

**STATE OF NEW HAMPSHIRE
INTER-DEPARTMENT COMMUNICATION**

FROM: *AS* on the behalf of Andrew O'Sullivan
Wetlands Program Manager

DATE: June 11, 2020

AT (OFFICE): Department of
Transportation

SUBJECT Dredge & Fill Application
Bedford, 42268

Bureau of
Environment

TO Karl Benedict, Public Works Permitting Officer
New Hampshire Wetlands Bureau
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Forwarded herewith is the application package prepared by NH DOT Bureau of Highway Design for the subject major impact project. This project is classified as major per Env-Wt 904.03(g); rehabilitation of an existing legal Tier 3 structure. The project is located at NH Route 101 and Boynton Street in the Town of Bedford, NH. The proposed work consists of rehabilitation of an existing 90" x 632' long corrugated metal culvert carrying Bowman Brook under the roads. The proposed work includes slip lining the pipe with a corrugated metal liner, shortening the inlet segment by approximately 12' by removing the mitered ends and replacing the end section with a concrete headwall, replacing the failed 18" drainage connector pipe, and restoration of the eroded landscape in the sag between NH 101 and Boynton Street.

This project was reviewed at the Natural Resource Agency Coordination Meeting on February 19, 2020. A copy of the minutes has been included with this application package. A copy of this application and plans can be accessed on the Departments website via the following link: <http://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/wetland-applications.htm>. NHDOT anticipates that this project will be reviewed and permitted by the Army Corp of Engineers through the State Programmatic General Permit process. A copy of the application has been sent to the Army Corp of Engineers.

Mitigation was determined to not be triggered by the proposed impacts and therefore is not required.

The lead people to contact for this project are Tobey Reynolds, Bureau of Highway Design (271-2731 or Tobey.Reynolds@dot.nh.gov) or Sarah Large, Wetlands Program Analyst, Bureau of Environment (271-3226 or Sarah.Large@dot.nh.gov).

A payment voucher has been processed for this application (Voucher # 612462) in the amount of \$3,476.

If and when this application meets with the approval of the Bureau, please send the permit directly to Andrew O'Sullivan, Wetlands Program Manager, Bureau of Environment.

AMO:sel
Enclosures

cc:
BOE Original
Town of Bedford (4 copies via certified mail)
David Trubey, NH Division of Historic Resources (Cultural Review Within)
Bureau of Construction
Carol Henderson, NH Fish & Game (via electronic notification)
Maria Tur, US Fish & Wildlife (via electronic notification)
Mark Kern, US Environmental Protection Agency (via electronic notification)
Michael Hicks, US Army Corp of Engineers (via electronic notification)
Kevin Nyhan, BOE (via electronic notification)

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**STANDARD DREDGE AND FILL
WETLANDS PERMIT APPLICATION**
Water Division/Land Resources Management
Wetlands Bureau
[Check the Status of your Application](#)



RSA/Rule: RSA 482-A/Env-Wt 100-900

APPLICANT'S NAME: NH Dept. of Transportation

Administrative Use Only	Administrative Use Only	Administrative Use Only	File No.:
			Check No.:
			Amount:
			Initials:

A person may request a waiver to requirements in Rules Env-Wt 100-900 to accommodate situations where strict adherence to the requirements would not be in the best interests of the public or the environment. A person may also request a waiver of standard for existing dwellings over water pursuant to RSA 482-A:26, III (b). For more information, please consult the [request form](#).

SECTION 1 - CONCURRENT PROCESSING OF RELATED SHORELAND/WETLANDS PERMIT APPLICATIONS (Env-Wt 313.05)
If the applicant is not requesting concurrent processing, please proceed to Section 2.

Is the proposed project eligible for the optional concurrent processing of related shoreland/wetlands permit applications (Env-Wt 313.05(d))? If the project is not eligible, proceed to Section 2 (the files will not be processed concurrently). Yes No

By signing this form and initialing this section, the applicant is requesting concurrent processing of related shoreland/wetlands permit applications and understands that concurrently filing the applications with a request to process the applications together constitutes:

- A waiver by the applicant of the shorter time frame, if application processing timelines are different for each permit program under the 2 statutes and their implementing rules; and Initials:
- An agreement by the applicant that any request for additional information by the department under either or both statutes shall affect the review timeframe of both applications being processed together. Initials:

SECTION 2 - REQUIRED PLANNING FOR ALL PROJECTS (Env-Wt 306.05)
Please use the Wetland Permit Planning Tool (WPPT) or any other database or source to assist in identifying key features such as: priority resource areas (PRA), protected species or habitat, coastal area, or designated river, or designated prime wetlands.

Step 1: A certified wetland scientist must delineate and classify all wetlands and identify the predominant resource functions of each wetland, unless the exceptions listed in Env-Wt 306.05(a)(1) are met (Env-Wt 306.05(a)(1)).

*Please refer to RSA 310-A:79 - Exemption III.
Wetlands delineated by Sarah Large, Andrew O'Sullivan, and Deidra Benjamin NHDOT state employees.*

Step 2: Determine whether the subject property is or contains a PRA by answering the following questions (Env-Wt 306.05(a)(2)):

- 1. Does the property contain any documented occurrences of protected species or habitat for such species? Please use the Natural Heritage Bureau (NHB) DataCheck Tool to make this determination. Yes No
- 2. Is the property a bog? Please use the WPPT "Peatland" layer (under the PRA module) for general location of bogs or any other database or source. Yes No
- 3. Is the property a floodplain wetland contiguous to a tier 3 or higher watercourse? Please use the WPPT "Floodplain Wetlands Adjacent to Tier 3 Streams" layer (under PRA module) or any other database or source. Yes No
- 4. Is the property a designated prime wetland or a duly-established 100-foot buffer? Please use the WPPT "Prime Wetlands" layers (under PRA module) or any other database or source. Yes No
- 5. Is the property a sand dune, tidal wetland, tidal water, or undeveloped tidal buffer zone? Please use the WPPT "Coastal" layers module and PRA module or any other database or source. Yes No

Step 3: For projects that are subject to Env-Wt 600, please attach the Coastal Functional Assessment (Env-Wt 603.04) and Vulnerability Assessment (Env-Wt 603.05) and conduct the data screening required by Env-Wt 603.03.

Step 4: Determine whether the following apply to the subject property (Env-Wt 306.05(a)(4); RSA 482-A:3, I(d)(2)):

- 1. Is the property within a Local River Management Advisory Committee (LAC) jurisdiction?
 - If yes, please provide the following information:
 - The project is within ¼ mile of: Yes No
 - A copy of the application was sent to the LAC on Month: Day: Year: .
 N/A (Env-Wt 311.01(e))
- 2. Is the property within or contains any areas that are subject to time of year restrictions under Env-Wt 307? Yes No

Step 5: For stream crossing projects: what is the size of the watershed (Env-Wt 306.05(a)(5))? 2,490 acres
 N/A

Step 6: For dredge projects: is the subject property contaminated (Env-Wt 306.05(a)(6))? Yes No
 N/A

Step 7: Does the project have the potential to impact any of the following (Env-Wt 306.05(a)(7)):
 N/A

- 1. Impaired waters? Yes No
- 2. Class A waters? Yes No
- 3. Outstanding resource waters? Yes No

SECTION 3 - PROJECT DESCRIPTION (Env-Wt 311.04(i))

Provide a brief description of the project and the purpose of the project, outlining the scope of work to be performed and whether impacts are temporary or permanent. DO NOT reply "See attached" in the space provided below.

The project will rehabilitate an existing 90" diameter x 632' long corrugated metal culvert carrying Bowman Brook under Boynton St and NH 101. The proposed design includes removing the damaged mitered end of the 90" pipe at the inlet and replacing it with a concrete headwall (shortening the culvert by approximately 12'), replacing a failed 18" pipe connected to the 90" culvert located near the middle of the culvert with a 24" pipe connection, repairing erosion resulting from the failed 18" pipe connection, and slip lining the remaining (620') of 90" culvert with a corrugated metal liner. Stone outlet protection will be constructed in non-jurisdictional areas and any existing stone channel and/or bank protection at the outlet that is disturbed will be reset.

SECTION 4 - PROJECT LOCATION			
Separate wetland permit applications must be submitted for each municipality within which wetland impacts occur.			
ADDRESS: Intersection of NH Route 101 and Boynton St		TOWN/CITY: Bedford, NH	
TAX MAP/BLOCK/LOT/UNIT: N/A			
UNITED STATES GEOLOGICAL SURVEY (USGS) TOPO MAP WATERBODY NAME: Bowman Brook <input type="checkbox"/> N/A			
LATITUDE (D.ddddd): 42.960358° North (Optional)		LONGITUDE (D.ddddd): 71.501392° West (Optional)	
SECTION 5 - APPLICANT (DESIRED PERMIT HOLDER) INFORMATION (Env-Wt 311.04(a))			
If the applicant is a trust or a company, then the name of the trust or company should be written as the applicant's name.			
NAME: NH Dept. of Transportation			
MAILING ADDRESS: PO Box 483			
TOWN/CITY: Concord		STATE: NH	ZIP CODE: 03302
EMAIL ADDRESS: Kirk.Mudgett@dot.nh.gov		FAX: [REDACTED]	PHONE: 603-271-1598
ELECTRONIC COMMUNICATION: By initialing here: <u>KOM</u> , I hereby authorize NHDES to communicate all matters relative to this application electronically.			
SECTION 6 - AUTHORIZED AGENT INFORMATION (Env-Wt 311.04(c))			
<input type="checkbox"/> N/A			
LAST NAME, FIRST NAME, M.I.: [REDACTED]			
COMPANY NAME: [REDACTED]		MAILING ADDRESS: [REDACTED]	
TOWN/CITY: [REDACTED]		STATE: [REDACTED]	ZIP CODE: [REDACTED]
EMAIL ADDRESS: [REDACTED]		FAX: [REDACTED]	PHONE: [REDACTED]
ELECTRONIC COMMUNICATION: By initialing here [REDACTED], I hereby authorize NHDES to communicate all matters relative to this application electronically.			
SECTION 7 - PROPERTY OWNER INFORMATION (IF DIFFERENT THAN APPLICANT) (Env-Wt 311.04(b))			
If the owner is a trust or a company, then the name of the trust or company should be written as the owner's name.			
<input checked="" type="checkbox"/> Same as applicant			
NAME: [REDACTED]			
MAILING ADDRESS: [REDACTED]			
TOWN/CITY: [REDACTED]		STATE: [REDACTED]	ZIP CODE: [REDACTED]
EMAIL ADDRESS: Andrew.OSullivan@dot.nh.gov		FAX: [REDACTED]	PHONE: 603-271-3226
ELECTRONIC COMMUNICATION: By initialing here <u>AMO</u> , I hereby authorize NHDES to communicate all matters relative to this application electronically.			

lrm@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

www.des.nh.gov

<p>SECTION 8 - RESOURCE-SPECIFIC CRITERIA ESTABLISHED IN Env-Wt 400, Env-Wt 500, Env-Wt 600, Env-Wt 700, OR Env-Wt 900 HAVE BEEN MET (Env-Wt 313.01(a)(3)).</p> <p>Describe how the resource-specific criteria have been met (please attach information about stream crossings, coastal resources, prime wetlands, or non-tidal wetlands and surface waters).</p> <p>The project has been designed in accordance with ENV-Wt 400, 500, and 900. An Alternative Design Request is included per Env-Wt 904.10. Unavoidable impacts to wetlands have been minimized to the maximum extent practicable; the Department has addressed Env-Wt 311.07 Avoidance and Minimization through the checklist document included with this application.</p> <p>The resources present within the project area are: Bowman Brook- a sinuous and meandering Rosgen type E stream, a scrub-shrub palustrine wetland complex surrounding the upstream reach of Bowman Brook, a forested palustrine wetland in the middle sag of NH Route 101 and Boynton Street, as well as another forested wetland complex adjacent to Bowman Brook at the outlet of the crossing. The functions and values of the palustrine wetland complexes are: sediment/toxicant retention (principal function), floodflow alteration (suitable), nutrient removal (suitable), and groundwater recharge/discharge (suitable). Bowman Brook has many character defining features and presents natural stream processes such as transport water and sediment and is supported by the surrounding palustrine wetlands. A partial stream crossing assessment was complete at this crossing. Upstream reference reach measurements and data from a stream crossing assessment completed for an NHDOT project along Bowman Brook upstream of this crossing were used as reference data for this project. The project team also used the Regional Hydraulic Geometry Reference Curve to estimate average bankfull widths that match this crossings drainage area. Included with this application package are functions and values assessment for the three wetlands (wetland 3 referred as Wetland A on the functions and values assessment form) as well as the partial stream crossing assessment data as well as the summary from the stream crossing assessment completed for Bowman Brook by Normandeau Associates for a prior NHDOT project.</p>
<p>SECTION 9 - AVOIDANCE AND MINIMIZATION</p> <p>Impacts within wetland jurisdiction must be avoided to the maximum extent practicable (Env-Wt 313.03(a)). If all impacts cannot be avoided, a functional assessment is required for minor and major projects (Env-Wt 311.03(b)(10)). Any project with unavoidable jurisdictional impacts must then be minimized as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization. Please refer to the application checklist to ensure that you have attached all documents related to avoidance and minimization, as well as functional assessment (where applicable).</p>
<p>SECTION 10 - MITIGATION REQUIREMENT (Env-Wt 311.02)</p> <p>If unavoidable jurisdictional impacts require mitigation, a mitigation pre-application meeting must occur at least 30 days but not more than 90 days prior to submitting this Standard Dredge and Fill Permit Application.</p> <p>Mitigation Pre-Application Meeting Date: Month: <input type="text"/> Day: <input type="text"/> Year: <input type="text"/></p> <p><input checked="" type="checkbox"/> N/A - Mitigation is not required</p>
<p>SECTION 11 - THE PROJECT MEETS COMPENSATORY MITIGATION REQUIREMENTS (Env-Wt 313.01(a)(1)c).</p> <p>Have you submitted a compensatory mitigation proposal that meets the requirements of Env-Wt 800 for all permanent impacts that will remain after avoidance and minimization demonstration?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> N/A - Mitigation is not required</p>

irm@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

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SECTION 12 - IMPACT AREA (Env-Wt 311.04(g))

For each jurisdictional area that will be/has been impacted, provide square feet (SF) and, if applicable, linear feet (LF) of impact, and note whether the impact is after-the-fact (ATF; i.e., work was started or completed without required permitting).

For intermittent streams, the linear footage of impact is measured along the thread of the channel.

For perennial streams/ivers, the linear footage of impact is calculated by summing the lengths of disturbances to the channel and banks.

Permanent impacts are impacts that will remain after the project is complete (e.g., changes in grade or surface materials).

Temporary impacts are impacts not intended to remain (and will be restored to pre-construction conditions) after the project is completed.

JURISDICTIONAL AREA	PERMANENT SF / LF		TEMPORARY SF / LF	
Forested Wetland	2003	<input type="checkbox"/> ATF	1894	<input type="checkbox"/> ATF
Scrub-shrub Wetland	0	<input type="checkbox"/> ATF	1116	<input type="checkbox"/> ATF
Emergent Wetland		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Wet Meadow		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Intermittent Stream	/	<input type="checkbox"/> ATF	/	<input type="checkbox"/> ATF
Perennial Stream or River	0 / 0	<input type="checkbox"/> ATF	1633 / 107	<input type="checkbox"/> ATF
Lake / Pond	/	<input type="checkbox"/> ATF	/	<input type="checkbox"/> ATF
Bank - Intermittent Stream	/	<input type="checkbox"/> ATF	/	<input type="checkbox"/> ATF
Bank - Perennial Stream / River	0 / 0	<input type="checkbox"/> ATF	2044 / 168	<input type="checkbox"/> ATF
Bank/shoreline - Lake / Pond	/	<input type="checkbox"/> ATF	/	<input type="checkbox"/> ATF
Tidal Waters	/	<input type="checkbox"/> ATF	/	<input type="checkbox"/> ATF
Tidal Marsh		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Sand Dune		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Designated Prime Wetland		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Duly-established 100-foot Prime Wetland Buffer		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Undeveloped Tidal Buffer Zone (TBZ)		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Previously-developed TBZ		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Docking - Lake / Pond		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Docking - River		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Docking - Tidal Water		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
Vernal Pool		<input type="checkbox"/> ATF		<input type="checkbox"/> ATF
TOTAL	2003 / 0		6687 / 275	

SECTION 13 - APPLICATION FEE (RSA 482-A:3, I)

MINIMUM IMPACT FEE: Flat fee of \$400

NON-ENFORCEMENT RELATED, PUBLICLY-FUNDED AND SUPERVISED RESTORATION PROJECTS, REGARDLESS OF IMPACT CLASSIFICATION: Flat fee of \$400 (refer to RSA 482-A:3, 1(c) for restrictions)

MINOR OR MAJOR IMPACT FEE: Calculate using the table below:

Permanent and temporary (non-docking):	8,690 SF	× \$0.40 =	\$ 3,476
Seasonal docking structure:	SF	× \$2.00 =	\$
Permanent docking structure:	SF	× \$4.00 =	\$
Projects proposing shoreline structures (including docks) add \$400 =			\$
Total =			\$ 3,476

The application fee for minor or major impact is the above calculated total or \$400, whichever is greater = \$ 3,476

irm@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

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SECTION 14 - PROJECT CLASSIFICATION (Env-Wt 306.05)
 Indicate the project classification.

<input type="checkbox"/> Minimum Impact Project	<input type="checkbox"/> Minor Project	<input checked="" type="checkbox"/> Major Project
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SECTION 15 - ALL APPLICABLE CONDITIONS IN Env-Wt 307 HAVE BEEN MET (Env-Wt 311.04(j); Env-Wt 313.01(a)(2)).

Check all conditions applicable to your project below. Please ensure that your plan design and access, construction sequence, and timing appropriately meet applicable conditions below:

<input checked="" type="checkbox"/> Env-Wt 307.02	US Army Corps of Engineers (USACE) Conditions	<input checked="" type="checkbox"/> Env-Wt 307.11	Filling Activity Conditions
<input checked="" type="checkbox"/> Env-Wt 307.03	Protection of Water Quality Required	<input checked="" type="checkbox"/> Env-Wt 307.12	Restoring Temporary Impacts: Site Stabilization
<input checked="" type="checkbox"/> Env-Wt 307.04	Protection of Fisheries and Breeding Areas Required	<input type="checkbox"/> Env-Wt 307.13	Property Line Setbacks
<input checked="" type="checkbox"/> Env-Wt 307.05	Protection Against Invasive Species Required	<input type="checkbox"/> Env-Wt 307.14	Rock Removal
<input checked="" type="checkbox"/> Env-Wt 307.06	Protection of Rare, Threatened or Endangered Species and Critical Habitat	<input checked="" type="checkbox"/> Env-Wt 307.15	Use of Heavy Equipment in Wetlands
<input type="checkbox"/> Env-Wt 307.07	Consistency Required with Shoreland Water Quality Protection Act	<input checked="" type="checkbox"/> Env-Wt 307.16	Adherence to Approved Plans Required
<input type="checkbox"/> Env-Wt 307.08	Protection of Designated Prime Wetlands and Duly-Established 100-Foot Buffers	<input checked="" type="checkbox"/> Env-Wt 307.17	Unpermitted Activities
<input type="checkbox"/> Env-Wt 307.09	Shoreline Structures	<input checked="" type="checkbox"/> Env-Wt 307.18	Reports
<input checked="" type="checkbox"/> Env-Wt 307.10	Dredging Activity Conditions		

Provide an explanation as to methods, timing, and manner as to how your project will meet standard permit conditions required in Env-Wt 307 (Env-Wt 311.03(b)(7)):

The project will be constructed in accordance with the NHDOT Standard Specifications for Road and Bridge Construction, 2016 Edition, and project specific Plans, Prosecution of Work requirements, and Special Provisions.

Project construction is expected to occur in Summer of 2021, with a total project duration of about 3 months.

Means and methods of construction and schedule of work are proposed by the Contractor and are subject to approval by NHDOT. Temporary works such as cofferdams and water diversions are designed by the Contractor and submitted to NHDOT for documentation in accordance with Section 105.02 of the Standard Specifications.

See the Construction Sequence included in the application.

SECTION 16 - REQUIRED CERTIFICATIONS (Env-Wt 311.11)

Initial each box below to certify:

Initials: <i>KOM</i>	To the best of the signer's knowledge and belief, all required notifications have been provided.
Initials: <i>KOM</i>	The information submitted on or with the application is true, complete, and not misleading to the best of the signer's knowledge and belief.
Initials: <i>KOM</i>	<p>The signer understands that:</p> <ul style="list-style-type: none"> The submission of false, incomplete, or misleading information constitutes grounds for NHDES to: <ol style="list-style-type: none"> Deny the application. Revoke any approval that is granted based on the information. And If the signer is a certified wetland scientist, licensed surveyor, or professional engineer licensed to practice in New Hampshire, refer the matter to the joint board of licensure and certification established by RSA 310-A:1. The signer is subject to the penalties specified in New Hampshire law for falsification in official matters, currently RSA 641. The signature shall constitute authorization for the municipal conservation commission and the Department to inspect the site of the proposed project, except for minimum impact trail projects, where the signature shall authorize only the Department to inspect the site pursuant to RSA 482-A:6, II.
Initials: <i>KOM</i>	If the applicant is not the owner of the property, each property owner signature shall constitute certification by the signer that he or she is aware of the application being filed and does not object to the filing.

SECTION 17 - REQUIRED SIGNATURE (Env-Wt 311.04(d); Env-Wt 311.11)

SIGNATURE (OWNER): <i>[Signature]</i>	PRINT NAME LEGIBLY: <i>KIRK MURGETT</i>	DATE: <i>6/8/20</i>
SIGNATURE (APPLICANT, IF DIFFERENT FROM OWNER):	PRINT NAME LEGIBLY:	DATE:
SIGNATURE (AGENT, IF APPLICABLE):	PRINT NAME LEGIBLY:	DATE:

SECTION 18 - TOWN / CITY CLERK SIGNATURE (Env-Wt 311.04(f))

As required by RSA 482-A:3, I(a),(1), I hereby certify that the applicant has filed four application forms, four detailed plans, and four USGS location maps with the town/city indicated below.

TOWN/CITY CLERK SIGNATURE: _____	PRINT NAME LEGIBLY: _____
TOWN/CITY: _____	DATE: _____

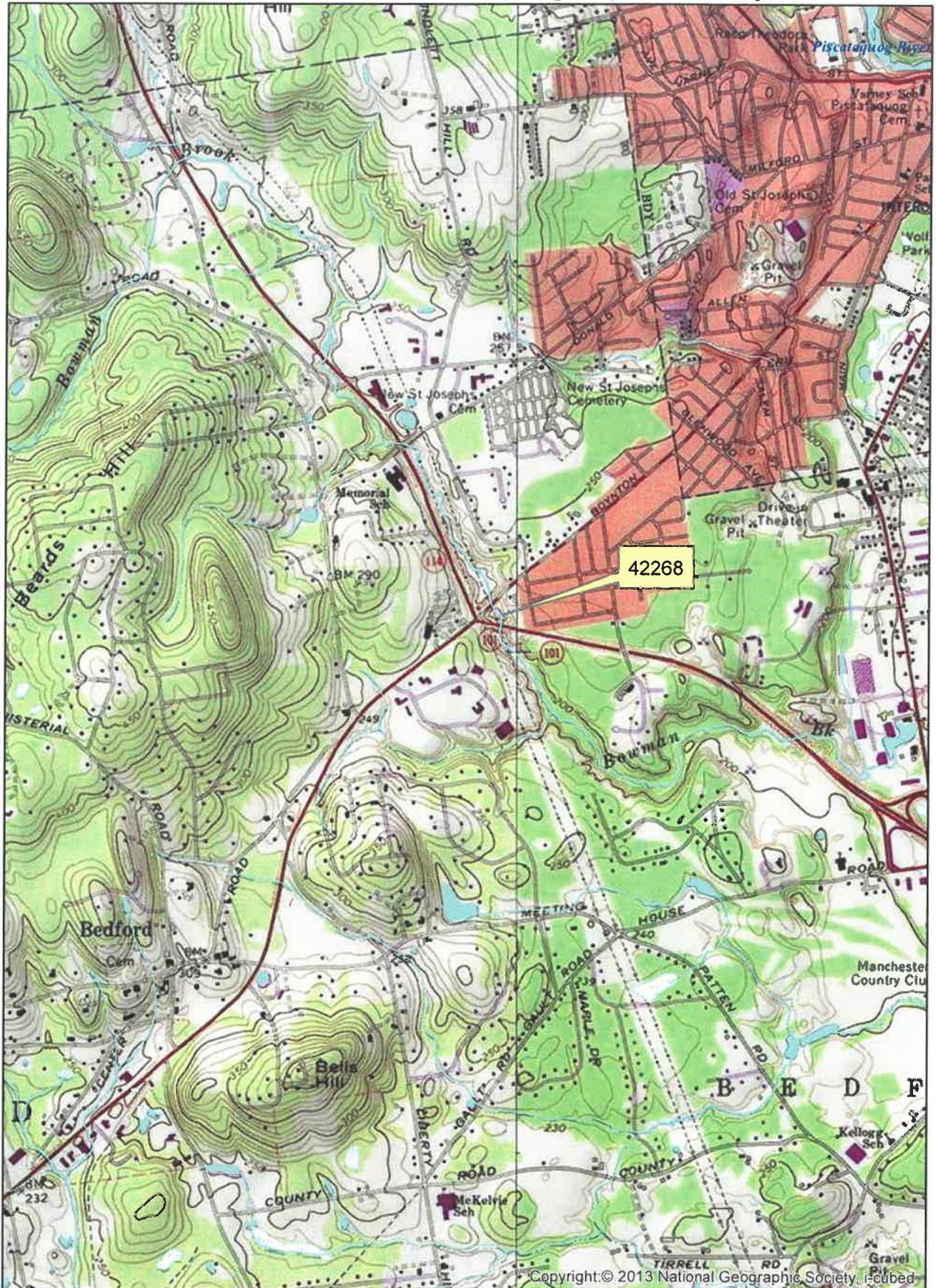
DIRECTIONS FOR TOWN/CITY CLERK:
Per RSA 482-A:3, I(a)(1)

*Please refer to Env-wt 311.05(a)(14) & RSA 482-A:3I(a)
The towns 4 copies have been sent via certified mail and have been filed directly with the town in accordance with the above rule and regulations*

- IMMEDIATELY sign the original application form and four copies in the signature space provided above.
- Return the signed original application form and attachments to the applicant so that the applicant may submit the application form and attachments to NHDES by mail or hand delivery.
- IMMEDIATELY distribute a copy of the application with one complete set of attachments to each of the following bodies: the municipal Conservation Commission, the local governing body (Board of Selectmen or Town/City Council), and the Planning Board. And
- Retain one copy of the application form and one complete set of attachments and make them reasonably accessible for public review.

DIRECTIONS FOR APPLICANT:
Submit the single, original permit application form bearing the signature of the Town/City Clerk, additional materials, and the application fee to NHDES by mail or hand delivery at the address at the bottom of this page.

Bedford 42268 Topographic Map

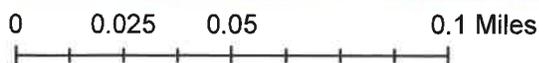


0 0.25 0.5 1 Miles

1:24,000

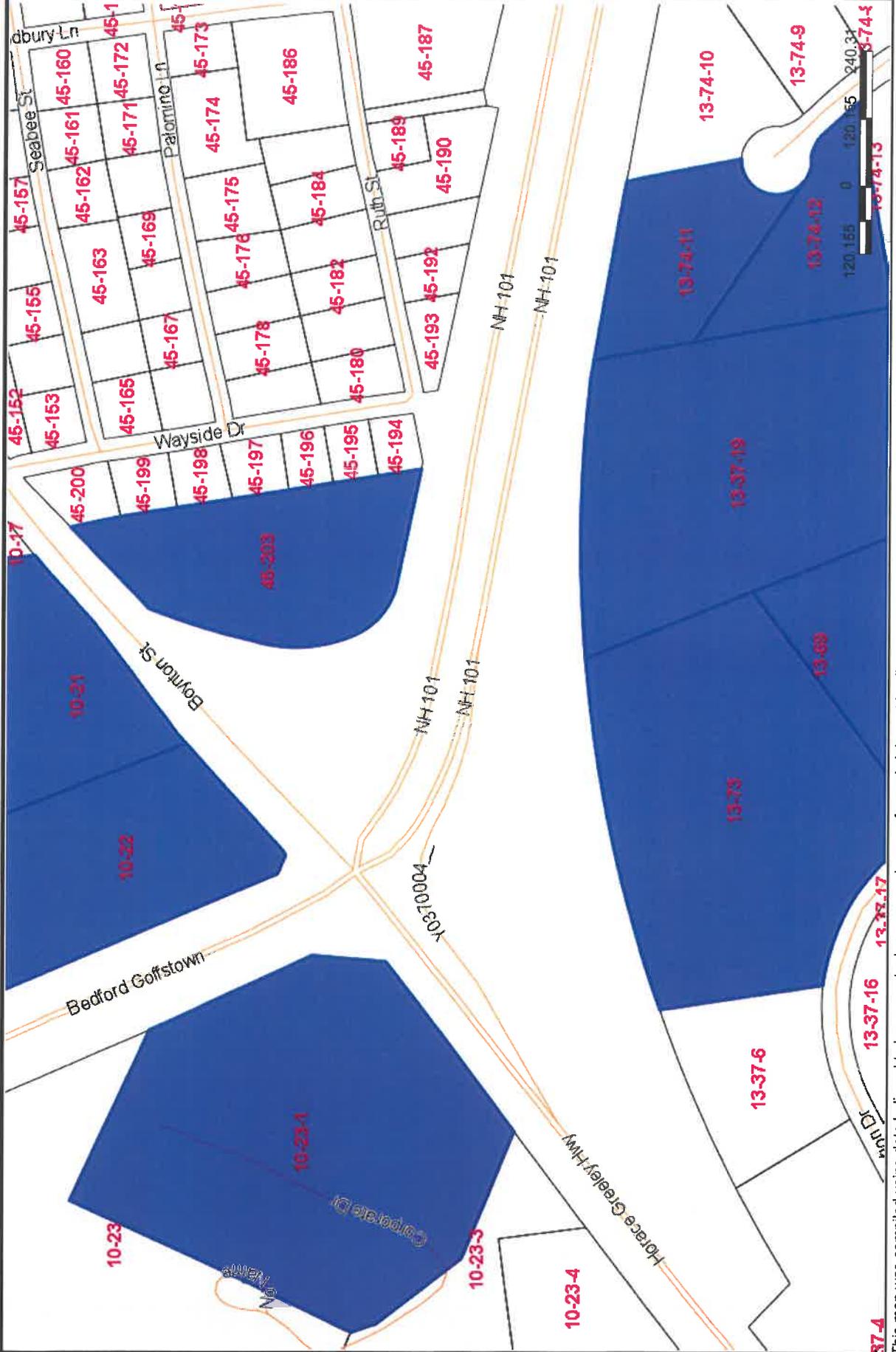
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Bedford 42268 Tax Parcels



Mosaic Map Bedford 42268

MOSAIC PARCEL MAP SHARING POOL





**STANDARD DREDGE AND FILL
WETLANDS PERMIT APPLICATION
ATTACHMENT A: MINOR AND MAJOR PROJECTS**



Water Division/Land Resources Management
Wetlands Bureau

[Check the Status of your Application](#)

RSA/ Rule: RSA 482-A/ Env-Wt 311.10; Env-Wt 313.01(a)(1); Env-Wt 313.03

APPLICANT LAST NAME, FIRST NAME, M.I.: NH Dept. of Transportation

Attachment A can be used to satisfy some of the additional requirements for minor and major projects regarding avoidance and minimization, as well as functional assessment.

