

# STATE OF NEW HAMPSHIRE INTER-DEPARTMENT COMMUNICATION

**DATE:** December 22, 2023

**FROM:** Joshua Brown  
Wetlands Program Analyst

**AT (OFFICE):** Department of  
Transportation

**SUBJECT** Dredge & Fill Application  
Sutton, 44212

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 NHDOT Bureau of Highway Design for the subject major impact project. The project proposes to replace a 60 foot long 48-inch diameter corrugated metal pipe culvert conveying Thistle Brook under NH Route 114 approximately 250' southwest of Village Road in the Town of Sutton, NH. The proposed crossing will be replaced with an 8X5' concrete box culvert with one foot of stream simulation. The inlet is proposed to move 25' upstream to improve hydraulic efficiency of the inlet (by reducing the sharp angle of the existing inlet) and to provide a more natural transition to the proposed culvert.

This project was reviewed at the Natural Resource Agency Coordination Meeting on October 18, 2023. 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: <https://www.dot.nh.gov/projects-plans-and-programs/programs/environmental-management-system/project-management-section-0>.

NHDOT anticipates and request that this project 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 required as the proposed work was determined to be self-mitigating.

Erosion Control Plans contained within this application should be considered final in accordance with Env-Wt 527.05(a).

The lead people to contact for this project are Kirk Mudgett, Bureau of Highway Design (271-1598 or [kirk.o.mudgett@dot.nh.gov](mailto:kirk.o.mudgett@dot.nh.gov)) or Andrew O'Sullivan, Wetlands Program Manager, Bureau of Environment (271-3226 or [Andrew.O'Sullivan@dot.nh.gov](mailto:Andrew.O'Sullivan@dot.nh.gov)).

A payment voucher has been processed for this application (Voucher # 740914) in the amount of \$601.60

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.

JRB;

cc:

BOE Original  
Town of Sutton (4 copies via certified mail)  
Marika Labash, NH Division of Historic Resources (Cultural Review Within)  
Mike Dionne & Kevin Newton, NH Fish & Game (via electronic notification)

Maria Tur, US Fish & Wildlife (via electronic notification)  
Jeanie Brochi, US Environmental Protection Agency (via electronic notification)  
Michael Hicks & Rick Kristoff, 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      **TOWN NAME:** Sutton

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

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

<b>SECTION 1 - REQUIRED PLANNING FOR ALL PROJECTS (Env-Wt 306.05; RSA 482-A:3, I(d)(2))</b>	
Please use the <a href="#">Wetland Permit Planning Tool (WPPT)</a> , the Natural Heritage Bureau (NHB) <a href="#">DataCheck Tool</a> , the <a href="#">Aquatic Restoration Mapper</a> , or other sources to assist in identifying key features such as: <a href="#">priority resource areas (PRAs)</a> , <a href="#">protected species or habitats</a> , coastal areas, designated rivers, or designated prime wetlands.	
Has the required planning been completed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Does the property contain a PRA? If yes, provide the following information:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<ul style="list-style-type: none"> <li>• Does the project qualify for an Impact Classification Adjustment (e.g. NH Fish and Game Department (NHF&amp;G) and NHB agreement for a classification downgrade) or a Project-Type Exception (e.g. Maintenance or Statutory Permit-by-Notification (SPN) project)? See Env-Wt 407.02 and Env-Wt 407.04.</li> </ul>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<ul style="list-style-type: none"> <li>• Protected species or habitat?                             <ul style="list-style-type: none"> <li>○ If yes, species or habitat name(s): Blanding's Turtle, Wood Turtle</li> <li>○ NHB Project ID #: NHB23-1147</li> </ul> </li> </ul>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
• Bog?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
• Floodplain wetland contiguous to a tier 3 or higher watercourse?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
• Designated prime wetland or duly-established 100-foot buffer?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
• Sand dune, tidal wetland, tidal water, or undeveloped tidal buffer zone?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Is the property within a Designated River corridor? If yes, provide the following information:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<ul style="list-style-type: none"> <li>• Name of Local River Management Advisory Committee (LAC):</li> <li>• A copy of the application was sent to the LAC on Month:    Day:    Year:</li> </ul>	

[irm@des.nh.gov](mailto:irm@des.nh.gov) or (603) 271-2147

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[www.des.nh.gov](http://www.des.nh.gov)

For dredging projects, is the subject property contaminated? • If yes, list contaminant: <span style="background-color: #cccccc; padding: 0 20px;"> </span>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Is there potential to impact impaired waters, class A waters, or outstanding resource waters?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
For stream crossing projects, provide watershed size (see <a href="#">WPPT</a> or Stream Stats): <span style="background-color: #cccccc; padding: 0 20px;">584 acres (Lidar delineation)</span>	
<b>SECTION 2 - PROJECT DESCRIPTION (Env-Wt 311.04(i))</b>	
Provide a <b>brief</b> 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"; please use the space provided below.	
<p>The project will replace a 60 foot long 48 inch diameter corrugated metal pipe culvert conveying Thistle Brook under NH Route 114 approximately 250' southwest of Village Road in the Town of Sutton. The existing pipe is in poor condition. The inlet invert is actively corroding and breaking apart and additional voids in the pipe wall are visible along the walls. There is approx. 1 to 1.5 feet of cover over the pipe.</p> <p>The proposed project will install a 8'X5' 4-sided Box Culvert with 1' embedment (open area approx. 8'X4') with concrete wingwalls upstream and downstream. The inlet is proposed to move 25' upstream to improve hydraulic efficiency of the inlet (by reducing the sharp angle of the existing inlet) and to provide a more natural transition to the proposed culvert. This will increase the crossing length from 60 feet to 70 feet. The location and elevation is proposed to remain the same. The streambed will be tied in upstream and downstream to provide a smooth transition through the culvert. Additional work, includes grading behind the wingwalls and pavement restoration following installation of the culvert.</p> <p>Permanent impacts to the stream (R2UB4) extend 8' downstream and 50' upstream of the existing culvert, which are required to install the proposed structure, wingwalls, and to grade the stream channel through the culvert. An additional permanent impact to the wetland adjacent to the outlet area (PEM1Ed) is required to install the wingwall and grade behind it. Temporary impacts to the stream extend and additional 10' downstream and 5' upstream and are required for installation of water diversion structures. An additional temporary impact to the PEM1Ed wetland is required to facilitate the excavation required to install the culvert sections and bedding material and to provide construction access to the outlet area.</p>	
<b>SECTION 3 - PROJECT LOCATION</b>	
Separate wetland permit applications must be submitted for each municipality within which wetland impacts occur.	
ADDRESS: <span style="background-color: #cccccc; padding: 0 20px;">NH RT 114 (250ft southwest of Village Road)</span>	
TOWN/CITY: <span style="background-color: #cccccc; padding: 0 20px;">Sutton</span>	
TAX MAP/BLOCK/LOT/UNIT: <span style="background-color: #cccccc; padding: 0 20px;">Map: 06 (Within State ROW)</span>	
US GEOLOGICAL SURVEY (USGS) TOPO MAP WATERBODY NAME: <span style="background-color: #cccccc; padding: 0 20px;">Thistle Brook</span> <input type="checkbox"/> N/A	
(Optional) LATITUDE/LONGITUDE in decimal degrees (to five decimal places):	
	<span style="background-color: #cccccc; padding: 0 20px;">43.3319° North</span> <span style="background-color: #cccccc; padding: 0 20px;">71.9461° West</span>

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<b>SECTION 4 - APPLICANT (DESIRED PERMIT HOLDER) INFORMATION (Env-Wt 311.04(a))</b>		
If the applicant is a trust or a company, then complete with the trust or company information.		
NAME: NH Dept. of Transportation		
MAILING ADDRESS: PO Box 483		
TOWN/CITY: Concord	STATE: NH	ZIP CODE: 03303
EMAIL ADDRESS: kirk.o.mudgett.dot.nh.gov		
FAX: [REDACTED]	PHONE: 603-271-1598	
ELECTRONIC COMMUNICATION: By initialing here: KOM, I hereby authorize NHDES to communicate all matters relative to this application electronically.		
<b>SECTION 5 - AUTHORIZED AGENT INFORMATION (Env-Wt 311.04(c))</b>		
<input checked="" 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.		
<b>SECTION 6 - PROPERTY OWNER INFORMATION (IF DIFFERENT THAN APPLICANT) (Env-Wt 311.04(b))</b>		
If the owner is a trust or a company, then complete with the trust or company information.		
<input checked="" type="checkbox"/> Same as applicant		
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 - 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))**

Describe how the resource-specific criteria have been met for each chapter listed above (please attach information about stream crossings, coastal resources, prime wetlands, or non-tidal wetlands and surface waters):

In accordance with Env-Wt 400, the jurisdictional areas within the project limits have been delineated by the NHDOT Bureau of the Environment on 8/14/23. The jurisdictional areas are referenced on the included wetland impact plans. The project has been designed in accordance with Env-Wt 527 and Env-Wt 900 to the maximum extent practicable as described per NRAM meeting on 10-18-23. The meeting minutes are included in this application package as well as a supplemental narrative to address Env-Wt 904.10-Alternative Designs. Unavoidable impacts to wetlands have been minimized to the maximum extent practicable. Project specific information is contained within this permit application.

**SECTION 8 - AVOIDANCE AND MINIMIZATION**

Impacts within wetland jurisdiction must be avoided to the maximum extent practicable (Env-Wt 313.03(a)).\* Any project with unavoidable jurisdictional impacts must then be minimized as described in the [Wetlands Best Management Practice Techniques For Avoidance and Minimization](#) and the [Wetlands Permitting: Avoidance, Minimization and Mitigation Fact Sheet](#). For minor or major projects, a functional assessment of all wetlands on the project site is required (Env-Wt 311.03(b)(10)).\*

Please refer to the application checklist to ensure you have attached all documents related to avoidance and minimization, as well as functional assessment (where applicable). Use the [Avoidance and Minimization Checklist](#), the [Avoidance and Minimization Narrative](#), or your own avoidance and minimization narrative.

*\*See Env-Wt 311.03(b)(6) and Env-Wt 311.03(b)(10) for shoreline structure exemptions.*

**SECTION 9 - MITIGATION REQUIREMENT (Env-Wt 311.02)**

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.

Mitigation Pre-Application Meeting Date: Month: **10** Day: **18** Year: **2023**

N/A - Mitigation is not required)

**SECTION 10 - THE PROJECT MEETS COMPENSATORY MITIGATION REQUIREMENTS (Env-Wt 313.01(a)(1)c)**

Confirm that you have submitted a compensatory mitigation proposal that meets the requirements of Env-Wt 800 for all permanent unavoidable impacts that will remain after avoidance and minimization techniques have been exercised to the maximum extent practicable:  I confirm submittal.

N/A – Compensatory mitigation is not required)

**SECTION 11 - 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 a permit).

For intermittent and ephemeral streams, the linear footage of impact is measured along the thread of the channel. *Please note, installation of a stream crossing in an ephemeral stream may be undertaken without a permit per Rule Env-Wt 309.02(d), however other dredge or fill impacts should be included below.*

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			TEMPORARY		
		SF	LF	ATF	SF	LF	ATF
Wetlands	Forested Wetland			<input type="checkbox"/>			<input type="checkbox"/>
	Scrub-shrub Wetland			<input type="checkbox"/>			<input type="checkbox"/>
	Emergent Wetland	143		<input type="checkbox"/>	1007		<input type="checkbox"/>
	Wet Meadow			<input type="checkbox"/>			<input type="checkbox"/>
	Vernal Pool			<input type="checkbox"/>			<input type="checkbox"/>
	Designated Prime Wetland			<input type="checkbox"/>			<input type="checkbox"/>
	Duly-established 100-foot Prime Wetland Buffer			<input type="checkbox"/>			<input type="checkbox"/>
Surface Water	Intermittent / Ephemeral Stream			<input type="checkbox"/>			<input type="checkbox"/>
	Perennial Stream or River	247	55	<input type="checkbox"/>	107	48	<input type="checkbox"/>
	Lake / Pond			<input type="checkbox"/>			<input type="checkbox"/>
	Docking - Lake / Pond			<input type="checkbox"/>			<input type="checkbox"/>
	Docking - River			<input type="checkbox"/>			<input type="checkbox"/>
Banks	Bank - Intermittent Stream			<input type="checkbox"/>			<input type="checkbox"/>
	Bank - Perennial Stream / River		116	<input type="checkbox"/>			<input type="checkbox"/>
	Bank / Shoreline - Lake / Pond			<input type="checkbox"/>			<input type="checkbox"/>
Tidal	Tidal Waters			<input type="checkbox"/>			<input type="checkbox"/>
	Tidal Marsh			<input type="checkbox"/>			<input type="checkbox"/>
	Sand Dune			<input type="checkbox"/>			<input type="checkbox"/>
	Undeveloped Tidal Buffer Zone (TBZ)			<input type="checkbox"/>			<input type="checkbox"/>
	Previously-developed TBZ			<input type="checkbox"/>			<input type="checkbox"/>
	Docking - Tidal Water			<input type="checkbox"/>			<input type="checkbox"/>
<b>TOTAL</b>		<b>390</b>	<b>171</b>		<b>1114</b>	<b>48</b>	

**SECTION 12 - 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): 1504 SF × \$0.40 = \$ 601.6

Seasonal docking structure: SF × \$2.00 = \$

Permanent docking structure: SF × \$4.00 = \$

Projects proposing shoreline structures (including docks) add \$400 = \$

Total = \$ 601.6

**The application fee for minor or major impact is the above calculated total or \$400, whichever is greater = \$ 601.6**

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**SECTION 13 - 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
-------------------------------------------------	----------------------------------------	---------------------------------------------------

**SECTION 14 - REQUIRED CERTIFICATIONS (Env-Wt 311.11)**

**Initial each box below to certify:**

Initials: KOM _____ _____	To the best of the signer’s knowledge and belief, all required notifications have been provided.
Initials: KOM _____ _____	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: KOM _____ _____	The signer understands that: <ul style="list-style-type: none"> <li>• The submission of false, incomplete, or misleading information constitutes grounds for NHDES to:                         <ol style="list-style-type: none"> <li>1. Deny the application.</li> <li>2. Revoke any approval that is granted based on the information.</li> <li>3. 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.</li> </ol> </li> <li>• The signer is subject to the penalties specified in New Hampshire law for falsification in official matters, currently RSA 641.</li> <li>• 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 forestry SPN projects and minimum impact trail projects, where the signature shall authorize only the Department to inspect the site pursuant to RSA 482-A:6, II.</li> </ul>
Initials: KOM _____ _____	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 15 - REQUIRED SIGNATURES (Env-Wt 311.04(d); Env-Wt 311.11)**

SIGNATURE (OWNER): _____	PRINT NAME LEGIBLY: _____	DATE: _____
SIGNATURE (APPLICANT, IF DIFFERENT FROM OWNER): 	PRINT NAME LEGIBLY: Kirk Mudgett	DATE: 12-21-23
SIGNATURE (AGENT, IF APPLICABLE): _____	PRINT NAME LEGIBLY: _____	DATE: _____

**SECTION 16 - 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: State agency exempt per RSA 482-A:3, I(a)
TOWN/CITY: 4 copies via cert. mail	DATE: exempt per Env-WT 311.05(a)(14)

**DIRECTIONS FOR TOWN/CITY CLERK:**

Per RSA 482-A:3, I(a)(1)

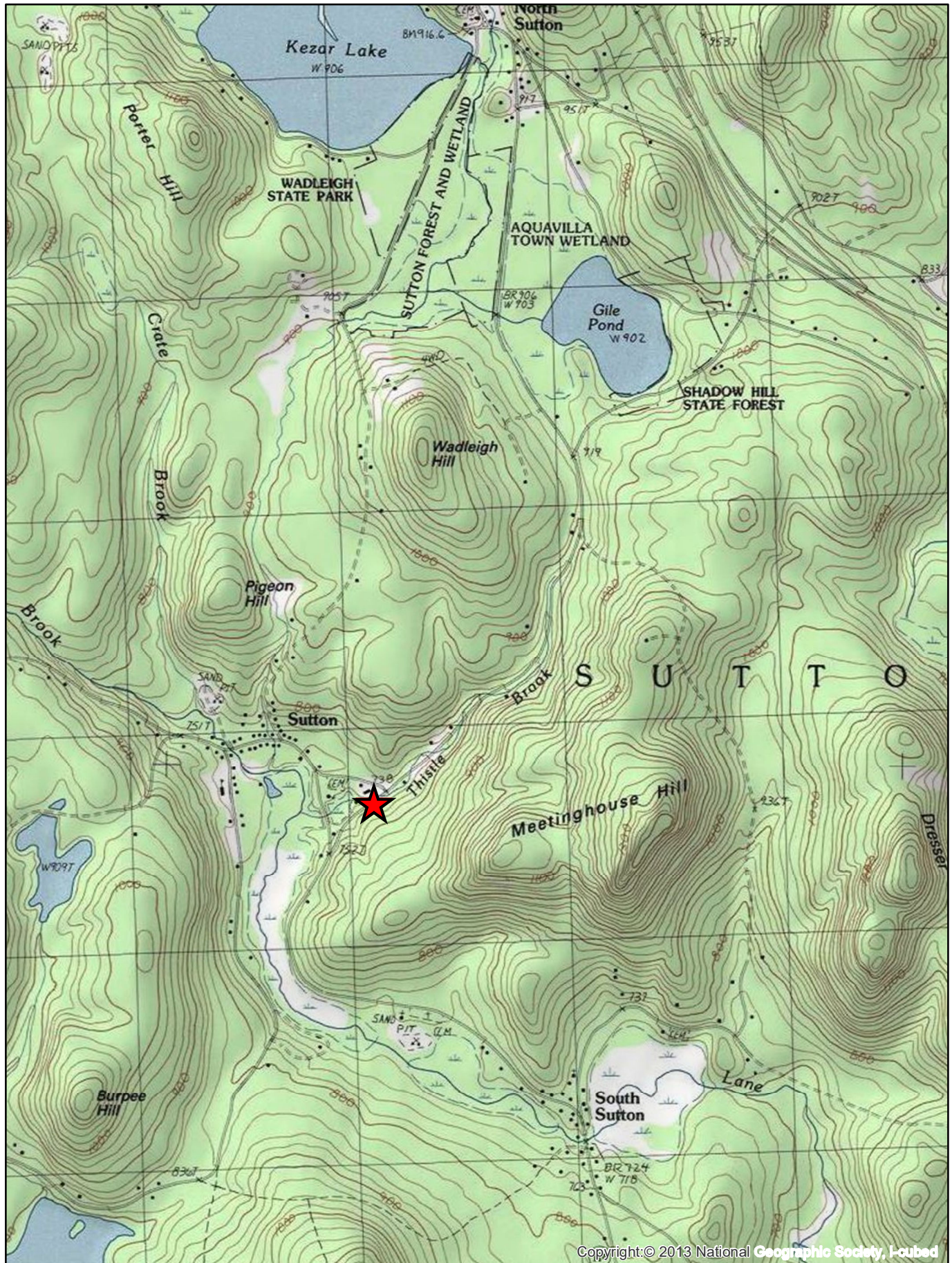
1. IMMEDIATELY sign the original application form and four copies in the signature space provided above.
2. Return the signed original application form and attachments to the applicant so that the applicant may submit the application form and attachments to NHDES by mail or hand delivery.
3. IMMEDIATELY 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.
4. Retain one copy of the application form and one complete set of attachments and make them reasonably accessible for public review.

**DIRECTIONS FOR APPLICANT:**

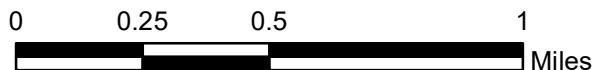
Submit the original permit application form bearing the signature of the Town/City Clerk, additional materials, and the application fee to NHDES by mail or hand delivery at the address at the bottom of this page. Make check or money order payable to "Treasurer – State of NH".



# SUTTON 44212



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## USGS TOPO MAP: 1:24,000



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'S NAME:** NH Dept. of Transportation      **TOWN NAME:** Sutton

Attachment A is required for *all minor and major projects*, and must be completed *in addition* to the [Avoidance and Minimization Narrative](#) or [Checklist](#) that is required by Env-Wt 307.11.

For projects involving construction or modification of non-tidal shoreline structures over areas of surface waters having an absence of wetland vegetation, only Sections I.X through I.XV are required to be completed.

**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 AT THIS LOCATION WOULD REPLACE THE EXISTING 48" DIA, CMP CULVERT WITH A 23' SPAN BRIDGE STRUCTURE WITH A WILDLIFE SHELF INSIDE. THIS WOULD LIKELY REQUIRE A PERMANENT EASEMENT OF THE SOUTH ABUTTING PROPERTY. THE CURRENT CONSTRUCTION COST ESTIMATE FOR THIS OPTION IS \$2,073,000. SECURING FUNDING AND ADDITIONAL DESIGN TIME WOULD REQUIRE A DELAY IN THE START OF CONSTRUCTION OF 3-5 YEARS. A DELAY OF THIS MAGNITUDE WOULD INCREASE THE RISK OF FAILURE OF THE EXISTING CULVERT AND THE ROADWAY. INFLATION, ENGINEERING, AND PERMANENT EASEMENTS OR ACQUISITIONS (WHICH MAY BE REQUIRED) ARE NOT INCLUDED IN THE COST ESTIMATE. THIS ALTERNATIVE IS NOT CONSIDERED PRACTICAL UNDER THIS PROGRAM.

A HYDRAULIC DESIGN IS PROPOSED TO PASS THE 50-YEAR EVENT WITHOUT OVERTOPPING THE ROADWAY. SEVERAL SPANS WERE CONSIDERED TO BALANCE HYDRAULIC CAPACITY, A TIMELY REPLACEMENT TO REDUCE THE RISK OF FAILURE, AND ENVIRONMENTAL IMPACTS (SEE THE SUPPLEMENTAL NARRATIVE FOR MORE INFORMATION ON THOSE ALTERNATIVES CONSIDERED). A 8' SPAN STRUCTURE WAS SELECTED WITH A 5' RISE AND EMBEDDED WITH STREAM SIMULATION MATERIAL. PERMANENT IMPACTS ARE LIMITED TO THE PROPOSED INLET AND OUTLET TO CONSTRUCT AND GRADE WINGWALLS, AND TO GRADE THE STREAM CHANNEL.

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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, crustacean, shellfish, and wildlife of significant value.

There are no 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 48" dia. pipe culvert provides a hydrologic connection on Thistle Brook under NH114. There is no existing perch at the inlet or outlet. The proposed structure is a 8'X5' concrete box culvert embedded with stream simulation material, which will improve the hydrologic connection by reducing the flows peak flows which can overtop NH114, increase the span to match that of the upstream channel, and improve overall hydraulic capacity. The proposed structure will also reduce the sharp angle at the inlet compared to the existing culvert. The proposed invert elevations will be set such that the simulated streambed material inside the culvert matches the existing streambed upstream and downstream. Temporary disturbance to inlet and outlet areas will be restored such that there is no change to the existing streambed grade. The hydrologic connection between the upstream and downstream channels will be maintained post-construction.

**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 proposed design is the minimum impact alternative that meets the project purpose and need and avoids impacts or minimizes impacts to nearby jurisdictional areas.

The resources present within the project area that will be impacted consist of Thistle Brook (R2UB4) and drained/ditched emergent wetland adjacent to the outlet (PEM1Ed). There will be no change in the function of these wetlands due to the project. Permanent impacts to Thistle Brook are required to move the inlet 25' upstream and grade the channel smoothly through the proposed culvert. An additional permanent is required to the PEM1Ed wetland adjacent to the outlet to install the wingwall and grade the slope behind it. The proposed temporary impacts are required to install cofferdams, water bypasses, and dewatering.

**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.

The proposed design/work will allow traffic to continue to flow along NH 114 during construction minimizing the impact to local and regional commuting and commerce. In the project area, Thistle 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.

In the project area, there are no delineated wetlands adjacent to Thistle Brook that provide flood storage. The PEM1Ed wetland adjacent to the outlet drains to Thistle Brook and conveys runoff from the direction of Village Road, it does not provide flood storage. There are wetlands upstream of the project area (PFO1E, PSS1E) adjacent to Thistle Brook which will not be impacted by the project.

**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.

There are both forested (PFO1E) and scrub shrub (PSS1E) wetland complexes upstream of the project area, which will not be impacted by the Project.

**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.

Avoidance of all impacts is not practical due to the size and poor structural condition of the existing culvert. The proposed 8'X5' box culvert will cause an increase in hydraulic capacity, enhance Aquatic Organism Passage, and improve geomorphic compatability. Simulated streambed material will be added inside the culvert without causing impacts to the upstream and downstream channels (beyond the permanent impacts). Permanent impacts to the stream channel are the minimum necessary to match the new culvert to the existing stream channel.

The stream channel will continue to capture, contain, and convey stormwater runoff in the same manner as it does today. The surrounding landscape topography will not be changed as a result of this project, therefore stormwater runoff will enter the stream system the same way it currently does.

**SECTION I.X - SHORELINE STRUCTURES - CONSTRUCTION SURFACE AREA (Env-Wt 313.03(c)(1))**

Describe how the project has been designed to use the minimum construction surface area over surface waters necessary to meet the stated purpose of the structures.

N/A

**SECTION I.XI - SHORELINE STRUCTURES - LEAST INTRUSIVE UPON PUBLIC TRUST (Env-Wt 313.03(c)(2))**

Describe how the type of construction proposed is the least intrusive upon the public trust that will ensure safe docking on the frontage.

N/A

**SECTION I.XII - SHORELINE STRUCTURES – ABUTTING PROPERTIES (Env-Wt 313.03(c)(3))**

Describe how the structures have been designed to avoid and minimize impacts on ability of abutting owners to use and enjoy their properties.

N/A

**SECTION I.XIII - SHORELINE STRUCTURES – COMMERCE AND RECREATION (Env-Wt 313.03(c)(4))**

Describe how the structures have been designed to avoid and minimize impacts to the public's right to navigation, passage, and use of the resource for commerce and recreation.

N/A



**SECTION I.XIV - SHORELINE STRUCTURES – WATER QUALITY, AQUATIC VEGETATION, WILDLIFE AND FINFISH HABITAT (Env-Wt 313.03(c)(5))**

Describe how the structures have been designed, located, and configured to avoid impacts to water quality, aquatic vegetation, and wildlife and finfish habitat.

N/A

**SECTION I.XV - SHORELINE STRUCTURES – VEGETATION REMOVAL, ACCESS POINTS, AND SHORELINE STABILITY (Env-Wt 313.03(c)(6))**

Describe how the structures have been designed to avoid and minimize the removal of vegetation, the number of access points through wetlands or over the bank, and activities that may have an adverse effect on shoreline stability.

N/A

<b>PART II: FUNCTIONAL ASSESSMENT</b>	
<b>REQUIREMENTS</b>	Ensure that project meets the requirements of Env-Wt 311.10 regarding functional assessment (Env-Wt 311.04(j); Env-Wt 311.10).
<b>FUNCTIONAL ASSESSMENT METHOD USED:</b>	See attached stream crossing assessment.
<b>NAME OF CERTIFIED WETLAND SCIENTIST (FOR NON-TIDAL PROJECTS) OR QUALIFIED COASTAL PROFESSIONAL (FOR TIDAL PROJECTS) WHO COMPLETED THE ASSESSMENT:</b> JOSH BROWN, MATT URBAN, ANDREW CZACHOR	
<b>DATE OF ASSESSMENT:</b> 8/14/2023	
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 type="checkbox"/>	
Note: The Wetlands Functional Assessment worksheet can be used to compile the information needed to meet functional assessment requirements.	

**BUREAU OF ENVIRONMENT  
CONFERENCE REPORT**

**SUBJECT:** NHDOT Monthly Natural Resource Agency Coordination Meeting

**DATE OF CONFERENCE:** October 18, 2023

**LOCATION OF CONFERENCE:** Virtual meeting held via Zoom

**ATTENDED BY:**

**NHDOT**

Matt Urban  
Andrew O’Sullivan  
Mark Hemmerlein  
Joshua Brown  
Jon Evans  
Rebecca Martin  
Meli Dube  
David Scott  
James Commerford  
Levi Byers  
Kerry Ryan  
Leah Savage  
Arin Mills

**ACOE**

Mike Hicks

**USCG**

Gary Croot

**EPA**

Jean Brochi

**NHDES**

Karl Benedict  
Maryann Tilton  
Seta Detzel  
Emily Nichols

**NHB**

Absent

**NH Fish & Game**

Kevin Newton  
Mike Dionne

**Federal Highway**

Jamie Sikora

**US Fish & Wildlife**

Absent

**The Nature Conservancy**

Absent

**NH Transportation &  
Wildlife Workgroup**

Absent

**Consultants/ Public  
Participants**

Kimberly Peace  
Deb Coon  
Josif Bicja  
Christopher Fournier  
Tucker Gordon  
Katy Lewis  
Trevor Ricker  
Jordan Pike

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

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requirements in terms of repair or replacement. GC stated for clarification purposes the Pemigewasset River is considered navigable up to Lincoln.

Jamie Sikora (JS) FHWA acknowledged that NEPA was completed in 2020 under a programmatic agreement for CE approvals and deferred to the DOT to determine the need for completing a re-evaluation and processing a new environmental commitments memo. JE stated it is not expected that a formal re-evaluation will be necessary and are only updating elements as required. JS stated he deferred to the Department on to what level the re-evaluation would be and could be as simple as a note placed in the file.

**Sutton, 44212 (Non-fed):**

The project was presented by Jim Commerford, PE (JSC), Highway Design and Matt Urban (MU), Bureau of Environment. the project is located on NH Route 114 just south of the intersection with Village Rd, in the Town of Sutton NH. The existing structure is a 48” CMP x 60’ long carrying Thistle Brook under NH Route 114. A watershed boundary Map and Aerial image were displayed for viewing.

MU presented the findings of his environmental resource investigation for the project area indicating that Thistle Brook was a tributary to Lane River, the brook is identified as a Teir 2 Stream with a 584 Acre watershed. There are no PRA’s present according to the results of the WPPT mapper, no designated rivers nearby, and no known previous wetlands permits. An NHB review was completed (NHB23-1147) with results identifying Blanding’s Turtle and Wood Turtle. Coordination with New Hampshire Fish and Game (NHFG) Kevin Newton via email indicated that upsizing the structure as proposed with natural stream simulation would be an improvement. Based on consultation DOT agreed to incorporate project specific commitments for turtle flyers with contact information for Melissa Winters or Josh Megyesy. The US Fish and Wildlife Service (USFWS) IPAC consultation was completed with a determination of “No Effect” for Northern Long Eared Bat (NLEB). Additionally, the project has completed Cultural Resource Coordination with the determination that the project is to be processed under the Section 106 Programmatic Agreement Appendix B.

