Truro Select Board Remote Meeting

Tuesday, December 13, 2022

Executive Session-4:00pm

Regular Meeting-5:00pm

EXECUTIVE SESSION

https://meet.goto.com/739628221

1-877-309-2073 Access Code: 739-628-221

This will be a remote meeting. The meeting will begin in open session solely for the purpose of moving, as set forth below, to enter into executive session. The meeting will be locked and closed to the public once the Board votes to enter into executive session.

Move that the Select Board enter into Executive Session for the following purposes:

(1) in accordance with the provisions of Massachusetts General Law, Chapter 30A, §21 (a) 3, to discuss strategy with respect to collective bargaining if an open meeting may have a detrimental effect on the bargaining position of the public body (Local 1462, American Federation of State, County, and Municipal Employees) and the chair so declares;

(2) in accordance with the provisions of Massachusetts General Law, Chapter 30A, §21 (a) 7 to comply with, or act under the authority of, any general or special law (Massachusetts General Law, Chapter 30A, §22 (f)(g)(Open Meeting Law), specifically, to review and approve and determine whether continued nondisclosure of the following executive session meeting minutes is warranted: November 15, 2022, December 6, 2022; and not to reconvene in open session.

REGULAR MEETING

https://meet.goto.com/992562645

1-877-309-2073 Access Code: 992-562-645

This will be a remote meeting. Citizens can view the meeting on Channel 18 in Truro and on the web on the "Truro TV Channel 18" button under "Helpful Links" on the homepage of the Town of Truro website. Click on the green "Watch" button in the upper right of the page. **To provide comment during the meeting please call-in toll free at 1-877-309-2073 and enter the following access code when prompted: 992-562-645 or you may join the meeting from a computer, tablet or smartphone by entering the follow URL into your web browser:** https://meet.goto.com/992562645 Please note that there may be a slight delay (15-30 seconds) between the meeting and the live-stream (and television broadcast). If you are watching the meeting and calling in, please lower the volume on your computer or television during public comment so that you may be heard clearly. We ask that you identify yourself when calling in to help us manage multiple callers effectively.

1. **PUBLIC COMMENT**

2. **PUBLIC HEARING**
   A. New Application for Aquaculture Development Area Grant-Douglas Grey, 6 Blackfish Rd
   Presenters: Douglas Grey, Dan Smith (Shellfish Advisory Committee), Tony Jackett, Harbormaster

3. **INTRODUCTION TO NEW EMPLOYEES**
   A. Austin Smith-Deputy Director of Community Services: Recreation & Beach Department

4. **BOARD/COMMITTEE/COMMISSION APPOINTMENTS**
   A. Interview and Possible Appointment of Recreation Advisory Committee Full Member: Christine McGee
   B. Interview and Possible Appointment of Board of Assessors Full Member: Annie Ditacchio
   C. Interview and Possible Appointment of Zoning Board of Appeals Full Member and Potential Alternate Member: Curtis Hartman, Joseph McKinnon, Nancy Medoff

5. **STAFF/ COMMITTEE UPDATES**
   A. Cape Cod 5 Educational Mini-Grant Announcement for Truro Central School Recipients
   Presenters: Stephanie Costigan, Superintendent/ Director of Student Services and John Dundas, Select Board Clerk and Liaison to School Committee

6. **TABLED ITEMS**
   A. Continued Discussion and Potential Adoption of Community Service Award Program
   Presenter: John Dundas, Select Board Clerk

7. **SELECT BOARD ACTION**
   A. Review and Approve the Dedication and Theme of the 2022 Annual Town Report
   Presenter: Darrin Tangeman, Town Manager
   B. Discussion and Possible Approval of Letter to Planning Board Related to Select Board FY23 Objective #11
   Presenters: John Dundas and Susan Areson, Select Board Members
   C. Discussion and Possible Vote for Mill Pond Road Culvert Replacement State Grant Contract
   Presenter: Jarrod Cabral, DPW Director
   D. Discussion and a Possible Vote on Mill Pond Road Culvert Replacement Alternatives
   Presenter: Jarrod Cabral, DPW Director

8. **CONSENT AGENDA**
   A. Review/Approve and Authorize Signature: None
   B. Review and Approve Appointment Renewals: None
   C. Review and Approve 2023 Business Licenses: North Truro Camping Area and Adventure Bound Camping Resort at Horton's (Transient Vendor); Truro Vineyards (Lodging)
   D. Review and Approve Select Board Minutes: Select Board/Planning Board Joint Minutes of 10.25.2022; Select Board Regular Meeting Minutes of 10.25.2022; Select Board Regular Meeting Minutes of 11.09.2022

9. Select Board Reports/Comments
10. Town Manager Report
11. Next Meeting Agenda: Executive Session TBA; Budget Task Force January 3, 2023; Budget Task Force January 10, 2023; Regular Meeting January 10, 2023

Agenda Item: 2A

TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: Administration

REQUESTOR: Nicole Tudor, Executive Assistant

REQUESTED MEETING DATE: December 13, 2022

ITEM: Public Hearing-New Application for Aquaculture Development Area Grant-Douglas Grey, 6 Blackfish Rd

EXPLANATION: Under MGL Chapter 130, Section 57, the licensing authority may issue new Shellfish Aquaculture Licenses. Douglas Grey, 6 Blackfish Rd, submitted an Aquaculture Development Area License Application on October 14, 2022, to acquire ADA Grant locations (#6-#10). On March 29, 2022, Mr. Grey applied to be added to the ADA grant waitlist. Grants #6-#10 became available in 2022 when the Souza family (Jeffrey, William, and Cheryl) chose not to renew their grant licenses held since 2013.
Harbor Master/Shellfish Constable Tony Jackett reviewed and signed Mr. Grey's application for an ADA Grant. The Shellfish Advisory Committee reviewed and supported the application at their meeting on October 27, 2022. Approved minutes from that meeting were submitted for documentation.

The coordinates for the acre grants in the Truro Bay area are as follows:

Grant #6 - #8 (3 Acres) Coordinates:
NW 42° 2' 54.54" N /70° 8' 43.74" W;
NE 42° 2' 54.188 "N/ 70 °8' 42.16 " W;
NW 42° 2' 53.863" N/ 70° 8' 40.596 " W;
NE 42° 2' 53.484" N/ 70° 8' 39.024 " W

Grant #9 & #10 (2 Acres) Coordinates:
NW 42° 2' 53.484" N /70° 8' 39.024" W;
NE 42° 2' 53.132 "N/ 70 °8' 37.452 " W;
NW 42° 2' 53.132" N/ 70° 8' 37.452 " W;
NE 42° 2' 52.78" N/ 70° 8' 35.88 " W

FINANCIAL SOURCE (IF APPLICABLE): N/A

IMPACT IF NOT APPROVED: The applicant will not be authorized to conduct aquaculture operations at the desired sites and may discourage future applications.

SUGGESTED ACTION: *Motion to issue an Aquaculture Development Area license to Douglas Grey of 6*

Blackfish Rd for grants #6-#10 in the Aquaculture Development area for a term of two years expiring December 31, 2024.