PART I: AVOIDANCE AND MINIMIZATION

In accordance with Env-Wt 313.03(a), the Department shall not approve any alteration of any jurisdictional area unless the applicant demonstrates that the potential impacts to jurisdictional areas have been avoided to the maximum extent practicable and that any unavoidable impacts have been minimized, as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization.

SECTION I.I - ALTERNATIVES (Env-Wt 313.03(b)(1))

Describe how there is no practicable alternative that would have a less adverse impact on the area and environments under the Department’s jurisdiction.

A FULLY COMPLIANT STREAM CROSSING DESIGN WOULD INVOLVE REPLACING THE 90" CMP CULVERT WITH TWO BRIDGES (ONE UNDER BOYNTON ST AND ONE UNDER NH 101). DUE TO THE DEPTH OF FILL AND COMPLEXITY OF CONSTRUCTION, WETLAND IMPACTS WOULD BE SIGNIFICANTLY LARGER THAN FOR THE PROPOSED ALTERNATIVE. THE LARGER STRUCTURES WOULD PASS HIGH FLOWS WITHOUT UTILIZING THE STORAGE IN THE UPSTREAM FLOODPLAIN TO ATTENUATE PEAK FLOWS. FOR Q100, THE INCOMING DESIGN FLOW IS 710 CFS AND ONLY ABOUT 403 CFS GOES THROUGH THE EXISTING 90" CULVERT. LARGER STRUCTURES WOULD ALLOW THE ENTIRE 710 CFS PEAK FLOW INTO THE DOWNSTREAM CHANNEL. THE ADDITIONAL FLOW WOULD AFFECT THE REGULATED 100 YEAR FLOODPLAIN ELEVATION AND EXTENT OF FLOODING AND WOULD INCREASE THE RISK OF FLOODING DOWNSTREAM.

A HYDRAULIC DESIGN WAS ALSO CONSIDERED, THAT WOULD PASS THE 50 YEAR STORM WITHOUT SUBMERGING THE INLET. THIS WOULD BE TWO 8’ HIGH X 10’ WIDE BOX CULVERTS, EMBEDDED 24”. THE EXTENT OF WETLAND IMPACTS AND THE POTENTIAL FOR INCREASED DOWNSTREAM FLOODING ARE SIMILAR TO THE FULLY COMPLIANT OPTION.

THE POOR CONDITION OF THE EXISTING 90" CULVERT REQUIRES TIMELY ACTION TO PREVENT STRUCTURAL FAILURE AND ASSOCIATED DAMAGE TO ENVIRONMENTAL REOURCES AS WELL AS PUBLIC AND PRIVATE INFRASTRUCTURE.

SEVERAL REHABILITATION METHODS WERE CONSIDERED, INCLUDING CONCRETE INVERT REPAIR AND SLIPLINING WITH OTHER MATERIALS SUCH AS STRUCTURAL PLATE LINER, SPRAYED ON MORTAR LINING, AND VARIOUS PLASTIC LINERS.

NONE OF THESE ALTERNATIVES MEETS THE PROJECT OBJECTIVE OF A TIMELY AND FULLY STRUCTURAL REHABILITATION THAT DOES NOT DECREASE THE CAPACITY OF THE CROSSING AND MINIMIZES CHANGES TO THE CULVERT OUTLET VELOCITY.

lrn@des.nh.gov or (603) 271-2147

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SECTION I.II - MARSHES (Env-Wt 313.03(b)(2))

Describe how the project avoids and minimizes impacts to tidal marshes and non-tidal marshes where documented to provide sources of nutrients for finfish, crustacea, shellfish and wildlife of significant value.

There are no palustrine marshes delineated within the project area.

SECTION I.III – HYDROLOGIC CONNECTION (Env-Wt 313.03(b)(3))

Describe how the project maintains hydrologic connections between adjacent wetland or stream systems.

The existing 90" culvert provides a hydrologic connection between the upstream and downstream channels. There is no perch at the inlet or outlet. The invert of the proposed liner pipe will be set as close as practical to the existing 90" culvert invert (typically about 2" higher). The inlet and outlet areas will be graded such that there is no perch. The proposed liner will maintain the existing hydrologic connection and match the existing flow conditions to the maximum extent practicable. There will be no effect on wetlands adjacent to the upstream and downstream channels.

The area at the base of the roadway embankments between Boynton St and NH 101 is delineated as a forrested wetland. The original (1961) project that constructed the 90" culvert included an 18" metal pipe connection from the wetland to the 90" pipe. This connection has failed causing erosion in the wetland area. The proposed design will re-establish the connection from the wetland to the 90" culvert (with a 24" corrugated metal pipe), fill the eroded areas, and regrade the area to match the elevation of the adjacent undisturbed wetland. This wetland is isolated and does not have a hydrologic connection to a watercourse. Based on field observations, the wetland collects stormwater as it is at a low point surrounded by higher topography. The wetland also likely is maintained through groundwater fluctuations.

SECTION I.IV - JURISDICTIONAL IMPACTS (Env-Wt 313.03(b)(4))

Describe how the project avoids and minimizes impacts to wetlands and other areas of jurisdiction under RSA 482-A, especially those in which there are exemplary natural communities, vernal pools, protected species and habitat, documented fisheries, and habitat and reproduction areas for species of concern, or any combination thereof.

The project has been designed in accordance with ENV-Wt 400, 500, and 900. Unavoidable impacts to wetlands have been minimized to the maximum extent practicable; the Department has addressed Env-Wt 311.07 Avoidance and Minimization through the checklist document included with this application.

The resources present within the project area are: Bowman Brook, a scrub-shrub palustrine wetlands complex surrounding the upstream reach of the brook, a forested palustrine wetland in the middle sag of NH 101 and Boynton Street, and another forested wetland at the outlet. There are no vernal pools, exemplary natural communities, or State listed species known to occur in the project area. The NH Natural Heritage database has been checked by staff of the NH Natural Heritage Bureau and/or the NH Nongame and Endangered Species Program for records of rare species and exemplary natural communities near the project area. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. It was determined by NHB or the NHF&G Nongame and Endangered Species Program that, although there was a NHB record (e.g., rare wildlife, plant, and/or natural community) present in the vicinity, we do not expect that it will be impacted by the proposed project.

It is possible that the project area might include habitat of the Northern Long Eared Bat (NLEB), which is listed as a threatened species under the Federal Endangered Species Act. The project team has received confirmation that the project qualifies for the December 15, 2016 FHWA Range-wide Programmatic Biological Opinion for NLEB and the project is not likely to jeopardize the continued existence of the NLEB. Conservation measures that will be incorporated into the project include only cutting trees designated to be cut in project plans and posting a flyer informing personnel on site during construction of the status of the NLEB and required conservation measures.

----- Continued on attached additional document -----

SECTION I.V - PUBLIC COMMERCE, NAVIGATION, OR RECREATION (Env-Wt 313.03(b)(5))

Describe how the project avoids and minimizes impacts that eliminate, depreciate or obstruct public commerce, navigation, or recreation.

Traffic will continue to flow along NH Route 101 and Boynton Street during construction allowing public travel and access to shops and other areas of commerce within the vicinity of the project site; therefore commerce should not be impacted by the proposed project. Bowman Brook is not used for water recreation nor is it an identified fishing location. The site is not a suitable nor feasible recreation area and therefore the level of impact to recreation will be minimal to none.

SECTION I.VI - FLOODPLAIN WETLANDS (Env-Wt 313.03(b)(6))

Describe how the project avoids and minimizes impacts to floodplain wetlands that provide flood storage.

The scrub shrub wetland that surrounds Bowman Brook upstream of the 90" culvert provides flood flow attenuation. It is also mapped as a FEMA floodplain Zone A. The scrub shrub wetland experiences regular disturbance and clearing associated with maintenance of the power transmission corridor.

The proposed design matches existing flow condition to the maximum extent practicable. The existing 90" culvert ponds water in the upstream floodplain at high flows. The proposed design closely matches the FEMA Q100 flood elevation. At low flows, the depth of surface water and groundwater in the upstream floodplain will not be significantly affected. Avoidance of all impacts is not practicable due to the poor structural condition of the existing culvert.

SECTION I.VII - RIVERINE FORESTED WETLAND SYSTEMS AND SCRUB-SHRUB –MARSH COMPLEXES (Env-Wt 313.03(b)(7))

Describe how the project avoids and minimizes impacts to natural riverine forested wetland systems and scrub-shrub – marsh complexes of high ecological integrity.

Avoidance of all impacts is not practicable due to the poor structural condition of the existing culvert. The proposed design has the least impact to wetlands of any practicable alternative. Impacts at the culvert inlet and outlet are temporary. Disturbed jurisdictional areas will be restored to existing conditions.

The scrub shrub and forested wetlands are not of high ecologic integrity. See the functional assesments included elsewhere in the application. The scrub shrub and forested wetlands are highly influenced already by the utility infrastructure and roadway infrastructure.

SECTION I.VIII - DRINKING WATER SUPPLY AND GROUNDWATER AQUIFER LEVELS (Env-Wt 313.03(b)(8))

Describe how the project avoids and minimizes impacts to wetlands that would be detrimental to adjacent drinking water supply and groundwater aquifer levels.

The project will have no effect on wetlands that would be detrimental to adjacent drinking water supply and groundwater aquifer levels.

SECTION I.IX - STREAM CHANNELS (Env-Wt 313.03(b)(9))

Describe how the project avoids and minimizes adverse impacts to stream channels and the ability of such channels to handle runoff of waters.

The project includes only temporary impacts to the upstream and downstream channels. The smaller diameter liner will cause an increase in the culvert outlet velocity at all flows. The 1996 project that extended the 90" culvert to its current location constructed heavy stone armor on the bed and banks of the outlet channel, to a distance of about 100' downstream of the culvert outlet. The existing stone protection is sufficient to withstand the increased outlet velocity and to dissipate energy and reduce velocity before the flow leaves the State ROW.

PART II: FUNCTIONAL ASSESSMENT	
REQUIREMENTS	Ensure that project meets requirements of Env-Wt 311.10 regarding functional assessment (Env-Wt 311.04(j); Env-Wt 311.10).
FUNCTIONAL ASSESSMENT METHOD USED:	US Army Corps of Engineers Highway Methodology
NAME OF CERTIFIED WETLAND SCIENTIST (FOR NON-TIDAL PROJECTS) OR QUALIFIED COASTAL PROFESSIONAL (FOR TIDAL PROJECTS) WHO COMPLETED THE ASSESSMENT:	<p>INITIAL ASSESMENT BY NHDOT (SARAH LARGE AND ANDREW O'SULLIVAN) 9/30/2019 REVIEW AND REVISION BY NHDOT (SARAH LARGE AND DEIDRA BENJAMIN) 2/5/2020 DELINEATION PER ENV-WT 406</p>
DATE OF ASSESSMENT:	9/30/2019, 2/5/2020
Check this box to confirm that the application includes a NARRATIVE ON FUNCTIONAL ASSESSMENT:	<input checked="" type="checkbox"/>
For minor or major projects requiring a standard permit without mitigation, the applicant shall submit a wetland evaluation report that includes completed checklists and information demonstrating the RELATIVE FUNCTIONS AND VALUES OF EACH WETLAND EVALUATED. Check this box to confirm that the application includes this information, if applicable:	<input checked="" type="checkbox"/>
<p>Note: The Wetlands Functional Assessment worksheet can be used to compile the information needed to meet functional assessment requirements.</p>	

Attachment A: Minor and Major Projects

Part I: Avoidance and Minimization

Section I.IV –Jurisdictional Impacts (Env-Wt 313.03(b)(4))

..... *continuation*

John Magee, the Fisheries Habitat Research and Management Programs Coordinator at NHF&G has communicated that the existing condition is not passable in the upstream direction for most fish species and he has concurred that the proposed liner would not significantly change fish passage conditions. John Magee also shared that F&G has one efish site a bit downstream of the culvert in question, and when it was surveyed in 2009 they caught blacknose dace, creek chub, common shiner, white sucker, wild brook trout, and slimy sculpin. The project will not include in water work in either September or October to to minimize impacts to any brook trout that are moving around to fish spawning areas during that time.

The proposed design is the minimum impact alternative that meets the project need. There will be no permanent impact to resources at the culvert inlet or outlet. Erosion in the middle area will be stabilized by re-establishing the previously existing existing wetland elevation, which requires a small amount of temporary and permanent impacts to the delineated forested wetland. The wetland will continue to function as it did prior to the failure of the 18" pipe connection and subsequent erosion.

**CULVERT REHABILITATION
BOWMAN BROOK UNDER BOYNTON ST. AND NH 101
BEDFORD, NH
NHDOT PROJECT NO. 42268
SUPPLEMENTAL NARRATIVE**

Project Description

The project will rehabilitate an existing 90” diameter x 632’ long corrugated metal culvert carrying Bowman Brook under Boynton St and NH 101. The proposed design includes replacing the existing damaged mitered end section at the inlet with a concrete headwall (shortening the culvert by about 12’), replacing a failed 18” pipe connection near the middle of the culvert with a 24” pipe connection, repairing erosion resulting from the failed 18” pipe connection, and slip lining the remaining (620’) of 90” culvert with a corrugated metal liner. Stone outlet protection will be constructed in non-jurisdictional areas and any existing stone channel protection at the outlet that is disturbed will be reset.

This is a federally funded culvert rehabilitation project. The proposed advertising date is August 18, 2020, with construction anticipated in summer of 2021.

This project was initiated and is funded under NHDOT’s Federal Culvert Replacement/Rehabilitation & Drainage Repair (CRDR) Program. The Program purpose is to address major culvert and drainage needs statewide that are not being addressed through current or future Capital Improvement or other programmatic projects. The Program receives \$2,000,000 in total funding annually, which includes construction, engineering, and ROW costs. Projects are selected and scheduled based primarily on the condition of the culvert (risk of failure), and Road Tier, traffic volume, depth of fill, and detour length (potential impact of failure). The Program funding is fully committed for at least the next three years. This culvert is one of the highest statewide priority locations out of nearly 50 known locations eligible for the Program. Failure to address the structural deficiency of this culvert risks deformation of the culvert which would make rehabilitation impossible and/or collapse of the culvert which could cause serious impacts to public/private infrastructure and the travelling public.

Existing Conditions

The culvert flows from north to south, just east of the intersection of Boynton St and NH 101. Project areas are generally referred to as inlet, middle, and outlet, with the “middle” area being the area of existing right of way between Boynton St and NH 101.

The existing culvert is a 90” diameter corrugated metal pipe, 632’ long with mitered ends. Slope is about 1%. Fill height is just over 31’ at Boynton St and about 41’ at NH101. The culvert was originally constructed in 1961 at 540’ long and was extended about 100’ on the outlet end in 1996. The 1961 portion is in very poor condition, with perforations along the sides and leaking joints. The 1996 portion is not as deteriorated but is heavily rusted along the bottom and lower sides. As of the last field review, shape was still round enough to allow rehabilitation by slip lining.

The 1961 project constructed an 18" corrugated metal pipe connection to the 90" culvert in the middle area. The 18" pipe brings in about 26 ac of overland and closed drainage flow from Boynton St and several slope drains from NH 101. The pipe is completely gone, leaving just the hole in the side of the 90" cmp. The existing sandy soil is eroding through the hole and being transported downstream through the 90" culvert. The 1961 plans show a second 18" pipe connection, about 130' south of the first 18" pipe connection. 1996 plans do not show this pipe and recent field reviews did not find it. It is likely that the second 18" pipe connection was never built as both pipe inlets would drain the same low area / wetland area at the base of the Boynton St and NH 101 embankments and based on the drainage area, one 18" pipe connection to the 90" culvert would be sufficient.

The 90" culvert is Statewide Priority #4, based on, fill height, traffic volume, and risk of failure. NH101 and Boynton St combined traffic volume is about 47,000 vehicles per day. NH Route 101 is classified as a Tier 1 roadway (Statewide Corridor – Divided Highway), providing a critical east-west link between the south/central region of the State to the I-93 corridor and to the seacoast region. Boynton Street is classified as a Tier 2 roadway (Statewide Corridor – Other), providing a high volume link from Manchester to NH Routes 101 and 114. NH 101 and Boynton St are urban roadways with raised medians, curbing, closed drainage, traffic signals, highway lighting, overhead sign structures, and numerous underground utilities. Four sets of high voltage overhead power transmission lines cross over the project area.

Some Type I invasive species were observed near the culvert inlet and along the riprap channel from the Boynton St closed drainage system outlet.

The Bowman Brook crossing is classified as Tier 3 based on drainage area of 3.94 Sq mi. The brook is in generally good condition within the project area. Upstream is a meandering channel and wide floodplain with no sign of erosion and minor deposition of fine sandy soil along the overbank areas (just above OHW lines). Just upstream of the culvert inlet, the main channel is about 10' wide and 2' -3' deep. The floodplain is about 150' wide x 2000' long, extending to the next upstream culvert crossing, a 90" culvert under NH 114 and Old Bedford Rd. The floodplain slope is about 1% based on LIDAR contours.

The downstream channel and banks appear stable with no evidence of erosion. The 1996 project included heavy stone armor on the bed and banks to about 100' downstream of the outlet. Vegetation is growing through the stone and some sediment deposition was observed. The sediment is likely from eroded material that is entering the culvert from the failed 18" pipe connection. The outlet channel is about 16' wide and 1' – 2' deep, which is consistent with the 1996 plan details. The outlet channel slope is about 0.5% based on LIDAR contours.

NHDOT Maintenance District 5 indicated that the 90" culvert has no history of flooding, which is consistent with the FEMA 100 year flood elevation (El 207) being lower than the lowest surrounding roadway elevation (Boynton St at approximate El 221). There is no bypass for this crossing, other than overtopping Boynton St.

The next crossing upstream is a 90" corrugated metal pipe under NH114 / Old Bedford Rd about ½ mile upstream. The next crossing downstream is a round culvert under Wendover Way, a Town road, about 2000' downstream. Size and condition of this crossing are unknown, but the NHDES Aquatic Web Mapper lists it as vulnerable for a 10 year storm.

Natural and Cultural Resources

The resources present within the project area are: Bowman Brook- a sinuous and meandering Rosgen type E stream, a scrub-shrub palustrine wetland complex surrounding the upstream reach of Bowman Brook, a forested palustrine wetland in the middle sag of NH Route 101 and Boynton Street, as well as another forested wetland complex adjacent to Bowman Brook at the outlet of the crossing. The functions and values of the palustrine wetland complexes are: sediment/toxicant retention (principal function), flood flow alteration (suitable), nutrient removal (suitable), and groundwater recharge/discharge (suitable). Bowman Brook has many character defining features and presents natural stream processes such as transport water and sediment and is supported by the surrounding palustrine wetlands.

The scrub-shrub palustrine wetland upstream of the crossing's inlet was identified as a flood plain wetland adjacent to a Tier 3 crossing on the NHDES Wetland Permit Planning Tool. The scrub-shrub wetland is heavily influenced by humans and is regularly cleared and impacted by the utility company since the powerline corridor runs straight through this resource. Clearing and trimming was observed likely associated with regular maintenance to the utility infrastructure located within the wetland complex. Included with the application is a Functions and Values Assessment for this wetland complex. As noted in the assessment the wetland's principal function is sediment/ toxicant retention and is suitable for flood flow alteration, and nutrient removal, which are common functions and values of a wetlands adjacent to development (transportation and utility). The impacts at the inlet are only temporary and the project is creating more channel by shortening the inlet length. The project does not change the base flood elevation of the area (*see the hydraulics section in this narrative for more information*) and the wetland complex will continue to competently store and pass storm and flood volumes post construction and therefore not significantly deteriorate the classified priority resource area (PRA) functions or values.

A stream assessment was performed for Bowman Brook, resulting in a bankfull width of 12.8' at the outlet. The upstream area is impounded scrub-shrub wetland, so bankfull width was not determined. Regional curves predict a bankfull width of 24.4' for this crossing based on drainage area, resulting in a compliant structure span of about 32'.

There is no perch at the inlet or outlet. Baseflow in the culvert was observed at 8" to 18" deep over several NHDOT field visits.

Bowman Brook is a FEMA mapped regulatory floodplain (Zone AE).

The project has been coordinated with NH Fish & Game for fish passage. There were surveys at two sites downstream, finding numerous fish species, including brook trout. Avoiding work in September & October was recommended. Based on the length of the culvert and predicted low

flow velocities, the existing culvert is unlikely to be passable in the upstream direction for most fish species. See e-mail coordination included with the application.

Using the same reasoning, the culvert would not be likely to be utilized for upstream movement regularly by other aquatic organisms, such as turtles or amphibians, except in the case of extreme drought. Based on the size of the drainage area, large upstream storage area, and multiple field observations, it is unlikely that flow depths in the culvert drop to levels that would promote swimming or crawling up the 600+' length.

Bowman Brook is a tributary to the Merrimack River, which is Essential Fish Habitat for Atlantic Salmon. The Department has completed an Essential Fish Habitat (EFH) Assessment on behalf of FHWA, which concluded that the adverse effect on EFH that would result from construction of the project would not be substantial. The assessment was submitted to the NOAA Greater Atlantic Regional Fisheries Office (GARFO). FHWA will continue consultation with NOAA GARFO and any conservation recommendations that are received for the project will be strongly considered for incorporation into the project as is determined reasonable and feasible by FHWA.

The only listed Federal or State listed endangered or threatened species is the Northern Long Eared Bat. USFWS has verified that this project may rely on the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat. The project has a may affect - likely to adversely affect determination for NLEB due to tree clearing and no further consultation is needed.

The Natural Heritage Bureau data check resulted in a determination (by NHB and NH Fish and Game Department staff) that a NHB record (e.g., rare wildlife, plant, and/or natural community) was present in the project vicinity, but it was not expected to be impacted by the proposed project. Bowman Brook is shown on the Wildlife Action Plan aquatic habitat layers, but no statewide or regionally highest ranked terrestrial habitats are shown in the area.

This area is also sensitive for pre-contact period archeology, with one known site located near the project area. The project will avoid impacts to the known site. The proposed project has been reviewed by the Department's Cultural Resource Program and has been determined to be consistent with the Department's Section 106 Programmatic Agreement (Appendix B) and a No Historic Properties Affected finding has been made for the project.

Hydrology / Hydraulics

Survey in the immediate vicinity of the culvert inlet, outlet, and middle area is from NHDOT survey, completed in June 2019. Detail outside the survey area is from previous NHDOT projects, aerial photos, and archive plans. LIDAR contours were developed from UNH Granite data, Merrimack River Watershed, 2011-2012.

USGS Streamstats delineates the drainage boundary at 3.93 Sq Mi. (2,521 acres). The watershed is highly developed with the majority of land used for residential single family homes and

associated streets and roads. There is also a significant amount of commercial development along and near the major highway corridors. Review of LIDAR contours showed approximately 31 acres of the Streamstats boundary in the southwest corner does not contribute to the 90" culvert. Revised drainage area is 2,490 acres (3.89 Sq Mi).

Streamstats Q50 = 476 cfs and Q100 = 578 cfs, based on the original 3.93 Sq Mi area. Due to the amount of development, it is likely that Streamstats runoff predictions are low. Also note that Streamstats does not model the effects of upstream storage, which is significant in this case.

Hydraulic analysis is based on the 2009 FEMA Flood Insurance Study (FIS# 33011CV002A). and associated archive data provided by FEMA.

Note that FEMA Maps and LIDAR elevations are based on the NAVD88 datum and NHDOT survey and FEMA archive data are on the NGVD29 datum. In this area, the NAVD88 is 0.70' lower than NGVD29. Elevations referenced in the Plans and Application for this project are on the NGVD29 datum unless otherwise noted. On the (large scale) wetland impact and erosion control plan sheets, LIDAR contours are shown at 2' intervals. On the detail plans, NHDOT survey contours are shown at 1' interval.

Also note that some of the values reported below differ from those presented at the Natural Resources Meeting. These differences are due to model refinements and corrections for datum, and do not change the overall conclusions of the analysis.

The FEMA Q100 of 710 cfs was used for analysis. Archive data provided by FEMA indicates the calculated 100 year water surface elevation just upstream of the 90" culvert inlet is 206.66, and the floodway elevation is 207.30 (NGVD29 datum). The FEMA map for this area (Panel# 33011C0359D) shows the regulatory (floodway) elevation at 207. The map elevations are based on the NAVD88 datum and are typically rounded to the nearest foot. This is consistent with FEMA's archive data $207.30 - 0.70' = 206.60$ (NAVD88) rounded up to 207.

The FEMA archive 100 year water surface elevation 206.66 (NGVD29) was used as the existing condition for evaluation of alternatives.

A HydroCAD model was used to evaluate the effect of the upstream storage, which is significant at approximately 71 ac-ft (at El 207, based on LIDAR contours). The HydroCADD model was verified to reproduce the FEMA Q100 of 710 cfs. For the 100 year storm, peak flow through the existing 90" culvert is 403 cfs (about 43% of the 710 cfs incoming flow). Headwater elevation is 206.65, which closely matches the FEMA elevation of 206.66. Storage utilized at this elevation is 70.03 ac-ft.

FHWA's HY-8 Culvert Analysis Program was used to evaluate velocities in the culvert and outlet channel. Q100 culvert velocity for the existing 403 cfs is predicted to be 12.35 ft/s. Just downstream of the outlet, the predicted channel velocity is 3.3 ft/s based on the 1996 stone armored channel section. At a low flow of 10 cfs (about 9" deep in the existing 90" culvert) outlet velocity is predicted to be 4.2 ft/s. This velocity combined with the culvert length was the basis for NH Fish & Game's conclusion that the existing culvert is not passable by most fish species.

A HydroCADD model was used to evaluate areas that drain to the ‘middle area’ (the wetland between Boynton St and NH 101). This area originally drained into the 90” cmp through an 18” corrugated metal pipe, which has failed, leaving only a hole in the side of the 90” culvert. Total area draining to this connection is approximately 25.7 acres, of which 18.6 acres comes in via a closed drainage system along Boynton St, 0.65 acres comes in via several slope drains along NH 101, and the remaining 6.45 acres comes in via overland flow. For the total area draining to the 18” pipe connection, Q10 = 17 cfs and Q100 = 26 cfs. Modelling the original 18” cmp and including storage in the analysis, the amount of flow entering the 90” culvert in a 100 year event is about 15 cfs (about 3.7% of the 90” culvert flow) which is not significant enough to affect the 90” culvert hydraulics. Q100 ponding depth in the middle area is about 3.9’.

Alternatives

The bankfull width for this size drainage area is about 24.4’ from the NH Regional Hydraulic Geometry equations. A typical compliant span would be $(24.4' \times 1.2) + 2' = 31.3'$.

A fully compliant crossing design was considered, consisting of two 32’ span bridges, one under Boynton St and one under NH 101. The structures used for estimating purposes were 32’ span x 12’ rise open bottom concrete arches. Impacts and costs for this option were based on open cut with phased construction. Traffic would be maintained on portions of existing roadways and/or on temporarily widened areas supported by cofferdams. At least 3 major changes in traffic patterns and associated cofferdams would be required for each roadway. Bowman Brook flow would be maintained in the existing 90” cmp, provided it remained structurally viable. Construction could be expected to take at least 2 years, with significant impacts to traffic and utilities.

The cost estimate for the fully compliant option is as follows:

Boynton St Structure (including excavation, backfill, headwalls, wingwalls) Based on 172’ length x 44’ base excavation width, adjusted for 31’ depth	\$1,992,000
Structure Incidentals (water diversion, cofferdams, simulated streambed, etc.)	\$ 478,640
Boynton St Roadway Reconstruction (150 LF x 72’ wide)	\$ 359,100
NH Route 101 Structure (including excavation, backfill, headwalls, wingwalls) Based on 265’ length x 44’ base excavation width, adjusted for 41’ depth	\$3,174,000
Structure Incidentals (water diversion, cofferdams, simulated streambed, etc.)	\$ 533,350
NH Route 101 Roadway Reconstruction (180 LF x 130’ wide)	\$ 502,800
Project wide Items (Fill & Abandon 90” cmp, Access Roads, LRS, Invasives Humus/Seed/Mulch, Field Office, etc)	\$ 341,850
	Sub-Total
	\$7,381,740
Erosion Control (5% of Sub-Total)	\$ 369,087
Traffic Control (7.5% of Sub-Total)	\$ 553,631
Misc. Items and Contingency (15% of Sub-Total)	\$1,107,261
	Contract Sub-Total
	\$9,411,719
Mobilization (5% of Contract Sub-Total)	\$ 470,586
Fuel & Asphalt Adjustments (fixed amount based on Contract Sub-Total)	\$ 95,000
Construction Administration and Inspection (6% of Contract Sub-Total)	\$ 564,703

Construction Total \$10,542,008

Note that Design Engineering, additional survey, geotechnical investigation, and ROW and/or Easement acquisition costs are not included in the above Construction Estimate. NHDOT Engineering and Contract preparation costs are typically 5% to 15% of the Construction Total, based on the size and complexity of the project. Projects designed by NHDOT Consultants are typically higher.

Securing the funding and typical design time for such a project would require a delay in the start of construction of at least 3 – 5 years. A delay of this magnitude would significantly increase the risk of structural failure of the existing 90" c/p. In addition, the larger structures would not utilize the upstream storage would cause a significant increase in downstream flows and 100 year flood elevations. The next downstream structure would likely be at increased risk of overtopping.

A hydraulic design was also considered, which would pass the 50 year storm without submerging the inlet. This would be two 8' high x 10' wide (clear opening) box culverts, embedded 24" below streambed. Costs and impacts were evaluated in the same way as for the fully compliant option. The box culverts would be fabricated at 10' high x 10' wide, with the culvert under Boynton St being 195' long and the culvert under NH Route 101 being 290' long. Roadway reconstruction length was estimated at 120 LF for Boynton St and 150 LF for NH 101. The Construction Cost for this option is estimated at \$6.5 million. Funding, delay, and potential downstream impacts are similar for this option.

Several rehabilitation methods were also considered, including concrete invert repair, sprayed on mortar lining, and slip lining with various liner materials such as steel structural plate, corrugated metal, and plastic. Concrete invert lining was not considered to be a fully structural repair because the deterioration extends too far up the sides of the pipe (over half the diameter in places) and there is evidence of leakage in the upper sides and top (white efflorescence deposits). Sprayed on mortar lining typically covers the entire interior surface of the pipe, with the thickness and need for steel reinforcement determined by structural analysis. This method is relatively new typically more expensive than other rehabilitation techniques and can significantly reduce hydraulic capacity (for mortar thickness over about 3"). Structural analysis methods are currently being evaluated by an AASHTO committee, through a pooled fund study ("Structural Design Methodology for Spray Applied Pipe Liners in Gravity Storm Water Conveyance Conduits"), with research scheduled to be completed in December of 2020. Due to the size, length, height of fill, and uncertain structural thickness, this method is not considered prudent at this time. Slip lining can also reduce capacity, depending on the reduction in diameter and the liner's roughness value. A relatively rough liner such as steel structural plate (mannings $n = 0.034$) would reduce capacity and increase the headwater elevation above the FEMA regulatory elevation. Very smooth liners such as plastic (mannings $n = 0.010$) typically have the longest predicted service life, but also have the highest velocities. Corrugated metal liners are typically the least expensive material and can be produced in a variety of diameters (1" increments), roughness values (mannings $n = 0.012$ to 0.027), and metal thickness. Various metal alloys and coating are available to increase predicted service life.