Representative photos showing existing conditions for the inlet and outlet areas, roadway, and wetlands (Palustrine and Riverine) were shared. It was also noted that the rock retaining wall adjacent to the existing inlet has cultural resource value, and that the DOT has minimized impacts to through its chosen preferred alternative that moves the inlet away from the retaining wall.

The wetland delineation with an aerial background image was shared and the various wetland types and locations were noted. Upstream is a combination of scrub shrub (PSS1E) and forested (PFO1E) palustrine wetlands along with an intermittent tributary (R4SB4,5). Thistle brook is classified as Riverine (R2UB4). As previously noted with pictures, there is a Palustrine (PEM1Ed) wetland near the outlet and beyond the roadway shoulder.

Three reference reaches were taken with an average Bankfull Width of 10.33 which equates to a 23’ compliant span when using the 2.2 entrenchment ratio multiplier. In addition, the references reaches consisted primarily of sand, with a smaller percentage of gravel, and occasional boulders.

A brief project overview was provided. The project is State funded through the culvert replacement Betterment program. The proposed ad-date is June 25, 2024, with construction anticipated in fall of 2024. The adjacent homeowner has reported occasional overtopping of the structure during high runoff events. It was reiterated that the stone retaining wall along the inlet was of cultural resources/historical value and used as a design constraint to ensure impacts to that resource were minimized. The condition of the culvert indicates corrosion at the invert of the pipe, additional voids along the bottom and sides, and an evident rust line. This structure is at the end of its design life.

The existing site plan, developed from recent survey and wetland delineations was shared. The location of three catchbasins which convey runoff to the 15" plastic outlet adjacent to the culvert inlet was noted. These were originally installed to help mitigate the occasional flooding. The hydrology was analyzed with the Streamstats (NH Rural Equation) and modified/increased with the USGS National Urban Equation using a Basin Development Factor (BDF) of 1. The watershed is flashy, with relatively low base flows and high runoff flows. The hydraulics indicate the existing inlet has poor hydraulic efficiency and the culvert has an approximate capacity of 76 cfs before overtopping the roadway. The 50-year Design Flow is 258 cfs.

An overview of the alternatives was provided that consisted of the following:

**Alternative 1:**

- Stream Crossing Rule Compliant Structure Bridge with 23' span
- Would require permanent easement and impacts to adjacent driveway. Significant Impacts also anticipated to stone retaining wall. Require raising the roadway approx. 1 foot.
- Cost Estimate: \$1,984,000 (does not include ROW impacts, acquisitions, design engineering, etc.) If selected, the project would be delayed 3-5 years or more for re-design and securing funding under a different Program.

**Alternative 2:**

- Slip-Line with new 5' Diameter Pipe 42" liner inside of 48" CMP
  - New 5' dia. CMP, embedded 1' with inlet located upstream existing pipe.
  - Significant improvement to culvert capacity.
  - Cost Estimate: \$369,000
- Alternative 3: (Proposed alternative)
- Embedded Box Culvert Hydraulically sized structure with 9' span with new inlet upstream of the existing pipe.
  - Embedded with Stream Simulation Material
  - Cost Estimate: \$750,000

A Performance Summary Table that showed a comparison of the 3 alternatives and pointed out that the proposed alternative (Alt#3) would no longer have overtopping at the 50 or 100 yr. storm event.

The Proposed Alternative Design consists of the following information:

- A 5' high by 9' span box culvert embedment with stream simulation material (4' by 9' clear opening)
- Proposed alignment will move the inlet approx. 25' upstream to improve hydraulic efficiency and adjust stream alignment.
- No change to roadway alignment or grade.
- Substantial improvement to hydraulic capacity.
- Embedment will include a stream armor layer for stability and primarily consist of sandy material to replicate existing substrate.
- Match outlet elevation of 730.41 (ft, NAVD88)
- Tie Invert Elevation into existing adjacent streambed elevation.

The Draft Wetland Impact Plan was shared. The alignment of the proposed structure shifts the inlet 25' upstream of the existing inlet and maintains the same outlet location. The new alignment will improve hydraulic efficiency at the inlet, minimize impacts to the stone retaining wall and the adjacent homeowner's driveway, and improve the constructability of the project.

The current total proposed impacts (Temp + Permanent) are 1,912 sf and 194LF. Which includes permanent impacts extending 15' downstream and 55' upstream of the existing culvert and 1,430 sf of temporary impact to the palustrine wetland near the outlet.

To summarize the Permanent and temporary Square Foot impacts are under 5,000 SF. The current Permanent Linear Foot impacts are 194 LF with the proposed re-alignment (such that we believe we are under the mitigation threshold). This would be proposed as an Alternative Design per the requirements of Env-904.10 since the proposed structure does not meet span requirement. However, the proposed culvert meets the remaining general design criteria under 904.01 and complies with the provisions of 904.07 to the maximum extent practicable and that the proposed culvert will substantially improve hydraulic capacity and connectivity, aquatic organism passage, sediment transport, and geomorphic compatibility.

Comments from Karl Benedict (DES) called attention to the impacts associated with the PEM1Ed grassed swale that would be impacted. He had two comments specific to this impact area. First, he asked that the Department look at those impacts to determine if they can be reduced and to limit access and staging in that quadrant to minimize the impacts. Secondly, he noted that when we propose to regrade/reintroduce the swale into the brook at a new location it appeared we did not account for impacts to the bank of the stream. DOT agreed that this area should be included in the linear foot bank impacts and will take that into account for the final impact plans. DOT also agreed to look for ways to minimize any additional impacts to the PEM1Ed swale.

There was some additional discussion as to whether or not the additional LF of impact associated with the reintroduction of the swale on the stream bank may put the total LF over 200LF whereby triggering mitigation potentially. DOT will evaluate whether the project will cross the 200LF threshold. If it's not feasible, DOT may seek additional coordination from the DES wetlands/mitigation program to discuss potential mitigation credits for the impacts area associated with the stream at the inlet that will be transitioning from stream channel to a wetland area through the act of moving the inlet of the structure 25 LF from its existing location. This area is shown as a permanent impact in the LF totals but is not a total loss of jurisdictional

resources and therefore DOT feels some consideration for mitigation “credit” may be up for discussion.

A third question raised by Karl Benedict was in regard to the alternative designs that were discussed. Karl asked if an alternative had been considered between the 9’ span and 23’ spans, for example a 12’ box structure with a wildlife bench within to meet the rules to be compliant with 904.07 vs. the proposed alternative design. The Department indicated it did look at some other alternatives but that they were determined to be infeasible/impracticable for various reasons such as design constraints, constructability, increased impacts, and additional costs and that we could include such an explanation in our discussion of alternatives in the application.

Kevin Newton (KN) from NH Fish and Game inquired about the timing of the work as it may relate to the turtle records identified in the NHB results. DOT indicated that the hope is to have construction occur in the fall of 2024. Kevin indicated this would be a good time of year for the work and noted spring construction may conflict with turtle nesting season.

**Weare, 41165 (non-Fed):**

Kerry Ryan, NHDOT Environmental Manager, gave an overview of the location of the proposed state funded bridge maintenance project, located at bridge 137/043 which carries NH Route 114 over Otter Brook. The existing crossing are dual 66” corrugated metal pipes connecting a lacustrine and palustrine system (Daniels Lake) and therefore function like an equalizer. This area is dam controlled. This is a Tier 3 crossing. Photos were shown of the surrounding area and outlet and inlet sides of the pipe.

Levi Byers, NHDOT Bridge Maintenance Engineer, described the purpose of the proposed project which is to replace the existing structure with an open span, 28’ wide three-sided structure. Draft impact plans were discussed which show permanent palustrine, lacustrine, and palustrine wetland impacts. Construction sequence, and hydraulic analysis were also discussed. K. Ryan described the resources in the area and summarized the September 21, 2016 Natural Resource Agency Meeting discussion of this project when it was determined the area is dam controlled, the second structure is not state owned, the crossing does not fall under the stream crossing guidelines, and a wildlife shelf is not necessary as changing from a dual opening structure to a single opening structure is an improvement.

Karl Benedict, NHDES asked (1) if there has been any considerations for a wildlife shelf, (2) if the velocities require riprap, and (3) if the rip rap could be pulled back to the end of the headwall?

L. Byers responded riprap was included because during larger storm events there are increased velocities through the structure even with the dam downstream, there is some swirling action by the masonry headwalls, and as the row line runs just south of the wing walls the Department wants to be sure to protect the structure from scour. K. Benedict asked if we could (4) follow the current contour rather than fill, (5) if it could be vegetated and still achieve the same stability, and (6) if there has been any coordination with the town regarding the second structure. L. Byers responded the second structure is privately owned and is not owned by the town and that since

**CULVERT REPLACEMENT  
NH ROUTE 114 OVER THISTLE BROOK  
SUTTON, NH  
NHDOT PROJECT NO. 44212  
NATURAL RESOURCE MEETING MINUTES SUPPLEMENT**

This document summarizes design changes which have occurred since the October 18<sup>th</sup> Natural Resources meeting. There are two main design changes, which affect the culvert span and the swale outlet, and are described below.

**Culvert Span Revised to 8 Feet**

The culvert span presented during the Natural Resources meeting was 9' perpendicular to the culvert. As measured along the roadway the span is 11.3' due to the 52 degree skew of the culvert relative to the roadway centerline. In accordance with RSA 234:2, a bridge is defined as having "a clear span of 10 feet or more measured along the centerline of the roadway" (RSA 234:2). Therefore, this structure would be considered a bridge. Chapter 2 Section 2.7 of the NH Bridge Design Manual specifies a minimum freeboard of 1 foot at the design flow, which requires raising the roadway for approximately 450 feet. The associated increase in cost to raise the roadway is approximately \$190,000.

Review of the hydraulic analysis shows that a shorter span will prevent overtopping at the 50-year design flow without causing foreseeable damage at the 100 year flow. By incorporating a 2" bevel for the crown of the box culvert inlet, modeling a more detailed outlet channel, and reviewing energy loss coefficients for sandy embedment material, an 8' span (10' as measured at the centerline) meeting the criteria was met. Detailed results for this proposed alternative are available in the supplemental narrative attached to this permit application.

**Swale Outlet Removed**

It was noted during the Natural Resources meeting that the intention was to outlet the existing grassed swale downstream of the culvert. The existing swale has no defined outlet and water ponds at the low point due to poor infiltration. This area is classified as a PEM1ed wetland. No impacts were presented during the meeting. The primary concern with ponding in the existing swale is the build-up of hydrostatic pressure due to saturated soils behind the wing/retaining wall on the north side of the outlet. Hydrostatic pressure increases the overall pressure behind the wall and is typically avoided.

Further review of the Right-of-Way (ROW) indicates that any outlet to the swale would occur outside the existing ROW and would require a permanent easement with the Town of Sutton. Instead of pursuing this further, it was determined weep holes in the wingwall will be sufficient to drain the soil immediately behind the wall. No changes to the grading of the swale are proposed. Areas noted as temporary impact on the wetland plans will be restored to pre-construction conditions.





**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(c)

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 (A/M), pursuant to RSA 482-A:1 and Env-Wt 311.07(c).

For the construction or modification of non-tidal shoreline structures over areas of surface waters without wetland vegetation, complete only Sections 1, 2, and 4 (or the applicable sections in [Attachment A: Minor and Major Projects \(NHDES-W-06-013\)](#)).

The following definitions and abbreviations apply to this worksheet:

- “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 Dept. of Transportation		
PROJECT STREET ADDRESS: NH Route 114	PROJECT TOWN: Sutton	
TAX MAP/LOT NUMBER: Map: 06 (Within State 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
<p>If you answered “no” to this question, describe the purpose of the “non-access” project type you have proposed:</p> <p>The purpose of this project is to replace a hydraulically undersized and structurally deficient 48" diameter and 60' long corrugated metal pipe culvert conveying Thistle Brook under NH 114, in order to support the long term and safe use of the State's public transportation network.</p>		

[irm@des.nh.gov](mailto: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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<b>SECTION 3 - A/M PROJECT DESIGN TECHNIQUES</b>		
Check the appropriate boxes below in order to demonstrate that these items have been considered in the planning of the project. Use N/A (not applicable) for each technique that is not applicable to your project.		
Env-Wt 311.07(b)(2)	For any project that proposes new permanent impacts of more than one acre or that proposes new 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"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 311.07(b)(3)	Whether alternative designs or techniques, such as different layouts, construction sequencing, or alternative technologies could be used to avoid impacts to jurisdictional areas or their functions and values.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(1) Env-Wt 311.10(c)(2)	The results of the functional assessment required by Env-Wt 311.03(b)(10) were used to select the location and design for the proposed project that has the least impact to wetland functions.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(3)	Where impacts to wetland functions are 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"/> Check <input type="checkbox"/> N/A
Env-Wt 313.01(c)(1) Env-Wt 313.01(c)(2) Env-Wt 313.03(b)(1)	No practicable alternative would reduce adverse impact on the area and environments under the department's jurisdiction and the project will not cause random or unnecessary destruction of wetlands.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
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"/> Check <input 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"/> Check <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"/> Check <input type="checkbox"/> N/A
Env-Wt 311.10 A/M BMPs	The project clusters structures to avoid wetland impacts.	<input type="checkbox"/> Check <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"/> Check <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 type="checkbox"/> Check <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"/> Check <input checked="" type="checkbox"/> N/A

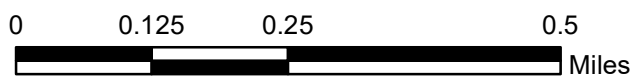
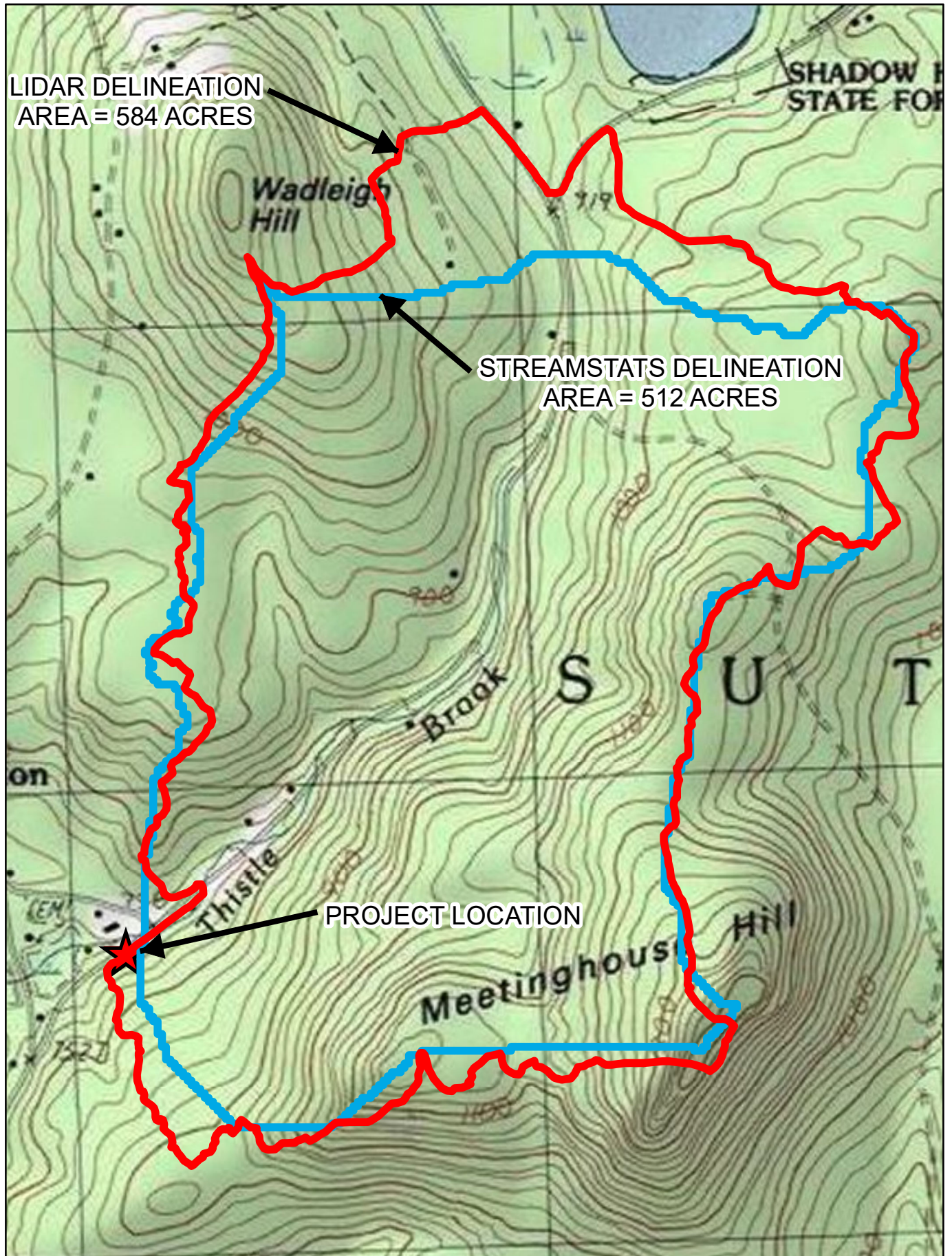
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A/M BMPs	The project is designed to minimize the number and size of crossings, and crossings cross wetlands and/or streams at the narrowest point.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 500 Env-Wt 600 Env-Wt 900	Wetland and stream crossings include features that accommodate aquatic organism and wildlife passage.	<input checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
Env-Wt 900	Stream crossings are sized to address hydraulic capacity and geomorphic compatibility.	<input checked="" type="checkbox"/> Check <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 checked="" type="checkbox"/> Check <input type="checkbox"/> N/A
<b>SECTION 4 - NON-TIDAL SHORELINE STRUCTURES</b>		
Env-Wt 313.03(c)(1)	The non-tidal shoreline structure has been designed to use the minimum construction surface area over surfaces waters necessary to meet the stated purpose of the structure.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 313.03(c)(2)	The type of construction proposed for the non-tidal shoreline structure is the least intrusive upon the public trust that will ensure safe navigation and docking on the frontage.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 313.03(c)(3)	The non-tidal shoreline structure has been designed to avoid and minimize impacts on the ability of abutting owners to use and enjoy their properties.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 313.03(c)(4)	The non-tidal shoreline structure has been designed to avoid and minimize impacts to the public's right to navigation, passage, and use of the resource for commerce and recreation.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 313.03(c)(5)	The non-tidal shoreline structure has been designed, located, and configured to avoid impacts to water quality, aquatic vegetation, and wildlife and finfish habitat.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A
Env-Wt 313.03(c)(6)	The non-tidal shoreline structure has been designed to avoid and minimize the removal of vegetation, the number of access points through wetlands or over the bank, and activities that may have an adverse effect on shoreline stability.	<input type="checkbox"/> Check <input checked="" type="checkbox"/> N/A

# SUTTON 44212



## WATERSHED MAP



WETLANDS PERMIT APPLICATION  
STREAM CROSSING WORKSHEET  
Water Division/Land Resources Management  
Wetlands Bureau



**RSA/Rule** RSA 482-A/ Env-Wt-900

This worksheet can be used to accompany Wetlands Permit Applications when proposing stream crossings.

[lrn@des.nh.gov](mailto:lrn@des.nh.gov) or (603) 271-2147

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## SECTION 1 - TIER CLASSIFICATIONS

Determine the contributing watershed size at [USGS StreamStats](#).

Note: Plans for tier 2 and 3 crossings shall be designed and stamped by a professional engineer who is licensed under RSA 310-A to practice in New Hampshire.

Size of contributing watershed at the crossing location: 584 acres

**Tier 1:** A tier 1 stream crossing is a crossing located on a watercourse where the contributing watershed size is less than or equal to 200 acres.

**Tier 2:** A tier 2 stream crossing is a crossing located on a watercourse where the contributing watershed size is greater than 200 acres and less than 640 acres.

**Tier 3:** A tier 3 stream crossing is a crossing that meets **any** of the following criteria:

On a watercourse where the contributing watershed is more than 640 acres.

Within a [designated river corridor](#) unless:

a. The crossing would be a tier 1 stream based on contributing watershed size, or

b. The structure does not create a direct surface water connection to the designated river as depicted on the national hydrography dataset as found on GRANIT.

Within a [100-year floodplain](#) (see Section 2 below).

In a jurisdictional area having any protected species or habitat ([NHB DataCheck](#)).

In a prime wetland or within a duly-established 100-foot buffer, unless a waiver has been granted pursuant to RSA 482-A:11, IV(b) and Env-Wt 706. Review the [Wetlands Permit Planning Tool \(WPPT\)](#) for town prime wetland and prime wetland buffer maps to determine if your project is within these areas.

**Tier 4:** A tier 4 stream crossing is a crossing located on a tidal watercourse.

## SECTION 2 - 100-YEAR FLOODPLAIN

Use the [FEMA Map Service Center](#) to determine if the crossing is located within a 100-year floodplain. Please answer the questions below:

**No:** The proposed stream crossing *is not* within the FEMA 100-year floodplain.

**Yes:** The proposed project *is* within the FEMA 100-year floodplain. Zone =

Elevation of the 100-year floodplain at the inlet:  feet (FEMA El. or Modeled El.)

## SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): 308 CFS

Calculation method: Regression

Estimated bankfull discharge at the crossing location: 73 CFS

Calculation method: Regression

➡ **Note: If tier 1, then skip to Section 10** ←

## SECTION 4 - PREDICTED CHANNEL GEOMETRY BASED ON REGIONAL HYDRAULIC CURVES

For **tier 2, tier 3 and tier 4** crossings only.

Bankfull Width: 11.2 feet

Mean Bankfull Depth: 1.2 feet

Bankfull Cross Sectional Area: 13.5 square feet (SF)

## SECTION 5 - CROSS SECTIONAL CHANNEL GEOMETRY: MEASUREMENTS OF THE EXISTING STREAM WITHIN A REFERENCE REACH

For **tier 2, tier 3 and tier 4** crossings only.

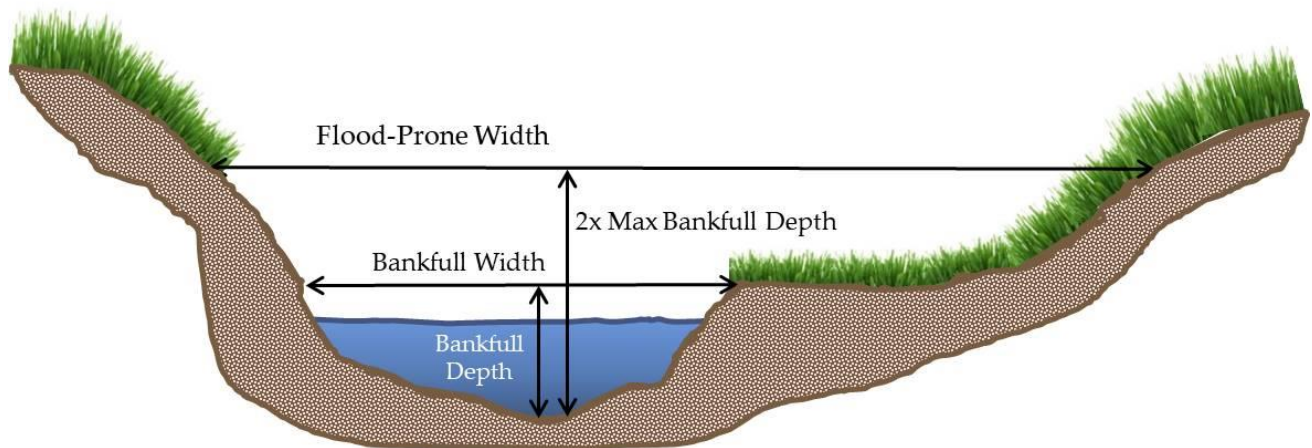
Describe the reference reach location: Upstream, Forested

Reference reach watershed size: 584 acres

Parameter	Cross Section 1	Cross Section 2	Cross Section 3	Range
-----------	-----------------	-----------------	-----------------	-------

	Describe bed form Run (e.g. pool, riffle, glide)	Describe bed form Run (e.g. pool, riffle, glide)	Describe bed form Run (e.g. pool, riffle, glide)	
<a href="#">Bankfull Width</a>	9 feet	8 feet	14 feet	8 -14 feet
<a href="#">Bankfull Cross Sectional Area</a>	9.9 SF	11.8 SF	18.9 SF	9.9-18.9 SF
Mean <a href="#">Bankfull Depth</a>	1.1 feet	1.5 feet	1.4 feet	1.1-1.5 feet
<a href="#">Width to Depth Ratio</a>	8.2	5.4	10.4	5.4 - 10.4
Max <a href="#">Bankfull Depth</a>	2.3 feet	1.9 feet	1.8 feet	1.8-2.3 feet
<a href="#">Flood Prone Width</a>	88 feet	94 feet	64 feet	64 -94 feet
<a href="#">Entrenchment Ratio</a>	9.78	11.75	4.57	4.57- 11.75

Use **Figure 1** below to determine the measurements of the Reference Reach Attributes



**Figure 1:** Determining the Reference Reach Attributes.

<b>SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION</b>	
<i>For tier 2, tier 3 and tier 4 crossings only.</i>	
Average Channel Slope of the Reference Reach:	<1%
Average Channel Slope at the Crossing Location:	<1%
<b>SECTION 7 - PLAN VIEW GEOMETRY</b>	
Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths.	
<i>For tier 2, tier 3 and tier 4 crossings only.</i>	
Sinuosity of the Reference Reach:	1.06
Sinuosity of the Crossing Location:	1.18
<b>SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS</b>	
<i>For tier 2, tier 3 and tier 4 crossings only.</i>	
% of reach that is bedrock:	0 %
% of reach that is boulder:	3 %
% of reach that is cobble:	0 %
% of reach that is gravel:	33 %

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

[www.des.nh.gov](http://www.des.nh.gov)

% of reach that is sand:	64 %
% of reach that is silt:	0 %
<b>SECTION 9 - STREAM TYPE OF REFERENCE REACH</b>	
<i>For tier 2, tier 3 and tier 4 crossings only.</i>	
Stream Type of Reference Reach:	Type C

Refer to Rosgen Classification Chart (Figure 2) below:

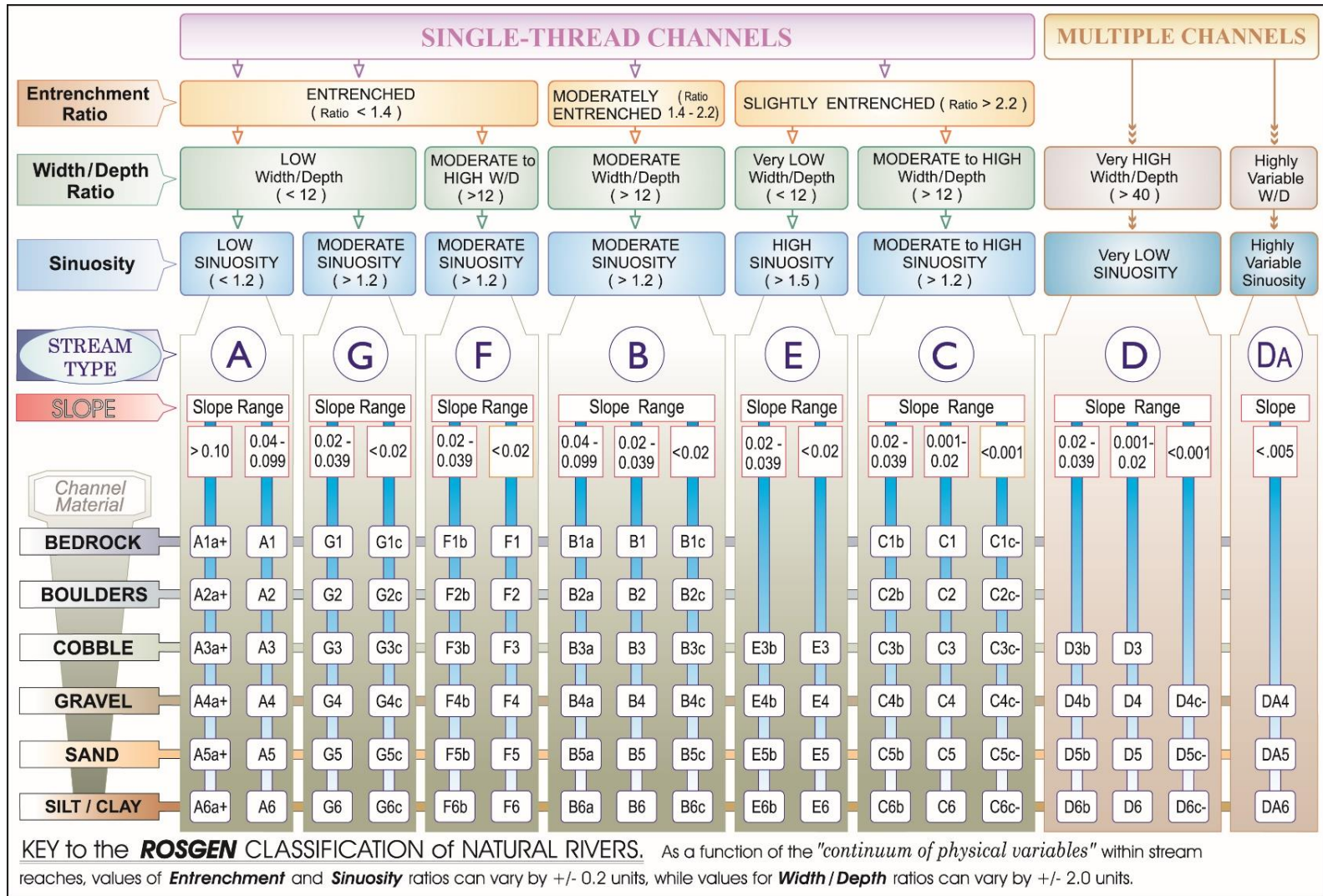


Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

<b>SECTION 10 - CROSSING STRUCTURE METRICS</b>	
<b>Existing Conditions</b>	<b>Existing Structure Type:</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Bridge span</li> <li><input type="checkbox"/> Pipe arch</li> <li><input type="checkbox"/> Open-bottom culvert</li> <li><input checked="" type="checkbox"/> Closed-bottom culvert</li> <li><input type="checkbox"/> Closed-bottom culvert with stream simulation</li> <li><input type="checkbox"/> Other: <span style="background-color: #cccccc; border: 1px solid black; padding: 2px 5px;"> </span></li> </ul>
	<b>Existing Crossing Span:</b> 4 feet <i>(perpendicular to flow)</i>
	<b>Culvert Diameter:</b> 4 feet <b>Inlet Elevation:</b> El. 731.03 feet



<b>Existing Crossing Length:</b> 60 feet <i>(parallel to flow)</i>		<b>Outlet Elevation:</b> El. 730.41 feet			
		<b>Culvert Slope:</b> <1%			
<b>Proposed Conditions</b>	<b>Proposed Structure Type:</b>	<b>Tier 1</b>	<b>Tier 2</b>	<b>Tier 3</b>	<b>Alternative Design</b>
	Bridge Span	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Pipe Arch	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Closed-bottom Culvert	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
	Open-bottom Culvert	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Closed-bottom Culvert with stream simulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Proposed Structure Span:</b> 8 feet <i>(perpendicular to flow)</i>	<b>Culvert Diameter:</b> N/A feet			
	<b>Inlet Elevation:</b> El. 731.2 feet				
<b>Proposed Structure Length:</b> 70 feet <i>(parallel to flow)</i>	<b>Outlet Elevation:</b> El. 730.41 feet				
	<b>Culvert Slope:</b> 1.1%				
<b>Proposed Entrenchment Ratio:</b> * 10.25					
<i>For Tier 2, Tier 3 and Tier 4 Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.</i>					

\* Note: Proposed Entrenchment Ratio must meet the minimum ratio for each stream type listed in **Figure 3**, otherwise the applicant must address the Alternative Design criteria listed in Env-Wt 904.10.