ATTACHMENTS:

1. Public Hearing Notice
2. Douglas Grey Aquaculture Application
3. Shellfish Advisory Committee October 27, 2022, Minutes
4. Aquaculture Development Area Regulations (See Section 10)

Agenda Item: 2A1

TOWN OF TRURO

P.O. Box 2030, Truro, MA 02666
Tel: 508-349-7004, Extension: 110 or 124 Fax: 508-349-5505

TOWN OF TRURO
PUBLIC HEARING
NEW AQUACULTURE LICENSE

In accordance with an application filed on October 14, 2022 by Douglas Grey, 8 Blackfish Road, Truro, for Shellfish Aquaculture Grants, pursuant to the Regulations for Aquaculture Licenses, the Select Board will conduct a public hearing on Tuesday, December 13, 2022 at 5:00pm. The proposed grants are for 5 acres total, located in the Aquaculture Development Area as shown on plans submitted with the application on file in the Select Board office.

To provide comment during the meeting please call-in toll free at 1-877-309-2073 and enter the access code when prompted: 992-562-645 or you may join the meeting from a computer, tablet or smartphone by entering the follow URL into your web browser: https://meet.goto.com/992562645

Kristen Reed, Chair
Select Board
Town of Truro

TOWN OF TRURO
NOV 22 2022
RECEIVED
TOWN CLERK

TOWN OF TRURO

P.O. Box 2030, Truro MA 02666

Tel: (508) 349-7004 Fax: (508) 349-5505

AQUACULTURE LICENSE APPLICATION

NAME OF APPLICANT: Douglas Grey

STREET ADDRESS: 8 Blackfish Road Truro MA 02666

TELEPHONE: [redacted] **E-MAIL ADDRESS** [redacted]

PROPOSED LOCATION OF THE LICENSE SITE: Describe below the specific measurements in feet of the desired area using land boundaries, when possible. Attach a sketch of a locus map indicating said boundaries and total square feet.

Description: Refer to coordinates as shown on Location of grants document.

PREVIOUS AQUACULTURE EXPERIENCE: Working on existing grants.

PROPOSED DEVELOPMENT PLAN: Describe in detail, your plans for development of Aquaculture and/or licensed site over a one, two and three-year term. Include the number of rafts/racks/floats, size, construction material, and square feet working area needed in the aquaculture area. Plans shall include shellfish by species, amount and sizes intended to be introduced to the waters and/or substratum. This plan is to be submitted as part of your application.

TYPES OF SHELLFISH TO BE RAISED: Oysters

METHOD OF PROPAGATION: floating cages, bottom culture/winter storage

MEANS OF ACCESS: Boat from mooring in Pamet Harbor/Provincetown

EQUIPMENT TO BE USED: floating cages, float & grow ketchem supply

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Signature of Applicant

10/06/2022
Date

Signature of Shellfish Constable

10-14-2022
Date

The following information must be included in this application in accordance with the Aquaculture Regulations:

1. Detailed site plan including latitude and longitude of corners (metes and bounds)
2. Geophysical characteristics
3. Benthic habitat conditions
4. Proposed species, quantities and densities
5. Proposed physical structures
6. Proposed method and details of access to the site

The following documents must be submitted with this application in accordance with the Aquaculture Regulations:

1. Copy of Notice of Intent submitted to the Conservation Commission, or Municipal Wetlands Permit or determination of non-applicability
2. Copy of application to the Corps of Engineers, Section 404 permit or Programatic General Permit

For the Truro Board of Selectmen and Truro Shellfish Committee:

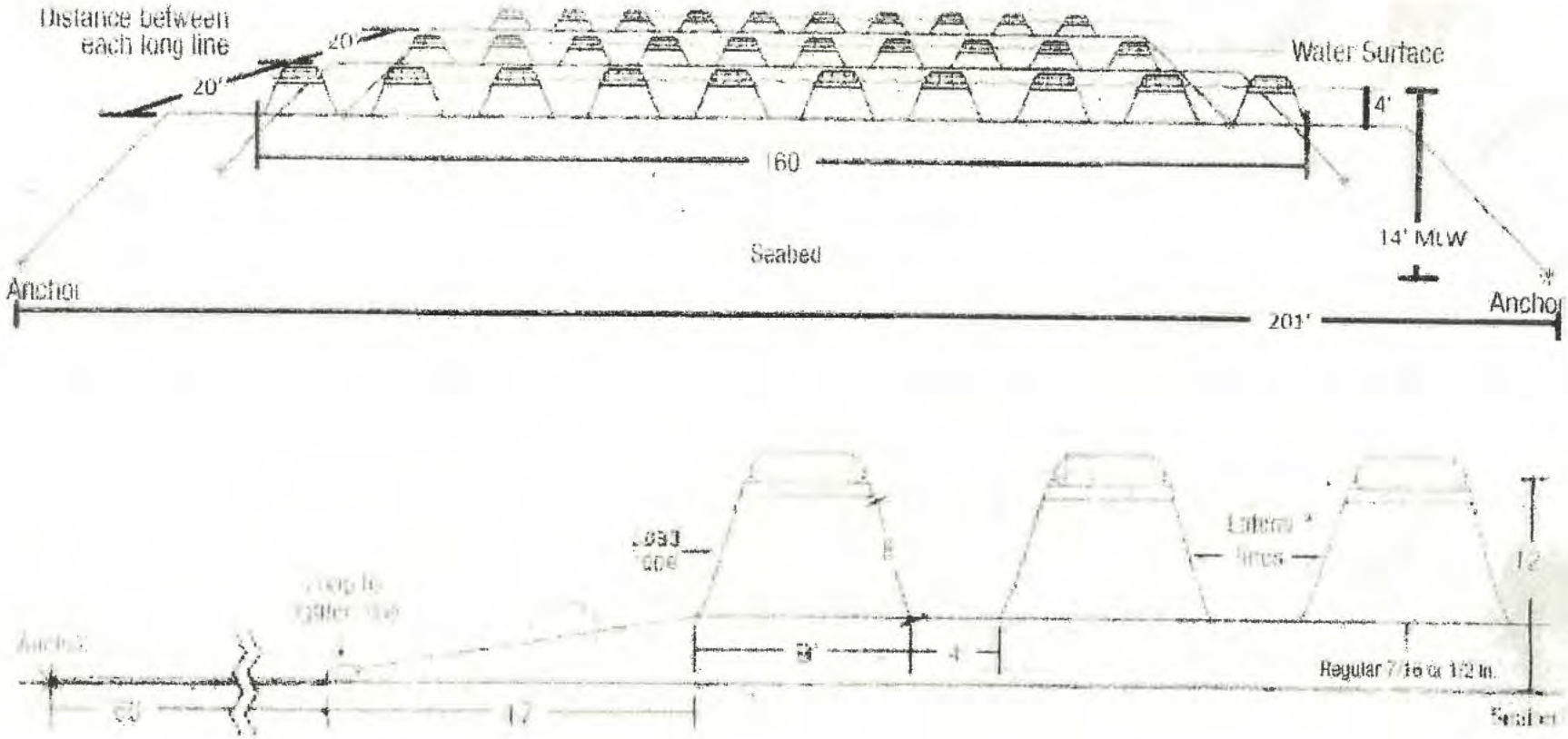
Please accept my plan for Oyster farming within the Truro ADA Grant:

My plan is to start with a relatively small initial installation in the first year with a conservative 30 float farm. These will be installed in three lines of ten cages spaced thirty feet apart in parallel. Each float will be a six bay float for a small farm totaling 180 bays. This number of bays will support approximately 50,000 market sized Oysters. The three trawls will consist of ten cages, spaced sixteen feet on center along the main line between two 2000 pound blocks or 250 pound pyramid anchors. Each block/anchor will have 6' of chain connected to the main line. Each float will be connected to the main line with two 6' lateral leads. All rope used will be sinking rope. Each bay will be loaded with 300 six mm Oyster seed for a starting total of 54,000. This plan imagines limiting labor by loading the bays this way, resulting in a minimum of handling time as they grow towards maturity.

