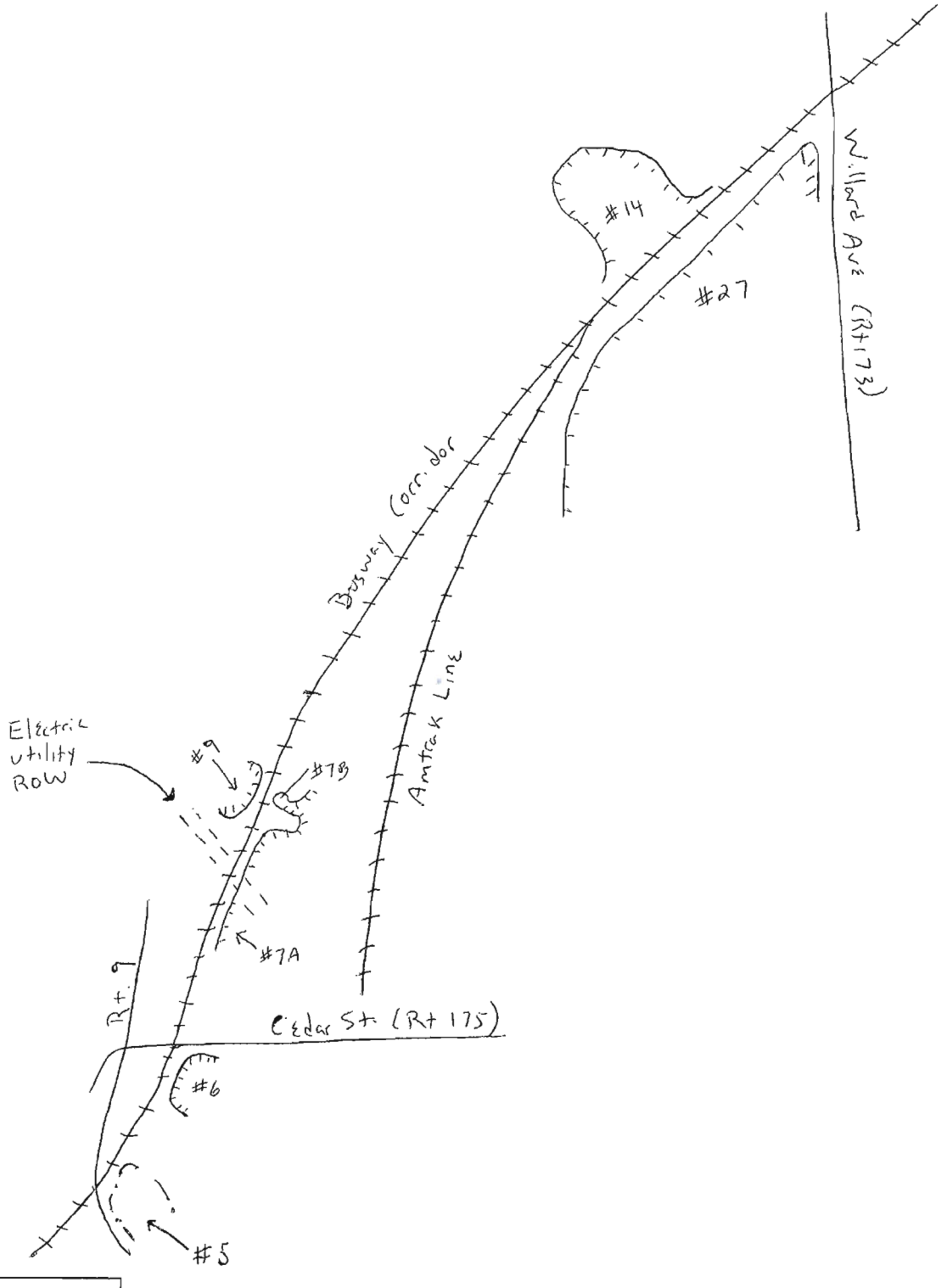
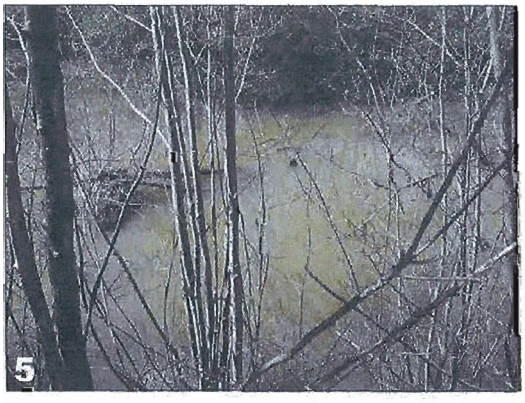
Table 1. Wetland Descriptions		
Wetland #	**Dominant Vegetation**	**Notes**
5	Alder	Open water permanent pond. Canada goose, green-backed heron, swallows, yellow warbler, beaver present.
6	Purple loosestrife, multiflora rose, gray dogwood	No surface water present. Bordered to the south by a shrubby old field.
7A (immediately south of electric utility ROW)	Red maple saplings, skunk cabbage, tussock sedge, jewelweed	A matrix of shallow water (5") surrounding dense vegetation on hummocks. Adult green frogs present.
7B (near flags 10-11 thru 10-18)	---	7" deep water column that is filled to the surface with fallen leaves. Brown and green algae abundant in the water column. Sediments are soft and anoxic. No amphibians present.
9	---	Small pond between railroad tracks and industrial building. Contains chocolate brown water that obscures view of the water column. Proximity to RR tracks and building makes it extremely unlikely that this area is a vernal pool. Painted turtles and warbling vireos present.
14	Red maple, silky dogwood, tussock sedge	Located south of Route 173 and west of RR tracks. Bordered to the west by houses. Consists of red maple swamp bordered to the north by a shallow marsh. Neither of these zones contained ponded water. Intermittent watercourses drain out of both zones.
27	Skunk cabbage, cattail, sensitive fern, sweetflag, joe-pye-weed, red maple	Large wetland located east of RR tracks and south of Route 173. Small marsh at north end contains only scattered shallow inundation and a 2' wide intermittent watercourse that drains to the north. The remainder of the wetland consists of a sapling or deciduous wooded swamp. Extensive shallow (4-5" deep) inundation present in the swamp. These inundated areas contain soft, anoxic sediments, mosquito larvae and are covered with brown algae. A backwater pool adjacent to the Park River contained 11" of water, green filamentous algae, but no amphibian eggs or larvae. Another backwater pool (6" deep) next to the Park River contains brown algae but no amphibian eggs or larvae.



Wetland Sketch Map
New Britain-Hartford Busway
Connecticut Ecosystems LLC
December 20, 2007
Not to Scale



New Britain-Hartford Busway May 2, 2007 1. Wetland 5 2. Wetland 6 3. Wetland 7A 4. Wetland 7B 5. Wetland 9 6. Marsh at north end of Wetland 14 7. Swamp at south end of Wetland 14 8. Marsh at north end of Wetland 27

New Britain-Hartford Busway May 2, 2007 9. Swamp in central portion of Wetland 27 10. Thick sediment deposits adjacent to watercourse in Wetland 27 11, 12. Backwater ponding adjacent to Park River

APPENDIX E – WETLAND PHOTOGRAPHS

New Britain – Hartford Busway
State Project No. 171-305
Federal/State Wetland Photos and Function-Value Assessments

Wetland No. 2A	Wetland No. 2B	Wetland No. 2C	Wetland No. 2D	Wetland No. 3
Size (acres): 0.066	**Size (acres):** 0.035	**Size (acres):** 0.016	**Size (acres):** 0.04	**Size (acres):** 1.70
Wetland type (per Cowardin): Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Scrub-Shrub	**Wetland type (per Cowardin):** Palustrine Scrub-Shrub	**Wetland type (per Cowardin):** Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Forest
Functions-Values: Sed/tox retention	**Functions-Values**: GW recharge, sed/tox retention	**Functions-Values**: GW recharge	**Functions-Values**: GW discharge	**Functions-Values**: GW recharge, sed/tox retention, wildlife habitat
Comments/Associated Stream: Small track-side depression with *Phragmites*	**Comments/Associated Stream**: Small wetland between developed parcels	**Comments/Associated Stream**: Depression within upland forest	**Comments/Associated Stream**: Depression at base of slope	**Comments/Associated Stream**: Small forested floodplain forest along segmented Bass Brook

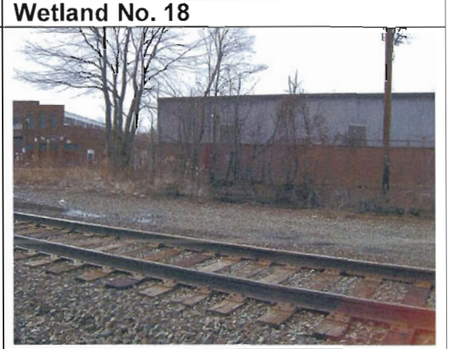
Wetland No. 6A	Wetland No. 6B	Wetland No. 6D	Wetland No. 6E	Wetland No. 7B
Size (acres): portion of large system >50 ac	**Size (acres):** 0.072	**Size (acres):** portion of large system >50 ac	**Size (acres):** 0.11 adjoins fed/state wetlands (6D, 7E)	**Size (acres):** 0.12 adjoins large fed/state wetland system >50 ac (6D, 7E)
Wetland type (per Cowardin): Palustrine Scrub-Shrub	**Wetland type (per Cowardin):** Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Forested
Functions-Values: GW recharge, sed/tox retention	**Functions-Values**: GW discharge, sed/tox retention	**Functions-Values**: GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	**Functions-Values**: GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	**Functions-Values**: GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
Comments/Associated Stream: Corner of large wetland in area disturbed by vehicles	**Comments/Associated Stream**: Narrow degraded finger under Route 9, disturbance has caused obstruction of flow path	**Comments/Associated Stream**: Part of extensive Piper Brook floodplain forest	**Comments/Associated Stream**: Piper Brook floodplain – upland forest / shrub / herbaceous vegetation	**Comments/Associated Stream**: Piper Brook floodplain with drainage to Piper Brook – upland forest / shrub / herbaceous vegetation

Federal/State Wetland Photos and Function-Value Assessments (cont'd)

Wetland No. 7C	Wetland No. 7E	Wetland No. 7F	Wetland No. 8A	Wetland No. 8B
Size (acres): portion of large system >50 ac	**Size (acres):** portion of large system >50 ac	**Size (acres):** 0.03	**Size (acres):** 0.006	**Size (acres):** 0.005
Wetland type (per Cowardin): Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Scrub-Shrub
Functions-Values: GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	**Functions-Values**: GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	**Functions-Values**: Sed/tox retention	**Functions-Values**: GW recharge, sed/tox retention	**Functions-Values**: GW recharge, sed/tox retention
Comments/Associated Stream: Part of extensive Piper Brook floodplain forest	**Comments/Associated Stream**: Riparian zone of Piper Brook	**Comments/Associated Stream**: Depression	**Comments/Associated Stream**: Tiny wetland within uplands	**Comments/Associated Stream**: Tiny wetland within uplands

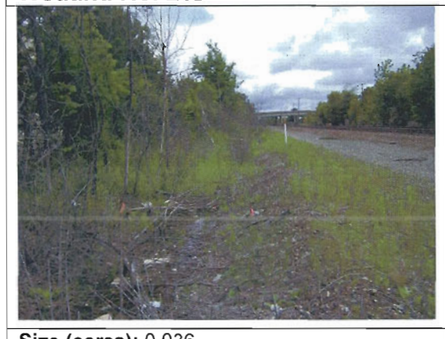
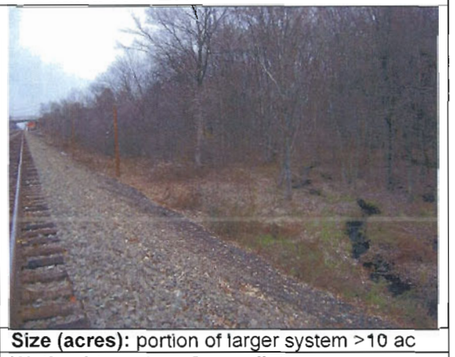
Wetland No. 8C	Wetland No. 9A	Wetland No. 9B	Wetland No. 10	Wetland No. 14
Size (acres): 1.52	**Size (acres):** 3.80	**Size (acres):** 0.046	**Size (acres):** 0.039	**Size (acres):** 3.75
Wetland type (per Cowardin): Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Forested, Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Forested, Palustrine Scrub-Shrub
Functions-Values: GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	**Functions-Values**: GW recharge, floodflow alteration, sed/tox retention, wildlife habitat	**Functions-Values**: Sed/tox retention, wildlife habitat	**Functions-Values**: Sed/tox retention	**Functions-Values**: GW recharge, sed/tox retention, wildlife habitat
Comments/Associated Stream: Linear finger west of tracks, draining (under tracks) toward Piper Brook	**Comments/Associated Stream**: Flows from this forested wetland collect along west side of tracks, piped to east through existing culvert	**Comments/Associated Stream**: Narrow linear forested wetland parallel to tracks	**Comments/Associated Stream**: Created bio-swale	**Comments/Associated Stream**: Sloping forested wetland cut off from Piper Brook floodplain by tracks. Hydrology further modified by linear storm sewer berm parallel to tracks

Federal/State Wetland Photos and Function-Value Assessments (cont'd)

Wetland No. 15	Wetland No. 16A	Wetland No. 16B	Wetland No. 17	Wetland No. 18
				
Size (acres): 0.048	**Size (acres):** 0.058	**Size (acres):** 0.045	**Size (acres):** 500 LF segment between culverts at Spring St. Newington and railroad	**Size (acres):** 0.124
Wetland type (per Cowardin): Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Scrub-Shrub	**Wetland type (per Cowardin):** Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Emergent
Functions-Values: GW recharge, sed/tox retention	**Functions-Values**: Sed/tox retention	**Functions-Values**: GW recharge/discharge, sed/tox retention	**Functions-Values**: None (eroded banks, fill debris)	**Functions-Values**: Sed/tox retention
Comments/Associated Stream: Track-side linear depression	**Comments/Associated Stream**: Degraded track-side ditch	**Comments/Associated Stream**:	**Comments/Associated Stream**: Unnamed tributary to Piper Brook	**Comments/Associated Stream**: Degraded track-side ditch

Wetland No. 19	Wetland No. 20	Wetland No. 21A	Wetland No. 21A2	Wetland No. 21C
Size (acres): 0.025	**Size (acres):** 0.055	**Size (acres):** 0.49	**Size (acres):** 0.220	**Size (acres):** 0.083
Wetland type (per Cowardin): Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Scrub-Shrub	**Wetland type (per Cowardin):** Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Emergent
Functions-Values: Sed/tox retention	**Functions-Values**: Sed/tox retention	**Functions-Values**: Sed/tox retention	**Functions-Values**: Sed/tox retention	**Functions-Values**: Sed/tox retention
Comments/Associated Stream: Degraded track-side ditch	**Comments/Associated Stream**: Degraded track-side ditch	**Comments/Associated Stream**: Unnamed tributary to Piper Brook	**Comments/Associated Stream**: Small track-side depression	**Comments/Associated Stream**: Track-side linear depression