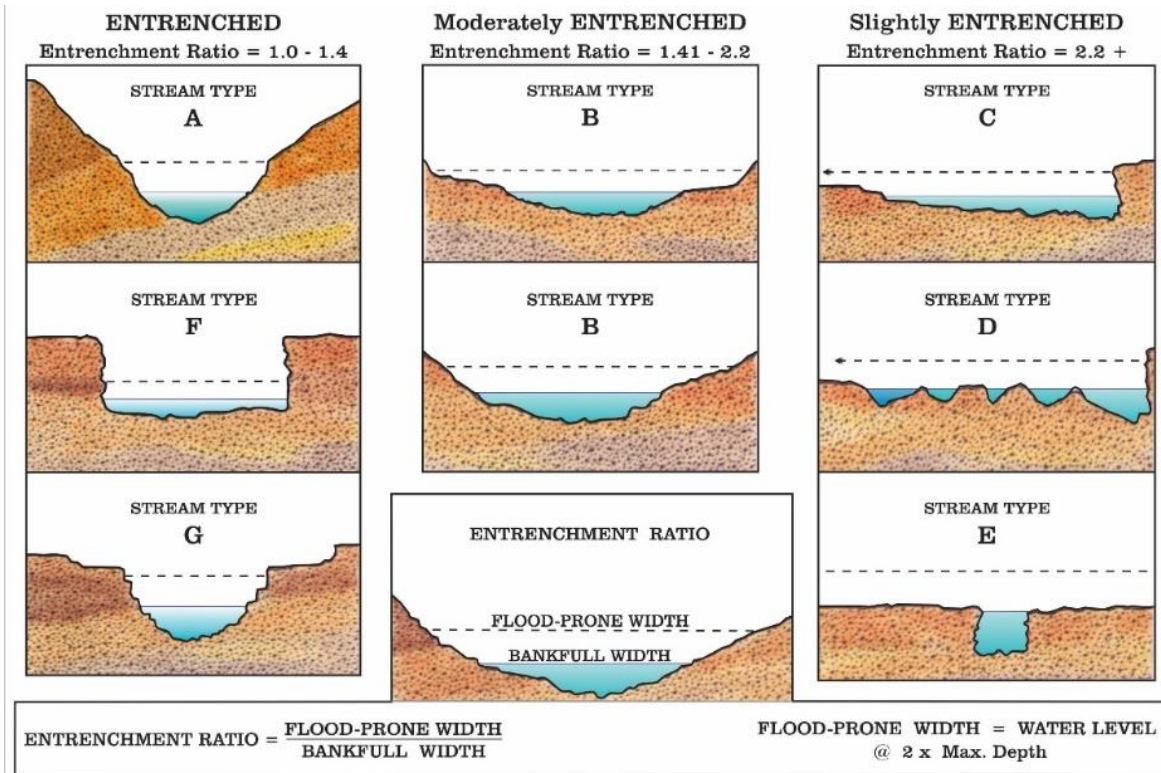


Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	Proposed
100 year flood stage elevation at inlet:	737.4	736.68
Flow velocity at outlet in feet per second (FPS):	6.33	3.65

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[www.des.nh.gov](http://www.des.nh.gov)

Calculated 100 year peak discharge (Q) for the <i>proposed</i> structure in CFS:	308
Calculated 50 year peak discharge (Q) for the <i>proposed</i> structure in CFS:	258
<b>SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO</b>	
<i>For tier 2, tier 3 and tier 4 crossings only.</i>	
<b>Crossing Structure Openness Ratio*</b> = 0.46 * Openness box culvert = (height x width)/length Openness round culvert = (3.14 x radius <sup>2</sup> )/length	
<b>SECTION 13 - GENERAL DESIGN CONSIDERATIONS</b>	
Env-Wt 904.01 requires all stream crossings to be designed and constructed according to the following requirements. Check each box if the project meets these general design considerations.	
All stream crossings shall be designed and constructed so as to: <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Not be a barrier to sediment transport.</li> <li><input checked="" type="checkbox"/> Prevent the restriction of high flows and maintain existing low flows.</li> <li><input checked="" type="checkbox"/> Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.</li> <li><input checked="" type="checkbox"/> Not cause an increase in the frequency of flooding or overtopping of banks.</li> <li><input checked="" type="checkbox"/> Maintain or enhance geomorphic compatibility by: <ul style="list-style-type: none"> <li>a. Minimizing the potential for inlet obstruction by sediment, wood, or debris, and</li> <li>b. Preserving the natural alignment of the stream channel.</li> </ul> </li> <li><input checked="" type="checkbox"/> Preserve watercourse connectivity where it currently exists.</li> <li><input checked="" type="checkbox"/> Restore watercourse connectivity where: <ul style="list-style-type: none"> <li>a. Connectivity previously was disrupted as a result of human activity(ies), and</li> <li>b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both.</li> </ul> </li> <li><input checked="" type="checkbox"/> Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.</li> <li><input checked="" type="checkbox"/> Not cause water quality degradation.</li> </ul>	
<b>SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA</b>	
Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.	
<input type="checkbox"/> The proposed project meets the tier specific design criteria listed in Part Env-Wt 904 and each requirement has been addressed in the plans and as part of the wetland application.	
<b>SECTION 15 - ALTERNATIVE DESIGN</b>	
<b>NOTE:</b> If the proposed crossing does not meet all of the general design considerations, the tier specific design criteria, or the minimum entrenchment ratio for each given stream type listed in <b>Figure 3</b> , then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.	
<input checked="" type="checkbox"/> I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.	

**New Hampshire Department of Transportation  
Bureau of Environment  
Stream Crossing Summary Report**

**Project:** Sutton, 44212

**Coordinates (Lat/Long):** 43.33214, -71.94577

**Date of Assessment:** August 14, 2023

**Assessment Completed By:** Josh Brown, Matt Urban, & Andrew Czachor

**Stream Information:**

**Stream Name:** Thistle Brook

**Stream Tier:** Tier 2

**Watershed Area:** 584 acres

**Wetland Classification:** R2UB4

**Average Reference Reach Values:**

**Average Bankfull Width:** 10.3'

**Average Slope:** <1%

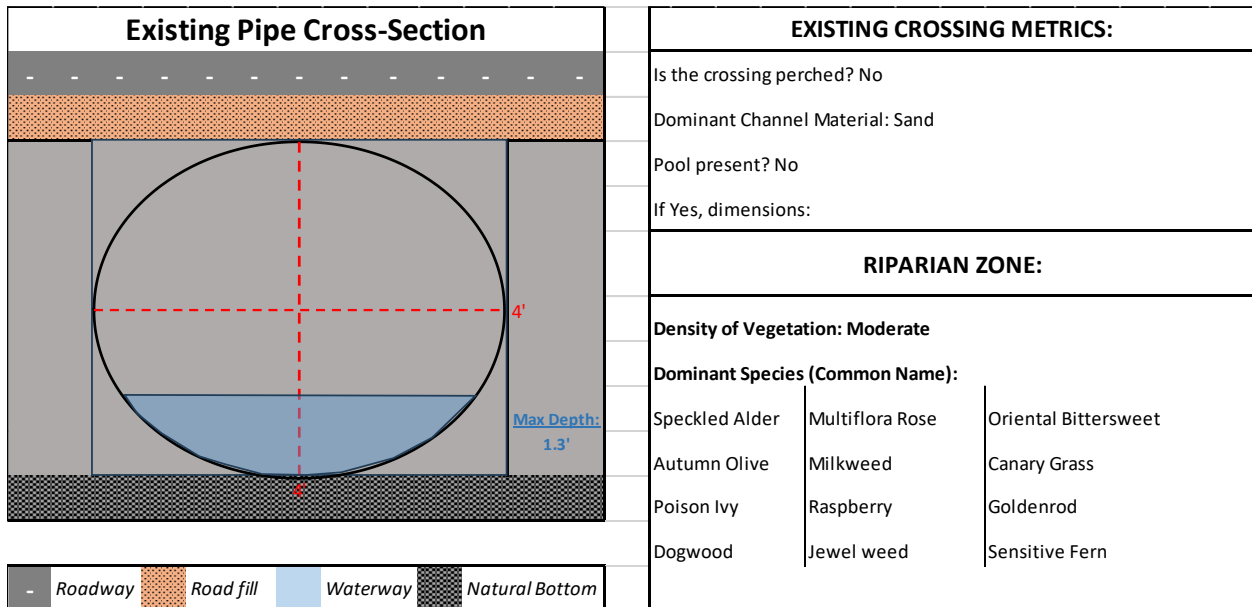
**Average Floodprone Width:** 82'

**Entrenchment Ratio:** 8.7

**Average Depth:** 1.3'

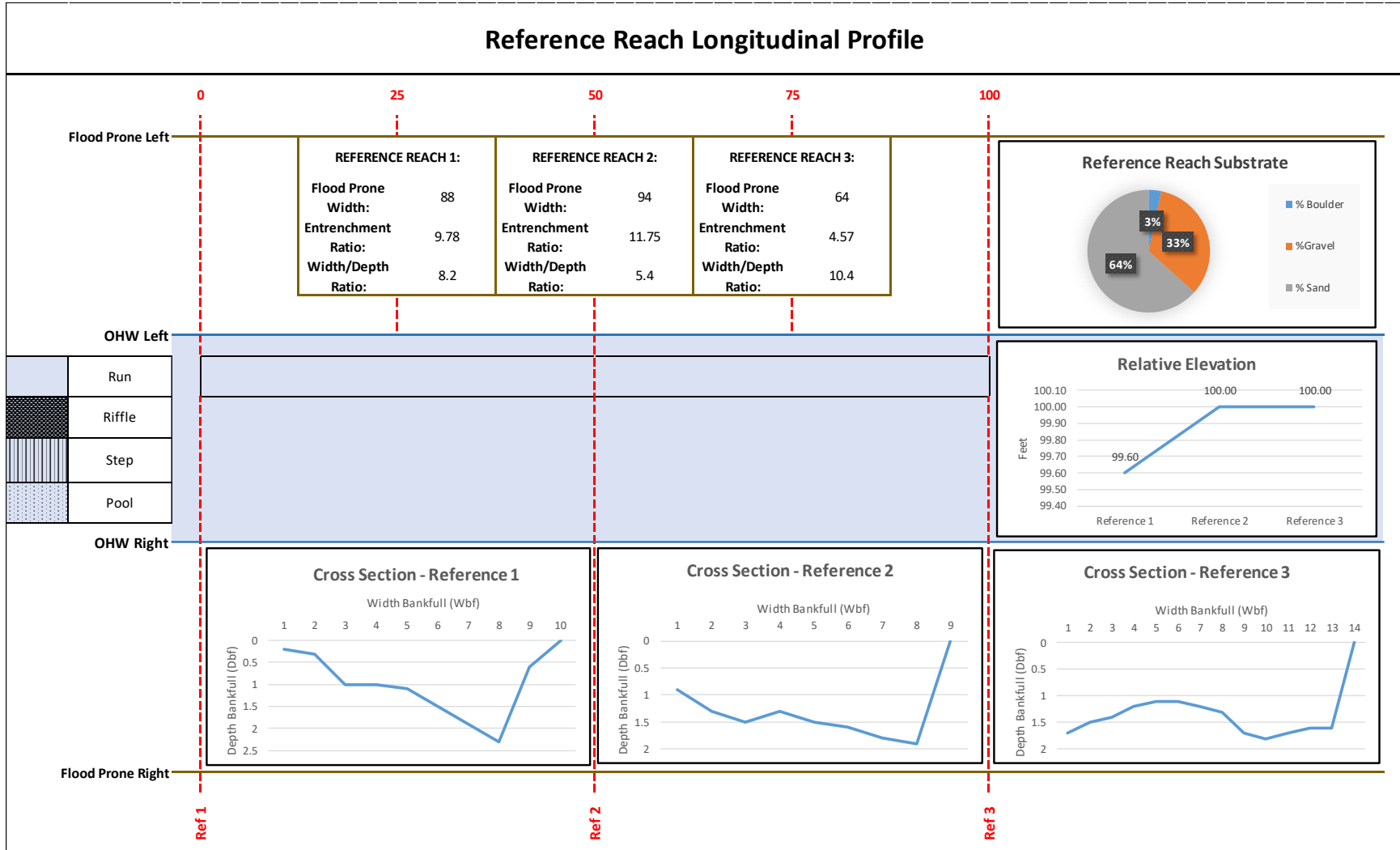
**Rosgen Classification:** Type C

**Existing Arch Pipe Cross Section:**



# New Hampshire Department of Transportation Bureau of Environment Stream Crossing Summary Report

## Reference Reach Longitudinal Profile



New Hampshire Department of Transportation  
Bureau of Environment  
Stream Crossing Summary Report

Photos:



**Photo 1:** *View of Outlet – Looking upstream*



**Photo 2:** *View of Outlet Area – Looking downstream*

New Hampshire Department of Transportation  
Bureau of Environment  
Stream Crossing Summary Report



**Photo 3:** *View of Inlet –Looking downstream*



**Photo 4:** *View of Inlet Area – Looking upstream*

New Hampshire Department of Transportation  
Bureau of Environment  
Stream Crossing Summary Report



**Photo 5:** *Reference Reach One – Looking upstream*



**Photo 6:** *Reference Reach One – Looking downstream*

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Stream Crossing Summary Report



**Photo 7:** *Reference Reach Two – Looking upstream*



**Photo 8:** *Reference Reach Two – Looking downstream*



New Hampshire Department of Transportation  
Bureau of Environment  
Stream Crossing Summary Report



*Photo 9: Reference Reach Three – Looking upstream*



*Photo 10: Reference Reach Three - Looking downstream*

# Memo

## NH Natural Heritage Bureau NHB DataCheck Results Letter

Please note: portions of this document are confidential.

Maps and NHB record pages are confidential and should be redacted from public documents.

**To:** Matt Urban, NH Department of Transportation  
7 Hazen Dr.  
Concord, NH 03301

**From:** NHB Review, NH Natural Heritage Bureau

**Date:** 4/18/2023 (valid until 04/18/2024)

**Re:** Review by NH Natural Heritage Bureau

**Permits:** NHDES - Wetland Standard Dredge & Fill - Major, USACE - General Permit

**NHB ID:** NHB23-1147

Town: Sutton

Location: NH Route 114

Description: Replace 60-ft long, 48 dia. CMP pipe conveying Thistle Brook under NH Rte 114 in Sutton, NH. Proposed replacement to be larger structure (i.e. embedded concrete box culvert) with greater hydraulic capacity. Construction BMP's may include; cofferdam downstream and upstream along with temporary pipe for water control, sediment dewatering bags, straw waddle, etc.

cc: NHFG Review

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

**Comments** NHB: No comments at this time.

F&G: Please refer to NHFG consultation requirements below.

Vertebrate species	State <sup>1</sup>	Federal	Notes
Blanding's Turtle ( <i>Emydoidea blandingii</i> )*	E	--	Contact the NH Fish & Game Dept (see below).
Wood Turtle ( <i>Glyptemys insculpta</i> )	SC	--	Contact the NH Fish & Game Dept (see below).

<sup>1</sup>Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (\*) indicates that the most recent report for that occurrence was more than 20 years ago.

For all animal reviews, refer to 'IMPORTANT: NHFG Consultation' section below.

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Disclaimer: A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

---

## Memo

## NH Natural Heritage Bureau NHB DataCheck Results Letter

Please note: portions of this document are confidential.

Maps and NHB record pages are confidential and should be redacted from public documents.

### **IMPORTANT: NHFG Consultation**

If this NHB Datacheck letter DOES NOT include ANY wildlife species records, then, based on the information submitted, no further consultation with the NH Fish and Game Department pursuant to Fis 1004 is required.

If this NHB Datacheck letter includes a record for a threatened (T) or endangered (E) wildlife species, consultation with the New Hampshire Fish and Game Department under Fis 1004 may be required. To review the Fis 1000 rules (effective February 3, 2022), please go to <https://wildlife.state.nh.us/wildlife/environmental-review.html>. All requests for consultation and submittals should be sent via email to [NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov) or can be sent by mail, and **must include the NHB DataCheck results letter number and “Fis 1004 consultation request” in the subject line.**

If the NHB DataCheck response letter does not include a threatened or endangered wildlife species but includes other wildlife species (e.g., Species of Special Concern), consultation under Fis 1004 is not required; however, some species are protected under other state laws or rules, so coordination with NH Fish & Game is highly recommended or may be required for certain permits. While some permitting processes are exempt from required consultation under Fis 1004 (e.g., *statutory permit by notification, permit by rule, permit by notification, routine roadway registration, docking structure registration, or conditional authorization by rule*), coordination with NH Fish & Game may still be required under the rules governing those specific permitting processes, and it is recommended you contact the applicable permitting agency. For projects not requiring consultation under Fis 1004, but where additional coordination with NH Fish and Game is requested, please email [NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov), and include the NHB DataCheck results letter number and “review request” in the email subject line.

Contact NH Fish & Game at (603) 271-0467 with questions.

## New Hampshire Natural Heritage Bureau - Animal Record

### Blanding's Turtle (*Emydoidea blandingii*)

#### Legal Status

Federal: Not listed  
State: Listed Endangered

#### Conservation Status

Global: Apparently secure but with cause for concern  
State: Critically imperiled due to rarity or vulnerability

#### Description at this Location

Conservation Rank: Fair quality, condition and/or landscape context ('C' on a scale of A-D).  
Comments on Rank: --

Detailed Description: 1999: Area 1638: 1 turtle nesting.

General Area: --

General Comments: --

Management: --

Comments:

#### Location

Survey Site Name: Lane River  
Managed By:

County: Merrimack

Town(s): Sutton

Size: 30.8 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 1999: Area 1638: Sutton Rescue Recovery Center. Rte. 114.

#### Dates documented

First reported: 1999

Last reported: 1999

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

## New Hampshire Natural Heritage Bureau - Animal Record

**Wood Turtle (*Glyptemys insculpta*)****Legal Status**

Federal: Not listed  
State: Special Concern

**Conservation Status**

Global: Rare or uncommon  
State: Rare or uncommon

**Description at this Location**

Conservation Rank: Good quality, condition and landscape context ('B' on a scale of A-D).  
Comments on Rank: --

Detailed Description: 2012: Area 13009: 1 adult observed. 2011: Area 13146: 1 adult observed. 1999: Area 1667: 14 year old female seen. Area 1668: At least one adult seen.

General Area: 2012: Area 13009: Middle of road. Surrounding habitat is mixed woods on east side and extensive wetlands running along west side of Rt.114. 2011: Area 13146: Shrub wetland near houses. 1999: Area 1667: Scrub-shrub wetland, soil type: Colton/sandy gravel - wild strawberry fruits and leaves open meadow in natural herbaceous cover. Area 1668: Marsh.

General Comments: --  
Management: --  
Comments:

**Location**

Survey Site Name: Lane River  
Managed By:

County: Merrimack  
Town(s): Sutton  
Size: 71.1 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2012: Area 13009: Rt.114 about .5 mile south of the wetland that is on both sides of Rt.114 that is south of fork where Rt.114 continues north to North Sutton and Main St. splits west to Sutton. Wetlands of Lane River are immediately west of wooded highway corridor. 2011: Area 13046: Meetinghouse Hill Road, Sutton. 1999: Area 1667: Lane River as it borders Sutton Mills. Area 1668: Lane River.

**Dates documented**

First reported: 1999-07-10 Last reported: 2012-06-16

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

## Urban, Matt

---

**From:** Newton, Kevin  
**Sent:** Tuesday, November 21, 2023 3:35 PM  
**To:** Urban, Matt  
**Cc:** FGC: NHFG review; Martin, Rebecca  
**Subject:** RE: NHB Review: NHB23-1147

Hi Matt,

Thanks for looping NHFG back into the discussion and providing the plan sheets. I have no further comments to add to the discussion at this time on behalf of the non-game program. I'll add this to our file.

Thanks,

Kevin Newton  
Wildlife Biologist  
NH Fish and Game Department  
Wildlife Division  
11 Hazen Drive, Concord NH 03301  
Phone: 603-271- 5860

---

**From:** Urban, Matt <Matt.R.Urban@dot.nh.gov>  
**Sent:** Thursday, November 16, 2023 11:55 AM  
**To:** Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>  
**Cc:** FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Winters, Melissa <Melissa.J.Winters@wildlife.nh.gov>; Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>  
**Subject:** RE: NHB Review: NHB23-1147

Hi Kevin,

Just looking to close the loop on this project coordination before we submit the wetlands application to DES. In our last correspondence below, you asked us to follow-up and let you know when we knew the proposed size of the box and if we had plans for you to see.

The proposed upgrade is going from a 48" pipe to an 8' wide by 5' high box with 1' of natural streambed simulation through the structure.

I have attached the latest plans for you to review as requested.

In the email chain below, you will recall that we have already discussed and agreed to incorporate the bulleted project specific commitments in our environmental document and project related contracts.

It would be great if you can let us know that with the additional information provided today in this email that F&G is satisfied with the proposed project improvements and project commitments in order to finalize our coordination so that we can submit our wetlands application.

Thanks,

Matt Urban  
Chief, Operations Management Section  
NHDOT Bureau of Environment  
[Matt.R.Urban@dot.nh.gov](mailto:Matt.R.Urban@dot.nh.gov)  
Office Phone: (603) 271-7969  
Cell Phone: (603) 513-9526

---

**From:** Newton, Kevin <[Kevin.M.Newton@wildlife.nh.gov](mailto:Kevin.M.Newton@wildlife.nh.gov)>  
**Sent:** Thursday, April 20, 2023 11:24 AM  
**To:** Urban, Matt <[Matt.R.Urban@dot.nh.gov](mailto:Matt.R.Urban@dot.nh.gov)>  
**Cc:** FGC: NHFG review <[NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov)>; Winters, Melissa <[Melissa.J.Winters@wildlife.nh.gov](mailto:Melissa.J.Winters@wildlife.nh.gov)>; Martin, Rebecca <[Rebecca.A.Martin@dot.nh.gov](mailto:Rebecca.A.Martin@dot.nh.gov)>  
**Subject:** NHB Review: NHB23-1147

Hi Matt,

The NHFG Nongame and Endangered Wildlife Program agrees with the BMPs provided below. The upsized box culvert, embedded with natural stream material, should improve passage opportunities for turtles utilizing Thistle Brook. Increasing the openness ratio of the box culvert as much as feasible will allow for more light to enter thus becoming for attractive for turtles. This in turn could reduce the likelihood of collision for rare turtles (and other amphibians) crossing the road.

Wood turtles may be attracted to southerly facing exposed soils within ¼ mile of rivers and streams during nesting season. As noted below, please review any areas with exposed soils that will experience truck traffic or equipment staging for turtle nesting activity and contact Melissa Winters (603-479-1129) or Josh Megyesy (978-578-0802) immediately for further consultation if a turtle is observed.

Please let us know when the size of the box culvert has been determined and plans are available for review.

Thanks,

Kevin Newton  
Wildlife Biologist  
NH Fish and Game Department  
Wildlife Division  
11 Hazen Drive, Concord NH 03301  
Phone: 603-271- 5860

New Hampshire Fish and Game requirements for environmental review consultation can be found at: [https://gencourt.state.nh.us/rules/state\\_agencies/fis1000.html](https://gencourt.state.nh.us/rules/state_agencies/fis1000.html). ALL requests for consultation and submittals should be sent via email to [NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov) or can be sent hardcopy by mail. **The NHB datacheck results letter number needs to be included in the email subject line to read as "NHBxx-xxxx\_Project Name\_FIS 1004 Consultation Submittal"**.

The requirements for consultation (Fis 1004) shall not apply to the following: statutory permit by notification, permit by rule, permit by notification, routine roadway registration, docking structure registration, or conditional authorization by rule. Review requests for these projects or other project types should be submitted to [NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov) or can be sent hardcopy by mail – email or mail subject line for these review requests should read "NHBxx-xxxx\_Project Name\_ Env. Review Request".

**Please provide shapefiles/KMZ/KMLs of the project site (and relevant features if applicable) with your submittal.** Review statements provided in the NHB Datacheck Results letter for additional guidance.

**From:** Urban, Matt <[Matt.R.Urban@dot.nh.gov](mailto:Matt.R.Urban@dot.nh.gov)>  
**Sent:** Tuesday, April 18, 2023 12:52 PM  
**To:** FGC: NHFG review <[NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov)>

Cc: Martin, Rebecca <[Rebecca.A.Martin@dot.nh.gov](mailto:Rebecca.A.Martin@dot.nh.gov)>

Subject: FW: NHB Review: NHB23-1147

Good afternoon,

I received the attached record for my project area. (NHB23-1147)

The Department is proposing to replace an undersized 48" CMP with a larger embedded box culvert (the exact size is still to be determined) there will be proposed natural simulation through the structure and it will be set such that there is no perch or barrier for AOP/turtle passage.

Knowing that there are Blanding's and Wood Turtles within a 1 mile radius of the project area the Department will implement the following project commitments and include the attached flyer in our contract documents:

- **The NHFG Turtle Flyer shall be shared with all operators, employees and contractors working on the project. All observations of wood turtles, spotted turtles, box turtles or Blanding's turtles shall be immediately reported to NHFG (Melissa Doperalski 603-271-1738 or Josh Megysey 603-271-0463).**
- **Turtle species of concern are known to occur in the vicinity of the project. During the turtle nesting season (May 15th through July 1st) the contractor shall review any areas with exposed soils that will experience truck traffic or equipment staging for turtle nesting activity. If turtles are found laying eggs in an area that will be disturbed, the contractor shall cease work immediately disturbing the turtle and contact the Bureau of Environment for further instructions and coordination with NH Fish & Game Melissa Winters (603-479-1129) or Josh Megysey (978-578-0802) at NH Fish & Game immediately for further consultation.**
- **All observations of threatened or endangered species on the project site shall be reported immediately to the NH Fish & Game nongame and endangered wildlife environmental review program by phone at 603-271-2461, and by email at [NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov), with the subject line containing the NHB Data Check tool results letter assigned number, the project name, and the term Wildlife Species Observation. Photographs of the observed species and nearby elements of habitat or areas of land disturbance shall be provided to NH Fish & Game in digital format at the above email address for verification, if feasible.**
- **In the event that a threatened or endangered species is observed on the project site during the term of the permit, the species shall not be disturbed, handled, or harmed in any way prior to consultation with NH Fish & Game, and implementation of corrective actions recommended by NH Fish & Game.**
- **Use wildlife friendly erosion control matting and avoid the use of welded plastic or 'biodegradable plastic' netting or thread in erosion control matting.**

Please let me know if you have any other comments, concerns or recommendations for the work proposed.

Thanks,

Matt Urban  
Chief, Operations Management Section  
NHDOT Bureau of Environment  
[Matt.R.Urban@dot.nh.gov](mailto:Matt.R.Urban@dot.nh.gov)



Office Phone: (603) 271-7969

Cell Phone: (603) 513-9526

**From:** DNCR: NHB Review <[nhbreview@dncr.nh.gov](mailto:nhbreview@dncr.nh.gov)>

**Sent:** Tuesday, April 18, 2023 12:14 PM

**To:** Urban, Matt <[Matt.R.Urban@dot.nh.gov](mailto:Matt.R.Urban@dot.nh.gov)>

**Cc:** FGC: NHFG review <[NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov)>

**Subject:** NHB Review: NHB23-1147

Attached, please find the review of the NH Natural Heritage Bureau's (NHB) database to determine whether the proposed project could impact rare species and exemplary natural communities.

If you received a comment on the DataCheck Letter from NHB, please reply to this email with any documents, photos, or information requested.

If you received a comment on the DataCheck Letter from NHFG, please follow the consultation requirements listed on the DataCheck Letter and coordinate with [NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov)

Best,  
Maddie

Maddie Severance  
Assistant Ecological Information Specialist

NH Natural Heritage Bureau  
DNCR - Forests & Lands  
172 Pembroke Rd  
Concord, NH 03301  
603-271-0687

If there are problems with your DataCheck letter or you need help using the DataCheck Tool, contact Maddie Severance: (603) 271-0687

If there is a rare plant or exemplary natural community and an NHB Comment on your DataCheck letter, contact Ashley Litwinenko for any environmental review questions: (603) 271-2834

If there is a rare wildlife species and an NHFG comment on your DataCheck Letter, contact Kim Snyder for any environmental review questions: (603) 271- 0467



# 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

In Reply Refer To:  
Project Code: 2023-0070292  
Project Name: Sutton 44212 Culvert Replacement

April 18, 2023

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

To Whom It May Concern:

*Updated 4/12/2023 - Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.*

## **About Official Species Lists**

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. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

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 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. 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 by returning to an existing project's page in IPaC.