The plan further is to install additional 30 float trawls in year two through four increasing the farm capacity by 50,000/year. Ideally in year two to three revenue can begin to be realized as the year one oysters mature and a steady system of harvesting market Oysters becomes possible. As these are sold a new crop of 6mm Oyster seeds can occupy the vacant floats.

I will access the grant via boat. We have a float mooring in Pamet harbor that can accommodate a 20' - 22' boat. The boat will be rigged with a davit and hauler that can raise the cages from the bottom as necessary. When use of Pamet harbor is not possible this boat can be trailered and launched as needed. It may also be possible to keep the boat at McMillan pier in Provincetown during the Pamet Harbor off season.

Floating cage farm design



Truro ADA:

NW: 42° 2' 56.3" N 70° 8' 51.6" W
SW: 42° 2' 52.7" N 70° 8' 51.6" W
NE: 42° 2' 47.5" N 70° 8' 12.3" W
SE: 42° 2' 44.2" N 70° 8' 14.0" W

LOCATION OF GRANTS (25)

1: 42° 2' 56.3" N 70° 8' 51.6" W
42° 2' 52.7" N 70° 8' 51.6" W
42° 2' 55.948" N 70° 8' 50.028" W
42° 2' 52.36" N 70° 8' 50.096" W

2: 42° 2' 55.948" N 70° 8' 50.028" W
42° 2' 52.36" N 70° 8' 50.096" W
42° 2' 55.596" N 70° 8' 48.456" W
42° 2' 52.02" N 70° 8' 48.592" W

3: 42° 2' 55.596" N 70° 8' 48.456" W
42° 2' 52.02" N 70° 8' 48.592" W
42° 2' 55.244" N 70° 8' 46.884" W
42° 2' 51.68" N 70° 8' 47.088" W

4: 42° 2' 55.244" N 70° 8' 46.884" W
42° 2' 51.68" N 70° 8' 47.088" W
42° 2' 54.892" N 70° 8' 45.312" W
42° 2' 51.34" N 70° 8' 45.584" W

5: 42° 2' 54.892" N 70° 8' 45.312" W
42° 2' 51.34" N 70° 8' 45.584" W
42° 2' 54.54" N 70° 8' 43.74" W
42° 2' 51" N 70° 8' 44.08" W

6: 42° 2' 54.54" N 70° 8' 43.74" W
42° 2' 51" N 70° 8' 44.08" W
42° 2' 54.188" N 70° 8' 42.16" W
42° 2' 50.66" N 70° 8' 42.576" W

7: 42° 2' 54.188" N 70° 8' 42.16" W
42° 2' 50.66" N 70° 8' 42.576" W
42° 2' 53.863" N 70° 8' 40.596" W
42° 2' 50.32" N 70° 8' 41.072" W

8: 42° 2' 53.863" N 70° 8' 40.596" W
42° 2' 50.32" N 70° 8' 41.072" W
42° 2' 53.484" N 70° 8' 39.024" W
42° 2' 49.98" N 70° 8' 39.568" W

9: 42° 2' 53.484" N 70° 8' 39.024" W
42° 2' 49.98" N 70° 8' 39.568" W
42° 2' 53.132" N 70° 8' 37.452" W

42° 2' 49.64" N 70° 8' 38.064" W

10: 42° 2' 53.132" N 70° 8' 37.452" W
42° 2' 49.64" N 70° 8' 38.064" W
42° 2' 52.78" N 70° 8' 35.88" W
42° 2' 49.3" N 70° 8' 36.56" W

11: 42° 2' 52.78" N 70° 8' 35.88" W
42° 2' 49.3" N 70° 8' 36.56" W
42° 2' 52.428" N 70° 8' 34.308" W
42° 2' 48.96" N 70° 8' 35.056" W

12: 42° 2' 52.428" N 70° 8' 34.308" W
42° 2' 48.96" N 70° 8' 35.056" W
42° 2' 52.076" N 70° 8' 32.736" W
42° 2' 48.62" N 70° 8' 33.552" W

13: 42° 2' 52.076" N 70° 8' 32.736" W
42° 2' 48.62" N 70° 8' 33.552" W
42° 2' 51.724" N 70° 8' 31.163" W
42° 2' 48.28" N 70° 8' 32.048" W

14: 42° 2' 51.724" N 70° 8' 31.163" W
42° 2' 48.28" N 70° 8' 32.048" W
42° 2' 51.372" N 70° 8' 29.592" W
42° 2' 47.94" N 70° 8' 30.544" W

15: 42° 2' 51.372" N 70° 8' 29.592" W
42° 2' 47.94" N 70° 8' 30.544" W
42° 2' 51.02" N 70° 8' 28.02" W
42° 2' 47.6" N 70° 8' 29.04" W

16: 42° 2' 51.02" N 70° 8' 28.02" W
42° 2' 47.6" N 70° 8' 29.04" W
42° 2' 50.668" N 70° 8' 26.448" W
42° 2' 47.26" N 70° 8' 27.536" W

17: 42° 2' 50.668" N 70° 8' 26.448" W
42° 2' 47.26" N 70° 8' 27.536" W
42° 2' 50.316" N 70° 8' 24.876" W
42° 2' 46.92" N 70° 8' 26.032" W

18: 42° 2' 50.316" N 70° 8' 24.876" W
42° 2' 46.92" N 70° 8' 26.032" W
42° 2' 49.964" N 70° 8' 23.304" W
42° 2' 46.58" N 70° 8' 24.528" W

19: 42° 2' 49.964" N 70° 8' 23.304" W
42° 2' 46.58" N 70° 8' 24.528" W
42° 2' 49.612" N 70° 8' 21.732" W
42° 2' 46.24" N 70° 8' 23.024" W

Ketcham Supply Co Inc
111 Myrtle Street
New Bedford, MA 02740
Phone: 508-997-4787
Email: info@ketchamsupply.com
Web: https://www.ketchamsupply.com

