THE STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION

William Cass, P.E.
Commissioner

David Rodrigue, P.E.
Assistant Commissioner

Michelle L. Winters
Deputy Commissioner

11-26-25

Re: Wiggin Conservation Easement / Squamscott Road Culverts

The New Hampshire Department of Transportation (NHDOT), in conjunction with the Nature Conservancy (TNC), the NH Department of Environmental Services Coastal Office, and CMA Engineers Inc., are proposing to replace two existing ,18" diameter concrete tidal culverts on Squamscott Road between Route 108 and Chisholm Farm Drive in Stratham. The culverts are adjacent to the Wiggin LCIP conservation easement assigned to Fish and Game. The project involves placing minor area permanent and temporary easements on both sides of Squamscott Road, including on the Wiggin parcel to the north. Squamscott Road is not eligible for federal transportation funds, so the NOAA grant is greatly appreciated.

The proposed culvert construction would involve removal of the existing pipes, grading or modifying side slopes; replacing culverts with 8 ft wide concrete box culverts; reconstructing roadway shoulders; and coordination for utilities. The purpose of the project is to improve salt marsh migration potential upstream of the crossings and to improve aquatic organism passage through the crossings. The need for this work is demonstrated by the culvert constriction compared to bankfull width of the upstream and downstream tidal reaches. The two existing 18" culverts are undersized and in fair to poor condition, with limited hydraulic capacity and poor aquatic organism passage. The concrete box culverts are sized to convey the bankfull channel width and improve tidal exchange.

The Department collaborated with NHDES Coastal Office staff to engage CMA Engineers, Inc and Streamworks, PLLC for the concrete box culvert designs that will increase connectivity with conservation lands (Wiggin Easement) under Fish and Game stewardship. Additional benefits include better shoulders in the vicinity of the culverts for bicycle use. The Rockingham Planning Commission has preliminarily considered a bicycle path along the popular Squamscott Road route. The slightly wider shoulders at the culvert crossing could help avoid future constraints should a bike path be advanced by the planning commission. Roadway improvements include new pavement at the crossings and steel backed wood beam guard rails requested by the Town of Stratham to help preserve sight views.

Improved flood resilience is a benefit for the surrounding property owners and the traveling public. Reduction of potential flood damage to the road and limiting access interruption through the area and minimizing costly emergency repairs are project benefits. The new crossings would be constructed with erosion and sediment controls that prevent water quality degradation during construction. The larger structures would minimize channel erosion and promote stream stability. Reduced erosion and sedimentation improve water quality and benefits stream and wetland functions and values in and near the project area. Salt marsh migration helps ecological adaptation for sea level rise, and Important ecological functions including tidal sediment capture that promote "living shores" for flood resistance.

Attached herewith are pertinent sections of the draft wetland application under review by the NHDOT Bureau of Environment for submission to NHDES in mid-December. Additional project details are available in the design and Right of Way plans included herewith.

Compensation for any interest in land obtained by the state department of transportation shall be at the full fair market value of those property interests in accordance with the Land Conservation Investment Program Section 162-C:6 VI

Requested Action of CORD:

At this time, the NHDOT requests CORD review and approval of the proposed project. Potential project changes or unanticipated impacts to the conservation easement will be brought to CORD for additional review, if needed.

Respectfully,

Timothy S. Mallette, P.E., P.L.S.
Group Leader, NHDOT Specialty Section
T: 603-271-2011 | M: 603-244-8844

THE STATE OF NEW HAMPSHIRE

DEPARTMENT OF TRANSPORTATION

William Cass, P.E.
Commissioner

David Rodrigue, P.E.
Assistant Commissioner

Michelle L. Winters
Deputy Commissioner

11-13-25

Re: November 4, 2025 Meeting Notes

Attendees: Tammy Hathaway, Robin Reed, Charlotte Harding, Kayla Woods, and Tim Mallette

An in-person project update briefing was held at 66 Squamscott Road in Stratham on 11-4-25 to help the owners of the Wiggin Conservation Easement better understand the current status of design, permitting, and the planned culvert and guard rail replacements. The goal of increasing connectivity across Squamscott Road for salt marsh migration potential, habit, and flood resiliency was discussed. T. Mallette explained that this is a good opportunity to leverage NOAA funds for a road that is not eligible for typical federal assistance. NHDOT District 6 maintains the road with budgeted State resources. It was explained that the road would be closed and dead ended first to build one 8 ft wide concrete box culvert and then closed from the opposite direction to build the second 8 ft wide box culvert. T. Mallette said the total time for construction of both culverts would last approximately 5 weeks. He mentioned that the soils will be challenging for construction and that the total construction time is weather dependent, and it could be a little more or less time.

Questions from the owners were as follows:

1.) T. Hathaway asked if the profile of the road surface would be raised to accommodate the 8 ft wide x 7 ft high concrete box culverts, because the existing 18" rcp culverts are submerged most of the time. A preliminary cross section plan of the proposed culverts was shown, and it was explained that the excavation would be deeper for natural streambed material to be placed inside the larger open area under the road.

2.) R. Reed asked if it was known that more tidal flow crosses under Squamscott Road through the culvert recently replaced closer to NH Rte. 108. T. Mallette indicated he was aware of the HDPE culvert that replaced the old metal culvert (Jewel Brook archive State project 15653). T Hathaway mentioned that ice sometimes washes onto Squamscott Road at the Jewel Brook crossing during high water events. T. Mallette inspected the culvert after the meeting, and it appears to perform well for normal tidal flow.

3.) T. Hathaway and R. Reed asked how far the grading would extend beyond the existing culverts. T Mallette said that most of the impacts will be temporary but that small areas of permanent impact are needed for the culvert and guard rail replacements. He indicated that the NHDOT Bureau of Right of Way and the consultant, CMA Inc. are finishing off plans that can be shared soon. He mentioned that Kayla Woods would be following up.

C. Harding outlined the normal stewardship activities for the Wiggin Easement performed by the Conservation Land Stewardship Program (CLSP). She explained that the adjacent parcel owned by the Department of Fish

and Game is managed by other Divisions at the Department. The development of the easement and proactive involvement of Florence "Flossy" Wiggin in other initiatives for conservation in the area was recognized. She shared many observations with Robin and Tammy, one in particular was the diversity of birds in the salt marsh.

T. Hathaway and R. Reed indicated that they have confidence in the engineers working on the design and permitting. In turn, T. Mallette said he is confident that they will be pleased with the proposed improvements which will not only promote a more natural tidal flow but will also add safety features for the travelling public, including bicycles to some degree. T. Hathaway and R. Reed said that the traffic volumes are quite high during peak commuting hours as Squamscott Road is a short cut for many travelers.

The group discussed next steps, which included the sharing of notes from the meeting and the requirement for an acknowledgement and/or recognition of support for the project by the landowner. C. Harding and T. Mallette stated that they would attend the next meeting of the Council on Resources Development (CORD) on December 11th and that such an acknowledgement would be an important component of CORD's review and approval of the project. They also indicated that they would follow up with R. Reed and T. Hathaway via email and solicit their acknowledgement in writing via that communication.

From: Tammy Hathaway <flowers.rgn@gmail.com>
Sent: Tuesday, November 25, 2025 6:57 AM
To: Harding, Charlotte <Charlotte.J.Harding@wildlife.nh.gov>
Subject: Re: Culvert Replacement - Meeting Notes

Thank You for sending the notes over on our meeting it was informative .

TAMMY HATHAWAY

From: reedwiggy@aol.com <reedwiggy@aol.com>
Sent: Sunday, November 23, 2025 12:10 PM
To: Harding, Charlotte <charlotte.j.harding@clsp.nh.gov>
Subject: Fw: Culvert Replacement - Meeting Notes

I am sending this email to say I have received meeting notes and agree with all.

signed
Robin Reed
----- Forwarded Message -----
From: Harding, Charlotte <charlotte.j.harding@wildlife.nh.gov>
To: reedwiggy@aol.com <reedwiggy@aol.com>; flowers.rgn@gmail.com <flowers.rgn@gmail.com>
Cc: Mallette, Timothy <timothy.s.mallette@dot.nh.gov>; Woods, Kayla <kayla.a.woods@dot.nh.gov>
Sent: Thursday, November 13, 2025, 2:40:54 PM EST
Subject: Culvert Replacement - Meeting Notes

Good afternoon, Robin and Tammy.

Thank you for meeting with us last week to discuss the culvert replacement project on Squamscott Road. Notes from our meeting are attached for your review. Please let us know if any information may be incorrect or missing from the notes. If you feel that the notes accurately reflect the conversation, please respond to this email with your acknowledgment and/or statement of support so that we may include it in the materials for CORD's assessment on December 11th.

Should you be interested in attending the meeting, let us know. We would be happy to share the details and accompany you.

Thank you for your assistance,

Charlotte

Charlotte J. Harding

Conservation Land Stewardship Program

Business Division

New Hampshire Fish and Game Department

11 Hazen Drive, Concord, NH 03301

p. 603-271-6809 | **c.** 603-931-2690

e. Charlotte.J.Harding@wildlife.nh.gov

wildlife.nh.gov

Connecting You to Life Outdoors™

Follow us: Facebook | Instagram | YouTube | X

NEW HAMPSHIRE FISH AND GAME DEPARTMENT
LANDS TEAM
MEETING NOTES

Date: October 2, 2025
Time: 9:00 AM
Location: MS Teams
Recorder: James Oehler

Attendees:

- James Oehler, Sean Coulter, Karen Williams, Sandra Houghton, John Sojka, Robert Weir, Jared Lamy, Dawn Trombly

3. Easement for Culvert Replacement – Wiggin LCIP Easement & Squamscott River WMA

Presenter: James Oehler

Overview:

- Wiggin CE purchased by the State of NH through the former Land Conservation Investment Program (LCIP) from the late 1980s – early 90s.
- Squamscott River WMA likely purchased using NOAA funds.
- DOT requires temporary and permanent easements for culvert replacement at two stream crossings.
- Project aims to improve flood resilience, aquatic organism passage, and salt marsh migration.
- Project would occur on the Wiggin easement and adjoining Fish and Game land owned in fee.
- Final approval on easement land required from the inter-agency Council on Resources and Development (CORD) who has ultimate authority on LCIP lands. CORD seeking recommendation from NHFG.
- Ecological benefits supported by the team.
- Legal process for granting easement discussed.
- Robert Weir volunteered to handle legal documentation and coordination.

Decision:

Supported – Fish and Game supports the project. James Oehler to communicate decision to CORD regarding the Wiggin CE as he is NHFG's rep on CORD. Robert Weir will manage easement process on the WMA.

C.

CONSERVATION EASEMENT SUMMARY
Land Conservation Investment Program (LCIP) Easement

Easement Name: Wiggin **Acreage:** 30

Location/Road: Squamscott Rd. **Town:** Stratham **County:** Rockingham

Registry Recording Information: **Book** 2794 **Page** 245 **Date** 5-26-89
Plan D-19372 **Date** 5-26-89

Grantor: Florence Wiggin

Grantee: NH LCIP, assigned to Dept. of Fish and Game

BRIEF DESCRIPTION OF PROPERTY CONSERVATION VALUES AND PURPOSES OF EASEMENT:

The Wiggin easement protects a highly visible tract of farmland and estuarine marsh. The open farm field on the property is bordered on two sides by creeks feeding the Squamscott River. These winding creeks are banked by wide bands of marshland which harbor three endangered or threatened plant species, and which provide habitat and breeding grounds for waterfowl, shellfish and other aquatic species. The property links a 200-acre corridor of protected farm, forest and marshland at the mouth of the Squamscott River and Great Bay. Research and education activities associated with the Great Bay National Estuarine Research Reserve (GBNERR), from which program part of the easement acquisition funds were drawn, are provided for in the easement terms.

TERMS OF EASEMENT: **("Non-standard" terms are listed below. "Standard" LCIP easement terms are summarized on the reverse.)**

1. Use Limitations:

Forest, wildlife, and agricultural management activities are more severely restricted than by standard LCIP easement provisions. See easement for detailed restrictions.

2. Reserved Rights of Landowner:

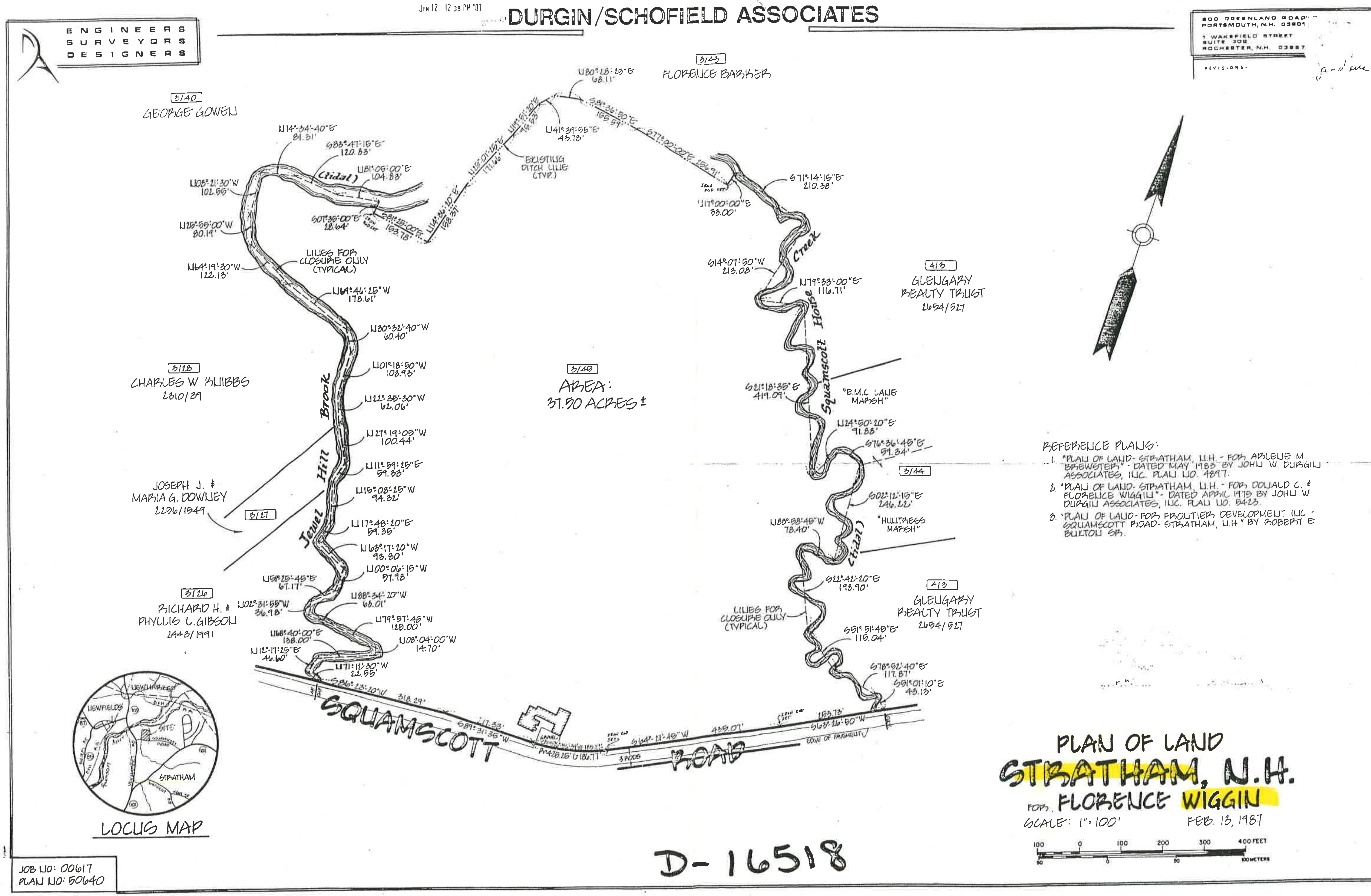
Standard, plus:
a. specific reserved right to grow commercial agricultural crops
b. right to build a boathouse, subject to Grantee approval

3. Affirmative Rights of Grantee:

Standard, except:
a. no standard right to place LCIP signs
b. no hunting rights granted, no hunting is allowed
c. research and education activities related to GBNERR are allowed

NOTE: **Consult the full easement document for the complete easement terms restricting the property. This summary does not include the full intent and specific provisions contained in the easement language.**

Summary Date: 7/8/92


DURGIN/SCHOFIELD ASSOCIATES
ENGINEERS SURVEYORS DESIGNERS
800 GREENLAND ROAD PORTSMOUTH, N.H. 03801
1 WAKEFIELD STREET SUITE 302 ROCHESTER, N.H. 03867
REVISIONS-
3/40 GEORGE GOWEN
3/43 FLORENCE BARKER
3/28 CHARLES W KNIBBS 2310/39
JOSEPH J. & MARIA G. DOWNEY 2256/1549
3/27
3/26 RICHARD H. & PHYLLIS L. GIBSON 2443/1991
4/3 GLENGARY REALTY TRUST 2654/527
3/44
3/45 AREA: 37.50 ACRES ±
Jewel Hill Brook
Squamscott House Creek
(tidal)
LINES FOR CLOSURE ONLY (TYPICAL)
EXISTING DITCH LINE (TYP.)
"E.M.C. LANE MARSH"
"HULTRESS MARSH"
SQUAMSCOTT ROAD
REFERENCE PLANS:
1. "PLAN OF LAND- STRATHAM, N.H.- FOR ARLENE M BREWSTER" - DATED MAY 1983 BY JOHN W. DURGIN ASSOCIATES, INC. PLAN NO. 4897.
2. "PLAN OF LAND- STRATHAM, N.H.- FOR DONALD C. & FLORENCE WIGGIN" - DATED APRIL 1979 BY JOHN W. DURGIN ASSOCIATES, INC. PLAN NO. 5423.
3. "PLAN OF LAND- FOR FRONTIER DEVELOPMENT INC.- SQUAMSCOTT ROAD- STRATHAM, N.H." BY ROBERT E BURTON SR.
LOCUS MAP
NEWFIELDS
NEWMARKET
SITE
STRATHAM
PLAN OF LAND
STRATHAM, N.H.
FOR FLORENCE WIGGIN
SCALE: 1"=100'
FEB. 13, 1987
100 0 100 200 300 400 FEET
JOB NO: 00617
PLAN NO: 50640
D-16518

Application

1. Application Form
2. Application Fee (*attached*)

STANDARD DREDGE AND FILL WETLANDS PERMIT APPLICATION

Water Division / Land Resources Management

Check the Status of your Application

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

APPLICANT'S NAME: NHDOT, Kirk Mudgett **TOWN NAME:** Rye

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.

SECTION 1 - REQUIRED PLANNING FOR ALL PROJECTS (Env-Wt 306.05; RSA 482-A:3, I(d)(2))

Please use the Wetland Permit Planning Tool (WPPT), the Natural Heritage Bureau (NHB) DataCheck Tool, the Aquatic Restoration Mapper, or other sources to assist in identifying key features such as: Priority Resource Areas (PRAs), protected species or habitats, coastal areas, designated rivers, or designated prime wetlands.

Has the required planning been completed?	(●) Yes ( ) No
Does the property contain a PRA? If yes, provide the following information:	(●) Yes ( ) No
• Does the project qualify for an Impact Classification Adjustment (e.g. NH Fish and Game Department (NHFG) 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.	( ) Yes (●) No
• Protected species or habitat? ○ If yes, species or habitat name(s): horned-pondweed, tundra a ○ NHB Project ID #: NHB24-1141	(●) Yes ( ) No
• Bog?	( ) Yes (●) No
• Floodplain wetland contiguous to a tier 3 or higher watercourse?	(●) Yes ( ) No
• Designated prime wetland or duly-established 100-foot buffer?	( ) Yes (●) No
• Sand dune, tidal wetland, tidal water, or undeveloped tidal buffer zone?	(●) Yes ( ) No
Is the property within a Designated River corridor? If yes, provide the following information: • Name of Local River Management Advisory Committee (LAC): • A copy of the application was sent to the LAC on Month: Day: Year:	( ) Yes (●) No

For dredging projects, is the subject property contaminated? • If yes, list contaminant:	○ Yes ◉ No
Is there potential to impact impaired waters, class A waters, or outstanding resource waters?	◉ Yes ○ No
For stream crossing projects, provide watershed size (see WPPT or Stream Stats):	185 acres

SECTION 2 - PROJECT DESCRIPTION (Env-Wt 311.04(i))

Provide a description of the project and the purpose of the project, the need for the proposed impacts to jurisdictional areas, an outline of the scope of work to be performed, and whether impacts are temporary or permanent.