## **Endangered Species Act Project Review**

Please visit the “**New England Field Office Endangered Species Project Review and Consultation**” website for step-by-step instructions on how to consider effects on listed

species and prepare and submit a project review package if necessary:

<https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review>

**\*NOTE\*** Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

**Northern Long-eared Bat - (Updated 4/12/2023)** The Service published a final rule to reclassify the northern long-eared bat (NLEB) as endangered on November 30, 2022. The final rule went into effect on March 31, 2023. You may utilize the **Northern Long-eared Bat Rangewide Determination Key** available in IPaC. More information about this Determination Key and the Interim Consultation Framework are available on the northern long-eared bat species page:

<https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis>

For projects that previously utilized the 4(d) Determination Key, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective. If your project was not completed by March 31, 2023, and may result in incidental take of NLEB, please reach out to our office at [newengland@fws.gov](mailto:newengland@fws.gov) to see if reinitiation is necessary.

#### *Additional Info About Section 7 of the Act*

Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines 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 Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. 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:

<https://www.fws.gov/service/section-7-consultations>

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) 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. Please contact NEFO if you would like more information.

**Candidate species** that appear on the enclosed species list have no current protections under the ESA. The species' occurrence on an official species list does not convey a requirement to

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consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

### **Migratory Birds**

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

<https://www.fws.gov/program/migratory-bird-permit>

<https://www.fws.gov/library/collections/bald-and-golden-eagle-management>

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

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

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## PROJECT SUMMARY

Project Code: 2023-0070292

Project Name: Sutton 44212 Culvert Replacement

Project Type: Drainage Project

Project Description: The proposed action is to Replace 60-ft long, 48" dia. CMP pipe conveying Thistle Brook under NH Rte 114 in Sutton, NH. The proposed replacement is anticipated to be a larger structure (i.e. embedded concrete box culvert) with greater hydraulic capacity. Construction BMP's may include a cofferdam downstream and upstream along with temporary pipe for water control, sediment dewatering bags, straw waddle, etc.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@43.332005949999996,-71.9459064646015,14z>



Counties: Merrimack County, New Hampshire

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## ENDANGERED SPECIES ACT SPECIES

There is a total of 2 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 Fisheries<sup>1</sup>, 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.

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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: <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a>	Endangered

## INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9743">https://ecos.fws.gov/ecp/species/9743</a>	Candidate

## CRITICAL HABITATS

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

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## **IPAC USER CONTACT INFORMATION**

Agency: New Hampshire Department of Transportation

Name: Rebecca Martin

Address: 7 Hazen Drive

City: Concord

State: NH

Zip: 03302

Email: rebecca.a.martin@dot.nh.gov

Phone: 6032716781

## **LEAD AGENCY CONTACT INFORMATION**

Lead Agency: Army Corps of Engineers

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## 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

In Reply Refer To:  
Project code: 2023-0070292  
Project Name: Sutton 44212 Culvert Replacement

April 18, 2023

Federal Action Agency (if applicable): Army Corps of Engineers

**Subject:** Record of project representative's no effect determination for 'Sutton 44212 Culvert Replacement'

Dear Rebecca Martin:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on April 18, 2023, for 'Sutton 44212 Culvert Replacement' (here forward, Project). This project has been assigned Project Code 2023-0070292 and all future correspondence should clearly reference this number. **Please carefully review this letter.**

### **Ensuring Accurate Determinations When Using IPaC**

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (Dkey), invalidates this letter.

### **Determination for the Northern Long-Eared Bat**

Based upon your IPaC submission and a standing analysis, your project has reached the determination of "No Effect" on the northern long-eared bat. To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may

include consequences occurring outside the immediate area involved in the action. (See § 402.17).

Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no consultation with the Service is required (ESA §7). If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13].

### **Other Species and Critical Habitat that May be Present in the Action Area**

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Candidate

You may coordinate with our Office to determine whether the Action may affect the animal species listed above and, if so, how they may be affected.

### **Next Steps**

Based upon your IPaC submission, your project has reached the determination of “No Effect” on the northern long-eared bat. If there are no updates on listed species, no further consultation/coordination for this project is required with respect to the northern long-eared bat. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the Service should take place to ensure compliance with the Act.

If you have any questions regarding this letter or need further assistance, please contact the New England Ecological Services Field Office and reference Project Code 2023-0070292 associated with this Project.

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**Action Description**

You provided to IPaC the following name and description for the subject Action.

**1. Name**

Sutton 44212 Culvert Replacement

**2. Description**

The following description was provided for the project 'Sutton 44212 Culvert Replacement':

The proposed action is to Replace 60-ft long, 48” dia. CMP pipe conveying Thistle Brook under NH Rte 114 in Sutton, NH. The proposed replacement is anticipated to be a larger structure (i.e. embedded concrete box culvert) with greater hydraulic capacity. Construction BMP’s may include a cofferdam downstream and upstream along with temporary pipe for water control, sediment dewatering bags, straw waddle, etc.

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@43.332005949999996,-71.9459064646015,14z>



## DETERMINATION KEY RESULT

Based on the information you provided, you have determined that the Proposed Action will have no effect on the Endangered northern long-eared bat (*Myotis septentrionalis*). Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for those species.

## QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of the northern long-eared bat or any other listed species?

**Note:** Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

*No*

2. The proposed action does not intersect an area where the northern long-eared bat is likely to occur, based on the information available to U.S. Fish and Wildlife Service as of the most recent update of this key. If you have data that indicates that northern long-eared bats are likely to be present in the action area, answer "NO" and continue through the key.

Do you want to make a no effect determination?

*Yes*

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# PROJECT QUESTIONNAIRE

## **IPAC USER CONTACT INFORMATION**

Agency: New Hampshire Department of Transportation

Name: Rebecca Martin

Address: 7 Hazen Drive

City: Concord

State: NH

Zip: 03302

Email: rebecca.a.martin@dot.nh.gov

Phone: 6032716781

## **LEAD AGENCY CONTACT INFORMATION**

Lead Agency: Army Corps of Engineers

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# Wetland Function-Value Evaluation Form

Total area of wetland	<u>1584</u> ft <sup>2</sup>	Human made?	<u>Yes</u>	Is the wetland part of a wildlife corridor?	<u>No</u>	Or a "habitat island"?	<u>No</u>	Wetland I.D.	<u>Wetland A</u>
Latitude	<u>43.332</u>	Longitude	<u>-71.946186</u>	Adjacent land use	<u>Roadway/Town Building</u>		Distance to nearest roadway or other development	<u>adjacent</u>	
Prepared by:	<u>JRB</u>	Date:	<u>12/20/2023</u>	Dominant wetland system present	<u>PEM1Ed</u>		Contiguous undeveloped buffer zone present	<u>No</u>	
<b>Wetland Impact:</b>				Is the wetland a separate hydraulic system?	<u>Yes</u>		If not, where does the wetland lie in the drainage basin?		
Type	<u>Permanent</u>	Area	<u>143</u> ft <sup>2</sup>	How many tributaries contribute to the wetland?	<u>1</u>		Wildlife & vegetation diversity/abundance (see attached list)		
<b>Evaluation based on:</b>				Office	<u>Yes</u>	Field	<u>Yes</u>	Corps manual wetland delineation	Completed?
									<u>Y</u> <u>X</u> <u>N</u>

Function / Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/ Value(s)	Comments
Groundwater Recharge/Discharge	No	2, 4, 5	No	Small roadside swale not suitable for groundwater.
Floodflow Alteration	Yes	3, 5, 7, 11	No	Wetland is adjacent to stream, however the wetland is not receiving floodwaters from the stream. The wetland outlets into the stream.
Fish and Shellfish Habitat	No		No	Small grass swale that outlets into adjacent stream. No potential for fish habitat.
Sediment/Toxicant Retention	No		No	This is a small roadside wetland in a mostly undeveloped area not known to have excess sediment.
Nutrient Removal	No	3, 10	No	This is small roadside wetland that collects runoff from surrounding road. There is no evidence of high nutrient content.
Production Export	No		No	This is a small, grassy roadside swale not suitable for production export.
Sediment/Shoreline Stabilization	No		No	There is no applicable shoreline or excess sediment in the wetland.
Wildlife Habitat	No		No	Due to it's small size and proximity to the road, this is wetland is not suitable for wildlife habitat.
Recreation	No		No	This is a roadside grass swale and no recreational opportunities exist.
Educational/Scientific Value	No	1	No	Endangered species record in the area and NHF&G recommendations have been incorporated.
Uniqueness/Heritage	No		No	This is a roadside grass swale with no particularly unique characteristics.
Visual Quality/Aesthetics	No	7, 9, 12	No	This is a grass roadside swale with very little visual quality.
<b>ES</b> Endangered Species Habitat	Yes	1	No	NHB records indicated state-protected species, however NHF&G recommendations have been incorporated and no impact to habitat will occur.
Other				

Notes:

\* Refer to backup list of numbered considerations.



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

**Appendix B  
New Hampshire General Permits  
Required Information and USACE Section 404 Checklist**

**USACE Section 404 Checklist**

1. Attach any explanations to this checklist. Lack of information could delay a USACE 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 3 for information on single and complete projects.
4. Contact USACE at (978) 318-8832 with any questions.
5. The information requested below is generally required in the NHDES Wetland Application. See page 61 for NHDES references and Admin Rules as they relate to the information below.

<b>1. Impaired Waters</b>	Yes	No
1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water? See the following to determine if there is an impaired water in the vicinity of your work area. * <a href="https://nhdes-surface-water-quality-assessment-site-nhdes.hub.arcgis.com/">https://nhdes-surface-water-quality-assessment-site-nhdes.hub.arcgis.com/</a> <a href="https://www.des.nh.gov/water/rivers-and-lakes/water-quality-assessment">https://www.des.nh.gov/water/rivers-and-lakes/water-quality-assessment</a> <a href="https://www4.des.state.nh.us/onestopdatamapper/onestopmapper.aspx">https://www4.des.state.nh.us/onestopdatamapper/onestopmapper.aspx</a>		X
<b>2. Wetlands</b>	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 tidal SAS, prime wetlands, or priority resource areas? 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 <a href="https://www4.des.state.nh.us/NHB-DataCheck/">https://www4.des.state.nh.us/NHB-DataCheck/</a> .		X
2.3 If wetland crossings are proposed, are they adequately designed to maintain hydrology, sediment transport & wildlife passage?	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?	0	
2.7 What is the area of the proposed fill in wetlands?	390 ft2	
2.8 What % of the overall project sire will be previously and proposed filled wetlands?	N/A	
<b>3. Wildlife</b>	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: <a href="https://www4.des.state.nh.us/NHB-DataCheck/">https://www4.des.state.nh.us/NHB-DataCheck/</a> . USFWS IPAC website: <a href="https://ipac.ecosphere.fws.gov/">https://ipac.ecosphere.fws.gov/</a>	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"> <li>• PDF: <a href="https://wildlife.state.nh.us/wildlife/wap-high-rank.html">https://wildlife.state.nh.us/wildlife/wap-high-rank.html</a>.</li> <li>• Data Mapper: <a href="http://www.granit.unh.edu">www.granit.unh.edu</a>.</li> <li>• GIS: <a href="http://www.granit.unh.edu/data/downloadfreedata/category/databycategory.html">www.granit.unh.edu/data/downloadfreedata/category/databycategory.html</a>.</li> </ul>		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 31?	X	
<b>4. Flooding/Floodplain Values</b>	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
<b>5. Historic/Archaeological Resources</b>		
For a minimum, minor or major impact project - a copy of the RPR Form ( <a href="http://www.nh.gov/nhdhr/review">www.nh.gov/nhdhr/review</a> ) with your DES file number shall be sent to the NH Division of Historical Resources as required on Page 37 GC 14(d) of the GP document**	X	
<b>6. Minimal Impact Determination (for projects that exceed 1 acre of permanent impact)</b>	Yes	No
Projects with greater than 1 acre of permanent impact must include the following: <ul style="list-style-type: none"> <li>• Functional assessment for aquatic resources in the project area.</li> <li>• On and off-site alternative analysis.</li> <li>• Provide additional information and description for how the below criteria are met.</li> </ul>		N/A
6.1 Will there be complete loss of aquatic resources on site?		X
6.2 Have the impacts to the aquatic resources been avoided and minimized to the greatest extent practicable?	X	
6.3 Will all aquatic resource function be lost?		X
6.4 Does the aquatic resource (s) have regional significance (watershed or ecoregion)?		X
6.5 Is there an on-site alternative with less impact?		X
6.6 Is there an off-site alternative with less impact?		N/A
6.7 Will there be a loss to a resource dependent species?		X
6.8 Are indirect impacts greater than 1 acre within and adjacent to the project area?		X
6.9 Does the proposed mitigation replace aquatic resource function for direct, indirect, and cumulative impacts?		N/A

\*Although this checklist utilizes state information, its submittal to USACE is a federal requirement.

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

**CULVERT REPLACEMENT  
NH ROUTE 114 OVER THISTLE BROOK  
SUTTON, NH  
NHDOT PROJECT NO. 44212  
SUPPLEMENTAL NARRATIVE**

**Project Description**

The project will replace an existing 48" diameter corrugated metal pipe which conveys Thistle Brook under NH114. The proposed alternative is a precast 8' wide by 5' high 4-sided box culvert embedded with stream simulation material, with concrete headwall and wingwalls upstream and downstream, a 12" layer of simulated streambed material to initiate natural sedimentation processes, and reconstruction of the roadway over the culvert. This is a state funded culvert rehabilitation project. The proposed advertising date is June 25, 2024, with construction anticipated in the summer-fall of 2024.

This project was initiated under NHDOT's State funded Betterment Headquarters Drainage (DRG-HQ) program. The purpose of the program is to address major culvert and drainage needs statewide that are not being addressed through current or future Capital Improvement, other programmatic projects, or on roadways not eligible for federal funding. The Program receives \$1,000,000 in total funding annually, which includes construction, engineering, and ROW costs. Exceeding the Program budget by a significant amount would not be considered practicable, and the project would have to be delayed to be funded under another Program.

**Existing Conditions**

The existing crossing is a 60' long 48" diameter corrugated metal pipe culvert which projects from the roadway embankment. No record of original construction is known, however right-of-way plans from 1967 suggests the stream and crossing was in its current alignment and size. The culvert slope is 1% with minimal embedment. Substrate upstream and downstream is primarily sand and gravel. Fill height over the pipe is approx. 2 feet at the roadway centerline. Adjacent to the inlet is a 15" plastic stormwater outfall pipe, which conveys runoff from three catchbasins along the roadway. The farthest catchbasin is approx. 300' from the inlet.

The pipe abruptly redirects flow approx. 60 degrees from the inlet channel. The inlet channel is bordered by a dry-laid stone retaining wall on one side and the roadway embankment on the other side. The dry-laid stone retaining wall is approx. 5 to 6 feet high and extends upstream approx. 80 feet. Original construction is unknown, but the wall reportedly predates the adjacent home, constructed in the 1940s.

The corrugated metal pipe is in poor condition. The inlet has largely corroded away and additional voids are evident along the sides of the pipe. There is an abrasion pattern extending about half way up the pipe, indicative of sand scouring the sides over time.

The crossing is a Tier 2 due to the 584 acre (0.91 square miles) watershed based on Lidar delineation. Streamstats delineates a smaller watershed of 512 acres (0.8 square miles). There is no FEMA floodplain at the culvert. The watershed is characterized by wooded areas with mild to steep slopes and generally slowly infiltrating soils. There is relatively little development and two conservation easements located along the edge of the watershed.

The NHDES Aquatic Restoration Mapper (as of 10/30/23) scores as AOP as reduced passage, geomorphic compatibility as mostly incompatible, notes it can pass the 2-year event, and has a drainage area of 512 acres (0.8 square miles).

NH114 is a Tier 3 road (Minor Collector) with average daily traffic (ADT) volume in 2022 of 1,742 vehicles per day with 14% being business/commercial vehicles. The peak recorded ADT was 1,838 vehicles per day in 2019 with 8% being business/commercial vehicles. The paved width is about 24' wide with markings for 11' travel lanes with 1' shoulders. The posted speed limit is 40 mph.

A stream assessment was conducted by the NHDOT Bureau of the Environment on 8/14/23. The average stream slope is less than 1% through the site and reference reach. Bankfull measurements ranged from 8 to 14 feet at the three reference reach cross sections. The stream is a Rosgen Type C stream, indicating it is slightly entrenched with high entrenchment ratios. The sinuosity of 1.06 is relative mild for Type C. The flood prone widths ranged from 64 to 94 feet with entrenchment ratios ranging from 4.57 to 11.75. Using the average bankfull width of the three reference reaches of 10.33 feet and the minimum entrenchment ratio for a Rosgen Type C stream (per Figure 3 of the Stream Crossing Worksheet) of 2.2; the stream crossing rule compliant span is calculated as 22.7 feet. Rounded to 23 feet for alternative analysis.

A challenge of construction at this location is the lack of available detours. While Village Road and Main Street (both Town of Sutton roads) do bypass the site, neither road (Main Street in particular) is suitable for the traffic volume and larger trucks which currently use NH114. This is due to the lane widths, turning radii, sight distances (at the Main Street and NH114 intersection), condition of the pavement, and potential for flooding. Instead, the proposed design will limit NH114 to one way traffic for the duration of construction. Access to install the replacement structure and to remove the existing pipe will primarily be done from within the existing roadway.

### **Natural and Cultural resources**

Natural Heritage Bureau (NHB datacheck)/Threatened and Endangered Species/Fish and Game Coordination: This project was submitted to the NH Natural Heritage Bureau (NHNHB) using the online DataCheck tool to determine if rare plant species, rare wildlife species, or exemplary natural communities exist within the project (NHB23-1147). NHNHB determined that there were two records of species within the project area, and they were Wood Turtle and Blanding's Turtle. Therefore, coordination with NHF&G was necessary. The Department coordinated with Kevin Newton of NHF&G in accordance with their FIS1004 rules. It was determined by NHF&G that DOT's project specific commitments were sufficient and

that there are no concerns for the proposed work and no further coordination with F&G would be required. Project specific commitments include:

1. The NHFG Turtle Flyer shall be shared with all operators, employees and contractors working on the project. All observations of wood turtles, spotted turtles, box turtles or Blanding's turtles shall be immediately reported to NHFG (Melissa Doperalski 603-271-1738 or Josh Megysey 603-271-0463).
2. Turtle species of concern are known to occur in the vicinity of the project. During the turtle nesting season (May 15th through July 1st) the contractor shall review any areas with exposed soils that will experience truck traffic or equipment staging for turtle nesting activity. If turtles are found laying eggs in an area that will be disturbed, the contractor shall cease work immediately to avoid disturbing the turtle and contact the Bureau of Environment for further instructions and coordination with NH Fish & Game Melissa Winters (603-479-1129) or Josh Megysey (978-578-0802) at NH Fish & Game immediately for further consultation.
3. All observations of threatened or endangered species on the project site shall be reported immediately to the NH Fish & Game nongame and endangered wildlife environmental review program by phone at 603-271-2461, and by email at [NHFGreview@wildlife.nh.gov](mailto:NHFGreview@wildlife.nh.gov), with the subject line containing the NHB Data Check tool results letter assigned number, the project name, and the term Wildlife Species Observation. Photographs of the observed species and nearby elements of habitat or areas of land disturbance shall be provided to NH Fish & Game in digital format at the above email address for verification, if feasible.
4. In the event that a threatened or endangered species is observed on the project site during the term of the permit, the species shall not be disturbed, handled, or harmed in any way prior to consultation with NH Fish & Game, and implementation of corrective actions recommended by NH Fish & Game.
5. Use wildlife friendly erosion control matting and avoid the use of welded plastic or 'biodegradable plastic' netting or thread in erosion control matting.

The Department also completed a USFWS IPAC species list search, the results of the search revealed Northern Long Eared Bat (NLEB) and the Monarch Butterfly. The Department then completed the NLEB consultation and based on the determination keys the project has reached a determination of "No Effect". Therefore, it was determined that the project is expected to have no effect on the Northern Long-Eared Bat.

Cultural Resources: The proposed project was reviewed by the Department's Cultural Resources Specialist, Sheila Charles, and it was determined the project would result in No Potential to Cause Effects. This project is consistent with the Section 106 Programmatic Agreement-Cultural Resources Review Effect Finding, Appendix B Certification, Activities with Minimal Potential to Cause Effects

Wetlands: Wetland Jurisdictional Resources have been described elsewhere within this wetlands application package and impacts have been quantified.

Water Quality: The project was reviewed by the Department's Water Quality Program Manager. The proposed project qualifies as a NHDES Alteration of Terrain (AOT) Permit-by-Rule activity. There will be no impacts to drinking water sources within the project area. The project as proposed is not anticipated to adversely impact water quality.

Impaired Waters: There are no impaired waters located within the project area.

Contamination: A review of the NHDES OneStop Database did not identify the presence of a remediation site within 1000' and there were no landfills within 4000' of the project area. Contamination concerns are not anticipated based scope of work.

Invasive Species: The project area has been reviewed for invasive plant species listed on the NH List of Prohibited Invasive Species (AGR PART 3802.01). All work must comply with the NHDOT manual *Best Management Practices for the Control of Invasive and Noxious Plant Species*.

Prime Wetlands, Designated Rivers, and Shoreland Water Quality Protection Act: A review of the NHDES Wetland Planning Permitting Tool (WPPT) has determined that there are no mapped Prime Wetlands, Designated Rivers, or waterbodies protected by the Shoreland Water Quality Protection Act within the project area.

Floodplains: There are no mapped floodplains within the project area.

Conservation Lands: There are no conservation lands within the project area.

Conservation Commission: Initial contact letters were sent to local officials, including the Conservation Commission, describing the anticipated scope of work. This initial contact letter was sent on 4/13/2023 and the Department received no comments from any of the local officials/offices. A copy of the wetlands application will be sent to the conservation commission when the application is sent to DES.

### **Hydrology/Hydraulics**

The watershed is primarily rural and forested, with NH114 bisecting roughly in the middle with occasional lots and short roads on either side. There is little development in the watershed and conservation easements are located in the upper reaches. Thistle brook follows the same valley as NH114 and there are seven total stream crossings. In addition, there are two driveway crossings just off of NH114 and one Town of Sutton Culvert just upstream of the confluence with the Lane River. Figure 1 shows the location of each crossing and Table 1 notes the type and size.

Table 1: Thistle Brook Culvert Crossings

ID	Roadway	Type	Size
1	NH121	CMP	48"
2	NH121	CMP Arch	4'-5" X 2'-8"
3	NH121	CMP	48"
4	NH121	CMP Arch	4'-5" X 3'-3"
5	NH121	CMP	42"
6	NH121	CMP	36"
7	NH121	CMP	30"
8	Main Street	CMP	(3) 36"
9	Driveway	Stone Slab Box	Unknown
10	Driveway	CMP	48"

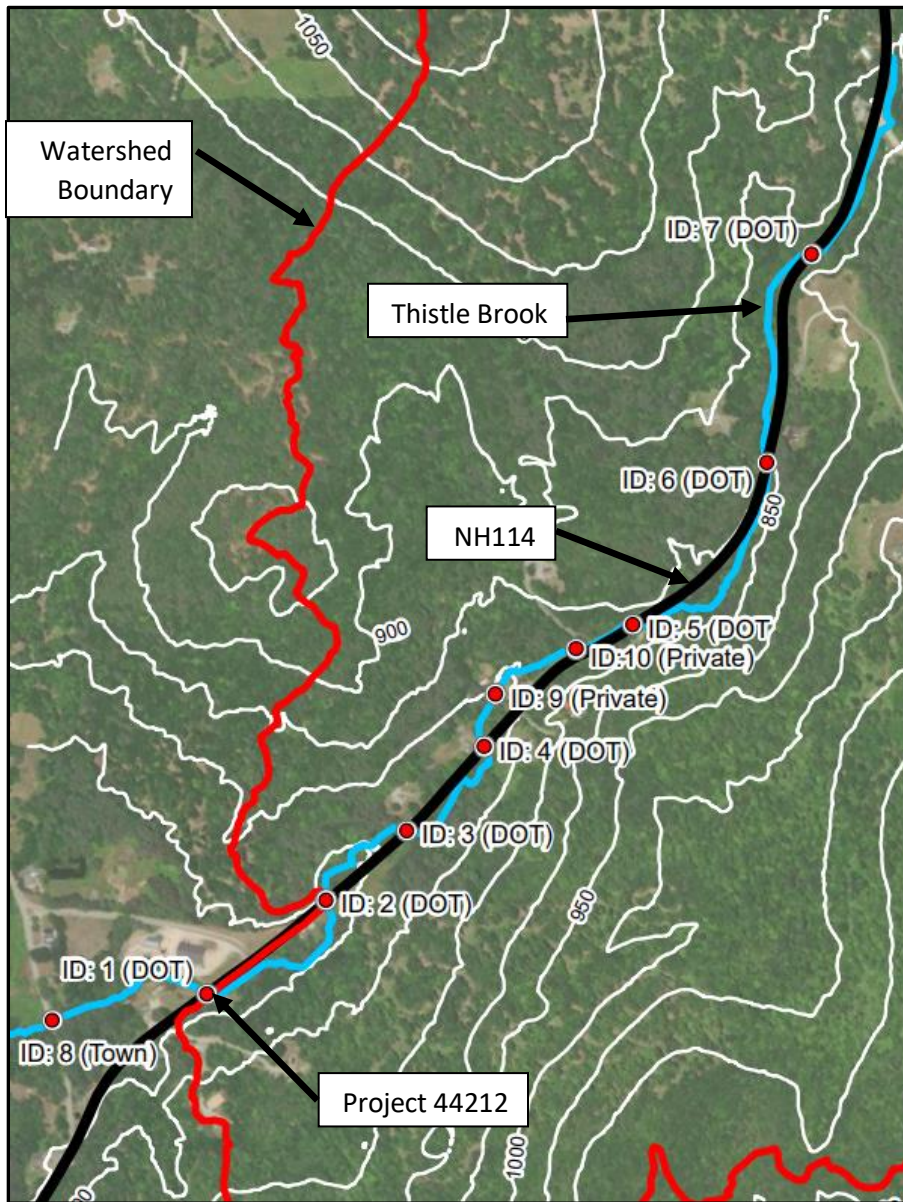


Figure 1: Culvert Locations Map

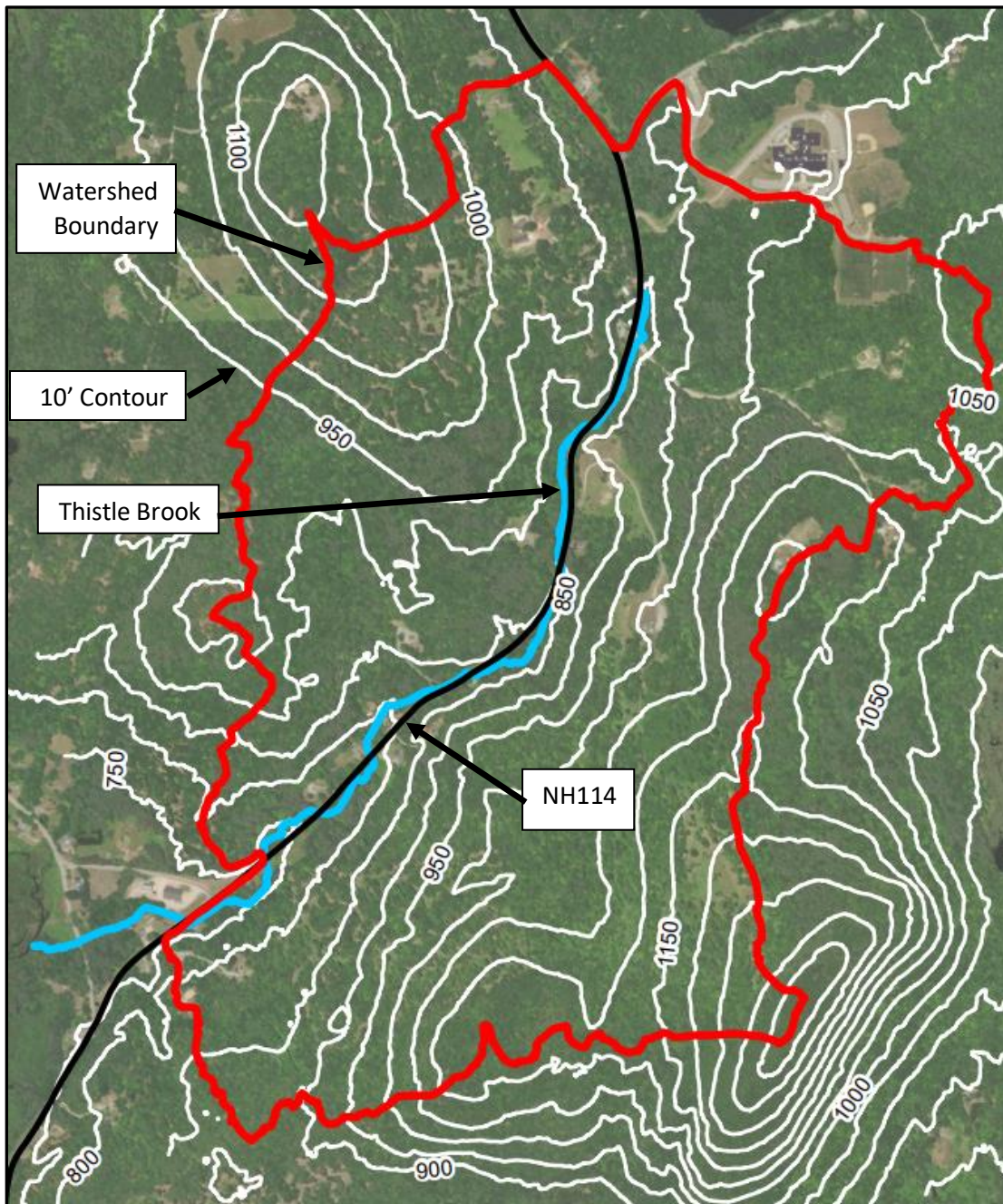


Figure 2: Watershed Boundary Map

Hydrology was analyzed with Streamstats (ie. the USGS NH Rural Equation) and the USGS National Urban Equation. The drainage area was delineated using Lidar as 584 acres. While the watershed is predominately rural, the combination of NH114 following the same valley as Thistle Brook and the moderate to steep slopes (up to 10%) of the adjacent hillsides produces more flashy type peak flows. That is, the base flow of Thistle Brook is generally small, but it has comparatively higher and faster peak flows. To help account for these watershed characteristics the USGS National Urban with a Basin Development Factor of 1 was used to augment the NH Rural Equation flows. While the NH Rural

Equation calculates flows for typical watersheds, incorporating the National Urban Equation to increase the flows will help capture the flashier elements of the watershed and produce a more resilient basis for design. Table 2 below shows the peak flows from the NH Rural Equation and with the National Urban Equation.