Proposed Design

The initial concept presented at the project's Natural Resources Coordination Meeting was to slip line with an 84" corrugated metal liner, which would provide a typical (3") annular space between the liner outside diameter and the existing 90" culvert inside diameter. Based on the structural condition and potential for deformation, the proposed liner diameter has been reduced to 81". The proposed material is galvanized steel in the thickest standard gage currently available (10 gage), with an additional polymer coating to extend service life. Helical corrugations with a moderate roughness value (mannings n of 0.025) were chosen to minimize the increase in velocity. For reference, the existing 90" structural plate culvert was modelled with a mannings n of 0.034, and the existing 90" culvert was 8 gage galvanized steel, and has lasted 59 years.

The inlet end of the culvert will be shortened by about 12', replacing the mitered end with a more hydraulically efficient concrete headwall. The combined increase in inlet efficiency and a smoother liner will prevent any significant increase in headwater elevation. No effect on the FEMA regulatory 100 year flood elevation or downstream structures is anticipated.

Model results predict the 100 year flood elevation upstream of the culvert at El 206.35 (vs existing model El 206.66) and the 100 year flowrate through the culvert at 408 cfs (vs existing at 403 cfs). Q100 outlet velocity will increase from the existing 12.35 ft/s to 13.4 ft/s. The existing stone armored channel is sufficient to withstand the velocity increase. At the low flow of 10 cfs, culvert velocity increase is not significant (unrounded values: existing 4.17 ft/s, proposed 4.22 ft/s). One year and two year 24 hour storms were also modelled, showing no significant velocity increase. One year storm (2.35" of rain) velocity is about 5.1 ft/s and 2 year storm (2.88" of rain) velocity is about 6.1 ft/s.

In the middle section, the failed 18" pipe connection will be replaced with a 24" pipe connection, and the eroded areas will be restored to elevations similar to the conditions prior to failure of the 18" pipe connection. The existing stone lined channel coming from the Boynton St closed drainage system will be extended to the bottom of slope. The proposed 24" pipe connection will not significantly change the hydraulic function of the system. At Q100, potential flow into the 90" culvert is 21 cfs (vs 15 cfs for the original 18" pipe) and ponding depth is 2.9' (vs 3.9' for the original 18" cmp).

The second 18" cmp shown on the 1961 plans will be filled and abandoned if it is found to exist. Filling with grout can be accomplished from inside the 90" culvert, so no additional wetland impacts are anticipated for this work. The proposed design will allow the wetland to continue to provide functions such as flood flow attenuation, sediment/toxicant retention, and nutrient removal and groundwater recharge.

Temporary access roads will be required at the inlet, middle and outlet. Any vegetation that is cut will be allowed to re-establish naturally. Mats or stone over geotextile will be used where access roads cross wetlands. Disturbance of wetland plant root systems is not anticipated.

Water diversion will be through the existing 90" pipe unless otherwise approved as part of the Contractor's stormwater plan. The water diversion will be designed by the Contractor to accommodate a 2 year storm, with the provision that excess flows be allowed through the

existing culvert. The proposed slipling process can accommodate these requirements. A typical water diversion for this type of project would be a sandbag dam at the inlet and pump(s) to maintain the upstream water elevation at an acceptable level. The pump discharge hose would be routed through the existing culvert. In the event of storm predicted to exceed the pump capacity, workers and loose materials would be removed from the culvert and flow would be allowed through or over the dam and into the existing culvert.

A Cofferdam Item will be provided for construction of the inlet headwall. This is a Contractor designed system to support the roadway embankment and isolate the headwall foundation area from surface water and groundwater.

Impacts at the culvert inlet are all temporary. The proposed headwall and stone pad are outside the delineated wetland. Access to the culvert inlet will be along the toe of the Boynton St embankment. The original mitered end had concrete buttress walls along both sides, approximately 12” wide x 24” deep x 12’ long. These buttress walls will be removed. Stone armor will be placed between the wingwalls for scour protection. The stone will be intermixed and covered with existing streambed material such that the streambed matches the new liner invert. Invasive species within the disturbed area will be handled in accordance with best management practices.

Work in the middle area will require cutting of brush, woody shrubs, and removal of a few isolated trees. Invasive species within the disturbed area will be handled in accordance with best management practices. A stone apron for an existing NH 101 slope drain outlet will be reset after filling the eroded areas. Any existing riprap or slope drains that are disturbed will be reset, repaired, or replaced in-kind.

Access to the 90” culvert outlet will require clearing about 1,300 sf (0.03 acres) of trees with diameter over 3”. Removal of stumps is not anticipated. No permanent impact to the 90” culvert outlet channel is expected. Any existing stone armor that is disturbed will be reset. Stones immediately adjacent to the culvert outlet will be reset to match the liner invert.

All work will be within the existing State right of way or permanent easements acquired under previous NHDOT projects.

Construction is estimated to take 3 months, with no significant impact to traffic, utilities, or other resources.

The preliminary estimate for the proposed option is as follows:

Corrugated metal liner, including cleaning and preparation of the existing pipe, and grouting of voids and the annular space	\$ 700,824
Inlet side concrete headwall	\$ 15,050
Water Diversion and Cofferdam Items	\$ 50,000
Middle area earthwork, 24” pipe connection, stone channel	\$ 49,784
Project wide Items (Access Roads, LRS, reset riprap, humus/seed mulch, Field Office, etc)	\$ 89,701

Erosion Control Items	\$ 22,650
Traffic Control Items	\$ 81,280
Misc. Items and Contingency (5% of Contract Item Total)	\$ 51,464
Fuel Adjustment (fixed amount based on Contract Item Total)	\$ 20,000
Mobilization (10% of Contract Item Total)	\$ 120,000
Contract Total	\$1,200,753
Construction Administration and Inspection (8% of Contract Total)	\$ 96,000
Construction Total	\$1,296,813

BUREAU OF ENVIRONMENT CONFERENCE REPORT

SUBJECT: NHDOT Monthly Natural Resource Agency Coordination Meeting

DATE OF CONFERENCE: February 19, 2020

LOCATION OF CONFERENCE: John O. Morton Building

ATTENDED BY:

NHDOT

Matt Urban
Sarah Large
Ron Crickard
Andrew O’Sullivan
Kerry Ryan
Meli Dube
Chris Carucci
Maggie Baldwin
Jason Abdulla
Arin Mills
Tobey Reynolds
Phil Brogan
Loretta Doughty
Bill Saffian
John Butler
Mike Mozer

ACOE

Rick Kristoff

EPA

Jeannie Brochi

**Federal Highway
Administration**

Jaimie Sikora

NHDES

Lori Sommer
Karl Benedict
Liz Sibson (intern)

NH Fish & Game

Carol Henderson

The Nature Conservancy

Pete Steckler

**Consultants/Public
Participants**

Kimberly Peace
Josif Bicja
Joanne Theriault
Matt Lundsted
Steve Halloran
Ben Lundsted
Taylor Vasquez
Nick Sceggell
Jennifer Doyle-Breen
Todd Dwyer
Pankaj Saharia
John Wilson
Vicki Chase
Kim Smith

PRESENTATIONS/ PROJECTS REVIEWED THIS MONTH: *(minutes on subsequent pages)*

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(When viewing these minutes online, click on a project to zoom to the minutes for that project.)

L. Sommer and K. Benedict added details about the required Restoration Plan. The plan should include monitoring for 3 years post-construction, detail restoration methods for all shoreland areas, and also include a description of all proposed plantings.

K. Peace asked if it would be acceptable to leave steel piles from the proposed temporary trestle in the riverbed and cutting them off below the mudline. K. Benedict warned against this, saying that the substrate of the Pemigewasset River is quite sandy in this location and could easily erode away and expose remaining steel piles. K. Benedict stated that if steel piles need to remain, their buried depth should be carefully considered. B. Saffian stated that the only reason DOT would want to leave them in place and cut off at the streambed is if the vibration during removal may negatively impact the piers and that this will be evaluated during design.

K. Benedict suggested the use of previously cleared lands in the vicinity of the project to minimize vegetation clearing necessary in the shoreland area.

K. Peace asked if reconfiguration of scuppers on the bridge deck would affect water quality. K. Benedict confirmed that there will be no new impervious surface, then stated that scupper reconfiguration would not be considered a change from the existing condition and would not be considered to have water quality impacts.

M. Dube discussed the current DOT operating procedure of allowing contractors to detail their own access plans. When the wetland permit application is submitted, these details for the proposed trestle will not yet be available. K. Benedict confirmed that showing conservative stream/bank impact boundaries for the access structure will be sufficient for wetland permitting.

R. Kristoff asked if the Coast Guard has been contacted about this work. K. Peace responded that a determination of navigability will be necessary.

J. Brochi asked how nearby remediation sites will be addressed. K. Peace stated that the known sites are within 1,000' but not immediately adjacent to the proposed project. Although no impacts are expected, any potential issues will be addressed during the NEPA process.

K. Benedict asked how long the proposed trestle access structure would be in place, and J. Bicja replied that it would most likely be needed for two construction seasons. K. Benedict indicated that it may be necessary to request a waiver if the current limit for temporary impacts is one calendar year. The waiver request should include a statement that impacts to jurisdictional resources would be greater if the temporary trestle were removed between the construction seasons.

K. Benedict suggested assessing the feasibility of substituting a barge for the proposed trestle.

This project has not been previously discussed at a Monthly Natural Resource Agency Coordination Meeting.

Bedford, #42268 (X-A004(797))

Chris Carucci described the project, a proposed culvert rehabilitation on the pipe carrying Bowman Brook under NH Route 101 and Boynton Street. The project is a federally funded culvert rehabilitation project. The proposed advertising date is August 18, 2020, with construction anticipated in summer of 2021. The culvert carries Bowman Brook under NH Route 101 and Boynton Street just east of the intersection of the two roads with NH Route 114. The crossing is a Tier 3 and has a drainage area of 3.94 square miles.

The existing culvert is a 90" diameter corrugated metal pipe and is 632' long with mitered ends. The slope of the culverts is about 1%. There is around 31' of fill over the pipe at Boynton Street and about 41' at NH Route 101. The depth of the fill and the heavy traffic are constraints for the project.

The pipe was originally constructed in 1961 at 540' long and was extended about 100' on the outlet end in 1996. The 1961 portion of the pipe is in very poor condition, with perforations along the sides and leaking joints. The 1996 portion of the pipe is not as deteriorated, but is heavily rusted along the bottom and lower sides. As of the last field review, the shape of the pipe was still round enough to allow rehabilitation.

The 1996 project included heavy stone armoring on the bed and banks of the stream at the outlet extending around 100' downstream. Some vegetation has grown through the stone and some sediment deposition has occurred as a result of erosion that is entering the culvert from a failed connection of an 18" pipe that is connected to the subject culvert and was constructed in 1961. The 18" pipe carries about 26 acres of overland and closed drainage flow from Boynton Street and several slope drains from NH Route 101 into Bowman Brook. The deterioration of the connection of the 18" pipe is significant, there is now a large hole where the two pipes previously connected.

The only listed endangered or threatened species is the northern long eared bat.

Bowman Brook is shown on the Wildlife Action Plan aquatic habitat layers, but no statewide or regionally highest ranked terrestrial habitats are shown in the area. It is tributary to the Merrimack River, so the project area will need to be evaluated for impacts to Essential Fish Habitat for Atlantic Salmon.

There are regulated 100 year floodplains (Zone AE) upstream and downstream of the crossing.

NHDOT coordinated with NH Fish & Game regarding fish passage. They had surveys at two sites downstream, finding numerous fish species, including brook trout. Avoiding work in September and October was recommended. Based on the length of the culvert and predicted velocity, the existing culvert is not passable in the upstream direction for most fish species.

There is no perch at the inlet or outlet of the pipe. Base flow within the structure is typically 8" to 18" deep.

A stream assessment was performed for Bowman Brook, resulting in a bank full width of 12.8' at the outlet. The upstream area is impounded scrub-shrub wetland, bank full width was not determined. The floodplain is about 150' wide and 2000' long with a shallow sinuous channel. Regional curves predict a bank full width of 24.4' for this crossing based on drainage area, resulting in a compliant structure span of about 32'. Due to the deep fill and high traffic counts, replacement with a compliant structure is not feasible or within the scope of the project. Other than tunneling, which is very expensive, the only practical way to construct a compliant structure would be an open cut of both roadways with phased construction.

Construction could be expected to take at least 2 years, with significant impacts to traffic and utilities. The 90" culvert has no history of flooding and there is no bypass other than overtopping Boynton Street. Hydraulic analysis is based on a 2009 FEMA Flood Insurance Study and associated backup information provided by FEMA. The FEMA Q100 of 710 cubic feet per second (cfs) was used for analysis (vs Streamstats Q100 of 578 cfs). The existing culvert passes the FEMA Q100 with headwater depth of about 15.5 feet.

The storage upstream of the structure is significant at approximately 71 acre feet (over 23 million gallons), reducing the flow through the culvert from 710 cfs to about 440 cfs.

The preferred alternative is a slipline treatment. The proposed design is slip lining with an 84" corrugated metal liner. The inlet end of the culvert would be shortened by about 12', replacing the mitered end with a more hydraulically efficient concrete headwall. The liner will also have a lower roughness coefficient than the existing culvert. The combined increase in efficiency will prevent any significant increase in headwater elevation that could result from the smaller diameter of the slipline. No effect on FEMA maps or downstream structures is anticipated.

The smaller diameter and smoother barrel will cause an increase in velocity at all flows through the pipe. For example, at a low flow of 10 cfs (9" deep) existing velocity is 4.2 feet per second (ft/s), increasing to 6 ft/s. At Q100, existing is 12.6 ft/s and proposed is 16.5 ft/s.

In the middle section (between NH Route 101 and Boynton Street), the failed 18" pipe connection is proposed to be replaced with a 24" pipe connection, and the eroded areas would be restored to the condition prior to the erosion. The existing stone lined channel from the Boynton Street closed drainage system is proposed to be extended to the bottom of the slope.

No permanent impact to the outlet channel is expected. The existing stone armor is adequate for scour prevention.

Temporary access roads will be required at the inlet, in the middle section and at the outlet. Any vegetation that is cut will be allowed to re-establish naturally. Water diversion will be through the existing 90" pipe unless otherwise approved as part of the Contractor's stormwater plan.

Construction is estimated to take 3 months. The estimated total disturbed area is approximately 38,500 square feet (sf) (0.88 acres). The proposed permanent wetland impacts are around 2,000 sf to regrade the middle area and there are no permanent channel impacts proposed. Temporary Wetland Impacts are estimated at 3,100 sf, temporary channel impacts are estimated at 1,725 SF (105 linear feet (LF)) and temporary bank impacts of 1,950 SF (145 LF). *[Numbers are proposed impacts at the time of the meeting. Final impacts pending final wetland impact plans and application submitted to NHDES.]*

Karl Benedict agreed that the alternative design seemed appropriate and commented that C. Carucci had laid it out well. He commented that it would be important to provide a narrative of how the existing pipe doesn't pass AOP. C. Carucci explained that the flow through the proposed slipline would be faster because the corrugation is less significant than the corrugation in the existing pipe.

Carol Henderson commented that the proposed corrugated metal slipline should provide some roughness within the new pipe. She said that Kim Tuttle would not be happy about the sliplining treatment, but that there is probably limited turtle passage here anyway. C. Carucci shared that the inlet areas is typically ponded.

K. Benedict asked if all of the impacts would be within NHDOT right of way (ROW) and C. Carucci responded that the project would be within the NHDOT and possibly the power line easement.

Rick Kristoff asked if there would be any loss of floodplain storage and C. Carucci responded that there would not be.

This project has not been previously discussed at a Monthly Natural Resource Agency Coordination Meeting.

At the February 20, 2020 Natural Resource Agency meeting Sarah Large described that since the impacts at the inlet and outlet are all temporary in nature and the project is shortening and creating channel at the inlet where pipe currently exists NHDOT did not anticipate mitigation would be required for the stream impacts. Lori Sommer agreed. The impacts to the forested wetlands associated with restoring the eroded land in the sag between NH 101 and Boynton Street is below the mitigation threshold of 10,000 SF of permanent palustrine wetland impacts, and therefore NHDOT did not anticipated mitigation for this work as well. Lori Sommer concurred that no mitigation was required for this project.



AVOIDANCE AND MINIMIZATION CHECKLIST
 Water Division/Land Resources Management
 Wetlands Bureau
[Check the Status of your Application](#)



RSA/Rule: RSA 482-A/ Env-Wt 311.07(d)

This checklist can be used in lieu of the written narrative required by Env-Wt 311.07(a) to demonstrate compliance with requirements for Avoidance and Minimization, pursuant to RSA 482-A:1 and Env-Wt 311.07(d).

A/M BMPs stands for *Wetlands Best Management Practice Techniques for Avoidance and Minimization* dated 2019, published by the New England Interstate Water Pollution Control Commission (Env-Wt 102.18).

Practicable means “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes” (Env-Wt 103.62).

SECTION 1 – CONTACT/LOCATION INFORMATION		
APPLICANT LAST NAME, FIRST NAME, M.I.: NH Department of Transportation		
PROJECT STREET ADDRESS: Intersection of NH Rt 101 & Boynton St		PROJECT TOWN: Bedford, NH
TAX MAP/LOT NUMBER: N/A NHDOT ROW		
SECTION 2 - PRIMARY PURPOSE OF THE PROJECT		
Env-Wt 311.07(b)(1)	Indicate whether the primary purpose of the project is to construct a water-access structure or requires access through wetlands to reach a buildable lot or the buildable portion thereof.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If you answered “no” to this question, describe the purpose of the “non-access” project type you have proposed. The purpose of this project is to rehabilitate an aging culvert and valuable state asset in order to support long term and safe use of the State's public transportation network.		

Avoidance and minimization requirements have not been met if you answer “No” to any technique/ construction timing in Sections 3 to 8, without providing justification that the requirements were not practicable and the proposed project incorporates the results of the functional assessment included as part of the functional assessment report or checklist.

SECTION 3 - AVOIDANCE PROJECT DESIGN TECHNIQUES		
Env-Wt 311.07(b)(2)	For any project that proposes permanent impacts of more than one acre or that proposes permanent impacts to a Priority Resource Area (PRA), or both, whether any other properties reasonably available to the applicant, whether already owned or controlled by the applicant or not, could be used to achieve the project’s purpose without altering the functions and values of any jurisdictional area, in particular wetlands, streams, and PRAs.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A

Env-Wt 311.07(b)(3)	Alternative design techniques could not be used to avoid impacts to jurisdictional areas or their functions and values on the subject property or on another property reasonably available to the applicant.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(1)	The results of the functional assessment required by Env-Wt 311.03(b)(10) were used to select the location of the proposed project having the least impact to wetland functions.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(2)	The proposed project has been designed to have the least impact to wetland functions.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(3)	Where impact to wetland functions is unavoidable, the proposed impacts are limited to the wetlands with the least valuable functions on the site while avoiding and minimizing impacts to the wetlands with the highest and most valuable functions.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 313.01(c) Env-Wt 313.03(b)(1)	No practicable alternative would reduce adverse impact on the area and environments and the project will not cause random or unnecessary destruction of wetlands.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 313.01(c)(3)	The project would not cause or contribute to the significant degradation of waters of the state or the loss of any PRAs.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 313.03(b)(2)	The project avoids impacts to marshes that are documented to provide sources of nutrients for finfish, crustacea, shellfish, and wildlife of significant value.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Env-Wt 313.03(b)(3) Env-Wt 904.07(c)(8)	The project maintains hydrologic connectivity between adjacent wetlands or stream systems.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 311.01(b) Env-Wt 313.03(b)(4)	The project avoids and minimizes impacts to wetlands and other areas of jurisdiction under RSA 482-A, especially those in which there are exemplary natural communities, vernal pools, protected species and habitat, documented fisheries, and habitat and reproduction areas for species of concern.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 313.03(b)(5)	The project avoids and minimizes impacts that eliminate, depreciate, or obstruct public commerce, navigation, or recreation.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Env-Wt 311.10 A/M BMPs	Buildings and/or access are positioned away from high function wetlands or surface waters to avoid impact.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Env-Wt 311.10 A/M BMPs	The project clusters structures to avoid wetland impacts.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Env-Wt 311.10 A/M BMPs	The placement of roads and utility corridors avoids wetlands and their associated streams.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A

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A/M BMPs	Proposed utilities are suspended from bridges to avoid trenching through wetlands.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
A/M BMPs	The width of access roads or driveways is reduced to avoid and minimize impacts. Pullouts are incorporated in the design as needed.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
A/M BMPs	Retaining walls are proposed to avoid placing fill in wetlands. The retaining walls would not block hydrology or wildlife corridors.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
A/M BMPs	The project proposes bridges or spans instead of roads/driveways/trails with culverts.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
A/M BMPs	Natural topography is incorporated in the design to avoid grading.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

This checklist is not complete without a description of the specific avoidance project design techniques employed for this project:

The proposed rehabilitation design is the alternative with the least impact to wetland functions. The Supplemental Narrative provides detailed information on the options considered. Replacement of the culvert with bridges or span structures was found to be not practicable due to site constraints. The subject culvert is an existing legal crossing and inlet, outlet, and middle storm drainage connection locations are fixed, requiring impacts at the locations where they are proposed. Natural topography in the "middle area" is preserved.

Functions and values of existing wetlands, PRA's, and other resources were considered in selecting the location and extent of access roads that are proposed. Access road location, width, and associated tree clearing are the minimum necessary to accomplish the work in a safe and productive manner. The impact of temporary access roads will be further minimized by avoiding disturbance of wetland plant root systems through the use of temporary mats or stone over geotextile where equipment must cross wetlands.

The proposed rehabilitation will maintain hydrologic connectivity by ensuring there is no perch at the culvert inlet or outlet, using a liner with a corrugated interior to minimize culvert velocity, and shortening the culvert and constructing a headwall to avoid permanent fill in wetlands.

The project specifications will include time of year restrictions to minimize impact to species of concern, specifically Brook Trout and Atlantic Salmon.

SECTION 4 - MINIMIZATION DESIGN TECHNIQUES

Env-Wt 311.10	The project was designed to minimize impacts to higher-quality wetlands.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Env-Wt 311.01(b) Env-Wt 313.03(b)	The project was designed to minimize impacts to habitat, reproduction areas, fishery, vernal pools, or protected species or habitat.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
A/M BMPs	The project was designed to minimize the number of crossings and their size.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
A/M BMPs	Wetlands and streams are proposed to be crossed at their narrowest point.	<input type="checkbox"/> Yes <input type="checkbox"/> No

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		<input checked="" type="checkbox"/> N/A
Env-Wt 500 Env-Wt 600 Env-Wt 900	Wetland and stream crossings include features that accommodate aquatic organism passage and wildlife passage.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Env-Wt 313.01(c)(1) Env-Wt 313.03(b)(6)	The project was designed to avoid and minimize impacts to floodplain wetlands that provide flood storage.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Env-Wt 313.01(c)(1) Env-Wt 313.03(b)(7)	Impacts to natural riverine forested wetlands systems and scrub-shrub marsh complexes of high ecologic integrity are avoided and minimized.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Env-Wt 313.01(c)(1) Env-Wt 313.03(b)(8)	Impacts to wetlands that would be detrimental to drinking water supply and groundwater aquifer levels are avoided and minimized.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 313.01(c)(1) Env-Wt 313.03(b)(9)	Adverse impacts to stream channels and their ability to handle stormwater runoff are avoided and minimized.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 900	Stream crossings are sized to address hydraulic capacity and geomorphic compatibility.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
A/M BMPs	Disturbed areas are used for crossings wherever practicable, including existing roadways, paths, or trails upgraded with new culverts or bridges.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
RSA 482-A:11, II	Project is designed to minimize impacts to abutting properties.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.13	Setbacks from property lines required by Env-Wt 307.13 are maintained.	<input type="checkbox"/> Yes <input type="checkbox"/> No

This checklist is not complete without a description of the specific minimization design techniques employed for this project:

The proposed rehabilitation design is the alternative with the least impact to wetland functions. The subject culvert is an existing legal crossing and inlet, outlet, and middle storm drainage connection locations are fixed, requiring impacts at the locations where they are proposed. Natural topography and potential for groundwater recharge in the "middle area" is preserved. Impacts to abutters are minimized by keeping all work will be within the existing State ROW or permanent easements acquired under previous projects. No permanent impacts to stream channels are proposed. The proposed rehabilitation avoids impacts to floodplains, flood storage areas, and downstream structures.

Functions and values of existing wetlands, PRA's, and other resources were considered in selecting the location and extent of access roads that are proposed. Access road location, width, and associated tree clearing are the minimum necessary to accomplish the work in a safe and productive manner. The impact of temporary access roads will be further minimized by avoiding disturbance of wetland plant root systems through the use of temporary mats or stone over geotextile where equipment must cross wetlands.

The proposed rehabilitation will maintain hydrologic connectivity by ensuring there is no perch at the culvert inlet or outlet, using a liner with a corrugated interior to minimize culvert velocity, and shortening the culvert and constructing a headwall to avoid permanent fill in wetlands.

SECTION 5 - RESOURCE-SPECIFIC DESIGN TECHNIQUES		
Env-Wt 500	The project is designed to address resource-specific avoidance and minimization criteria for non-tidal jurisdictional areas.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Env-Wt 600	The project is designed to address resource-specific avoidance and minimization criteria for coastal lands and tidal waters/wetlands.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Env-Wt 307.08 Env-Wt 700	The project is designed to address resource-specific avoidance and minimization criteria for designated prime wetlands.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
<p>This checklist is not complete without a description of the resource-specific design techniques employed for this project:</p> <p>The project is designed to avoid or minimize impacts to:</p> <p>The Northern Long Eared Bat by minimizing clearing of trees</p> <p>Atlantic Salmon, by restricting the time of year that work can occur</p> <p>Minimizing impacts to the vegetated buffer around the brook and wetlands and revegetating temporary impact areas to re-establish natural stable landscapes throughout the project area.</p> <p>Erosion and siltation, as standard BMPs will be used and maintained throughout construction.</p> <p>Water quality by utilizing water diversion and water management plans.</p>		
SECTION 6 - PROJECT-SPECIFIC DESIGN TECHNIQUES		
Env-Wt 500	The project is designed to use techniques outlined in Env-Wt 500 for projects in non-tidal jurisdictional areas.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Env-Wt 600	The project is designed to use techniques outlined in Env-Wt 600 for projects in coastal lands and tidal waters/wetlands.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Env-Wt 900	The project is designed to use stream crossing techniques outlined in Env-Wt 900 for stream crossing projects.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

This checklist is not complete without a description of the project-specific design techniques employed for this project:

The project design includes stream crossing techniques outlined in Env-Wt 900 to the maximum extent practicable, such as covering new stone armor within the stream channel at the culvert inlet with simulated streambed material, requiring grading at the culvert inlet and outlet to ensure there is no perch, and using a corrugated liner to minimize culvert velocity.

NHDOT has also taken into consideration Env-Wt 527- Public Highways and have met Env-Wt 527 to the maximum extent practicable.

SECTION 7 - CONSTRUCTION TECHNIQUES		
Env-Wt 311.05	Limits of jurisdictional areas, construction activities and proposed water quality protection measures are clearly marked on plans.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.03(b)	Best management practices (BMPs) for erosion control and construction stormwater management will be used and maintained during construction.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.03(c)	Techniques to protect water quality will be used.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.03(g)	Techniques to avoid fuel, oil, and hydraulic fluid spills in and around wetlands jurisdiction will be used.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.05(e)	The Best Management Practices For the Control of Invasive and Noxious Plant Species" (dated 2018, published by NHDOT) will be followed to avoid introducing nuisance or invasive species to the work site from soil or seed stock.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.03(b) Env-Wt 307.10 Env-Wt 307.15	Construction staging and stockpiling of materials will be kept out of wetlands with adequate containment measures.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.04	Techniques will be used to protect fisheries, bird migratory areas, fish, amphibian, and shellfish spawning or nursery areas, breeding areas, and high quality waters.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.05	Equipment brought from other sites will be cleaned away from wetlands so that invasive plants and exotic aquatic species of wildlife are not introduced into the work site.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.06	Techniques will be used to protect rare, threatened, and endangered species and habitat.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.07	The project will be conducted in compliance with the Shoreland Water Quality Protection Act.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.08	Water quality and environmental minimization measures will be in place to protect designated prime wetlands.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.10	Techniques will be used to meet standard dredge conditions outlined in Env-Wt 307.10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.11	Techniques will be used to meet standard fill conditions outlined in Env-Wt 307.11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.12	Work site will be restored in accordance with Env-Wt 307.12.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.15	Impacts from use of heavy machinery will be minimized.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

irm@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

www.des.nh.gov

This checklist is not complete without a description of the specific construction techniques employed for this project: The project will be constructed in accordance with the NHDOT Standard specifications for Road and Bridge Construction, 2016 Edition, and amendments in effect at the time of Advertising. The project specifications incorporate the following by reference:

The Project Wetland Plans, Erosion Control Plan, and Erosion Control Strategies sheet

The approved Project Stormwater Pollution Prevention Plan

The NHDES wetland permit for the Project, including all general and project specific conditions

NHDOT manual Best Management Practices for Roadside Invasive Plants

NHDES Alteration of Terrain Env-Wq 1500 requirements applicable to construction practices

New Hampshire Stormwater Manual Vol. 3 – Erosion Control and Sediment Controls During Construction (December 2008).

SECTION 8 - CONSTRUCTION TIMING

Env-Wt 307.04	The project will be conducted outside spawning or breeding season to reduce impacts to aquatic resources.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Env-Wt 307.10	Timing restrictions described in Env-Wt 307.10 will be adhered to.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

These criteria do not relieve the applicant from the obligation to obtain other local, state or federal permits, and/or consult with other agencies as may be required (including US Environmental Protection Agency, US Army Corps of Engineers, NH Department of Transportation, NH Division of Historical Resources, NHDES Alteration of Terrain Bureau, etc.)

This checklist is not complete without a description of the specific construction timing employed for this project:

Env-Wt 307.04: The project will be scheduled such that impacts to the brook do not occur during September and October, as recommended by NH Fish & Game for Brook Trout. No work is will be conducted between October 1 and March 31 per Env-Wt 307.04. The work will be completed in April through August.

John Magee, the Fisheries Habitat Research and Management Programs Coordinator at NHF&G has communicated that the existing condition is not passable in the upstream direction for most fish species and he has concurred that the proposed liner would not significantly change fish passage conditions. John Magee also shared that F&G has one efish site a bit downstream of the culvert in question, and when it was surveyed in 2009 they caught blacknose dace, creek chub, common shiner, white sucker, wild brook trout, and slimy sculpin. The project will not include in water work in either September or October to to minimize impacts to any brook trout that are moving around a lot to fish spawning areas during that time.