The project is located in Stratham at two tidal crossings on Squamscott Road. The purpose of the project is to promote salt marsh migration upstream of the culvert. To accomplish this goal, the project proposes to replace two 18" RCP culverts with appropriately sized culverts. A comprehensive modeling study and an alternatives analysis was performed in a collaborative effort by CMA Engineers, Inc., Streamworks, PLLC, NHDOT, NHDES, and The Nature Conservancy. The proposed culverts were evaluated with respect to geomorphic compatibility, aquatic organism passage, sea level rise, and future stormwater flows. The proposed culverts are 8' wide, four-sided, embedded concrete culverts and will include permanent impacts.

SECTION 3 - PROJECT LOCATION

Separate wetland permit applications must be submitted for each municipality within which wetland impacts occur.

ADDRESS:	Squamcott Road
TOWN/CITY:	Stratham
TAX MAP/BLOCK/LOT/UNIT:	21
US GEOLOGICAL SURVEY (USGS) TOPO MAP WATERBODY NAME: ■ N/A	
(Optional) LATITUDE/LONGITUDE in decimal degrees (to five decimal places):	43.0375 N, 70.9175 W

SECTION 4 - APPLICANT (DESIRED PERMIT HOLDER) INFORMATION (Env-Wt 311.04(a))

If the applicant is a trust or a company, then complete with the trust or company information.

NAME: NHDOT, Kirk Mudgett, P.E.		
MAILING ADDRESS: 7 Hazen Drive		
TOWN/CITY: Concord	STATE: NH	ZIP CODE: 03302
EMAIL ADDRESS: kirk.o.mudgett@dot.nh.gov		
FAX:	PHONE: 6032711598	

ELECTRONIC COMMUNICATION: By initialing here, I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 5 - AUTHORIZED AGENT INFORMATION (Env-Wt 311.04(c))

☐ N/A

LAST NAME, FIRST NAME, M.I.: Clark, Ben		
COMPANY NAME: CMA Engineers, Inc.		
MAILING ADDRESS: 35 Bow St		
TOWN/CITY: Portsmouth	STATE: NH	ZIP CODE: 03801
EMAIL ADDRESS: bclark@cmaengineers.com		
FAX:	PHONE: 6034316196	

ELECTRONIC COMMUNICATION: By initialing here, I hereby authorize NHDES to communicate all matters relative to this application electronically. BC 11/24/25

SECTION 6 - PROPERTY OWNER INFORMATION (IF DIFFERENT THAN APPLICANT) (Env-Wt 311.04(b))

If the owner is a trust or a company, then complete with the trust or company information.

■ Same as applicant

NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP CODE:
EMAIL ADDRESS:		
FAX:	PHONE:	

ELECTRONIC COMMUNICATION: By initialing here, 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):

Wetlands have been delineated by a certified wetland scientist in compliance with Env-Wt 400. A CFA has been completed in accordance with Env-Wt 603.04. The project has been designed in accordance with Env-Wt 500, 600, and 900 to the maximum extent practicable. Env-Wt 700 does not apply to this project.

See attachments for project specific information and worksheets.

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: Day: Year:

(☒ 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/rivers, the linear footage of impact is calculated by summing the lengths of disturbances to the channel and banks.

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

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

JURISDICTIONAL AREA		PERM. SF	PERM. LF	PERM. ATF	TEMP. SF	TEMP. LF	TEMP. ATF
Wetlands	Forested Wetland			☐			☐
	Scrub-shrub Wetland			☐			☐
	Emergent Wetland			☐			☐
	Wet Meadow			☐			☐
	Vernal Pool			☐			☐
	Designated Prime Wetland			☐			☐
	Duly-established 100-foot Prime Wetland Buffer			☐			☐
Surface	Intermittent / Ephemeral Stream			☐			☐
	Perennial Stream or River			☐			☐
	Lake / Pond			☐			☐
	Docking - Lake / Pond			☐			☐
	Docking - River			☐			☐
Banks	Bank - Intermittent Stream			☐			☐
	Bank - Perennial Stream / River			☐			☐
	Bank / Shoreline - Lake / Pond			☐			☐
Tidal	Tidal Waters	137	77	☐			☐
	Tidal Marsh	2019	59	☐	1472	115	☐
	Sand Dune			☐			☐
	Undeveloped Tidal Buffer Zone (TBZ)			☐			☐
	Previously-developed TBZ			☐			☐
	Docking - Tidal Water			☐			☐
TOTAL		2156	136		1472	115	

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): 3628	SF	× $0.60 =	$ 2176.8
Seasonal docking structure:	SF	× $2.00 =	$
Permanent docking structure:	SF	× $4.00 =	$
Projects proposing shoreline structures (including docks) add $400 =			$
		Total =	$ 2176.8
The application fee for minor or major impact is the above calculated total or $400, whichever is greater =			*$*

SECTION 13 - PROJECT CLASSIFICATION (Env-Wt 306.05) Indicate the project classification.		
☐ Minimum Impact Project	■ Minor Project	☐ Major Project

SECTION 14 - REQUIRED CERTIFICATIONS (Env-Wt 311.11)	
Initial each box below to certify:	
Initials:	To the best of the signer's knowledge and belief, all required notifications have been provided.
Initials:	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:	The signer understands that: • The submission of false, incomplete, or misleading information constitutes grounds for NHDES to: 1. Deny the application. 2. Revoke any approval that is granted based on the information. 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.
Initials:	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:	DATE:
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:
TOWN/CITY:	DATE:

Keep this checklist for your reference; do not submit with your application.

APPLICATION CHECKLIST

Unless specified, all items below are required. Failure to provide the required items will delay a decision on your project and may result in denial of your application. Please reference statute RSA 482-A, Fill and Dredge in Wetlands, and the Wetland Rules Env-Wt 100-900.

- ☐ The completed, dated, signed, and certified application (Env-Wt 311.03(b)(1)).
- ☐ Correct fee as determined in RSA 482-A:3, I(b) or (c), subject to any cap established by RSA 482-A:3, X (Env-Wt 311.03(b)(2)). Make check or money order payable to "Treasurer – State of NH".
- ☐ The Required Planning actions required by Env-Wt 311.01(a)-(c) and Env-Wt 311.03(b)(3).
- ☐ US Army Corps of Engineers (ACE) "Appendix B, New Hampshire General Permits (GPs), Required Information and Corps Secondary Impacts Checklist" and its required attachments (Env-Wt 307.02). This includes the US Fish and Wildlife Service IPAC review and Section 106 Historic/Archaeological Resource review.
- ☐ Project plans described in Env-Wt 311.05 (Env-Wt 311.03(b)(4)).
- ☐ Maps, or electronic shape files and meta data, and other attachments specified in Env-Wt 311.06 (Env-Wt 311.03(b)(5)).
- ☐ Explanation of the methods, timing, and manner as to how the project will meet standard permit conditions required in Env-Wt 307 (Env-Wt 311.03(b)(7)).
- ☐ If applicable, the information regarding proposed compensatory mitigation specified in Env-Wt 311.08 and Chapter Env-Wt 800 - Permittee Responsible Mitigation Project Worksheet, unless not required under Env-Wt 313.04 (Env-Wt 311.03(b)(8); Env-Wt 311.08; Env-Wt 313.04).
- ☐ Any additional information specific to the **type of resource** as specified in Env-Wt 311.09 (Env-Wt 311.03(b)(9); Env-Wt 311.04(j)).
- ☐ Project specific information required by Env-Wt 500, Env-Wt 600, and Env-Wt 900 (Env-Wt 311.03(b)(11)).
- ☐ A list containing the name, mailing address and tax map/lot number of each abutter to the subject property (Env-Wt 311.03(b)(12)).
- ☐ Copies of certified postal receipts or other proof of receipt of the notices that are required by RSA 482-A:3, I(d) (Env-Wt 311.03(b)(13)).
- ☐ Project design considerations required by Env-Wt 313 (Env-Wt 311.04(j)).
- ☐ Town tax map showing the subject property, the location of the project on the property, and the location of properties of abutters with each lot labeled with the name and mailing address of the abutter (Env-Wt 311.06(a)).
- ☐ Dated and labeled color photographs that:
  - (1) Clearly depict:
    - a. All jurisdictional areas, including but not limited to portions of wetland, shoreline, or surface water where impacts have or are proposed to occur.
    - b. All existing shoreline structures.
  - (2) Are mounted or printed no more than 2 per sheet on 8.5 x 11 inch sheets (Env-Wt 311.06(b)).
- ☐ A copy of the appropriate US Geological Survey map or updated data based on LiDAR at a scale of one inch equals 2,000 feet showing the location of the subject property and proposed project (Env-Wt 311.06(c)).
- ☐ A narrative that describes the work sequence, including pre-construction through post-construction, and the relative timing and progression of all work (Env-Wt 311.06(d)).

lrm@des.nh.gov or (603) 271-2147
29 Hazen Drive, PO Box 95, Concord, NH 03302-0095
des.nh.gov

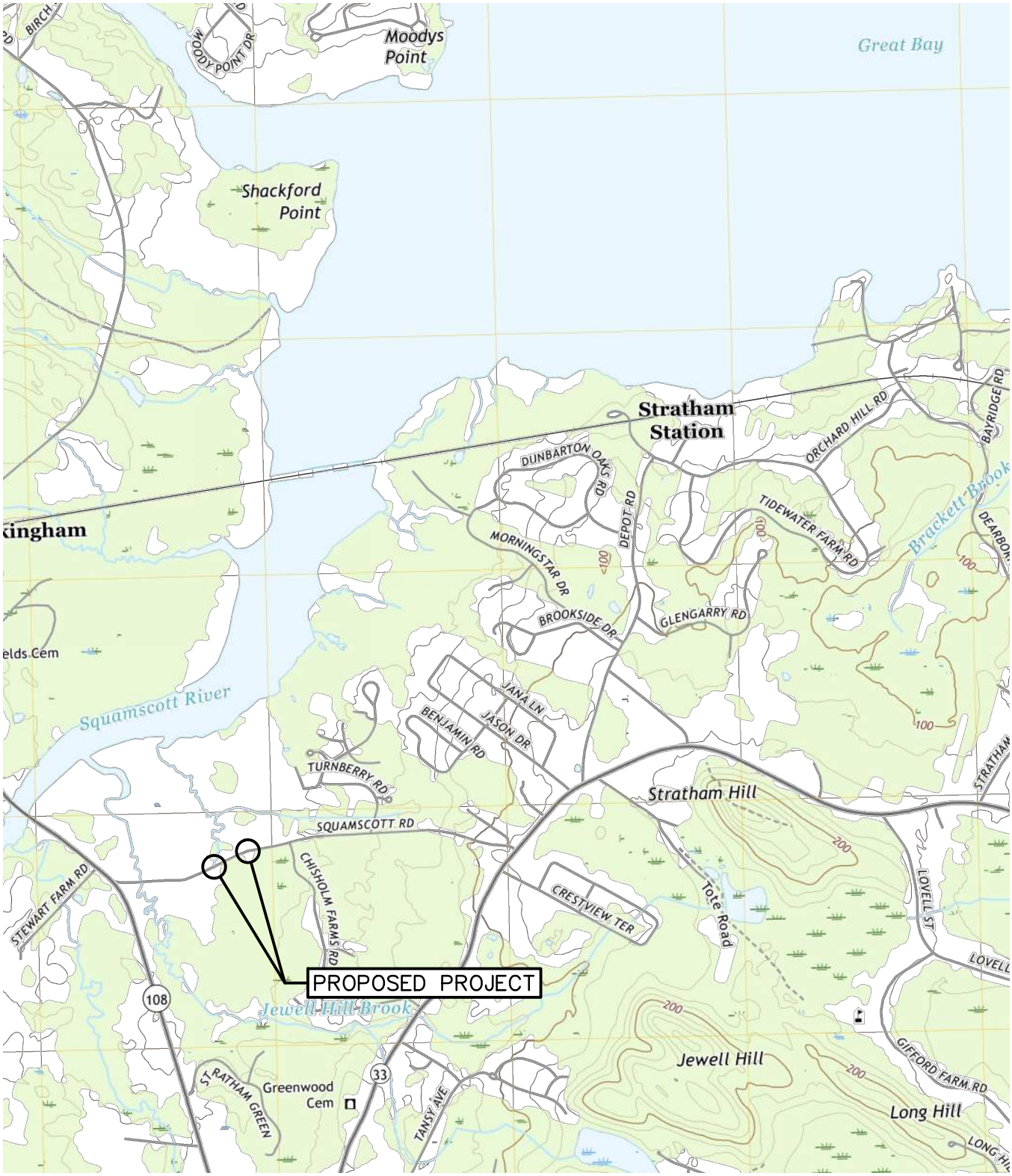
- [x] For all projects in the protected tidal zone, a copy of the recorded deed with book and page numbers for the property (Env-Wt 311.06(e)).
- [ ] If the applicant is not the owner in fee of the subject property, documentation of the applicant's legal interest in the subject property, provided that for utility projects in a utility corridor, such documentation may comprise a list that:
  - (1) Identifies the county registry of deeds and book and page numbers of all of the easements or other recorded instruments that provide the necessary legal interest; and
  - (2) Has been certified as complete and accurate by a knowledgeable representative of the applicant (Env-Wt 311.06(f)).
- [x] The NHB memo containing the NHB identification number and results and recommendations from NHB as well as documentation of any consultation requests made to NHFG, communications and information related to the consultation, with the consultation results and recommendations from NHFG. (Env-Wt 311.06(g)). See Wetlands Permitting: Protected Species and Habitat Fact Sheet.
- [x] A statement of whether the applicant has received comments from the local conservation commission and, if so, how the applicant has addressed the comments (Env-Wt 311.06(h)).
- [ ] For projects in LAC jurisdiction, a statement of whether the applicant has received comments from the LAC and, if so, how the applicant has addressed the comments (Env-Wt 311.06(i)).
- [ ] If the applicant is also seeking to be covered by the state general permits, a statement of whether comments have been received from any federal agency and, if so, how the applicant has addressed the comments (Env-Wt 311.06(j)).
- [x] Avoidance and Minimization Written Narrative or the Avoidance and Minimization Checklist, or your own avoidance and minimization narrative (Env-Wt 311.07).
- [ ] For after-the-fact applications: information required by Env-Wt 311.12.
- [x] Coastal Resource Worksheet for coastal projects as required under Env-Wt 600.
- [x] Prime Wetlands information required under Env-Wt 700. See WPPT for prime wetland mapping.
- [x] For non-tidal shoreline structure projects, the length of shoreline frontage per Env-Wt 311.09(b)(1)

Required Attachments for Minor and Major Projects

- [x] Attachment A: Minor and Major Projects (Env-Wt 313.03).
- [x] Functional Assessment Worksheet or others means of documenting the results of actions required by Env-Wt 311.10 as part of an application preparation for a standard permit (Env-Wt 311.03(b)(3); Env-Wt 311.03(b)(10)). See Functional Assessments for Wetlands and Other Aquatic Resources Fact Sheet. For shoreline structures, see shoreline structures exemption in Env-Wt 311.03(b)(10)).

Optional Materials

- [x] Stream Crossing Worksheet which summarizes the requirements for stream crossings under Env-Wt 900.
- [ ] Request for concurrent processing of related shoreland / wetlands permit applications (Env-Wt 313.05).



CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 • 603/627-0708 • 207/541-4223
c m a e n g i n e e r s . c o m

The New Hampshire Department of Transportation
Concord, New Hampshire
Tidal Culverts under Squamscott Road in Stratham
USGS Map

June 2025

Scale: 1" = 2,000'

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: **Mudgett, Kik** **TOWN NAME:** Stratham

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.

DURING THE DESIGN PROCESS, MULTIPLE CULVERT SIZES WERE EVALUATED, AND IT WAS DETEREMINED THAT A CULVERT WITH A 8-FT SPAN WOULD BEST MEET THE PROJECT'S GOALS THAT ARE TO PROMOTE SALT MARSH MIGRATION, IMPROVE AQUATIC ORGANISM PASSAGE, AND TO REPLACE A FAILING CULVERT. THE ANALYSIS DETERMINED THAT AN OPENING THAT IS NARROWER THAN TYPICALLY REQUIRED ACCOMPLISHES THESE GOALS, BUT IT ALSO BETTER ADDRESSES FUTURE SEA LEVEL RISE THAN A LARGER HYDRAULIC OPENING WOULD.

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.

The project is located in a tidal stream crossing and does not involve construction in a marsh.

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 proposed design increases the crossing width from existing conditions and is designed to increase hydrologic connectivty between the salt marshes upstream and downstream of the crossing.

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.

Plant, mammal, and fish species flagged by one of NHB, USFWS, and NOAA EFH are present in the project site. The purpose of the project is to improve salt marsh habitat and aquatic organism passage. It is believed the benefits of the project outweigh any potential adverse impacts to species, and impacts are reduced to the most practical extent.

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.

N/A

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.

A project goal it to improve the health of the salt marshes upstream of the culvert and encourage salt marsh migration. Salt marsh migration will create more habitat suitable for flood storage.

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.

N/A

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.

There are no public water supplies or groundwater aquifers in the project area.

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

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

The project will widen the existing crossing, so it can better handle large storm events and reduce upstream flooding. The hydraulic analysis determined that an 8-ft span allowed for unimpeded tidal and freshwater channel flow, and the analysis determined that a larger span did not significantly futher improve flows.

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

PART II: FUNCTIONAL ASSESSMENT
REQUIREMENTS Ensure that project meets the requirements of Env-Wt 311.10 regarding functional assessment (Env-Wt 311.04(j); Env-Wt 311.10).
FUNCTIONAL ASSESSMENT METHOD USED: Steckler, P., Lucey, K., Burdick, B., Glode, J., and Flanagan, S. 2017. New Hampshire's Tidal Crossing Assessment Protocol. The Nature Conservancy. Prepared for the New Hampshire Department of Environmental Services Coastal Program, Concord, NH. New Hampshire Department of Environmental Services. 2019. "Resilient Tidal Crossings: An Assessment and Prioritization to Address New Hampshire's Tidal Crossing Infrastructure for Coastal Resilience". R-WD-19-20. Portsmouth, NH.
NAME OF CERTIFIED WETLAND SCIENTIST (FOR NON-TIDAL PROJECTS) OR QUALIFIED COASTAL PROFESSIONAL (FOR TIDAL PROJECTS) WHO COMPLETED THE ASSESSMENT: PETER STECKLER, CWS #254
DATE OF ASSESSMENT: 7/5/2018
Check this box to confirm that the application includes a NARRATIVE ON FUNCTIONAL ASSESSMENT: ☒
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: ☒ Note: The Wetlands Functional Assessment worksheet can be used to compile the information needed to meet functional assessment requirements.

CULVERT REPLACEMENTS

SQUAMSCOTT ROAD TIDAL CROSSINGS

STRATHAM, NH

NHDOT PROJECT NO. 43001

SUPPLEMENTAL NARRATIVE

Project Description

The project proposes the replacement of two separate 18-in tidally influenced culverts on Squamscott Road in Stratham. The preferred alternative is an 8-ft embedded four-sided box culvert at both crossings with removal of a downstream log at the eastern crossing.

This project is primarily funded by a National Fish and Wildlife Foundation Coastal Resilience Grant with additional funding from the National Oceanic and Atmospheric Administration (NOAA), NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the New Hampshire Department of Environmental Services Coastal Program, and The Nature Conservancy.

The culverts were evaluated under the Resilient Tidal Crossing project published in 2019 and the culverts received high replacement priority due to high erosion and restriction on salt marsh migration.

Existing Conditions

The existing structures are 18-in corrugated metal pipe (CMP) culverts with mortar rubble masonry (MRM) headwalls. The culverts predate historical aerial imagery from 1985. The culvert bottoms are flat (slope ~0%). Just downstream of the eastern crossing, a tree fell down across the channel, and it is acting like a dam, so it is affecting tidal flow in the channel.

The crossings are Tier 4 because they are tidal. The upstream watershed of the east and west crossings are 107 and 77 acres, respectively.

Stream assessments were performed by Streamworks, PLLC. The reference reach location was downstream of the crossings, in a tidally connected reach. The average channel slope of the reference reach is 0.3%. The stream type of the reference reach, based on the Rosgen classification chart, is E4.