**Table 2: Summary Peak Runoff Flows (design value shown **Bold**)**

Recurrence	Peak Flow Summary (cfs)	
	NH Rural Equation	National Urban Equation (BDF=1)
2	48	73
5	85	124
10	117	161
25	162	211
50	200	<b>258</b>
100	247	308

The Federal Highway Administration’s (FHWA) HY-8 program was used to model existing conditions, conduct alternative analyses, and to determine the final sizing of the proposed culvert. In addition, a HEC-RAS model was developed to check whether backwater from the downstream Town of Sutton culvert or the Lane River (or a combination thereof) could backwater the 48” CMP. The modeling indicates the backwater influence ends approx. 500 feet downstream of the culvert. Table 3 below shows the calculated performance (by headwater elevation) of the existing culvert. The culvert is located at the low point in the NH114 profile with the lowest centerline elevation approx. 736.4’. Analysis shows the culvert overtops at the 5-year flow, however this is slightly more frequent than has been reported and indicates the hydrologic analysis leans conservative.

**Table 3: Existing 5’ Diameter Pipe Calculated Headwater Elevations**

Recurrence Year	Flow (cfs)	Headwater Elevation (ft, NAVD88)
2	73	736.18
5	124	<b>736.6</b>
10	161	<b>736.74</b>
25	211	<b>736.88</b>
50	258	<b>737</b>
100	308	<b>737.11</b>

**Bold text indicates Overtopping**

Note; HydroCAD, a commonly used surrogate of the SCS SCS Curve Number method, was reviewed for this project. Reasonable application of this methodology produced peak runoff flows significantly in excess reported conditions and measurements of bankfull widths. This method was not used for design or analysis.



## **Alternative Analysis**

The FWHA HY-8 program was used for alternative analyses. Four alternatives were considered and are described below with a comparison of the hydraulic performance shown in Table 2 for the 2 to 100-year flows. Cost estimates for each alternative are provided at the end of this supplemental narrative.

### **Alternative 1: Stream Crossing Rules Compliant 23' Bridge**

The existing structure would be completely removed, a significant portion of roadway closed and excavated, a new bridge structure installed, and the roadway subsequently reconstructed. The span would be equal to the (rounded) calculated stream crossing compliant span of 23'. Therefore, this alternative proposes a 23' open span by 35' wide (through the road), concrete beam bridge structure with bridge rail, headers, and wingwalls. Construction would be phased to maintain a single lane of traffic on NH114, however the project would cause significant traffic interruptions. It is anticipated this will require raising the roadway to El. 737.65 for 260' to meet departments standards to allow 1' of freeboard at the 100-year event.

**Cost for this alternative is estimated at \$2,070,000.** See the attached preliminary detailed cost estimate located at the end of this supplemental narrative. Note that the estimates provided are only for preliminary construction cost. Design engineering, permit fees, mitigation cost (if any), ROW impacts, and reimbursable utility impacts are not included. We anticipate this alternative would require permanent easement from the adjacent property (on the inlet side) or acquisition of the property due to significant impacts at the driveway, and additional cultural resources review for the destruction of the dry laid stone wall. Securing funding and additional design time would require a delay in the start of construction of 3 – 5 years, or more. The condition of the existing pipe is degrading, and this alternative does not meet the goal of timely repair and is not considered practical under the DRG-HQ betterment program.

### **Alternative 2: 42" Slip-line with a new 6' Diameter Pipe**

The pipe would be slip-lined with a 42" liner (inside the 48" CMP), the voids filled with pumpable cellular concrete, and a new 6' diameter CMP culvert constructed approx. 25' upstream of the existing culvert. The 6' CMP would be embedded 2' with a clear rise of 4'. The 42" liner would be embedded approx. 6" to achieve an invert elevation 6" high than the 6' CMP. Up to approx. 14 cfs can be passed through the 6' CMP before the stream begins flowing through the 42" slip-line. The outlet of both pipes would be adjacent with approx. 1' between the edges of the pipe walls. Compared to other alternatives this would minimize traffic disturbances and reduce construction time and costs. Hydraulic analyses shown in Table 2 below indicates this alternative provides improved hydraulic performance from the existing condition.

**Cost for this alternative is estimated at \$373,000.** See the attached preliminary detailed cost estimate located at the end of this supplemental narrative. Note that the estimates provided are only for construction cost. Design engineering, permit fees, mitigation cost (if any), ROW impacts, and reimbursable utility impacts are not included.

### Alternative 3: 8'X5' 4-Sided Concrete Box Culvert

This alternative proposes a 8' open span perpendicular to the stream (10' span as measured along the NH114 alignment) by 5' high 4-sided concrete box culvert with concrete headwalls and wingwalls. The culvert would be embedded with 1 foot of stream simulation material providing an 8'X4' clear opening. The existing pipe will be used for water diversion during construction and then fully removed. The adjacent 15" plastic stormwater pipe outfall will remain and the existing channel will be preserved to maintain connectivity between the outfall and the proposed culvert inlet. Compared with other alternatives, this would improve AOP, hydraulic connectivity, and substantially increase the hydraulic capacity. This alternative can pass the 50-year flood without overtopping the roadway.

**Cost for this alternative is estimated at \$745,000.** See the attached preliminary detailed cost estimate located at the end of this supplemental narrative. Note that the estimates provided are only for construction cost. Design engineering, permit fees, mitigation cost (if any), ROW impacts, and reimbursable utility impacts are not included.

### Alternative 4: 12'X6.5' 4-Sided Concrete Box Bridge

As requested during the 10/18/23 Natural Resources Agency Meeting, an additional alternative was taken into consideration. The 12' span was suggested as it is between the 23' and 8' spans previously considered and could potentially accommodate a wildlife shelf within the structure. The span as measured along the roadway centerline is 15'. In accordance with RSA 234:2, a bridge is defined as having "a clear span of 10 feet or more measured along the centerline of the roadway" (RSA 234:2). Therefore, this structure would be considered a bridge. Chapter 2 Section 2.7 of the NH Bridge Design Manual specifies a minimum freeboard of 1 foot at the design flow. Analysis shows the 100-year WSEL for this alternative is 736.68 (ft, NAVD88). Meeting the 1' of freeboard standard would require the low chord to a minimum of El. 737.68 (ft, NAVD88) (necessitating the 6' height) and would require raising the roadway to approx. El. 739.18 (ft, NAVD88), assuming an 18" deck thickness. This will require raising the NH 114 roadway for approx. 460 feet, which adds a substantial cost to the project.

**Cost for this alternative is estimated at \$1,127,000.** See the attached preliminary detailed cost estimate located at the end of this supplemental narrative. Note that the estimates provided are only for construction cost. Design engineering, permit fees, mitigation cost (if any), ROW impacts, and reimbursable utility impacts are not included.

Table 3: Existing and Alternative Headwater Elevations

Recurrence Year	Flow (cfs)	Headwater Elevation (ft, NAVD88)				
		Existing 4' Dia. Pipe	Alt 1: 23' Span Bridge	Alt 2: Slip line with new 6' Dia. Pipe	Alt 3: 8'X5' Box (8'X4' Open Area)	Alt 4: 12'X6.5' Bridge (12'X5' Open Area)
2	73	736.18	733.22	734.69	733.33	732.89
5	124	<b>736.6</b>	733.69	735.62	734.23	733.65
10	161	<b>736.74</b>	734.04	736.28	734.8	734.13
25	211	<b>736.88</b>	734.51	<b>736.56</b>	735.53	734.71
50	258	<b>737</b>	734.91	<b>736.72</b>	736.23	735.2
100	308	<b>737.11</b>	735.31	<b>736.86</b>	<b>736.53</b>	735.68

**Bold** indicates roadway overtopping.

Outlet velocities for each alternative are shown in Table 4 below. In general, the velocities increase with flow and then decrease as the depth of water in the tailwater channel (and thus the flow area) increases at higher flows.

Table 4: Existing and Alternative Outlet Velocities

Recurrence Year	Outlet Velocities (ft/s)				
	Existing 4' Dia. Pipe	Alt 1: 23' Span Bridge	Alt 2: Slip line with new 6' Dia. Pipe	Alt 3: 8'X5' Box (8'X4' Open Area)	Alt 4: 12'X6.5' Bridge (12'X5.5' Open Area)
2	8.62	2.87	6.44	4.68	2.89
5	8.86	3.03	8.09	6.41	3.72
10	7.84	3.21	9.08	6.12	4.22
25	6.89	3.47	9.5	7.44	4.83
50	6.55	3.71	9.69	4.37	5.34
100	6.33	3.95	9.86	3.65	5.85

Note: Existing and Alternative 3 velocities have been calculated with HEC-RAS, other alternatives calculated with HY-8.

### **Proposed Design**

The proposed design is the 8'X5' four-sided box culvert 70 feet long and embedded with 1' of stream simulation material. The inlet is proposed approx. 25' upstream of the existing inlet, which skews the culvert 52 degrees to the roadway alignment (less than the existing culvert). The resulting span per RSA 234:2 as "measured along the center line of the roadway" is 10'. Wingwalls will be installed angled at 45 degrees from the box except from the inlet south wingwall, which is angled at 90 degrees relative to the box to minimize impact to the existing riverine wetland. The proposed inlet elevation is proposed to tie-in to the adjacent streambed and the outlet elevation will match the existing outlet elevation. The proposed slope is 1.1%. Proposed streambed tie-ins are shown on the Stream and Culvert Profile of the Wetland Plans.

It is worth noting the bankfull width of the inlet channel is only approx. 4-5 feet wide and is constrained by the dry-laid stone retaining and the roadway embankment. The proposed project will widen the bankfull width through the culvert to 8 feet. However, the upstream channel will remain a constriction of the bankfull width post-project.

Design models for the 100 year flow overtop NH Route 114 at elevation 736.5 at an estimated depth of 0.1 ft. The length of shallow sheet flow across the pavement could span as long 90 ft. Sheet flow is often seen on roadway pavement during intense rainfall, typically for short duration prior to concentrated flow collecting in gutters. Potential overtopping at this location would likely be of similar magnitude and duration for 100 year annual exceedance events, often with no damage to property or infrastructure. The lowest adjacent grade at the upstream home is 737.1, meaning depth of flow over NH 114 would exceed approximately 7" prior to surface water touching the home. The garage immediately adjacent to NH 114, with a sill elevation of 735.7, has a history of flooding. Simulations of existing conditions show that water may touch the garage at the 2 year event (this is more frequent than reported by the

homeowner). The proposed culvert will reduce the risk of surface water reaching the garage up to the 50 year design, a significant improvement.

Water diversion will be accomplished with the existing 4' diameter pipe for the-majority-of construction. The first phase will install the inlet side of the proposed box with a water diversion structure installed to convey the stream through the existing inlet channel and pipe. The second phase will install the outlet side of the proposed box. The stream will continue to the flow through the existing pipe until the final section of box will be installed. At this point, it is anticipated the contractor will substitute a sandbag channel lined with sheeting or similar to prevent erosion. Once this section of box is installed, the stream simulation placed, and streambed tied in upstream and downstream; the stream channel will be diverted through the box while the outlet wingwall, headwall, and grading is completed. It is anticipated sandbags will again be used to control the stream in the outlet channel to complete the work. The final water control plan will be per the Contractors approved SWPPP.

Pavement reconstruction is anticipated for approx. 30 feet on either side of the proposed box or approx. 70 feet total. The utility pole north of the inlet will be protected during construction.

Benefits of this alternative include; increasing hydraulic capacity and connectivity, improving AOP, maintaining and improving sediment transport, and reducing the potential for flooding. While a wildlife shelf is not proposed as part of the design (in-order-to increase hydraulic capacity), the culvert will be passable during low flow periods due to the shallow water depth, such as late summer, fall, and winter.

Permanent stream impacts are required to install the culvert, grade around the new wingwalls, move the inlet 25' upstream, and tie-in the streambed upstream and downstream. Additional permanent impact to the PEM1Ed wetland on the downstream side are required for grading behind the wingwall. Temporary impacts to the stream are required to install water diversion structures upstream and downstream to the facilitate the work. Additional temporary impacts to the PEM1Ed wetland downstream are required to excavate the outlet and for access. These impacts extend approx. 18 feet downstream and 55 feet upstream of the existing culvert. The total disturbed area (temporary and permanent) is 1,504 square feet (0.035 acres).

Note; of the proposed permanent impacts to the stream; approx. 87 square feet and 25 linear feet is the section which is bypassed by moving the inlet 25' upstream. No fill is proposed in this area and the existing stormwater outfall will convey runoff through this channel to the proposed inlet. The area is anticipated to transition from a riverine to an emergent wetland following the project.

No tree clearing is required at the inlet and only brush clearing is required at the outlet. Temporary impact areas will be restored with approved seed, mulch, and wildlife friendly erosion control matting (where steeper than 4:1).

### **Construction and Access Considerations**

Construction will be phased to maintain single lane travel along NH114 for the duration of the anticipated two-month construction period. Access to the culvert will primarily be from the closed travel lanes and shoulders of NH 114 due to the low fill height. Temporary easements are anticipated on the

downstream side for access. Permanent easements may also be required depending on the final ROW determination for the wingwalls.

It is anticipated the first phase of traffic control will close the northbound lane and install the proposed box culvert on the inlet side. During this phase temporary lane widening will shift the southbound lane towards the existing headwall to allow for approximately half the culvert length to be installed. The anticipated second phase of traffic will switch the lanes, closing the southbound lane while installing the second half of the culvert on the outlet side. Single lane traffic will be maintained with temporary signals.

### **Summary**

The proposed culvert replacement is presented as an Alternative Design under Env-Wt 904.10 because the proposed culvert would not meet the compliant span requirement, would not provide a vegetated bank or wildlife shelf within the structure, and overtops by 0.1 feet at the 100-year.

The proposed culvert will meet all the general design criteria under 904.01 and comply with the remaining provisions of 904.07 to the maximum extent practicable.

Sutton 44212		Preliminary Design						
Culvert Replacement Option - Bridge Alternative (Wetland Rule Compliant)								
3-Sided Concrete Frame, 23' span x 35' wide			By	JSC	11/2023			
Phased Construction to maintain single lane traffic			Checked	tsm	11-28-23			
Item No.	Description	Unit	Quantity	Price (\$)	Total			
<b>Earthwork Items</b>								
202.42	Removal of Existing Pipe Culvert	LF	60	\$85	\$5,100			
203.1	Common Excavation (remove existing pavement & base)	CY	240	\$46	\$11,040			
203.11	Common Excavation - LRS within ROW	CY	300	\$40	\$12,000			
203.601	Embankment in Place (small amount for misc grading)	CY	25	\$35	\$875			
206.1	Common Structure Excavation (included in bridge estimate)	CY	N/A	\$50	\$0			
206.19	Common Structure Ex - Exploratory	CY	10	\$110	\$1,100			
209.1	Granular Backfill	CY	50	\$70	\$3,500			
214	Fine Grading (for stream channel through culvert)	U	1	\$3,000	\$3,000			
				<b>Sub-Total</b>	<b>\$36,615</b>			
<b>Structure Items</b>								
503.101	Water Diversion	U	1	\$35,000	\$35,000			
503.201	Cofferdams	U	2	\$50,000	\$100,000			
508	Structural Fill, (subsidiary to item No. 529.001)	CY	80	\$70	\$5,600			
	Concrete Rigid Frame (3-sided) - 35' rail to rail, 23' span x 6' rise, no skew							
	Includes standard headers, wings, bridge curb & rail, excav, backfill, incidentals	U	1	\$1,062,352	\$1,062,352			
585.21XXX	Simulated Streambed Material (Bed and Banks = 23 ft wide, 70 ft long, 2 ft deep)	CY	120	\$100	\$12,000			
	Including Stone Armor Layer and Geotextile							
				<b>Sub-Total</b>	<b>\$1,214,952</b>			
<b>Roadway Items</b>								
304.3	Crushed Gravel (12" Base and shoulder, plus raising the roadway for 260')	CY	231	\$51	\$11,787			
403.x	Hot Bituminous Pavement (260' length x 24' width x 4.5" depth)	TON	178	\$210	\$37,380			
606.417	Portable Concrete Barrier for Traffic Control	LF	300	\$50	\$15,000			
616.161	Temp. Traffic Signal (2-phase)	U	1	\$25,000	\$25,000			
618.61	Officers w/ Vehicle (3 weeks, 40 hours x \$105/hr)	\$	12,600	\$1	\$12,600			
618.7	Flaggers (2 flaggers x 4 weeks x 5 days/week x 10 hrs/day)	HR	400	\$45	\$18,000			
619.25	Portable Changeable Message Sign	U	2	\$3,100	\$6,200			
				<b>Sub-Total</b>	<b>\$125,967</b>			
<b>Project Wide Items</b>								
645.7	Storm Water Pollution Prevention Plan	U	1	3,500	\$3,500			
646.x	Humus, Seed, Mulch	SY	200	\$15	\$3,000			
697.11	Invasive Species Management Plan	U	1	\$3,000	\$3,000			
697.31	Project Operations Plan (for LRS / Contaminated Soil& Water Mgm't)	U	1	\$4,000	\$4,000			
698.13	Field Office, Type C - 1 Season	MON	4	\$2,500	\$10,000			
				<b>Item Sub-Total</b>	<b>\$23,500</b>			
				<b>Construction Sub-Total</b>	<b>\$1,401,034</b>			
<b>Project Wide Items (% of Total Costs)</b>								
	Erosion Control		5.0%	of Construction Sub-Total	U	1.00	\$70,100	\$70,100
619.1	Traffic Control		10.0%	of Construction Sub-Total	U	1.00	\$140,200	\$140,200
	Misc Items and Contingency		10.0%	of Construction Sub-Total	U	1.00	\$140,200	\$140,200
692	Mobilization		12.0%	of Construction Sub-Total	U	1.00	\$168,200	\$168,200
1010.x	Fuel and Asphalt Adjustments (fixed amount per guideline memo)	\$	1.00				\$10,000	\$10,000

Sutton 44212		Preliminary Design				
<b>Culvert Replacement Option - Bridge Alternative (Wetland Rule Compliant)</b>				By	JSC	11/2023
3-Sided Concrete Frame, 23' span x 35' wide				Checked	tsm	11-28-23
Phased Construction to maintain single lane traffic						
Item No.	Description	Unit	Quantity	Price (\$)	Total	
1030	Construction Admin & Inspection 10.0% of Construction Sub-Total		1.00	\$140,100	\$140,100	
				<b>Sub-Total</b>	<b>\$668,800</b>	
				<b>Cost Estimate Total</b>	<b>\$2,070,000</b>	

1. Cost Estimate Total rounded to nearest \$1,000.

Sutton 44212		Preliminary Design			
<b>Culvert Replacement Option - Slipe-line with New 6' diameter pipe</b>					
Slipeline existing 4' dia. cmp with a 42" Liner and install new 6' dia. cmp culvert					
Phased Construction to maintain single lane traffic					
		By	JSC	11/2023	
		Checked	tsm	11-28-23	
Item No.	Description	Unit	Quantity	Price (\$)	Total
<b>Earthwork Items</b>					
202.42	Removal of Existing Pipe Culvert	LF	N/A	\$85	\$0
203.1	Common Excavation (remove existing pavement & base)	CY	20	\$46	\$920
203.11	Common Excavation - LRS within ROW	CY	20	\$40	\$800
203.601	Embankment in Place (small amount for misc grading)	CY	25	\$35	\$875
206.1	Common Structure Excavation	CY	280	\$50	\$14,000
206.19	Common Structure Ex - Exploratory	CY	10	\$110	\$1,100
209.1	Granular Backfill	CY	25	\$70	\$1,750
214	Fine Grading (for stream channel through culvert)	U	1	\$3,000	\$3,000
				<b>Sub-Total</b>	<b>\$22,445</b>
<b>Structure Items</b>					
503.101	Water Diversion	U	1	\$15,000	\$15,000
503.201	Cofferdams	U	2	\$15,000	\$30,000
508	Structural Fill, (subsidiary to item No. 529.001)	CY	40	\$70	\$2,800
	Slipline Existing 48" Pipe (60' long)	U	1	\$50,000	\$50,000
603.11672	6' Diameter CMP Culvert (70' long)	LF	70	\$410	\$28,700
520.1	Concrete Wingwalls (Class A Concrete) w/ footing	CY	20	\$2,000	\$40,000
544.1	Reinforcing Steel	LB	1,600	\$3.00	\$4,800
585.21XXX	Simulated Streambed Material (6' dia. pipe, 2 ft deep)	CY	23	\$100	\$2,333
	Including Stone Armor Layer and Geotextile				
				<b>Sub-Total</b>	<b>\$173,633</b>
<b>Roadway Items</b>					
304.3	Crushed Gravel (12" Base and shoulder)	CY	13	\$51	\$680
403.x	Hot Bituminous Pavement (100' length x 24' width x 4.5" depth)	TON	11	\$210	\$2,310
606.417	Portable Concrete Barrier for Traffic Control	LF	100	\$50	\$5,000
616.161	Temp. Traffic Signal (2-phase)	U	N/A	\$25,000	\$0
618.61	Officers w/ Vehicle (40 hours x \$105/hr)	\$	4,200	\$1	\$4,200
618.7	Flaggers (2 flaggers x 3 weeks x 5 days/week x 10 hrs/day)	HR	300	\$45	\$13,500
619.25	Portable Changeable Message Sign	U	2	\$3,100	\$6,200
				<b>Sub-Total</b>	<b>\$31,890</b>
<b>Project Wide Items</b>					
645.7	Storm Water Pollution Prevention Plan	U	1	3,500	\$3,500
646.x	Humus, Seed, Mulch	SY	200	\$15	\$3,000
697.11	Invasive Species Management Plan	U	1	\$3,000	\$3,000
697.31	Project Operations Plan (for LRS / Contaminated Soil& Water Mgm't)	U	1	\$4,000	\$4,000
698.13	Field Office, Type C - 1 Season	MON	2	\$2,500	\$5,000
				<b>Item Sub-Total</b>	<b>\$18,500</b>
				<b>Construction Sub-Total</b>	<b>\$246,468</b>
<b>Project Wide Items (% of Total Costs)</b>					
	Erosion Control		5.0%	of Construction Sub-Total	U 1.00 \$12,400 \$12,400
619.1	Traffic Control		10.0%	of Construction Sub-Total	U 1.00 \$24,700 \$24,700
	Misc Items and Contingency		10.0%	of Construction Sub-Total	U 1.00 \$24,700 \$24,700



Sutton 44212		Preliminary Design					
<b>Culvert Replacement Option - Slupe-line with New 6' diameter pipe</b>				By	JSC	11/2023	
Slipeline existing 4' dia. cmp with a 42" Liner and install new 6' dia. cmp culvert				Checked	tsm	11-28-23	
Phased Construction to maintain single lane traffic							
Item No.	Description	Unit	Quantity	Price (\$)	Total		
692	Mobilization 12.0% of Construction Sub-Total		1.00	\$29,600	\$29,600		
1010.x	Fuel and Asphalt Adjustments (fixed amount per guideline memo)	\$	1.00	\$10,000	\$10,000		
1030	Construction Admin & Inspection 10.0% of Construction Sub-Total		1.00	\$24,600	\$24,600		
				<b>Sub-Total</b>	<b>\$126,000</b>		
				<b>Cost Estimate Total</b>	<b>\$373,000</b>		

1. Cost Estimate Total rounded to nearest \$1,000.

Sutton 44212		Preliminary Design			
Culvert Replacement Option - Hydraulic Design					
8' span 4-Sided Concrete Box Culvert			By	JSC	11/2023
Phased Construction to maintain single lane traffic			Checked	tsm	11-28-23
Item No.	Description	Unit	Quantity	Price (\$)	Total
<b>Earthwork Items</b>					
202.42	Removal of Existing Pipe Culvert	LF	60	\$85	\$5,100
203.1	Common Excavation (remove existing pavement & base)	CY	75	\$46	\$3,450
203.11	Common Excavation - LRS within ROW	CY	110	\$40	\$4,400
203.601	Embankment in Place (small amount for misc grading)	CY	25	\$35	\$875
206.1	Common Structure Excavation	CY	620	\$50	\$31,000
206.19	Common Structure Ex - Exploratory	CY	10	\$110	\$1,100
209.1	Granular Backfill	CY	50	\$70	\$3,500
214	Fine Grading (for stream channel through culvert)	U	1	\$3,000	\$3,000
				<b>Sub-Total</b>	<b>\$52,425</b>
<b>Structure Items</b>					
503.101	Water Diversion	U	1	\$20,000	\$20,000
503.201	Cofferdams	U	2	\$18,000	\$36,000
508	Structural Fill, (subsidiary to item No. 529.001)	CY	70	\$70	\$4,900
529.001	Precast Box Culvert (includes headwalls, excav, backfill, incidentals) 70' long x 8' x 5' precast box, 8" walls assumed 19.11 SF / LF x 70 LF = 50 CY (rounded) \$ 5,000 /CY	U	1	\$250,000	\$250,000
520.1	Concrete Wingwalls (Class A Concrete) w/ footing	CY	20	\$2,000	\$40,000
544.1	Reinforcing Steel	LB	1,600	\$3.00	\$4,800
585.21XXX	Simulated Streambed Material (Bed and Banks = 8 ft wide, 70 ft long, 1 ft deep) Including Stone Armor Layer and Geotextile	CY	21	\$100	\$2,074
				<b>Sub-Total</b>	<b>\$357,774</b>
<b>Roadway Items</b>					
304.3	Crushed Gravel (12" Base and shoulder)	CY	67	\$51	\$3,400
403.x	Hot Bituminous Pavement (100' length x 24' width x 4.5" depth)	TON	52	\$210	\$10,920
606.417	Portable Concrete Barrier for Traffic Control	LF	150	\$50	\$7,500
616.161	Temp. Traffic Signal (2-phase)	U	1	\$25,000	\$25,000
618.61	Officers w/ Vehicle (40 hours x \$105/hr)	\$	4,200	\$1	\$4,200
618.7	Flaggers (2 flaggers x 3 weeks x 5 days/week x 10 hrs/day)	HR	300	\$45	\$13,500
619.25	Portable Changeable Message Sign	U	2	\$3,100	\$6,200
				<b>Sub-Total</b>	<b>\$70,720</b>
<b>Project Wide Items</b>					
645.7	Storm Water Pollution Prevention Plan	U	1	3,500	\$3,500
646.x	Humus, Seed, Mulch	SY	200	\$15	\$3,000
697.11	Invasive Species Management Plan	U	1	\$3,000	\$3,000
697.31	Project Operations Plan (for LRS / Contaminated Soil& Water Mgm't)	U	1	\$4,000	\$4,000
698.13	Field Office, Type C - 1 Season	MON	2	\$2,500	\$5,000
				<b>Item Sub-Total</b>	<b>\$18,500</b>
				<b>Construction Sub-Total</b>	<b>\$499,419</b>
<b>Project Wide Items (% of Total Costs)</b>					
619.1	Erosion Control		5.0%	of Construction Sub-Total	U 1.00 \$25,000 \$25,000
619.1	Traffic Control		10.0%	of Construction Sub-Total	U 1.00 \$50,000 \$50,000

Sutton 44212		Preliminary Design						
<b>Culvert Replacement Option - Hydraulic Design</b>				By		JSC	11/2023	
8' span 4-Sided Concrete Box Culvert				Checked		tsm	11-28-23	
Phased Construction to maintain single lane traffic								
Item No.	Description	Unit	Quantity	Price (\$)	Total			
	Misc Items and Contingency		10.0%	of Construction Sub-Total	U	1.00	\$50,000	\$50,000
692	Mobilization		12.0%	of Construction Sub-Total		1.00	\$60,000	\$60,000
1010.x	Fuel and Asphalt Adjustments (fixed amount per guideline memo)	\$	1.00			1.00	\$10,000	\$10,000
1030	Construction Admin & Inspection		10.0%	of Construction Sub-Total		1.00	\$49,900	\$49,900
							<b>Sub-Total</b>	<b>\$244,900</b>
							<b>Cost Estimate Total</b>	<b>\$745,000</b>