Federal/State Wetland Photos and Function-Value Assessments (cont'd)

Wetland No. 21D	Wetland No. 22A	Wetland No. 22B	Wetland No. 22C	Wetland No. 27A
				
Size (acres): 0.036	**Size (acres):** 0.062	**Size (acres):** 0.048	**Size (acres):** 0.18	**Size (acres):** portion of larger system >10 ac
Wetland type (per Cowardin): Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Forested	**Wetland type (per Cowardin):** Palustrine Forested, Palustrine Scrub-Shrub
Functions-Values: Sed/tox retention	**Functions-Values**: GW recharge, sed/tox retention	**Functions-Values**: GW recharge, sed/tox retention	**Functions-Values**: GW recharge, sed/tox retention, wildlife habitat	**Functions-Values**: GW recharge, floodflow alteration, sed/tox retention, wildlife habitat
Comments/Associated Stream: Track-side linear depression	**Comments/Associated Stream**: Track-side linear depression	**Comments/Associated Stream**: Track-side linear depression	**Comments/Associated Stream**: Track-side linear depression	**Comments/Associated Stream**: Part of extensive Piper Brook floodplain forest

Wetland No. 28	Wetland No. 30
Size (acres): 0.008	**Size (acres):** 0.093
Wetland type (per Cowardin): Palustrine Emergent	**Wetland type (per Cowardin):** Palustrine Emergent
Functions-Values: Sed/tox retention	**Functions-Values**: Sed/tox retention
Comments/Associated Stream: Tiny track-side depression	**Comments/Associated Stream**: Linear track-side depression

New Britain – Hartford Busway
State Project No. 171-305
Intermittent Watercourse (IWC) Photos and Function-Value Assessments

IWC No. 1-1 to 1-4	IWC No. 3-2 to 3-3	IWC No. 3A	IWC No. 4-1 to 4-11	IWC No. 4A
Linear Feet (LF): 174	**Linear Feet (LF):** 121	**Linear Feet (LF):** 453	**Linear Feet (LF):** 950	**Linear Feet (LF):** 17
Wetland type (per Cowardin): **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **
Functions-Values: Sed/tox retention	**Functions-Values**: Sed/tox retention	**Functions-Values**: GW recharge, sed/tox retention	**Functions-Values**: Sed/tox retention	**Functions-Values**: GW recharge, sed/tox retention
Comments/Associated Stream: Degraded track-side ditch with debris, sparsely vegetated edges (hydrophytic herbs and upland trees/shrubs	**Comments/Associated Stream**: Track-side ditch, veg. edges (sparse hydrophytic emergents / shrubs and upland herbs)	**Comments/Associated Stream**: Track-side drainage ditch, vegetated edges (sparse hydrophytic herbs and shrubs)	**Comments/Associated Stream**: Track-side drainage ditch, vegetated edges (upland trees and shrubs)	**Comments/Associated Stream**: Ditch along base of Rt. 9 slope, vegetated edges (hydrophytic trees and shrubs)

IWC No. 5-1 to 5-5	IWC No. 10-2 to 10-7	IWC No. 11B	IWC No. 11-2 to 11-4	IWC No. 12-1 to 12-3
Linear Feet (LF): 407	**Linear Feet (LF):** 60	**Linear Feet (LF):** 271	**Linear Feet (LF):** 240	**Linear Feet (LF):** 190
Wetland type (per Cowardin): **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **
Functions-Values: Sed/tox retention	**Functions-Values**: Sed/tox retention	**Functions-Values**: None (degraded)	**Functions-Values**: None (eroded banks, fill debris)	**Functions-Values**: None (eroded banks, fill debris)
Comments/Associated Stream: Track-side drainage ditch, vegetated edges (upland trees and shrubs)	**Comments/Associated Stream**: Track-side drainage ditch, vegetated edges (upland trees & shrubs)	**Comments/Associated Stream**: Degraded track-side ditch with debris, sparse emergent veg	**Comments/Associated Stream**:	**Comments/Associated Stream**:

*** Wetland Type Not Applicable – Resource does not meet 3-parameter federal wetland definition*

Intermittent Watercourse (IWC) Photos and Function-Value Assessments (cont'd)

IWC No. 13-1 to 13-8	IWC No. 14-1 to 14-6	IWC No. 14B	IWC No. 14C	IWC No. 14D
Linear Feet (LF): 788	**Linear Feet (LF):** 817	**Linear Feet (LF):** 744	**Linear Feet (LF):** 308	**Linear Feet (LF):** 185
Wetland type (per Cowardin): **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **
Functions-Values: GW recharge, sed/tox retention	**Functions-Values**: GW discharge, sed/tox retention	**Functions-Values**: GW discharge, Sed/tox retention	**Functions-Values**: None (degraded)	**Functions-Values**: GW discharge, sed/tox retention
Comments/Associated Stream: Track-side drainage ditch, veg. edges (sparse emergent and upland herbs)	**Comments/Associated Stream**: Track-side drainage ditch, veg. edges (sparse upland herbs)	**Comments/Associated Stream**: Vegetated drainage ditch (sparse emergent)	**Comments/Associated Stream**: Degraded track-side ditch, vegetated edges (sparse emergent)	**Comments/Associated Stream**: Vegetated drainage ditch (emergent)

IWC No. 14E	IWC No. 14F	IWC No. 15-1 to 15-5
Linear Feet (LF): 500	**Linear Feet (LF):** 101	**Linear Feet (LF):** 754
Wetland type (per Cowardin): **	**Wetland type (per Cowardin):** **	**Wetland type (per Cowardin):** **
Functions-Values: GW discharge, Sed/tox retention	**Functions-Values**: None (degraded)	**Functions-Values**: GW recharge, sed/tox retention
Comments/Associated Stream: Vegetated drainage ditch (emergent)	**Comments/Associated Stream**: Degraded track-side ditch, vegetated edges (sparse emergent)	**Comments/Associated Stream**: Track-side drainage ditch, vegetated edges (upland shrubs)

*** Wetland Type Not Applicable – Resource does not meet 3-parameter federal wetland definition*

APPENDIX F – REPORT OF MEETING FOR FISHERIES CONCERNS

REPORT OF MEETING NO. 3

Meeting Minutes

Project:	New Britain-Hartford Busway	**Date:**	07/24/03
Subject:	Permits – Field Review	**Time:**	9:00 am – 1:00 pm
By:	Jeffrey A. Scala (Garg Consulting Services)	**Place:**	ConnDOT / Project Site

Attendees:

Name	Company
Mark Alexander	ConnDOT – Environmental Planning
Chong Lung Chow	ConnDOT - Hydraulics & Drainage
Sharon Yurasevecz	CT DEP IWRD
Jeff Caiiola	CT DEP IWRD
Karen Leonard Allen	CT DEP IWRD
Don Mysling	CT DEP IWRD
Jeffrey A. Scala	Garg Consulting Services, Inc.

cc: Attendees, John M. Welsh, FTA (Carter & Burgess)
Jeffrey A. Quay (Baker Engineering NY, Inc.)
James H. Swadley (Baker Engineering NY, Inc.)

The participants visited the site to get a feel for the project location and potential impacts to the regulated areas.

- All the hydraulic sites with the exception of Piper Brook in New Britain were visited. The southern half, up to Newington Junction of the project was visited.
- It was expressed that preserving the resources to the east side of the right of way is more important, therefore modifying the alignment to minimize impacts on the east side was suggested.
- There are no fisheries concerns.
- Several questions about construction sequencing and stage construction were raised since this will have an effect on storm water managements.
- There were specific questions on how some of the hydraulic crossing replacements would be accomplished.
- Since no Analysts were present and limited information on proposed conditions is available, limited comments on the hydraulic sites were provided. However, no major concerns are anticipated.
- All agreed that a follow up meeting to review of the anticipated construction would be beneficial, however more information on the proposed hydraulics and storm water drainage systems to make the meeting as meaningful as possible.

Statement of Accuracy:

We believe these minutes accurately describe the discussion and determinations of this meeting. Unless notified to the contrary within 5 business days, we will assume all in attendance concur with the accuracy of this transcript.

Submitted by: _____
Jeffrey A. Scala, P.E.

Reviewed by: _____
Mark D. Rolfe

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Connecticut Department of Transportation
State Project No. 171-305, New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain

Attachment L: Mitigation Report

1.0 Summary of Impacts

Wetland impacts are detailed in the Environmental Report (Attachment K) and summarized in the Executive Summary (Attachment A). As reported, a total of approximately 2.111 acres of federal/state wetlands will be permanently impacted by the project. The project will also result in 7,108 linear feet (LF) of permanent impacts to intermittent watercourses (IWCs). Temporary impacts include approximately 0.459 acres of federal/state wetlands and zero (0) acres of IWCs. Impacts below OHW are 0.09 acres. It should be noted that these impacts are included in the total wetland impact area of 2.111 acres.

The IWCs and the ditch-like wetlands along the Busway are very low-value wetlands. Almost all of these have been assessed to, at most, perform the single function of sediment/toxicant retention. As noted in Attachment K, these wetlands are narrow and linear in nature, parallel to the rail corridor and squeezed between existing urban and transportation land uses. They are noted as "depressions" and "ditches" in the wetland summary tables. These features have formed in the drainage flows from urban and rail lands. Often barely noticeable as depressions, they are repeatedly subject to inflows of sediments and toxicants, along with urban refuse/debris, which have inhibited vegetative development. Field observations of these degraded wetlands raise the question of whether, given their small sizes and sparse vegetation, they have remaining capacity in the soils and limited root structure to perform effective sed/tox retention (see photographs in Attachment K). The water that collects in the IWCs and small tributaries along the rail ROW is visibly degraded, supporting the supposition that these small wetlands are not capable of effective filtration for water quality purposes.

The track-side ditches are all considered to meet the federal/state wetlands definition for the purposes of mitigation development. The proposed drainage system is expected to provide improved trackside drainage conditions over the existing 7,108 linear feet (LF) of impaired IWCs, through the incorporation of 11,132 LF of new grass-lined ditches, swales, and channels (as indicated on the plans/plates) designed to both move and filter surface runoff. The placement of these vegetated drainage channels along the rail ROW and proposed Busway would be an improvement over the existing ROW drainage system in terms of sediment/toxicant retention. For this reason, the impacts to the low-functioning wetland and IWC ditches are proposed to be replaced through the construction of the project's grass-lined drainage channels.

The only substantive impacts to wildlife habitat are along the edge of the Piper Brook floodplain, where fill from the Busway and the Amtrak Access Road will result in strip impacts (losses) of the existing forested wetlands. The trees and shrubs along this large wetland system provide shelter, cover, and food and water sources. Because the habitat impacts are relatively narrow strips along the edges of large undeveloped lands, there would be only a marginal loss of available habitat. These impacts would not result in a loss of wildlife populations or diversity, although the total number of individual animals supported could decline very slightly. Since

wildlife habitat is one of the wetland functions affected by the project, the slight adverse effects on wildlife habitat are expected to be mitigated through the wetland mitigation proposal.

Fish habitat is not expected to be impacted, as there are no direct impacts to fish habitat. The streams where culvert replacements will occur do not support fisheries resources, based on early coordination with CTDEP (see report of field visit in Appendix F of Attachment K) and field observations during wetland delineations.

2.0 Alternative Mitigation Sites

2.1 Investigations of Potential Mitigation Sites

Investigations to locate potential wetland mitigation sites for the Busway project began in 2007 and are summarized in a Technical Memorandum, *New Britain-Hartford Busway Wetland Mitigation Planning Assistance* (Fitzgerald & Halliday, Inc., August 2007). The initial investigations of potential mitigation sites involved a corridor-wide search for properties, preferably publicly-owned sites, located within the same watersheds as the Busway wetland impacts. These watersheds include Piper Brook, Bass Brook, Trout Brook, the Park River, the South Branch of the Park River, and the North Branch of the Park River watersheds.

Large sites about five acres in size were preferred. However, smaller properties down to approximately 0.5 acres in size were also considered, since multiple smaller properties in combination could potentially be used. Additional important considerations included topography and hydrology (availability of a water source). Undeveloped, non-forested lands were preferred for wetland creation, and degraded wetlands were considered for potential wetland enhancement.

GIS Screening and Municipal Contacts

The first step to identify properties that met the above criteria involved collection of Geographic Information Systems (GIS) data from the Connecticut Department of Environmental Protection (CTDEP). Data layers used in the site identification and screening process included the following:

- Drainage Basins
- Municipal Properties
- State Properties
- Federal Properties
- State Wetlands
- Federal Wetlands
- Municipal Waste Sites
- Leachate & Wastewater Discharge Points
- Hazardous Materials Sites
- FEMA Floodplains
- CTDEP Natural Diversity Database Areas
- Delineated wetlands (delineated by CT Ecosystems) for the Busway project

Forest cover was an important consideration for the site screening but no suitable GIS data layers were available for this factor. Aerial photographs were therefore used, in combination with field observations, to determine vegetative cover.

As the GIS analysis was underway, municipal staff in New Britain, Newington, West Hartford, and Hartford were contacted by telephone interview. They were asked about publicly owned properties in the appropriate watersheds that might be suitable mitigation sites meeting the search criteria. Through the GIS screening, municipal coordination process, and site visits, 13 potential mitigation sites were identified. These sites were then investigated in more detail through site inspections and evaluation.

Site Visits and Site Evaluations

During site inspections, the physical and ecological features of the potential wetland mitigation sites were observed in order to evaluate their potential to support wetlands. Features included topography, vegetation, existing/adjacent wetlands, streams, seeps, evidence of standing water, land uses, evidence of past disturbance, rock outcrops, and signs of wildlife. The sites were comparatively evaluated by way of a screening matrix in order to identify the sites with the greatest potential for wetland mitigation.

Preferred Mitigation Sites

Based on the field evaluations, four of the mitigation sites (Sites 1, 2, 3 and 13) rose to the top of the list as preferred sites:

- Mitigation Site #1: City of Hartford Open Space on Brookfield Street, Hartford
- Mitigation Site #2: City of Hartford Open Space on Overlook Terrace, Hartford (sold to U.S. Government for Job Corps)
- Mitigation Site #3: Beechland Park, West Hartford
- Mitigation Site #13: Connecticut Department of Transportation Property, Hartford

Based on size, ownership, and potential of successful wetland creation and/or enhancement, Mitigation Site #13 was deemed to be the most suitable site, offering potential for both wetlands creation and wetlands restoration. Compared to Site #13, the other potential mitigation sites have less available hydrology, smaller acreage of potential mitigation, and possible land use constraints.