A Coastal Functional Assessment was prepared by Peter Steckler, CWS. The assessment indicated heavy tidal restrictions imposed by the crossings and high erosion. The culverts are submerged even at low tide, and there is marsh loss upstream of the culverts. The upstream salt marsh migration potential between the two sites is 7.06 acres.

Natural and Cultural Resources

Threatened and Endangered Species:

The project area is within the range of the Northern Long Eared Bat. A 'no effect determination' is provided for endangered species.

The Natural Heritage Bureau data check:

NHB indicated the presence of several natural communities, plant species, and vertebrate spcies. Consultation with NHFG and NHB has been completed for the species. This is a restoration project; therefore, any temporary adverse impacts on these species are expected to be outweighed by the benefits of the project.

NH Fish & Game Coordination:

There are no concerns for impacts to species under NHFG jurisdiction.

Cultural Resources:

A request for Project Review was submitted in June 2022. A 'no effect finding' is provided.

Wetlands:

Using NHDES' Wetland Permitting and Planning Tool (WPPT), upstream and downstream of the crossings is mapped as salt marsh.

Water Quality:

The project does not propose to widen the road, so there will no increase in the amount of impervious surface. Erosion control notes and plans are included in the construction plans.

Impaired Waters:

The crossing is not an impaired water.

Contamination:

There are no sources of potential contamination, including remediation sites, NPDES outfalls, or underground storage tanks, in the project area.

Invasive Species:

Glossy buckthorn and Oriental bittersweet are present around the crossings. The Contractor will be required to perform all work activities in accordance with the Department publication "Best Management Practices for the Control of Invasive and Noxious Plant Species"

Prime Wetlands, Designated Rivers, and Shoreland Water Quality Protection Act:

There are no prime wetlands in the project area. The crossing is not subjected to a Local River Management Advisory Committee.

Floodplains:

The entirety of the project is in the FEMA 100-year floodplain.

Conservation Lands:

Downstream of the eastern crossing is a conservation easement. A construction easement will have to be acquired prior to construction.

NHDES Aquatic Restoration Mapper:

The Aquatic Restoration Mapper included a structural condition assessment. The assessment, dated July 27, 2022, rated the structure condition as 'fair' for the western culvert and 'poor' for the eastern culvert.

Hydrology / Hydraulics

Based on hydrologic modeling, the existing 100-year peak discharge at the two sites are 88 cfs (east) and 67 cfs (west); however, the hydraulic capacity of the existing crossing are 16 cfs (east) and 19 cfs (west).

The peak discharges for the proposed structure are:
Q50 = 76 cfs (east) and 64 cfs (west)
Q100 = 88 cfs (east) and 67 cfs (west)

It is estimated that the proposed crossings will lower the 100-year flood elevation at the inlet from 7.48 ft to 5.07 ft (east) and 5.48 ft to 4.96 ft (west).

Alternatives

A comprehensive hydrologic and hydraulic modeling study for the site was performed by Streamworks, PLLC. Hydraulic modeling for the sites were performed using HEC-RAS software. Also, the modelling considered sea level rise (SLR), and using NHDES' Int-High Projection guidance on sea level rise, several freshwater and tidal scenarios in 2020 and 2100 were simulated.

The study considered four alternatives for the proposed structure span length. The four alternatives were: 18-in (in-kind replacement), 8- and 12-ft (bankfull-width, or BFW), 14- and 21-ft (2.2 BFW), and 6 feet at both crossings. The alternatives were evaluated with respect to hydraulics, flow velocities, aquatic organism passage, roadway flooding, and salt marsh migration potential. All alternatives were modelled with removal of the downstream log at the eastern crossing.

Proposed Design

Since the hydraulic modelling showed similar hydraulics between the latter three alternatives, the preferred alternative is an 8-ft span, 7-ft rise four-sided, embedded box culvert at both sites. The proposed culverts are 53-ft long. The 8-ft span was selected to achieve, or nearly achieve, BFW while remaining under the 10-foot span which would classifies a culvert as a bridge. If feasible, this was requested by NHDOT. The hydraulic modelling shows the roadway only overtops in 2100 tidal scenarios, and due to its infrequency, raising the roadway elevation was not considered in this analysis. Also, due to the poor subsurface conditions, raising the roadway would be costly at these sites.

A four-sided box culvert is proposed because the weights of the culvert and roadway are supported by the bottom of the box culvert which spreads the loading over a broad area, reducing the settlement potential due to the subsurface marine clays. For the same reason, parallel wingwalls are proposed because the extension of the box culvert bottom will support the walls.

Additionally, the hydraulic modelling showed significant improvements in AOP with removal of the log, so the project proposes to remove this log.

The proposed channel bottom is 24" (east) and 30" (west) of natural stream bed material, and this material is over 36-in of Class B Stone fill at the inlet and outlet. The channel bottom will include low-flow channels.

The slopes and embankments will include approved wetland plantings to promote wetland vegetation growth around the wing walls.

Construction and Access Considerations

The traffic control plan reflects full road closure with a detour.

There are no underground utilities at the sites.

The water diversion plan will require the contractor maintain the daily tide range observed upstream of the crossings.

BUREAU OF ENVIRONMENT
CONFERENCE REPORT

SUBJECT: NHDOT Monthly Natural Resource Agency Coordination Meeting
DATE OF CONFERENCE: April 20, 2022
LOCATION OF CONFERENCE: Virtual meeting held via Zoom

ATTENDED BY:

NHDOT
Andrew O'Sullivan
Matt Urban
Jon Evans
Joshua Brown
Mark Hemmerlein
Meli Dube
Kirk Mudgett
Chris Carucci
Kerry Ryan
Tim Boodey
Joseph Jorgens
Arin Mills
Carol Niewola
Richard Dyment

ACOE
Richard Kristoff

EPA
Absent

NHDES
Karl Benedict
Lori Sommer
Maryann Tilton
Christian Williams
Eben Lewis
Kevin Lucey

NHB
Amy Lamb

NH Fish & Game
John Magee

Federal Highway
Absent

The Nature Conservancy
Pete Steckler

Consultants/ Public Participants
Brenda Bhatti
Carl Gross
Pamela Hunt
Gregg Cohen
Bill Straub
Nick Messina

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

Table of Contents:

Amy Lamb (NHB): NHB previously recommended survey for target species and is concerned with accelerated timeline since this survey has not been performed. W. Straub states will be addressed.

Pete Steckler (TNC) clarifies only draft permits are being prepared as part of this phase, not final.

Rick Kristoff (ACOE): No comment.

Pete Steckler (TNC): recuses himself.

Stratham, 43001 (Non-Fed):

Stratham Culverts

William Straub, CMA Engineers, Inc., presented on project. The project includes replacement of two tidally influenced 18" culverts on Squamscott Road in Stratham. The Funding for the ongoing alternatives analysis and preliminary design was provided by The Nature Conservancy. The eastern culvert was identified as Crossing 113, the western culvert was identified as Crossing 114, and were evaluated as part of the Resilient Tidal Crossings project published 2019, and the culvert received high replacement priority due tidal restrictions and erosion. The site was screened for natural and cultural resources. NHB database results include the horned-pondweed and tundra alkali grass. The culvert replacement will have minimal impacts on the site, wetlands, and roadway runoff because widening of the road is not proposed. Hydraulic modeling for the site was performed in HEC-RAS by Streamworks, PLLC and completed in 2021. The Int-Low Projection from NHDES guidance on sea level rise (SLR) was selected for analysis, and several freshwater and tidal scenarios in 2021 and 2100 were simulated. Four culvert alternatives were modeled at each site, including 18" (existing), 8 and 12' (1.2 BFW), 14 and 21' (2.2 BFW), and 6' with removal of a downstream log at the eastern culvert that impedes tidal flow. Alternatives were evaluated with respect to hydraulics, flow velocities, aquatic organism passage (AOP), roadway flooding, and salt marsh migration potential. The preferred alternatives after analysis are 8' embedded, four-sided boxes at both sites with removal of the downstream log. Similar hydraulics were achieved between all three alternatives, and poor subsurface conditions (clay conditions) necessitate the four-sided box for foundation. There were significant improvements in AOP with removal of the log. With similar hydraulic performance between all three alternatives, 8' was selected to achieve BFW at one location and comes close at the other while remaining under the 10-foot width to be considered a bridge, in keeping with DOT's preference to not maintain bridges where not necessary. The roadway only overtops in 2100 tidal scenarios and raising the roadway elevation was not considered in this analysis due to its infrequency. Raising the roadway would be costly here due to the poor subsurface conditions. The project does not have a timeline for going construction.

Karl Benedict (NHDES): Defers to Eben Lewis.

Eben Lewis (NHDES): Repeats concern that abutters will not be adversely impacted and this project does not require mitigation.

Lori Sommer (NHDES): Noted that these projects would otherwise be good candidates for ARM funding, and these projects serve as good models for DOT tidal crossings. L. Sommer asked about the material used to embed culvert. W. Straub responded that CMA has not developed that yet, but will consult with Streamworks, PLLC and it will likely be similar to existing marsh material.

John Magee (NH F&G): John noted nearby fishing data in Jewel Hill Brook includes American eel, sea lamprey, and wild brook trout. These species will likely also see benefits from the project.

Amy Lamb (NHB): The two species NHB populated are plants. Horned pondweed is brackish and may be adversely impacted, however the overall benefits of the project will outweigh impacts. A. Lamb recommends survey for pondweed in upstream reaches. The tundra alkali grass is found in salt marshes.

Rick Kristoff (ACOE): No comment.

Pete Steckler (TNC): Recuses himself.

Bedford, 43138 (X-A005(049)):

43138 Bedford, 24" Pipe Outlet Repair – 4/20/2022 NRA Meeting Minutes

Chris Carucci, NHDOT Highway Design, gave an overview of the proposed federally funded repair work to a 24" culvert outlet located on NH Route 114 at approximately 775' north of New Boston Road.

Bedford 43138 is a federal funded project initiated to rehabilitate a 72" pipe carrying Bowman Brook under NH Route 114 at 475' north of New Boston Road. Permit #2021-03569. The project advertised on March 8, 2022, with construction anticipated in the summer of 2022.

Subsequent to finalizing the design for the 72" pipe rehabilitation, significant erosion at an adjacent 24" pipe outlet was found. As of the last field review on 4/13/22, the erosion was about 20' from the edge of NH 114 and getting progressively worse.

Repair of the erosion is not related to the 72" pipe rehabilitation work and is not necessary to complete the 72" pipe work. Due to the close proximity, similar nature of work, and risk to the NH 114 embankment, NHDOT is proposing to add the 24" outlet repair to the 72" pipe rehabilitation contract.

The subject pipe is a 24" concrete culvert originally constructed in 1965. Original length was about 103', at about 1.36 % slope. The inlet side has a mortared stone headwall. The outlet side had no end treatment. The crossing would be Tier 1 based solely on drainage area. Streamstats mapping was not accurate for this crossing. Drainage boundary from LIDAR is 46.8 acres.

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.: Mudgett, Kirk	
PROJECT STREET ADDRESS: Squamscott Road	PROJECT TOWN: Stratham
TAX MAP/LOT NUMBER: 21 1/4/150/151	

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.	☐ Yes ☒ No

If you answered "no" to this question, describe the purpose of the "non-access" project type you have proposed:

The project is located in Stratham at two tidal crossings on Squamscott Road. The purpose of the project is to promote salt marsh migration upstream of the culvert. To accomplish this goial,m the project proposes to replace two 18" RCP culverts with appropriately sized culverts. A comprehensive modeling study and an alternatives analysis was performed in a collaborative effort by CMA Engineers, Inc., Streamworks, PLLC, NHDOT, NHDES, and The Nature Conservancy. The proposed culverts were evaluated with respect to geomorphic compatability, aquatic organism passage, sea level rise, and future stormwater flows. The proposed culverts are 8' wide, four-sided, embedded concrete culverts and wil include permanent impacts.

SECTION 3 - A/M PROJECT DESIGN TECHNIQUES 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.	☐ Check ☒ 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.	☒ Check ☐ 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.	☒ Check ☐ 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.	☒ Check ☐ 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.	☒ Check ☐ 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.	☒ Check ☐ 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.	☒ Check ☐ 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.	☐ Check ☒ N/A
Env-Wt 311.10 A/M BMPs	The project clusters structures to avoid wetland impacts.	☐ Check ☒ N/A
Env-Wt 311.10 A/M BMPs	The placement of roads and utility corridors avoids wetlands and their associated streams.	☐ Check ☒ 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.	☐ Check ☒ N/A
A/M BMPs	The project proposes bridges or spans instead of roads/driveways/trails with culverts.	☒ Check ☐ N/A

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.	☐ Check ☒ N/A
Env-Wt 500 Env-Wt 600 Env-Wt 900	Wetland and stream crossings include features that accommodate aquatic organism and wildlife passage.	☒ Check ☐ N/A
Env-Wt 900	Stream crossings are sized to address hydraulic capacity and geomorphic compatibility.	☒ Check ☐ 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.	☒ Check ☐ N/A
SECTION 4 - NON-TIDAL SHORELINE STRUCTURES		
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.	☐ Check ☐ 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.	☐ Check ☐ 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.	☐ Check ☐ 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.	☐ Check ☐ 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.	☐ Check ☐ 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.	☐ Check ☐ N/A

Watershed Boundaries

NHDES Crossing #114

NHDES Crossing #113

177 ac.

Crossing 113
Drainage Area

77 ac.

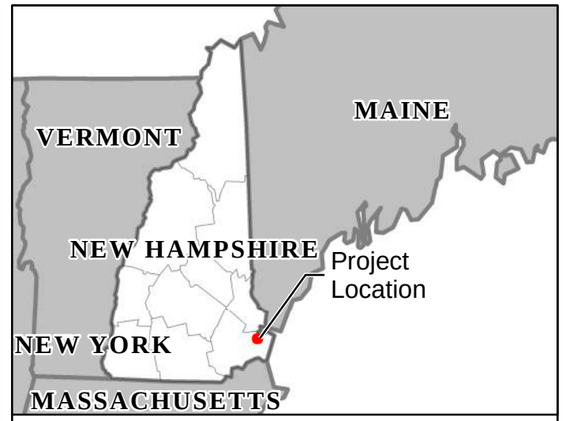
Crossing 114
Drainage Area

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBC
Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) O

N

0 250 500 1,000 Feet

1 inch = 500 feet



Legend

Drainage Area

Layer Sources: Topographic Map (ESRI, 2022); All other layers (Streamworks, 2020)

Prepared By:

Streamworks, PLLC
tballestero@streamworkspllc.com

CMA Engineers, Inc.
wstraub@cmaengineers.com

Prepared for:

The Nature Conservancy
22 Bridge Street, 4th Floor
Concord, NH 03301

Figure 1 - Exhibit 1 Drainage Area

Tidal Crossings in Stratham and Rye
Squamscott Road, Stratham, NH
Permit Application Package

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.

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: 107 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 = AE

Elevation of the 100-year floodplain at the inlet: 7 feet (FEMA El. or Modeled El.)

SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): 16 (b/c attenuation) CFS	Calculation method: Rainfall-runoff mode
Estimated bankfull discharge at the crossing location: 20 CFS	Calculation method: Hydraulic model

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: n/a (tidal) feet	Mean Bankfull Depth: n/a (tidal) feet
Bankfull Cross Sectional Area: n/a (tidal) 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: Downstream of crossing, in tidally-connected reac.	
Reference reach watershed size: 107 acres	

Parameter	**Cross Section 1** Describe bed form riffle/run (*e.g. pool, riffle, glide*)	**Cross Section 2** Describe bed form riffle/run (*e.g. pool, riffle, glide*)	**Cross Section 3** Describe bed form riffle/run (*e.g. pool, riffle, glide*)	**Range**
Bankfull Width	9.5 feet	8.6 feet	9.7 feet	feet
Bankfull Cross Sectional Area	13.3 SF	12.0 SF	11.5 SF	SF
Mean Bankfull Depth	1.40 feet	1.40 feet	1.19 feet	feet
Width to Depth Ratio	6.8	6.2	8.2	
Max Bankfull Depth	2.28 feet	2.12 feet	2.20 feet	feet
Flood Prone Width	175 feet	188 feet	163 feet	feet
Entrenchment Ratio	18.4	21.9	16.8	

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

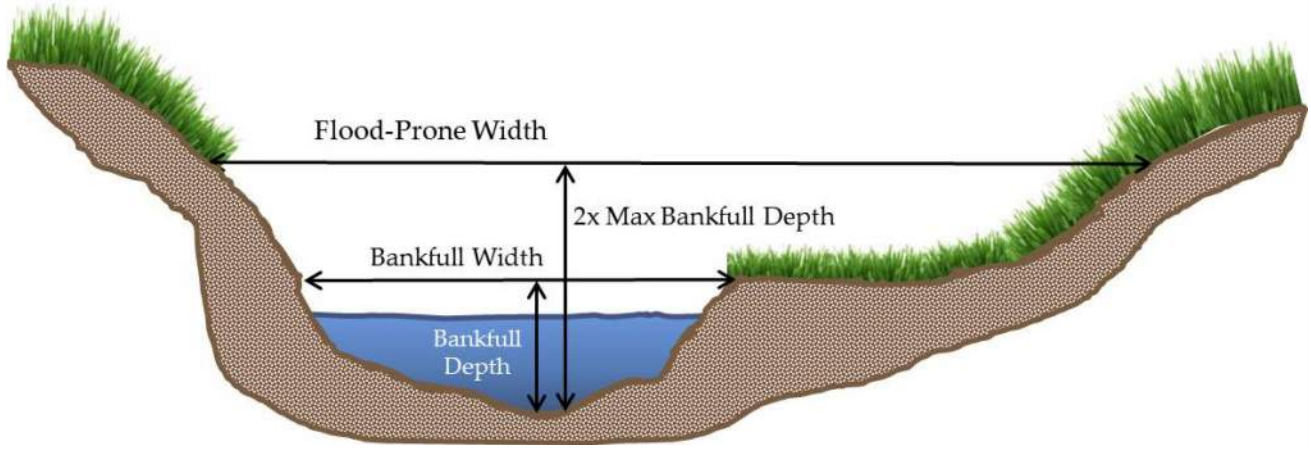


Figure 1: Determining the Reference Reach Attributes.

SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Average Channel Slope of the Reference Reach: 0.034%
Average Channel Slope at the Crossing Location: 0.2%
SECTION 7 - PLAN VIEW GEOMETRY Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths. *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Sinuosity of the Reference Reach: 1.6
Sinuosity of the Crossing Location: 1.6

SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS *For **tier 2, tier 3** and **tier 4** crossings only.*	
% of reach that is bedrock:	**0** %
% of reach that is boulder:	**0** %
% of reach that is cobble:	**0** %
% of reach that is gravel:	**95** %
% of reach that is sand:	**5** %
% of reach that is silt:	**0** %
SECTION 9 - STREAM TYPE OF REFERENCE REACH *For **tier 2, tier 3** and **tier 4** crossings only.*	
Stream Type of Reference Reach:	E4

*Refer to Rosgen Classification Chart (**Figure 2**) below:*

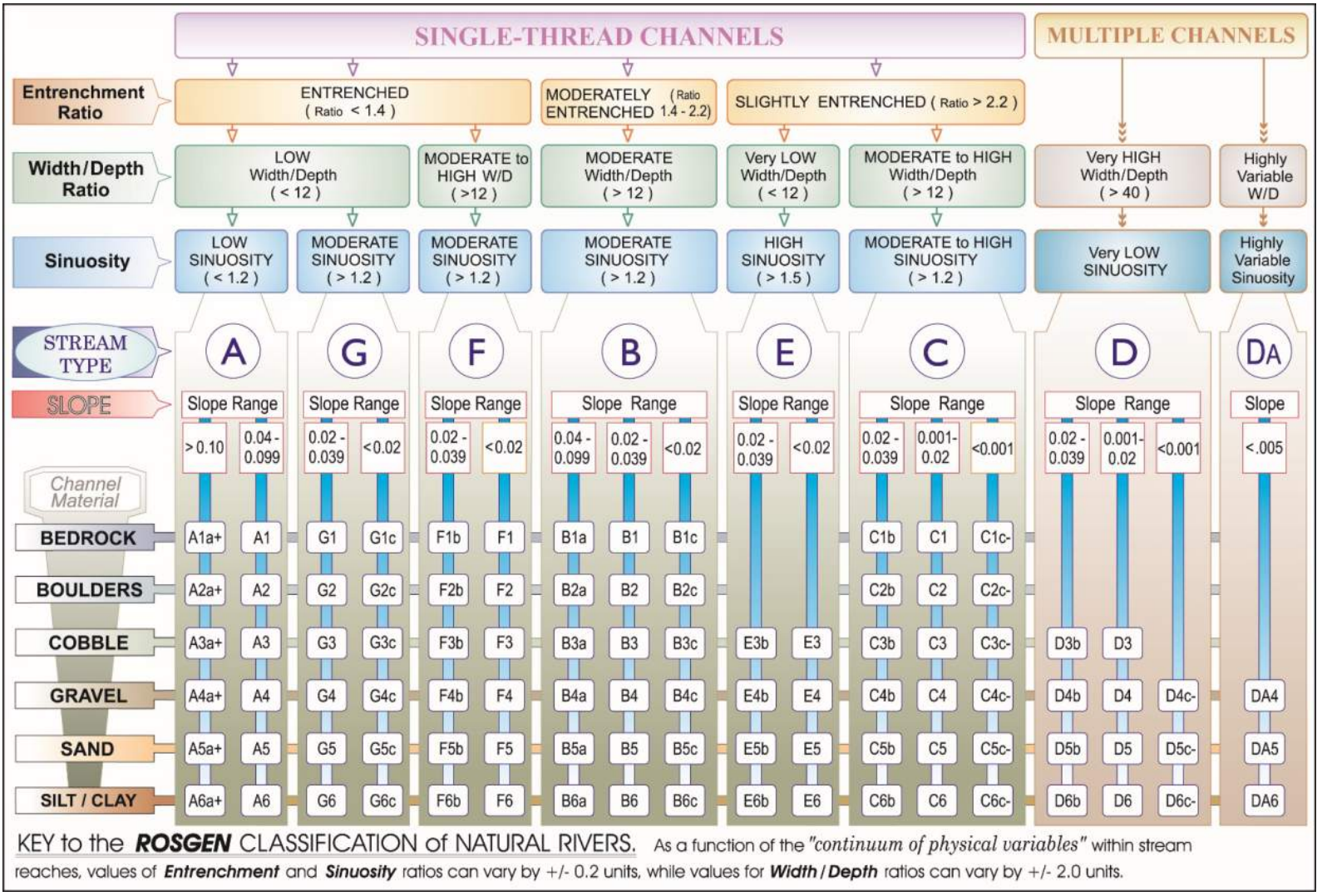


Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 10 - CROSSING STRUCTURE METRICS

Existing Conditions

Existing Structure Type:

- ☐ Bridge span
- ☐ Pipe arch
- ☐ Open-bottom culvert
- ☒ Closed-bottom culvert
- ☐ Closed-bottom culvert with stream simulation
- ☐ Other:

Existing Crossing Span: *(perpendicular to flow)*	feet
Existing Crossing Length: *(parallel to flow)*	42 feet
Culvert Diameter:	1.5 feet
Inlet Elevation:	El. 1.3 feet
Outlet Elevation:	El. 0.9 feet
Culvert Slope:	1%

Proposed Conditions

Proposed Structure Type:	**Tier 1**	**Tier 2**	**Tier 3**	**Alternative Design**
Bridge Span	☐	☐	☐	☐
Pipe Arch	☐	☐		☐
Closed-bottom Culvert	☐	☐		☐
Open-bottom Culvert	☐	☐	☐	☐
Closed-bottom Culvert with stream simulation	☐	☐	☐	☐

Proposed Structure Span: 8/8 feet *(perpendicular to flow)*	**Culvert Diameter:** feet
	Inlet Elevation: El. 1.0/0.5 feet
Proposed Structure Length: 33/33 feet *(parallel to flow)*	**Outlet Elevation:** El. 1.0/0.5 feet
	Culvert Slope: 0%

Proposed Entrenchment Ratio:*

*For **Tier 2**, **Tier 3** and **Tier 4** Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.*

** 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.*

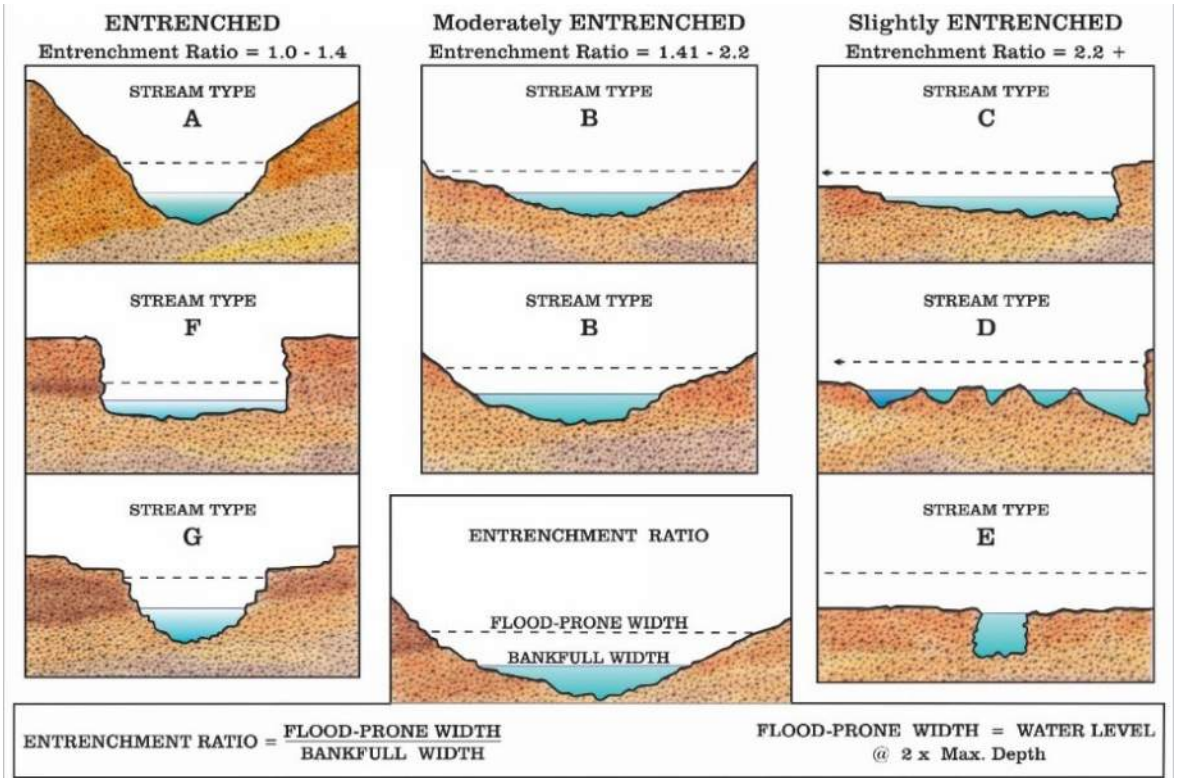


Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	**Proposed**
100 year flood stage elevation at inlet:	7.48	5.07
Flow velocity at outlet in feet per second (FPS):	9.0	3.0
Calculated 100 year peak discharge (Q) for the *proposed* structure in CFS:		88
Calculated 50 year peak discharge (Q) for the *proposed* structure in CFS:		76

SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO

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

Crossing Structure Openness Ratio* = 1.1/1.2

* Openness box culvert = (height x width)/length
Openness round culvert = (3.14 x radius^2)/length

SECTION 13 - GENERAL DESIGN CONSIDERATIONS

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:

☒ Not be a barrier to sediment transport.

☒ Prevent the restriction of high flows and maintain existing low flows.

☒ Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.

☒ Not cause an increase in the frequency of flooding or overtopping of banks.

☒ Maintain or enhance geomorphic compatibility by:

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

b. Preserving the natural alignment of the stream channel.

☒ Preserve watercourse connectivity where it currently exists.

☒ Restore watercourse connectivity where:

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

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

☒ Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.

☒ Not cause water quality degradation.

SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA

Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.

☒ 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.

SECTION 15 - ALTERNATIVE DESIGN

NOTE: 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 **Figure 3**, then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.

☐ I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.

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.

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: 77 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 = AE

Elevation of the 100-year floodplain at the inlet: 7 feet (FEMA El. or Modeled El.)

SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): 19 (b/c attenuation) CFS	Calculation method: Rainfall-runoff mode
Estimated bankfull discharge at the crossing location: 23 CFS	Calculation method: Hydraulic model

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: n/a (tidal) feet	Mean Bankfull Depth: n/a (tidal) feet
Bankfull Cross Sectional Area: n/a (tidal) 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: Downstream of crossing, in tidally-connected reac.
Reference reach watershed size: 77 acres

Parameter	**Cross Section 1** Describe bed form riffle/run (*e.g. pool, riffle, glide*)	**Cross Section 2** Describe bed form riffle/run (*e.g. pool, riffle, glide*)	**Cross Section 3** Describe bed form riffle/run (*e.g. pool, riffle, glide*)	**Range**
Bankfull Width	6.9 feet	5.8 feet	5.9 feet	feet
Bankfull Cross Sectional Area	8.3 SF	7.9 SF	7.1 SF	SF
Mean Bankfull Depth	1.20 feet	1.36 feet	1.21 feet	feet
Width to Depth Ratio	5.7	4.3	4.9	
Max Bankfull Depth	1.96 feet	1.82 feet	1.59 feet	feet
Flood Prone Width	152 feet	145 feet	134 feet	feet
Entrenchment Ratio	22.0	25.0	22.7	

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

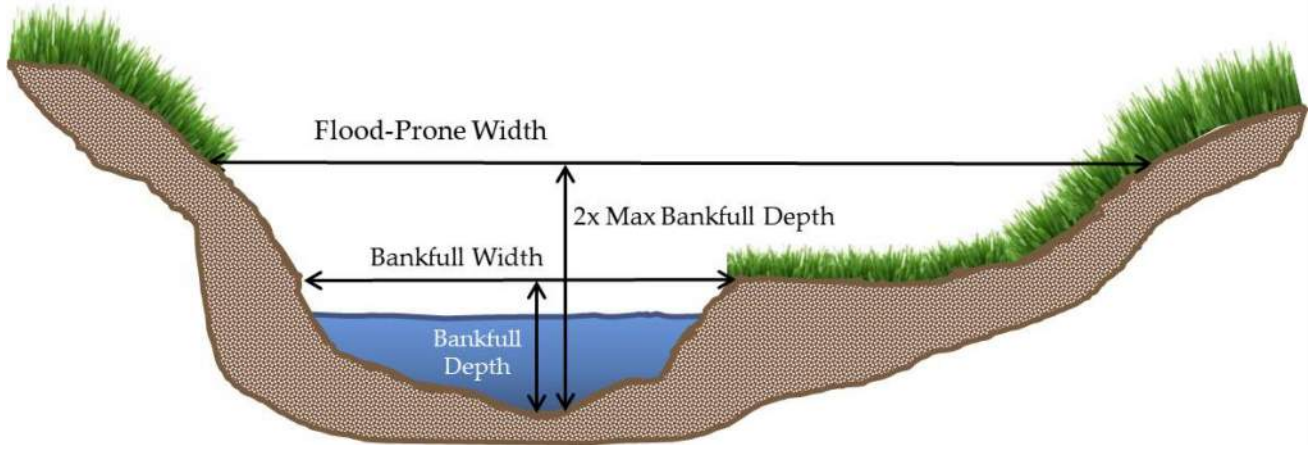


Figure 1: Determining the Reference Reach Attributes.

SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Average Channel Slope of the Reference Reach: 0.3%
Average Channel Slope at the Crossing Location: 0.2%

SECTION 7 - PLAN VIEW GEOMETRY Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths. *For **tier 2**, **tier 3** and **tier 4** crossings only.*
Sinuosity of the Reference Reach: 1.3
Sinuosity of the Crossing Location: 1.3

SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS *For **tier 2, tier 3** and **tier 4** crossings only.*	
% of reach that is bedrock:	**0** %
% of reach that is boulder:	**0** %
% of reach that is cobble:	**46** %
% of reach that is gravel:	**30** %
% of reach that is sand:	**24** %
% of reach that is silt:	**0** %
SECTION 9 - STREAM TYPE OF REFERENCE REACH *For **tier 2, tier 3** and **tier 4** crossings only.*	
Stream Type of Reference Reach:	E4

*Refer to Rosgen Classification Chart (**Figure 2**) below:*

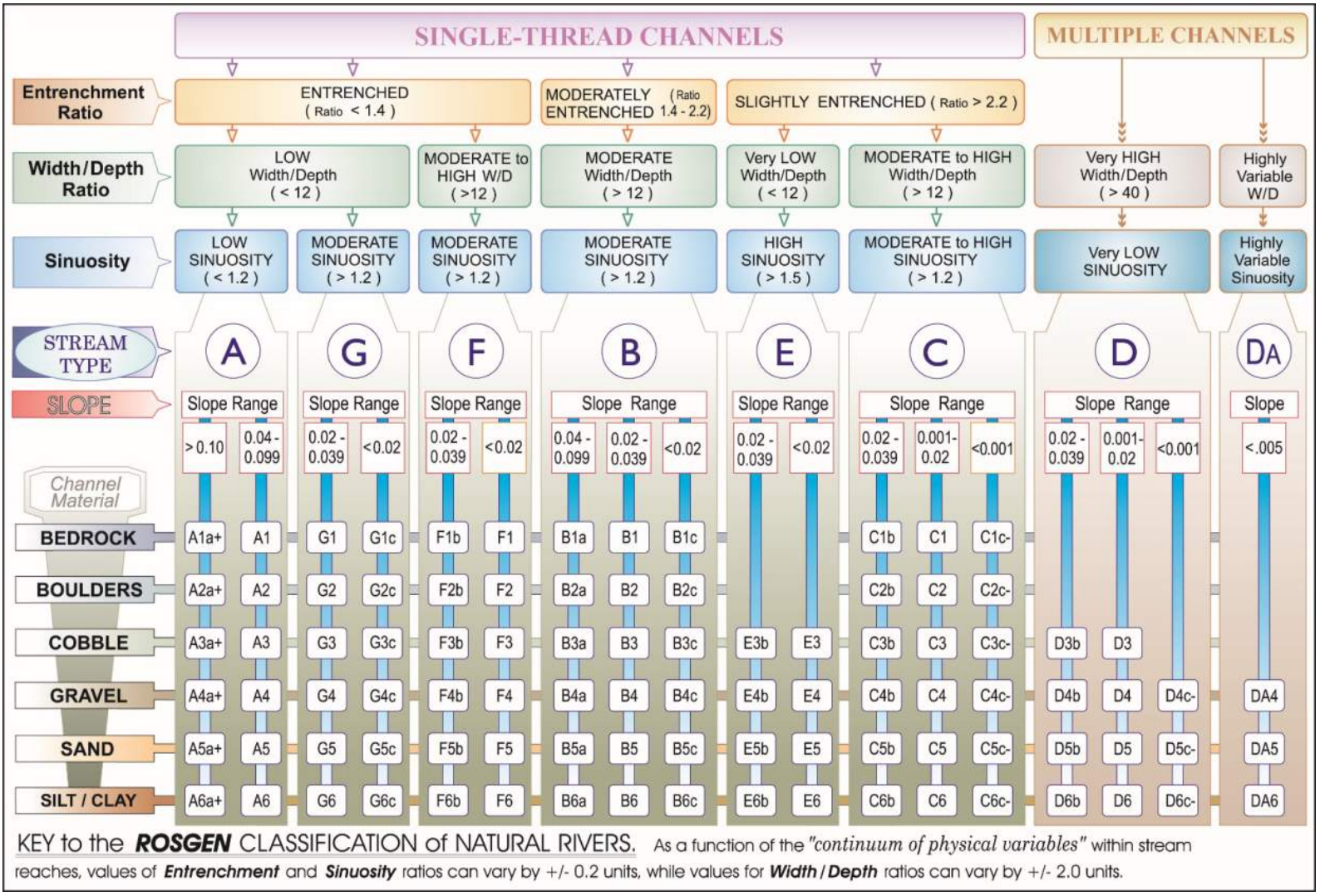


Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 10 - CROSSING STRUCTURE METRICS

Existing Conditions

Existing Structure Type:

- ☐ Bridge span
- ☐ Pipe arch
- ☐ Open-bottom culvert
- ☒ Closed-bottom culvert
- ☐ Closed-bottom culvert with stream simulation
- ☐ Other:

Existing Crossing Span: *(perpendicular to flow)*	feet
Existing Crossing Length: *(parallel to flow)*	35 feet

Culvert Diameter: 1.5 feet
Inlet Elevation: El. 1.7 feet
Outlet Elevation: El. 1.7 feet
Culvert Slope: 0%

Proposed Conditions

Proposed Structure Type:	**Tier 1**	**Tier 2**	**Tier 3**	**Alternative Design**
Bridge Span	☐	☐	☐	☐
Pipe Arch	☐	☐		☐
Closed-bottom Culvert	☐	☐		☐
Open-bottom Culvert	☐	☐	☐	☐
Closed-bottom Culvert with stream simulation	☐	☐	☐	☐

Proposed Structure Span: 8/8 feet *(perpendicular to flow)*	**Culvert Diameter:** feet **Inlet Elevation:** El. 1.0/0.5 feet
Proposed Structure Length: 33/33 feet *(parallel to flow)*	**Outlet Elevation:** El. 1.0/0.5 feet **Culvert Slope:** 0%

Proposed Entrenchment Ratio:*

*For **Tier 2**, **Tier 3** and **Tier 4** Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.*

** 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.*

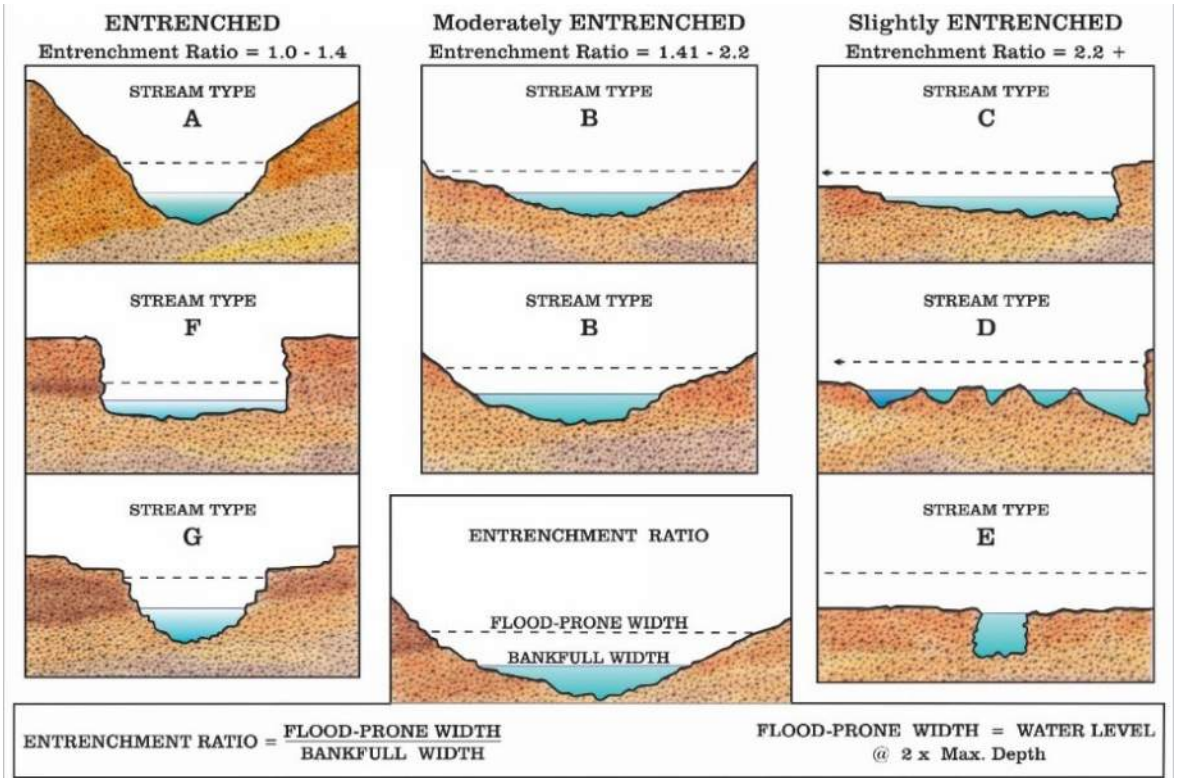


Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	**Proposed**
100 year flood stage elevation at inlet:	5.49	4.96
Flow velocity at outlet in feet per second (FPS):	9.4	3.3
Calculated 100 year peak discharge (Q) for the *proposed* structure in CFS:		67
Calculated 50 year peak discharge (Q) for the *proposed* structure in CFS:		64

SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO

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

Crossing Structure Openness Ratio* = 1.1/1.2

* Openness box culvert = (height x width)/length
Openness round culvert = (3.14 x radius^2)/length

SECTION 13 - GENERAL DESIGN CONSIDERATIONS

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:

☒ Not be a barrier to sediment transport.