Quote

Date	Quote #
9/20/2022	Q3849

Bill To:
Douglas Grey PO Box 145 8 Blackfish RD Truro MA 02666

Ship To
Douglas Grey 8 Blackfish RD Truro, MA 02666

Terms	FOB
50% Down, 50% at Shipment	New Bedford

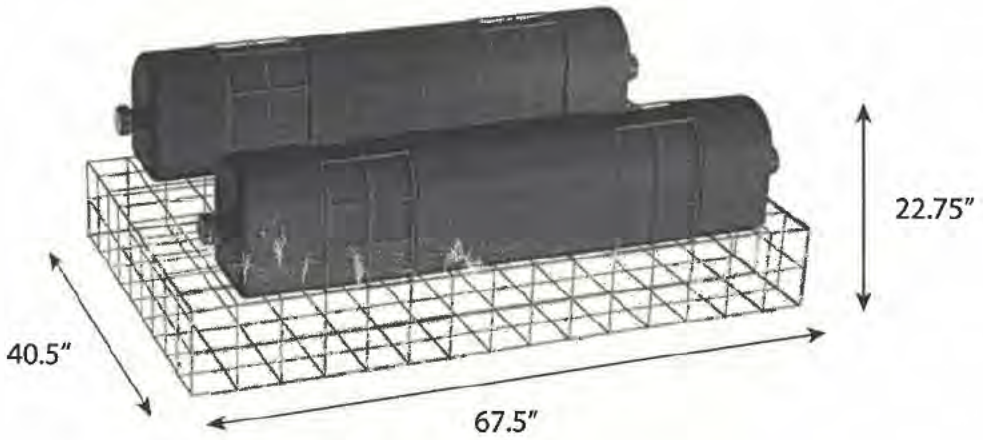
Item	Description	Qty	Unit Price	Total
FG6+	Flow N Grow, 6 Bay Floating Cage, Floats 1 Mesh In	30	[redacted]	[redacted]
OB4S	4mm Square Oyster Bag, Intermas	180		
R12S	1/2" ProFlex Sinking Rope, 1200' Coil	2		
BM16Y	16" Ball Yellow Marker Buoy	6		
HR121	1/2" Hog Rings SS per Pound	5		
HR341	3/4" Hog Ring SS per Pound	5		
C38	3/8 Mooring Chain per Foot 6--6foot sections	36		
TH12	1/2 Thimble Hvy Duty Galv	6		
SH12	1/2" Shackle Spa Galv Alloy	12		
SW38	3/8 Swivel Eye/Jaw Galv	6		
PA250	250 Pound Pyramid Anchor	6		
	Sales Tax			

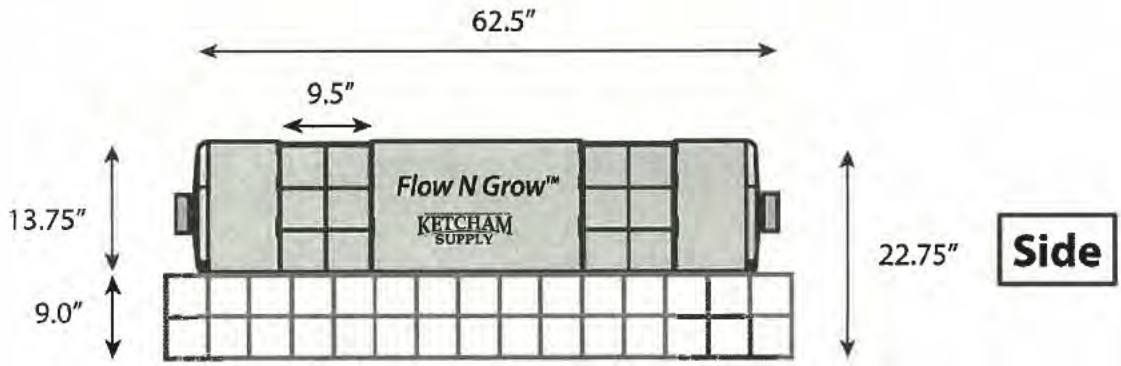
Prices quoted are valid for 7 days.

Total [redacted]

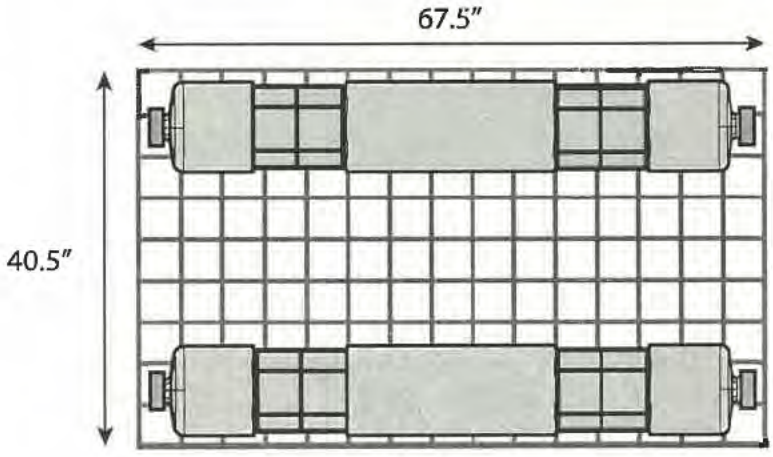
Flow N Grow™

6-Bay Cage Dimensions





Side



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Shellfish Advisory Committee
Minutes

Remote meeting of October 27, 2022 was called to order at 2:05 PM

SAC Members Present: Dan Smith (Chairman), Gary Sharpless (Vice-chair), Mark Wisotzky, Steve Wisbauer, Nick Brown,

Others Present: Tony Jacket (Truro Shellfish Constable), Noelle Scoullar (Town Admin, Exec. Asst.), John Donahue (Secretary of Truro Harbor Commission), Jon Winder (Vice Commodore Pamet Yacht Club), Jarrod Cabral (Director, Truro DPW), Douglas Grey, Orian White

Committee could not approved the minutes from the March 10, 2022

Public Comment – Parker Small discussed a Proposed Scientific Permit aimed at improving on Sea Clam propagation – using some of commercial Sea Clam fishermen's underside catch to develop a Spawning Sanctuary (nursery) between recreational shellfish areas and commercial areas in Cape Cod Bay. While the Committee supports projects such as the one Parker outlined, SAC asked that he submit a written proposal for formal review and recommendation by SAC for the Truro Select Board to consider. Tony made note of the fact that Sea Clams are regulated by the State and would need to involve them.