The proposed design is the minimum impact alternative that meets the project need. There will be no permanent impact to resources at the culvert inlet or outlet. Erosion in the middle area will be stabilized.

Env-Wt 307.10: The project specifications will include applicable time of year restrictions and a Final Completion Date that will accommodate the restrictions.

WATERSHED BOUNDARY
 2,490 AC (3.89 SQ MI).



TOPO EXHIBIT 1
 SCALE 1" = 2400'

STATE OF NEW HAMPSHIRE			
BEDFORD			
DEPARTMENT OF TRANSPORTATION		BUREAU OF HIGHWAY DESIGN	
42268 WATERSHED BOUNDARY			
DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
42268 Topo Exhibit 1	42268	1	1

**NH Department of Transportation
Bureau of Highway Design
Project, #42268 Bedford
Env-Wt 904.10 Alternative Design
TECHNICAL REPORT
Prepared by: C. Carucci, PE**

Env-Wt 904.10(a) - If the applicant can demonstrate that installing the structure specified in the applicable rule is not practicable, as that term is defined in Env-Wt 103, the applicant may propose an alternative design in accordance with this section.

Please explain why the structure specified in the applicable rule (*a compliant structure*) is not practicable. (Env-Wt 101.69 defines practicable as *available and capable of being done after taking into consideration costs, existing technology, and logistics in light of overall project purposes.*)

This project was initiated and is funded under NHDOT's Federal Culvert Replacement/Rehabilitation & Drainage Repair (CRDR) Program. The Program purpose is to address major culvert and drainage needs statewide that are not being addressed through current or future Capital Improvement or other programmatic projects. The Program receives \$2,000,000 in total funding annually, which includes construction, engineering, and ROW costs. Projects are selected and scheduled based primarily on the condition of the culvert (risk of failure), and Road Tier, traffic volume, depth of fill, and detour length (potential impact of failure). The Program funding is fully committed for at least the next three years. This culvert is one of the highest statewide priority locations out of nearly 50 known locations eligible for the Program. Failure to address the structural deficiency of this culvert risks deformation of the culvert which would make rehabilitation impossible and/or collapse of the culvert which could cause serious impacts to public/private infrastructure and the travelling public. Alternatives that significantly exceed the Program budget are not practicable since allocating multiple years of Program funding to a single culvert would put the State at risk for failures elsewhere.

In addition to the cost and scheduling concerns, the larger alternative structures would not utilize the upstream storage which would cause a significant increase in downstream flows and 100 year flood elevations. The next downstream structure would likely be at increased risk of overtopping.

Env-Wt 904.10(c)(1) Explain how the proposed alternative meets the criteria for approval specified as applicable:

- a. Detailed financial comparison of the costs of a structure that complies with all applicable design requirements, the proposed structure, and a structure that requires fewer waivers than the proposed structure, with a range of costs estimated for each;
A fully compliant design would be two 32' span x 12' rise open bottom concrete arches. The estimated construction cost for this option is \$10,542,008.
A hydraulic design was also considered, which would pass the 50 year storm without submerging the inlet. This would be two 8' high x 10' wide (clear opening) box culverts, embedded 24" below streambed. The estimated construction cost for this option is \$6,500,000.

See the Supplemental Narrative for detailed cost information. The typical range of costs for the preliminary alternative estimates presented are from 10% under to 30% over the amount cited. The typical range of costs for the preferred alternative is 5% under to 20% over the amount cited.

- b. A detailed description of the physical limitations of the site; and
The physical limitations for this site include the depth of fill over the culvert, highly developed roadway infrastructure over the culvert, traffic volumes and critical nature of the roadways above the culvert, and regulated 100 year flood elevations.

See the Supplemental Narrative for detailed information about the site and associated resources and constraints.

- c. A hydraulic analysis to show the proposed stream crossing can accommodate the applicable design storm that the crossing, together with the associated roadway and roadway embankment, can safely accommodate overtopping flows;
For this project, the design flow is the FEMA 100 year flowrate of 710 cfs. The existing culvert accommodates the design flow with approximately 15' of headwater depth, which is approximately 14' below the low point in Boynton St. There is no bypass mechanism other than overtopping of Boynton St. NHDOT Highway Maintenance District 5 has indicated that floodwater has never overtopped Boynton St and there are no reports of flooding associated with this culvert. The proposed design will accommodate the design flow with approximately the same headwater depth and flowrate as currently exists.

See the Supplemental Narrative for detailed information about hydraulic modelling and associated model results.

Env-Wt 904.10(c)(2)a – The proposed alternative design must meet the general design criteria established in Env-Wt 904.01:

See the Supplemental Narrative for additional information related to the responses below.

Env-Wt 904.01 General Design Considerations

- (a) All stream crossings, whether over tidal or non-tidal waters, shall be designed and constructed so as to:
- 1) Not be a barrier to sediment transport;
The proposed design has no features that would be a barrier to sediment transport. The existing culvert has been in service for 59 years, with no evidence of obstructing sediment transport.
 - 2) Not restrict high flows and maintain existing low flows;
The proposed liner will maintain existing high flow and low flow hydraulic capacities and flow depths.
 - 3) Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction;
The proposed liner will not obstruct the movement of aquatic life indigenous to the waterbody. The area immediately adjacent to the culvert inlet and outlet will be graded to match the liner invert such that there is no perch. Velocities within the culvert will increase slightly as a result of the smoother liner. Discussions with NH Fish & Game indicate that due to the existing culvert length and velocities, the culvert is not passable in the upstream direction by most fish species. Due to the size of the drainage area, large upstream wetland area, it is unlikely that the culvert is

ever dry, except possibly in extreme drought conditions. Baseflow in the culvert was observed at 8" to 18" deep over several NHDOT field visits. The proposed design will not significantly change low flow conditions. With all of this in mind, current passage of aquatic life is inhibited and will remain the same post construction. The design has taken into consideration ways to not make aquatic organism passage substantially worse by not creating a perch at the inlet or outlet by resetting the inlet and outlet stone riprap scour protection to match the culvert inverts and by selecting a corrugated liner rather than a smooth liner.

- 4) Not cause an increase in the frequency of flooding or overtopping of banks;

The project was designed to accommodate the FEMA 100 year incoming flow of 710 cfs. The proposed design will accommodate the same flow without increasing regulated 100 year flood elevations upstream or downstream. The upstream scrub-shrub wetland also has approximately 71 acre-feet of storage capacity at the FEMA 100 year flood elevation.

- 5) Maintain or enhance geomorphic compatibility by:

- a. Minimizing the potential for inlet obstruction by sediment, wood, or debris; and

The existing (damaged) mitered inlet will be replaced with concrete headwall which is more hydraulically efficient and easier for sediment, wood, and debris to pass as well as making maintenance easier.

- b. Preserving the natural alignment of the stream channel;

The proposed design will not alter the existing culvert alignment. The existing culvert is aligned well with the upstream floodplain. The culvert is well aligned with the outlet channel within the project limits. Prior to any development in this area the stream was a sinuous meandering stream through a broad floodplain. However due to development the stream was previously impacted and redirected through the present day culvert. Due to the construction constraints, rehabilitating the existing structure is the proposed scope of work and restoring the stream back to its sinuous state is not feasible with this project. This project is not making the alignment worse.

- 6) Preserve watercourse connectivity where it currently exists;

The proposed design will not alter connectivity. The liner invert will be about 2" higher than the existing culvert invert. The areas immediately adjacent to the inlet and outlet will be graded such that there is no perch.

- 7) Restore watercourse connectivity where:

- a. Connectivity previously was disrupted as a result of human activity(ies); and

Connectivity of low flows and the hydrologic connection was maintained by the existing culvert. It is not practicable to restore vegetated banks, buffers, or floodplain inside of the existing culvert.

- b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both;

Per coordination with NH Fish and Game (NH F&G), the existing crossing was determined to likely not support upstream fish passage presently. The length of the culvert (over 600 feet) makes it unlikely to support upstream passage for aquatic organisms other than fish. Due to the site constraints (see section 904.10(c)(1)b), restoration or significantly improving connectivity for AOP is not achievable. The watercourse is

connected currently (there is no perch at the crossing) and competently functions as a stream by passing flows and sediment.

The project will reduce sedimentation and erosion currently taking place due to the failure of the connection of the 18-inch pipe to the subject pipe (between Boynton Street and NH Route 101). Repairing this failure will improve water quality, which will benefit aquatic life downstream of the project area.

8) Not cause erosion, aggradation, or scouring upstream or downstream of the crossing; and
The proposed design will have no effect on upstream hydraulics or sediment transport through the culvert. Outlet velocities will increase as a result of the smoother liner, but the existing downstream stone channel protection is sufficient to prevent erosion or scouring of the downstream channel. No changes to the downstream channel are proposed.

9) Not cause water quality degradation.
The project will have no effect on water quality. No new pavement or changes to drainage patterns is being proposed.

(b) For stream crossing over tidal waters, the stream crossing shall be designed to:

1) Match the velocity, depth, cross-sectional area, and substrate of the natural stream: and
N/A – This is not a tidal crossing

2) Be of sufficient size to not restrict bi-directional tidal flow over the natural tide range above, below, and through the crossing.
N/A – This is not a tidal crossing

Env-Wt 904.10(c)(2)b - The proposed alternative design meets the applicable design criteria established in Env-Wt 904.07 for Tier 2, Tier 3, and Tier 4 stream crossings to the *maximum extent practicable*, as specified below.

Env-Wt 904.07 Design Criteria for Tier 2, Tier 3, and Tier 4 Stream Crossings

(a) Unless otherwise specified, all design criteria in this section shall apply to new and replacement Tier 2 crossings, new and replacement Tier 3 crossings, as well as new and replacement Tier 4 tidal crossings that do not meet the requirements of Env-Wt 904.07.

The proposed rehabilitation (by sliplining) meets all of the requirements for permitting under 904.09, but the project was discussed as an Alternative Design at the project's Natural Resource Meeting and is therefore presented as such in this application.

(b) Tier 2 and tier 3 stream crossings shall be designed in accordance with the NH Stream Crossing Guidelines.

As this is not a new or replacement crossing, there is little to no opportunity to modify the crossing to better match the NH Stream Crossing Guidelines.

(c) Tier 2, tier 3, and tier 4 stream crossings shall be designed:

1) To meet the general design considerations specific in En-Wt 904.01;
The proposed design meets the requirements of 904.01.

- 2) Of sufficient size to accommodate the greater of:
 - a. The 100-year 24-hour design storm;
 - b. Flows sufficient to:
 1. Prevent an increase in flooding on upstream and downstream properties; and
 2. Not affect flows and sediment transport characteristics in a way that would adversely affect channel stability; or
 - c. Applicable federal, state, or local requirements;

The project was designed to accommodate the FEMA 100 year incoming flow of 710 cfs, which is greater than the NHDOT requirement of a 50 year storm design for this type of crossing. The proposed design will accommodate the same flow without increasing regulated 100 year flood elevations upstream or downstream. The existing culvert has performed well for 59 years, with no evidence of obstructing sediment transport or causing channel instability. The proposed design will not significantly alter sediment transport capacity or flow conditions.

NHDOT does not typically use 24 hour design storms to predict runoff from large watersheds. Current guidance indicates that the SCS Method (HydroCADD) should not be used to predict runoff from drainage areas over 2000 acres. In this case, the project's HydroCADD model was calibrated to produce the FEMA 100 year runoff, which was then routed through the upstream storage area using existing and proposed culvert conditions to document the effect of the proposed design.

- 3) With bed forms and streambed characteristics necessary to cause water depths and velocities within the crossing structure at a variety of flows to be comparable to those found in the natural channel upstream and downstream of the stream crossing.

It is not practicable to cause water depths and velocities within the crossing structure at a variety of flows to be comparable to those found in the natural channel upstream and downstream of the stream crossing since the crossing is a closed bottom structure and will remain closed bottom as well as the site constraints that prevent replacement and support rehabilitation. The selection of the liner material provides the best available balance between capacity and velocity.

- 4) To provide a vegetated bank on both sides of the watercourse or to provide a wildlife shelf of suitable substrate and access to allow for wildlife passage.

It is not practicable to provide a vegetated bank on both sides of the watercourse or to provide a wildlife shelf inside the existing culvert due to site constraints.

- 5) To preserve the natural alignment and gradient of the stream channel, so as to accommodate natural flow regimes and the functioning of the natural floodplain.

It is not practicable to alter the alignment or gradient of the existing culvert to restore the natural alignment of the stream that it once was prior to the original culvert installation. The proposed rehabilitation maintains the existing alignment and gradient of the crossing.

- 6) To simulate a natural stream channel.

It is not practicable to simulate a natural stream channel inside the existing culvert. The existing 90" CMP is a closed bottom corrugated metal pipe. The proposed culvert will be a closed bottom 81" diameter corrugated metal culvert.

7) So as not to alter sediment transport competence.

The proposed design will not have a significant effect on sediment transport competence. Existing culvert velocities are sufficient to prevent aggregation of sediment inside the culvert. Proposed liner velocities will be slightly higher than the existing velocities.

8) To avoid and minimize impacts to the stream in accordance with Env-Wt 313.03

The project was designed to avoid and minimize wetland impacts to the maximum extent practicable. Additional details are provided in the Avoidance and Minimization checklist included elsewhere in the application.

(d) In addition to meeting the criteria specified in (c), above, new, repaired, rehabilitated, or replaced tier 4 stream crossing shall be designed:

N/A – Crossing is not a Tier 4

- 1) Based on a hydraulic analysis that accounts for daily fluctuating tides, bidirectional flows, tidal inundation, and coastal storm surge;
- 2) To prevent creating a restriction on tidal flows; and
- 3) To account for tidal channel morphology and potential impacts due to sea level rise.

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project Bedford 42268

Location of Crossing NH Rt 101

Date of field assessment 9/30/19

Boylston St

Stream Parameters at Crossing

Existing Crossing (type and size): 76" x 90" elliptical

Watershed size 3.89 sq. mi.

CMP RCP HDPE Arch/Squash Pipe Closed Box Open Box Bridge Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: YES NO

Riparian Zone (surrounding or on the banks):

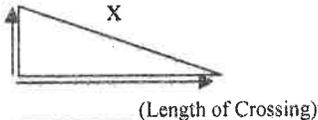
Extent of vegetation (circle): absent, low density, moderate density, (high density)

Type of dominant vegetation (circle): graminoid, herbaceous, (shrub/sapling), tree

Dominant Species:
Smooth Alder
Sensitive fern
goldenrod.
oriental bitter sweet.
birch

Not measurable in the field with survey rods: Pop levels

Slope at crossing: _____ (Rise in Elev.)



Outlet Data:

Depth of water at invert if not perched: 12" (example):

Perched at outlet? YES NO (If yes, Distance from invert to the waters surface: _____) (example):

Tailwater Controls present at crossing? YES NO

Pool Configuration: width 17' length: 57' Max pool depth at outlet: 12"

Location (distance from outlet): 57' Materials: gravel, sand, muck

Dominant Channel Material (visual assessment): sand silt gravel cobble boulder bedrock
Pebble Count: YES NO (Collect Data on Pg. 2)

50% sand
50% silt

Photo of Outlet Structure
 Photo of Downstream Conditions

Outlet Cross Section (Use Pg. 3 to collect Data)

Inlet Data:

Depth of water at inlet: _____ (example):

Beaver Dam blocking flow
10ft from inlet

Dominant Channel Material (visual assessment): sand silt gravel cobble boulder bedrock
Pebble Count: YES NO (Collect Data on Pg. 2)

water flowing under, around pipe

Photo of Inlet Structure
 Photo of Upstream Conditions

Inlet Cross Section (Use Pg. 4 to collect Data) N/A not surveyable, see Normandeau

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project Bedford, 42260

Location of Crossing _____

Date of field assessment 9/30/19

Outlet Cross Section:

Starting bank (left/right)

Dist. from bank (ft.)	Dbf
1	1.4
2	1.5
3	1.7
4	1.8
5	1.8
6	1.8
7	1.8
8	1.7
9	1.7
10	1.4
11	1.3
12	1'
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Avg Dbf= 1.6'
 Max water depth= 0.7'
 Ctr of structure@: 6'
 Wbf = 12.8'
 Flood Prone Width= 27.5'

12' 10"



Stream Crossing Assessment Bowman Brook, Bedford, NH

Prepared For:
Fay, Spofford, & Thorndike, Inc
288 South River Road, Building C
Bedford, NH 03110

Submitted On:
November 12, 2013

Prepared By:
Normandeau Associates, Inc.
25 Nashua Road
Bedford, NH 03110

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Introduction

In December 2012, data was collected at Bowman Brook in Bedford, NH to characterize the stream on either side of its passage under Route 114. A subsurface road crossing present for the brook is being targeted by NH Department of Transportation (NHDOT) for rehabilitation or replacement. Due to development in the area, the reference reach proposed for use in the characterization was located 100 to 500 feet upstream of the present crossing. The crossing currently consists of a round corrugated metal culvert with a 7.5 foot opening and the pipe run is approximately 200 feet in length. This report presents the results of a stream assessment using the form titled NHDOT Stream Field Worksheet, dated 2010 and revised May 2011.

Under the Stream Crossings rules (Chapter Env-Wt 900), the proposed replacement of the existing culvert that channels Bowman Brook below Route 114 meets the requirements of a replacement Tier 3 major impact project. For the replacement of an existing legal stream crossing, the Stream Crossings rules require that an assessment of the geomorphic compatibility of the existing stream channel be performed based on the NH Stream Crossing Guidelines (UNH 2009).

Methods

Six representative cross-sections were located along the brook; three upstream of the culvert, one just before the inlet, one just beyond the outlet, and one downstream of the culvert. Locations of the cross-sections are shown on Plan A and profiles of the cross-sections are shown on Plan B. At each cross-section location, the bankfull elevation and floodprone area were interpreted and flagged based on evidence along the bank. The flags were ground surveyed at a later date by NHDOT. Other characterization calculations were also completed at each section, including the entrenchment ratio, the width to depth ratio and the maximum bankfull depth. These data are presented below the graphic interpretation of each cross-section. Attachment A contains Plans A and B as well as the longitudinal profile. Attachment B contains a completed NHDOT Stream Crossing Assessment Worksheet and supporting data. A spreadsheet showing the data reductions is also included in this attachment.

Results

Based on the assessment results, the two most upstream cross-sections (at 0+250 and 0+400) were classified as E4 stream forms in accordance with the Rosgen (1996) stream classification system. It should be noted that the sinuosity of the brook in this reach was lower than a typical E4 channel. Typical E4 channels have sinuosity of >1.5. In this reach of the brook the sinuosity was measured to be 1.21 (242 feet of channel thread over a 200 foot valley slope). The brook appeared stable at each of these cross-section locations with no large sloughs or bank erosion noted. The cross-section at 0+75 was classified as a B4c stream type. The south bank at this cross-section location was exhibiting instability in the form of

an eroding bank face. This area of the brook may be influenced by the nearby culvert approximately 75 feet downstream.

The longitudinal profile downstream of the culvert crossing indicates a steepening of the gradient to approximately 2.9% as measured between the tops of riffles at 0+24 (24 feet downstream of the culvert outlet) and 0+102 downstream of the outlet. This portion of the brook drains into a power line right-of-way that was constructed in the past and the surrounding wetland cover type is scrub-shrub (vs. forest upstream of the culvert). This disturbance of the land by the ROW construction or the elevated location of discharge from the culvert (due to the amount of fill needed for the road) may be responsible for this increase in gradient in this segment of the stream.

The segment of stream from 0+425 to 0+150 appears to have fewer influences from anthropogenic changes, and was therefore used as the reference segment. The longitudinal profile (Attachment A) indicates the gradient of approximately 0.9 percent (2.35 feet over 275 feet) between the tops of riffles in the reference reach (from 150 feet upstream of the crossing to 425 upstream of the crossing). The scour potential based on riffle top heights and pool depths appears to be about 2.8 feet in the reference reach. See the attached profile plan for a graphical depiction of this.

Due to their distance from culvert influences, the upper most two cross-sections (CS-2 at 0+250 and CS-3 at 0+400) likely represent the most natural bankfull widths for this section of the stream system. The measured bankfull widths at these two upper most cross-sections were very comparable at 16.25 feet and 17.4 feet. The floodprone widths at both of these locations were also comparable and almost identical at 192 feet and 193 feet.

One other observation of note is the pebble counts completed with each transect show a predominance of fine gravel in the brook substrate, 100 feet upstream and beyond, of the culvert. Coarser gravel was dominant at the inlet, in the structure and downstream of it. The D50 for the area upstream of the culvert was evaluated to be 0.007 feet (Appendix B). The D50 of the material at the culvert inlet and outlet cross-sections was 0.132 feet reflecting the larger particle sizes of substrate in these locations. This may be occurring for a number of reasons. Coarser materials may be accumulating at the entry of the culvert due to the ribbed nature and undersized opening of the corrugated culvert causing friction that does not allow the natural bed transport. The force of water exiting the culvert is likely responsible for the dominance of coarser gravel at just beyond the outlet of the culvert and 100 feet downstream. Because the culvert is undersized, increased velocities of water exiting the culvert likely have a "fire hose effect" on the substrate during high flow event, washing away the finer materials.

Design Considerations

The bankfull width in the chosen reference reach, upstream of the crossing, was measured to be 16.5 feet to 17.4 feet. This indicates that the stream, in its current state, should have a bankfull width close to this size to retain its natural morphology. Several regulatory guidelines recommend that stream crossing structures be at least 1.2 times the bankfull width of the stream including the U.S. Army Corps of Engineers Draft Stream Crossing Best Management Practices dated 6/10/13.

The New Hampshire Stream Crossing Guidelines take the incorporation of morphology into crossing design a step further by providing considerations for crossing designs specific to the Rosgen Stream Type Classifications. The reference reach was found to most closely match an E type stream while data from the stream closer to the culvert (inlet, outlet and approximately 100 feet up and downstream of the crossing) match a B type stream. The New Hampshire Stream Crossing Guidelines recommend the width of the crossing to be 1.2 times the bankfull width plus 2 feet for both B and E type streams. The guidelines also offer important considerations for crossing designs, particularly for crossing in an E type stream which can be susceptible to changes into other channel types if the channel dimensions are altered. The guidelines mention the use of floodplain culverts in E type stream to alleviate floodflows. That may be a viable consideration in this setting.

References

- Rosgen, D. 1996. Applied river morphology. Wildlife Hydrology, Pagosa Springs, Colorado.
- University of New Hampshire. 2009. NH Stream Crossing Guidelines.
<http://des.nh.gov/organization/divisions/water/wetlands/documents/nh-stream-crossings.pdf>



NEW HAMPSHIRE NATURAL HERITAGE BUREAU
NHB DATACHECK RESULTS LETTER

To: Rebecca Martin, NH DOT
7 Hazen Drive
PO Box 483
Concord, NH 03302

From: NH Natural Heritage Bureau

Date: 9/3/2019 (valid for one year from this date)

Re: Review by NH Natural Heritage Bureau of request submitted 8/29/2019

NHB File ID: NHB19-2802

Applicant: Rebecca Martin

Location: Bedford
42268 Culvert under Rt 101 and Bonton Street

Project

Description: 42268: The project proposes to rehabilitate a 90" structural plate pipe under NH 101 & Boynton St. which carries Bowman Brook under Boynton St. & NH 101. The inlet is 285' Northeast of NH101 & Boynton St. intersection and outlet is located 478' Southwest. There is corrosion along the bottom of the pipe and the inlet has folded in allowing water to flow underneath the pipe. A leaking area has also caused a significant sink hole. The design team is proposing to separate the existing pipe into two sections and allow the existing saddle connection to flow directly into the newly created channel between the two inverts. The existing structural plate pipe would be lined using a corrugated metal structural plate liner. The project would also reconstruct a slope failure between Boynton St & NH 101.

The NH Natural Heritage database has been checked by staff of the NH Natural Heritage Bureau and/or the NH Nongame and Endangered Species Program for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government.

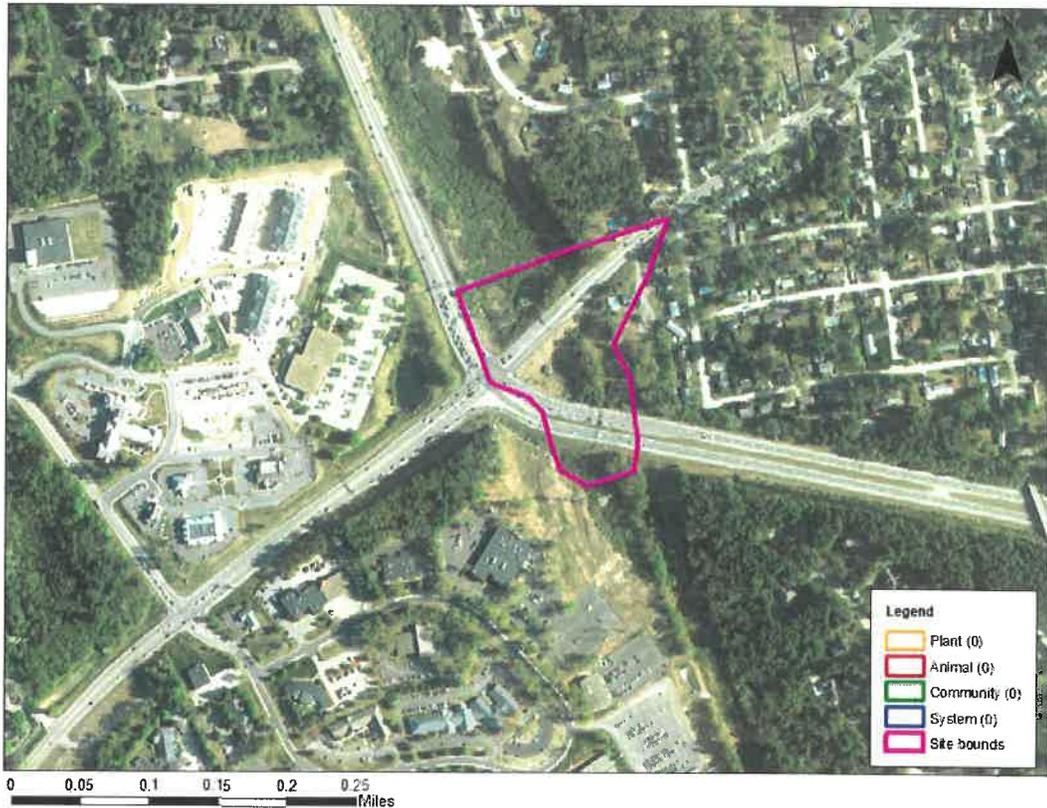
It was determined that, although there was a NHB record (e.g., rare wildlife, plant, and/or natural community) present in the vicinity, we do not expect that it will be impacted by the proposed project. This determination was made based on the project information submitted via the NHB Datacheck Tool on 8/29/2019, and cannot be used for any other project.



NEW HAMPSHIRE NATURAL HERITAGE BUREAU
NHB DATA CHECK RESULTS LETTER

MAP OF PROJECT BOUNDARIES FOR: NHB19-2802

NHB19-2802



Martin, Rebecca

From: Magee, John
Sent: Tuesday, September 3, 2019 5:21 PM
To: Martin, Rebecca
Cc: Carpenter, Matthew
Subject: RE: Bowman Brook- Bedford, NH 42268

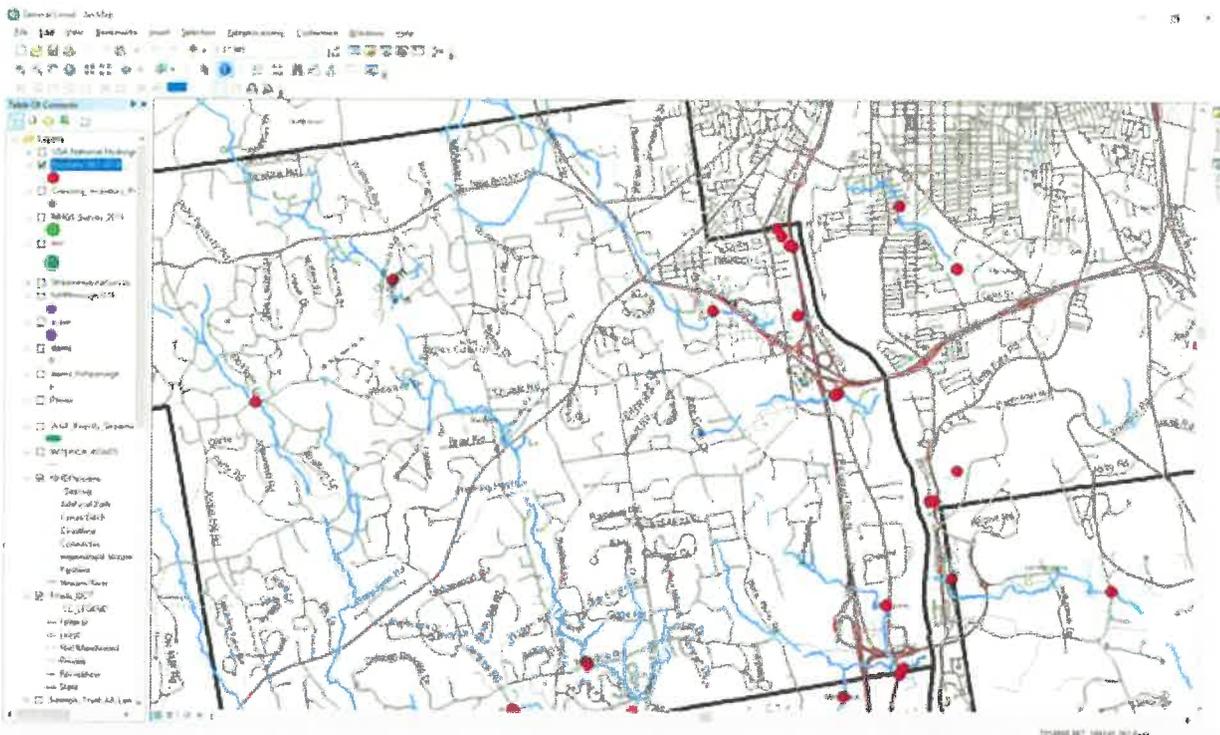
Hi. Are you saying the crossing is 285ft + 478ft?

Below is a screenshot of ArcMap. F&G has one efish site a bit downstream of the culvert in question, and it was surveyed in 2009. We caught blacknose dace, creek chub, common shiner, white sucker, wild brook trout, and slimy sculpin. At other streams nearby, we have caught the same species, which is interesting because trout and sculpin tend to be rare in that area. DES surveyed Bowman Brook a bit farther downstream in 2018, on the upstream side of Rt 293 and caught American eel, brown bullhead, blacknose dace, creek chub, common shiner, pumpkinseed sunfish, white sucker, fallfish, largemouth bass, margined madtom, smallmouth bass, striped killifish, spottail shiner, tessellated darter and yellow bullhead (indicating a more warmwater fish community near the Merrimack River than at the F&G site upstream). They also caught eleven hatchery brook trout (maybe they came from the Merrimack).