☒ Prevent the restriction of high flows and maintain existing low flows.

☒ Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.

☒ Not cause an increase in the frequency of flooding or overtopping of banks.

☒ Maintain or enhance geomorphic compatibility by:

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

b. Preserving the natural alignment of the stream channel.

☒ Preserve watercourse connectivity where it currently exists.

☒ Restore watercourse connectivity where:

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

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

☒ Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.

☒ Not cause water quality degradation.

SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA

Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.

☒ 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.

SECTION 15 - ALTERNATIVE DESIGN

NOTE: 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 **Figure 3**, then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.

☐ I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.

Stratham

ALTERNATIVE DESIGN NARRATIVE

As noted in the Stream Crossings worksheets, the proposed replacement structures for Crossing 113 and Crossing 114 are Alternative Designs per NHDES's Chapter Env-Wt 900 rules. The bullets below summarize the specific reasons the replacement structures are considered Alternative Designs and provide the Project Team's rationale for requesting that NHDES approve the Alternative Design:

1. Neither Crossing 113 nor Crossing 114 provide a minimum span of 2.2 times the bankfull width of the reference stream specified in DES's Stream Crossing Worksheet. However, Env-Wt 904.07(b) specifies that the *NH Stream Crossing Guidelines* do not apply to Tier 4 Crossings such that the Project Team does not consider this to be rationale justifying the proposed crossings be permitted as Alternative Designs.

2. Neither the proposed Crossing 113 nor Crossing 114 comply with the General Design Considerations in Env-Wt 904.01(a) that require that proposed stream crossings not cause an increase in the frequency of flooding or overtopping of banks. Both crossings were intentionally designed to restore tidal connectivity which includes increasing the frequency of tidal flooding of the upstream wetland. However, the increase in upstream tidal flooding is anticipated to promote salt marsh migration and provide an environmental benefit. Additionally, no increase in upstream flood damage (to property or infrastructure) is anticipated.

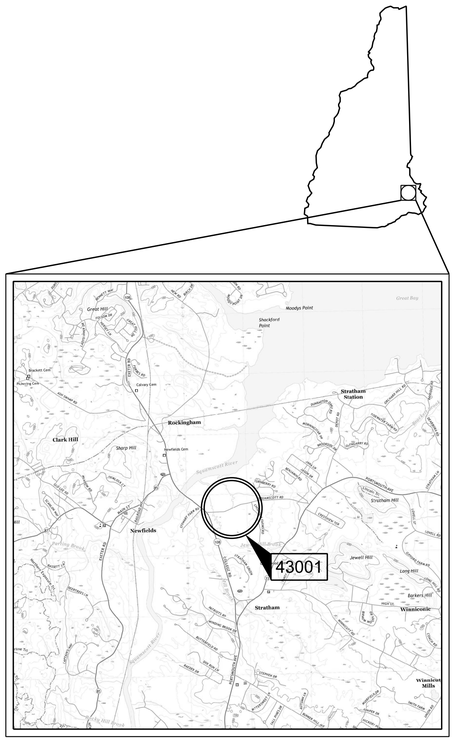
3. Crossing 113 does not comply with Env-Wt 904.07(c) rules that Tier 2, 3, and 4 Stream Crossings provide a vegetated bank to allow for [terrestrial] wildlife passage. The Project Team recommends DES approval of this Alternative Design as nearby Crossing 114 would provide a vegetated bank that could be utilized by wildlife to cross beneath Squamscott Road (the tidal wetlands downstream of the two crossings are directly connected; the wetlands above the two crossings are separated by 150 feet of upland).

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

WETLAND IMPACT PLANS
FEDERAL AID PROJECT

N.H. PROJECT NO. 43001
SQUAMSCOTT ROAD

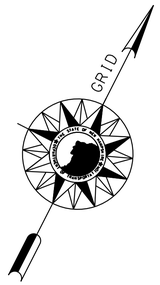
DESIGN DATA	
AVERAGE DAILY TRAFFIC 20 24	6447
AVERAGE DAILY TRAFFIC 20 44	7790
PERCENT OF TRUCKS	7.0%
DESIGN SPEED	40 mph
LENGTH OF PROJECT	204 ft

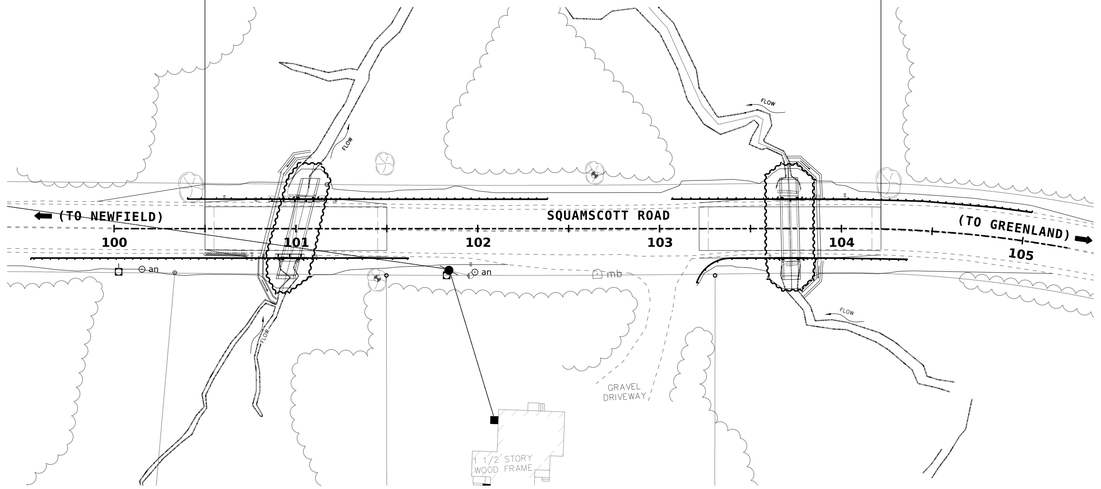


LOCATION MAP

1 1/2 0 1 2 mi.

GRAPHIC SCALE





INDEX OF SHEETS	
1	TITLE SHEET
2-3	STANDARD SYMBOLS (2 SHEETS)
4	EROSION CONTROL NOTES
5	EXISTING CONDITIONS PLAN
6	WETLAND IMPACT PLAN
7	PROFILE
8	CULVERT DETAILS
9	EROSION CONTROL PLAN

DRAWN BY NJM DATE 11/2025

CHECKED BY BCC DATE 11/2025

New Hampshire Department of Transportation

TOWN OF STRATHAM

ROCKINGHAM COUNTY

SCALE: 1" = 50'

HIGHWAY DESIGN	BRIDGE DESIGN

CMA ENGINEERS

NHDOT THE STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR APPROVAL:

DIRECTOR OF PROJECT DEVELOPMENT — DATE

APPROVED:

ASSISTANT COMMISSIONER AND CHIEF ENGINEER — DATE

FINAL DESIGN SUBMISSION	FEDERAL PROJECT NO.	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
DECEMBER 2025		43001	1	9

GENERAL

EDGE OF PAVEMENT — PROPOSED ROADWAY
TRAVELED WAY — existing roadway
(pavement removed outside slope lines)

DRIVEWAYS — (label surface type)

BUILDINGS — (building to be removed)
(label house or type of building)

FOUNDATION — (label type)

LEACH FIELD — leach field

BRIDGE CROSSINGS
STREAM
OVERPASS

STEPS AND WALK — (label type)

DITCH LINE

INTERMITTENT WATER COURSE/STREAM — ST

SHORE LINE — river/stream — pond — (label name of water body)

POTENTIAL WET AREA SYMBOL

BRUSH OR WOODS LINE

TREES (PLANS) — (deciduous) (coniferous) (stump)

TREE OR STUMP (CROSS-SECTIONS) — (show station, circumference in feet & type)

HEDGE — (label type)

MONITORING WELL — mon

WELL

FLAG POLE — fp

ORIGINAL GROUND (TYPICALS)

MUCK LAYER (SECTIONS/REMOVAL) — Exist. Muck

ROCK OUTCROP

ROCK LINE (TYPICALS & SECTIONS ONLY) — Exist. Rock

GUARDRAIL — existing / PROPOSED — (label type) bgr; (label type) cgr

JERSEY BARRIER

CURB — (label type)

STONE WALL

SHEET PILE \ COFFERDAM

RETAINING WALL — (label type) — (points toward retained ground)

FENCE — (label type)

SIGNS — (single post) (double post)

OVERHEAD SIGN STRUCTURE

GAS PUMP — gp

FUEL TANK (ABOVE GROUND) — ft — (label size & type)

STORAGE TANK FILLER CAP — fc

SEPTIC TANK — S

GRAVE — gr

MAILBOX — mb

VENT PIPE — vp

SATELLITE DISH ANTENNA — da

PHONE — ph

GROUND LIGHT/LAMP POST — gl lp

BORING LOCATION

TEST PIT

INTERSTATE NUMBERED HIGHWAY — 93

UNITED STATES NUMBERED HIGHWAY — 3

STATE NUMBERED HIGHWAY — 102

SHORELAND - WETLAND

WETLAND DESIGNATION AND TYPE — 2 PUB2E

DELINEATED WETLAND — DW
ORDINARY HIGH WATER — OHW
TOP OF BANK — TOB
TOP OF BANK & ORDINARY HIGH WATER — TOBOHW
NORMAL HIGH WATER — NHW
WIDTH AT BANK FULL — WBF
PRIME WETLAND — PWET
PRIME WETLAND 100' BUFFER — PWET100
NON-JURISDICTIONAL DRAINAGE AREA — NJDA
COWARDIN DISTINCTION LINE — CDL
TIDAL BUFFER ZONE — TBZ
DEVELOPED TIDAL BUFFER ZONE — DTBZ
HIGHEST OBSERVABLE TIDE LINE — HOTL
MEAN HIGH WATER — MHW
MEAN LOW WATER — MLW
VERNAL POOL — VP
SPECIAL AQUATIC SITE — SAS
REFERENCE LINE — REF
WATER FRONT BUFFER — WB50
NATURAL WOODLAND BUFFER — NWB150
PROTECTED SHORELAND — PS250
INVASIVE SPECIES LABEL — I.S. I / I.S. II
INVASIVE SPECIES — INV

FLOODPLAIN / FLOODWAY

500 YEAR FLOODPLAIN BOUNDARY — FP500
100 YEAR FLOODPLAIN BOUNDARY — FP100
FLOODWAY — FW

ENGINEERING

CONSTRUCTION BASELINE — 30 31 32

PC, PT, POT (ON CONST BASELINE)

PI (IN CONSTRUCTION BASELINES)

INTERSECTION OR EQUATION OF TWO LINES

ORIGINAL GROUND LINE (PROFILES AND CROSS-SECTIONS)

PROFILE GRADE LINE (PROFILES AND CROSS-SECTIONS)

CLEARING LINE — SLOPE LINE

SLOPE LINE

SLOPE LINE (FILL)

SLOPE LINE (CUT)

PROFILES AND CROSS SECTIONS:
ORIGINAL GROUND ELEVATION (LEFT) — 72.5
FINISHED GRADE ELEVATION (RIGHT) — 79.14

STATE OF NEW HAMPSHIRE
Stratham
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

STANDARD SYMBOLS

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
2-28-2024	1309-symbols	43001	2	9

STD SYMB SHT 1 OF 2

DRAINAGE

MANHOLE — (existing) / (PROPOSED)

CATCH BASIN — cb

DROP INLET — di

DRAINAGE PIPE (existing) — DP — DP — (label size & type)

DRAINAGE PIPE (PROPOSED) — PDP — PDP

UNDERDRAIN (existing) W/ FLUSHING BASIN — DP — fb — DP — (label size & type)

UNDERDRAIN (PROPOSED) W/ FLUSHING BASIN — PDP — PDP

show direction of flow

HEADER (existing & PROPOSED) — DP — PDP — (with stone outlet protection)

END SECTION (existing & PROPOSED) — DP — PDP — METAL or PLASTIC

DP — PDP — RCP

OPEN DITCH (PROPOSED)

EROSION CONTROL/ STONE SLOPE PROTECTION

BOUNDARIES / RIGHT-OF-WAY

RIGHT-OF-WAY LINE — (label type)

RR RIGHT-OF-WAY LINE

PROPERTY LINE

TOWN/COUNTY/STATE LINE — EASTON / BENTON — COOS / GRAFTON

EASEMENT — (label type)

BENCH MARK / SURVEY DISK

BOUND CONCRETE — cnb

BOUND STONE — snb

BOUND NH HIGHWAY — nhb — (PROPOSED)

NHDOT PROJECT MARKER

IRON PIPE — ip

IRON ROD — ir

REBAR — rb

DRILL HOLE IN ROCK — dh

MISCELLANEOUS BOUNDARY MOUNMENT — mb

TAX MAP AND LOT NUMBER — TM 156 Lot 1642/341 / Bk. 32 Pg. 14 / 6.80 Ac.± / Plan 5

PROPERTY PARCEL NUMBER — 12

UTILITIES

TELEPHONE POLE

POWER POLE

JOINT OCCUPANCY

MISCELLANEOUS/UNKNOWN POLE

GUY POLE OR PUSH BRACE

LIGHT POLE

LIGHT ON POWER POLE

LIGHT ON JOINT POLE

existing / PROPOSED — (plot point at face not center of symbol)

POLE STATUS:
REMOVE, LEAVE, PROPOSED, OR TEMPORARY
AS APPLICABLE e.g.:

R — L — P+04 25.0' — T+04 25.0'

RAILROAD — (label ownership)

RAILROAD SIGN

RAILROAD SIGNAL

UTILITY JUNCTION BOX — jb — JB

OVERHEAD WIRE — OW — OW — (label type)

UNDERGROUND UTILITIES

WATER (on existing lines label size, type and note if abandoned) — W — W — PW — PW

SEWER — S — S — PS — PS

TELEPHONE — T — T — PT — PT

ELECTRIC — E — E — PE — PE

GAS — G — G — PG — PG

LIGHTING — L — L — PL — PL

INTELLIGENT TRANSPORTATION SYSTEM — ITS — ITS — PITS — PITS

FIBER OPTIC — FO — FO — PFO — PFO

WATER SHUT OFF — WSO

GAS SHUT OFF — GSO

HYDRANT — HYD

MANHOLES

SEWER — MHS

TELEPHONE — MHT

ELECTRICAL — MHE

GAS — MHG

UNKNOWN

WATER — MHW

TRAFFIC SIGNALS / ITS

	existing	PROPOSED
MAST ARM		30' MA (NOTE ANGLE FROM R)
OPTICOM RECEIVER		
OPTICOM STROBE		
TRAFFIC SIGNAL		
PEDESTAL WITH PEDESTRIAN SIGNAL HEADS AND PUSH BUTTON UNIT		
SIGNAL CONDUIT	C — C — C	PC — PC — PC
CONTROLLER CABINET	cc	CC
METER PEDESTAL	mp	MP
PULL BOX	pb	PB
LOOP DETECTOR (QUADRUPOLE)		(label size)
LOOP DETECTOR (RECTANGULAR)		(label size)
CAMERA POLE (CCTV)		
FIBER OPTIC DELINEATOR	fod	FOD
FIBER OPTIC SPLICE VAULT		SVF
ITS EQUIPMENT CABINET	its	ITS
MOTOR VEHICLE DETECTION SYSTEM (MVDS)		
VARIABLE SPEED LIMIT SIGN		
DYNAMIC MESSAGE SIGN		
ROAD AND WEATHER INFO SYSTEM		

CONSTRUCTION NOTES

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

STATE OF NEW HAMPSHIRE
Stratham
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

STANDARD SYMBOLS

STD SYMB SHT 2 OF 2

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
2-28-2024	1309-symblos	43001	3	9

EROSION CONTROL STRATEGIES

1. ENVIRONMENTAL COMMITMENTS:
   1.1. THESE GUIDELINES DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH ANY CONTRACT PROVISIONS, OR APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
   1.2. THIS PROJECT WILL BE SUBJECT TO THE US EPA'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORM WATER CONSTRUCTION GENERAL PERMIT AS ADMINISTERED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THIS PROJECT IS SUBJECT TO REQUIREMENTS IN THE MOST RECENT CONSTRUCTION GENERAL PERMIT (CGP).
   1.3. THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE NHDES WETLAND PERMIT, THE US ARMY CORPS OF ENGINEERS PERMIT, WATER QUALITY CERTIFICATION AND THE SPECIAL ATTENTION ITEMS INCLUDED IN THE CONTRACT DOCUMENTS.
   1.4. ALL STORM WATER, EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE NEW HAMPSHIRE STORMWATER MANUAL, VOLUME 3, EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION (DECEMBER 2008) (BMP MANUAL) AVAILABLE FROM THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES (NHDES).
   1.5. THE CONTRACTOR SHALL COMPLY WITH RSA 485-A:17, AND ALL, PUBLISHED NHDES ALTERATION OF TERRAIN ENV-WQ 1500 REQUIREMENTS (HTTP://DES.NH.GOV/ORGANIZATION/COMMISSIONER/LEGAL/RULES/INDEX.HTM)
   1.6. THE CONTRACTOR IS DIRECTED TO REVIEW AND COMPLY WITH SECTION 107.1 OF THE CONTRACT AS IT REFERS TO SPILLAGE, AND ALSO WITH REGARDS TO EROSION, POLLUTION, AND TURBIDITY PRECAUTIONS.

2. STANDARD EROSION CONTROL SEQUENCING APPLICABLE TO ALL CONSTRUCTION PROJECTS:
   2.1. PERIMETER CONTROLS SHALL BE INSTALLED PRIOR TO EARTH DISTURBING ACTIVITIES. PERIMETER CONTROLS AND STABILIZED CONSTRUCTION EXITS SHALL BE INSTALLED AS SHOWN IN THE BMP MANUAL AND AS DIRECTED BY THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARER.
   2.2. EROSION, SEDIMENTATION CONTROL MEASURES AND INFILTRATION BASINS SHALL BE CLEANED, REPLACED AND AUGMENTED AS NECESSARY TO PREVENT SEDIMENTATION BEYOND PROJECT LIMITS THROUGHOUT THE PROJECT DURATION.
   2.3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED IN ACCORDANCE WITH THE CONSTRUCTION GENERAL PERMIT AND SECTION 645 OF THE NHDOT SPECIFICATIONS FOR ROAD AND BRIDGES CONSTRUCTION.
   2.4. AN AREA SHALL BE CONSIDERED STABLE IF ONE OF THE FOLLOWING HAS OCCURRED:
      (A) BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED;
      (B) A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED;
      (C) A MINIMUM OF 3" OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIP-RAP HAS BEEN INSTALLED;
      (D) TEMPORARY SLOPE STABILIZATION CONFORMING TO TABLE 1 HAS BEEN PROPERLY INSTALLED
   2.5. ALL STOCKPILES SHALL BE CONTAINED WITH A PERIMETER CONTROL. IF THE STOCKPILE IS TO REMAIN UNDISTURBED FOR MORE THAN 14 DAYS, MULCHING WILL BE REQUIRED.
   2.6. A WATER TRUCK SHALL BE AVAILABLE TO CONTROL EXCESSIVE DUST AT THE DIRECTION OF THE CONTRACT ADMINISTRATOR.
   2.7. TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL REMAIN UNTIL THE AREA HAS BEEN PERMANENTLY STABILIZED.
   2.8. CONSTRUCTION PERFORMED ANY TIME BETWEEN NOVEMBER 30" AND MAY 1" OF ANY YEAR SHALL BE CONSIDERED WINTER CONSTRUCTION AND SHALL CONFORM TO THE FOLLOWING REQUIREMENTS.
      (A) ALL PROPOSED VEGETATED AREAS WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15", OR WHICH ARE DISTURBED AFTER OCTOBER 15", SHALL BE STABILIZED IN ACCORDANCE WITH TABLE 1.
      (B) ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15", OR WHICH ARE DISTURBED AFTER OCTOBER 15", SHALL BE STABILIZED TEMPORARILY WITH STONE OR IN ACCORDANCE WITH TABLE 1.
      (C) AFTER NOVEMBER 30" INCOMPLETE ROAD SURFACES, WHERE WORK HAS STOPPED FOR THE SEASON, SHALL BE PROTECTED IN ACCORDANCE WITH TABLE 1.
      (D) WINTER EXCAVATION AND EARTHWORK SHALL BE DONE SUCH THAT NO MORE THAN 1 ACRE OF THE PROJECT IS WITHOUT STABILIZATION AT ONE TIME, UNLESS A WINTER CONSTRUCTION PLAN HAS BEEN APPROVED BY NHDOT THAT MEETS THE REQUIREMENTS OF ENV-WQ 1505.02 AND ENV-WQ 1505.05.
      (E) A SWPPP AMENDMENT SHALL BE SUBMITTED TO THE DEPARTMENT, FOR APPROVAL, ADDRESSING COLD WEATHER STABILIZATION (ENV-WQ 1505.05) AND INCLUDING THE REQUIREMENTS OF NO LESS THAN 30 DAYS PRIOR TO THE COMMENCEMENT OF WORK SCHEDULED AFTER NOVEMBER 30".