Discussion of Millpond Culvert Project - Jarrod Cabral (Director, Truro DPW) with engineering consultant and Woods Hole consultant.
Jarrod explained that the Town has received federal funds for a project to increase the flow of the bay into Pamet Harbor and River to return it back to it's original state as a salt water marsh. He outlined four options 1) 8' x 8' culvert, 2) 9' x 8' culvert 3) Roadway abandonment of 65', 4) Roadway abandon of 90-95'. Both 1) & 2) would require raising the road at the taxpayers cost of about $1.5M. Currently the Mill Pond road culvert is a 3ft diameter cement pipe that would need repair.
Mark asked what type of flow would we expect – WH consultant said the Mill Pond area would increase from its current 10 acres to about 13.6 acres increasing the flow about 30%. There was also discussions by Steve W. Nick B. about the redo repair of the Pilgrim Lake culvert, delay of Eagle Creek bridge and concerns what would the town be left with if the project didn't work. Jarrod indicated that the resultant project would be monitored for 5-years.
Gary (Vice-Chair) asked if he could read his nine questions and then at later date submit other questions that others may have (because the meeting was getting behind schedule and need to discuss other items on the agenda). These are the questions and concerns about the Mill Pond Culvert Project:

1 - What problem are we trying to fix?
2 - If it is a federal grant - are there other costs that the taxpayer will have to pick-up (i.e. raising the road 2 ft., annual cleanup of the dead vegetation from salt water flow)
3 - What does this due to fresh water life up stream, Diamond Back turtles, Eastern Box turtles that are both endangered?
4 - What negative effect will it have on inner harbor coastal and PHYC coastal erosion?
5 - Will there be sediment (black mud) flowing more - back into the harbor requiring more dredging of the basin moorings (now our permit only allows basin dredging every other year.)
6 - Will the short term brackish water make us close recently opened oyster beds and delay our over all opening for recreation shell fishing which has grown steadily up to 60% increase in last two years.
7 - Will this brackish water create an increased insect problem that we now see at the harbor during the summer months

8 - What are the other alternatives to what we are trying to fix that would be incremental changes that we could easily monitor vs. an 8ft x 8ft culver from about a 2-3ft-diameter culver under the existing road we have right now
9 - I know that increase flow long-term could be good for shellfish growth, but I am concerned about the short-term effects we might have to live with over the next 10 years until the pond/harbor reaches a healthy equilibrium!

Review ADA applications:
Doug Grey – Resident of Truro has submitted an application for a grant in the ADA (see attached). It was discussed and reviewed by the SAC. Gary made a motion to approve his application, Mark seconded it and the vote passed 5-0.

Discuss Over-Wintering Oysters in the Pamet:
Orion put forth a proposal to create an over-wintering location in the Pamet for oysters that could be used by Truro growers that have grants in the ADA. This would allow them to consolidate their product and put it up river in the Little Pamet. The proposal is aimed at assisting the ADA grower by giving them a sheltered location to over-winter product versus sinking gear in the ADA which would be subject to storm damage and potential scallop dragger hits. A similar effort was done last year with Steve Roderick. Permitting was obtained from DMF to allow the over-wintering and also to allow the sale of Truro oysters at below market price as part of the Covid Relief Funding for Shellfish propagation effort. The committee supports this activity and suggested Orion work with Tony to bring this before the BOS. (Maps and Orion's proposal are attached).

Election of Officers:
Mark made a motion to have Chris Clarke be the Secretary for another year. Gary seconded and vote carried 5-0 in favor of Chris for Secretary
Nick made a motion to have Dan be the Chairman for another year. Dan accepted for only another year. Gary seconded and vote carried 5-0 in favor of Dan for Chairman
Mark made a motion to have Gary be Vice- Chair for another year. Nick seconded and vote carried 5-0 in favor of Gary for Vice-Chair.

Other New Business and Topics for next meeting:
Gary suggested we look into the new Shellfish Revolving fund that was voted in at the last Town Meeting (about $2500/yr.) and look at what we might want to fund in 2023.

Dan also noted that Matthew McCue, a SAC Alternate, decided not to renew his term and asked the members to consider his replacement.

Dan made a motion to adjourn the SAC meeting at 3:35pm and Mark seconded and vote passed 5-0.

Minutes submitted on 11-6-22 for approval by:

Gary Sharpless, Vice-Chair (filling in for Chris Clarke Secretary) who had to leave the meeting.

Approved @ 11/17/22 SAC Meeting

TOWN OF TRURO
NOV 22 2022
RECEIVED
TOWN CLERK

TOWN OF TRURO

P.O. Box 2030, Truro, MA 02666

Tel: 508-349-7004 , Extension: 10 or 24 Fax: 508-349-5505

REGULATIONS FOR AQUACULTURE LICENSES

Adopted by the Board of Selectmen March 20, 2012
with amendments through May 22, 2013; April 8, 2014; July 14, 2015

GENERAL

The following regulations are promulgated in compliance with MGL Ch 130 ss 57-68 for the establishment of Aquaculture License Sites within the boundaries of the Town of Truro. These regulations are in addition to other shellfish regulations approved by the Board of Selectmen (Board). Compliance with relevant statutes and regulations will ensure the orderly and successful implementation of the polices established by the Board in conjunction with the Massachusetts Division of Marine Fisheries (Division).

1. Shellfish licenses may be awarded to Truro residents who can show to the satisfaction of the licensing authority that they are bona fide domiciled residents of the Town of Truro.

2. Applications desiring a license shall be required to complete and submit all information required on the Town's approved application form.

3. License applications shall be considered on a first-come, first-served basis within the limitations of acceptable and available areas. The Harbor Master Shellfish Constable shall make recommendations to the Shellfish Advisory Committee on those areas. The Board of Selectmen may issue a moratorium on license approvals at any time this action is deemed appropriate and in the best interest of the town.

4.Licenses approved shall be subject to certification by the Division of Marine Fisheries in compliance with Chapter 130 of MGL and 322 CMR 7.01 (4) and be licensed by the Army Corps of Engineers in compliance with Section 404 of the Army Corp of Engineers.

5. When the ADA Grants are all allocated to license holders, a Waiting List will be established. The order of the list shall be determined by the date of acceptance of complete applications submitted to the Harbor Master/Shellfish Constable.

Interested parties must complete the Aquaculture License Application and pay the $10.00 application fee in order to be considered and placed on the ADA Waiting List. As grant space becomes available, the Harbor Master/Shellfish Constable will notify the individual(s) on the Waiting List in sequential order. If an individual elects to not accept the opportunity to obtain a

Licensed Grant in the ADA, for whatever reason, they may elect to retain their order on the Waiting List and give the next individual on the Waiting List the current License.

All individuals who wish to remain on the Waiting List must pay the required annual fee of $10.00 no later than January 1st of each calendar year in order remain on the Waiting List for the next year. (IE: Pay $10.00 on Dec 28th 2015 for the 2016 calendar year Waiting List)

APPLICATION

Applications for aquaculture licenses shall be submitted on the Town's Application for Shellfish License form. Each application shall include, but not be limited to, the following items, as promulgated by the Division of Marine Fisheries:

1. Detailed site plan including latitude and longitude of corners (meters & bounds)
2. Geophysical site characteristics
3. Benthic habitat conditions
4. Proposed species, quantities and densities
5. Proposed physical structures
6. Proposed method and details of access to the site
7. Evidence of Municipal Wetlands permit or determination of non-applicability
8. Evidence of application for Corps of Engineers, section 404 Permit or Programatic General Permit

6. For the license application within the designated Aquaculture Development Area (ADA) designated by the Board of Selectmen the application shall provide the exact location of the individual one acre site or sites and acreage which is requested.

After consultation with the Shellfish Advisory Committee, the Harbor Master Shellfish Constable may recommend a different size grant than that for which an applicant has applied depending on the Harbor Master Shellfish Constable 's assessment of the applicant's experience, resources, available time to farm and his/her best estimate of the overall demand for the sites. License sites will require approval from the Board of Selectmen.