Time of year: I recommend not doing the work in Sept and Oct to minimize impacts from any brook trout that are moving around a lot to fish spawning areas.

Atlantic salmon: I have cc'd Matt Carpenter here, and he may know.

John



John Magee
President, Northeastern Division of the American Fisheries Society
Fish Habitat Biologist

New Hampshire Fish and Game Department
11 Hazen Drive, Concord, NH 03301
603-271-2744
603-271-5829

From: Martin, Rebecca <Rebecca.Martin@dot.nh.gov>
Sent: Tuesday, September 3, 2019 8:13 AM
To: Magee, John <john.magee@wildlife.nh.gov>
Subject: Bowman Brook- Bedford, NH 42268

Hello John,

I hope that your field season is going well. I am writing to ask if you might have some information about Bowman Brook in Bedford (tributary to the Merrimack). I am beginning my review of a project that proposes to impact this stream in order to rehabilitate a 90" structural plate pipe under NH 101 and Boynton St. which carries Bowman Brook. The inlet is 285' Northeast of the NH101 and Boynton St. intersection and outlet is located 478' Southwest. There is corrosion along the bottom of the pipe and the inlet has folded in allowing water to flow underneath the pipe. A leaking area has also caused a significant sink hole. The design team is proposing to separate the existing pipe into two sections and allow the existing saddle connection to flow directly into the newly created channel between the two inverts. The existing structural plate pipe would be lined using a corrugated metal structural plate liner. The project would also reconstruct a slope failure between Boynton St. and NH 101. The pipe was constructed in December of 1959 and extended in 1996.

My first question is, do you know if brook trout might come up this far in Bowman Brook? Any measure you would recommend (time of year or other) to reduce impacts to the brook trout if they do come up this far?

I was recently at a meeting at the Gloucester NOAA NMFS office to discuss two existing Programmatic Agreements between FHWA and NOAA NMFS. One of the items that we discussed was the importance of local knowledge (State fisheries biologists) with regards to where EFH species and habitat might actually be present. The Merrimack River is listed as EFH for Atlantic Salmon, but Bowman Brook is not on the list of Merrimack 'rivers and indices' that are also EFH. However, 'Smaller tributaries not shown on the map are also EFH for one or more life stage as long as they conform to the proposed habitat descriptions.' Mike Johnson indicated (see attached) that to determine if an EFH assessment is necessary we should compare the habitat in the impact area to each Atlantic Salmon life stage habitat requirements. I can certainly do that when I visit the site, but based on the conversations about local knowledge, I want to ask if you have any information about whether Bowman Brook would provide habitat suitable for Atlantic Salmon? No worries if you are not familiar.

Thank you,

Rebecca Martin
Senior Environmental Manager
NH DOT Bureau of Environment
7 Hazen Drive
Concord, NH 03302
(603)271-6781
Rebecca.Martin@dot.nh.gov



United States Department of the Interior



FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
<http://www.fws.gov/newengland>

In Reply Refer To:
Consultation Code: 05E1NE00-2019-SLI-2738
Event Code: 05E1NE00-2019-E-07136
Project Name: Bedford 42268

August 30, 2019

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office

70 Commercial Street, Suite 300

Concord, NH 03301-5094

(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2019-SLI-2738

Event Code: 05E1NE00-2019-E-07136

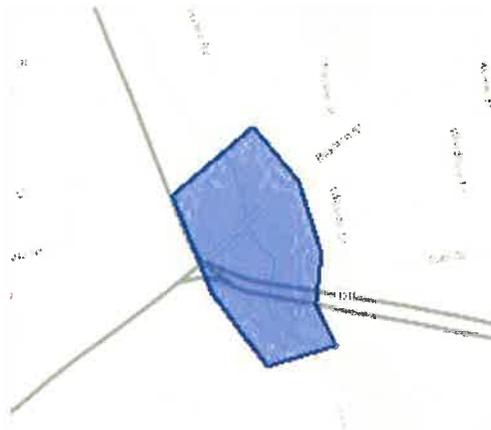
Project Name: Bedford 42268

Project Type: TRANSPORTATION

Project Description: The project proposes to rehabilitate a 90" structural plate pipe under NH 101 and Boynton St. which carries Bowman Brook. The inlet is 285' Northeast of the NH101 and Boynton St. intersection and outlet is located 478' Southwest. There is corrosion along the bottom of the pipe and the inlet has folded in allowing water to flow underneath the pipe. A leaking area has also caused a significant sink hole. The design team is proposing to separate the existing pipe into two sections and allow the existing saddle connection to flow directly into the newly created channel between the two inverts. The existing structural plate pipe would be lined using a corrugated metal structural plate liner.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/42.95990480477785N71.50071826182852W>



Counties: Hillsborough, NH

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.



United States Department of the Interior



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<http://www.fws.gov/newengland>

IPaC Record Locator: 894-20536481

February 28, 2020

Subject: Consistency letter for the 'Bedford 42268' project (TAILS 05E1NE00-2019-R-2738) under the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat.

To whom it may concern:

The U.S. Fish and Wildlife Service (Service) has received your request to verify that the **Bedford 42268** (Proposed Action) may rely on the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action is within the scope and adheres to the criteria of the PBO, including the adoption of applicable avoidance and minimization measures, and may affect, and is likely to adversely affect the endangered Indiana bat (*Myotis sodalis*) and/or the threatened Northern long-eared bat (*Myotis septentrionalis*). Consultation with the Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) is required.

This "may affect - likely to adversely affect" determination becomes effective when the lead Federal action agency or designated non-federal representative requests the Service rely on the PBO to satisfy the agency's consultation requirements for this project. Please provide this consistency letter to the lead Federal action agency or its designated non-federal representative for review, and as the agency deems appropriate, transmit to this Service Office for verification that the project is consistent with the PBO.

This Service Office will respond by letter to the requesting Federal action agency or designated non-federal representative within 30 calendar days to:

- verify that the Proposed Action is consistent with the scope of actions covered under the PBO;

- verify that all applicable avoidance, minimization, and compensation measures are included in the action proposal;
- identify any action-specific monitoring and reporting requirements, consistent with the monitoring and reporting requirements of the PBO, and
- identify anticipated incidental take.

ESA Section 7 compliance for this Proposed Action is not complete until the Federal action agency or its designated non-federal representative receives a verification letter from the Service.

For Proposed Actions that include bridge/structure removal, replacement, and/or maintenance activities: If your initial bridge/structure assessments failed to detect Indiana bats, but you later detect bats during construction, please submit the Post Assessment Discovery of Bats at Bridge/Structure Form (User Guide Appendix E) to this Service Office. In these instances, potential incidental take of Indiana bats may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency accordingly.

Project Description

The following project name and description was collected in IPaC as part of the endangered species review process.

Name

Bedford 42268

Description

The project proposes to rehabilitate a 90" structural plate pipe under NH 101 and Boynton St. which carries Bowman Brook. The inlet is 285' Northeast of the NH101 and Boynton St. intersection and outlet is located 478' Southwest. There is corrosion along the bottom of the pipe and the inlet has folded in allowing water to flow underneath the pipe. A leaking area has also caused a significant sink hole. The design team is proposing to slip line the existing 90" pipe using a corrugated metal liner that would be 84" in diameter. The erosion in the saddle area between the two roads would also be addressed.

Determination Key Result

Based on your answers provided, this project is likely to adversely affect the endangered Indiana bat and/or the threatened Northern long-eared bat. Therefore, consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required. However, also based on your answers provided, this project may rely on the conclusion and Incidental Take Statement provided in the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat.

Qualification Interview

1. Is the project within the range of the Indiana bat^[1]?

[1] See [Indiana bat species profile](#)

Automatically answered

No

2. Is the project within the range of the Northern long-eared bat^[1]?

[1] See [Northern long-eared bat species profile](#)

Automatically answered

Yes

3. Which Federal Agency is the lead for the action?

A) *Federal Highway Administration (FHWA)*

4. Are *all* project activities limited to non-construction^[1] activities only? (examples of non-construction activities include: bridge/abandoned structure assessments, surveys, planning and technical studies, property inspections, and property sales)

[1] Construction refers to activities involving ground disturbance, percussive noise, and/or lighting.

No

5. Does the project include *any* activities that are **greater than** 300 feet from existing road/rail surfaces^[1]?

[1] Road surface is defined as the actively used [e.g. motorized vehicles] driving surface and shoulders [may be pavement, gravel, etc.] and rail surface is defined as the edge of the actively used rail ballast.

No

6. Does the project include *any* activities **within** 0.5 miles of a known Indiana bat and/or NLEB hibernaculum^[1]?

[1] For the purpose of this consultation, a hibernaculum is a site, most often a cave or mine, where bats hibernate during the winter (see suitable habitat), but could also include bridges and structures if bats are found to be hibernating there during the winter.

No

7. Is the project located **within** a karst area?

No

8. Is there *any* suitable^[1] summer habitat for Indiana Bat or NLEB **within** the project action area^[2]? (includes any trees suitable for maternity, roosting, foraging, or travelling habitat)

[1] See the Service's [summer survey guidance](#) for our current definitions of suitable habitat.

[2] The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR Section 402.02). Further clarification is provided by the [national consultation FAQs](#).

Yes

9. Will the project remove *any* suitable summer habitat^[1] and/or remove/trim any existing trees **within** suitable summer habitat?

[1] See the Service's [summer survey guidance](#) for our current definitions of suitable habitat.

Yes

10. Will the project clear more than 20 acres of suitable habitat per 5-mile section of road/rail?

No

11. Have presence/probable absence (P/A) summer surveys^{[1][2]} been conducted^{[3][4]} **within** the suitable habitat located within your project action area?

[1] See the Service's [summer survey guidance](#) for our current definitions of suitable habitat.

[2] Presence/probable absence summer surveys conducted within the fall swarming/spring emergence home range of a documented Indiana bat hibernaculum (contact local Service Field Office for appropriate distance from hibernacula) that result in a negative finding requires additional consultation with the local Service Field Office to determine if clearing of forested habitat is appropriate and/or if seasonal clearing restrictions are needed to avoid and minimize potential adverse effects on fall swarming and spring emerging Indiana bats.

[3] For projects within the range of either the Indiana bat or NLEB in which suitable habitat is present, and no bat surveys have been conducted, the transportation agency will assume presence of the appropriate species. This assumption of presence should be based upon the presence of suitable habitat and the capability of bats to occupy it because of their mobility.

[4] Negative presence/probable absence survey results obtained using the [summer survey guidance](#) are valid for a minimum of two years from the completion of the survey unless new information (e.g., other nearby surveys) suggest otherwise.

No

12. Does the project include activities **within documented NLEB habitat**^{[1][2]}?

[1] Documented roosting or foraging habitat – for the purposes of this consultation, we are considering documented habitat as that where Indiana bats and/or NLEB have actually been captured and tracked using (1) radio telemetry to roosts; (2) radio telemetry biangulation/triangulation to estimate foraging areas; or (3) foraging areas with repeated use documented using acoustics. Documented roosting habitat is also considered as suitable summer habitat within 0.25 miles of documented roosts.)

[2] For the purposes of this key, we are considering documented corridors as that where Indiana bats and/or NLEB have actually been captured and tracked to using (1) radio telemetry; or (2) treed corridors located directly between documented roosting and foraging habitat.

No

13. Will the removal or trimming of habitat or trees occur **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors?

Yes

14. What time of year will the removal or trimming of habitat or trees **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors occur?

A) During the active season

15. Will *any* tree trimming or removal occur **within** 100 feet of existing road/rail surfaces?

Yes

16. Will **more than** 10 trees be removed **between** 0-100 feet of the road/rail surface *during* the active season^[1]?

[1] Areas containing more than 10 trees will be assessed by the local Service Field Office on a case-by-case basis with the project proponent.

Yes

17. Will the tree removal alter *any* **documented** Indiana bat or NLEB roosts and/or alter any surrounding summer habitat **within** 0.25 mile of a documented roost?

No

18. Will *any* tree trimming or removal occur **between** 100-300 feet of existing road/rail surfaces?

Yes

19. Are *all* trees that are being removed clearly demarcated?

Yes

20. Will the removal of habitat or the removal/trimming of trees involve the use of **temporary** lighting?

No

21. Will the removal of habitat or the removal/trimming of trees include installing new or replacing existing **permanent** lighting?

No

22. Does the project include wetland or stream protection activities associated with compensatory wetland mitigation?

No

23. Does the project include slash pile burning?

No

24. Does the project include *any* bridge removal, replacement, and/or maintenance activities (e.g., any bridge repair, retrofit, maintenance, and/or rehabilitation work)?

No

25. Does the project include the removal, replacement, and/or maintenance of *any* structure other than a bridge? (e.g., rest areas, offices, sheds, outbuildings, barns, parking garages, etc.)

No

26. Will the project involve the use of **temporary** lighting *during* the active season?

No

27. Will the project install new or replace existing **permanent** lighting?

No

28. Does the project include percussives or other activities (**not including tree removal/trimming or bridge/structure work**) that will increase noise levels above existing traffic/background levels?

Yes

29. Will the activities that use percussives (**not including tree removal/trimming or bridge/structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the active season^[1]?

[1] Coordinate with the local Service Field Office for appropriate dates.

Yes

30. Will *any* activities that use percussives (**not including tree removal/trimming or bridge/structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the inactive season^[1]?

[1] Coordinate with the local Service Field Office for appropriate dates.

Yes

31. Are *all* project activities that are **not associated with** habitat removal, tree removal/trimming, bridge and/or structure activities, temporary or permanent lighting, or use of percussives, limited to actions that DO NOT cause any additional stressors to the bat species?

Examples: lining roadways, unlighted signage, rail road crossing signals, signal lighting, and minor road repair such as asphalt fill of potholes, etc.

No

32. Will the project raise the road profile **above the tree canopy**?

No

33. Are the project activities that use percussives (not including tree removal/trimming or bridge/structure work) consistent with a Not Likely to Adversely Affect determination in this key?

Automatically answered

Yes, because the activities are within 300 feet of the existing road/rail surface, greater than 0.5 miles from a hibernacula, and conducted during the active season within undocumented habitat.

34. Are the project activities that use percussives (not including tree removal/trimming or bridge/structure work) and/or increase noise levels above existing traffic/background levels consistent with a No Effect determination in this key?

Automatically answered

Yes, because the activities are within 300 feet of the existing road/rail surface, greater than 0.5 miles from a hibernacula, and conducted during the inactive season

35. Is the habitat removal portion of this project consistent with a Likely to Adversely Affect determination in this key?

Automatically answered

Yes, because tree removal that occurs within the NLEB's active season occurs greater than 0.5 miles from the nearest hibernaculum, is less than 100 feet from the existing road/rail surface, and is not in documented NLEB roosting/foraging habitat or travel corridors, and a visual emergence survey has not been conducted.

36. Is the habitat removal portion of this project consistent with a Likely to Adversely Affect determination in this key?

Automatically answered

Yes, because tree removal that occurs within the NLEB's active season occurs greater than 0.5 miles from the nearest hibernaculum, is 100-300 feet from the existing road/rail surface and is not in documented NLEB roosting/foraging habitat or travel corridors.

37. **General AMM 1**

Will the project ensure *all* operators, employees, and contractors working in areas of known or presumed bat habitat are aware of *all* FHWA/FRA/FTA (Transportation Agencies) environmental commitments, including all applicable Avoidance and Minimization Measures?

Yes

38. Tree Removal AMM 1

Can *all* phases/aspects of the project (e.g., temporary work areas, alignments) be modified, to the extent practicable, to avoid tree removal^[1] in excess of what is required to implement the project safely?

Note: Tree Removal AMM 1 is a minimization measure, the full implementation of which may not always be practicable. Projects may still be NLAA as long as Tree Removal AMMs 2, 3, and 4 are implemented and LAA as long as Tree Removal AMMs 3, 5, 6, and 7 are implemented.

[1] The word “trees” as used in the AMMs refers to trees that are suitable habitat for each species within their range. See the USFWS’ current summer survey guidance for our latest definitions of suitable habitat.

No

39. Tree Removal AMM 3

Can tree removal be limited to that specified in project plans and ensure that contractors understand clearing limits and how they are marked in the field (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits)?

Yes

40. For Indiana bat, if applicable, compensatory mitigation measures are required to offset adverse effects on the species (see Section 2.10 of the BA). Please select the mechanism in which compensatory mitigation will be implemented:

6. Not Applicable

Project Questionnaire

1. Have you made a No Effect determination for *all* other species indicated on the FWS IPaC generated species list?

N/A

2. Have you made a May Affect determination for *any* other species on the FWS IPaC generated species list?

N/A

3. How many acres^[1] of trees are proposed for removal between 0-100 feet of the existing road/rail surface?

[1] If described as number of trees, multiply by 0.09 to convert to acreage and enter that number.

0.5

4. How many acres^[1] of trees are proposed for removal between 100-300 feet of the existing road/rail surface?

[1] If described as number of trees, multiply by 0.09 to convert to acreage and enter that number.

0.2

5. **Please verify:**

All tree removal will occur greater than 0.5 mile from any hibernaculum.

Yes, I verify that all tree removal will occur greater than 0.5 miles from any hibernaculum.

6. Is the project location 0-100 feet from the edge of existing road/rail surface?

Yes

7. Is the project location 100-300 feet from the edge of existing road/rail surface?

Yes

8. **Please verify:**

No documented NLEB roosts or surrounding summer habitat within 150 feet of documented roosts will be impacted between June 1 and July 31.

Yes, I verify that no documented NLEB roosts or surrounding summer habitat within 150 feet of documented roosts will be impacted during this period.

9. You have indicated that the following Avoidance and Minimization Measures (AMMs) will be implemented as part of the proposed project:

- *General AMM 1*
- *Tree Removal AMM 3*

Avoidance And Minimization Measures (AMMs)

This determination key result includes the commitment to implement the following Avoidance and Minimization Measures (AMMs):

GENERAL AMM 1

Ensure all operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all FHWA/FRA/FTA (Transportation Agencies) environmental commitments, including all applicable AMMs.

TREE REMOVAL AMM 3

Ensure tree removal is limited to that specified in project plans and ensure that contractors understand clearing limits and how they are marked in the field (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits).

Determination Key Description: FHWA, FRA, FTA Programmatic Consultation For Transportation Projects Affecting NLEB Or Indiana Bat

This key was last updated in IPaC on December 02, 2019. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the threatened **Northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's [February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects](#). The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.

New Hampshire Recordation of Bridges that Apply to the Program Comment for Common Post-1945 Concrete & Steel Bridges

Project Name: Bedford

State Number: 42268

FHWA Number: X-A004(797)

Form Completed by: Rebecca Martin
Email if not NHDOT staff: [Click here to enter text.](#)

Date: January 24, 2020

Culvert Outlet:



Town: Bedford

NHDOT Bridge No.

Year Built (rebuilt): Built in 1959 and extended in 1996

Owner: NHDOT

Road carrying: NH Route 101 and Boynton St.

Over feature: Bowman Brook

Bridge/culvert Type: Corrugated metal structural plate pipe

Number of Spans: NA - culvert

Length: 632 feet

Width: 90 inches

Abutment style: NA

Pier style: NA

Reviewed by:

Shirley Charles

Date Reviewed:

1/30/2020

NHDOT Cultural Resources Staff

Approved

Not Approved

Justification:

RPR Number: _____

Reviewed under PA: _____

Created March 27, 2014

Updated September 15, 2014

Rail Type	NA	Rail installation date:	NA
Designer/Engineer (if known)		Bridge Plaques or Engravings?	NA

Please refer to the *NHDOT Guidance on Using the Program Comment for Common Post-1945 Concrete and Steel Bridges*, located on the NHDOT Bureau of Environment Website, for information on using this form:

<http://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/cultural.htm>

Information on specific bridges can be found on the NHDOT Bureau of Bridge Design **Bridge Summary** Spreadsheet:

<http://www.nh.gov/dot/org/projectdevelopment/bridgedesign/documents.htm>.

(Additional photographs may be attached here if needed).

Culvert Outlet from above



New Hampshire Recordation of Bridges that Apply to the Program Comment for Common Post-1945 Concrete & Steel Bridges

Interior of culvert taken from the culvert inlet



Culvert Inlet

Reviewed by:

Sheila Charles

NHDOT Cultural Resources Staff

Date Reviewed:

1/30/2020

Approved

Not Approved

Justification:

RPR Number: _____

Reviewed under PA: _____

Created March 27, 2014

Updated September 15, 2014



Section 106 Programmatic Agreement – Cultural Resources Review Effect Finding

Appendix B Certification – Activities with Minimal Potential to Cause Effects

Railroad Improvements	
<input type="checkbox"/>	15. Modernization, maintenance, and safety improvements of railroad facilities within the existing railroad or highway right-of-way, provided no historic railroad features are impacted , including, but not limited to: Choose an item. Choose an item.
<input type="checkbox"/>	16. In-kind replacement of modern railroad features (i.e. those features that are less than 50 years old)
<input type="checkbox"/>	17. Modernization/modification of railroad/roadway crossings provided that all work is undertaken within the limits of the roadway structure (edge of roadway fill to edge of roadway fill) and no associated character defining features are impacted
Other Improvements	
<input type="checkbox"/>	18. Installation of Intelligent Transportation Systems
<input type="checkbox"/>	19. Acquisition or renewal of scenic, conservation, habitat, or other land preservation easements where no construction will occur
<input type="checkbox"/>	20. Rehabilitation or replacement of existing storm drains.
<input type="checkbox"/>	21. Maintenance of stormwater treatment features and related infrastructure

Please describe how this project is applicable under Appendix B of the Programmatic Agreement.

The project is considered to have minimal potential to cause effects because it is being designed to avoid a known archaeological resource near the project area and the majority of the project work will be completed within previously disturbed areas. The corrugated metal pipe to be addressed by the project is larger than 60 inches (90 inches in diameter) and was constructed in 1959 and extended in 1996. The pipe qualifies for the NH Recordation of Bridges that Apply to the Program Comment for Common Post-1945 Concrete & Steel Bridges and is therefore not considered historic. The project area was reviewed by NHDOT’s Cultural Resources Program Specialist, Sheila Charles, using EMMIT and other desktop resources. She concluded that EMMIT shows no historic properties or districts at or immediately adjacent to the intersection of RT 101 and Boynton Street. S. Charles did note an archaeological site near the project area and she reviewed previous archaeological investigations that overlapped with the project area. After discussing methods to ensure that the known site is protected (fencing) and reviewing the proposed impacts in previously disturbed areas, she determined that the project would not impact archaeological sites. Please see the attached Cultural Resource Review completed by Sheila Charles. This information was shared with NHDHR archaeologist David Trubey who concurred on 1/29/2020 with the review results.

Please submit this Certification Form along with the Transportation RPR, including photographs, USGS maps, design plans and as-built plans, if available, for review. Note: The RPR can be waived for in-house projects, please consult Cultural Resources Program Staff.

Coordination Efforts:

Has an RPR been submitted to NHDOT for this project?	No	NHDHR R&C # assigned?	Click here to enter text.
Please identify public outreach effort contacts; method of outreach and date:	Initial contact letters were distributed to local public officials on January 9, 2020.		

Finding: (To be filled out by NHDOT Cultural Resources Staff)

<input type="checkbox"/>	No Potential to Cause Effects	<input checked="" type="checkbox"/>	No Historic Properties Affected
This finding serves as the Section 106 Memorandum of Effect. No further coordination is necessary.			
<input type="checkbox"/>	This project does not comply with Appendix B. Review will continue under Stipulation VII of the Programmatic Agreement. Please contact NHDOT Cultural Resources Staff to determine next steps.		

Section 106 Programmatic Agreement – Cultural Resources Review Effect Finding

Appendix B Certification – Activities with Minimal Potential to Cause Effects

NHDOT comments:



NHDOT Cultural Resources Staff

1/30/2020

Date

Coordination of the Section 106 process should begin as early as possible in the planning phase of the project (undertaking) so as not to cause a delay.

Project sponsors should not predetermine a Section 106 finding under the assumption a project is limited to the activities listed in Appendix B until this form is signed by the NHDOT Bureau of Environment Cultural Resources Program staff.

Every project shall be coordinated with, and reviewed by the NHDOT-BOE Cultural Resources Program in accordance with the *Programmatic Agreement Among the Federal Highway Administration, the New Hampshire State Historic Preservation Office, the Army Corps of Engineers, New England District, the Advisory Council on Historic Preservation, and the New Hampshire Department of Transportation Regarding the Federal Aid Highway Program in New Hampshire*. In accordance with the Advisory Council's regulations, we will continue to consult, as appropriate, as this project proceeds.

If any portion of the project is not entirely limited to any one or a combination of the activities specified in Appendix B (with, or without the inclusion of any activities listed in Appendix A), please continue discussions with NHDOT Cultural Resources staff.

This No Potential to Cause Effect or No Historic Properties Affected project determination is your Section 106 finding, as defined in the Programmatic Agreement.

Should project plans change, please inform the NHDOT Cultural Resources staff in accordance with Stipulation VII of the Programmatic Agreement.



**US Army Corps
of Engineers**®
New England District

**New Hampshire General Permits (GPs)
Appendix B - Corps Secondary Impacts Checklist
(for inland wetland/waterway fill projects in New Hampshire)**

1. Attach any explanations to this checklist. Lack of information could delay a Corps permit determination.
2. All references to “work” include all work associated with the project construction and operation. Work includes filling, clearing, flooding, draining, excavation, dozing, stumping, etc.
3. See GC 5, regarding single and complete projects.
4. Contact the Corps at (978) 318-8832 with any questions.

1. Impaired Waters	Yes	No
1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water? See http://des.nh.gov/organization/divisions/water/wmb/section401/impaired_waters.htm to determine if there is an impaired water in the vicinity of your work area.*		X
2. Wetlands	Yes	No
2.1 Are there are streams, brooks, rivers, ponds, or lakes within 200 feet of any proposed work?	X	
2.2 Are there proposed impacts to SAS, special wetlands. Applicants may obtain information from the NH Department of Resources and Economic Development Natural Heritage Bureau (NHB) DataCheck Tool for information about resources located on the property at https://www2.des.state.nh.us/nhb_datacheck/ . The book Natural Community Systems of New Hampshire also contains specific information about the natural communities found in NH.		X
2.3 If wetland crossings are proposed, are they adequately designed to maintain hydrology, sediment transport & wildlife passage? <small>Rehabilitating an existing structure</small>	X	
2.4 Would the project remove part or all of a riparian buffer? (Riparian buffers are lands adjacent to streams where vegetation is strongly influenced by the presence of water. They are often thin lines of vegetation containing native grasses, flowers, shrubs and/or trees that line the stream banks. They are also called vegetated buffer zones.)	X	
2.5 The overall project site is more than 40 acres?		X
2.6 What is the area of the previously filled wetlands?	5 Acres	
2.7 What is the area of the proposed fill in wetlands?	0.046 Acres	
2.8 What is the % of previously and proposed fill in wetlands to the overall project site?	45%	
3. Wildlife	Yes	No
3.1 Has the NHB & USFWS determined that there are known occurrences of rare species, exemplary natural communities, Federal and State threatened and endangered species and habitat, in the vicinity of the proposed project? (All projects require an NHB ID number & a USFWS IPAC determination.) NHB DataCheck Tool: https://www2.des.state.nh.us/nhb_datacheck/ USFWS IPAC website: https://ecos.fws.gov/ipac/location/index <small>Possible presence of NLEB</small>	X	

3.2 Would work occur in any area identified as either “Highest Ranked Habitat in N.H.” or “Highest Ranked Habitat in Ecological Region”? (These areas are colored magenta and green, respectively, on NH Fish and Game’s map, “2010 Highest Ranked Wildlife Habitat by Ecological Condition.”) Map information can be found at: <ul style="list-style-type: none"> • PDF: www.wildlife.state.nh.us/Wildlife/Wildlife_Plan/highest_ranking_habitat.htm. • Data Mapper: www.granit.unh.edu. • GIS: www.granit.unh.edu/data/downloadfreedata/category/databycategory.html. 		X
3.3 Would the project impact more than 20 acres of an undeveloped land block (upland, wetland/waterway) on the entire project site and/or on an adjoining property(s)?		X
3.4 Does the project propose more than a 10-lot residential subdivision, or a commercial or industrial development?		X
3.5 Are stream crossings designed in accordance with the GC 21?	X	
4. Flooding/Floodplain Values	Yes	No
4.1 Is the proposed project within the 100-year floodplain of an adjacent river or stream?	X	
4.2 If 4.1 is yes, will compensatory flood storage be provided if the project results in a loss of flood storage? N/A: No loss of flood storage anticipated		
5. Historic/Archaeological Resources		
For a minimum, minor or major impact project - a copy of the Request for Project Review (RPR) Form (www.nh.gov/nhdhr/review) with your DES file number shall be sent to the NH Division of Historical Resources as required on Page 11 GC 8(d) of the GP document**	X	

*Although this checklist utilizes state information, its submittal to the Corps is a Federal requirement.

** If your project is not within Federal jurisdiction, coordination with NH DHR is not required under Federal law.

Supplemental information:

2.4 - Tree clearing of about 1,300 sf will be required for access to the culvert outlet. Isolated small trees and brush will be removed in other areas. Vegetation will be allowed to re-establish naturally.

2.5 - The area of previously filled wetlands is unknown. The estimate provided represents the area of the base of roadway embankments within the project site area and potential wetland areas.

2.8 - The area of the "project site" is estimated at 11.2 acres, based on the area within the existing right of way and easements and within the project limits.

4.1 - No changes to topography are proposed within the 100 year floodplain. The proposed culvert rehabilitation will not increase 100 year flood elevations.