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

3. PLAN ACTIVITIES TO ACCOUNT FOR SENSITIVE SITE CONDITIONS:
   3.1. CLEARLY FLAG AREAS TO BE PROTECTED IN THE FIELD AND PROVIDE CONSTRUCTION BARRIERS TO PREVENT TRAFFICKING OUTSIDE OF WORK AREAS.
   3.2. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS.
   3.3. PROTECT AND MAXIMIZE EXISTING NATIVE VEGETATION AND NATURAL FOREST BUFFERS BETWEEN CONSTRUCTION ACTIVITY AND SENSITIVE AREAS.
   3.4. WHEN WORK IS PERFORMED IN AND NEAR WATER COURSES, STREAM FLOW DIVERSION METHODS SHALL BE IMPLEMENTED PRIOR TO ANY EXCAVATION OR FILLING.
   3.5. WHEN WORK IS PERFORMED WITHIN 50 FEET OF SURFACE WATERS (WETLAND, OPEN WATER OR FLOWING WATER), PERIMETER CONTROL SHALL BE ENHANCED CONSISTENT WITH SECTION 2.1.2.1. OF THE 2012 NPDES CONSTRUCTION GENERAL PERMIT.

4. MINIMIZE THE AMOUNT OF EXPOSED SOIL:
   4.1. CONSTRUCTION SHALL BE SEQUENCED TO LIMIT THE DURATION AND AREA OF EXPOSED SOILS. MINIMIZE THE AREA OF EXPOSED SOIL AT ANY ONE TIME. PHASING SHALL BE USED TO REDUCE THE AMOUNT AND DURATION OF SOIL EXPOSED TO THE ELEMENTS AND VEHICLE TRACKING.
   4.2. UTILIZE TEMPORARY MULCHING OR PROVIDE ALTERNATE TEMPORARY STABILIZATION ON EXPOSED SOILS IN ACCORDANCE WITH TABLE 1.
   4.3. THE MAXIMUM AMOUNT OF DISTURBED EARTH SHALL NOT EXCEED A TOTAL OF 5 ACRES FROM MAY 1" THROUGH NOVEMBER 30", OR EXCEED ONE ACRE DURING WINTER MONTHS, UNLESS THE CONTRACTOR DEMONSTRATES TO THE DEPARTMENT THAT THE ADDITIONAL AREA OF DISTURBANCE IS NECESSARY TO MEET THE CONTRACTORS CRITICAL PATH METHOD SCHEDULE (CPM), AND THE CONTRACTOR HAS ADEQUATE RESOURCES AVAILABLE TO ENSURE THAT ENVIRONMENTAL COMMITMENTS WILL BE MET.

5. CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT:
   5.1. DIVERT OFF SITE RUNOFF OR CLEAN WATER AWAY FROM THE CONSTRUCTION ACTIVITY TO REDUCE THE VOLUME THAT NEEDS TO BE TREATED ON SITE.
   5.2. DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM DISTURBED AREAS, SLOPES, AND AROUND ACTIVE WORK AREAS AND TO A STABILIZED OUTLET LOCATION.
   5.3. CONSTRUCT IMPERMEABLE BARRIERS AS NECESSARY TO COLLECT OR DIVERT CONCENTRATED FLOWS FROM WORK OR DISTURBED AREAS.
   5.4. STABILIZE, TO APPROPRIATE ANTICIPATED VELOCITIES, CONVEYANCE CHANNELS OR PUMPING SYSTEMS NEEDED TO CONVEY CONSTRUCTION STORMWATER TO BASINS AND DISCHARGE LOCATIONS PRIOR TO USE.
   5.5. DIVERT OFF-SITE WATER THROUGH THE PROJECT IN AN APPROPRIATE MANNER SO NOT TO DISTURB THE UPSTREAM OR DOWNSTREAM SOILS, VEGETATION OR HYDROLOGY BEYOND THE PERMITTED AREA.

6. PROTECT SLOPES:
   6.1. INTERCEPT AND DIVERT STORM RUNOFF FROM UPSLOPE DRAINAGE AREAS AWAY FROM UNPROTECTED AND NEWLY ESTABLISHED AREAS AND SLOPES TO A STABILIZED OUTLET OR CONVEYANCE.
   6.2. CONSIDER HOW GROUNDWATER SEEPAGE ON CUT SLOPES MAY IMPACT SLOPE STABILITY AND INCORPORATE APPROPRIATE MEASURES TO MINIMIZE EROSION.
   6.3. CONVEY STORMWATER DOWN THE SLOPE IN A STABILIZED CHANNEL OR SLOPE DRAIN.
   6.4. THE OUTER FACE OF THE FILL SLOPE SHOULD BE IN A LOOSE RUFFLED CONDITION PRIOR TO TURF ESTABLISHMENT. TOPSOIL OR HUMUS LAYERS SHALL BE TRACKED UP AND DOWN THE SLOPE, DISKED, HARROWED, DRAGGED WITH A CHAIN OR MAT, MACHINE-RAKED, OR HAND-WORKED TO PRODUCE A RUFFLED SURFACE.

7. ESTABLISH STABILIZED CONSTRUCTION EXITS:
   7.1. INSTALL AND MAINTAIN CONSTRUCTION EXITS, ANYWHERE TRAFFIC LEAVES A CONSTRUCTION SITE ONTO A PUBLIC RIGHT-OF-WAY.
   7.2. SWEEP ALL CONSTRUCTION RELATED DEBRIS AND SOIL FROM THE ADJACENT PAVED ROADWAYS AS NECESSARY.

8. PROTECT STORM DRAIN INLETS:
   8.1. DIVERT SEDIMENT LADEN WATER AWAY FROM INLET STRUCTURES TO THE EXTENT POSSIBLE.
   8.2. INSTALL SEDIMENT BARRIERS AND SEDIMENT TRAPS AT INLETS TO PREVENT SEDIMENT FROM ENTERING THE DRAINAGE SYSTEM.
   8.3. CLEAN CATCH BASINS, DRAINAGE PIPES, AND CULVERTS IF SIGNIFICANT SEDIMENT IS DEPOSITED.
   8.4. DROP INLET SEDIMENT BARRIERS SHOULD NEVER BE USED AS THE PRIMARY MEANS OF SEDIMENT CONTROL AND SHOULD ONLY BE USED TO PROVIDE AN ADDITIONAL LEVEL OF PROTECTION TO STRUCTURES AND DOWN-GRADIENT SENSITIVE RECEPTORS.

9. SOIL STABILIZATION:
   9.1. WITHIN THREE DAYS OF THE LAST ACTIVITY IN AN AREA, ALL EXPOSED SOIL AREAS, WHERE CONSTRUCTION ACTIVITIES ARE COMPLETE, SHALL BE STABILIZED.
   9.2. IN ALL AREAS, TEMPORARY SOIL STABILIZATION MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE STABILIZATION REQUIREMENTS (SECTION 2.2) OF THE 2012 CGP. (SEE TABLE 1 FOR GUIDANCE ON THE SELECTION OF TEMPORARY SOIL STABILIZATION MEASURES.)
   9.3. EROSION CONTROL SEED MIX SHALL BE SOWN IN ALL INACTIVE CONSTRUCTION AREAS THAT WILL NOT BE PERMANENTLY SEEDED WITHIN TWO WEEKS OF DISTURBANCE AND PRIOR TO SEPTEMBER 15, OF ANY GIVEN YEAR, IN ORDER TO ACHIEVE VEGETATIVE STABILIZATION PRIOR TO THE END OF THE GROWING SEASON.
   9.4. SOIL TACKIFIERS MAY BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND REAPPLIED AS NECESSARY TO MINIMIZE SOIL AND MULCH LOSS UNTIL PERMANENT VEGETATION IS ESTABLISHED.

10. RETAIN SEDIMENT ON-SITE AND CONTROL DEWATERING PRACTICES:
    10.1. TEMPORARY SEDIMENT BASINS (CGP-SECTION 2.1.3.2) OR SEDIMENT TRAPS (ENV-WQ 1506.10) SHALL BE SIZED TO RETAIN, ON SITE, THE VOLUME OF A 2-YEAR 24-HOUR STORM EVENT FOR ANY AREA OF DISTURBANCE OR 3,600 CUBIC FEET OF STORMWATER RUNOFF PER ACRE OF DISTURBANCE, WHICHEVER IS GREATER. TEMPORARY SEDIMENT BASINS USED TO TREAT STORMWATER RUNOFF FROM AREAS GREATER THAN 5-ACRES OF DISTURBANCE SHALL BE SIZED TO ALSO CONTROL STORMWATER RUNOFF FROM A 10-YEAR 24 HOUR STORM EVENT. ON-SITE RETENTION OF THE 10-YEAR 24-HOUR EVENT IS NOT REQUIRED.
    10.2. CONSTRUCT AND STABILIZE DEWATERING INFILTRATION BASINS PRIOR TO ANY EXCAVATION THAT MAY REQUIRE DEWATERING.
    10.3. TEMPORARY SEDIMENT BASINS OR TRAPS SHALL BE PLACED AND STABILIZED AT LOCATIONS WHERE CONCENTRATED FLOW (CHANNELS AND PIPES) DISCHARGE TO THE SURROUNDING ENVIRONMENT FROM AREAS OF UNSTABILIZED EARTH DISTURBING ACTIVITIES.

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

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

12. STRATEGIES SPECIFIC TO OPEN AREAS LESS THAN 5 ACRES:
    12.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500: ALTERATION OF TERRAIN FOR CONSTRUCTION AND USE ALL CONVENTIONAL BMP STRATEGIES.
    12.2. SLOPES STEEPER THAN 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING.
    12.3. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT ALONE.
    12.4. AREAS WHERE HAUL ROADS ARE CONSTRUCTED AND STORMWATER CANNOT BE TREATED THE DEPARTMENT WILL CONSIDER INFILTRATION.
    12.5. FOR HAUL ROADS ADJACENT TO SENSITIVE ENVIRONMENTAL AREAS OR STEEPER THAN 5%, THE DEPARTMENT WILL CONSIDER USING EROSION STONE, CRUSHED GRAVEL, OR CRUSHED STONE BASE TO HELP MINIMIZE EROSION ISSUES.
    12.6. ALL AREAS THAT CAN BE STABILIZED SHALL BE STABILIZED PRIOR TO OPENING UP NEW TERRITORY.
    12.7. DETENTION BASINS SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE A 2 YEAR STORM EVENT.

13. STRATEGIES SPECIFIC TO OPEN AREAS BETWEEN 5 AND 10 ACRES:
    13.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES WILL BE UTILIZED.
    13.2. DETENTION BASINS WILL BE CONSTRUCTED TO ACCOMMODATE THE 2-YEAR 24-HOUR STORM EVENT AND CONTROL A 10-YEAR 24-HOUR STORM EVENT.
    13.3. SLOPES STEEPER THAN A 3:1 WILL RECEIVE TURF ESTABLISHMENT WITH MATTING OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS. OTHER ALTERNATIVE MEASURES, SUCH AS BONDED FIBER MATRIXES (BFMS) OR FLEXIBLE GROWTH MEDIUMS (FGMS) MAY BE UTILIZED, IF MEETING THE NHDES APPROVALS AND REGULATIONS.
    13.4. SLOPES 3:1 OR FLATTER WILL RECEIVE TURF ESTABLISHMENT OR OTHER TEMPORARY SOIL STABILIZATION MEASURES DETAILED IN TABLE 1. THE CONTRACTOR MAY ALSO CONSIDER A SOIL BINDER IN ACCORDANCE WITH THE NHDES APPROVALS OR REGULATIONS.

14. STRATEGIES SPECIFIC TO OPEN AREAS OVER 10 ACRES:
    14.1. THE CONTRACTOR SHALL COMPLY WITH RSA 485:A:17 AND ENV-WQ 1500 ALTERATION OF TERRAIN AND SHALL USE CONVENTIONAL BMP STRATEGIES AND ALL TREATMENT OPTIONS USED FOR UNDER 5 ACRES AND BETWEEN 5 AND 10 ACRES WILL BE UTILIZED.
    14.2. THE DEPARTMENT ANTICIPATES THAT SOIL BINDERS WILL BE NEEDED ON ALL SLOPES STEEPER THAN 3:1, IN ORDER TO MINIMIZE EROSION AND REDUCE THE AMOUNT OF SEDIMENT IN THE STORMWATER TREATMENT BASINS.
    14.3. THE CONTRACTOR WILL BE REQUIRED TO HAVE AN APPROVED DESIGN IN ACCORDANCE WITH ENV-WQ 1506.12 FOR AN ACTIVE FLOCCULANT TREATMENT SYSTEM TO TREAT AND RELEASE WATER CAPTURED IN STORM WATER BASINS. THE CONTRACTOR SHALL ALSO RETAIN THE SERVICES OF AN ENVIRONMENTAL CONSULTANT WHO HAS DEMONSTRATED EXPERIENCE IN THE DESIGN OF FLOCCULANT TREATMENT SYSTEMS. THE CONSULTANT WILL ALSO BE RESPONSIBLE FOR THE IMPLEMENTATION AND MONITORING OF THE SYSTEM.

TABLE 1

GUIDANCE ON SELECTING TEMPORARY SOIL STABILIZATION MEASURES

APPLICATION AREAS	DRY MULCH METHODS				HYDRAULICALLY APPLIED MULCHES[2]				ROLLED EROSION CONTROL BLANKETS[3]			
	HMT	WC	SG	CB	HM	SMM	BFM	FRM	SNSB	DNSB	DNSCB	DNCB
SLOPES[1]												
STEEPER THAN 2:1	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES
2:1 SLOPE	YES'	YES'	YES	YES	NO	NO	YES	YES	NO	YES	YES	YES
3:1 SLOPE	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO
4:1 SLOPE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO
WINTER STABILIZATION	4T/AC	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES
CHANNELS												
LOW FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
HIGH FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

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

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

STATE OF NEW HAMPSHIRE
Stratham

DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL NOTES

	REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
EROS NOTES	2-28-2024	1309-Erosion Notes	43001	4	9

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED	NAME1	DATE1
NEW DESIGN	NAME2	DATE2
SHEET CHECKED	NAME3	DATE3
AS BUILT DETAILS		DATE

21
001
6448/777
37.5 Ac.

21-001-000
WIGGIN, FLORENCE E. REED, ROBIN E.
66 SQUAMSCOTT ROAD
STRATHAM, NH 03885
BK/PG 6448-777

21
004
3564/1161
57.00 Ac.

21-004-000
STATE OF NEW HAMPSHIRE FISH & GAME DEPARTMENT
11 HAZEN DRIVE
P. O. BOX 483
CONCORD, NH 03301
BK/PG 3564-1161

SQUAMSCOTT
N 1367979.8475
E 1184359.9258

N63°03'54.4"E

100 101 102 103 104 105

SQUAMSCOTT
PI 104+68.95
Δ 09°37'37.5" RT
D 08°34'04.9"
T 56.31'
L 112.36'
R 668.72'
PC 104+12.64
PT 105+25.00

PC 104+12.64

END 105+25.00

S004
7.270

21
152
6448/782
3.75 Ac.

21-152-000
HATHAWAY, TAMMY W.
HATHAWAY, GLENN M.
61 SQUAMSCOTT ROAD
STRATHAM, NH 03885
BK/PG 6448-782

21
150
4250/2030
85.06 Ac.

21-150-000
CHISHOLM FARM HOMEOWNERS ASSOC
CP MANAGEMENT
11 COURT STREET
SUITE 100
EXETER, NH 03833
BK/PG 4250-2030

GRAVEL DRIVEWAY

1 1/2 STORY WOOD FRAME

21
151
5507/2452
2.00 Ac.

21-151-000
CHISHOLM, R&L REVOCABLE TRUST
CHISHOLM, RONALD & LIZABETH
55 SQUAMSCOTT ROAD
STRATHAM, NH 03885
BK/PG 5507-2452

21
150
4250/2030
85.06 Ac.

21-150-000
CHISHOLM FARM HOMEOWNERS ASSOC
CP MANAGEMENT
11 COURT STREET
SUITE 100
EXETER, NH 03833
BK/PG 4250-2030

NOTES:
1. THE ENTIRETY OF THE PROJECT FALLS WITHIN THE TIDAL BUFFER ZONE. FOR DRAWING CLARITY, IMPACTS WITHIN THE TIDAL BUFFER ZONE ARE NOT ILLUSTRATED.

CMA ENGINEERS

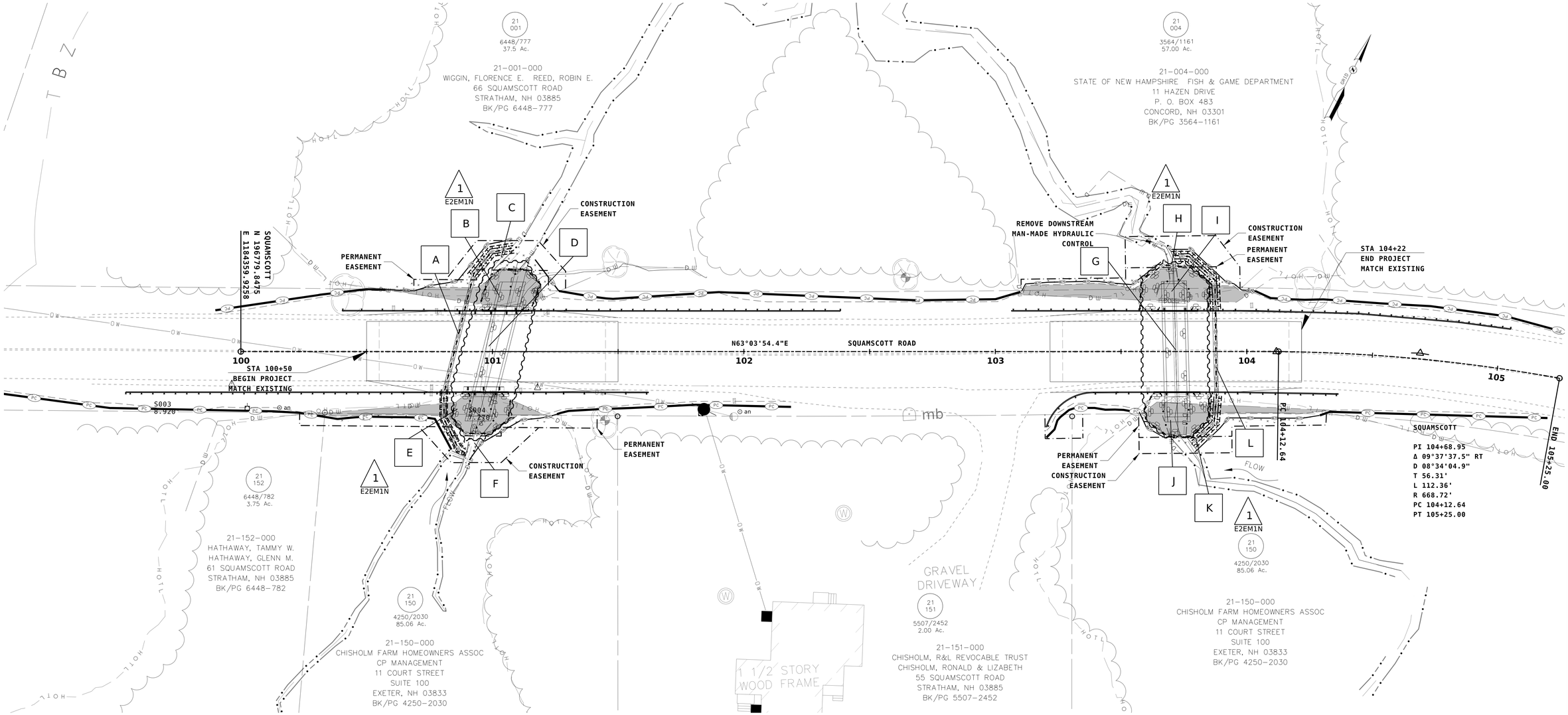
20 0 20 40
SCALE IN FEET

ECP PLAN 1 [Sheet]

STATE OF NEW HAMPSHIRE
Stratham
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

Existing Conditions Plan

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
1309-ECP	43001	5	9



REVISIONS AFTER PROPOSAL

STATION	DESCRIPTION	STATION	DATE	NUMBER

SDR PROCESSED	NAME1	DATE1	
NEW DESIGN	NAME2	DATE2	
SHEET CHECKED	NAME3	DATE3	
AS BUILT DETAILS			DATE

WETLAND IMPACT SUMMARY

WETLAND NUMBER	WETLAND CLASS-IFICATION	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)				BANK LEFT	BANK RIGHT	CHANNEL
			SF	LF	SF	LF	SF	LF	LF	LF	LF
		A					71	42			
1	E2EM1N	B			424	16					
1	E2EM1N	C					402	10			
		D	60	36							
1	E2EM1N	E			533	17					
1	E2EM1N	F					337	11			
		G	77	41							
1	E2EM1N	H					354	8			
1	E2EM1N	I			620	13					
1	E2EM1N	J			475	13					
1	E2EM1N	K					228	3			
		L					80	41			
		TOTAL	137	77	2,052	59	1,472	115			

LEGEND

TYPE OF WETLAND IMPACT	SHADING/ HATCHING
NEW HAMPSHIRE WETLANDS BUREAU (PERMANENT NON-WETLAND)	
NEW HAMPSHIRE WETLANDS BUREAU & ARMY CORP OF ENGINEERS (PERMANENT WETLAND)	
TEMPORARY IMPACTS (WETLAND)	

WETLAND DESIGNATION NUMBER

WETLAND IMPACT LOCATION

WETLAND MITIGATION AREA

MITIGATION

PERMANENT IMPACTS: 3,612.2 SF
TEMPORARY IMPACTS: 1,442.0 SF
TOTAL IMPACTS: 3,612.2 SF

NOTES:
1. THE ENTIRETY OF THE PROJECT FALLS WITHIN THE TIDAL BUFFER ZONE. FOR DRAWING CLARITY, IMPACTS WITHIN THE TIDAL BUFFER ZONE ARE NOT ILLUSTRATED.