1. Cost Estimate Total rounded to nearest \$1,000.

Sutton 44212		Preliminary Design			
Culvert Replacement Option - 12' Span Bridge					
12' span 4-Sided Concrete Box Culvert			By	JSC	11/2023
Phased Construction to maintain single lane traffic			Checked	tsm	11-28-23
Item No.	Description	Unit	Quantity	Price (\$)	Total
<b>Earthwork Items</b>					
202.42	Removal of Existing Pipe Culvert	LF	60	\$85	\$5,100
203.1	Common Excavation (remove existing pavement & base)	CY	240	\$46	\$11,040
203.11	Common Excavation - LRS within ROW	CY	300	\$40	\$12,000
203.601	Embankment in Place (small amount for misc grading)	CY	25	\$35	\$875
206.1	Common Structure Excavation	CY	1,050	\$50	\$52,500
206.19	Common Structure Ex - Exploratory	CY	10	\$110	\$1,100
209.1	Granular Backfill	CY	50	\$70	\$3,500
214	Fine Grading (for stream channel through culvert)	U	1	\$3,000	\$3,000
<b>Sub-Total</b>					<b>\$89,115</b>
<b>Structure Items</b>					
503.101	Water Diversion	U	1	\$25,000	\$25,000
503.201	Cofferdams	U	2	\$25,000	\$50,000
508	Structural Fill, (subsidiary to item No. 529.001)	CY	90	\$70	\$6,300
529.001	Precast Box Culvert (includes headwalls, excav, backfill, incidentals) 70' long x 12' x 5' precast box, 8" walls assumed 24.44 SF / LF x 70 LF = 65 CY (rounded) \$ 5,000 /CY	U	1	\$325,000	\$325,000
520.1	Concrete Wingwalls (Class A Concrete) w/ footing	CY	20	\$2,000	\$40,000
544.1	Reinforcing Steel	LB	1,600	\$3.00	\$4,800
585.21XXX	Simulated Streambed Material (Bed and Banks = 12 ft wide, 70 ft long, 1 ft deep) Including Stone Armor Layer and Geotextile	CY	31	\$100	\$3,111
<b>Sub-Total</b>					<b>\$454,211</b>
<b>Roadway Items</b>					
304.3	Crushed Gravel (12" Base plus raising the roadway for 460')	CY	1,022	\$51	\$52,133
403.x	Hot Bituminous Pavement (460' length x 24' width x 4.5" depth)	TON	315	\$210	\$66,150
606.417	Portable Concrete Barrier for Traffic Control	LF	300	\$50	\$15,000
616.161	Temp. Traffic Signal (2-phase)	U	1	\$25,000	\$25,000
618.61	Officers w/ Vehicle (3 weeks, 40 hours x \$105/hr)	\$	12,600	\$1	\$12,600
618.7	Flaggers (2 flaggers x 4 weeks x 5 days/week x 10 hrs/day)	HR	400	\$45	\$18,000
619.25	Portable Changeable Message Sign	U	2	\$3,100	\$6,200
<b>Sub-Total</b>					<b>\$195,083</b>
<b>Project Wide Items</b>					
645.7	Storm Water Pollution Prevention Plan	U	1	3,500	\$3,500
646.x	Humus, Seed, Mulch	SY	200	\$15	\$3,000
697.11	Invasive Species Management Plan	U	1	\$3,000	\$3,000
697.31	Project Operations Plan (for LRS / Contaminated Soil & Water Mgm't)	U	1	\$4,000	\$4,000
698.13	Field Office, Type C - 1 Season	MON	3	\$2,500	\$7,500
<b>Item Sub-Total</b>					<b>\$21,000</b>
<b>Construction Sub-Total</b>					<b>\$759,409</b>
<b>Project Wide Items (% of Total Costs)</b>					
619.1	Erosion Control	U	1.00	\$38,000	\$38,000
				5.0% of Construction Sub-Total	
619.1	Traffic Control	U	1.00	\$76,000	\$76,000
				10.0% of Construction Sub-Total	

Sutton 44212		Preliminary Design					
<b>Culvert Replacement Option - 12' Span Bridge</b>				By		JSC	11/2023
12' span 4-Sided Concrete Box Culvert				Checked		tsm	11-28-23
Phased Construction to maintain single lane traffic							
Item No.	Description	Unit	Quantity	Price (\$)	Total		
	Misc Items and Contingency 10.0% of Construction Sub-Total	U	1.00	\$76,000	\$76,000		
692	Mobilization 12.0% of Construction Sub-Total		1.00	\$91,200	\$91,200		
1010.x	Fuel and Asphalt Adjustments (fixed amount per guideline memo)	\$	1.00	\$10,000	\$10,000		
1030	Construction Admin & Inspection 10.0% of Construction Sub-Total		1.00	\$75,900	\$75,900		
				<b>Sub-Total</b>	<b>\$367,100</b>		
				<b>Cost Estimate Total</b>	<b>\$1,127,000</b>		

1. Cost Estimate Total rounded to nearest \$1,000.



**Photo 1:** *Culvert Inlet with 15" Stormwater Outfall (4/28/23) J. Commerford*



**Photo 2:** *Culvert Inlet (8/14/23) M. Urban*

Sutton, 44212



**Photo 3:** *Culvert Outlet (4/28/23) J. Commerford*



**Photo 4:** *Inlet Channel (4/28/23) J. Commerford*

Sutton, 44212



**Photo 5.** Culvert Inlet (4/28/23) J. Commerford



**Photo 6:** Upstream at Intermittent Tributary (4/28/23) J. Commerford



Sutton, 44212



**Photo 7:** *Roadway Shoulder on Inlet Side (4/28/23) J. Commerford*



**Photo 8:** *Roadway Looking Southbound Google Streetview*

Sutton, 44212



**Photo 9:** Roadway Looking Northbound Google Streetview



**Photo 10:** Downstream Main Street Culvert (3) 36" Pipes (Town of Sutton) (4/28/23) J. Commerford

## Sutton 44212

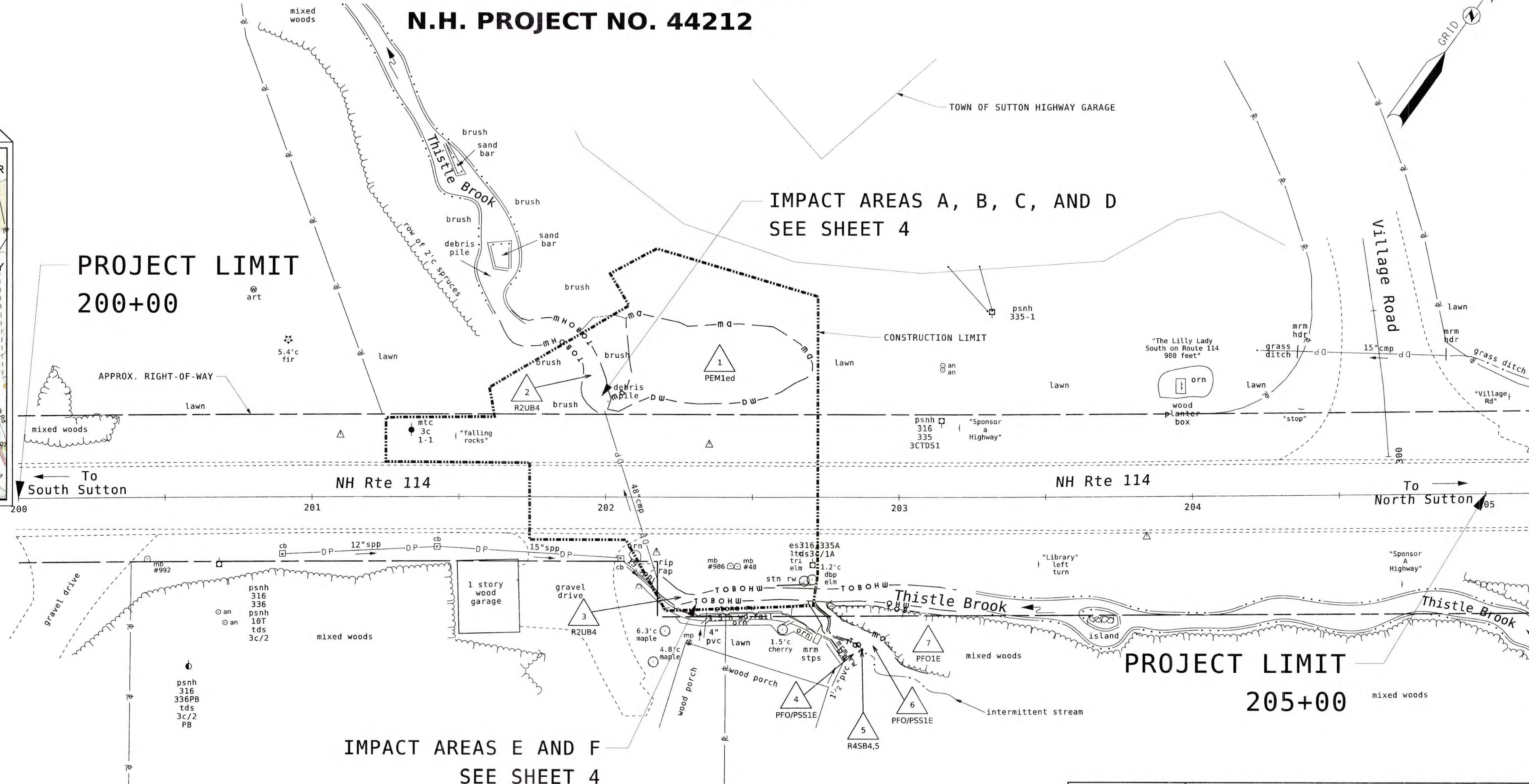
### CONSTRUCTION SEQUENCE

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 areas.
3. Install Water Diversion (stream diversion). The anticipated water diversion method will use the existing 48" CMP for stream diversion during the first phase of construction, which will install the inlet side of the proposed box culvert. The Contract will require the Contractor's water diversion plan be designed to accommodate a 2-year storm event.
4. Construct temporary widening on outlet side of the culvert for Phase 1 traffic control. Widening is expected to extend to within 5' from the existing outlet. The actual width of widening will be as approved by the NHDOT Engineer, based on the Contractor's installation plan for the culvert.
5. Set up Phase 1 traffic control barrier (maintain 1 lane of traffic through work area using, shifted toward the outlet side of culvert).
6. Install Cofferdam to support the portion of NH 114 open to traffic.
7. Install new box culvert sections starting from the inlet side, embedment material, inlet side headwall, wingwalls, and grading to match existing channel and banks.
8. Stabilize inlet channel banks and over bank areas.
9. Modify cofferdam supporting NH 114 as needed for Phase 2 of culvert installation.
10. Set up Phase 2 traffic control (shift traffic toward inlet side of culvert). Construct temporary widening at the inlet side of the culvert.
11. Remove temporary widening constructed during Phase 1. Restore disturbed areas to original or proposed grade. Stabilize disturbed areas. Maintain water diversion through the existing pipe.
12. Install new box culvert sections. It is estimated the existing pipe can be used for water diversion until the final section of box culvert is installed. At which point, the contractor will substitute a sandbag channel lined with sheeting or similar at the end of the pipe to move the stream diversion away from the proposed box.
13. Install final section of box culvert, embedment material, inlet side headwall, wingwalls, and grading to match inlet channel and banks. In order to install wingwalls, Contractor may switch flow to the embedded box culvert and use sandbags with sheeting in the outlet channel to control flow and facilitate installation and grading of the wingwalls.
14. Stabilize inlet channel banks and over bank areas.
15. Remove cofferdam and traffic control barrier (maintain 1 lane of traffic using concrete barriers, shift traffic as needed to accomplish remaining operations).
16. Remove remaining 48" CMP pipe, repair and stabilize areas disturbed by removal. Remove water diversion and re-establish flow through the new culvert.
17. Install final paving and pavement markings. Final pavement width and elevation will match the original NH 114 conditions.
18. Stabilize remaining disturbed areas.

19. Remove all perimeter controls.

STATE OF NEW HAMPSHIRE  
DEPARTMENT OF TRANSPORTATION  
**WETLANDS PLANS**  
**FEDERAL AID PROJECT**  
N.H. PROJECT NO. 44212

DESIGN DATA		
AVERAGE DAILY TRAFFIC 20	22	1742
AVERAGE DAILY TRAFFIC 20	TBD	TBD
PERCENT OF TRUCKS		UNKNOWN
DESIGN SPEED		40 MPH (POSTED)
LENGTH OF PROJECT		70 LF (CULVERT)



DRAWN BY: JSC  
CHECKED BY: TSM  
DATE: 10/23  
DATE: 11/23

INDEX OF SHEETS

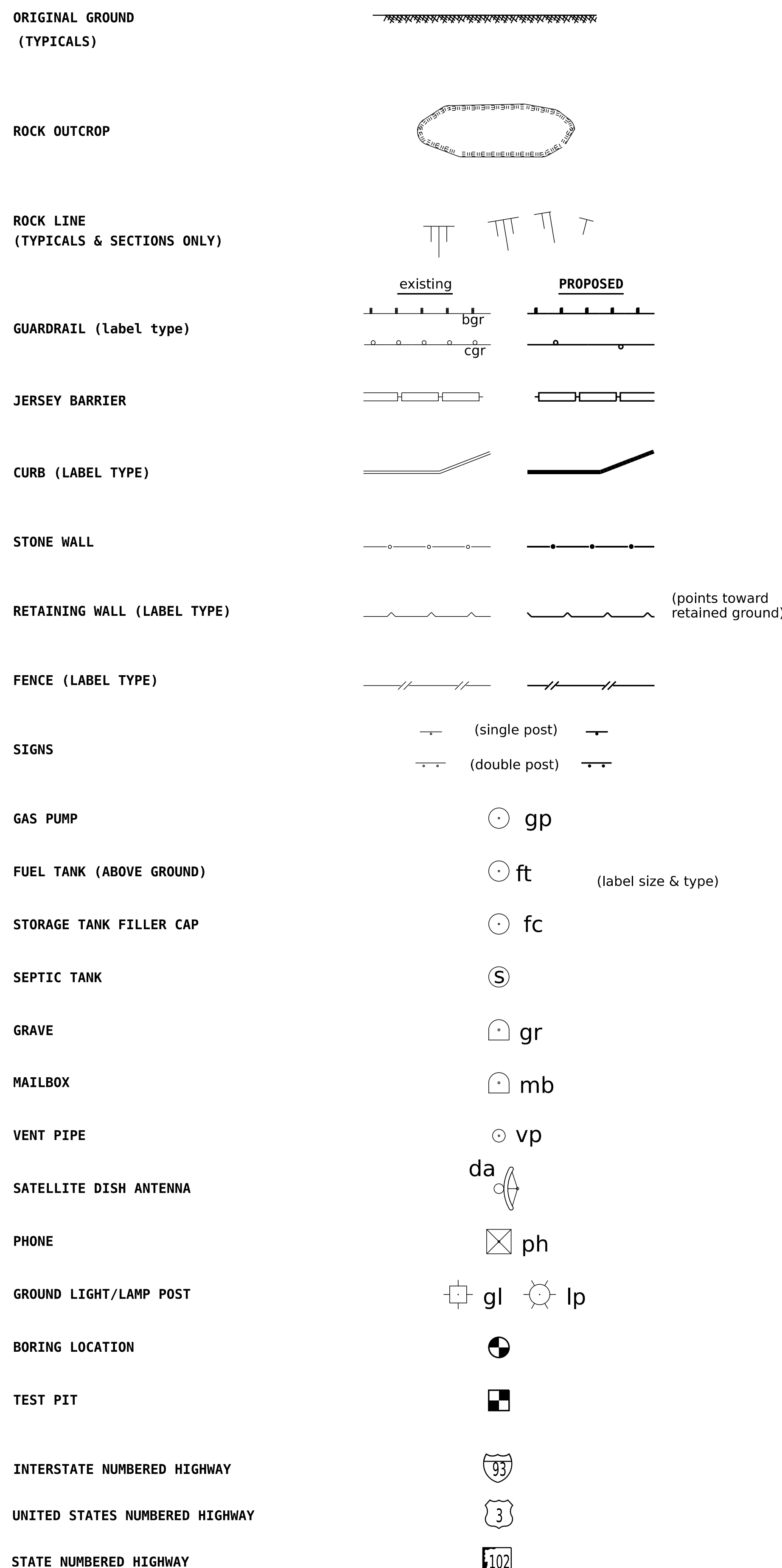
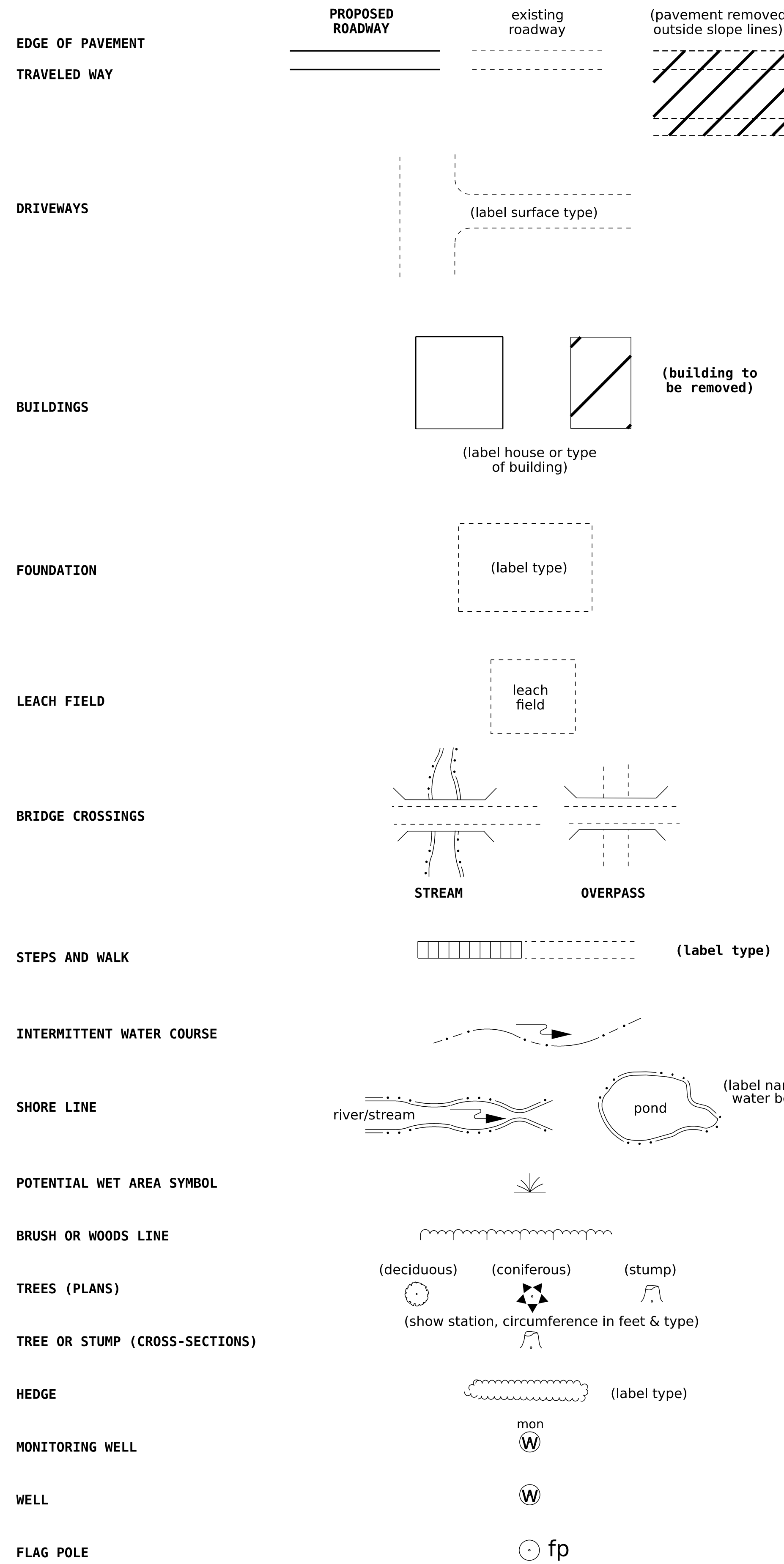
1	FRONT SHEET
2-3	STANDARD SYMBOLS SHEETS
4	WETLAND IMPACT PLAN
5	PROFILES
6	CULVERT DETAILS
7	EROSION CONTROL STRATEGIES
8	EROSION CONTROL PLAN

WETLAND DELINEATION PER ENV-WT BY:  
NHDOT (JOSHUA BROWN, MATT URBAN, & ANDREW CZACHOR) ON 8/14/23

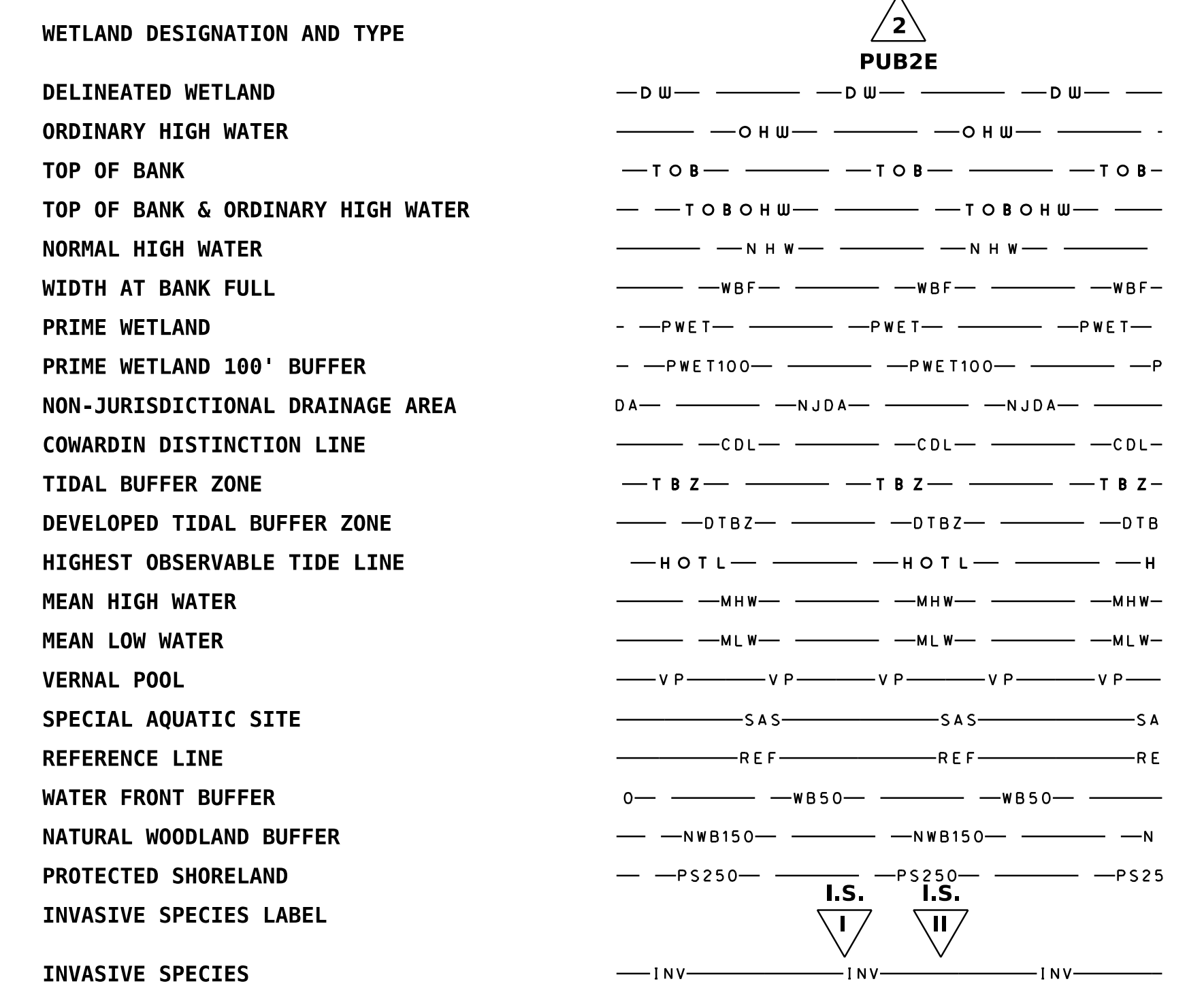
PER WETLAND PLANS RULE(S) ENV-WT 311.05 FOR ENGINEERING	<b>NHDOT</b>	THE STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
	<b>NH ROUTE 114</b> <b>CULVERT REPLACEMENT</b> <b>WETLAND IMPACT AND</b> <b>EROSION CONTROL PLANS</b>	
	DRAWING NAME <b>1-44212-FSC</b>	FEDERAL PROJECT NO. <b>N/A</b>
	SHEET NO. <b>1</b>	TOTAL SHEETS <b>8</b>