2.2 Mitigation Site #13

Mitigation Site #13 is located on Connecticut Department of Transportation property, within the highway right-of-way (ROW) of the I-84 Flatbush Avenue interchange in Hartford. It consists ot two portions: a southern portion (S13), which is an 8.9-acre piece between Flatbush Avenue (on the south), the I-84 eastbound (EB) on-ramp (on the west and north), and the South Branch (of the Park River) on the east; and a portion north of the EB on-ramp (N13), an 11.7-acre piece between the EB on-ramp and the westbound (WB) off-ramp.

During fall 2008, Site #13 was further evaluated to determine:

- Existing and/or potential hydrologic connections between the northern and southern pieces of the site, as well as the general drainage characteristics, sources of hydrology, and structural drainage features of the site
- The boundaries of existing wetlands and existing vegetation (cover types) on the site, including the locations and extent of invasive species
- The condition and ecological values of the site based on vegetation, soils, and other factors observed in the field
- The site acreage that could likely be graded to provide wetland creation
- The site acreage of low-value wetlands infested by invasive species which would benefit from wetland enhancement measures

Existing Site Conditions

Existing site conditions on Site #13 are illustrated on the *Existing Conditions* figures at the end of this attachment. Photographs of Site 13 are included in Appendix A of this Attachment.

Hydrologic Conditions: The South Branch Park of the River lies along the eastern edge of the site and is the receiving waterway for all drainage from the site. There is a continuous steep embankment with a slope of approximately 30% (3:1) all along the river, which rests about 15 feet below the site. Drainage flow paths are surprisingly variable across the site. The broader central portions of the site (both pieces) are very level, such that runoff tends to collect in pockets and surface flows are slow. S13 and N13 each have a drainage divide: the northern portion of each piece drains northerly and the southern portion of each drains southerly. The waterways through each piece flow easterly to the South Branch and a narrow eastern edge of each piece contributes surface flows to the South Branch.

Although all of the soils on the site are historically disturbed and are officially classified as urban land complex soils, there has been ample soil development in both the wetland and upland areas. Approximately 40 percent of each portion of the site is wetland. The wetlands are state and federal in all cases; there are no alluvial or fluvial soils that would be classified as state wetlands only. The upland areas are comprised of fine grained loam and silt loam soils and are relatively free of stones. The sources of surface water feeding the site under normal conditions are relatively limited. The majority of the site receives water solely from the interchange ramps and from precipitation on the surface of the site itself. Since depth to groundwater was unknown, monitoring wells were established in spring 2009 to more clearly understand the hydrological (groundwater) conditions.

Wetlands: Wetlands occur on approximately 44 percent of the southern part of the site (S13) and 39 percent of the northern part (N13). Of the nearly 9-acre S13 portion, approximately 4 acres are wetlands, another 2.7 acres are comprised of side-slopes and river banks which bound the site, and approximately 2.3 acres are level uplands. Of the nearly 12-acre N13 piece, nearly 5 acres are wetlands, 5 acres are side-slopes, and 2 acres are level uplands.

Site #13 supports a mosaic of wetland vegetation, surrounded by upland vegetation (see *Existing Conditions* Figures depicting the existing plant communities on the site). The wetland

vegetation communities and their approximate acreage are tabulated in Table 1 below. The wetland communities are grouped into the categories of Invasives, Mixed Invasives, Emergent, Riparian, and Wet Meadow in order to more readily understand their current functions and values. As shown, the predominant communities differ between south and north. The predominant vegetation in S13 is invasive (*Phragmites australis*), while native riparian trees and shrubs (dogwood, cottonwood, willows) dominate in N13.

Table 2 shows the plant species list for the vegetation communities.

Function and Values of Existing Wetlands: The major function performed by the existing S13 wetlands is pollutant removal (sediment and toxicant retention), since the site collects substantial runoff from the interchange ramps, slows it down, and filters out sediments and toxicants through the stems of emergent vegetation. During infrequent monumental flooding events, these wetlands would also play a role in floodflow alteration. The dominance of invasive plants of low habitat value – *Phragmites* and purple loosestrife – indicates that wildlife habitat is not a strong function. However, the existing mosaic of upland woods and grasses, interfacing with the wetlands, provides good habitat edge, and the existing dogwood and wet meadow areas within themselves provide food and some cover for wildlife. The availability of running water and adjacent water sources increases its potential for wildlife use. No fish habitat is provided on site and the site is not suited to public/educational purposes since it is a limited access area with potential safety concerns.

The structure and vegetation of the N13 wetlands suggest a high value for wildlife habitat and production export, if the site were not so constricted by highway infrastructure and an artificial river channel. The riparian species and wet meadow species on the site provide rich food sources, abundant cover and nesting sites. Their interface with upland habitats containing an additional variety of food, cover and nesting sites, combined with the ready availability of water (watercourses), increases their potential value for wildlife. Based on field observations, however, the site is not greatly used by wildlife, which would be expected due to its location next to industrial areas, residential developments, and highway infrastructure. During the infrequent monumental flooding events where the South Branch overtops its banks, this area would play a valuable role in floodflow alteration. This piece appears to serve only a minor role for pollutant removal. Although it collects runoff from the ramps, the discharges are generally from single catch basins which do not collect from very large drainage areas. The major pollutant removal for the ramps takes place in the *Phragmites* ditches on the west side of the WB off-ramp and on S13. No fish habitat is provided on the N13 site and the site is not suited to public/educational purposes since it is a limited access area with potential safety concerns.

Uplands: The uplands support a mix of communities, quite interspersed throughout the site. The northern uplands in S13 and N13, as well as the central upland areas of S13, are composed primarily of mixed deciduous trees, shrubs, and vines. The southern and western uplands in S13 and the western uplands in N13 are dominated by herbaceous communities fringed by shrubs. On both pieces, the upland edges along the South Branch are dominated by trees and lightly covered by shrubs. The tree species in the uplands are characteristic of floodplain areas in Connecticut and include sugar maple, red maple, quaking aspen, box elder, eastern cottonwood, and willows. The existing uplands provide a number of valuable ecological functions in their current condition. The predominantly native trees provide good habitat (for wildlife tolerant of urban settings) and the established root systems serve to help stabilize the

river banks and floodplain terrace. The above-ground vegetation provides attenuation of surface flows and contributes food sources to the aquatic community (South Branch).

Table 1 – Approximate Acreages of Wetland Plant Communities on Site #13

Site 13 South (S13)	VEGETATION	ACRES	% of Site
Total Site		8.92	100.0%
Wetlands			
Invasives	Phragmites	2.22	24.9%
	Purple loosestrife	0.14	1.6%
Mixed Invasives	Cattail / purple loosestrife	0.22	2.5%
Emergent	Cattail	0.53	5.9%
Riparian	Dogwood	0.12	1.3%
	Dogwood/willow	0.08	0.9%
Wet Meadow	Sedge, horsetail, willow	0.66	7.4%
Wetland Subtotal		3.97	44.5%
Uplands			
Level Upland Acres	Mixed & Interspersed	2.28	25.6%
Upland Slopes / River Banks		2.67	29.9%
Upland Subtotal		4.95	55.5%
Site 13 North (N13)		**ACRES**	**VEGETATION**
Total Site		11.76	
Wetlands			
Invasives	Phragmites	0.62	5.3%
	Purple loosestrife	0.31	2.6%
Mixed Invasives	Phragmites & dogwood	0.11	0.9%
Riparian	Dogwood, cottonwood & willow	1.45	12.3%
	Dogwood/willow	0.42	3.6%
	Dogwood	0.68	5.8%
Wet Meadow	Sedge, horsetail, willow	0.98	8.3%
Wetland Subtotal		4.57	38.9%
Uplands			
Level Upland Acres		2.17	18.5%
Upland Slopes / River Banks		5.02	42.7%
Upland Subtotal		7.19	61.1%

Table 2 – Existing Plant Species List for Site #13

Dominant Wetland Vegetation

Wetland Plant Community	Common Name	Scientific Name
Cattail	Broadleaf Cattail	*Typha latifolia*
Cattail, Purple Loosestrife	Broadleaf Cattail	*Typha latifolia*
	Purple Loosestrife	*Lythrum salicaria*
	Japanese Knotweed	*Polygonum cuspidatum*
Dogwood	Redosier Dogwood	*Cornus sericea*
Dogwood, Cottonwood, Willow	Redosier Dogwood	*Cornus sericea*
	Eastern Cottonwood	*Populus deltoids*
	Weeping Willow	*Salix babylonica*
	Black Willow	*Salix nigra*
Dogwood, Willow	Redosier Dogwood	*Cornus sericea*
	Weeping Willow	*Salix babylonica*
Phragmites	Common Reed Grass	*Phragmites australis*
Phragmites, Dogwood	Common Reed Grass	*Phragmites australis*
	Redosier Dogwood	*Cornus sericea*
Purple Loosestrife	Purple Loosestrife	*Lythrum salicaria*
Sedge, Horsetail, Willow	Pennsylvania Sedge	*Carex pensylvanica*
	Yellow Nutsedge	*Cyperus esculentus*
	Field Horsetail	*Equisetum arvense*
	Reed Canarygrass	*Phalaris arundinacea*
	Weeping Willow	*Salix babylonica*

Dominant Upland Vegetation

	Common Name	Scientific Name
	Various field grasses	*Graminae spp.*
	Bull Thistle	*Cirsium vulgare*
	Pennsylvania Sedge	*Carex pensylvanica*
	Yellow Nutsedge	*Cyperus esculentus*
	Multiflora Rose	*Rosa Multiflora*
	Goldenrod	*Solidago spp.*
	Lesser Burdock	*Arctium minus*
	Black Raspberry	*Rubus occidentalis*
	Northern Red Oak	*Quercus rubra*
	Red Maple	*Acer rubrum*
	Sugar Maple	*Acer saccharum*
	Oriental Bittersweet	*Celastrus orbiculatus*

Table 2 – Existing Plant Species List for Site #13

Red Maple	*Acer rubrum*
Sugar Maple	*Acer saccharum*
Grape	*Vitis spp.*
Black Locust	*Robinia pseudoacacia*
Quaking Aspen	*Populus tremuloides*
Field Horsetail	*Equisetum arvense*
Purple Loosestrife	*Lythrum salicaria*
Japanese Knotweed	*Polygonum cuspidatum*
Boxelder	*Acer negundo*
Quaking Aspen	*Populus tremuloides*
Boxelder	*Acer negundo*
Eastern Cottonwood	*Populus deltoides*
Weeping Willow	*Salix babylonica*
Black Willow	*Salix nigra*
Eastern Red Cedar	*Juniperus virginiana*

Monitoring Well Data

FHI conducted groundwater monitoring on Site 13 at two locations in N13 to determine the existing hydrologic conditions and the potential for future wetland mitigation/creation opportunities. See the Wetland Mitigation Concept Plan for Site 13 North, provided at the end of this attachment for well locations. Two monitoring wells were installed on Site #13 to determine groundwater elevations over the period of one year. Well #1 is located in a wetland area to remain intact in the central portion of the site. Well #2 is located in an upland area approximately 200 feet southwest of Well #1, in a wetland creation area.

Measurements were taken bi-weekly from May 28, 2009 through May 11, 2010 at both wells. Groundwater monitoring data is provided in Table 3 below. The monitoring well data on Site #13 show that groundwater levels fluctuate substantially throughout the year, ranging from 7 inches to 61 inches below ground surface, with frequent readings of less than 36 inches. Well #1 has an average annual depth to groundwater of 27.5 inches from the ground's surface, with depths ranging from 7 to 61 inches. Well #2 has an average annual depth to groundwater of 21.7 inches, with depths ranging from 9 to 40 inches below the ground surface.

Data taken from the NRCS Soil Survey of the State of Connecticut indicates that the growing season occurs between April 27 and October 11 (5 out of 10 years). These dates were determined by observation of freeze dates in spring and fall, when the temperature is 32° F or lower. The temperature data was collected between 1961 and 1990 at Hartford Brainard Field in Hartford, Connecticut. During the growing season as defined above, Well #1 (within wetlands) has an average depth to groundwater of 34.5 inches from the ground's surface and Well #2 (uplands) has an average depth to groundwater of 22.1 inches. Since Well #2 is located in a wetland creation zone, the seasonal groundwater data was evaluated more closely. From early May to the end of August, groundwater levels were continuously above or equal to 24" below the surface, with an average of 18" below surface. The wetland mitigation grading plan calls for excavating wetland creation areas to bring finished grades 18" to 24" below existing ground elevations. The grading thus correlates well with the availability of groundwater through the majority of the growing season.

Mitigation Potential / Site Constraints

Based on the detailed evaluations, Site #13 has a combined total of approximately 12 acres of uplands. Not all of this acreage is available for wetland mitigation, however. About 8 acres of are situated around the borders of the site and play a critical role in supporting the embankments of the I-84 ramp infrastructure and the concrete channel of the South Branch. The northern-most tip of N13 contains the MDC's Park River Branch Interceptor (sewer infrastructure.) The remaining level uplands occur in fragmented blocks around existing wetlands, making them difficult to work on without disturbing the adjacent wetlands. Furthermore, many portions of the uplands are in good ecological health and complement the functions and values of the interspersed wetlands. As such, only the low-value uplands are proposed to be used for wetland creation and only the low-value wetland components (invasive plants) are proposed to be used for wetland enhancement. The portions of the site identified as suitable for wetland mitigation, based on initial field visits, are shown on the *Proposed Mitigation Concept* figures at the end of this attachment. Detailed grading plans and planting plans for the mitigation site can be found on Plates and on the sheets WMT-xx of the design plans.

Table 3
Wetland Mitigation Site #13 - Well Monitoring Data (Groundwater Depth)

	2009-2010 Monitoring Data					Precipitation (PPT) Data**	
	Date	Time	Depth to Groundwater from Ground Surface* (Inches) Well #1	Well #2	Recorded By	Total PPT Month to Date (Inches)	Total PPT Year to Date (Inches)
May	5/28/2009	10-11:00 AM	35	24	J.Weiss	3.83	12.40
June	6/15/2009	3-4 PM	17	22	J. Weiss	2.65	15.85
	6/30/2009	3-4 PM	18	11	J. Weiss	5.92	19.12
July	7/15/2009	2-3 PM	28	14	J. Weiss	3.09	22.21
	7/30/2009	230-330PM	10	9	J. Weiss	8.80	27.92
August	8/17/2009	2-3 PM	40	21	J. Weiss	0.75	29.51
	8/31/2009	3-4 PM	41	24	D. Laiuppa	2.46	31.22
September	9/15/2009	230-330PM	54	34	J. Weiss	0.50	31.72
	9/29/2009	130-230PM	61	40	J. Weiss	1.83	33.05
October	10/15/2009	9-10AM	50	40	J. Weiss	2.13	35.18
	10/29/2009	2-3 PM	13	25	J. Weiss	5.55	38.60
November	11/16/2009	330-4 PM	14	19	J.Weiss	0.94	39.59
	11/30/2009	9-10 AM	12	14	J.Weiss	2.38	41.03
December	12/15/2009	2-3 PM	8	14	J. Weiss	3.13	43.89
	12/31/2009	11-12 AM	19	22	J. Weiss	3.79	44.82
January	1/15/2010	11-12 AM	40	28	J. Weiss	0.66	0.66
	2/1/2010[1]	12-1 PM	24	24	J. Weiss	1.95	1.95
February	2/15/2010	2-3 PM	41	25	J. Weiss	0.12	2.07
	2/27/2010	9-10 AM	15	19	J. Weiss	3.47	5.42
March	3/15/2010	2-3 PM	11	18	J. Weiss	2.35	7.60
	3/31/2010	230-330PM	7	12	D. Laiuppa	7.48	12.90
April	4/14/2010	4-5 PM	28	18	J. Weiss	0.38	13.28
	4/27/2010	230-330 PM	29	15	J. Weiss	1.55	14.45
May	5/11/2010	330-430 PM	46	29	J. Weiss	0.46	14.91

* Heights of well casings were subtracted from total measurements to yield depth from ground surface.