Photo from NHSADES database

Culvert inlet side, looking upstream
Wetland #1 (channel), Wetland #2 (over bank areas)
Impact Areas A, B, C



By NHDOT Bureau of Environment 2/5/2020

Culvert inlet side, looking upstream
Wetland #1 (channel), Wetland #2 (floodplain)
No impacts in the photo area



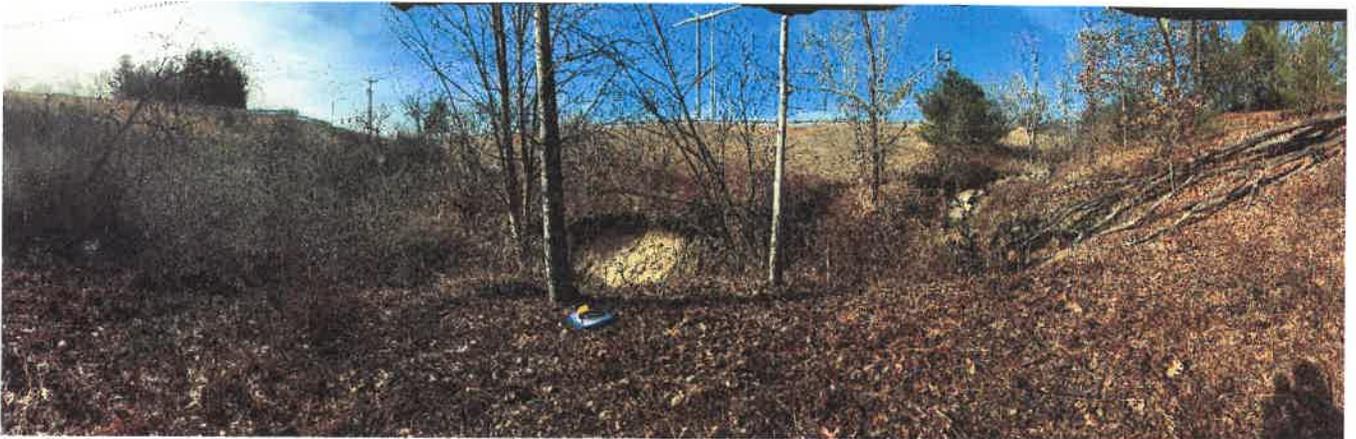
By NHDOT Bureau of Highway Design 5/24/2018

Culvert inlet
Wetland #1 (channel), Wetland #2 (left & right of channel)
Impact Areas A, B, C



By NHDOT Bureau of Highway Design 5/24/2018

Inside culvert, inlet side, looking downstream
Illustrates poor condition, holes in lower sides, rust and efflorescence
extending above half the diameter



By NHDOT Bureau of Environment 2/5/2020

Middle area, looking northwest toward Boynton St
Wetland #3 (foreground), eroded area (center)
Impact Areas D, E



By NHDOT Bureau of Environment 2/5/2020

Middle area, looking southeast, NH 101 on right at top of slope
Wetland #3 (center)
Approx limit of temporary impact (Area E) just below bottom of photo
No impact to area in photo



By NHDOT Bureau of Environment 2/5/2020

Riprap channel from Boynton St pipe outlet, looking southwest
Wetland #3 (at bottom of slopes), NH101 in background
Impact Areas D, E



By NHDOT Bureau of Environment 2/5/2020

Middle area, failed pipe connection to 90" culvert
Standing at edge of Wetland #3 looking south west
No impacts in photo area



By NHDOT Bureau of Highway Design 5/24/2018
Culvert outlet
Wetland #4 (channel), Wetland #6 (bank on right)
Impact Areas H, I



By NHDOT Bureau of Environment 9/3/2019
Culvert outlet, showing large riprap used in 1996 construction



By NHDOT Bureau of Highway Design 5/24/2018

Culvert outlet, looking west
Wetland #7 (above and behind stone around culvert)
Impact Area F



Photo from NHSADES database

Looking downstream from culvert outlet
Existing riprap covered by sediment and vegetation
Wetland #4 (channel), Wetland #5 (bank on right)
Impact Areas H, G

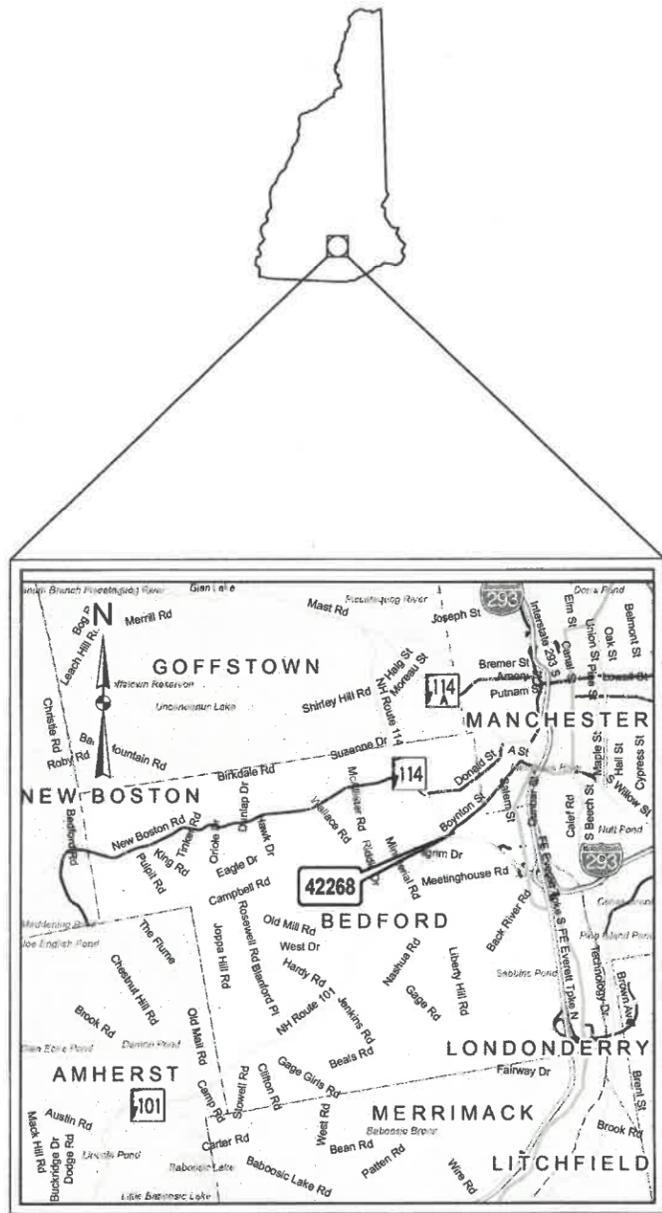
Bedford 42268**CONSTRUCTION SEQUENCE**

1. Perform necessary clearing operations for access and staging.
2. Install perimeter sediment controls and install necessary temporary erosion controls as specified on the strategies sheet. Include all staging areas. Set up dewatering basin.
3. Place temporary protection such as mats or stone over geotextile where access roads cross wetlands.
4. Install water diversion at inlet and other sedimentation controls/BMP's as needed
5. Clean water bypass shall be through a temporary pipe or pump discharge hose routed through the existing pipe unless otherwise approved as part of the Contractor's SWPPP.
6. Clean and inspect existing pipe.
7. Fill voids outside of pipe and areas of missing invert with grout.
8. Install liner pipe, beginning on outlet side and proceeding upstream. End liner approximately 12' from inlet end.
9. Install new 24" saddle connection to the culvert in the area between Boynton St and NH 101.
10. Grout annular space between liner and existing pipe.
11. Reset existing stone at culvert outlet to match new liner invert.
12. Install cofferdam around inlet.
13. Remove approximately 12 LF of existing pipe at inlet end.
14. Excavate and dewater proposed inlet headwall foundation area.
15. Install inlet headwall and wing walls.
16. Place stone fill and streambed material on top of stone at inlet such that streambed matches the new liner invert.
17. Remove cofferdam, remove water diversion, and re-establish flow through culvert.
18. Place humus, seed, mulch, and temporary slope matting on the slope around the new inlet headwall.
19. Place fill to re-establish the previously existing elevation of the forested wetland within the eroded areas between Boynton St and NH 101.
20. Replace the 18" drainage culvert connection with a 24" cmp. Reset small stone apron and construct stone channel in the area between Boynton St and NH 101.
21. Place humus, seed, and mulch (and temporary slope matting, where necessary) on newly graded areas between Boynton St and NH 101.
22. Remove temporary access roads, repair or replace any slope drains that were damaged or altered by the access roads.
23. Stabilize any remaining disturbed areas.
24. Remove erosion control measures

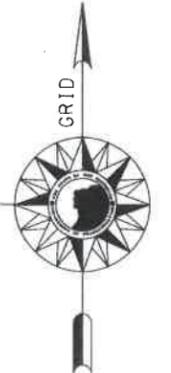
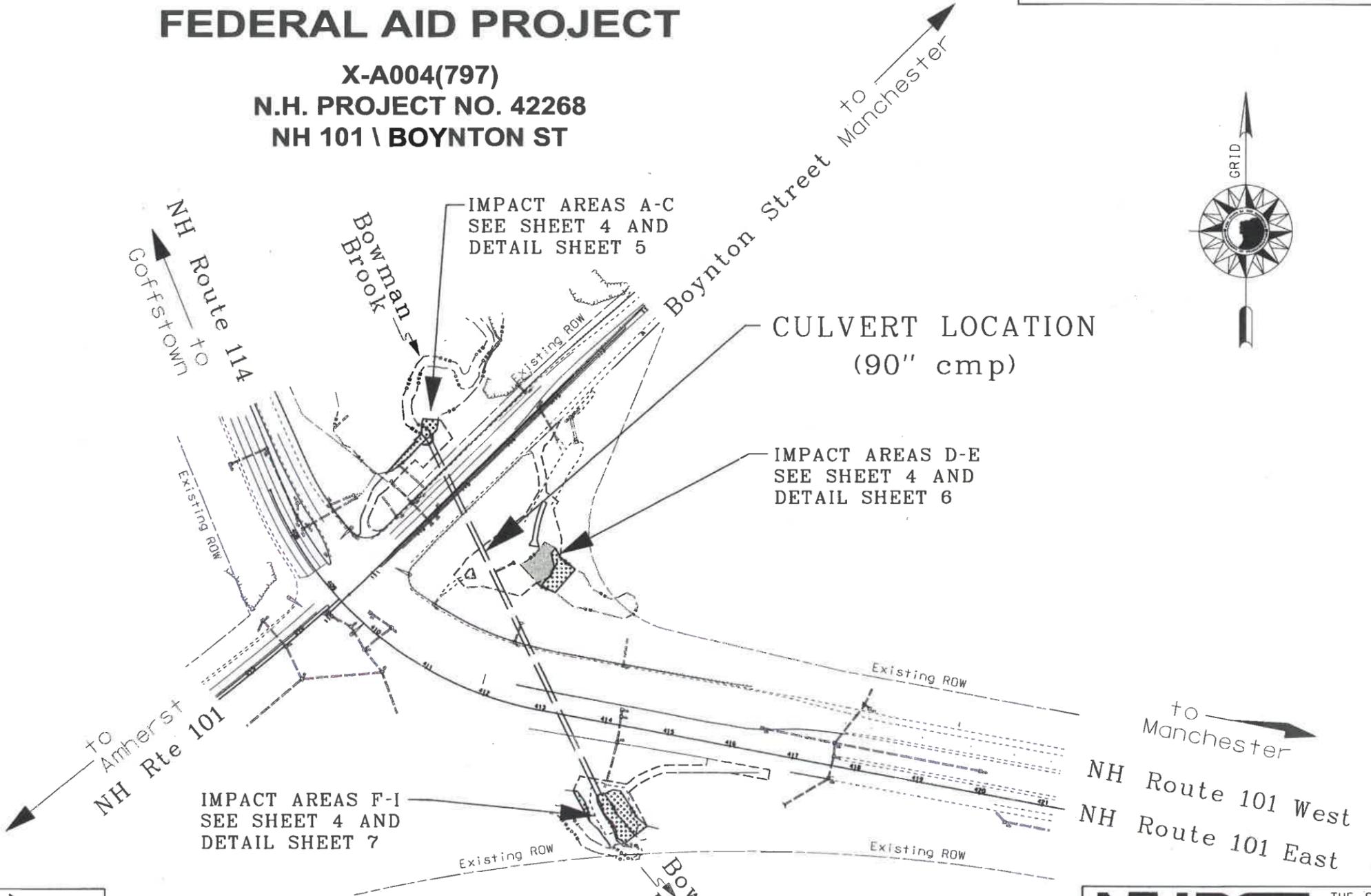
STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
WETLANDS PLANS
FEDERAL AID PROJECT

X-A004(797)
N.H. PROJECT NO. 42268
NH 101 \ BOYNTON ST

DESIGN DATA			
AVERAGE DAILY TRAFFIC NH 101	2019	36,712	
AVERAGE DAILY TRAFFIC BOYNTON ST	2019	10,216	
PERCENT OF TRUCKS		7%	
DESIGN SPEED		35 MPH	
LENGTH OF PROJECT		632' (culvert)	



1 1/2 0 1 2 Miles
LOCATION MAP



DRAWN BY J-JN
CHECKED BY CAC
DATE 2/20
DATE 5/8/20

INDEX OF SHEETS

1	FRONT SHEET
2-3	STANDARD SYMBOLS SHEETS
4	WETLAND IMPACT PLAN
5-7	WETLAND IMPACT DETAILS
8-9	DRAINAGE DETAILS
10	EROSION CONTROL STRATEGIES
11	EROSION CONTROL PLAN

Wetland Delineation per ENV-Wt 406 by:
NHDOT (Sarah Large, Andrew O'Sullivan) 9/30/2019
NHDOT (Sarah Large, Deidra Benjamin) 2/5/2020

Per Wetland Plans Rule(s)
Env-Wt 311.05

Plans Prepared by:
Christopher Carucci, PE



DATE May 8, 2020

TOWN OF BEDFORD
COUNTY OF MERRIMACK

SCALE: 1" = 100'

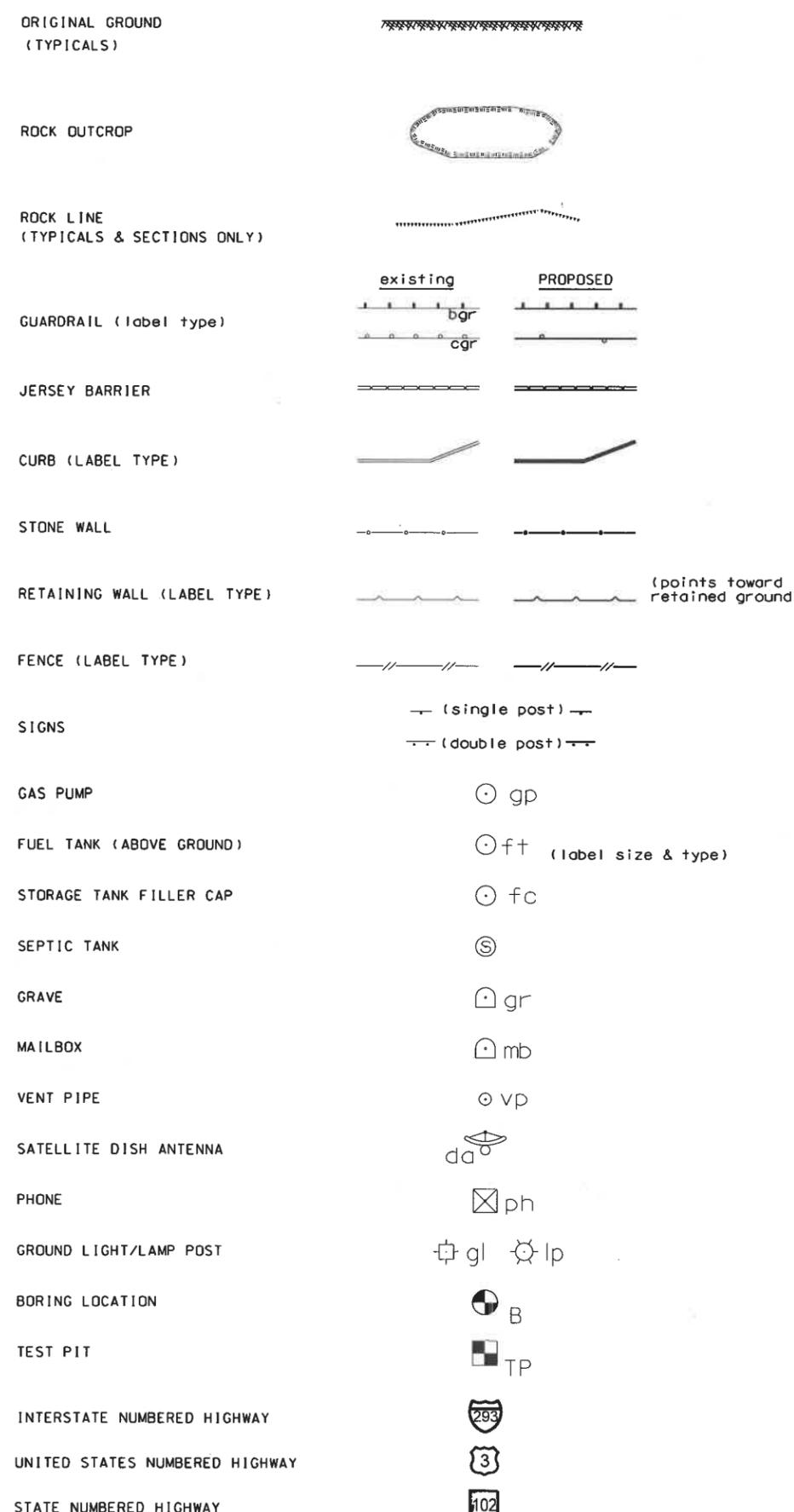
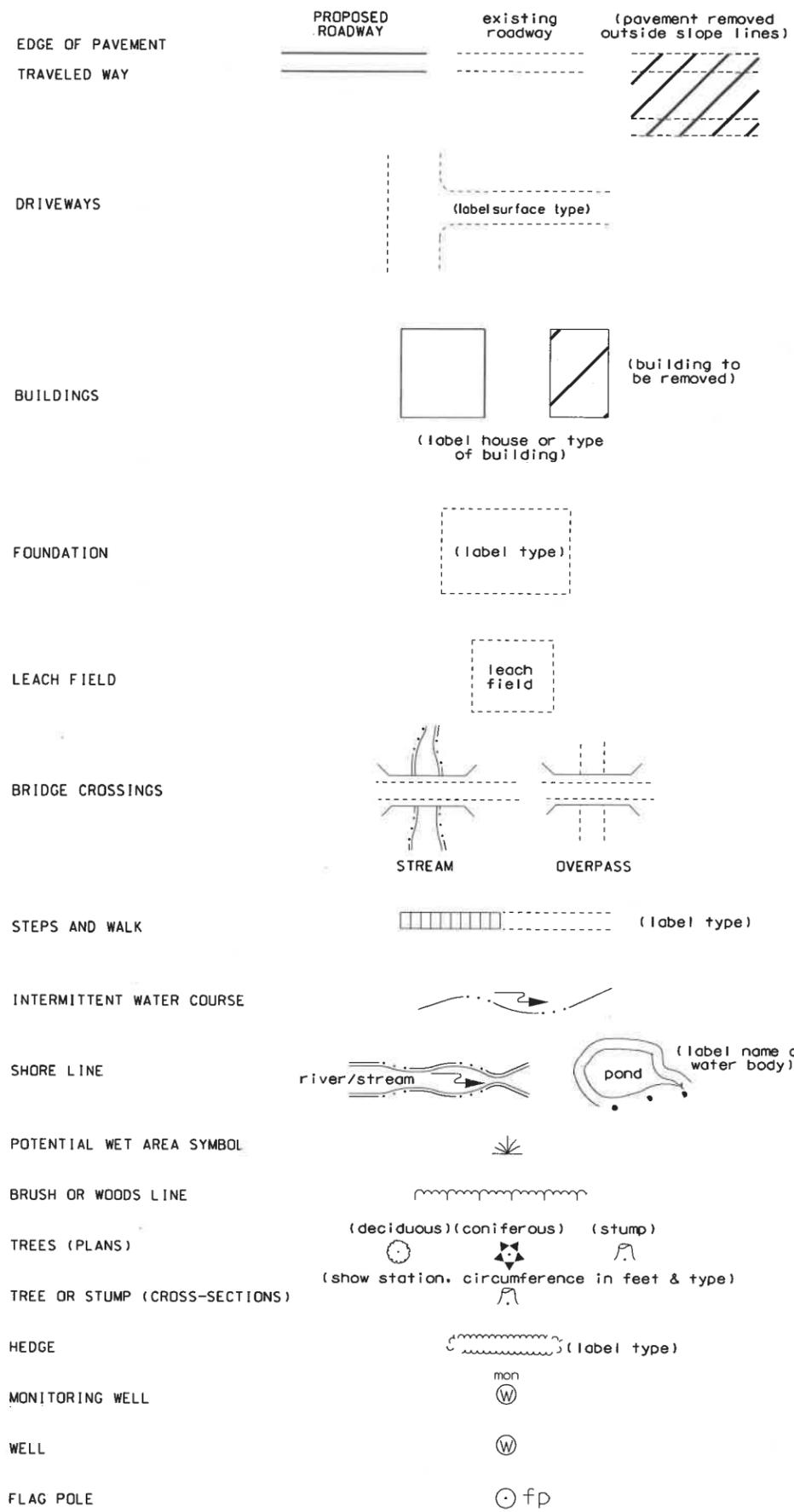
FOR CONSTRUCTION AND ALIGNMENT DETAILS - SEE CONSTRUCTION PLANS



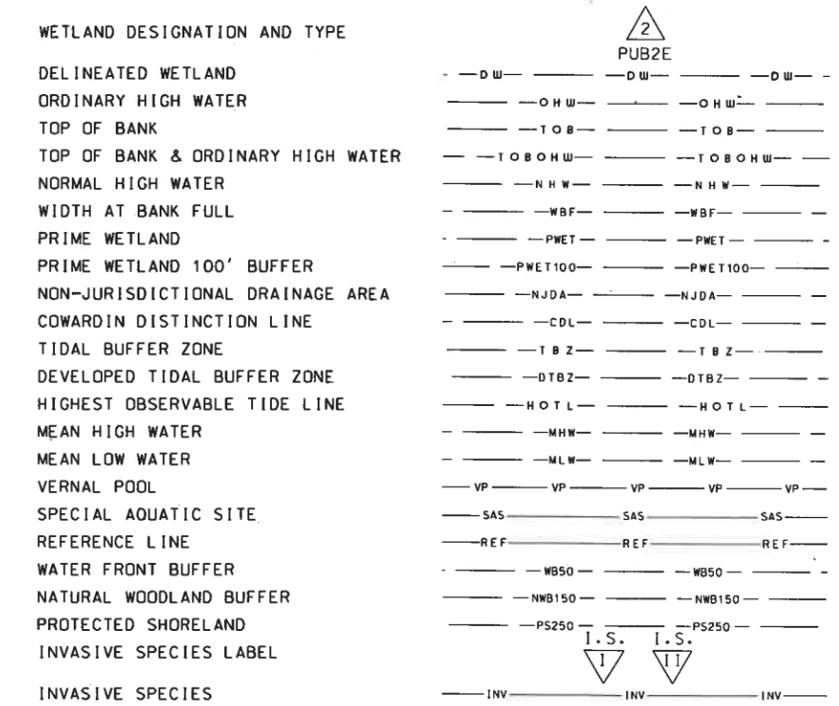
NH Route 101 / Boynton
Culvert Rehabilitation
Wetland Impact Plans

DRAWING NAME	FEDERAL PROJECT NO.	STATE PROJECT NO.	SHEET NO.	TOTAL
42268fsw	X-A004(797)	42268	1	

GENERAL



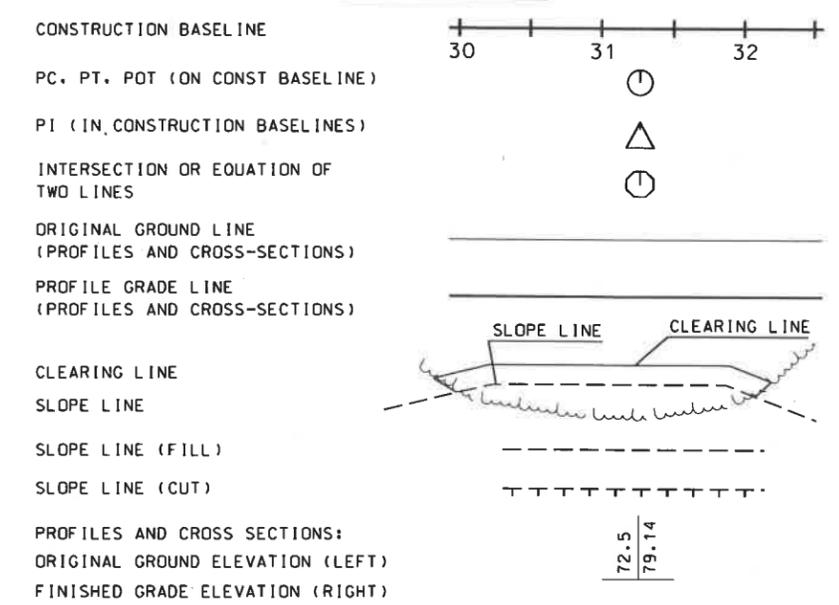
SHORELAND - WETLAND



FLOODPLAIN / FLOODWAY



ENGINEERING



STATE OF NEW HAMPSHIRE BEDFORD				
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN				
STANDARD SYMBOLS				
REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
11-21-2014	std symb	42268	2	11

DRAINAGE

MANHOLE		(existing)		(PROPOSED)
CATCH BASIN		(existing)		(PROPOSED)
DROP INLET		(existing)		(PROPOSED)
DRAINAGE PIPE (existing)				
DRAINAGE PIPE (PROPOSED)				
UNDERDRAIN (existing) W/ FLUSHING BASIN		(existing)		(PROPOSED)
UNDERDRAIN (PROPOSED) W/ FLUSHING BASIN				
HEADER (existing & PROPOSED)				
END SECTION (existing & PROPOSED)				
OPEN DITCH (PROPOSED)				
EROSION CONTROL/ STONE SLOPE PROTECTION				

BOUNDARIES / RIGHT-OF-WAY

RIGHT-OF-WAY LINE		(label type)
RR RIGHT-OF-WAY LINE		
PROPERTY LINE		
PROPERTY LINE (COMMON OWNER)		
TOWN LINE		
COUNTY LINE		
STATE LINE		
NATIONAL FOREST		
CONSERVATION LAND		
BENCH MARK / SURVEY DISK		
BOUND		(PROPOSED)
STATE LINE/TOWN LINE MONUMENT		
NHDOT PROJECT MARKER		
IRON PIPE OR PIN		
DRILL HOLE IN ROCK		
TAX MAP AND LOT NUMBER		
PROPERTY PARCEL NUMBER		
HISTORIC PROPERTY		

UTILITIES

TELEPHONE POLE		existing		PROPOSED
POWER POLE		existing		PROPOSED
JOINT OCCUPANCY		existing		PROPOSED
MISCELLANEOUS/UNKNOWN POLE		existing		PROPOSED
GUY POLE OR PUSH BRACE		existing		PROPOSED
LIGHT POLE		existing		PROPOSED
LIGHT ON POWER POLE		existing		PROPOSED
LIGHT ON JOINT POLE		existing		PROPOSED
POLE STATUS: REMOVE, LEAVE, PROPOSED, OR TEMPORARY AS APPLICABLE e.g.:				
RAILROAD		existing		PROPOSED
RAILROAD SIGN		existing		PROPOSED
RAILROAD SIGNAL		existing		PROPOSED
UTILITY JUNCTION BOX		existing		PROPOSED
OVERHEAD WIRE		existing		PROPOSED
UNDERGROUND UTILITIES				
WATER (on existing lines label size, type and note if abandoned)		existing		PROPOSED
SEWER		existing		PROPOSED
TELEPHONE		existing		PROPOSED
ELECTRIC		existing		PROPOSED
GAS		existing		PROPOSED
LIGHTING		existing		PROPOSED
INTELLIGENT TRANSPORTATION SYSTEM		existing		PROPOSED
FIBER OPTIC		existing		PROPOSED
WATER SHUT OFF		existing		PROPOSED
GAS SHUT OFF		existing		PROPOSED
HYDRANT		existing		PROPOSED
MANHOLES				
SEWER		existing		PROPOSED
TELEPHONE		existing		PROPOSED
ELECTRICAL		existing		PROPOSED
GAS		existing		PROPOSED
UNKNOWN		existing		PROPOSED

TRAFFIC SIGNALS / ITS

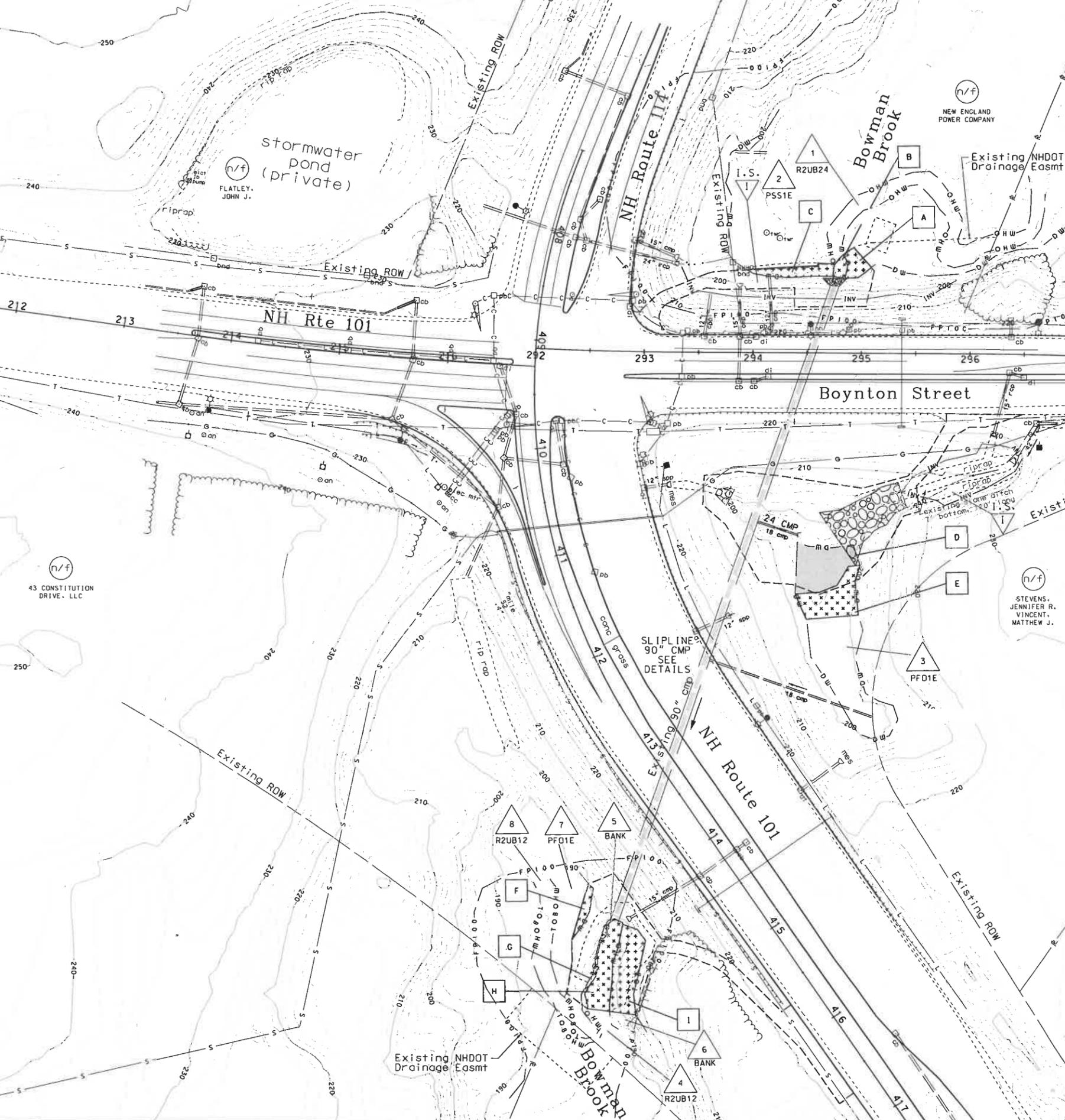
MAST ARM (existing)		existing		PROPOSED
OPTICOM RECEIVER		existing		PROPOSED
OPTICOM STROBE		existing		PROPOSED
TRAFFIC SIGNAL		existing		PROPOSED
PEDESTAL WITH PEDESTRIAN SIGNAL HEADS AND PUSH BUTTON UNIT		existing		PROPOSED
SIGNAL CONDUIT		existing		PROPOSED
CONTROLLER CABINET		existing		PROPOSED
METER PEDESTAL		existing		PROPOSED
PULL BOX		existing		PROPOSED
LOOP DETECTOR (QUADRUPOLE)		existing		PROPOSED
LOOP DETECTOR (RECTANGULAR)		existing		PROPOSED
CAMERA POLE (CCTV)		existing		PROPOSED
FIBER OPTIC DELINEATOR		existing		PROPOSED
FIBER OPTIC SPLICE VAULT		existing		PROPOSED
ITS EQUIPMENT CABINET		existing		PROPOSED
VARIABLE SPEED LIMIT SIGN		existing		PROPOSED
DYNAMIC MESSAGE SIGN		existing		PROPOSED
ROAD AND WEATHER INFO SYSTEM		existing		PROPOSED