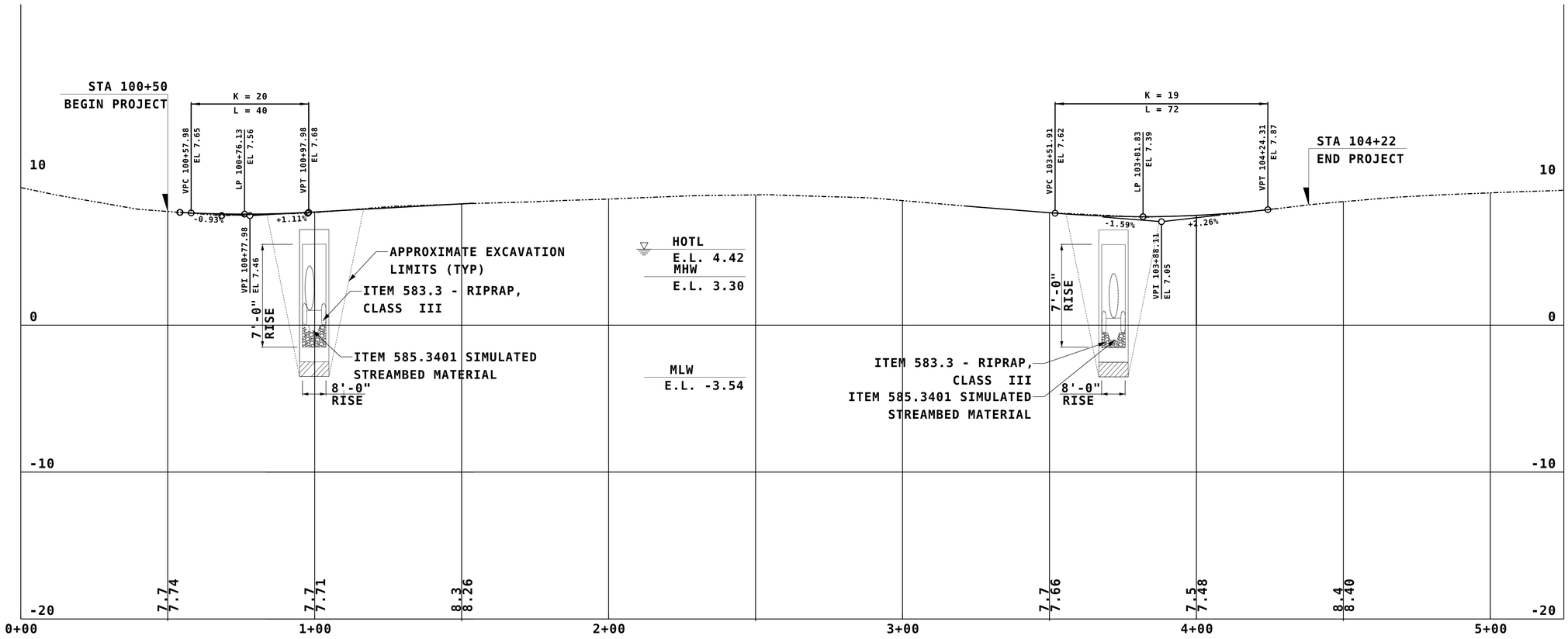
CMA ENGINEERS

STATE OF NEW HAMPSHIRE
Stratham
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

WETLAND IMPACT PLAN

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
1309-ROW	43001	6	9

GEN PLAN 1 [Sheet]



SCALE:
1"= 50' HORIZ.
1"= 10' VERT.

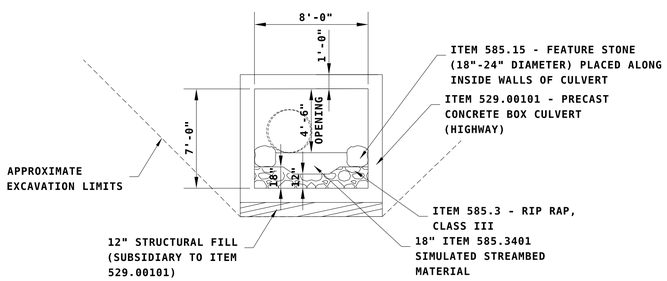
CMA ENGINEERS

STATE OF NEW HAMPSHIRE
Stratham
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

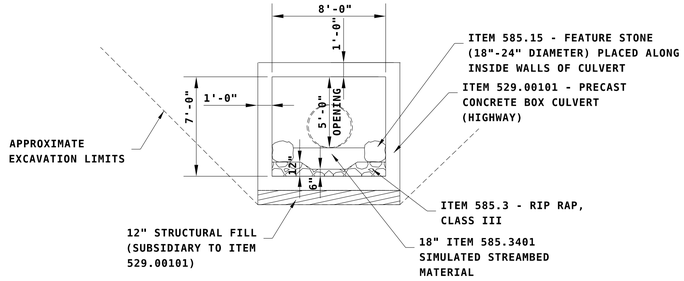
SQUAMSCOTT
ROAD PROFILE

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
1309-PROFILES	43001	7	9

Plan- - Profile 1 [Sheet]



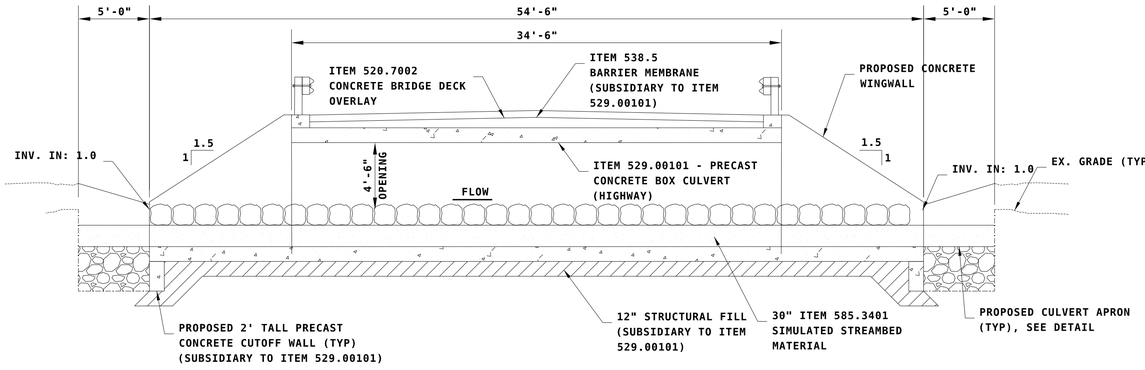
CROSSING #114



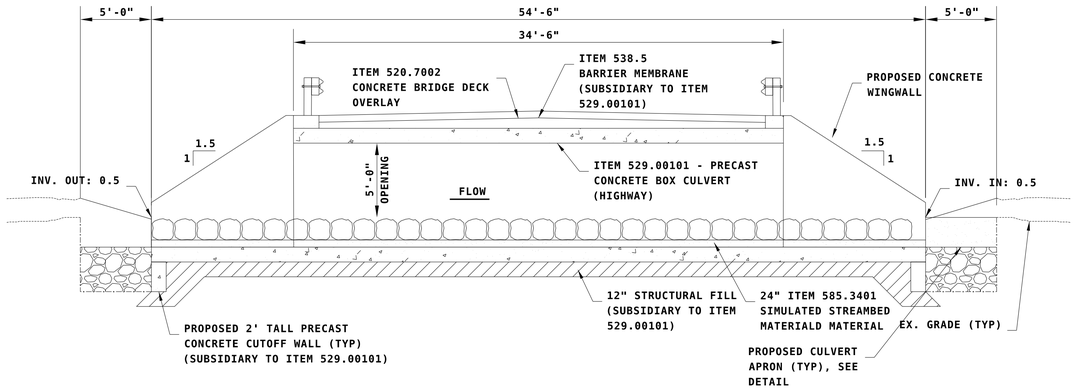
CROSSING #113

CULVERT BOX SECTION

3/16" = 1'



CROSSING #114



CROSSING #113

CULVERT LONGITUDINAL SECTIONS

1" = 5'-0"

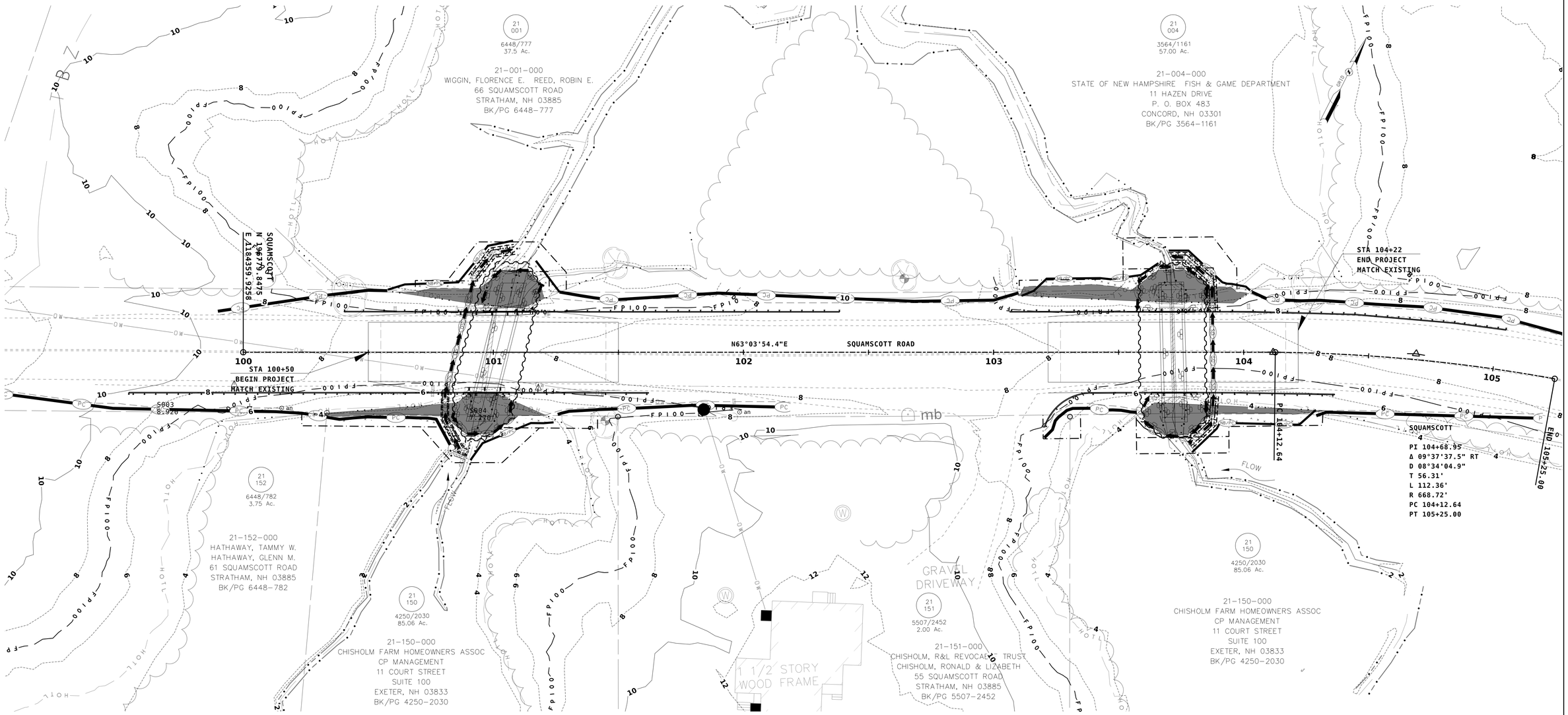
CMA ENGINEERS

STATE OF NEW HAMPSHIRE
Stratham
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

CULVERT LAYOUT AND LONGITUDINAL SECTION

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
1309-Details	43001	8	9

MODEL: **Detail 3**



EROSION CONTROL PLAN LEGEND

- PC — PERIMETER CONTROL
  - SILT FENCE
  - EROSION CONTROL MIX BERM
  - EROSION CONTROL MIX SOX
  - TURBIDITY CURTAIN
  - SHEET PILE
  - COFFER DAM
- NB/PC — NATURAL BUFFER/PERIMETER CONTROL
  - SILT FENCE
  - EROSION CONTROL MIX BERM
  - EROSION CONTROL MIX SOX
  - TURBIDITY CURTAIN
  - SHEET PILE
  - COFFER DAM
- CP — CHANNEL PROTECTION
  - STONE CHECK DAMS
  - STRAW WATTLES
  - CHANNEL MATTING
  - CLASS D EROSION STONE
  - CLASS C STONE
- SD — STREAM DIVERSION
  - SEE ATTACHED PLAN FOR DETAILS

CONSTRUCTION SEQUENCE NOTES:

1. Install all erosion control devices.
2. Verify horizontal and vertical datum.
3. Install traffic control signs and barriers and temporary water diversion device(s).
4. Excavate for the proposed culvert and remove the existing culvert,
5. Install proposed culvert, streambed material, and backfill
6. Install inlet and outlet protection.
7. Install slope protection.
8. Remove temporary water diversion device(s).
9. Construct road as shown in plans.
10. Install loam and seed over all disturbed areas.
11. Remove all erosion control devices.

NOTES:

1. THE ENTIRETY OF THE PROJECT FALLS WITHIN THE TIDAL BUFFER ZONE. FOR DRAWING CLARITY, IMPACTS WITHIN THE TIDAL BUFFER ZONE ARE NOT ILLUSTRATED.

REVISIONS AFTER PROPOSAL

STATION	DESCRIPTION	STATION	DATE	NUMBER

SDR PROCESSED	NAME1	DATE	DATE1
NEW DESIGN	NAME2	DATE	DATE2
SHEET CHECKED	NAME3	DATE	DATE3
AS BUILT DETAILS		DATE	

CMA ENGINEERS

STATE OF NEW HAMPSHIRE
Stratham
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLAN

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
1309-ErosPlan	43001	9	9

EROS PLAN 1 [Sheet]

Miscellaneous Documentation

- Coastal Resource Worksheet
- Tax Map
- Abutter List
- NOAA EFH Mapper
- WPPT Mapping
- FEMA Flood Map

COASTAL RESOURCE WORKSHEET

Water Division/Land Resources Management
Wetlands Bureau

Check the Status of your Application

RSA/Rule: RSA 482-A/ Env-Wt 600

APPLICANT LAST NAME, FIRST NAME, M.I.: **Mudgett, Kirk**

This worksheet may be used to present the information required for projects in coastal areas, in addition to the information required for Lower-Scrutiny Approvals, Expedited Permits, and Standard Permits under Env-Wt 603.01.

Please refer to Env-Wt 605.03 for impacts requiring compensatory mitigation.

SECTION 1 - REQUIRED INFORMATION (Env-Wt 603.02; Env-Wt 603.06; Env-Wt 603.09)

The following information is required for projects in coastal areas.

Describe the purpose of the proposed project, including the overall goal of the project, the core project purpose consisting of a concise description of the facilities and work that could impact jurisdictional areas, and the intended project outcome. Specifically identify all natural resource assets in the area proposed to be impacted and include maps created through a data screening in accordance with Env-Wt 603.03 (refer to Section 2) and Env-Wt 603.04 (refer to Section 3) as attachments.

The project is located in Stratham at two tidal crossings on Squamscott Road. The purpose of the project is to promote salt marsh migration upstream of the culvert. To accomplish this goial,m the project proposes to replace two 18" RCP culverts with appropriately sized culverts. A comprehensive modeling study and an alternatives analysis was performed in a collaborative effort by CMA Engineers, Inc., Streamworks, PLLC, NHDOT, NHDES, and The Nature Conservancy. The proposed culverts were evaluated with respect to geomorphic compatability, aquatic organism passage, sea level rise, and future stormwater flows. The proposed culverts are 8' wide, four-sided, embedded concrete culverts and wil include permanent impacts.

NHB has identified plant pecies in the project area. Rare plant surveys were conducted and consultation is complete.

For standard permit projects, provide:

☒ A Coastal Functional Assessment (CFA) report in accordance with Env-Wt 603.04 (refer to Section 3).

☒ A vulnerability assessment in accordance with Env-Wt 603.05 (refer to Section 4).

Explain all recommended methods and other considerations to protect the natural resource assets during and as a result of project construction in accordance with Env-Wt 311.07, Env-Wt 313, and Env-Wt 603.04.

Per Env-Wt 311.07, the purpose of the project is to increase the salt marsh migration potential by widening the stream crossings. The wider culverts will redue the tidal restriction that the current culverts cause, and by installing a wider culvert, the salt marsh's tidal range will increase. The proposed project will not construct a water access structure nor provide access through wetlands to reach a buildable lot. This project is neither industrial development nor commercial development; it is a restoration project.

Per Env-Wt 313, the proposed project meets all standards and criteria for a Standard Permit.

Per Env-Wt 603.04, a Coastal Functional Assessment is included as an attachment to this permit application.

Provide a narrative showing how the project meets the standard conditions in Env-Wt 307 and the approval criteria in Env-Wt 313.01.

See attachments addressing Env-Wt 307 and 313.01.

Provide a project design narrative that includes the following:

☒ A discussion of how the proposed project:

- Uses best management practices and standard conditions in Env-Wt 307;
- Meets all avoidance and minimization requirements in Env-Wt 311.07 and Env-Wt 313.03;
- Meets approval criteria in Env-Wt 313.01;
- Meets evaluation criteria in Env-Wt 313.01(c);
- Meets CFA requirements in Env-Wt 603.04; and
- Considers sea-level rise and potential flooding evaluated pursuant to Env-Wt 603.05;

☒ A construction sequence, erosion/siltation control methods to be used, and a dewatering plan; and

☒ A discussion of how the completed project will be maintained and managed.

See Wetland Impacts Plans for the Construction Sequence, Erosion Control plan sheet, and Methods, and Dewatering Notes.