** Source of PPT data: http://www.wunderground.com/history/airport/KHFD

[1] monitoring scheduled for 1/29/2010 prevented by blizzard-like conditions

Wetland Creation: Groundwater monitoring well data shows water within three feet of the soil surface for much of the growing season; therefore minimal excavation would need to take place to reach the groundwater. Soil auguring in the potential wetland creation zones reveals hydric soils at approximately 14 inches below ground surface. The combination of groundwater fluctuating close to the ground surface and hydric soils close to the surface strongly supports the feasibility of wetland creation on the site. The concept for creation entails excavating the ground surface below its existing grade, applying appropriate planting topsoil, and installing wetland and riparian vegetation adapted to floodplain conditions.

Wetland Enhancement: The extensive areas of *Phragmites* on Site #13 will be the focus of the wetland enhancement efforts. The concept for these areas is to perform mowing and repetitive herbicidal treatments until the plants are dead, followed by removal of dead root mass, regrading, and replanting.

The primary functions and values of the wetland creation and restoration areas would be similar to those of the surrounding areas, such that they will adequately compensate for the lost functions of the impacted wetlands: groundwater recharge/discharge, floodflow alteration, sediment/toxicant retention, and wildlife habitat.

The suitability of Site #13 to provide adequate acreage was based on the following assumptions:

- Maintain or establish new slopes no steeper than 4:1 along the ramp embankments, allowing ROW for the proposed ramp reconfiguration project (future reconstruction of the I-84 EB on-ramp from Flatbush Avenue at-grade adjacent to the I-84 WB off-ramp)
- No substantial excavation along the edge of the South Branch concrete flood control channel
- Avoid impacts as much as possible to existing non-invasive wetland vegetation
- Existing hydrology would be used to support the enhancement areas
- Groundwater would be used to support the wetland creation areas
- No water diversions from Smith School Brook or the South Branch (existing water elevations are too low for use on site)

Phragmites on Site 13 was mowed by the CT DEP on March 24th, 2010. The State of Connecticut, Department of Environmental Protection's Wildlife Division, Wetlands Habitat and Mosquito Management (WHAMM) Program has been conducting *Phragmites* control since 1997. The WHAMM Program utilizes a three-year herbicide application and mowing regime to remove *Phragmites*. Aquatic herbicides such as Rodeo® (glyphosate), Habitat® (imazapyr) and Renovate® (triclopyr), are used to control dense stands of *Phragmites* in brackish tidal marshes of Connecticut. Adjuvents (surfactants, stickers, and/or sinking agents) are typically mixed with the active ingredient herbicide prior to its application. The adjuvents in the trade names listed above are EPA-approved for aquatic use. Spraying occurs during the mid summer months until the first frost. A month after the spraying, mowing can begin and is done with low ground pressure equipment. This ground spraying and mowing is done for three successive years. Typically, about eighty percent of the *Phragmites* will be eliminated after the first year. Photographs of the mowed *Phragmites* are provided in Appendix A of this attachment.

3.0 Summary of Mitigation Plan

3.1 Permanent Impacts

3.1.1 Wetland Creation and Enhancement

The wetland impacts from the Busway project are unavoidable, given that the existing rail ROW – an existing transportation facility -- is the most logical and least-impact alternative for a much-needed transit option between New Britain and Hartford. CTDOT has developed a Compensatory Mitigation Plan to compensate for the wetland acreage and functions impacted by the project (no wetland values are impacted by the project). Mitigation types, and the acres of each, have been determined based on the U. S. Army Corps of Engineers (USACE) 2007 *Compensatory Mitigation Addendum*. This document provides guidance on suggested mitigation ratios, considering both wetland type and mitigation method (i.e., restoration, creation, enhancement, and preservation). This guidance was used to determine the acreage of available compensatory mitigation available on Site 13.

Since Site 13 contains existing upland and wetland areas, both wetland creation and enhancement have been proposed. According to the USACE 2007 *Compensatory Mitigation Addendum* the following ratios are suggested for the different wetland types and mitigation methods, where the first number in the ratio represents the mitigation acreage and the second represents the impacted acreage:

Wetland Type	Wetland Mitigation Method	
	Creation*	Enhancement*
PFO	3:1	5:1
PSS	2:1	3:1
PEM	2:1	3:1

* Minimum suggested ratio from USACE 2007 Compensatory Mitigation Addendum

The proposed compensatory mitigation plan provides for the creation of 4.98 acres of wetlands and restoration of 3.67 acres of wetlands. The attached figures show the wetland mitigation concept plan for Site 13. The table below provides additional detail of the types of wetland mitigation proposed.

Wetland Type	Creation Area	Enhancement Area	Total Creation and Enhancement Area
PFO	2.64	2.15	4.79
PSS	0.49	1.03	1.52
PEM	1.85	0.49	2.34
Total	*4.98*	*3.67*	***8.65***

The proposed wetland mitigation plan and calculations, including both the creation and enhancement areas, will provide sufficient mitigation for each wetland type based on the suggested compensation ratios shown.

Wetland Creation

To construct the wetland creation areas, portions of Site 13 will be re-graded, appropriate wetland soils placed, and plantings installed. The grading was designed around the hydrologic conditions at the site, taking into consideration annual fluctuations of groundwater and surface water flows, depth to redoximorphic features, and groundwater monitoring wells. Providing adequate hydrology, organic soils and appropriate plantings will ensure that the wetland creation area is successful and embodies the desired functions to compensate for unavoidable wetland impacts. The key factors for mitigation success are described in more detail below.

Grading: Typically, wetland creation areas will be excavated to an elevation approximately one to two feet below the elevation of the proposed final grade elevation. This will allow for the later placement of organic soil materials to bring the grade to the appropriate elevation. In areas of *Phragmites* removal, excavation to remove root mass from this plant may extend deeper than 2 feet based on field conditions. A proposed grading plan for the creation areas is provided in the plates.

The proposed wetland creation areas will include microtopography (a ground surface that fluctuates regularly or irregularly over short distances). The microtopography will provide a surface that varies between approximately six inches above and six inches below the finished grade depicted on the final grading plans. It is anticipated that upon settling, at least 1.5 feet of organic wetland soil material shall cover the subsoil at the lowest levels within the microtopography.

Additional microtopography and wildlife habitat will be provided by placing rocks/boulders, stumps and/or logs randomly, or by creating soil mounds within the mitigation area. A combination of the above methods would be employed to create a greater diversity of cover. Dead and/or dying woody debris will cover at least 4%, but not more than 5%, of the ground throughout the mitigation site after the completion of construction of the mitigation site. All of the material could likely be obtained from on-site construction activities for the Busway project. Rocks and/or boulders would provide cover for aquatic species and sunning areas for reptiles and amphibians. Likewise, stumps and logs would also provide these functions; however, plants would also grow on these objects. These objects could also be placed in combinations which would diversify the types of cover and habitat provided. For example, by leaning a flat boulder on a log or stump, cover would be maximized while still providing a sunning area and vegetation growth area.

Wetland Soils: Organic soil material will be placed within the excavated area to a depth of 1.5 feet in the southern mitigation area and an estimated two feet in the northern mitigation area.

The installation of this soil material will raise the elevation of the creation area to the final design elevation.

Vegetation: Wetland plant material will be installed within the proposed creation (establishment) areas, to create a layer of wetland vegetation.

The creation areas have been designed to connect to the existing wetlands on the site, which will improve the potential success of the mitigation. By matching the proposed elevations to the observed elevations of existing, native wetlands, hydrology will be similar to the existing wetland, and wetland seed stock from the existing wetland will help establish hydrophytic vegetation.

The proposed wetland planting plan utilizes native, non-invasive vegetation species. The chosen plants include trees, shrubs and herbaceous materials which are adapted to grow in the fluctuating groundwater conditions observed on the site. The species and planting associations were chosen to provide wildlife habitat (food and cover) as well as to provide compensation for other functions lost as a result of the permanent project wetland impacts. The planting plans on the attached plates provide details on plant location, size, and spacing requirements.

Hydrology: Hydrology on the site will be controlled by the grading plan design and other aspects such as depth of organic soils and vegetation types and locations. Soils within existing uplands will be excavated to a sufficient level to intercept the groundwater (based on monitoring well data and field soil investigations). The final wetland creation area elevation will be slightly above the groundwater level in some areas to promote a saturated soil, or it may be excavated below it to create ponded water areas during some parts of the growing season. Microtopography has been incorporated into the design to encourage hydrologic diversity within the wetland creation areas. Grading will also be used to control surface water movement within the creation areas. Meandering surface water features will improve wildlife habitat, slow water velocity, and promote longer contact time for surface water renovation.

Wetland Enhancement

As discussed in Section 2.2 above, the extensive areas of *Phragmites* within Site #13 will be the major focus of the wetland enhancement efforts. In addition, wetlands dominated by purple loosestrife (*Lythrum salicaria*) will also be enhanced on the site. The concept for the *Phragmites* areas is to perform mowing and repetitive herbicidal treatments until the plants are dead. This will be followed by removal of the remaining invasive species rhizomes. Regrading and replanting of the site will then re-establish conditions conducive to wetland vegetation and hydrology. *Phragmites* on the site is currently being treated under the CTDEP WHAMM program (See Section 2.2 above).

Existing wetlands dominated by purple loosestrife will be excavated to remove all root masses and existing wetland soil. This material will be removed from the site and properly discarded. The site will then be re-graded to connect to other wetland creation or enhancement areas on the site. These areas will then be enhanced with organic soils and wetland vegetation.

3.1.2 Grass-lined (Vegetated) Swales, Ditches, and Channels

Mitigation for impacted IWCs will be achieved by the use of grass-lined swales, ditches and channels (as proposed in the design plans) and treatment of the *Phragmites*-infested swale adjacent to the wetland mitigation site (west of the I-84 WB off-ramp).

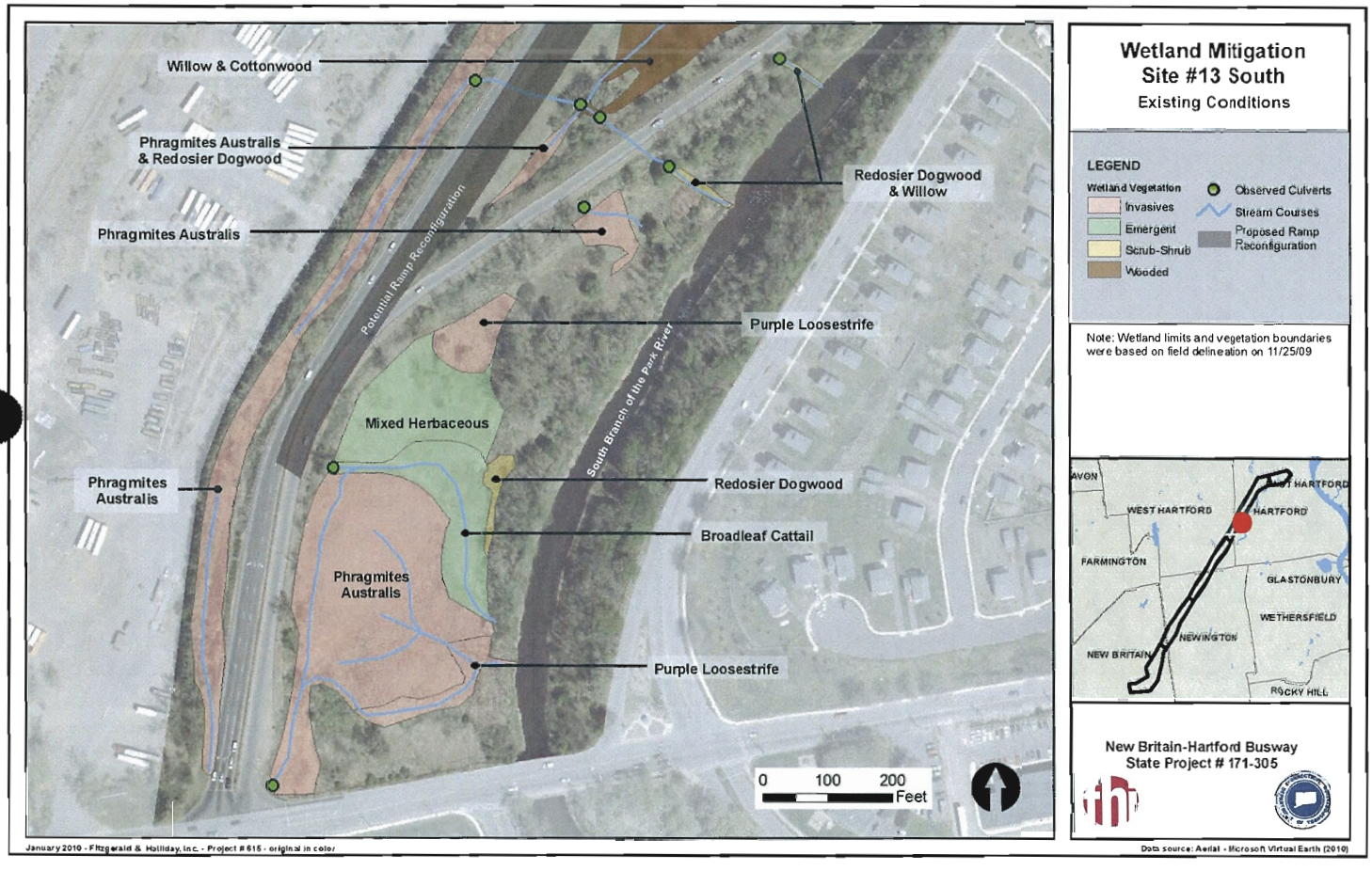
A total of 7,108 linear feet of IWCs will be impacted as a result of the proposed project. Approximately 11,132 linear feet of new grass-lined swales, ditches and channels are proposed throughout the project area. The new grass-lined swales are expected to provide sufficient mitigation for these impacts. These swales will perform at a higher level than the existing IWCs to provide sediment/toxicant retention -- the function most impacted as a result of the proposed project. These swales will also promote groundwater recharge and stormwater retention. The drainage design also includes a detention basin (grass-lined water quality basin) to be constructed at the Cedar Street Station and a detention basin (vegetated bio-retention basin) to be installed at the Elmwood Station. These basins will serve a sediment/toxicant retention function and provide improved water quality within the project area.