CONSTRUCTION NOTES

CURB MARK NUMBER - BITUMINOUS	B-1
CURB MARK NUMBER - GRANITE	G-1
CLEARING AND GRUBBING AREA	
DRAINAGE NOTE	
EROSION CONTROL NOTE	
FENCING NOTE	
GUARDRAIL NOTE	
ITS NOTE	
LIGHTING NOTE	
TRAFFIC SIGNAL NOTE	

STATE OF NEW HAMPSHIRE BEDFORD				
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN				
STANDARD SYMBOLS				
REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
9-1-2016	std symb	42268	3	11

SDR PROCESSED	DATE	DATE	DATE	DATE
NEW DESIGN	JUN	2/2020		
SHEET CHECKED	CAC	DATE	5/8/20	
AS BUILT DETAILS				



WETLAND IMPACT SUMMARY														
WETLAND NUMBER	WETLAND CLASSIFICATION	LOCATION	AREA IMPACTS						LINEAR STREAM IMPACTS FOR MITIGATION					
			PERMANENT				TEMPORARY		PERMANENT					
			N.H.W.B. (NON-WETLAND)		N.H.W.B. & A.C.O.E. (WETLAND)		SF	LF	BANK LEFT LF	BANK RIGHT LF	CHANNEL LF			
2	PSS1E	A						437						
1	R2UB24	B						205	21			0	0	0
2	PSS1E	C						679						
3	PFD1E	D								2003				
3	PFD1E	E								1592				
7	PFD1E	F								302				
5	BANK	G								241	88	0	0	0
4	R2UB12	H								1428	86	0	0	0
6	BANK	I								1803	80	0	0	0
TOTAL										2,003	6,687	275		

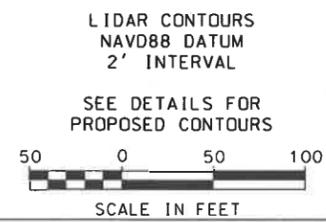
PERMANENT IMPACTS: 2,003 SF
 TEMPORARY IMPACTS: 6,687 SF
 TOTAL IMPACTS: 8,690 SF



LEGEND

TYPE OF WETLAND IMPACT	SHADING/HATCHING	#	WETLAND DESIGNATION NUMBER
NEW HAMPSHIRE WETLANDS BUREAU (PERMANENT NON-WETLAND)	[Diagonal Hatching]	#	WETLAND IMPACT LOCATION
NEW HAMPSHIRE WETLANDS BUREAU & ARMY CORP OF ENGINEERS (PERMANENT WETLAND)	[Solid Grey]	#	WETLAND MITIGATION AREA
TEMPORARY IMPACTS	[Dotted Pattern]	[Diagonal Hatching]	MITIGATION

WETLAND CLASSIFICATION CODES	
R2UB12	RIVERINE, LOWER PERENNIAL, UNCONSOLIDATED BOTTOM, COBBLE-GRAVEL, SAND
R2UB24	RIVERINE, LOWER PERENNIAL, UNCONSOLIDATED BOTTOM, SAND, ORGANIC
PFD1E	PALUSTRINE, FORESTED, BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED
PSS1E	PALUSTRINE, SHRUB SCRUB, BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED
BANK	BANK

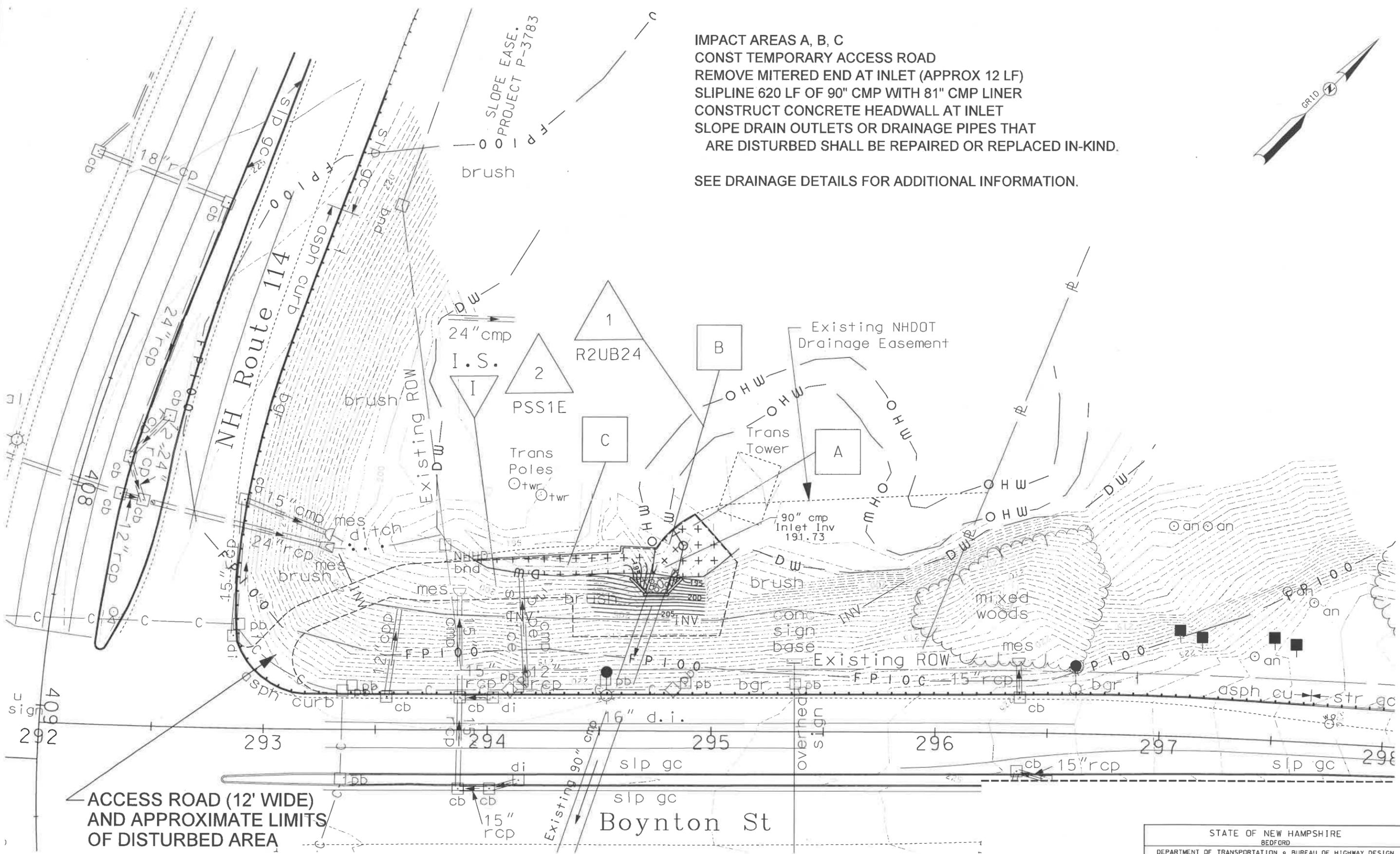


STATE OF NEW HAMPSHIRE BEDFORD			
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN			
WETLAND IMPACT PLAN			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42268wetplans	42268	4	11

SDR PROCESSED	DATE	DATE	DATE	DATE	DATE	DATE	DATE
NEW DESIGN	JUN	2/2020					
SHEET CHECKED	CAJ	5/8/2020					
AS BUILT DETAILS							

REVISIONS AFTER PROPOSAL	STATION	STATION	STATION	STATION	STATION	STATION	DESCRIPTION

IMPACT AREAS A, B, C
 CONST TEMPORARY ACCESS ROAD
 REMOVE MITERED END AT INLET (APPROX 12 LF)
 SLIPLINE 620 LF OF 90" CMP WITH 81" CMP LINER
 CONSTRUCT CONCRETE HEADWALL AT INLET
 SLOPE DRAIN OUTLETS OR DRAINAGE PIPES THAT
 ARE DISTURBED SHALL BE REPAIRED OR REPLACED IN-KIND.
 SEE DRAINAGE DETAILS FOR ADDITIONAL INFORMATION.

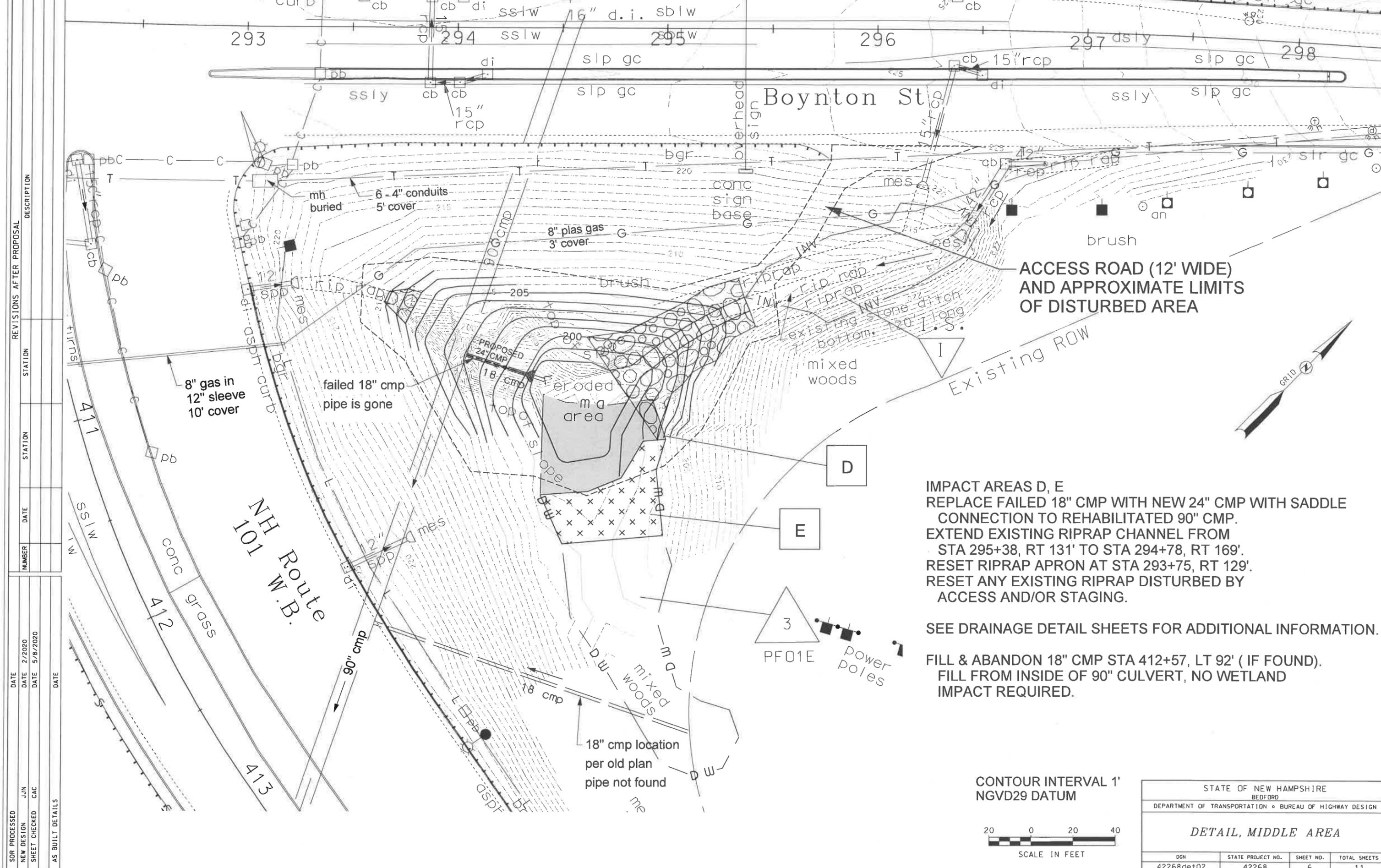


ACCESS ROAD (12' WIDE)
 AND APPROXIMATE LIMITS
 OF DISTURBED AREA

CONTOUR INTERVAL 1'
 NGVD29 DATUM



STATE OF NEW HAMPSHIRE BEDFORD			
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN			
DETAIL, INLET AREA			
DCN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42268det01	42268	5	11



ACCESS ROAD (12' WIDE) AND APPROXIMATE LIMITS OF DISTURBED AREA

IMPACT AREAS D, E
 REPLACE FAILED 18" CMP WITH NEW 24" CMP WITH SADDLE CONNECTION TO REHABILITATED 90" CMP.
 EXTEND EXISTING RIPRAP CHANNEL FROM STA 295+38, RT 131' TO STA 294+78, RT 169'.
 RESET RIPRAP APRON AT STA 293+75, RT 129'.
 RESET ANY EXISTING RIPRAP DISTURBED BY ACCESS AND/OR STAGING.

SEE DRAINAGE DETAIL SHEETS FOR ADDITIONAL INFORMATION.

FILL & ABANDON 18" CMP STA 412+57, LT 92' (IF FOUND).
 FILL FROM INSIDE OF 90" CULVERT, NO WETLAND IMPACT REQUIRED.

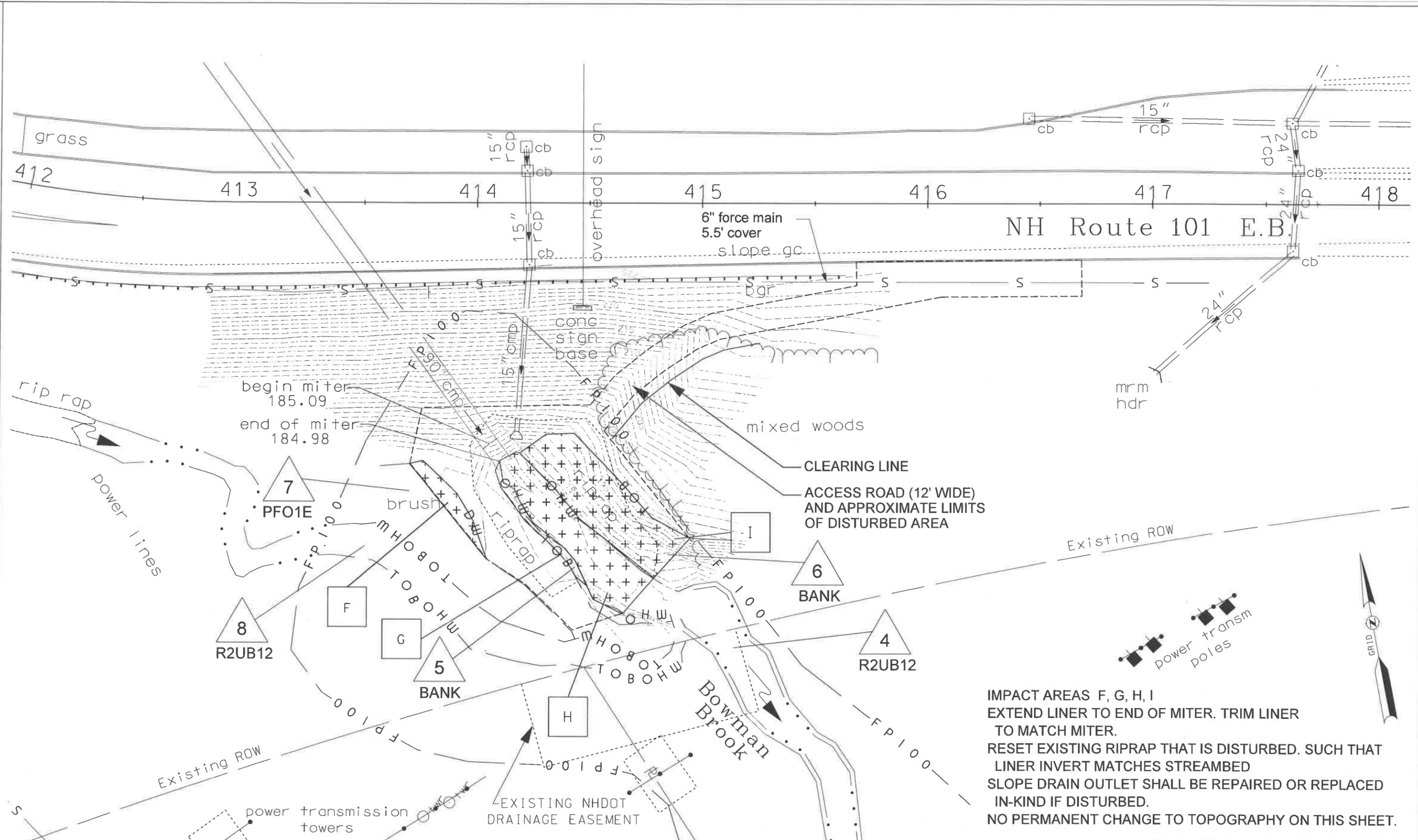
CONTOUR INTERVAL 1'
 NGVD29 DATUM



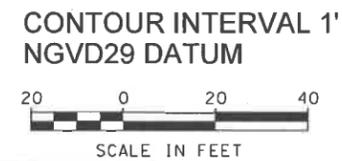
STATE OF NEW HAMPSHIRE BEDFORD			
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN			
DETAIL, MIDDLE AREA			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42268det02	42268	6	11

SDR PROCESSED	DATE	DATE	DATE	DATE
	NEW DESIGN	JUN	2/2020	
AS BUILT DETAILS	SHEET CHECKED	CAC	DATE	5/8/2020
	STATION			
DESCRIPTION				

SDR PROCESSED	DATE	DATE	DATE	DATE
NEW DESIGN	JUN	2/2020	5/8/2020	
SHEET CHECKED	CAC			
AS BUILT DETAILS				



IMPACT AREAS F, G, H, I
 EXTEND LINER TO END OF MITER. TRIM LINER
 TO MATCH MITER.
 RESET EXISTING RIPRAP THAT IS DISTURBED. SUCH THAT
 LINER INVERT MATCHES STREAMBED
 SLOPE DRAIN OUTLET SHALL BE REPAIRED OR REPLACED
 IN-KIND IF DISTURBED.
 NO PERMANENT CHANGE TO TOPOGRAPHY ON THIS SHEET.



STATE OF NEW HAMPSHIRE BEDFORD			
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN			
DETAIL, OUTLET AREA			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42268de+03	42268	7	11

REVISIONS AFTER PROPOSAL

STATION

STATION

DATE

NUMBER

DATE

DATE

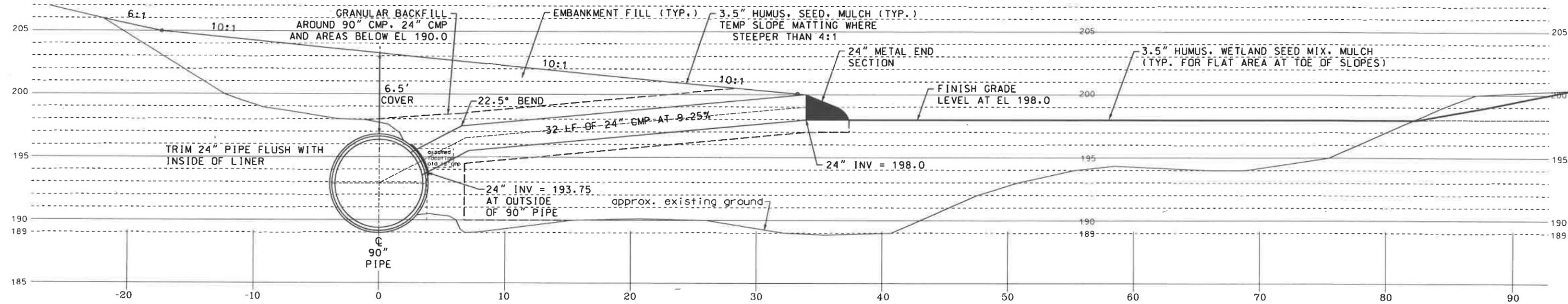
DATE

SDR PROCESSED

NEW DESIGN

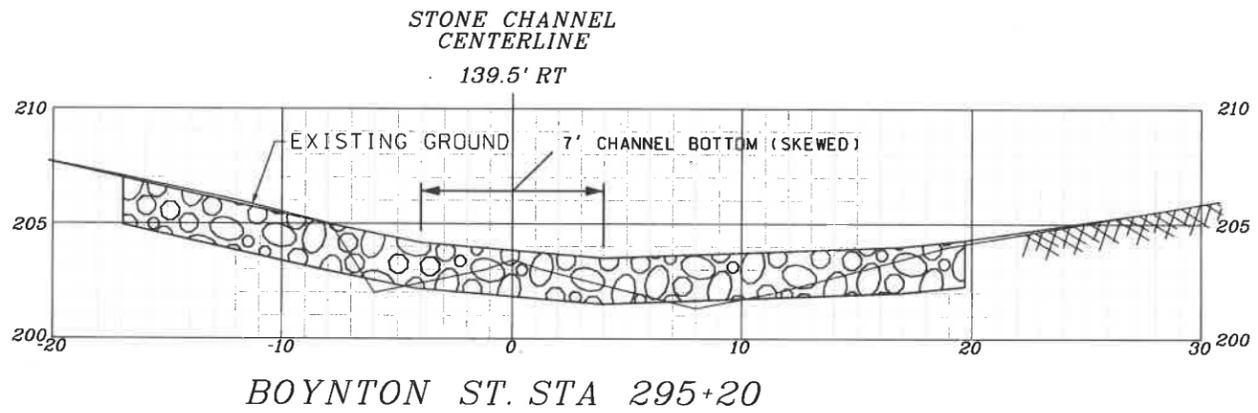
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AS BUILT DETAILS

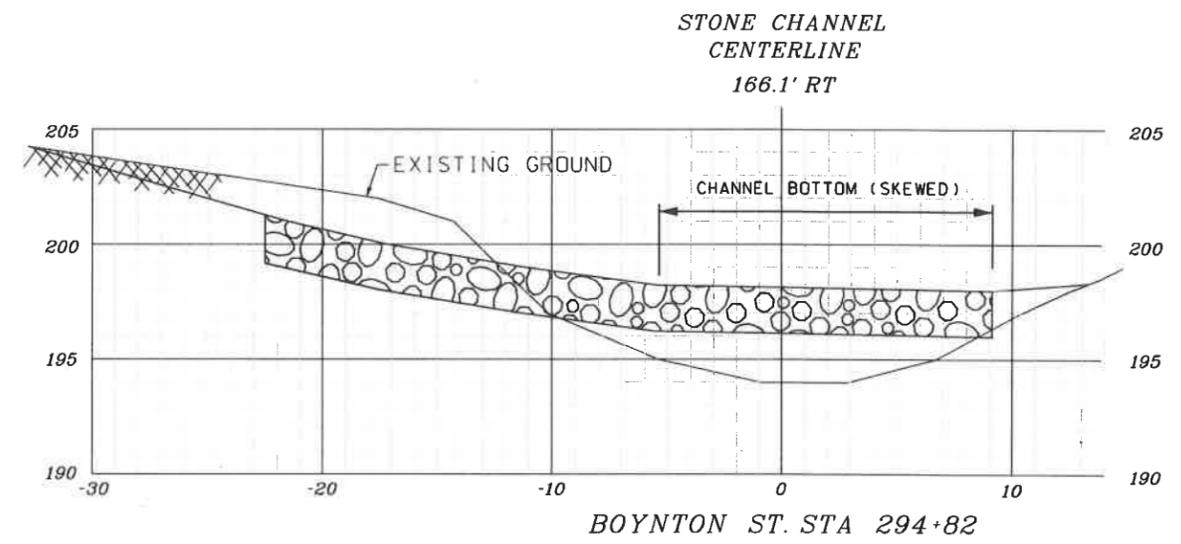


SADDLE CONNECTION DETAIL

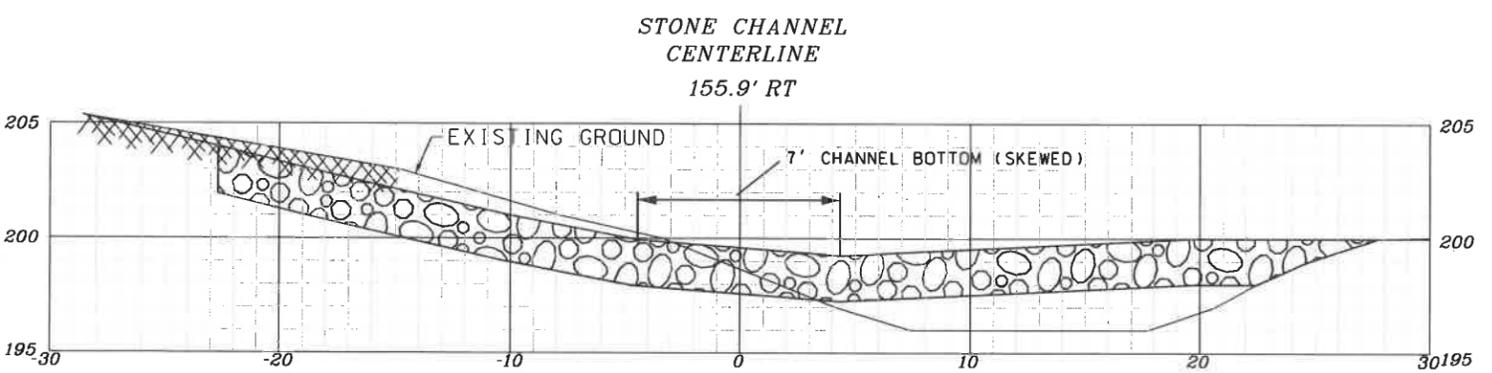
Middle Area (See Plan Sheet 6)



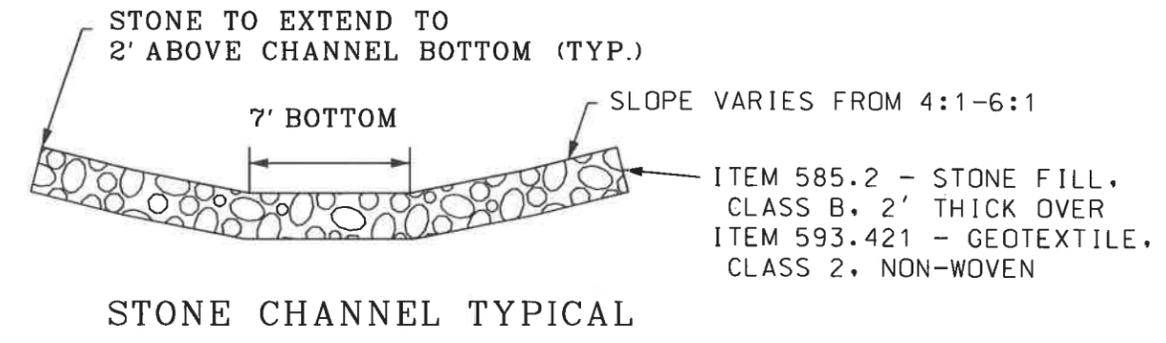
BOYNTON ST. STA 295+20



BOYNTON ST. STA 294+82



BOYNTON ST. STA 294+95

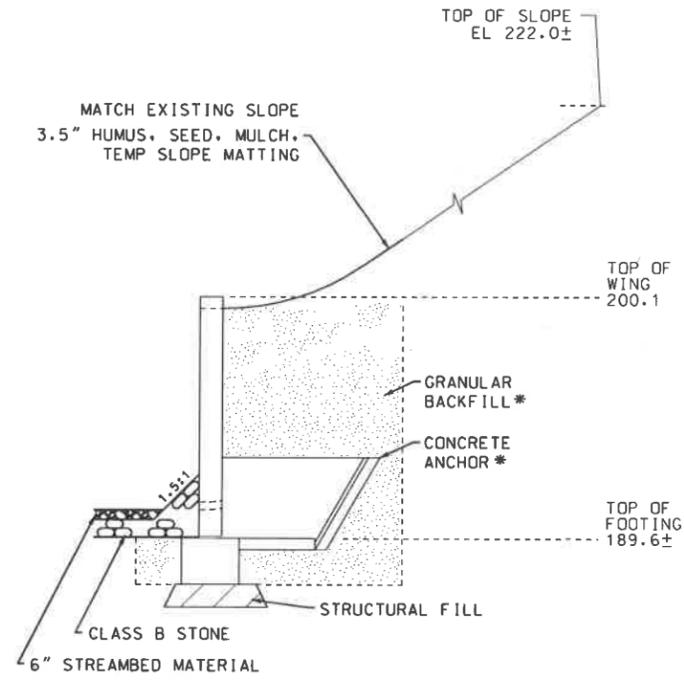
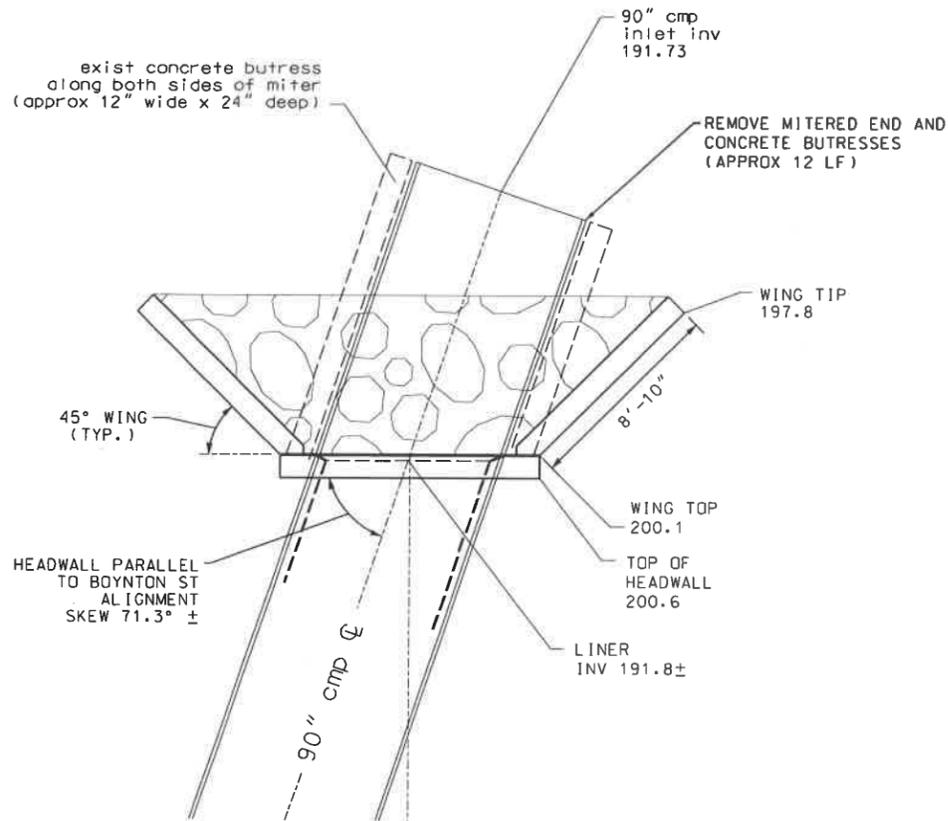