7. Following receipt of the acceptable and complete license application, the Board of Selectmen shall establish a public hearing date. At least fourteen (14) days prior to the hearing the Board shall take necessary action to publish a legal notice before the hearing in a newspaper with local distribution. In addition, a hearing notice shall be posted at the Town Hall and two other places in Truro.

8. The license permit application may be subject to review by the Harbor Master Shellfish Constable , the Shellfish Advisory Committee and by the Truro Conservation Commission,

9. The Board of Selectmen shall hold a public hearing and either tentatively approve or deny the license.

A. If the license site has been inactive for a period of more than two years the Harbor Master Shellfish Constable shall make an inspection of the license area together with the Division of Marine Fisheries which shall prepare a written report on the standing shellfish within the license area in order to determine productivity of the site

B. If the license is approved, the Selectmen shall issue a license permit and license number in accordance with established regulations. Final location of the license is subject to decision by the Board.

10. In the event that an applicant is approved for a license, the initial period will be for two (2) growing seasons and expire on the 31st of December following the second growing season. The license holder shall comply will all Federal, State and Town regulations while holding the license. The license holder shall provide information related to activity on the license site at least annually. License renewals following the initial period may be applied for at anytime during year two. Established license holders with a five year period may apply for renewal at anytime during years four or five of the license period. License renewals following the initial two year period may be made for a period of five year period. In order to be reviewed and considered for renewal, the license holder must have complied with all of the following four items:

a) All Town fees paid in full
b) Compliance Bond must be current and in full force
c) Evidence of Propagation Permit from DMF
d) Compliance with Annual Activity Report Submission

If the license holder fails to comply with any or all of the items listed above, the license renewal will not be recommended by the Shellfish Advisory Committee or Harbor Master Shellfish Constable. All renewals shall be subject to approval by the Board of Selectmen with recommendations by the Harbor Master Shellfish Constable.

11. Annual reporting shall be completed on forms provided by the Harbor Master Shellfish Constable to each license holder on or before December 31 of each year for the previous year's effort. Within a reasonable amount of time, the Harbor Master Shellfish Constable shall review the license report submitted by the license holders and submit a copy of said report to the Board of Selectmen. The license holder shall produce documents at the request of the Harbor Master Shellfish Constable Harbor Master Shellfish Constable showing shellfish purchase and sales slips.

12. Each license shall be reviewed annually by the Board of Selectmen and the Harbor Master Shellfish Constable involving a review of the license holder's yearly production report. If it cannot be shown by the license holder that a reasonable amount of shellfish has been produced on the license area during the preceding year the license may be deemed forfeited by the Board of Selectmen. As a minimum for the purposes stated a reasonable amount shall not be less than the statuary requirements as set forth by Section 65 of MGL Chapter 130. Applicant shall be responsible for state reports.

REQUIREMENTS

13. Licenses shall not be transferred or sublet; the license is to be worked by the license holder and immediate family; exceptions may be permitted for reasons of hardship. Employees of the license holder may be permitted to conduct aquaculture operations with the permission of the Harbor Master Shellfish Constable .

14. It is the responsibility of the license holder to comply with all relevant sections of the General laws; Division of Marine Fisheries regulations and the Department of Public Health regulations regarding handling transport and sale of shellfish grown on the license site including permits for possession of seed and sale and processing as described in 105 CMR 533 and 322 CMR 15.

15. It shall be unlawful for the license holder to take seed shellfish from any waterway in the Town of Truro without written permission from the Board of Selectmen. {Amended 05-22-13}

16. It shall be unlawful for any license holder to transfer to or from the licensed site any contaminated shellfish. Any Shellfish transferred to a licensed site must come from the hatcheries certified by the Division as disease- free.

17. The Town Harbor Master Shellfish Constable shall be notified prior to any transfer of shellfish, stating that the location and name of the company from which the shellfish are purchased, the date of the transfer and proof of certification.

18. The Town of Truro reserves the right to obtain samples of any shellfish from the license area for the purpose of certified testing for disease.

19. The Harbor Master Shellfish Constable shall have authority to inspect the license area including the contents of all boxes or other containers at any time.

20. The license holder shall assume liability for all boxes, racks, etc. used in shellfish farming. If any boxes, rack, etc. are moved by a storm or other event to a location off the licensed site, it shall be the responsibility of the license holder to remove it. If within three weeks the license holder has not complied with this requirement, the Town, through the Harbor Master Shellfish Constable may cause such boxes, racks, etc. to be removed and may bill the license holder. For purposes of identification, each box, rack, etc. used by the individual license holder shall bear the Truro Aquaculture license site number. When a license is discontinued or terminated for any reason, the license holder shall be required to remove all boxes, racks, pens, boundary markers, etc. from the waters and substratum within thirty (30) days of the license expiration date. Any and all equipment not removed within thirty (30) days may be recovered by the Town through the Harbor Master Shellfish Constable at the license holder's expense.

21. License holders shall be responsible for affixing permanent markers to the four corners of their licensed site after the license is issued. Each marker shall display the number of the license site, as prescribed by the Board in compliance with the statutory requirements.

22. Inasmuch as this ADA lies within a Critical Habitat area for marine mammals all floating gear which is affixed to the bottom shall be in compliance with the provisions and requirements of the Massachusetts Division of Marine Fisheries. This shall include marker buoys, and their attachment lines. There shall be compliance with any Department of Marine Fisheries or NOAA Regulations promulgated in the future to further the goals of the Federal Marine Mammal Protection Act.

23. A five foot long sleeved enclosure shall be installed immediately below the buoy on any permanent mooring line and marker buoy lines (not gangions) to prevent entanglement with sea turtles between May 15th and December 31st.

24. For retrieving fixed gear on bottom one line per acre with a 600 lbs. breakaway link or ROABS (ropes of appropriate breaking strength per ALWTRP) to shellfish bags, cages, or containers at the shallowest depth of the lease for the purposes of retrieving marketable product.

25. An area of twenty five (25) feet inside the perimeter of the license site abutting another site shall remain unobstructed for passage of others.

26. Should license boundary disputes arise among license holders, they shall first take their dispute to the Harbor Master Shellfish Constable for resolution. Should this prove unresolved, the Board of Selectmen may require an engineered survey of the licenses in question. Such survey would be performed at the license holder's expense.

27. No persons may moor a vessel within twenty-five (25) feet, at rest, of a licensed site area.

FEES

28. A $25 application fee for the public hearing shall be payable at the time of submission of the application to the Board.

29. A fee of $25 per acre or part thereof shall be payable at the time of license approval. An annual license fee of $25.00 per acre shall be paid by the license holder, payable on or before January 1st of each year thereafter. If the fee is not paid within 6 months after it is due, the license shall be deemed forfeited.