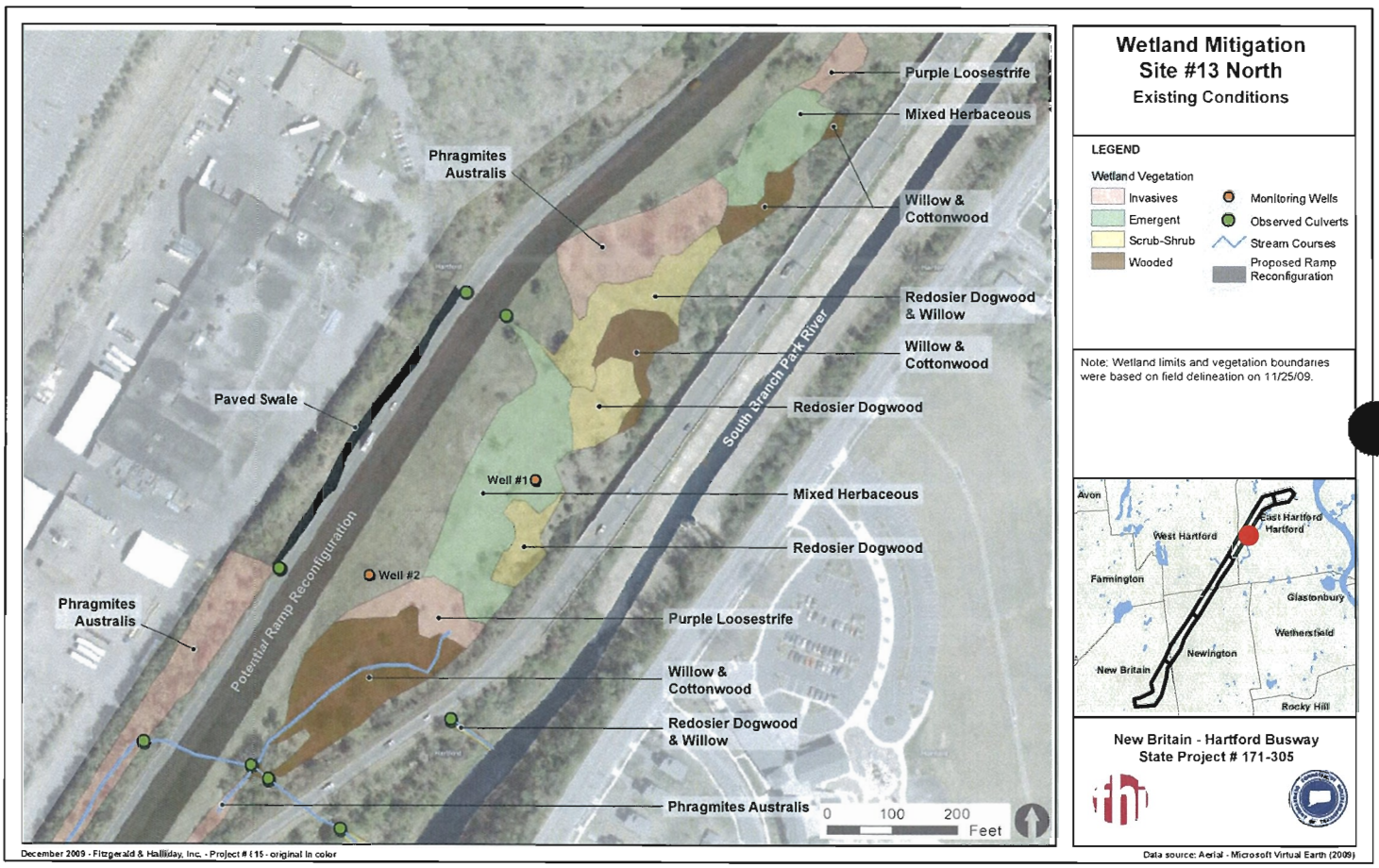
As noted, additional compensatory mitigation for IWCs will be achieved through the enhancement of the existing drainage swale to the west of the Flatbush Avenue WB off-ramp (see Wetland Mitigation Concept Plans contained in this attachment). The enhancement of this swale will include the removal of an existing *Phragmites* stand, which dominates both sides of the 1,500 linear-foot intermittent watercourse (ditch). It is estimated that removal of the common reed within this ditch will result in approximately 1.4 acres of wetland enhancement credit.

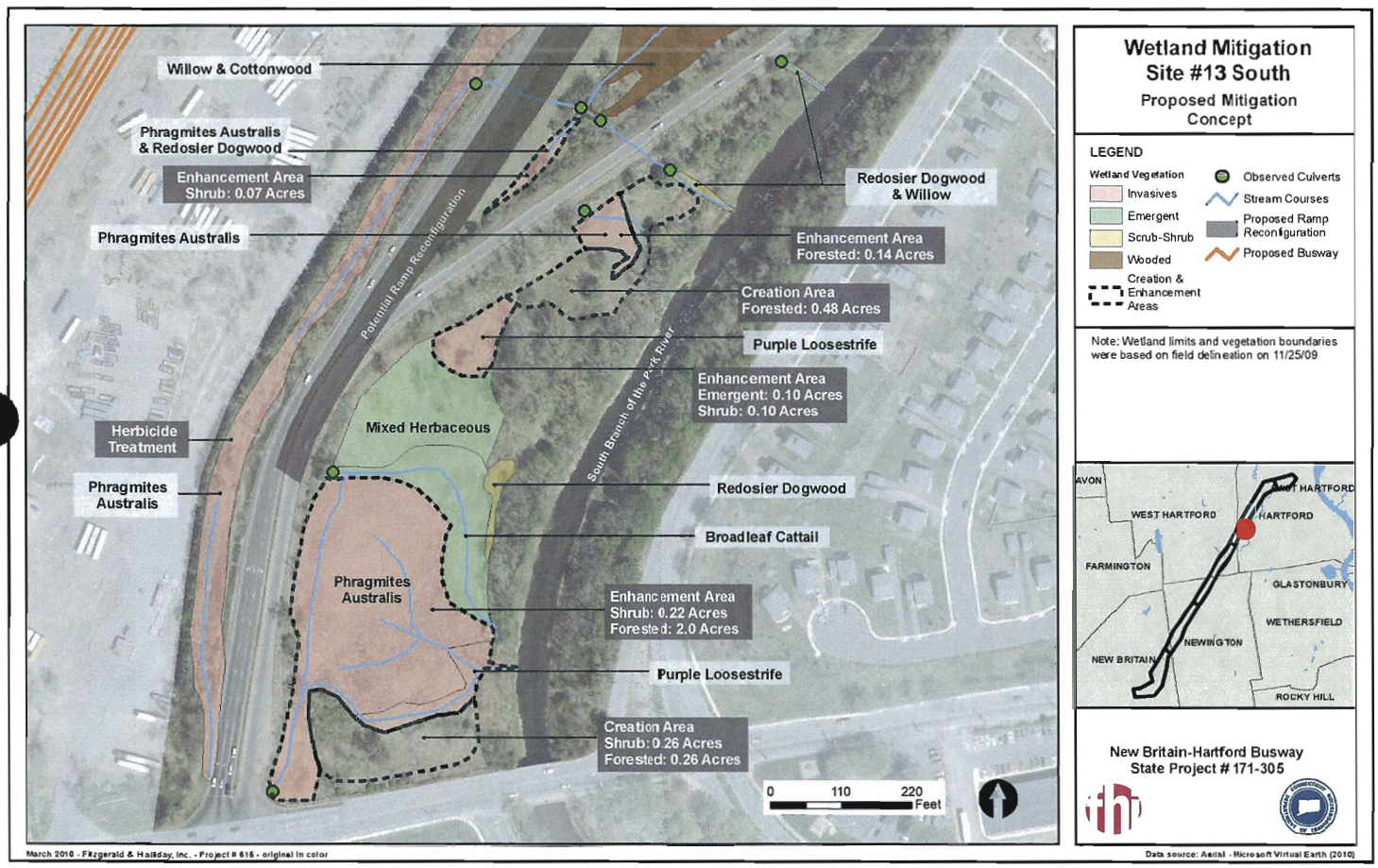
3.2 Temporary Impacts

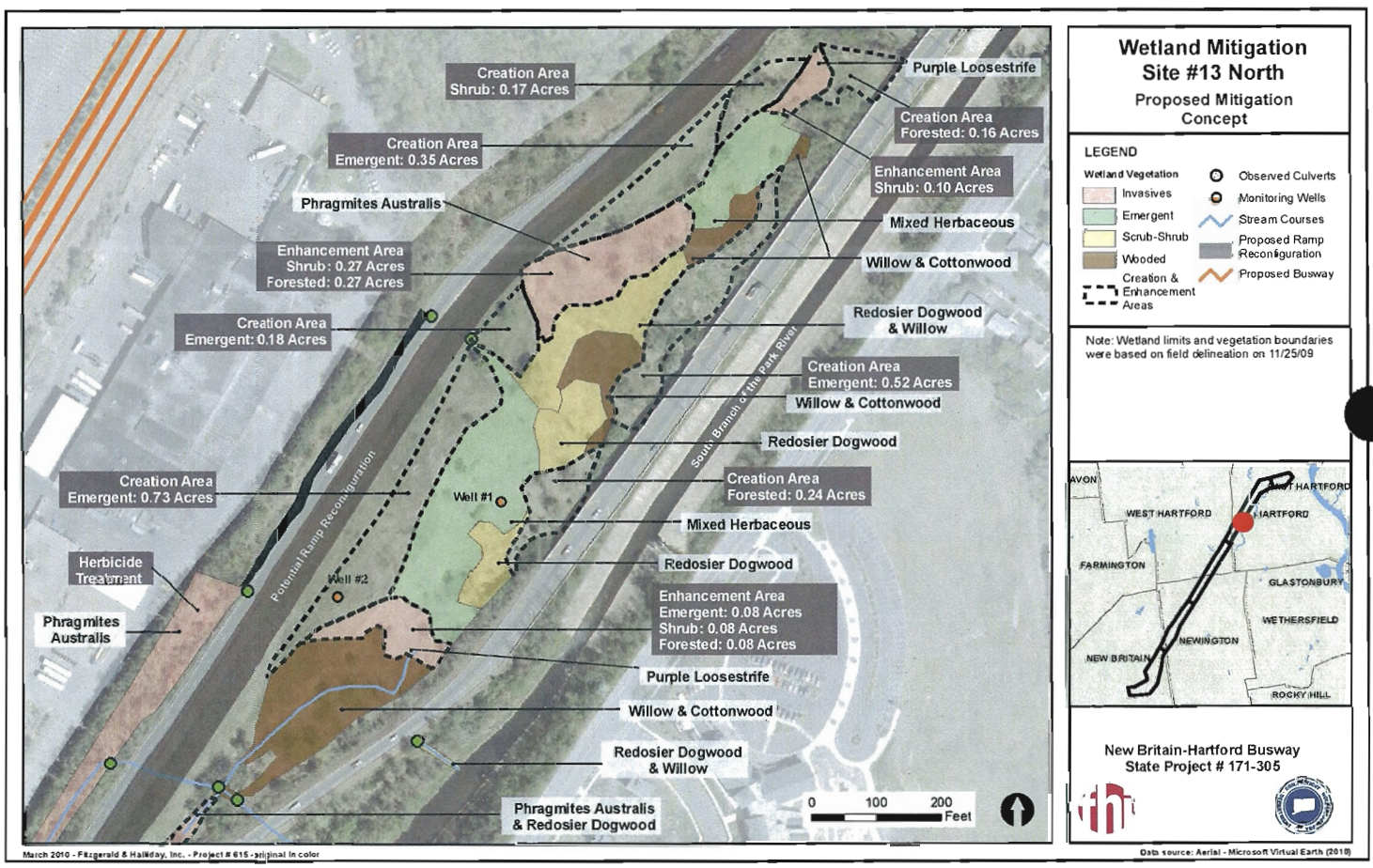
Temporary impacts to wetlands include the installation of access roads, retaining wall construction, jacking pits, and areas for water handling, where required. The total area of temporary wetland area impact to be reestablished is approximately 0.459 acres.

Restoration efforts will include the removal of temporary access roads, re-grading, and re-establishment of wetland areas. Soil erosion and sedimentation controls will not be removed until vegetation is established. As shown on construction plans, restoration will include re-grading of the soil surface and establishing native non-invasive wetland species as specified, corresponding to the wetland type disturbed. If invasive species are found at the temporary impact areas, additional measures to remove invasive species prior to replanting will be taken as needed. Seed mixtures to be used will be those specified and approved by CTDOT prior to use.