PLAN PREPARED BY:  
JIM COMMERFORD, PE  
DATE: 11/27/23

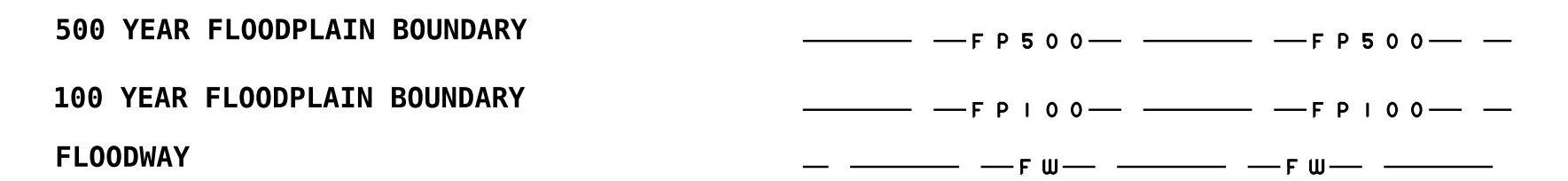
# GENERAL



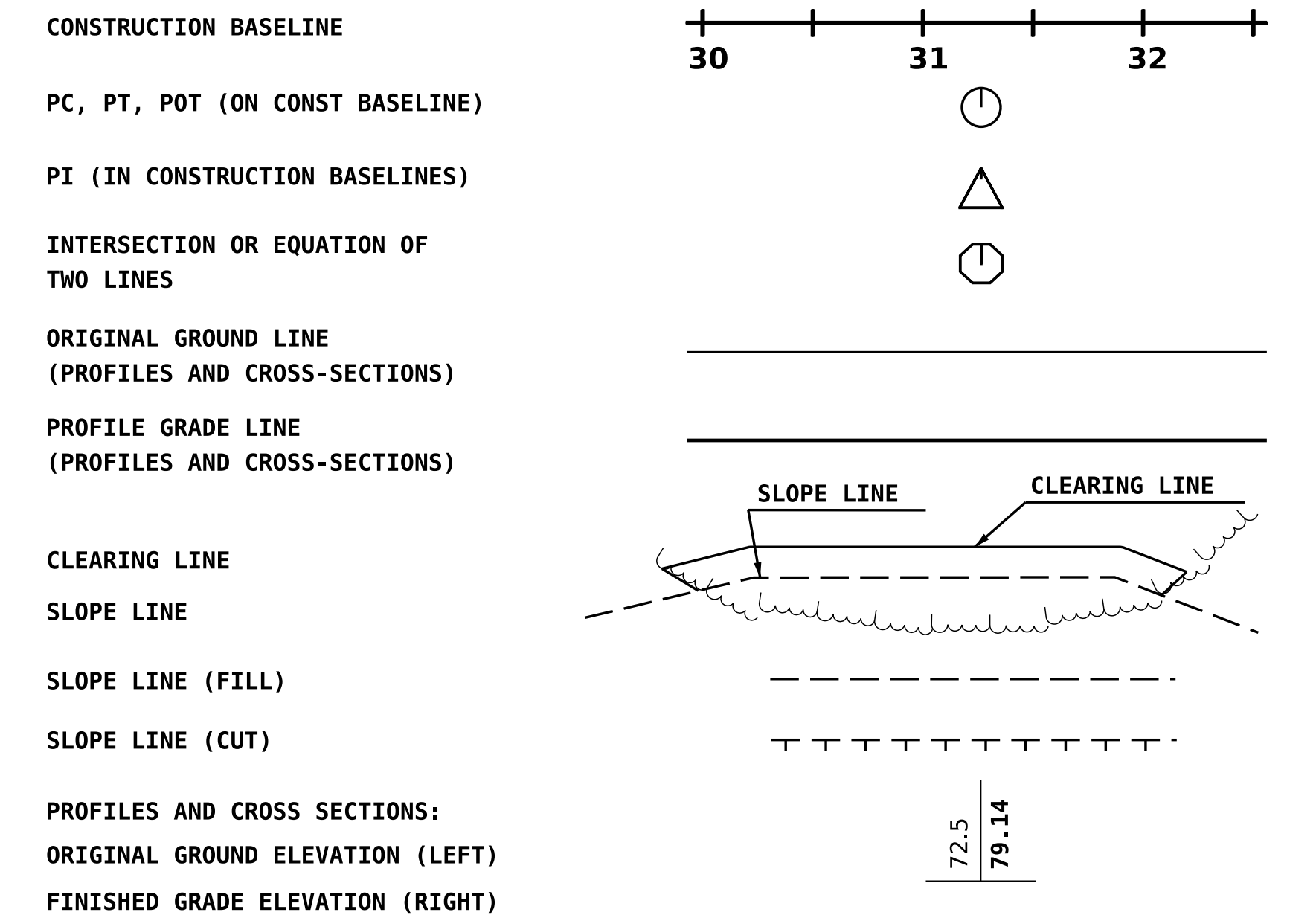
# SHORELAND - WETLAND



# FLOODPLAIN / FLOODWAY



# ENGINEERING

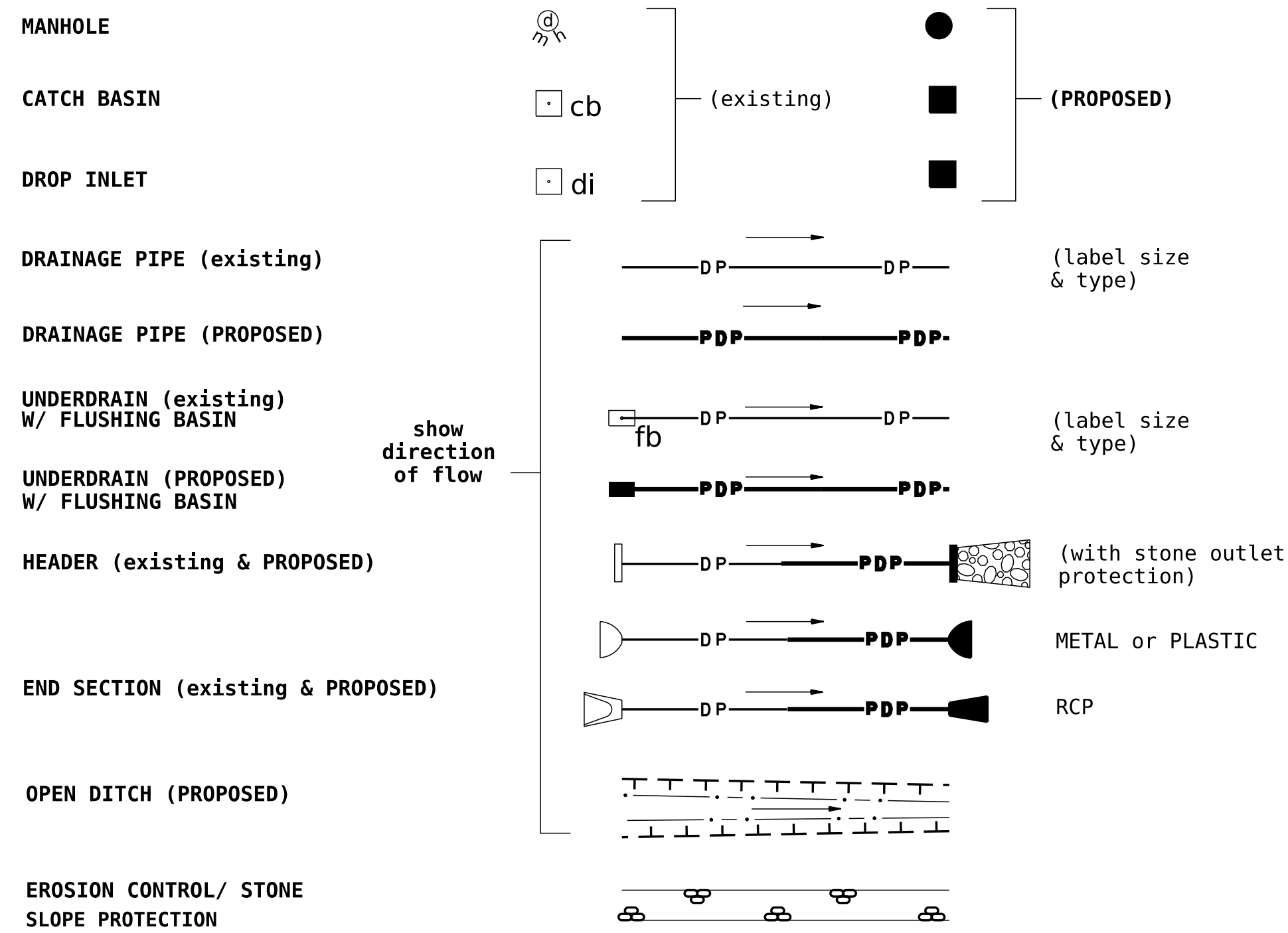


STATE OF NEW HAMPSHIRE  
 SUTTON  
 DEPARTMENT OF TRANSPORTATION o BUREAU OF HIGHWAY DESIGN

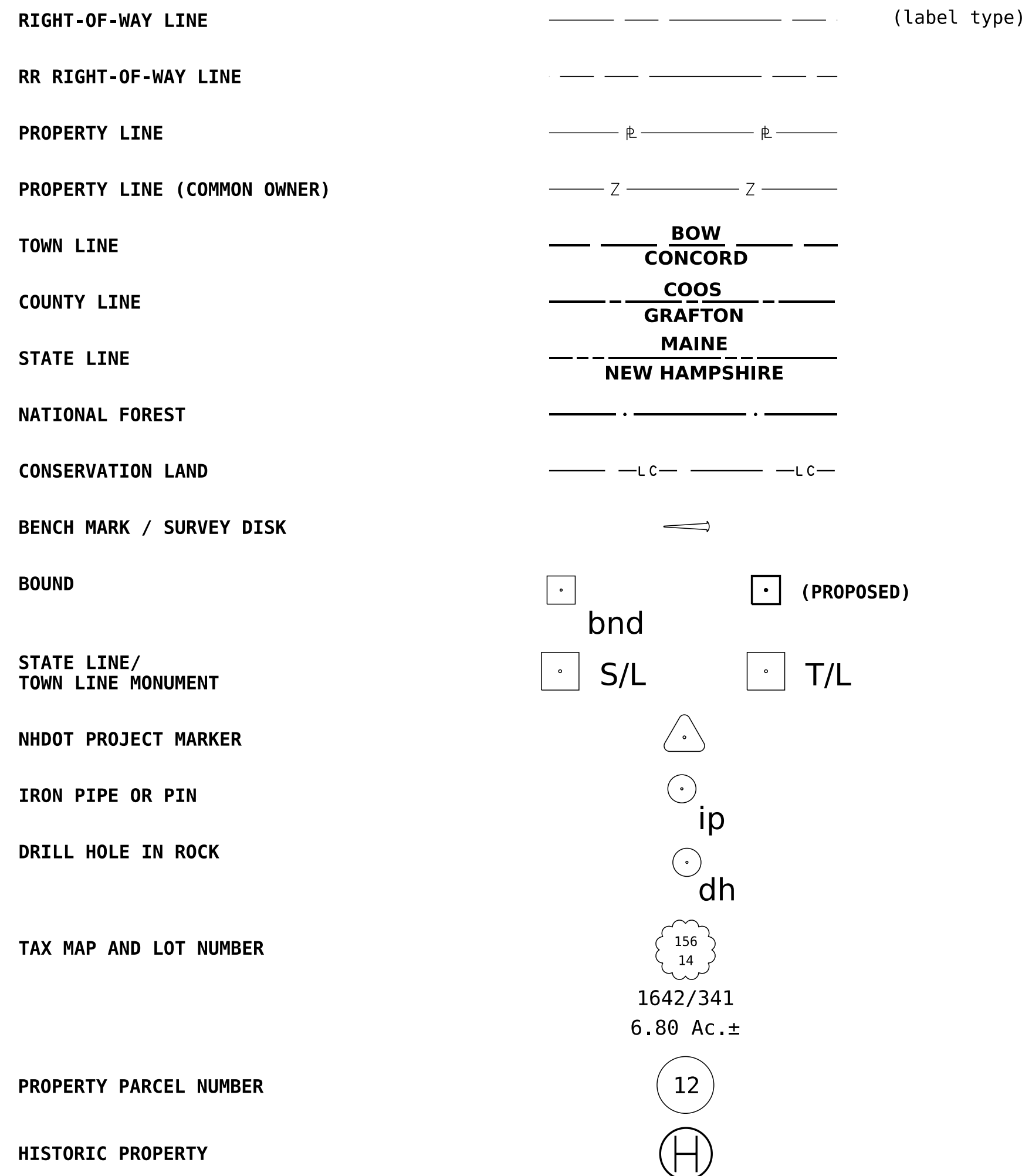
## STANDARD SYMBOLS

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
02-25-2022	2, 3 44167stdsyml-2-ce	44212	2	8

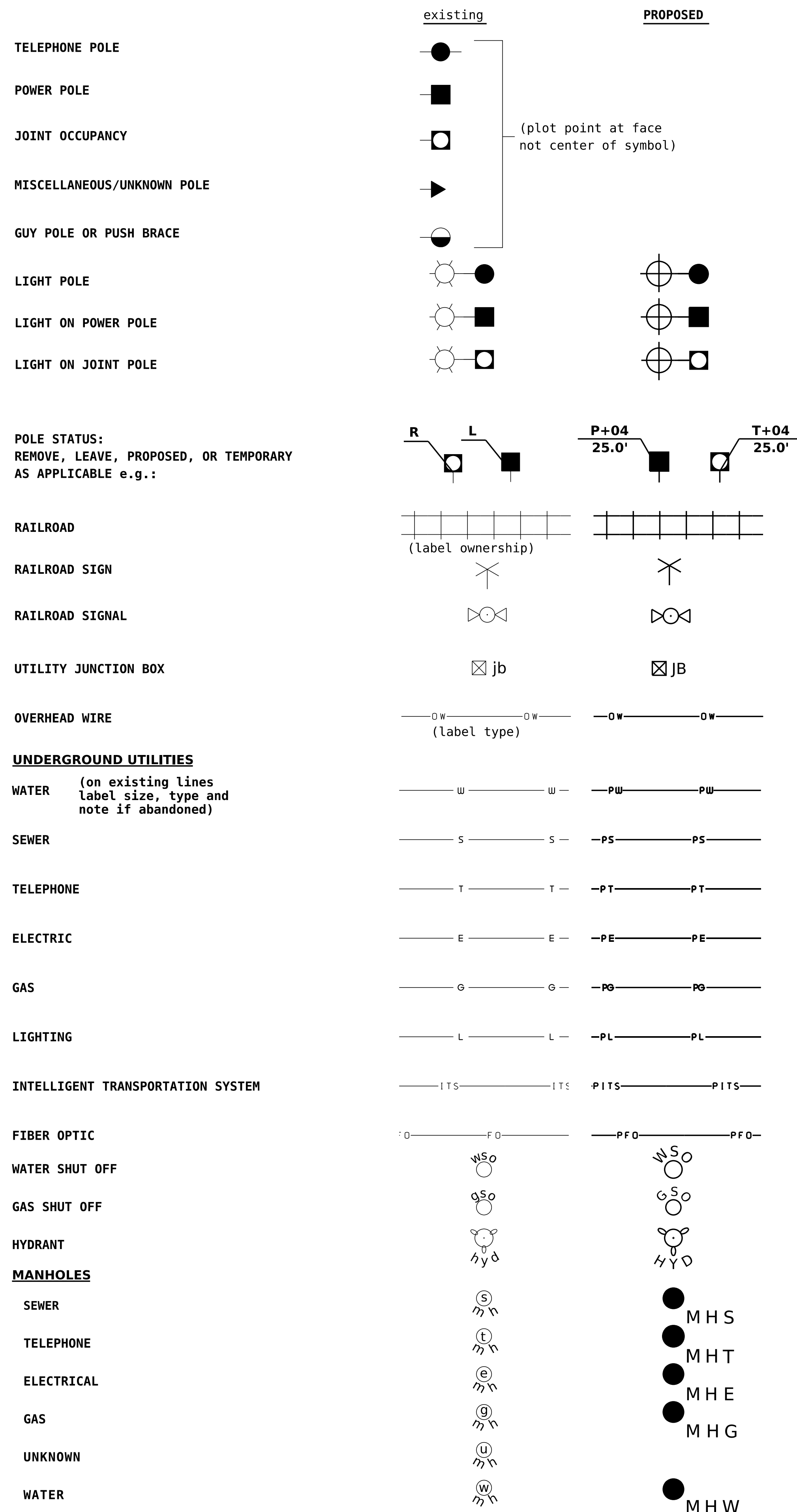
## DRAINAGE



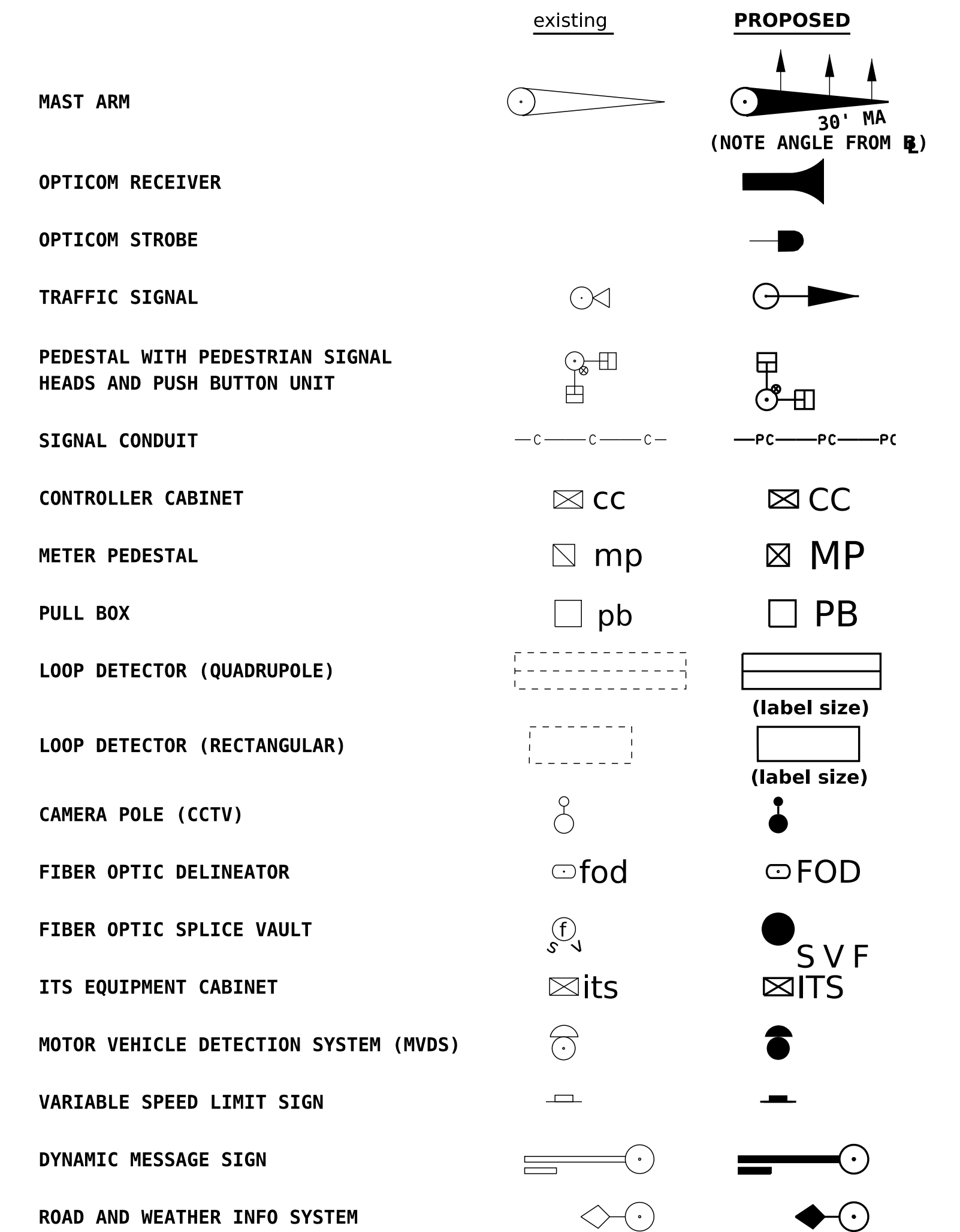
## BOUNDARIES / RIGHT-OF-WAY



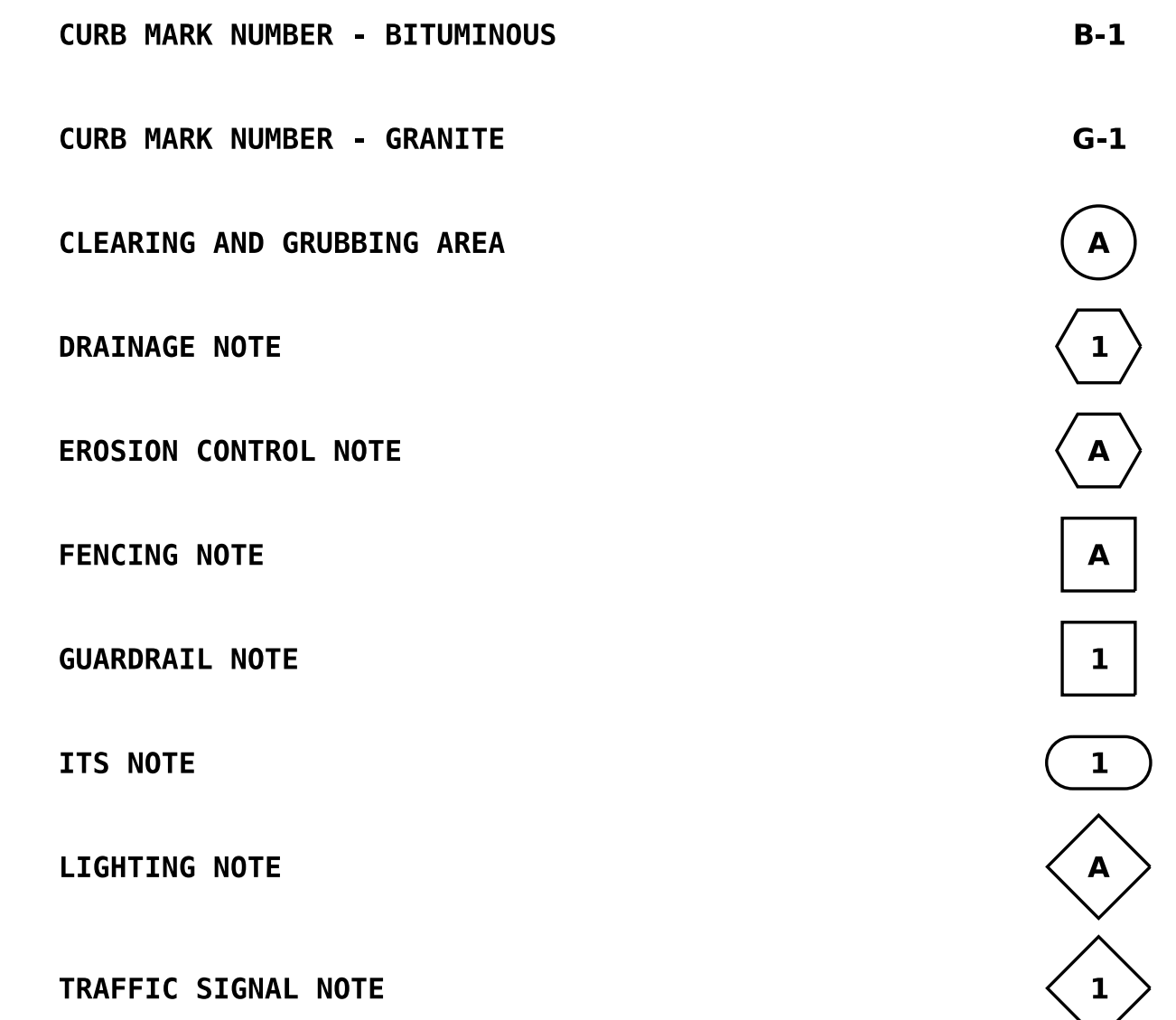
## UTILITIES



## TRAFFIC SIGNALS / ITS

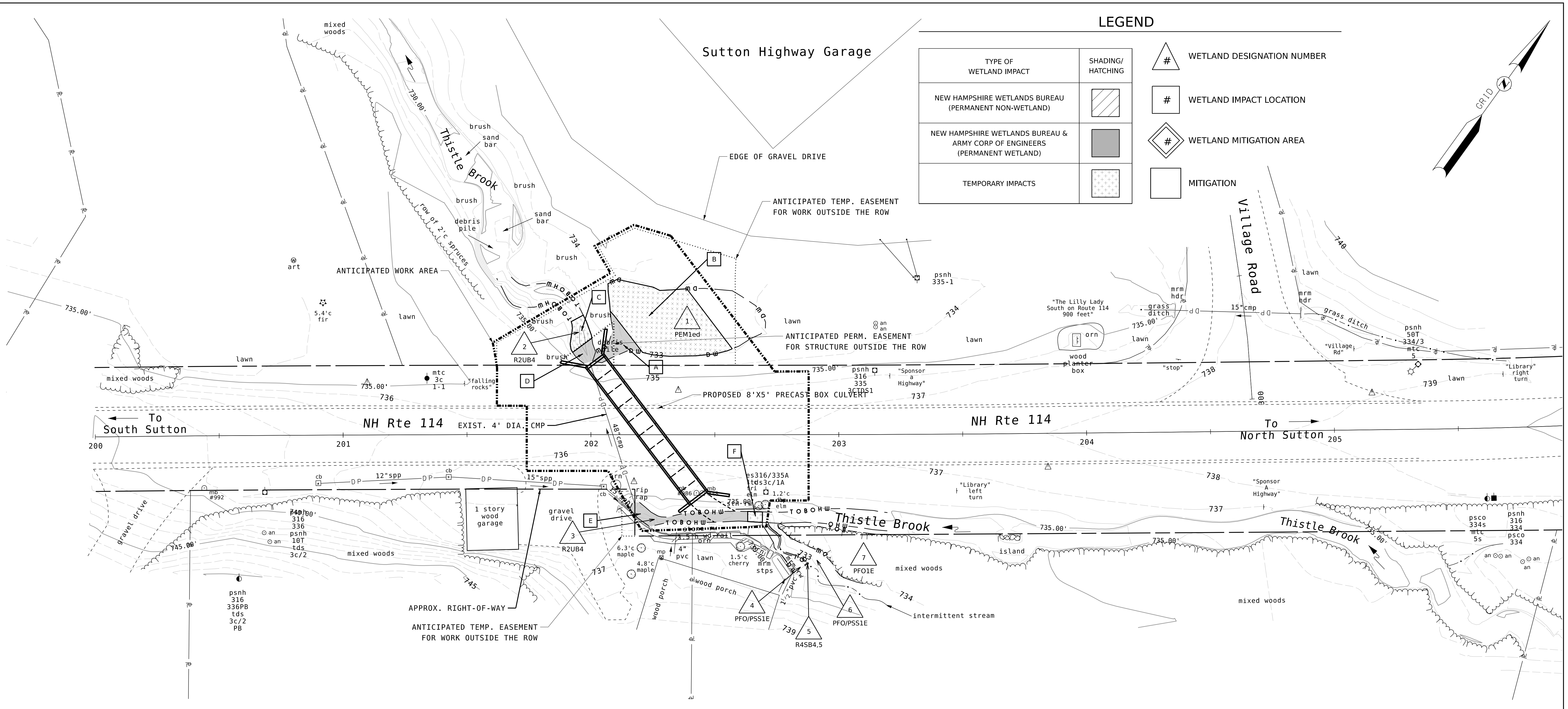


## CONSTRUCTION NOTES



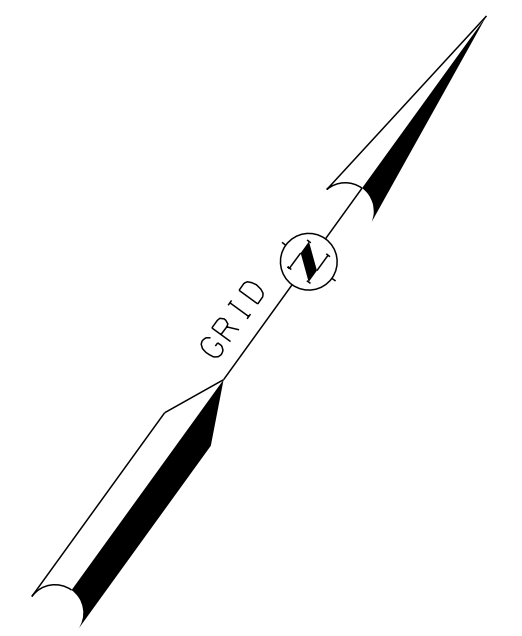
<b>STATE OF NEW HAMPSHIRE</b>				
SUTTON				
DEPARTMENT OF TRANSPORTATION		BUREAU OF HIGHWAY DESIGN		
<b>STANDARD SYMBOLS</b>				
REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
02-25-2022	2, 3 44167stdsyml1-2-ce	44212	3	8

SDR PROCESSED	DATE	8/23	DATE	10/23	DATE	11/23	DATE	
NEW DESIGN	JSC		TSM					
SHEET CHECKED								
AS BUILT DETAILS								



**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	[Cross-hatch]		MITIGATION



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)		TEMPORARY		BANK LEFT	BANK RIGHT	CHANNEL	
SF	LF	SF	LF	SF	LF	LF	LF	LF			
1	PEM1ed	A		143							
1	PEM1ed	B				1007					
2	R2UB4	C				82	30				
2	R2UB4	D		54	8						
2	BANK	D	16								
3	R2UB4	E		193	47						
3	BANK	E	100								
3	R2UB4	F				25	18				
4	PFO,PSS1E	*									
5	R4SB4,5	*									
6	PFO,PSS1E	*									
7	PFO1E	*									
<b>TOTAL</b>			116	390	55	1114	48				

WETLAND CLASSIFICATION CODES	
R2UB4	RIVERINE, LOWER PERENNIAL, UNCONSOLIDATED BOTTOM, ORGANIC
R4SB4,5	RIVERINE, INTERMITTENT, STREAMBED, SAND, MUD
PEM1ed	PALUSTRINE, EMERGENT, PERSISTENT, SEASONALLY FLOODED/SATURATED, PARTLY DRAINED/DITCHED
PFO1E	PALUSTRINE, FORESTED, BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED
PFO	PALUSTRINE, FORESTED
PSS1E	PALUSTRINE, SCRUB-SHRUB, BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED

**SCOPE OF WORK**

STA 202+09:  
REMOVE EXISTING 60' LONG 4' DIAMETER CMP CULVERT.

STA 202+24  
INSTALL PROPOSED 8' SPAN X 5' RISE (4' CLEAR HEIGHT) X 70' LONG PRECAST CONCRETE BOX EMBEDDED 1' BELOW STREAMBED. CONSTRUCT CONCRETE HEADWALLS AS DEPICTED.

SEE DETAILS FOR MATCHING NEW CULVERT TO EXISTING STREAM.  
USE APPROVED WETLAND SEED MIX TO RESTORE JURISDICTIONAL WETLAND AREAS.



\*NO IMPACTS PROPOSED.

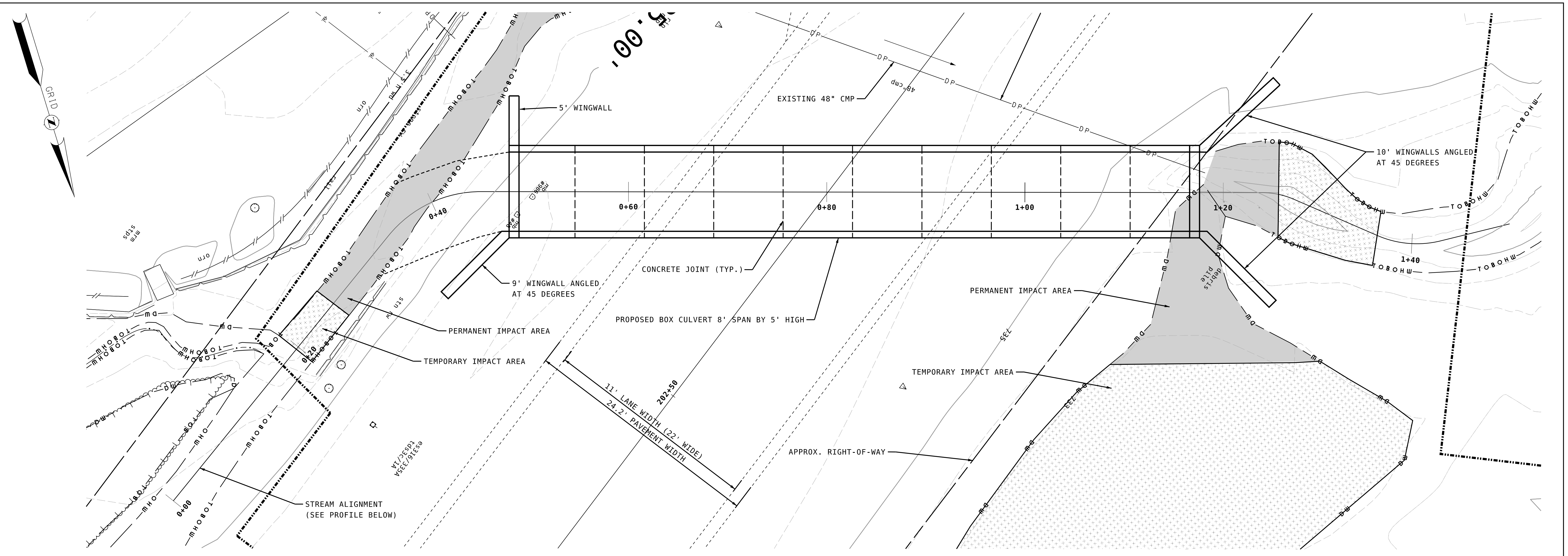
PERMANENT IMPACTS: 390 SF / 171 LF  
TEMPORARY IMPACTS: 1114 SF / 48 LF  
TOTAL IMPACTS: 1504 SF

NOTES:  
1. WETLANDS WERE DELINEATED ACCORDING TO ENV-WT 406 ON 8/14/2023 BY JOSHUA BROWN, MATT URBAN, AND ANDREW CZACHOR.