30. The license holder shall post a Compliance Bond for the licensed area or part thereof to ensure compliance with Section 20 regulations. The bond amount shall be $10,000.00 for licensed areas ranging from one to five acres. In the event a license holder has a licensed area in excess of five acres; the bond amount shall be increased to $20,000.00. The license holder shall provide the Town of Truro a fully executed Surety Rider naming the Town as the Obligee. {Amended July 14, 2015}

Submitted for consideration by Truro Shellfish Advisory Committee, February 21, 2012. Went into effect March 20, 2012; amended May 22, 2013; amended April 8th, 2014; July 14, 2015

Paul Wisotzky, Chairman

Jan Worthington, Vice-Chairman

Maureen Burgess, Clerk

Jay Coburn

Robert Weinstein

Town of Truro Board of Selectmen

Agenda Item: 3A

TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: Community Services

REQUESTOR: Damion Clements, Director of Community Services

REQUESTED MEETING DATE: December 13, 2022

ITEM: Introduction of New Employee – Austin Smith, Deputy Director of Community Services: Recreation & Beach Department.

EXPLANATION: Community Services Director Clements will introduce Mr. Smith to the Select Board and community.

FINANCIAL SOURCE (IF APPLICABLE): N/A

IMPACT IF NOT APPROVED: N/A

SUGGESTED ACTION: Discussion only

ATTACHMENTS: None

TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: Administration

REQUESTOR: Noelle Scoullar, Executive Assistant

REQUESTED MEETING DATE: December 13, 2022

ITEM: Application to Serve

EXPLANATION: Christine McGee has submitted an application to serve on the Recreation Advisory Committee. There is one alternate member position vacant on this committee which carries a one-year term. The Chair has reviewed the application and her comments are included with the application to serve.

FINANCIAL SOURCE (IF APPLICABLE): N/A

IMPACT IF NOT APPROVED: The Recreation Advisory Committee will continue to operate with only one of the two alternate positions filled. Alternates provide essential back-up for when full members cannot attend a meeting resulting in the inability to meet a quorum.

SUGGESTED ACTION: *Motion to appoint Christine McGee as an Alternate on the Recreation Advisory Committee for a one-year term which will expire June 30, 2023.*

ATTACHMENTS:

1. Application to Serve; Chair's comments

Truro

Application to Serve on a Board or Committee

Last Name

McGee

First Name

Christine

Middle Initial

E

Email Address

Phone Number

Address (Street)

4 Highview Lane

Address (City)

Truro

Address (State)

MA

Address (Zip Code)

02666

Mailing Address (Please indicate box number and zip code)

PO Box 400 North Truro 02652

Only full-time, registered Truro voters are able to serve on regulatory boards and commissions. All taxpayers/ residents are eligible to serve on non-regulatory boards and commissions.

Are you a full-time resident of Truro?

[*] Yes

[ ] No

Are you registered to vote in Truro?

[*] Yes

[ ] No

What Board/ Committee Are You Applying For?

Recreation

Briefly Describe Why You Wish to Serve on This Board or Committee:

I would like to help problem solve the staffing challenges that Recreation has had in order to have a summer program up and running well in advance of school ending. I would like to help expand the programming for our children during the school year.

Have you attended a meeting of the committee listed above?

[ ] Yes

[*] No

Have you read the charge of the committee?

[ ] Yes

[*] No

Have you met with the chair of the committee?

[ ] Yes

[*] No

Have you read the Select Board's current Goals and Objectives?

[*] Yes

[ ] No

Do you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve?

[ ] Yes

[*] No

If you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve, please elaborate.

Not so much a concern but in regards to the Select Board's goal to address affordable housing, I believe will also be important for Recreation to help entice summer staff.

Are there other Boards/ Committees in which you are interested? Note: To be appointed to a regulatory board or commitee, you must be a full-time resident and registered voter in Truro. Please list the Boards/ Committees names:

Briefly list your experience working on a committee or team. This can be professional, town, volunteer, charity, etc.

I have been a member of the TCS school council for the last year working alongside the principal, teachers and community members.

Briefly list any other relevant experience such as professional work, training, education, etc. A resume is NOT required. If you choose to attach a resume, it will become a public document.

I own and operate two retail stores in Provincetown so I am familiar with working with a team.

Signature

Christine McGee

Date

Nov 09, 2022

Noelle Scoullar

From: Chelsea Loughran
Sent: Tuesday, November 15, 2022 4:50 PM
To: Noelle Scoullar
Cc: Nicole Tudor
Subject: Re: Application to Serve-Christine McGee

Hi Noelle,

I'm not sure what comments are expected, but this application looks fine to me. There is widespread desire to get the Truro Summer Rec program back to full capacity so it is definitely a focal point of the Committee, and I understand Christine's comments there.

The Committee meets one Tuesday per month at 3:30 p.m. at the TCS Media Center. Our next meeting is 11/22.

Thanks,

Chelsea

On Tuesday, November 15, 2022 at 04:01:02 PM EST, Noelle Scoullar <nscoullar@truro-ma.gov> wrote:

Hello Chelsea,

I am awaiting your comments/approval before scheduling Christine for an interview with the Select Board.
May I receive your response by Friday of this week?

Thank you,
Noelle

-----Original Message-----
From: Noelle Scoullar
Sent: Thursday, November 10, 2022 8:11 AM
To: Chelsea Loughran <
Cc: Nicole Tudor <ntudor@truro-ma.gov>
Subject: Application to Serve-Christine McGee

Good Morning Chelsea,

Christine McGee has applied to serve on the Recreation Advisory Committee. I have reached out to her, advising her that there is a one-year Alternate position available.
Will you review the application and reply to this email with your comments/approval?

Thank you,
Noelle

-----Original Message-----
From: trurotownscanner@gmail.com <trurotownscanner@gmail.com>
Sent: Thursday, November 10, 2022 8:00 AM
To: Noelle Scoullar <nscoullar@truro-ma.gov>
Subject: Message from Mail Room KM_C458

TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: Administration

REQUESTOR: Noelle Scoullar, Executive Assistant

REQUESTED MEETING DATE: December 13, 2022

ITEM: Application to Serve

EXPLANATION: Annie Ditacchio has submitted an application to serve on the Board of Assessors. There is an unexpired full member position vacancy on this committee which carries a three-year term and expires June 30, 2024. The Chair has reviewed the application and his comments are included with the application to serve.

FINANCIAL SOURCE (IF APPLICABLE): N/A

IMPACT IF NOT APPROVED: The Board of Assessors will continue to operate with two-thirds of their positions filled. A full board makes it more likely that a quorum will be reached.

SUGGESTED ACTION: *Motion to appoint Annie Ditacchio to the unexpired full term on the Board of Assessors which will expire June 30, 2024.*

ATTACHMENTS:

1. Application to Serve; Chair's comments

Truro

Application to Serve on a Board or Committee

Last Name

Ditacchio

First Name

Annie

Middle Initial

S.

Email Address

Phone Number

Address (Street)

412 Shore Road

Address (City)

North Truro

Address (State)

MA

Address (Zip Code)

02652

Mailing Address (Please indicate box number and zip code)

POB 829 02652

Only full-time, registered Truro voters are able to serve on regulatory boards and commissions. All taxpayers/ residents are eligible to serve on non-regulatory boards and commissions.

Are you a full-time resident of Truro?

[*] Yes

[ ] No

Are you registered to vote in Truro?