Willow & Cottonwood
Phragmites Australis & Redosier Dogwood
Phragmites Australis
Redosier Dogwood & Willow
Potential Ramp Reconfiguration
Purple Loosestrife
South Branch of the Park River
Mixed Herbaceous
Phragmites Australis
Redosier Dogwood
Broadleaf Cattail
Phragmites Australis
Purple Loosestrife
0 100 200 Feet
Wetland Mitigation Site #13 South
Existing Conditions
LEGEND
Wetland Vegetation
Invasives
Emergent
Scrub-Shrub
Wooded
Observed Culverts
Stream Courses
Proposed Ramp Reconfiguration
Note: Wetland limits and vegetation boundaries were based on field delineation on 11/25/09
AVON
WEST HARTFORD
HARTFORD
FARMINGTON
GLASTONBURY
WETHERSFIELD
NEWINGTON
NEW BRITAIN
ROCKY HILL
New Britain-Hartford Busway
State Project # 171-305
January 2010 - Fitzgerald & Halliday, Inc. - Project # 615 - original in color
Data source: Aerial - Microsoft Virtual Earth (2010)


Purple Loosestrife
Mixed Herbaceous
Phragmites Australis
Willow & Cottonwood
Redosier Dogwood & Willow
Willow & Cottonwood
Paved Swale
Redosier Dogwood
South Branch Park River
Well #1
Mixed Herbaceous
Redosier Dogwood
Well #2
Phragmites Australis
Purple Loosestrife
Potential Ramp Reconfiguration
Willow & Cottonwood
Redosier Dogwood & Willow
Phragmites Australis
0 100 200 Feet
Wetland Mitigation Site #13 North
Existing Conditions
LEGEND
Wetland Vegetation
Invasives
Emergent
Scrub-Shrub
Wooded
Monitoring Wells
Observed Culverts
Stream Courses
Proposed Ramp Reconfiguration
Note: Wetland limits and vegetation boundaries were based on field delineation on 11/25/09.
Avon
East Hartford
Hartford
West Hartford
Farmington
Glastonbury
Wethersfield
Newington
New Britain
Rocky Hill
New Britain - Hartford Busway
State Project # 171-305
December 2009 - Fitzgerald & Halliday, Inc. - Project # 115 - original in color
Data source: Aerial - Microsoft Virtual Earth (2009)


Willow & Cottonwood
Phragmites Australis & Redosier Dogwood
Enhancement Area Shrub: 0.07 Acres
Phragmites Australis
Redosier Dogwood & Willow
Enhancement Area Forested: 0.14 Acres
Creation Area Forested: 0.48 Acres
Purple Loosestrife
Enhancement Area Emergent: 0.10 Acres Shrub: 0.10 Acres
Herbicide Treatment
Mixed Herbaceous
Phragmites Australis
Redosier Dogwood
Broadleaf Cattail
Phragmites Australis
Enhancement Area Shrub: 0.22 Acres Forested: 2.0 Acres
Purple Loosestrife
Creation Area Shrub: 0.26 Acres Forested: 0.26 Acres
Potential Ramp Reconfiguration
South Branch of the Park River
0 110 220 Feet
Wetland Mitigation Site #13 South
Proposed Mitigation Concept
LEGEND
Wetland Vegetation
Invasives
Emergent
Scrub-Shrub
Wooded
Creation & Enhancement Areas
Observed Culverts
Stream Courses
Proposed Ramp Reconfiguration
Proposed Busway
Note: Wetland limits and vegetation boundaries were based on field delineation on 11/25/09
AVON
WEST HARTFORD
HARTFORD
FARMINGTON
GLASTONBURY
WETHERSFIELD
NEWINGTON
NEW BRITAIN
ROCKY HILL
New Britain-Hartford Busway
State Project # 171-305
March 2010 - Fitzgerald & Halliday, Inc. - Project # 615 - original in color
Data source: Aerial - Microsoft Virtual Earth (2010)

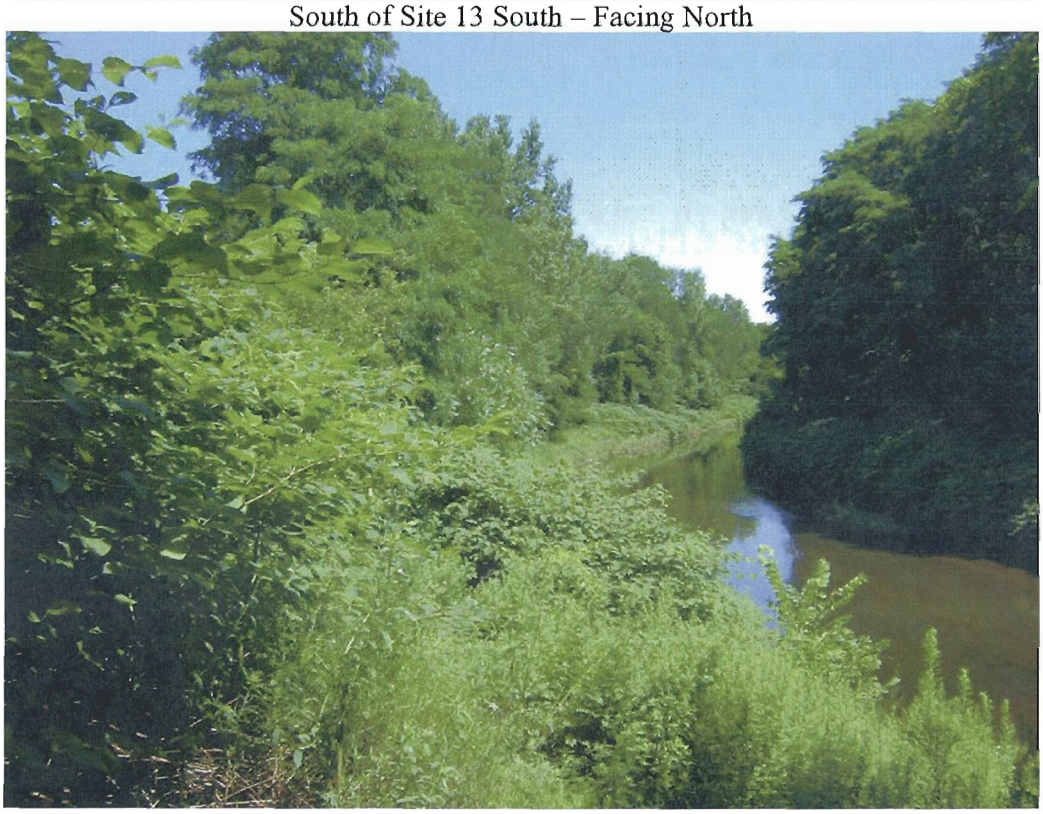

Creation Area
Shrub: 0.17 Acres
Purple Loosestrife
Creation Area
Forested: 0.16 Acres
Creation Area
Emergent: 0.35 Acres
Enhancement Area
Shrub: 0.10 Acres
Phragmites Australis
Mixed Herbaceous
Enhancement Area
Shrub: 0.27 Acres
Forested: 0.27 Acres
Willow & Cottonwood
Creation Area
Emergent: 0.18 Acres
Redosier Dogwood
& Willow
Creation Area
Emergent: 0.52 Acres
Willow & Cottonwood
South Branch of the Park River
Redosier Dogwood
Creation Area
Emergent: 0.73 Acres
Well #1
Creation Area
Forested: 0.24 Acres
Mixed Herbaceous
Herbicide
Treatment
Well #2
Redosier Dogwood
Potential Ramp Reconfiguration
Enhancement Area
Emergent: 0.08 Acres
Shrub: 0.08 Acres
Forested: 0.08 Acres
Phragmites
Australis
Purple Loosestrife
Willow & Cottonwood
Redosier Dogwood
& Willow
Phragmites Australis
& Redosier Dogwood
0
100
200
Feet
March 2010 - Fitzgerald & Halliday, Inc. - Project # 615 - original in color
Wetland Mitigation
Site #13 North
Proposed Mitigation
Concept
LEGEND
Wetland Vegetation
Invasives
Emergent
Scrub-Shrub
Wooded
Creation & Enhancement Areas
Observed Culverts
Monitoring Wells
Stream Courses
Proposed Ramp Reconfiguration
Proposed Busway
Note: Wetland limits and vegetation boundaries were based on field delineation on 11/25/09
AVON
WEST HARTFORD
FARMINGTON
GLASTONBURY
WETHERSFIELD
NEWINGTON
NEW BRITAIN
ROCKY HILL
New Britain-Hartford Busway
State Project # 171-305
Data source: Aerial - Microsoft Virtual Earth (2010)

APPENDIX A

Attachment L
NEW BRITAIN – HARTFORD BUSWAY
Site 13 – Wetland Mitigation
Hartford, Connecticut

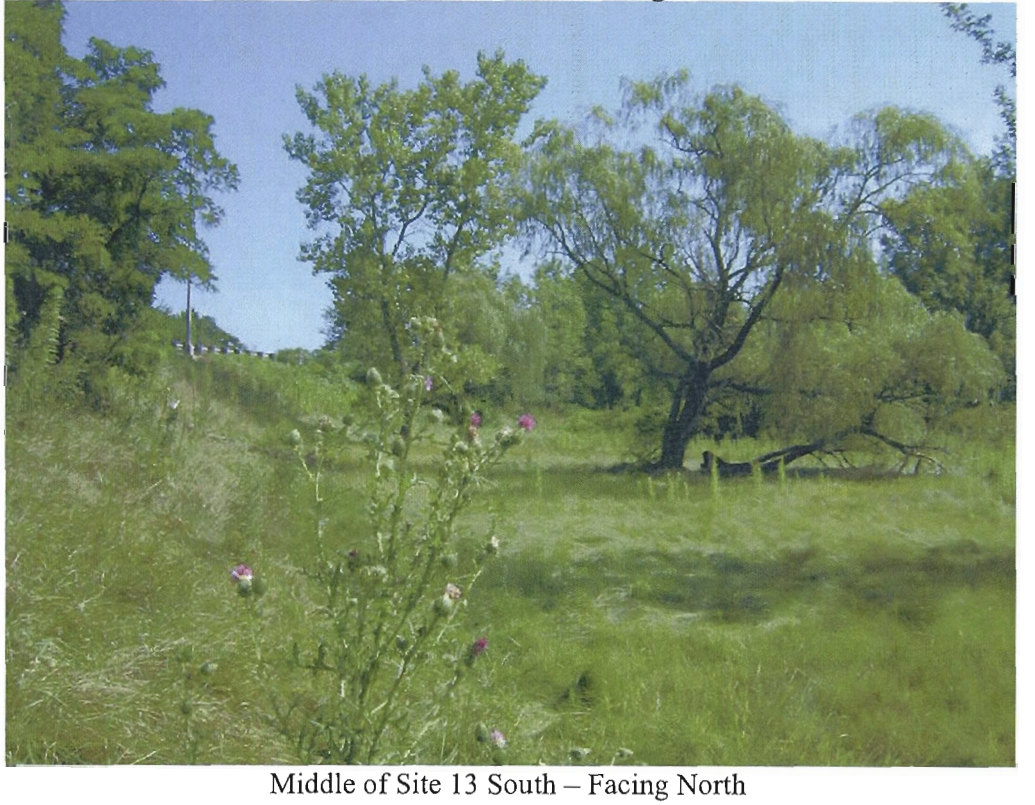
State Project 171-305

South of Site 13 South – Facing North



Southeast of Site 13 South – Facing North

West of Site 13 South – Facing East



Middle of Site 13 South – Facing North

Middle of Site 13 South – Facing South

Middle of Site 13 South – Facing Northeast

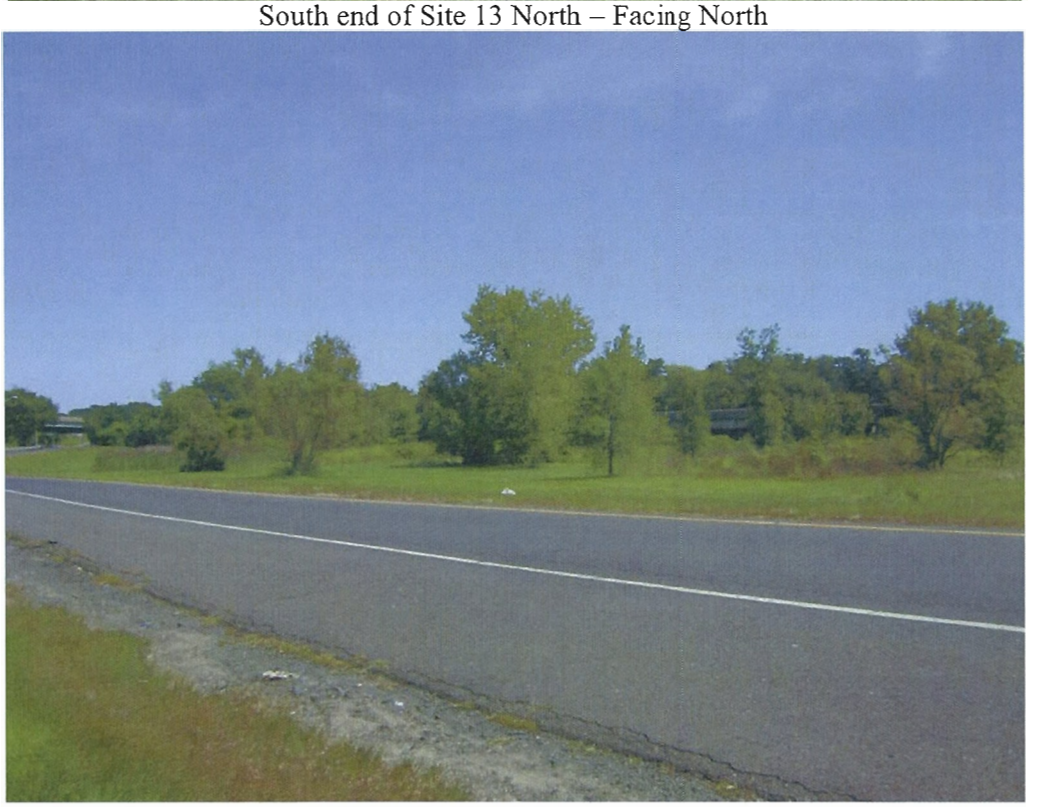
Middle of Site 13 South – Facing Northwest

North end of Site 13 South – Facing North

North end of Site 13 South – Facing East

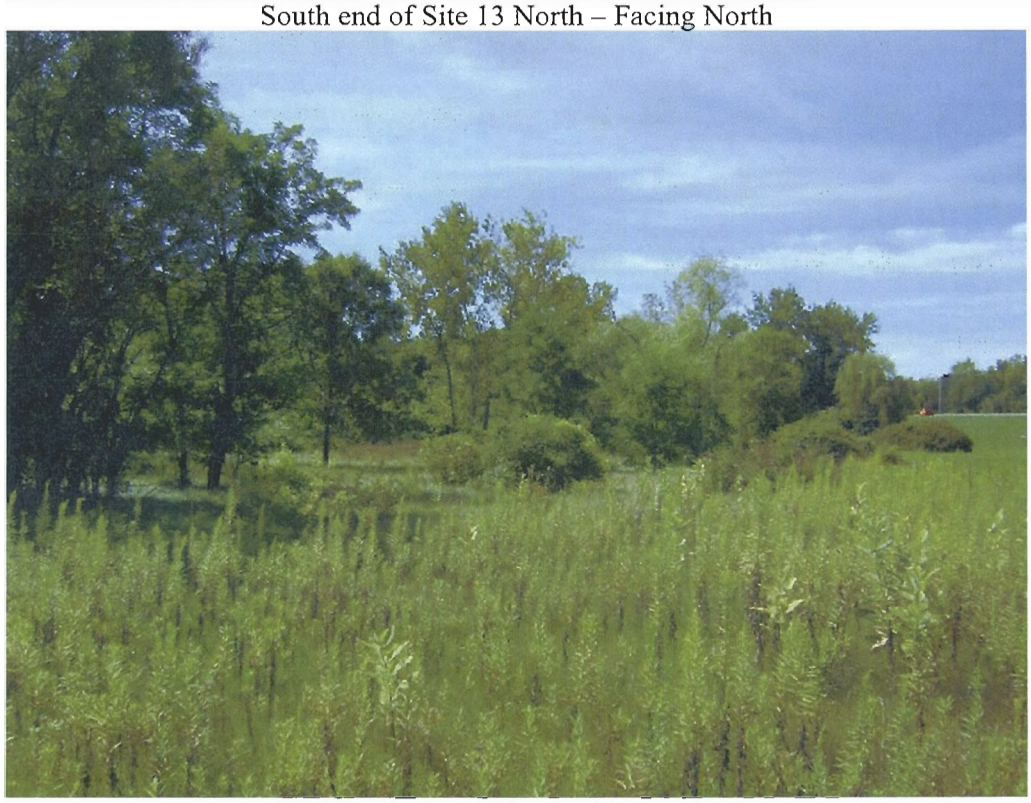
North end of Site 13 South – Facing South