STONE CHANNEL TYPICAL

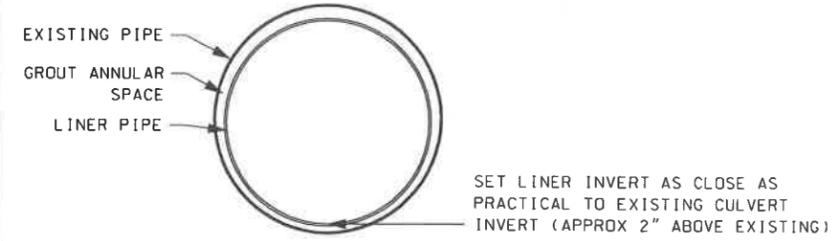
scale: 1" = 4'

STATE OF NEW HAMPSHIRE BEDFORD			
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN			
DRAINAGE DETAILS			
DCN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42268det04	42268	8	11

SDR PROCESSED	DATE	DATE	DATE	DATE
	NEW DESIGN	JUN 2/2020	DATE	5/8/2020
	SHEET CHECKED	CAC	DATE	
	AS BUILT DETAILS		DATE	
REVISIONS AFTER PROPOSAL	DESCRIPTION	STATION	STATION	DATE



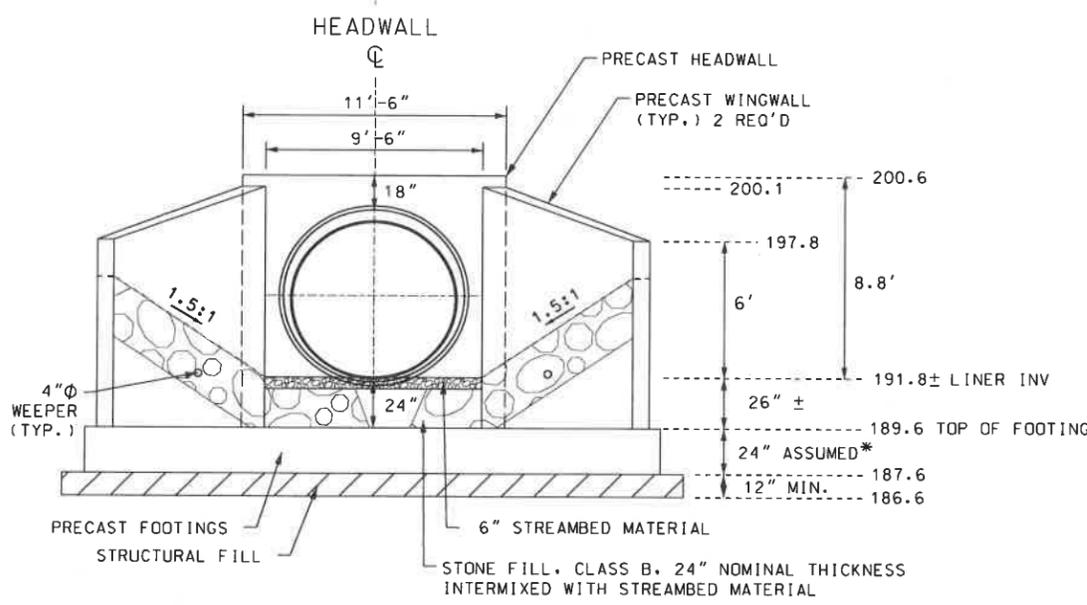
TYPICAL WING SECTION
1" = 4'



Existing 90" Galvanized Structural Plate Pipe,
6" x 2" corrugations, 8 gage
Existing Inlet invert 191.73 (at end of miter)
Existing Outlet invert 184.98 (at end of miter)
Length 632'± Slope 1.07%

SLIP LINE DETAILS
NOT TO SCALE

REMOVE 12 LF± OF EXISTING 90" CMP AT INLET END.
SLIPLINE 620 LF± OF REMAINING 90" CMP WITH 81" POLYMER COATED CORRUGATED METAL LINER, HELICAL CORRUGATIONS, 10 gage MIN THICKNESS
PLACE STONE FILL CLASS B WITHIN LIMITS OF WINGWALLS ONLY.
INTERMIX STONE FILL WITH STREAMBED MATERIAL TO FILL VOIDS.
PLACE 6" OF STREAMBED MATERIAL ON TOP OF STONE AT PIPE INLET.
STREAMBED MATERIAL SHALL MAKE A SMOOTH TRANSITION FROM LINER INVERT TO EXISTING STREAM BED.



INLET HEADWALL DETAILS
1" = 4'

* PRECAST HEADWALL REINFORCEMENT, WINGWALL TIEBACKS, FOOTINGS, STRUCTURAL FILL BASE THICKNESS, BACKFILL REQUIREMENTS, AND OTHER DETAILS NOT SHOWN ARE DESIGNED BY THE CONTRACTOR'S ENGINEER. STAMPED DRAWINGS AND STRUCTURAL CALCULATIONS ARE SUBMITTED TO NHDOT FOR APPROVAL.

STATE OF NEW HAMPSHIRE BEDFORD			
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN			
DRAINAGE DETAILS			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42268det05	42268	9	11

EROSION CONTROL STRATEGIES

1. ENVIRONMENTAL COMMITMENTS:

- 1.1. THESE GUIDELINES DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH ANY CONTRACT PROVISIONS, OR APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
 - 1.2. THIS PROJECT WILL BE SUBJECT TO THE US EPA'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORM WATER CONSTRUCTION GENERAL PERMIT AS ADMINISTERED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THIS PROJECT IS SUBJECT TO REQUIREMENTS IN THE MOST RECENT CONSTRUCTION GENERAL PERMIT (CGP).
 - 1.3. THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE NHDES WETLAND PERMIT, THE US ARMY CORPS OF ENGINEERS' PERMIT, WATER QUALITY CERTIFICATION AND THE SPECIAL ATTENTION ITEMS INCLUDED IN THE CONTRACT DOCUMENTS.
 - 1.4. ALL STORM WATER, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE NEW HAMPSHIRE STORMWATER MANUAL, VOLUME 3, EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION (DECEMBER 2008) (BMP MANUAL) AVAILABLE FROM THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES (NHDES).
 - 1.5. THE CONTRACTOR SHALL COMPLY WITH RSA 485-A:17, AND ALL PUBLISHED NHDES ALTERATION OF TERRAIN ENV-WO 1500 REQUIREMENTS ([HTTP://DES.NH.GOV/ORGANIZATION/COMMISSIONER/EGAL/RULES/INDEX.HTM](http://des.nh.gov/organization/commissioner/egal/rules/index.htm))
 - 1.6. THE CONTRACTOR IS DIRECTED TO REVIEW AND COMPLY WITH SECTION 107.1 OF THE CONTRACT AS IT REFERS TO SPILLAGE, AND ALSO WITH REGARDS TO EROSION, POLLUTION, AND TURBIDITY PRECAUTIONS.
- 2. STANDARD EROSION CONTROL SEQUENCING APPLICABLE TO ALL CONSTRUCTION PROJECTS:**
- 2.1. PERIMETER CONTROLS SHALL BE INSTALLED PRIOR TO EARTH DISTURBING ACTIVITIES. PERIMETER CONTROLS AND STABILIZED CONSTRUCTION EXITS SHALL BE INSTALLED AS SHOWN IN THE BMP MANUAL AND AS DIRECTED BY THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARER.
 - 2.2. EROSION, SEDIMENTATION CONTROL MEASURES AND INFILTRATION BASINS SHALL BE CLEANED, REPLACED AND AUGMENTED AS NECESSARY TO PREVENT SEDIMENTATION BEYOND PROJECT LIMITS THROUGHOUT THE PROJECT DURATION.
 - 2.3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED IN ACCORDANCE WITH THE CONSTRUCTION GENERAL PERMIT AND SECTION 645 OF THE NHDOT SPECIFICATIONS FOR ROAD AND BRIDGES CONSTRUCTION.
 - 2.4. AN AREA SHALL BE CONSIDERED STABLE IF ONE OF THE FOLLOWING HAS OCCURRED:
 - (A) BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED;
 - (B) A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED;
 - (C) A MINIMUM OF 3" OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIP-RAP HAS BEEN INSTALLED;
 - (D) TEMPORARY SLOPE STABILIZATION CONFORMING TO TABLE 1 HAS BEEN PROPERLY INSTALLED
 - 2.5. ALL STOCKPILES SHALL BE CONTAINED WITH A PERIMETER CONTROL. IF THE STOCKPILE IS TO REMAIN UNDISTURBED FOR MORE THAN 14 DAYS, MULCHING WILL BE REQUIRED.
 - 2.6. A WATER TRUCK SHALL BE AVAILABLE TO CONTROL EXCESSIVE DUST AT THE DIRECTION OF THE CONTRACT ADMINISTRATOR.
 - 2.7. TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL REMAIN UNTIL THE AREA HAS BEEN PERMANENTLY STABILIZED.
 - 2.8. CONSTRUCTION PERFORMED ANY TIME BETWEEN NOVEMBER 30th AND MAY 1st OF ANY YEAR SHALL BE CONSIDERED WINTER CONSTRUCTION AND SHALL CONFORM TO THE FOLLOWING REQUIREMENTS.
 - (A) ALL PROPOSED VEGETATED AREAS WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15th, OR WHICH ARE DISTURBED AFTER OCTOBER 15th, SHALL BE STABILIZED IN ACCORDANCE WITH TABLE 1.
 - (B) ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15th, OR WHICH ARE DISTURBED AFTER OCTOBER 15th, SHALL BE STABILIZED TEMPORARILY WITH STONE OR IN ACCORDANCE WITH TABLE 1.
 - (C) AFTER NOVEMBER 30th INCOMPLETE ROAD SURFACES, WHERE WORK HAS STOPPED FOR THE SEASON, SHALL BE PROTECTED IN ACCORDANCE WITH TABLE 1.
 - (D) WINTER EXCAVATION AND EARTHWORK SHALL BE DONE SUCH THAT NO MORE THAN 1 ACRE OF THE PROJECT IS WITHOUT STABILIZATION AT ONE TIME, UNLESS A WINTER CONSTRUCTION PLAN HAS BEEN APPROVED BY NHDOT THAT MEETS THE REQUIREMENTS OF ENV-WO 1505.02 AND ENV-WO 1505.05.
 - (E) A SWPPP AMENDMENT SHALL BE SUBMITTED TO THE DEPARTMENT, FOR APPROVAL, ADDRESSING COLD WEATHER STABILIZATION (ENV-WO 1505.05) AND INCLUDING THE REQUIREMENTS OF NO LESS THAN 30 DAYS PRIOR TO THE COMMENCEMENT OF WORK SCHEDULED AFTER NOVEMBER 30th.

GENERAL CONSTRUCTION PLANNING AND SELECTION OF STRATEGIES TO CONTROL EROSION AND SEDIMENT ON HIGHWAY CONSTRUCTION PROJECTS

3. PLAN ACTIVITIES TO ACCOUNT FOR SENSITIVE SITE CONDITIONS:
 - 3.1. CLEARLY FLAG AREAS TO BE PROTECTED IN THE FIELD AND PROVIDE CONSTRUCTION BARRIERS TO PREVENT TRAFFICKING OUTSIDE OF WORK AREAS.
 - 3.2. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS.
 - 3.3. PROTECT AND MAXIMIZE EXISTING NATIVE VEGETATION AND NATURAL FOREST BUFFERS BETWEEN CONSTRUCTION ACTIVITY AND SENSITIVE AREAS.
 - 3.4. WHEN WORK IS PERFORMED IN AND NEAR WATER COURSES, STREAM FLOW DIVERSION METHODS SHALL BE IMPLEMENTED PRIOR TO ANY EXCAVATION OR FILLING.
 - 3.5. WHEN WORK IS PERFORMED WITHIN 50 FEET OF SURFACE WATERS (WETLAND, OPEN WATER OR FLOWING WATER), PERIMETER CONTROL SHALL BE ENHANCED CONSISTENT WITH SECTION 2.1.2.1. OF THE 2012 NPDES CONSTRUCTION GENERAL PERMIT.
4. MINIMIZE THE AMOUNT OF EXPOSED SOIL:
 - 4.1. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS. MINIMIZE THE AREA OF EXPOSED SOIL AT ANY ONE TIME. PHASING SHALL BE USED TO REDUCE THE AMOUNT AND DURATION OF SOIL EXPOSED TO THE ELEMENTS AND VEHICLE TRACKING.
 - 4.2. UTILIZE TEMPORARY MULCHING OR PROVIDE ALTERNATE TEMPORARY STABILIZATION ON EXPOSED SOILS IN ACCORDANCE WITH TABLE 1.
 - 4.3. THE MAXIMUM AMOUNT OF DISTURBED EARTH SHALL NOT EXCEED A TOTAL OF 5 ACRES FROM MAY 1st THROUGH NOVEMBER 30th, OR EXCEED ONE ACRE DURING WINTER MONTHS, UNLESS THE CONTRACTOR DEMONSTRATES TO THE DEPARTMENT THAT THE ADDITIONAL AREA OF DISTURBANCE IS NECESSARY TO MEET THE CONTRACTORS CRITICAL PATH METHOD SCHEDULE (CPM), AND THE CONTRACTOR HAS ADEQUATE RESOURCES AVAILABLE TO ENSURE THAT ENVIRONMENTAL COMMITMENTS WILL BE MET.
5. CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT:
 - 5.1. DIVERT OFF SITE RUNOFF OR CLEAN WATER AWAY FROM THE CONSTRUCTION ACTIVITY TO REDUCE THE VOLUME THAT NEEDS TO BE TREATED ON SITE.
 - 5.2. DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM DISTURBED AREAS, SLOPES, AND AROUND ACTIVE WORK AREAS AND TO A STABILIZED OUTLET LOCATION.
 - 5.3. CONSTRUCT IMPERMEABLE BARRIERS AS NECESSARY TO COLLECT OR DIVERT CONCENTRATED FLOWS FROM WORK OR DISTURBED AREAS.
 - 5.4. STABILIZE, TO APPROPRIATE ANTICIPATED VELOCITIES, CONVEYANCE CHANNELS OR PUMPING SYSTEMS NEEDED TO CONVEY CONSTRUCTION STORMWATER TO BASINS AND DISCHARGE LOCATIONS PRIOR TO USE.
 - 5.5. DIVERT OFF-SITE WATER THROUGH THE PROJECT IN AN APPROPRIATE MANNER SO NOT TO DISTURB THE UPSTREAM OR DOWNSTREAM SOILS, VEGETATION OR HYDROLOGY BEYOND THE PERMITTED AREA.
6. PROTECT SLOPES:
 - 6.1. INTERCEPT AND DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM UNPROTECTED AND NEWLY ESTABLISHED AREAS AND SLOPES TO A STABILIZED OUTLET OR CONVEYANCE.
 - 6.2. CONSIDER HOW GROUNDWATER SEEPAGE ON CUT SLOPES MAY IMPACT SLOPE STABILITY AND INCORPORATE APPROPRIATE MEASURES TO MINIMIZE EROSION.
 - 6.3. CONVEY STORMWATER DOWN THE SLOPE IN A STABILIZED CHANNEL OR SLOPE DRAIN.
 - 6.4. THE OUTER FACE OF THE FILL SLOPE SHOULD BE IN A LOOSE RUFFLED CONDITION PRIOR TO TURF ESTABLISHMENT. TOPSOIL OR HUMUS LAYERS SHALL BE TRACKED UP AND DOWN THE SLOPE, DISKED, HARROWED, DRAGGED WITH A CHAIN OR MAT, MACHINE-RAKED, OR HAND-WORKED TO PRODUCE A RUFFLED SURFACE.
7. ESTABLISH STABILIZED CONSTRUCTION EXITS:
 - 7.1. INSTALL AND MAINTAIN CONSTRUCTION EXITS, ANYWHERE TRAFFIC LEAVES A CONSTRUCTION SITE ONTO A PUBLIC RIGHT-OF-WAY.
 - 7.2. SWEEP ALL CONSTRUCTION RELATED DEBRIS AND SOIL FROM THE ADJACENT PAVED ROADWAYS AS NECESSARY.
8. PROTECT STORM DRAIN INLETS:
 - 8.1. DIVERT SEDIMENT LADEN WATER AWAY FROM INLET STRUCTURES TO THE EXTENT POSSIBLE.
 - 8.2. INSTALL SEDIMENT BARRIERS AND SEDIMENT TRAPS AT INLETS TO PREVENT SEDIMENT FROM ENTERING THE DRAINAGE SYSTEM.
 - 8.3. CLEAN CATCH BASINS, DRAINAGE PIPES, AND CULVERTS IF SIGNIFICANT SEDIMENT IS DEPOSITED.
 - 8.4. DROP INLET SEDIMENT BARRIERS SHOULD NEVER BE USED AS THE PRIMARY MEANS OF SEDIMENT CONTROL AND SHOULD ONLY BE USED TO PROVIDE AN ADDITIONAL LEVEL OF PROTECTION TO STRUCTURES AND DOWN-GRADIENT SENSITIVE RECEPTORS.
9. SOIL STABILIZATION:
 - 9.1. WITHIN THREE DAYS OF THE LAST ACTIVITY IN AN AREA, ALL EXPOSED SOIL AREAS, WHERE CONSTRUCTION ACTIVITIES ARE COMPLETE, SHALL BE STABILIZED.
 - 9.2. IN ALL AREAS, TEMPORARY SOIL STABILIZATION MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE STABILIZATION REQUIREMENTS (SECTION 2.2) OF THE 2012 CGP. (SEE TABLE 1 FOR GUIDANCE ON THE SELECTION OF TEMPORARY SOIL STABILIZATION MEASURES.)
 - 9.3. EROSION CONTROL SEED MIX SHALL BE SOWN IN ALL INACTIVE CONSTRUCTION AREAS THAT WILL NOT BE PERMANENTLY SEEDED WITHIN TWO WEEKS OF DISTURBANCE AND PRIOR TO SEPTEMBER 15, OF ANY GIVEN YEAR, IN ORDER TO ACHIEVE VEGETATIVE STABILIZATION PRIOR TO THE END OF THE GROWING SEASON.
 - 9.4. SOIL TACKIFIERS MAY BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND REAPPLIED AS NECESSARY TO MINIMIZE SOIL AND MULCH LOSS UNTIL PERMANENT VEGETATION IS ESTABLISHED.
10. RETAIN SEDIMENT ON-SITE AND CONTROL DEWATERING PRACTICES:
 - 10.1. TEMPORARY SEDIMENT BASINS (CGP-SECTION 2.1.3.2) OR SEDIMENT TRAPS (ENV-WO 1506.10) SHALL BE SIZED TO RETAIN, ON SITE, THE VOLUME OF A 2-YEAR 24-HOUR STORM EVENT FOR ANY AREA OF DISTURBANCE OR 3,600 CUBIC FEET OF STORMWATER RUNOFF PER ACRE OF DISTURBANCE, WHICHEVER IS GREATER. TEMPORARY SEDIMENT BASINS USED TO TREAT STORMWATER RUNOFF FROM AREAS GREATER THAN 5-ACRES OF DISTURBANCE SHALL BE SIZED TO ALSO CONTROL STORMWATER RUNOFF FROM A 10-YEAR 24 HOUR STORM EVENT. ON-SITE RETENTION OF THE 10-YEAR 24-HOUR EVENT IS NOT REQUIRED.
 - 10.2. CONSTRUCT AND STABILIZE DEWATERING INFILTRATION BASINS PRIOR TO ANY EXCAVATION THAT MAY REQUIRE DEWATERING.
 - 10.3. TEMPORARY SEDIMENT BASINS OR TRAPS SHALL BE PLACED AND STABILIZED AT LOCATIONS WHERE CONCENTRATED FLOW (CHANNELS AND PIPES) DISCHARGE TO THE SURROUNDING ENVIRONMENT FROM AREAS OF UNSTABILIZED EARTH DISTURBING ACTIVITIES.

11. ADDITIONAL EROSION AND SEDIMENT CONTROL GENERAL PRACTICES:

- 11.1. USE TEMPORARY MULCHING, PERMANENT MULCHING, TEMPORARY VEGETATIVE COVER, AND PERMANENT VEGETATIVE COVER TO REDUCE THE NEED FOR DUST CONTROL. USE MECHANICAL SWEEPERS ON PAVED SURFACES WHERE NECESSARY TO PREVENT DUST BUILDUP. APPLY WATER, OR OTHER DUST INHIBITING AGENTS OR TACKIFIERS, AS APPROVED BY THE NHDES.
- 11.2. ALL STOCKPILES SHALL BE CONTAINED WITH TEMPORARY PERIMETER CONTROLS. INACTIVE SOIL STOCKPILES SHOULD BE PROTECTED WITH SOIL STABILIZATION MEASURES (TEMPORARY EROSION CONTROL SEED MIX AND MULCH, SOIL BINDER) OR COVERED WITH ANCHORED TARPS.
- 11.3. EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSPECTED IN ACCORDANCE WITH SECTION 645 OF NHDOT SPECIFICATIONS, WEEKLY AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.25 IN. OF RAIN PER 24-HOUR PERIOD. EROSION AND SEDIMENT CONTROL MEASURES WILL ALSO BE INSPECTED IN ACCORDANCE WITH THE GUIDANCE MEMO FROM THE NHDES CONTAINED WITHIN THE CONTRACT PROPOSAL AND THE EPA CONSTRUCTION GENERAL PERMIT.
- 11.4. THE CONTRACTOR SHOULD UTILIZE STORM DRAIN INLET PROTECTION TO PREVENT SEDIMENT FROM ENTERING A STORM DRAINAGE SYSTEM PRIOR TO THE PERMANENT STABILIZATION OF THE CONTRIBUTING DISTURBED AREA.
- 11.5. PERMANENT STABILIZATION MEASURES WILL BE CONSTRUCTED AND MAINTAINED IN LOCATIONS AS SHOWN ON THE CONSTRUCTION PLANS TO STABILIZE AREAS. VEGETATIVE STABILIZATION SHALL NOT BE CONSIDERED PERMANENTLY STABILIZED UNTIL VEGETATIVE GROWTH COVERS AT LEAST 85% OF THE DISTURBED AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION AND SEDIMENT CONTROL FOR ONE YEAR AFTER PROJECT COMPLETION.
- 11.6. CATCH BASINS: CARE SHALL BE TAKEN TO ENSURE THAT SEDIMENTS DO NOT ENTER ANY EXISTING CATCH BASINS DURING CONSTRUCTION. THE CONTRACTOR SHALL PLACE TEMPORARY STONE INLET PROTECTION OVER INLETS IN AREAS OF SOIL DISTURBANCE THAT ARE SUBJECT TO SEDIMENT CONTAMINATION.
- 11.7. TEMPORARY AND PERMANENT DITCHES SHALL BE CONSTRUCTED, STABILIZED AND MAINTAINED IN A MANNER THAT WILL MINIMIZE SCOUR. TEMPORARY AND PERMANENT DITCHES SHALL BE DIRECTED TO DRAIN TO SEDIMENT BASINS OR STORM WATER COLLECTION AREAS.
- 11.8. WINTER EXCAVATION AND EARTHWORK ACTIVITIES NEED TO BE LIMITED IN EXTENT AND DURATION, TO MINIMIZE POTENTIAL EROSION AND SEDIMENTATION IMPACTS. THE AREA OF EXPOSED SOIL SHALL BE LIMITED TO ONE ACRE, OR THAT WHICH CAN BE STABILIZED AT THE END OF EACH DAY UNLESS A WINTER CONSTRUCTION PLAN, DEVELOPED BY A QUALIFIED ENGINEER OR A CPESC SPECIALIST, IS REVIEWED AND APPROVED BY THE DEPARTMENT.
- 11.9. CHANNEL PROTECTION MEASURES SHALL BE SUPPLEMENTED WITH PERIMETER CONTROL MEASURES WHEN THE DITCH LINES OCCUR AT THE BOTTOM OF LONG FILL SLOPES. THE PERIMETER CONTROLS SHALL BE INSTALLED ON THE FILL SLOPE TO MINIMIZE THE POTENTIAL FOR FILL SLOPE SEDIMENT DEPOSITS IN THE DITCH LINE.

BEST MANAGEMENT PRACTICES (BMP) BASED ON AMOUNT OF OPEN CONSTRUCTION AREA

12. STRATEGIES SPECIFIC TO OPEN AREAS LESS THAN 5 ACRES:
 - 12.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WO 1500; ALTERATION OF TERRAIN FOR CONSTRUCTION AND USE ALL CONVENTIONAL BMP STRATEGIES.
 - 12.2. SLOPES STEEPER THAN 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING.
 - 12.3. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT ALONE.
 - 12.4. AREAS WHERE HAUL ROADS ARE CONSTRUCTED AND STORMWATER CANNOT BE TREATED THE DEPARTMENT WILL CONSIDER INFILTRATION.
 - 12.5. FOR HAUL ROADS ADJACENT TO SENSITIVE ENVIRONMENTAL AREAS OR STEEPER THAN 5%, THE DEPARTMENT WILL CONSIDER USING EROSION STONE, CRUSHED GRAVEL, OR CRUSHED STONE BASE TO HELP MINIMIZE EROSION ISSUES.
 - 12.6. ALL AREAS THAT CAN BE STABILIZED SHALL BE STABILIZED PRIOR TO OPENING UP NEW TERRITORY.
 - 12.7. DETENTION BASINS SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE A 2 YEAR STORM EVENT.
13. STRATEGIES SPECIFIC TO OPEN AREAS BETWEEN 5 AND 10 ACRES:
 - 13.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WO 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES WILL BE UTILIZED.
 - 13.2. DETENTION BASINS WILL BE CONSTRUCTED TO ACCOMMODATE THE 2-YEAR 24-HOUR STORM EVENT AND CONTROL A 10-YEAR 24-HOUR STORM EVENT.
 - 13.3. SLOPES STEEPER THAN A 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS. OTHER ALTERNATIVE MEASURES, SUCH AS BONDED FIBER MATRIXES (BFMS) OR FLEXIBLE GROWTH MEDIUMS (FGMS) MAY BE UTILIZED, IF MEETING THE NHDES APPROVALS AND REGULATIONS.
 - 13.4. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS.
14. STRATEGIES SPECIFIC TO OPEN AREAS OVER 10 ACRES:
 - 14.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WO 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES AND BETWEEN 5 AND 10 ACRES WILL BE UTILIZED.
 - 14.2. THE DEPARTMENT ANTICIPATES THAT SOIL BINDERS WILL BE NEEDED ON ALL SLOPES STEEPER THAN 3:1, IN ORDER TO MINIMIZE EROSION AND REDUCE THE AMOUNT OF SEDIMENT IN THE STORMWATER TREATMENT BASINS.
 - 14.3. THE CONTRACTOR WILL BE REQUIRED TO HAVE AN APPROVED DESIGN IN ACCORDANCE WITH ENV-WO 1506.12 FOR AN ACTIVE FLOCCULANT TREATMENT SYSTEM TO TREAT AND RELEASE WATER CAPTURED IN STORM WATER BASINS. THE CONTRACTOR SHALL ALSO RETAIN THE SERVICES OF AN ENVIRONMENTAL CONSULTANT WHO HAS DEMONSTRATED EXPERIENCE IN THE DESIGN OF FLOCCULANT TREATMENT SYSTEMS. THE CONSULTANT WILL ALSO BE RESPONSIBLE FOR THE IMPLEMENTATION AND MONITORING OF THE SYSTEM.

**TABLE 1
GUIDANCE ON SELECTING TEMPORARY SOIL STABILIZATION MEASURES**

APPLICATION AREAS	DRY MULCH METHODS				HYDRAULICALLY APPLIED MULCHES ²				ROLLED EROSION CONTROL BLANKETS ³			
	HMT	WC	SG	CB	HM	SMM	BFM	FRM	SNSB	DNSB	DNSCB	DNCB
SLOPES ¹												
STEEPER THAN 2:1	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES
2:1 SLOPE	YES ¹	YES ¹	YES	YES	NO	NO	YES	YES	NO	YES	YES	YES
3:1 SLOPE	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO
4:1 SLOPE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO
WINTER STABILIZATION	4T/AC	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES
CHANNELS												
LOW FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
HIGH FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE
HMT	HAY MULCH & TACK	HM	HYDRAULIC MULCH	SNSB	SINGLE NET STRAW BLANKET
WC	WOOD CHIPS	SMM	STABILIZED MULCH MATRIX	DNSB	DOUBLE NET STRAW BLANKET
SG	STUMP GRINDINGS	BFM	BONDED FIBER MATRIX	DNSCB	2 NET STRAW-COCONUT BLANKET
CB	COMPOST BLANKET	FRM	FIBER REINFORCED MEDIUM	DNCB	2 NET COCONUT BLANKET

- NOTES:
1. ALL SLOPE STABILIZATION OPTIONS ASSUME A SLOPE LENGTH ≤10 TIMES THE HORIZONTAL DISTANCE COMPONENT OF THE SLOPE, IN FEET.
 2. PRODUCTS CONTAINING POLYACRYLAMIDE (PAM) SHALL NOT BE APPLIED DIRECTLY TO OR WITHIN 100 FEET OF ANY SURFACE WATER WITHOUT PRIOR WRITTEN APPROVAL FROM THE NH DEPARTMENT OF ENVIRONMENTAL SERVICES.
 3. ALL EROSION CONTROL BLANKETS SHALL BE MADE WITH WILDLIFE FRIENDLY BIODEGRADABLE NETTING.

STATE OF NEW HAMPSHIRE
BEDFORD
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**EROSION CONTROL
STRATEGIES**

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
12-21-2015	erosstrat	42268	10	11

SDR PROCESSED	DATE	2/2020
NEW DESIGN	DATE	5/8/20
SHEET CHECKED	CAC	
AS BUILT DETAILS	DATE	



EROSION CONTROL PLAN LEGEND	
	PERIMETER CONTROL SILT FENCE EROSION CONTROL MIX BERM EROSION CONTROL MIX SOX TURBIDITY CURTAIN SHEET PILE COFFER DAM
	NATURAL BUFFER/PERIMETER CONTROL SILT FENCE EROSION CONTROL MIX BERM EROSION CONTROL MIX SOX TURBIDITY CURTAIN SHEET PILE COFFER DAM
	CHANNEL PROTECTION STONE CHECK DAMS STRAW WATTLES CHANNEL MATTING CLASS D EROSION STONE CLASS C STONE
	CLEAN WATER BYPASS PUMP THROUGH PIPE DRAIN THROUGH PIPE OR CHANNEL

to →
Manchester



APPROXIMATE LIMITS OF ACCESS
AND DISTURBED AREA (TYP.)

18" cmp shown
on old plans
Not found on
field review.

LIDAR CONTOURS
NAVD88 DATUM
CONTOUR INTERVAL 2'



STATE OF NEW HAMPSHIRE BEDFORD			
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EROSION CONTRIL PLAN			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
42268ercplans	42268	11	11