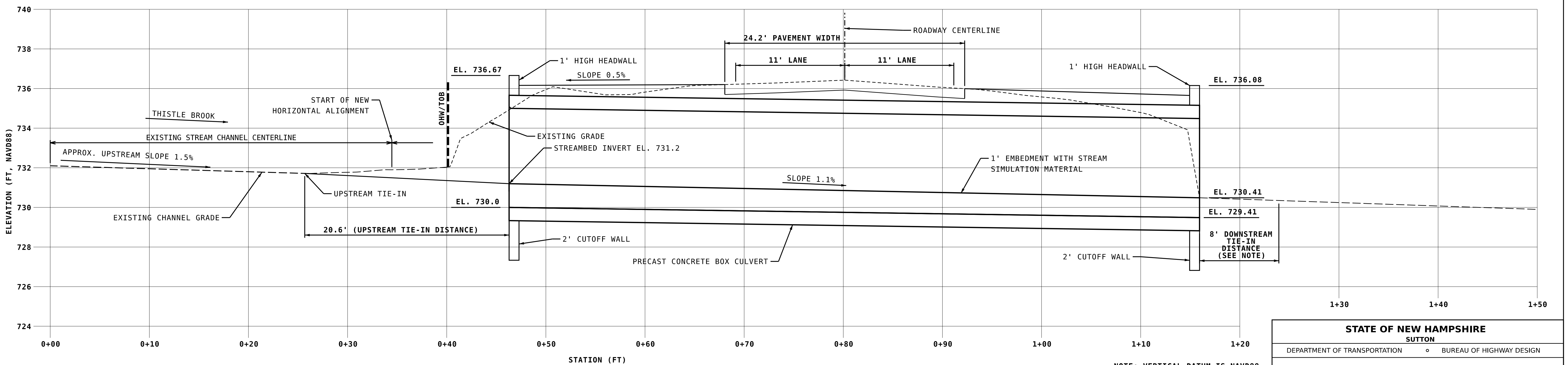
STATE OF NEW HAMPSHIRE SUTTON			
DEPARTMENT OF TRANSPORTATION		BUREAU OF HIGHWAY DESIGN	
<b>WETLAND IMPACT PLAN</b>			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
4-44212-wetplan	44212	4	8



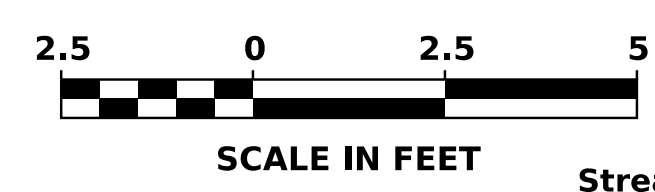
REVISIONS AFTER PROPOSAL		STATION	DATE	NUMBER	DESCRIPTION
SDR PROCESSED	JSC		8/23		
NEW DESIGN	TSM		11/23		
SHEET CHECKED			11/23		
AS BUILT DETAILS					



**STREAM AND CULVERT PLAN**  
SCALE: 1"=5'



**STREAM AND CULVERT PROFILE**  
HORIZONTAL SCALE: 1"=5' VERTICAL SCALE: 1"=2.5'



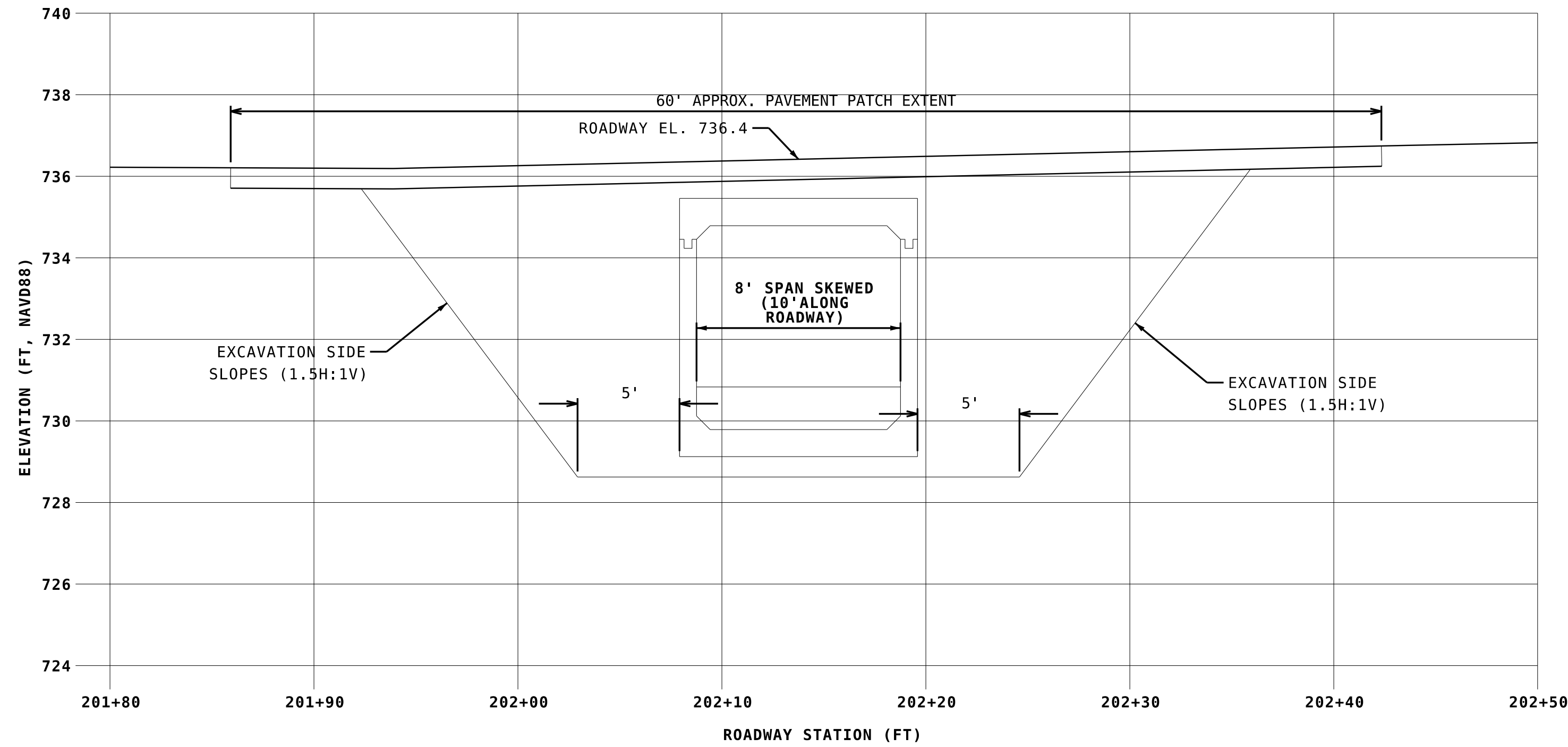
NOTE: THE 8 FOOT DOWNSTREAM TIE-IN IS REQUIRED FOR WINGWALL INSTALLATION.  
PROPOSED INVERT EL. TO MATCH EXISTING INVERT EL.

NOTE: VERTICAL DATUM IS NAVD88.

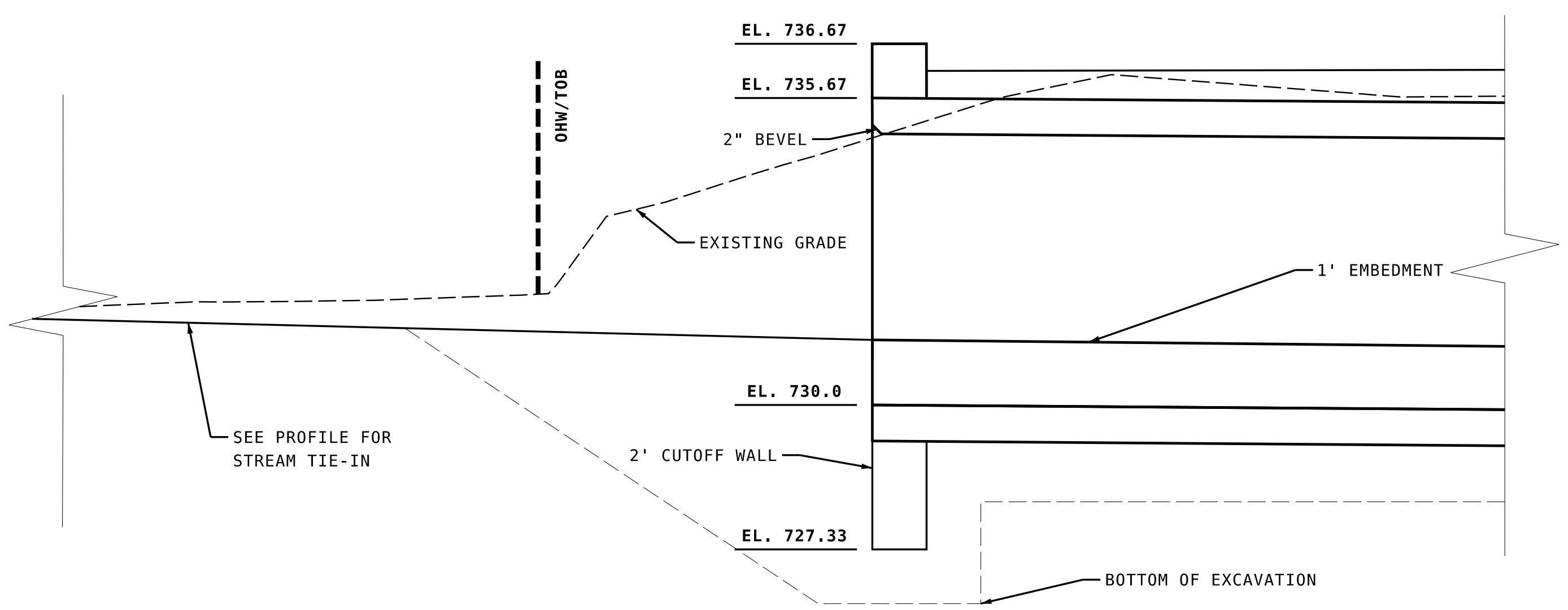
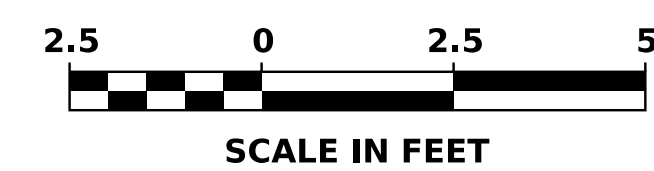
STATE OF NEW HAMPSHIRE			
SUTTON			
DEPARTMENT OF TRANSPORTATION		BUREAU OF HIGHWAY DESIGN	
<b>STREAM AND CULVERT PLAN AND PROFILE</b>			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
5 44212-profile	44212	5	8

Stream Alignment - Profile [Sheet]

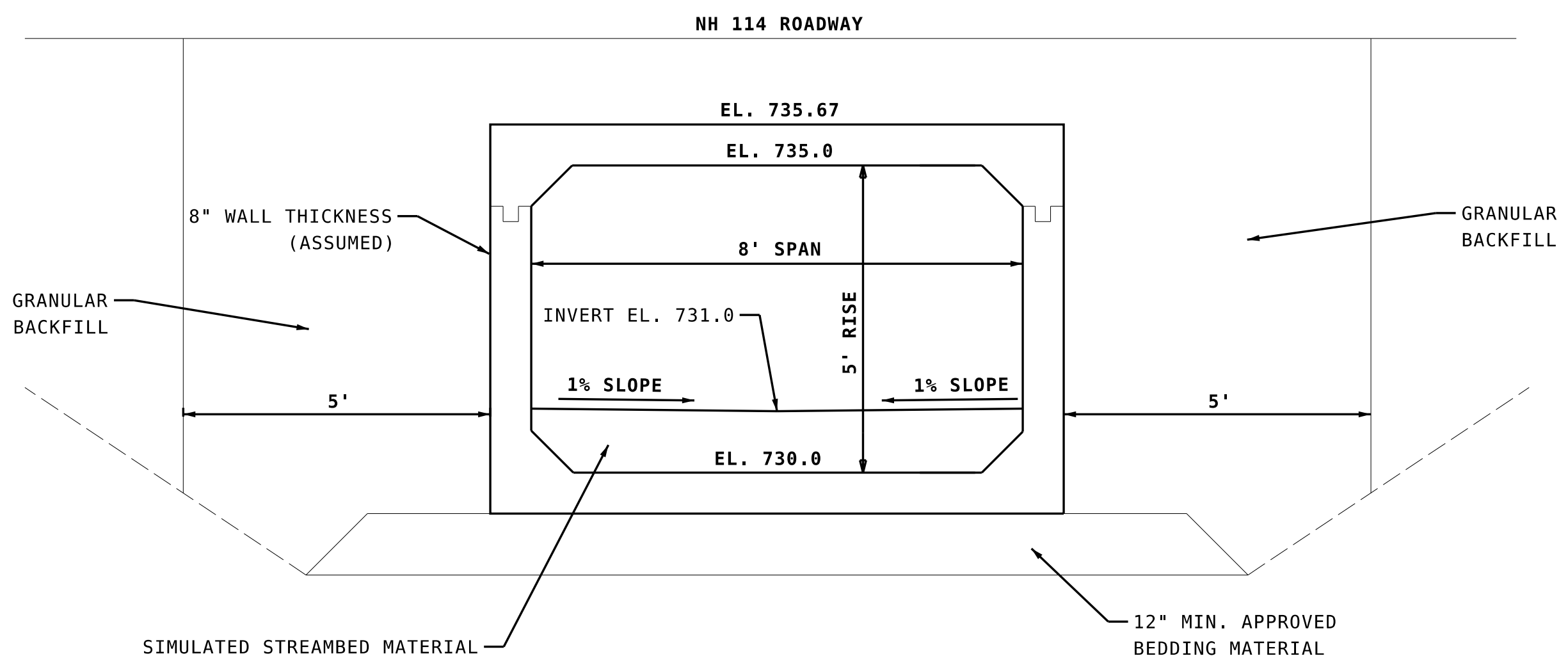
SDR PROCESSED		SEL	DATE	8/23
NEW DESIGN		JSC	DATE	11/23
SHEET CHECKED		TSM	DATE	11/23
AS BUILT DETAILS			DATE	
REVISIONS AFTER PROPOSAL		NUMBER	DATE	STATION
DESCRIPTION				



**CULVERT CROSS SECTION (AT MEDIAN)**  
 HORIZONTAL SCALE: 1"=5' VERTICAL SCALE: 1"=2.5'



**CULVERT INLET SECTION**  
 SCALE: 1"=2'



**TYPICAL CULVERT SECTION**  
 SCALE: 1"=2'



NOTE: VERTICAL DATUM IS NAVD88.

STATE OF NEW HAMPSHIRE			
SUTTON			
DEPARTMENT OF TRANSPORTATION		BUREAU OF HIGHWAY DESIGN	
<b>CULVERT CROSS SECTION AND DETAILS</b>			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
6 44212-details	44212	6	8

# EROSION CONTROL NOTES AND STRATEGIES

1. Erosion Control/Stormwater Control Selection, Sequencing and Maintenance
  - 1.1. Comply with RSA 485-A:17 Terrain Alteration.
  - 1.2. Install and maintain all erosion control/stormwater controls in accordance with the New Hampshire Stormwater Management Manual, Volume 3, Erosion and Sediment Controls During Construction, December 2008 (BMP Manual), available from the NH Department of Environmental Services (NHDES).
  - 1.3. Install erosion control/stormwater control measures prior to the start of work and in accordance with the manufacturer's recommendations.
  - 1.4. Select erosion control/stormwater control measures based on the size and nature of the project and physical characteristics of the site, including slope, soil type, vegetative cover, and proximity to jurisdictional areas.
  - 1.5. Install perimeter controls prior to earth disturbing activities.
  - 1.6. Install stormwater treatment ponds and drainage swales before rough grading the site.
  - 1.7. Clean, replace, and augment stormwater control measures and infiltration basins as necessary to prevent sedimentation beyond project limits throughout the project duration.
  - 1.8. Inspect erosion and sediment control measures in accordance with Section 645 of the specifications, weekly, and within 24 hours (during normal work hours), of any storm event greater than 0.25 inches of rain in a 24-hour period.
  - 1.9. Contain stockpiles with temporary perimeter controls. Protect inactive soil stockpiles with soil stabilization measures (temporary erosion control seed mix and mulch, soil binder) or cover them with anchored tarps. If the stockpile is to remain undisturbed for more than 14 days, mulch the stockpile.
  - 1.10. Maintain temporary erosion and stormwater control measures in place until the area has been permanently stabilized.
  - 1.11. An area is considered stable if one of the following has occurred:
    - Base course gravels have been installed in areas to be paved;
    - A minimum of 85% vegetative growth has been established;
    - A minimum of 3" of non-erosive material such as stone or rip-rap has been installed;
    - Temporary slope stabilization has been properly installed (see Table 1).
  - 1.12. Direct runoff to temporary practices until permanent stormwater infrastructure is constructed and stabilized.
  - 1.13. 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.
  - 1.14. Plan activities to account for sensitive site conditions
    - Sequence construction to limit the duration and area of exposed soils.
    - Clearly flag areas to be protected in the field and provide construction barrier to prevent trafficking outside of work areas.
    - Protect and maximize existing native vegetation and natural forest buffers between construction activities and sensitive areas.
    - When work is undertaken in a flowing watercourse, implement stream flow diversion methods prior to any excavation or filling activity.
  - 1.15. Utilize storm drain inlet protection to prevent sediment from entering a storm drainage system prior to the permanent stabilization of the contributing disturbed area.
  - 1.16. Use care to ensure that sediments do not enter any existing catch basins during construction. Place temporary inlet protection at inlets in areas of soil disturbance that are subject to sedimentation.
  - 1.17. Construct, stabilize, and maintain temporary and permanent ditches in a manner that will minimize scour. Direct temporary and permanent ditches to drain to sediment basins or stormwater collection areas.
  - 1.18. Supplement channel protection measures with perimeter control measures when ditch lines occur at the bottom of long fill slopes. Install the perimeter controls on the fill slope to minimize the potential for fill slope sediment deposits in the ditch line.
  - 1.19. Divert sediment laden water away from drainage inlet structures to the extent possible.
  - 1.20. Install sediment barriers and sediment traps at drainage inlets to prevent sediment from entering the drainage system.
  - 1.21. Clean catch basins, drainage pipes, and culverts if significant sediment is deposited.
  - 1.22. Construct and stabilize dewatering infiltration basins prior to any excavation that may require dewatering.
  - 1.23. Place and stabilize temporary sediment basins or traps at locations where concentrated flow (channels and pipes) discharge to the surrounding environment from areas of unstabilized earth disturbing activities.
  - 1.24. Stabilize, to appropriate anticipated velocities, conveyance channels or pumping systems needed to convey construction stormwater to basins and discharge locations prior to use.
  - 1.25. Size temporary sediment basins to contain the 2-year, 24 hour storm event.
  - 1.26. Size temporary sediment traps to contain 3,600 cubic feet of storage for each acre of drainage area.
  - 1.27. Construct detention basins to accommodate the 2-year, 24-hour storm event.
2. Construction Planning
  - 2.1. Divert off site runoff or clean water away from the construction activities to reduce the volume that needs to be treated on site.
  - 2.2. Divert storm runoff from upslope drainage areas away from disturbed areas, slopes and around active work areas to a stabilized outlet location.
  - 2.3. Construct impermeable barriers, as necessary, to collect or divert concentrated flows from work or disturbed areas.
  - 2.4. Locate staging areas and stockpiles outside of wetlands jurisdiction.
  - 2.5. Do not store, maintain, or repair mobile heavy equipment in wetlands, unless equipment cannot be practicably removed and secondary containment is provided.
  - 2.6. Provide a water truck to control excessive dust, at the discretion of the Contract Administrator.
3. Site Stabilization
  - 3.1. Stabilize all areas of unstabilized soil as soon as practicable, but no later than 45 days after initial disturbance.
  - 3.2. Limit unstabilized soil to a maximum of 5 acres unless documentation is provided that demonstrates that cuts and fills are such that 5 acres is unreasonable.
  - 3.3. Use erosion control seed mix in all inactive construction areas that will not be permanently seeded within two weeks of disturbance and prior to September 15<sup>th</sup> of any given year in order to achieve vegetative stabilization prior to the end of the growing season.
  - 3.4. Apply, and reapply as necessary, soil tackifiers in accordance with the manufacturer's specifications to minimize soil and mulch loss until permanent vegetation is established.
  - 3.5. Stabilize basins, ditches and swales prior to directing runoff to them.
  - 3.6. Stabilize roadway and parking areas within 72 hours of achieving finished grade.
  - 3.7. Stabilize cut and fill slopes within 72 hours of achieving finished grade.
  - 3.8. When temporarily stabilizing soils and slopes, utilize the techniques outlined in Table 1.
  - 3.9. Stabilize all areas that can be stabilized prior to opening up new areas to construction activities.
  - 3.10. Utilize Table 1 when selecting temporary soil stabilization measures.
  - 3.11. Divert off-site water through the project in an appropriate manner so as not to disturb the upstream or downstream soils, vegetation or hydrology beyond the permitted area.
  - 3.12. Install and maintain construction exits anywhere traffic leaves a construction site onto a public right-of-way.
  - 3.13. Sweep all construction related debris and soil from the adjacent paved roadways, as necessary.

4. Slope Protection
  - 4.1. Intercept and divert storm runoff from upslope drainage areas away from unprotected and newly established areas and slopes to a stabilized outlet or conveyance.
  - 4.2. Consider how groundwater seepage on cut slopes may impact slope stability and incorporate appropriate measures to minimize erosion.
  - 4.3. Convey storm water down the slope in a stabilized channel or slope drain.
  - 4.4. The outer face of the fill slope should be in a loose, ruffled condition prior to turf establishment.
5. Winter Construction
  - 5.1. To minimize erosion and sedimentation impacts, limit the extent and duration of winter excavation and earthwork activities. The maximum amount of disturbed earth shall not exceed a total of 5 acres from May 1<sup>st</sup> through November 30<sup>th</sup>, 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 contractor's Critical Path Method (CPM) schedule, and the contractor has adequate resources available to ensure that environmental requirements will be met.
  - 5.2. Construction performed any time between November 30<sup>th</sup> and May 1<sup>st</sup> of any year is considered winter construction. During winter construction:
    - Stabilize all proposed vegetation areas which do not exhibit a minimum of 85% vegetative growth by October 15<sup>th</sup>, or which are disturbed after October 15<sup>th</sup>, in accordance with Table 1.
    - Stabilize all ditches or swales which do not exhibit a minimum of 85% vegetative growth by October 15<sup>th</sup>, or which are disturbed after October 15<sup>th</sup>, in accordance with Table 1.
    - Protect incomplete road surfaces, where base course gravels have not been installed, and where work has stopped for the season after November 30<sup>th</sup>, in accordance with Table 1.
    - Unless a winter construction plan has been approved by NHDOT, conduct winter excavation and earthwork such that no more than 1 acre of the project is without stabilization any one time.
6. Wildlife Protection Measures
  - 6.1. Report all observations of threatened and endangered species on the project site to the Department's Bureau of Environment by phone at 603-271-3226 or by email at [Bureau16@dot.nh.gov](mailto:Bureau16@dot.nh.gov), indicating in the subject line the project name, number, and that a threatened/endangered species was found.
  - 6.2. Photograph the observed species and nearby elements of habitat or areas of land disturbance and provide them to the Department's Bureau of Environment at the above email address.
  - 6.3. In the event that a threatened or endangered species is observed on the project during work, the species shall not be disturbed, handled, or harmed prior to receiving direction from the Bureau of Environment.
  - 6.4. Utilize wildlife friendly erosion control methods when:
    - Erosion control blankets are used,
    - A protected species or habitat is documented,
    - The proposed work is in or adjacent to a priority resource area, and/or when specifically requested by NHB or NHF&G

GUIDANCE ON SELECTING TEMPORARY SOIL STABILIZATION MEASURES  
TABLE 1

APPLICATION AREAS	DRY MULCH METHODS				HYDRAULICALLY APPLIED MULCHES <sup>2</sup>				ROLLED EROSION CONTROL BLANKETS <sup>3</sup>			
	HMT	WC	SG	CB	HM	SMM	BFM	FRM	SNSB	DNSB	DNSCB	DNCB
SLOPES <sup>1</sup>												
STEEPER THAN 2:1	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES
2:1 SLOPE	YES <sup>1</sup>	YES <sup>1</sup>	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:**

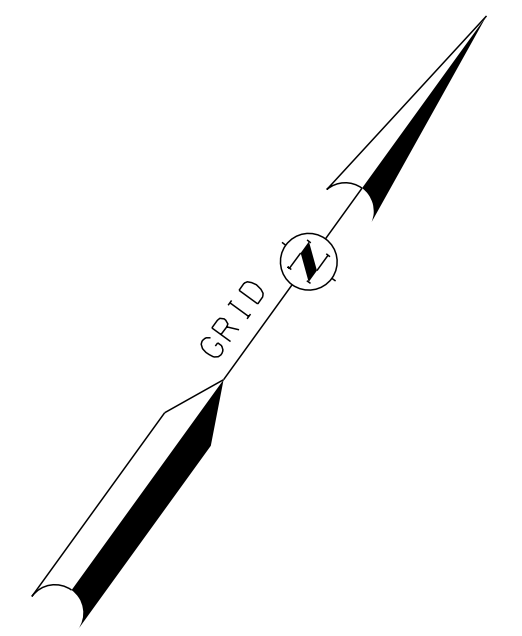
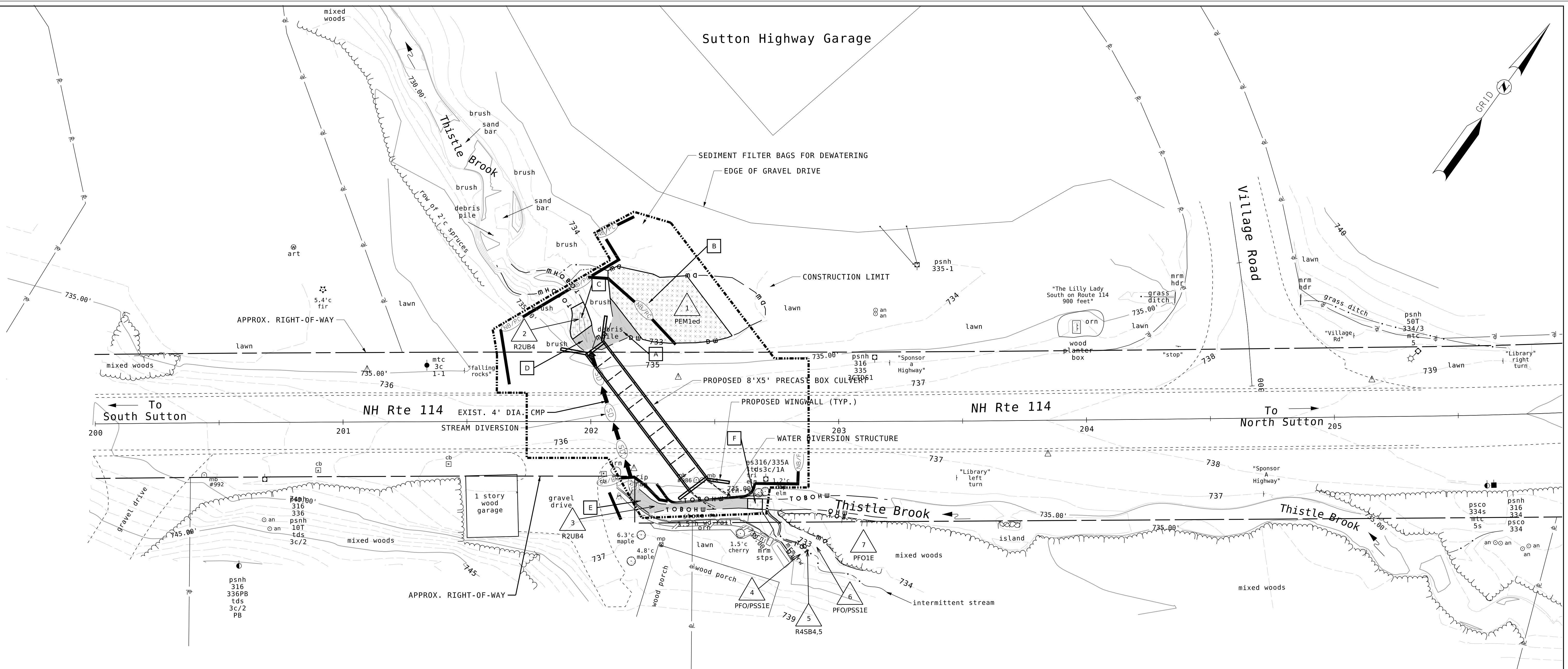
1. All slope stabilization options assume a slope length ≤ 10 times the horizontal distance component of the slope, in feet.
2. Do not apply products containing polyacrylamide (PAM) directly to, or within 100 feet of any surface water without NHDES approval.
3. Install all methods in Table 1 per the manufacturer's recommendation for time of year and steepness of slope.

**STATE OF NEW HAMPSHIRE**  
SUTTON  
DEPARTMENT OF TRANSPORTATION      BUREAU OF HIGHWAY DESIGN

**EROSION CONTROL PLANS**

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
erosstrat-ce 07-31-2023	_7 44167-erostrat-ce	44212	7	8

SDR PROCESSED	SL	DATE	8/23
NEW DESIGN	JSC	DATE	9/23
SHEET CHECKED	TSM	DATE	11/23
AS BUILT DETAILS		DATE	



EROSION CONTROL PLAN LEGEND	
	<b>PERIMETER CONTROL</b> SILT FENCE EROSION CONTROL MIX BERM EROSION CONTROL MIX SOX TURBIDITY CURTAIN SHEET PILE COFFER DAM
	<b>NATURAL BUFFER/PERIMETER CONTROL</b> SILT FENCE EROSION CONTROL MIX BERM EROSION CONTROL MIX SOX TURBIDITY CURTAIN SHEET PILE COFFER DAM
	<b>CHANNEL PROTECTION</b> STONE CHECK DAMS STRAW WATTLES CHANNEL MATTING CLASS D EROSION STONE CLASS C STONE
	<b>STREAM DIVERSION</b> PUMP THROUGH PIPE DRAIN THROUGH PIPE OR CHANNEL
	<b>UNIMPACTED RIVERINE SURFACE WATERS</b> NO WORK AND/OR IMPACT
	<b>ROUTINE ROADWAY QUALIFYING ACTIVITY</b> BMP

**GENERAL NOTES**

- LIMITS OF TEMPORARY DISTURBANCE ARE BASED ON CONSTRUCTION OF THE CULVERT ONE HALF AT A TIME WHILE MAINTAINING ONE LANE OF TRAFFIC THROUGH THE WORK AREA. ALL AREAS OF TEMPORARY DISTURBANCE SHALL BE RESTORED TO THE EXISTING GRADE.
- A COFFERDAM ITEM WILL BE INCLUDED IN THE CONTRACT FOR SUPPORT OF THE ROADWAY, EXCAVATION, AND CONTROL OF WATER. SEDIMENT BAGS FOR DEWATERING MAY BE PLACED BETWEEN THE EDGE OF PAVEMENT AND THE ROW, WITH APPROPRIATE SEPARATION FROM WETLANDS.
- A WATER DIVERSION ITEM WILL BE INCLUDED IN THE CONTRACT FOR MANAGING SURFACE WATER. STREAM FLOW SHALL BE PASSED THROUGH THE WORK AREA BY AN APPROVED METHOD. AT A MINIMUM, THE WATER DIVERSION SHALL BE DESIGNED TO ACCOMMODATE A 2-YEAR STORM.
- COFFERDAM, DEWATERING, AND WATER DIVERSION SHALL BE DESIGNED BY THE CONTRACTOR AND SUBMITTED TO NHDOT FOR APPROVAL.

**SCOPE OF WORK**

- STA 202+09:  
REMOVE EXISTING 60' LONG 4' DIAMETER CMP CULVERT.
- STA 202+24  
INSTALL PROPOSED 8' SPAN X 5' RISE (4' CLEAR HEIGHT) X 70' LONG PRECAST CONCRETE BOX EMBEDDED 1' BELOW STREAMBED.  
CONSTRUCT CONCRETE HEADWALLS AS DEPICTED. SEE DETAILS FOR MATCHING NEW CULVERT TO EXISTING STREAM.  
USE APPROVED WETLAND SEED MIX TO RESTORE JURISDICTIONAL WETLAND AREAS.



<b>STATE OF NEW HAMPSHIRE</b>			
SUTTON			
DEPARTMENT OF TRANSPORTATION		BUREAU OF HIGHWAY DESIGN	
<b>EROSION CONTROL PLAN</b>			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
8 44212-erc-plan	44212	8	8

ERC Plan [Sheet]