South end of Site 13 North – Facing North



West of Site 13 North – Facing Northeast

South end of Site 13 North – Facing North



Middle of Site 13 North – Facing South

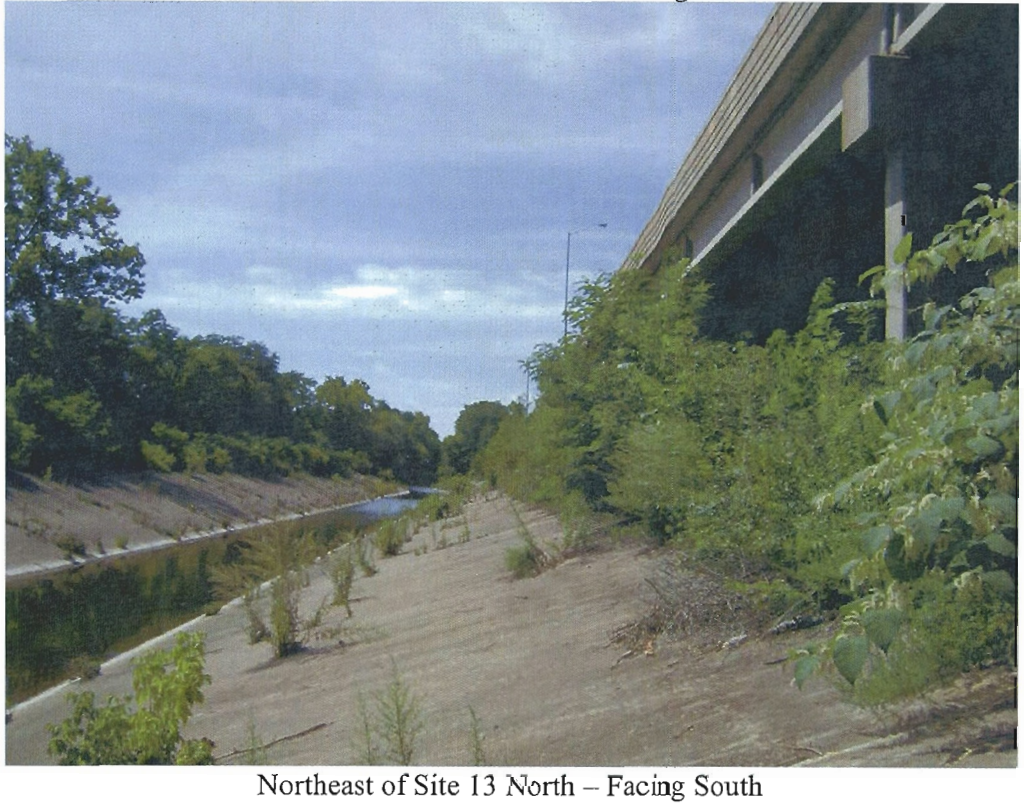
Middle of Site 13 North – Facing North

Middle of Site 13 North – Facing Southeast

East of Site 13 North – Facing West

Middle of Site 13 North – Facing Northwest

North end of Site 13 North – Facing North



Northeast of Site 13 North – Facing South

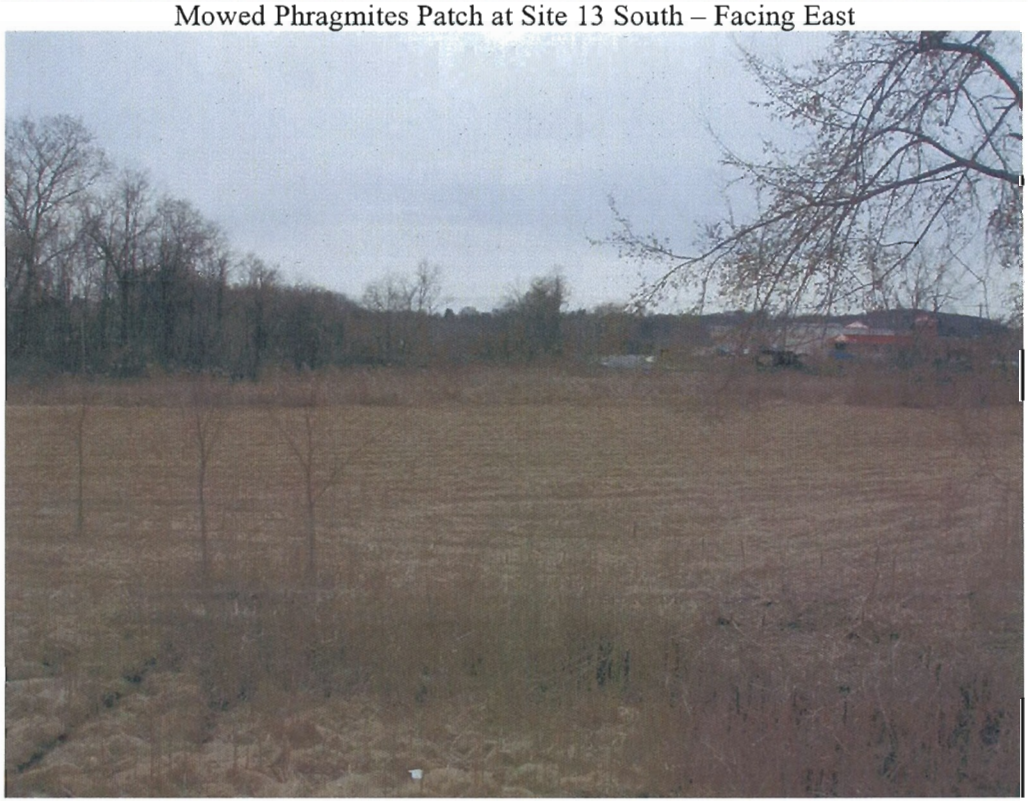
Mowed Phragmites Patch at Site 13 North – Facing North

Mowed Phragmites Patch at Site 13 South – Facing North

Mowed Phragmites Patch at Site 13 South – Facing South

Mowed Phragmites Patch at Site 13 South – Facing South

Mowed Phragmites Patch at Site 13 South – Facing East



Mowed Phragmites Patch at Site 13 South – Facing Southeast

Connecticut Department of Transportation
State Project No. 171-305, New Britain – Hartford Busway
Hartford, West Hartford, Newington, New Britain

Attachment M: Alternatives Assessment

Project Alternatives

Alternatives were evaluated in a Draft EIS and Section 4(f) Evaluation completed in March 2001. Alternatives considered are described below. These alternatives were evaluated against the project purposes of reducing congestion levels on I-84 and parallel roadways and providing alternative modes of transportation.

No Build Alternative: The No Build Alternative assumed that no transportation improvements would be made in the corridor other than projects that are currently programmed or routine maintenance of the current transportation system. Under the No Build Alternative, congestion levels on I-84 and parallel roadways would continue to worsen, and no opportunities would be provided for expanded interregional transit service or alternative modes of transportation. Overall, the No Build Alternative would not address any of the needs of the project.

TSM/TDM Alternative: The TSM/TDM Alternative included a broad range of low-cost, localized improvements to improve traffic flow, increase safety, and reduce travel demand without major capital investment or construction. While these measures could be easily implemented, they would only have a minimal effect on addressing the purpose and need for this project.

Build Alternative - New Britain-Hartford Busway: The proposed Build Alternative would be a dedicated, 9.4-mile BRT facility between downtown New Britain and downtown Hartford. The proposed corridor follows an abandoned rail line south of Newington Junction, while north of Newington Junction the corridor would run within active Amtrak rights-of-way. Up to 12 passenger stations (including Union Station in downtown Hartford) were considered to serve the users of the Busway. A multi-use pathway for bicyclists and pedestrians would be constructed parallel to the Busway. The Build Alternative evaluated several alignment options, summarized briefly below.

- Alignment Option 1: After exiting Route 72 onto an exclusive bus-only off-ramp to a Downtown New Britain Station, buses would follow a dedicated busway along an abandoned rail line (owned by CTDOT) north to Newington Junction. The dedicated busway would then follow an unused portion of active Amtrak right-of-way from Newington Junction, north to Union Station in downtown Hartford.

- Alignment Option 2: Regional express buses would not exit Route 72, but would continue onto Route 9 north in mixed traffic. An exclusive bus-only off-ramp would be provided between East Street in New Britain and Cedar Street in Newington for buses continuing onto the dedicated busway along the abandoned rail line. An exclusive bus-only on-ramp would be provided on southbound Route 9 for buses traveling southbound. Continuing north, this alignment option would follow the path of Alignment Option 1.

- Alignment Option 3: Similar to Alignment Option 1, the Busway would use a bus-only off-ramp from Route 72 to a Downtown New Britain Station, then would continue northward following the abandoned rail line. The Busway would then continue over Route 9 using an existing railroad bridge and then continue northward in the median of Route 9. The Busway would continue for approximately one (1) mile in the dedicated median until St. Mary's Cemetery, where it would cross under the southbound lanes of Route 9 onto the abandoned rail corridor. From this point, the Busway would continue northward towards Hartford following an unused portion of Amtrak right-of-way, similar to Alignment Option 1.

Station locations were selected to minimize the acquisition of private properties and to maximize proximity to residential, employment, shopping centers and various community resources compatible with transit oriented development (TOD) within one-half mile of the stations. All stations were envisioned to have, at a minimum, two covered platforms for loading and unloading passengers, bicycle racks, and kiss-and-ride drop-off areas. All stations would be designed and constructed to be in compliance with the Americans with Disabilities Act (ADA) and would include new sidewalks, where appropriate, to improve pedestrian accessibility and/or connectivity. Those stations that are expected to have high ridership would have full amenities such as park and ride lots, climate-controlled station buildings/waiting areas, restrooms, payphones, and some private retail services such as a newsstand and coffee shop/café. All but three of the proposed stations would include pick-up/drop-off areas for local feeder buses.

The Final EIS and Section 4(f) Statement, which was completed in December 2001, identified the Build Alternative on Alignment Option 1 as CTDOT's Recommended Action. The Recommended Action included the following station options:

- Downtown New Britain Option A1;
- East Main Street Option B1;
- East Main Street Option C1 modified;
- Cedar Street Option D1;
- Newington Junction Station Option E1;
- Elmwood Station Option F1;
- Flatbush Station Option G3 modified;
- New Park Avenue Station/Kane Street Station Option H2;
- Park Street Station Option I4;
- Sigourney Street Station Option J2;
- Armory/Legislative Office Building Station Option K1; and
- Union Station Option L1.

In order to address changes in the project scope since issuance of the Record of Decision (ROD), CTDOT completed supplementary environmental work, which was approved by the Federal Transit Administration (FTA) in June 2006. FTA approved final design for the project in October 2006. Based on the supplemental environmental and design work, the New Britain-Hartford Busway Project is proceeding as approved by FTA.

Design and Impact Avoidance Alternatives

Project impacts result from three main factors: a) the existing railroad ROW crosses a number of watercourses; b) wetlands have formed in linear pockets along the existing ROW due to the lack of positive drainage (very level terrain); and c) the rail alignment was originally located through large wetland systems which still persist in some areas along the corridor. These conditions made it very difficult for the project to avoid impacts to wetlands and watercourses. In order to take advantage of the existing transportation (rail) corridor, the Busway alignment is the best possible choice. However, construction of the Busway will impact wetlands along the alignment. Considering the history of the rail corridor, these are "edge" impacts to wetlands that have previously been affected by the rail alignment.

The primary design principle to avoid impacts was to minimize the change in grade between the existing ROW elevation and the proposed Busway. Designing the Busway to rest at or near existing grades minimized the amount of excavation or fill required to construct the new roadway. The same principle was applied to the Amtrak Access Road; however, Amtrak dictated the requirements of the roadway elevation relative to the existing rail bed for safety of rail operations.

Efforts to limit the edge impacts to wetlands consisted of the following measures: 1) utilizing steep slopes wherever possible; 2) constructing retaining walls instead of fill slopes where long stretches of wetlands occurred directly along the Busway; 3) locating stations and their on- and off-ramps on previously developed sites.

Designs have been completed in accordance with CTDOT's Highway Design Manual and Drainage Manual. Additional criteria of the CTDEP 2004 Stormwater Quality Manual were also incorporated as much as possible.

Numerous impact avoidance strategies were applied in designing the Busway to avoid and minimize impacts to other regulated areas. The existing rail line is sandwiched between dense urban development and wetland/watercourse systems, so avoiding impacts were not always possible. The primary strategies employed were the following:

- Design storm drainage systems for the 10-year storm event
- Separate Busway drainage as much as possible from municipal or private systems
- Eliminate curbing and closed drainage systems as much as possible
- Maximize sheet flow and vegetated swales for water quality treatment
- Locate drainage outfalls and outfall protection outside regulated areas where possible
- Use steep slopes and retaining walls to reduce encroachment into adjacent wetlands/watercourses, floodplains, and/or stream channel encroachment lines

Each potential impact was reviewed carefully by the designers to look for ways to avoid the impact altogether. Where it was not possible, various means to reduce and minimize the impacts were considered and applied to the extent possible.

REPORT OF MEETING

Project: New Britain Hartford Busway Project
Location: CTDOT Room G328
Date/Time: October 5, 2009 @ 9 AM
Report by: Marianne Latimer
Attendees: **CTDEP-** Jeff Caiola, Danielle Missell, Gary Steinhaus (IWRD)
CTDOT-Mark Alexander, Kim Lesay, Drew Colburn (Environmental Planning), Yolanda Antoniak (Drainage and Hydraulics), Rich Armstrong, Brian Cunningham, Dave Mancini, Laurie LaRocca (Consultant Design)
CME- Jake Argiro
URS- Tom Walb, Gary Nash, Stephanie Mather
CJM- Richard Fontaine, Jim McBrian
SEA- Al Bisacky
Baker Engineering - Tony Morelli
FHI- David Laiuppa, Marianne Latimer

Subject: A Permitting Pre-Application Meeting was held at CTDOT with CTDEP Inland Water Resources Permit Staff to introduce the project and start engineering submittals prior to the full application scheduled in January 2010. The subjects of this first meeting were Contract 88-H035 and the East Main Street Station within Contract 88-H035.