☒ Provide design plans that meet the requirements of Env-Wt 603.07 (refer to Section 5);

☒ Provide water depth supporting information required by Env-Wt 603.08 (refer to Section 6); and

☐ For any major project that proposes to construct a structure in tidal waters/wetlands or to extend an existing structure seaward, provide a statement from the Pease Development Authority Division of Ports and Harbors (DP&H) chief harbormaster, or designee, for the subject location relative to the proposed structure's impact on navigation. If the proposed structure might impede existing public passage along the subject shoreline on foot or by non-motorized watercraft, the applicant shall explain how the impediments have been minimized to the greatest extent practicable.

SECTION 2 - DATA SCREENING (Env-Wt 603.03, in addition to Env-Wt 306.05)

Please use the Wetland Permit Planning Tool, or any other database or source, to indicate the presence of:

☒ Existing salt marsh and salt marsh migration pathways;

☒ Eelgrass beds;

☒ Documented shellfish sites;

☒ Projected sea-level rise; and

☒ 100-year floodplain.

Conduct data screening as described to identify documented essential fish habitat, and tides and currents that may be impacted by the proposed project, by using the following links:

☒ National Oceanic and Atmospheric Administration (NOAA) Tides & Currents; and

☒ NOAA Essential Fish Habitat Mapper.

☒ Verify or correct the information collected from the data screenings by conducting an on-site assessment of the subject property in accordance with Env-Wt 406 and Env-Wt 603.04.

SECTION 3 - COASTAL FUNCTIONAL ASSESSMENT/ AVOIDANCE AND MINIMIZATION (Env-Wt 603.04; Env-Wt 605.01; Env-Wt 605.02; Env-Wt 605.03)

Projects in coastal areas shall:

☒ Not impair the navigation, recreation, or commerce of the general public; and

☐ Minimize alterations in prevailing currents.

An applicant for a permit for work in or adjacent to tidal waters/wetlands or the tidal buffer zone shall demonstrate that the following have been avoided or minimized as required by Env-Wt 313.04:

☒ Adverse impacts to beach or tidal flat sediment replenishment;

☒ Adverse impacts to the movement of sediments along a shore;

☒ Adverse impacts on a tidal wetland's ability to dissipate wave energy and storm surge; and

☒ Adverse impacts of project runoff on salinity levels in tidal environments.

For standard permit applications submitted for minor or major projects:

☒ Attach a CFA based on the data screening information and on-site evaluation required by Env-Wt 603.03. The CFA for tidal wetlands or tidal waters shall be:

- Performed by a qualified coastal professional; and
- Completed using one of the following methods:

  a. The US Army Corps of Engineers (USACE) Highway Methodology Workbook, dated 1993, together with the USACE New England District *Highway Methodology Workbook Supplement*, dated 1999; or

  b. An alternative scientifically-supported method with cited reference and the reasons for the alternative method substantiated.

For any project that would impact tidal wetlands, tidal waters, or associated sand dunes, the applicant shall:

☒ Use the results of the CFA to select the location of the proposed project having the least impact to tidal wetlands, tidal waters, or associated sand dunes;

☒ Design the proposed project to have the least impact to tidal wetlands, tidal waters, or associated sand dunes;

☒ Where impact to wetland and other coastal resource functions is unavoidable, limit the project impacts to the least valuable functions, avoiding and minimizing impact to the highest and most valuable functions; and

☐ Include on-site minimization measures and construction management practices to protect coastal resource areas.

Projects in coastal areas shall use results of this CFA to:

☒ Minimize adverse impacts to finfish, shellfish, crustacean, and wildlife;

☒ Minimize disturbances to groundwater and surface water flow;

☒ Avoid impacts that could adversely affect fish habitat, wildlife habitat, or both; and

☒ Avoid impacts that might cause erosion to shoreline properties.

SECTION 4 - VULNERABILITY ASSESSMENT (Env-Wt 603.05)

Refer to the New Hampshire Coastal Flood Risk Summary Part 1: Science and New Hampshire Coastal Flood Risk Summary Part II: Guidance for Using Scientific Projections or other best available science to:

Determine the time period over which the project is designed to serve.

75 years (culverts only); road grade will have shorter useful life.

Identify the project's relative risk tolerance to flooding and potential damage or loss likely to result from flooding to buildings, infrastructure, salt marshes, sand dunes and other valuable coastal resource areas.

Medium tolerance for flood risk - culvert project assessed to have a "medium cost" and would be moderately easy to adapt (in comparison to other NHDOT crossings.) Note the culverts themselves have relatively low sensitivity to inundation but Squamscott Road has a moderate sensitivity to inundation; a reasonable detour route along NH108 and NH33 moderates the impact of Squamscott Road being closed due to flooding.

There is no upstream public infrastructure that would be affected by increased tidal flooding. Some private property would be affected, but is generally elevated above the forecasted 100-year storm surge plus 75-year sea-level rise (with noted exception of septic system).

Upstream of the tidal crossings are up 17 acres of potential wetland marsh (based on 2100 sea-level rise scenario), many acres of which have restricted connectivity due to the existing culverts which in turn restricts marsh migration. The existing wetlands upstream of the culverts, which have a similar floodplain elevation to the salt marsh downstream of the culverts, exhibit more characteristics of freshwater wetlands than tidal marsh, demonstrating the effect the existing culverts have on the upstream wetland.

Reference the projected sea-level rise (SLR) scenario that most closely matches the end of the project design life and the project's tolerance to risk or loss.

2100, with a SLR of 3.8 feet from New Hampshire Coastal Flood Risk Summary. 2030 (SLR = 0.9 feet) and 2050 (SLR = 1.6 feet) also considered in alterantives analysis for near-term impacts.

Identify areas of the proposed project site subject to flooding from SLR.

Existing wetlands, upstream and downstream of the crossings.

Squamscott Road (note that sunny-day flooding of Squamscott Road may occur due to SLR by 2100; storm surge events would readily overtop Squamscott Road).

Nuisance flooding (property, but not the structure) of one private residence, access to which would be prevented by overtopping of Squamscott Road.

Identify areas currently located within the 100-year floodplain and subject to coastal flood risk.

Existing wetlands, upstream and downstream of the crossings, plus adjacent riparian buffers and small portions of agricultural land downstream of the crossings (flooding frequency of which is unaffected by proposed project).

Squamscott Road - embankment prism as well as shoulder and/or lane flooding expected due to 100-year storm surge (both stream crossings) and riverine flooding (Crossing 113 only)

Describe how the project design will consider and address the selected SLR scenario within the project design life, including in the design plans.

Crossings were sized to promote tidal connectivity and aquatic organism passage. Design sizes were sufficient to restore sunny-day tidal connectivity through 2100 SLR scenario (peak MHHW upstream of the culverts within 0.01 ft of MHHW in natural condition that Squamscott Road did not exist).

Storm surge scenarios would overtop Squamscott Road and the crossings have negligible impact on upstream flooding at such scenarios. As poor subsurface conditions would necessitate expensive foundation improvements to raise Squamscott Road, any modification of the Squamscott Road profile has been deferred to a future project (again noting that the culverts have been sized to restore sunny-day tidal connectivity)

Where there are conflicts between the project's purpose and the vulnerability assessment results, schedule a pre-application meeting with the department to evaluate design alternatives, engineering approaches, and use of the best available science.

☐ Pre-application meeting date held:

SECTION 5 - DESIGN PLANS (Env-Wt 603.07, in addition to Env-Wt 311)

Submit design plans for the project in both plan and elevation views that clearly depict and identify all required elements.

The plan view shall depict the following:

☒ The engineering scale used, which shall be no larger than one inch equals 50 feet;

☒ The location of tidal datum lines depicted as lines with the associated elevation noted, based on North American Vertical Datum of 1988 (NAVD 88), derived from https://tidesandcurrents.noaa.gov/datum_options.html, as described in Section 6.

☒ An imaginary extension of property boundary lines into the waterbody and a 20-foot setback from those property line extensions;

☒ The location of all special aquatic sites at or within 100 feet of the subject property;

☒ Existing bank contours;

☒ The name and license number, if applicable, of each individual responsible for the plan, including:

a. The agent for tidal docking structures who determined elevations represented on plans; and

b. The qualified coastal professional who completed the CFA report and located the identified resources on the plan;

☒ The location and dimensions of all existing and proposed structures and landscape features on the property;

☒ Tidal datum(s) with associated elevations noted, based on NAVD 88; and

☒ Location of all special aquatic sites within 100-feet of the property.

The elevation view shall depict the following:

☒ The nature and slope of the shoreline;

☐ The location and dimensions of all proposed structures, including permanent piers, pilings, float stop structures, ramps, floats, and dolphins; and

☐ Water depths depicted as a line with associated elevation at highest observable tide, mean high tide, and mean low tide, and the date and tide height when the depths were measured. Refer to Section 6 for more instructions regarding water depth supporting information.

See specific design and plan requirements for certain types of coastal projects:

- Overwater structures (Env-Wt 606).
- Dredging activities (Env-Wt 607).
- Tidal beach maintenance (Env-Wt 608).
- Tidal shoreline stabilization (Env-Wt 609).
- Protected tidal zone (Env-Wt 610).
- Sand Dunes (Env-Wt 611).

SECTION 6 - WATER DEPTH SUPPORTING INFORMATION REQUIRED (Env-Wt 603.08)

Using current predicted NOAA tidal datum for the location, and tying field measurements to NAVD 88, field observations of at least three tide events, including at least one minus tide event, shall be located to document the range of the tide in the proposed location showing the following levels:

☒ Mean lower low water;

☒ Mean low water;

☒ Mean high water;

☒ Mean tide level;

☒ Mean higher high water;

☒ Highest observable tide line; and

☒ Predicted sea-level rise as identified in the vulnerability assessment in Env-Wt 603.05.

The following data shall be presented in the application project narrative to support how water depths were determined:

☒ The date, time of day, and weather conditions when water depths were recorded; and

☒ The name and license number of the licensed land surveyor who conducted the field measurements.

For tidal stream crossing projects, provide:

☒ Water depth information to show how the tier 4 stream crossing is designed to meet Env-Wt 904.07(c) and (d).

For repair, rehabilitation or replacement of tier 4 stream crossings:

☒ Demonstrate how the requirements of Env-Wt 904.09 are met.

SECTION 7 - GENERAL CRITERIA FOR TIDAL BEACHES, TIDAL SHORELINE, AND SAND DUNES (Env-Wt 604.01)

Any person proposing a project in or on a tidal beach, tidal shoreline, or sand dune, or any combination thereof, shall evaluate the proposed project based on:

☐ The standard conditions in Env-Wt 307;

☐ The avoidance and minimization requirements in Env-Wt 311.07 and Env-Wt 313.03;

☐ The approval criteria in Env-Wt 313.01;

☐ The evaluation criteria in Env-Wt 313.05;

☐ The project specific criteria in Env-Wt 600;

☐ The CFA required by Env-Wt 603.04; and

☐ The vulnerability assessment required by Env-Wt 603.05.

New permanent impacts to sand dunes that provide coastal storm surge protection for protected species or habitat shall not be allowed except:

☐ To protect public safety; and

☐ Only if constructed by a state agency, coastal resiliency project, or for a federal homeland security project.

Projects in or on a tidal beach, tidal shoreline, or sand dune shall support integrated shoreline management that:

☐ Optimizes the natural function of the shoreline, including protection or restoration of habitat, water quality, and self-sustaining stability to flooding and storm surge; and

☐ Protects upland infrastructure from coastal hazards with a preference for living shorelines over hardened shoreline practices.

SECTION 8 - GENERAL CRITERIA FOR TIDAL BUFFER ZONES (Env-Wt 604.02)

The 100-foot statutory limit on the extent of the tidal buffer zone shall be measured horizontally. Any person proposing a project in or on an undeveloped tidal buffer zone shall evaluate the proposed project based on:

- ☐ The standard conditions in Env-Wt 307;
- ☐ The avoidance and minimization requirements in Env-Wt 311.07 and Env-Wt 313.03;
- ☐ The approval criteria in Env-Wt 313.01;
- ☐ The evaluation criteria in Env-Wt 313.05;
- ☐ The project specific criteria in Env-Wt 600;
- ☐ The CFA required by Env-Wt 603.04; and
- ☐ The vulnerability assessment required by Env-Wt 603.05.

Projects in or on a tidal buffer zone shall preserve the self-sustaining ability of the buffer area to:

- ☐ Provide habitat values;
- ☐ Protect tidal environments from potential sources of pollution;
- ☐ Provide stability of the coastal shoreline; and
- ☐ Maintain existing buffers intact where the lot has disturbed area defined under RSA 483-B:4, IV.

SECTION 9 - GENERAL CRITERIA FOR TIDAL WATERS/WETLANDS (Env-Wt 604.03)

Except as allowed under Env-Wt 606, permanent new impacts to tidal wetlands shall be allowed only to protect public safety or homeland security. Evaluation of impacts to tidal wetlands and tidal waters shall be based on:

- ☐ The standard conditions in Env-Wt 307;
- ☐ The avoidance and minimization requirements in Env-Wt 311.07 and Env-Wt 313.03;
- ☐ The approval criteria in Env-Wt 313.01;
- ☐ The evaluation criteria in Env-Wt 313.05;
- ☐ The project specific criteria in Env-Wt 600;
- ☐ The CFA required by Env-Wt 603.04; and
- ☐ The vulnerability assessment required by Env-Wt 603.05.

Projects in tidal surface waters or tidal wetlands shall:

- ☐ Optimize the natural function of the tidal wetland, including protection or restoration of habitat, water quality, and self-sustaining stability to storm surge;
- ☐ Be designed with a preference for living shorelines over hardened stabilization practices; and
- ☐ Be limited to public infrastructure or restoration projects that are in the interest of the general public, including a road, a bridge, energy infrastructure, or a project that addresses predicted sea-level rise and coastal flood risk.

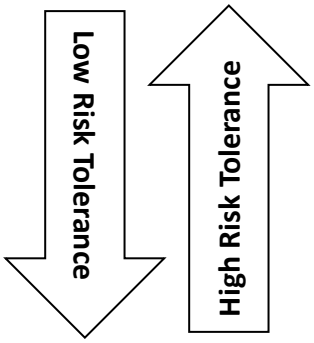
SECTION 10 – GUIDANCE

Your application must follow the New Hampshire Coastal Risk and Hazards Commission's Guiding Principles or other best available science. Below are some of these guidance principles:

- Incorporate science-based coastal flood risk projections into planning;
- Apply risk tolerance* to assessment, planning, design, and construction;
- Protect natural resources and public access;
- Create a bold vision, start immediately, and respond incrementally and opportunistically as projected coastal flood risks increase over time; and
- Consider the full suite of actions including effectiveness and consequences of actions.

*Risk tolerance is a project's willingness to accept a higher or lower probability of flooding impacts. The diagram below gives examples of project with lower and higher risk tolerance:

Critical infrastructures, historic sites, essential ecosystems, and high value assets typically have lower risk tolerance, and thus should be planned, designed, and constructed using higher coastal flood risk projections.



Sheds, pathways, and small docks typically have higher risk tolerance and thus may be planned, designed, and constructed using less protective coastal flood risk projections.

SUPPLEMENTAL NARRATIVE

to Section 6

The following text has been prepared to be incorporated into the Project Narrative to respond to elements of Section 6 (which is not editable) of the Coastal Resource Worksheet.

To quantify tidal datums at the proposed replacement crossings, Streamworks, PLLC (Streamworks) installed five pressures transducers at the project site: one near Chapman's Landing on the Squamscott River, one approximately 300 feet downstream (seaward) of the two crossings at the confluence of the two tidal channels conveyed beneath the crossings, one upstream (landward) of each crossing, and a fifth to measure atmospheric pressures. The pressure transducers recorded data from September 25, 2020 through November 25, 2020. Included within this data record was a King Tide event around November 16, 2020 and three rainfall events with precipitation depths in excess of 1.5 inches on October 13, October 17, and November 23, 2022. Staff gages were installed at each pressure transducer by Streamworks and surveyed by James Verra and Associates, Inc. (Verra) in October 2020. Verra's survey was referenced to the North American Vertical Datum of 1988; James Verra (NH Licensed Land Surveyor No. 625) sealed the survey. To tie the pressure transducers to Verra's survey, Streamworks observed water levels on the staff gage and also surveyed water surface elevations at the pressure transducers relative to Verra's benchmarks. Streamworks then used the measurements of water surface elevations at each pressure transducer to apply a constant adjustment to tie the elevations recorded by the pressure transducers to the project datum.

Streamworks developed tidal datums by adapting tidal datums from Denney's (2012) "A Tidal Study of Great Bay New Hampshire" for the Squamscott River 6,800 feet downstream of Chapman's Landing as the tidal datums for Streamworks' Chapman's Landing pressure transducer. Streamworks then plotted the daily higher high tide elevations at Streamworks' pressure transducers at Chapman's Landing and downstream of the proposed crossings to develop tidal datums downstream of the crossings. Streamworks then developed synthetic tidal hydrographs from these tidal datums and used a calibrated HEC-RAS model to attenuate the tidal hydrographs and develop tidal datums downstream of the crossings. The resultant tidal datums immediately downstream of the crossings which are requested in Section 6 of NHDES's "Coastal Resource Worksheet" are summarized in Table 1: Tidal Datums at Proposed Crossings.

Table 1: Tidal Datums at Proposed Crossings

Datum	Elevation (ft, NAVD88)		Comments
	Crossing 113	Crossing 114	
MLLW	0.87	1.63	Low tide restricted by channel geometry at both crossings (log at Crossing 113 excluded)
MLW	0.87	1.63	Low tide restricted by channel geometry at both crossings (log at Crossing 113 excluded)
MTL	0.87	1.63	Low tide restricted by channel geometry at both crossings (log at Crossing 113 excluded)
MHW	2.95	2.95	
MHHW	3.31	3.31	
HOTL	4.42	4.42	Peak water surface elevation downstream of crossings measured on November 16, 2020
Predicted SLR	+ 3.6	+ 3.6	In year 2100; see Section 4 of Coastal Resource Worksheet for further documentation.

MLLW = Mean Lower Low Water, MLW = Mean Low Water, MTL = Mean Tide Level, MHW = Mean High Water, MHHW = Mean Higher High Water, HOTL = Highest Observable Tide Line, SLR = Sea Level Rise

As provided on Sheet 2 of the accompanying Drawings, the modeled water surface elevations of 5.07 feet and 4.96 feet at Crossing 113 and Crossing 114, respectively, for the 24-hour, 100-year precipitation event are conveyed beneath the low chord elevations of 5.5 feet for the two crossings.

ABUTTER LIST

Abutters of the proposed project have been sent notification letters. The list of abutters is provided below. See attached example notification letter.

Map 21 Lot 1
Florence E. Wiggin and Robin E. Reed
66 Squamscott Road
Stratham, NH 03885

Map 21 Lot 4
State of New Hampshire Fish & Game Department
11 Hazen Drive
P.O. Box 483
Concord, NH 03301

Map 21 Lot 150
Chisholm Farm Homeowners Association
CP Management
11 Court Street
Suite 100
Exeter, NH 03833

Map 21 Lot 151
Chisholm, R&L Revocable Trust
Ronald and Elizabeth Chisholm
55 Squamscott Road
Stratham, NH 03885

CMA ENGINEERS, INC.
CIVIL | ENVIRONMENTAL | STRUCTURAL

35 Bow Street
Portsmouth
New Hampshire
03801-3819

P: 603|431|6196
www.cmaengineers.com

<DATE>

<ADDRESS>

Re: Stratham Culvert Replacements
Stratham, NH
Wetlands Application
Tax Map X/ Lot X
CMA #1309

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Dear Sir or Madam:

On behalf of the NH Department of Transportation, we are writing this letter to provide notice that a Wetlands Permit Application will be filed with the New Hampshire Department of Environmental Services (NHDES) Wetland Bureau for the above referenced project. The proposed project includes replacing two 18" pipes with two 8' concrete box culverts on Squamscott Road. The project will require impacts to wetlands for which a Wetlands Permit is required to complete the work. As an abutter to a property on which wetland impacts are proposed, we are required to notify you about the application under state law RSA 482-A:3 I (d)(1).

Once it is filed, the permit application, including plans that show the proposed project will be available for viewing at the NHDES offices by scheduling a file review by calling 603-271-2919 or emailing filereview@des.nh.gov.

Should you have any questions, please feel free to call me at 603-431-6196.

Very truly yours,

CMA ENGINEERS, INC.

Ben Clark, P.E.
Project Engineer