Transactions

Mark Alexander asked for introductions, then explained the process for submitting engineering documentation for permit application. Jeff Caiola expressed a preference for working with a small group on specific issues, and asked that materials be submitted ahead of meetings so that DEP could review them prior to discussions. Rich Armstrong explained that the project was very important to CTDOT and that CTDOT wanted to provide the correct staff to answer any questions that might arise.

Tony Morelli gave an overview of the project and a map depicting the Busway by contract was distributed.

CTDOT handed out a table of wetland impacts for H035 prepared by FHI. [Note: Danielle Missell had attended recent site walks and was familiar with the project wetlands, so FHI did not go into a detailed description of wetlands.]

Tom Walb gave an overview of H035 and explained how the drainage was designed.

A transmittal of materials for H035 and the East Main Street Station was given to CTDEP. A complete list of materials is attached.

General

CJM asked for clarification on siting of two proposed water quality basins, in terms of whether they could be situated in floodplains and/or wetlands. Jeff Caiola suggested that CJM send him questions and engineering information for these alternatives so that CTDEP can provide better guidance. CJM will work with CTDOT and provide that information to CTDEP ASAP.

Next Meeting

A second Pre-Application meeting with CTDEP IWRD for H034, H046, and the Amtrak Access Road is scheduled for October 19 at the same time and location.

REPORT OF MEETING

Project: New Britain Hartford Busway Project
Location: CTDOT Room G328
Date/Time: October 19, 2009 @ 9 AM
Report by: Marianne Latimer
Attendees: **CTDEP-** Danielle Missell, Gary Steinhaus (IWRD)
CTDOT-Mark Alexander,(Environmental Planning),
Yolanda Antoniak (Drainage and Hydraulics),
Dave Mancini, Kevin Mahoney, Laurie LaRocca (Consultant Design)
CME- Jake Argiro
Ammann &Whitney- Roy Lohne
CJM- Richard Fontaine, Cory Garro
SEA- Al Bisacky
GM2- Eric Buckley, Jeff Keefe
Baker Engineering - Tony Margiotta
FHI- David Laiuppa, Marianne Latimer

Subject: A Permitting Pre-Application Meeting was held at CTDOT with CTDEP Inland Water Resources Permit Staff to introduce additional contract areas of the project and continue the engineering submittals prior to the full application scheduled in January 2010. The subject of this second meeting were Contract 88-H034 (Newington), Contract 93-H046 (West Hartford), the Amtrak Access Road, the East Street Station within H034 and Newington Junction Station within H046.

Transactions

Mark Alexander asked the designers to walk through an overview of each project and DEP was invited to ask questions.

CTDOT handed out a table of project impacts for H034, H046 and the Amtrak Access Road.

Richard Fontaine gave an overview of H034 and explained how the 14 drainage systems were designed. The drainage information and mapping will be submitted to DEP within a few days to make sure the wetlands are numbered consistently. The East Street Station's drainage is complicated by coordination with the nearby CCSU project. CTDOT asked DEP to let them know if any red flag issues arise during their review of this area. A general discussion of drainage issues involving Cedar Street Station was presented, but this station has a few outstanding issues to resolve before submittal to DEP.

Roy Lohne presented the drainage design for H046. CTDOT explained that the Amtrak Access Road would be put in first, with the culvert extentions at Sites 4 and 5 being jacked under the railroad. The Newington Junction Station design was submitted to DEP with materials from H046. The Elmwood Station includes a bioretention basin with a flap on the outfall directly into Trout Brook. CTDOT asked if DEP could check to see if they have original as-built drawings from the Trout Brook flood control project, and Mark Alexander will also check with Susan Lee at ACOE.

Tony Margiotta went through the Amtrak Access Road design. It starts along H046 and continues to Hartford to the east of the tracks. There will be no addition of paved surface, as it is being designed as a gravel road. It has 5 drainage systems, generally open channels with sheet flow. Some piping will be installed to reduce ROW impacts. Temporary access roads will need to be built to reach the 2 jacking pits for sites 4 and 5 for the culvert crossings. Fill in the Piper Brook floodplain will be reduced as much as possible by installing steep slopes. Design for AAR will be sent to DEP prior to next scheduled meeting.

A transmittal of materials for these projects will be prepared and given this week to CTDEP.

General

DEP asked that an explanation be provided in the application for not being able to eliminate each wetland impact.

CTDOT explained its general directive of keeping state drainage separate from other systems because of its responsibility for maintaining the systems.

Next Meeting

A third Pre-Application meeting with CTDEP IWRD is scheduled for November 2 and Mark Alexander will send out a notice when the date, time and location is confirmed.

REPORT OF MEETING

Project: New Britain Hartford Busway Project
Location: CTDOT Room G328
Date/Time: November 2, 2009 @ 9 AM
Report by: Marianne Latimer
Attendees: **CTDEP-** Danielle Missell, Gary Steinhaus (IWRD)
CTDOT-Mark Alexander, Kim Lesay (Environmental Planning),
Yolanda Antoniak (Drainage and Hydraulics),
Bob Reilly, Laurie LaRocca (Consultant Design)
CME- Jake Argiro
URS- Rob Aloise, Stephanie Mather
SEA- Kimberly Raetz
FHI- Marianne Latimer

Subject: A Permitting Pre-Application Meeting was held at CTDOT with CTDEP Inland Water Resources permit staff to introduce the Hartford South contract area of the project and continue the engineering submittals prior to the full application submittal scheduled in January 2010. The subjects of this third meeting were Contract 155-H025 (Hartford South) and the stations at Flatbush Avenue, Kane and Parkville.

Transactions

Mark Alexander asked the designers to walk through their contract design and activities. DEP was invited to ask questions. CTDOT handed out a table of project impacts to wetlands and watercourses for H025.

Rob Aloise gave an overview of H025 and explained how the 6 drainage systems were designed, eliminating curbing as much as possible and using swales. One other drainage system is being constructed independently from the busway project near Flatbush Avenue, and the busway will tie into that drainage system. Coordination with MDC has been ongoing during design.

Kimberly Raetz gave an overview of the three stations with the contract area. Parkville Station will have detention under parking lot because of MDC's limit to accept 1 cfs.

Yolanda Antoniak explained that designers are doing the best they can to provide stormwater treatment and that she was pleased with MDCs cooperation. She asked DEP what they were most concerned with during reviews. Gary Steinhaus replied that he looks at pre and post development flows and whether there is an off-site impact. He also wants to be sure that the calculation methodology is correct.

Mark Alexander asked that if DEP notices any issues during review of the pre-application materials submitted, that they notify him before the formal application submittal.

The drainage information and mapping for H025 and the three stations was submitted to DEP. CTDOT also submitted drainage information for H034 that had been reviewed at the 10/19 meeting.

Next Meeting

A fourth Pre-Application meeting with CTDEP IWRD is scheduled for November 16. Mark Alexander will send out a notice to all when the date, time and location is confirmed.

REPORT OF MEETING NO. 3

Meeting Minutes

Project:	New Britain-Hartford Busway	**Date:**	07/24/03
Subject:	Permits – Field Review	**Time:**	9:00 am – 1:00 pm
By:	Jeffrey A. Scala (Garg Consulting Services)	**Place:**	ConnDOT / Project Site

Attendees:

Name	Company
Mark Alexander	ConnDOT – Environmental Planning
Chong Lung Chow	ConnDOT - Hydraulics & Drainage
Sharon Yurasevecz	CT DEP IWRD
Jeff Caiiola	CT DEP IWRD
Karen Leonard Allen	CT DEP IWRD
Don Mysling	CT DEP IWRD
Jeffrey A. Scala	Garg Consulting Services, Inc.

cc: Attendees, John M. Welsh, FTA (Carter & Burgess)
Jeffrey A. Quay (Baker Engineering NY, Inc.)
James H. Swadley (Baker Engineering NY, Inc.)

The participants visited the site to get a feel for the project location and potential impacts to the regulated areas.

- All the hydraulic sites with the exception of Piper Brook in New Britain were visited. The southern half, up to Newington Junction of the project was visited.
- It was expressed that preserving the resources to the east side of the right of way is more important, therefore modifying the alignment to minimize impacts on the east side was suggested.
- There are no fisheries concerns.
- Several questions about construction sequencing and stage construction were raised since this will have an effect on storm water managements.
- There were specific questions on how some of the hydraulic crossing replacements would be accomplished.
- Since no Analysts were present and limited information on proposed conditions is available, limited comments on the hydraulic sites were provided. However, no major concerns are anticipated.
- All agreed that a follow up meeting to review of the anticipated construction would be beneficial, however more information on the proposed hydraulics and storm water drainage systems to make the meeting as meaningful as possible.

Statement of Accuracy:

We believe these minutes accurately describe the discussion and determinations of this meeting. Unless notified to the contrary within 5 business days, we will assume all in attendance concur with the accuracy of this transcript.

Submitted by: _____
Jeffrey A. Scala, P.E.

Reviewed by: _____
Mark D. Rolfe

F:\PROJECTS\#0126-Busway\Correspondence\REPORT OF MEETING NO.3 (7-24-03).doc

TETRA TECH RIZZO

MEMORANDUM

To: Amie Maines and Judy Nemecek

From: David T. Williams

Re: General Guidance – Management of Controlled Materials and Related Topics
New Britain to Hartford Busway Project
State Project No.: 0171-0305

Date: October 23, 2009

Pursuant to our recent meeting with Connecticut Department of Transportation (CT DOT) and design engineers assigned to the New Britain to Hartford Busway Project, Tetra Tech Rizzo (Tetra Tech) is submitting this general guidance memorandum regarding the management of Controlled Materials and other related topics.

Controlled Materials

Controlled Materials are all materials, excluding the existing pavement structure (asphalt and sub base), rock, and bedrock that are excavated within an Area of Environmental Concern (AOEC). CT DOT specifications define how Controlled Materials are handled, reused, solidified (if necessary) and disposed.

Areas of Environmental Concern – Controlled Material Management

AOECs are defined as areas that have been determined to contain contaminants in soil and/or groundwater that exceed one or more of the numerical criteria presented in the Connecticut Department of Environmental Protection's (DEP's) Remediation Standard Regulations (RSRs).

Generally, when Controlled Material is excavated from within an AOEC it is transported to a Waste Stockpile Area (WSA) for waste characterization testing. However, similar to utility work, Controlled Material may be used as backfill in the same AOEC where it originated from without going to the WSA. This is allowed if the material is returned to the originating excavation in a timely manner and is not allowed to be staged for prolonged periods of time in a location other than the WSA. Controlled material that is reused as backfill may not be placed below the water table or in an area subject to erosion.

If excavated Controlled Material is not re-used as backfill in the originating AOEC and/or is deemed unsuitable (structurally unsound, etc.) for backfill, it must go to the WSA for testing. If testing at the WSA determines that the AOEC material **does** have contaminants above the applicable RSR criteria, the material is disposed of at a CT DOT

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approved facility as Controlled Material. If testing at the WSA determines that the AOEC material **does not** have contaminants above the applicable RSR criteria, the material can be classified as "Reuse Material" and may be reused within the project limits in accordance with the following conditions:

1. Such soil is deemed to be structurally suitable for use as fill by the engineer.
2. Such soil is not placed below the water table.
3. The DEP's groundwater classification of the area where the soil is to be reused as fill does not preclude said reuse.
4. Such soil is not place in an area subject to erosion.

Low Level Areas of Environmental Concern – Material Management

Low Level Areas of Environmental Concern (LLAOEC) are those "polluted" areas defined as containing contaminants at concentrations that have been detected, but not detected above the numerical criteria presented in the RSRs for the specific groundwater classified area. LLAOEC material is not considered Controlled Material.

LLAOEC material that is excavated within the project limits may be reused throughout the project limits without testing. If excavated LLAOEC material cannot be reused within project limits, it is transported to the WSA. At the WSA, the LLAOEC may be staged in a designated re-use area for future use. If LLAOEC material cannot be reused, it is considered excess material and is tested for off-site disposal along with Controlled Material.

Contaminated groundwater that is located in an AOEC is managed in accordance with the CT DOT "Handling of Contaminated Groundwater" specification.

Groundwater Classification – Controlled Material Reuse

Test results from Controlled Material staged at the WSA are compared to the applicable RSR criteria to assess disposal/reuse options. Generally speaking, different RSR criteria apply to different groundwater classification areas. The majority of the groundwater in Connecticut has been classified by the DEP as either GB (impacted due to spills, poor land use practices and not consumable without treatment) or GA (drinking water quality).

Controlled Materials that have been excavated from a GB classified AOEC are typically not reused in any portion of the originated AOEC that is classified GA. The reasoning is to avoid potential negative impacts to groundwater resulting from the placement of degraded material in an area where the groundwater is assumed to be of drinking water quality.

Controlled Materials excavated in a portion of an AOEC that is classified GA and which have contaminants at concentrations above the GA standards but below the less stringent

GB standards may be reused in a portion of the same (originating) AOEC if classified GB. In some cases, construction limits traverse the boundaries of different groundwater classified areas.

Waste Stockpile Area and Characterization Testing

Waste Stockpile Areas (WSAs) are constructed, managed and dismantled in accordance with CT DOT specifications. If the volume of staged soil in any one month is expected to exceed 1,000 cubic yards, a DEP soil staging permit is required and is prepared by Environmental Compliance's consultant. Generally speaking, the size, configuration and location of the WSA are based on a number of factors including the volume of material expected to be generated and managed. Typically WSAs have concrete block "storage bins" capable of staging up to 250 cubic yards in each bin. Material is staged on and covered with plastic sheeting. When bins become full, the material is tested and characterized. A CT DOT specification defines how the WSA is managed, constructed and dismantled.

Connecticut Commission on Culture & Tourism

Historic Preservation
& Museum Division

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September 19, 2006

Mr. Keith T. Hall
Environmental Planning
ConnDOT
2800 Berlin Turnpike
Newington, CT

Subject: New Britain-Hartford Busway
ConnDOT #171-305

Dear Mr. Hall:

The State Historic Preservation Office acknowledges receipt of the narrative text and photographs provided by Fitzgerald & Halliday Inc. concerning the above-named project. This office believes that the submitted materials are consistent with our documentation standards and succinctly document the historic Newington Depot, the Trout Brook Railroad Bridge and the Railroad Culvert beneath I-84.

The State Historic Preservation Office has transferred the documentation materials to the Thomas J. Dodd Research Center at the University of Connecticut (Storrs) for permanent archiving and public accessibility.

This office believes that the Federal Highway Administration and ConnDOT have satisfied the mitigative measures stipulated in our correspondence dated September 7, 2000, for the proposed undertaking. We appreciate ConnDOT's efforts to professionally manage and document Connecticut's cultural heritage.

This comment updates and supersedes all previous correspondence for the proposed undertaking. For further information please contact Dr. David A. Poirier, Staff Archaeologist.

Sincerely,

J. Paul Loether
Division Director and Deputy
State Historic Preservation Officer

cc: Mr. Robert Turner/FHWA
Ms. Stacey Vairo/FHI

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