[*] Yes

[ ] No

What Board/ Committee Are You Applying For?

Board of Assessors

Briefly Describe Why You Wish to Serve on This Board or Committee:

I have worked for the last few years in the Assessor's Office for my Senior Work-off assignment. I find the work interesting and have become familiar with how this office serves the Truro citizens. When I learned there was a vacancy on the Board I decided to apply.

Have you attended a meeting of the committee listed above?

[ ] Yes

[*] No

Have you read the charge of the committee?

[ ] Yes

[*] No

Have you met with the chair of the committee?

[ ] Yes

[*] No

Have you read the Select Board's current Goals and Objectives?

[*] Yes

[ ] No

Do you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve?

[ ] Yes

[*] No

If you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve, please elaborate.

Are there other Boards/ Committees in which you are interested? Note: To be appointed to a regulatory board or commitee, you must be a full-time resident and registered voter in Truro. Please list the Boards/ Committees names:

Briefly list your experience working on a committee or team. This can be professional, town, volunteer, charity, etc.

I owned and operated a hospitality business (26 room inn and restaurant) for over 15 years, then worked for Bayberry Gardens as Manager/Buyer for another 20 years before retiring when Covid began. I am currently doing Meals on Wheels once a week with my husband. All of these experiences working with others require a good work ethic, clarity of communication and an upbeat attitude to guide and encourage fellow workers.

Briefly list any other relevant experience such as professional work, training, education, etc. A resume is NOT required. If you choose to attach a resume, it will become a public document.

I am a 1968 graduate of Northeastern University with a BA in Liberal Arts. I have also spent a lot of time living and traveling aboard a small sailboat which teaches a lot about self-sufficiency and problem solving.

Signature

Anne S Ditacchio

Date

Nov 30, 2022

Noelle Scoullar

From: FRED GAECHTER
Sent: Wednesday, November 30, 2022 12:48 PM
To: Noelle Scoullar; Jon Nahas
Cc: Nicole Tudor
Subject: Re: FW: Application to Serve-BoA-Annie Ditacchio

Noelle,
I would be glad to have Anne on the Board of Assessors, so, I certainly approve her application.
Thanks,
Fred

> On 11/30/2022 12:14 PM Noelle Scoullar <nscoullar@truro-ma.gov> wrote:
>
>
> Good Afternoon Fred,
> Annie Ditacchio has submitted an application to fill the vacancy on the Board of Assessors.
> Please respond to this email with your comments/approval.
>
> Thank you,
> Noelle
>
>
> -----Original Message-----
> From: Jon Nahas <JNahas@truro-ma.gov>
> Sent: Wednesday, November 30, 2022 12:11 PM
> To: Noelle Scoullar <nscoullar@truro-ma.gov>
> Cc: Nicole Tudor <ntudor@truro-ma.gov>
> Subject: RE: Application to Serve-BoA-Annie Ditacchio
>
> Hi Noelle,
>
> At the Board of Assessors Meeting on October 20, 2022, it was voted and accepted that Fred Gaechter is the new Chair of the Board of Assessors due to the resignation of Bruce Boleyn.
>
> I'd be happy to add....
>
> "Annie Ditacchio has offered to serve on the Board of Assessors and we're very grateful for her offer. Annie has worked in the Assessors Office as part of the Senior Work off program for numerous years and she is familiar with what Assessors do; as well as she is familiar with some of the processes of the office. She understands the expected commitment to the Board, she is willing to embrace the necessary training, and is willing to serve. We'd be very fortunate to have Annie be appointed to the Board of Assessors by the Select Board"
>
> Thank you,
>
> Jon
>
> Jon Nahas
> Principal Assessor

> Town of Truro
> PO Box 2012
> 24 Town Hall Rd
> Truro, MA 02666
> 508.214.0917
>
> -----Original Message-----
> From: Noelle Scoullar <nscoullar@truro-ma.gov>
> Sent: Wednesday, November 30, 2022 11:53 AM
> To: Jon Nahas <JNahas@truro-ma.gov>
> Cc: Nicole Tudor <ntudor@truro-ma.gov>
> Subject: Application to Serve-BoA-Annie Ditacchio
>
> Hi Jon,
>
> Annie Ditacchio has submitted an application to serve on the Board of Assessors. I don't see that there is a Chair of BOA yet, may we have you respond with your comments/approval? One received, we'll coordinate with the Select Board to place her interview on an agenda and reach out to Annie.
>
> Thanks,
> Noelle
>
> -----Original Message-----
> From: trurotownscanner@gmail.com <trurotownscanner@gmail.com>
> Sent: Wednesday, November 30, 2022 11:40 AM
> To: Noelle Scoullar <nscoullar@truro-ma.gov>
> Subject: Message from Mail Room KM_C458
>
> CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.
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TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: Administration

REQUESTOR: Noelle Scoullar, Executive Assistant

REQUESTED MEETING DATE: December 13, 2022

ITEM: Interview and Possible Appointment of Applicants: Curtis Hartman, Joseph McKinnon, Nancy Medoff

EXPLANATION: The Zoning Board of Appeals has an unexpired full seat vacancy due to the resignation of a member. The two Alternates on the ZBA have submitted applications to serve, along with one other citizen application. If one of the Alternates is appointed to the full seat, an Alternate position will then be vacant which the Select Board could consider filling with the other applicant.

FINANCIAL SOURCE (IF APPLICABLE): N/A

IMPACT IF NOT APPROVED: The Zoning Board of Appeals will continue to be short by one full member.

SUGGESTED ACTION: *Motion to appoint {INSERT NAME HERE} to an unexpired three-year term which ends June 30, 2023.*

If one of the current alternates is appointed to the full-member seat: *Motion to appoint Joseph McKinnon to an unexpired alternate term which ends June 30, 2023.*

ATTACHMENTS:

1. Application to Serve-Curtis Hartman
2. Application to Serve-Joseph McKinnon
3. Application to Serve-Nancy Medoff

Truro

Application to Serve on a Board or Committee

Last Name

Hartman

First Name

Curtis

Middle Initial

P

Email Address

Phone Number

Address (Street)

4 Sylvias Way

Address (City)

Truro

Address (State)

MA

Address (Zip Code)

02666

Mailing Address (Please indicate box number and zip code)

PO Box 410, 02666

Only full-time, registered Truro voters are able to serve on regulatory boards and commissions. All taxpayers/ residents are eligible to serve on non-regulatory boards and commissions.

Are you a full-time resident of Truro?

[*] Yes

[ ] No

Are you registered to vote in Truro?

[*] Yes

[ ] No

What Board/ Committee Are You Applying For?

Zoning Board of Appeals

Briefly Describe Why You Wish to Serve on This Board or Committee:

As a ZBA alternate, I have enjoyed the work. Now I would like to serve full time, and feel I have the knowledge of zoning law, skills, and temperament to serve effectively.

Have you attended a meeting of the committee listed above?

[*] Yes

[ ] No

Have you read the charge of the committee?

[*] Yes

[ ] No

Have you met with the chair of the committee?

[*] Yes

[ ] No

Have you read the Select Board's current Goals and Objectives?

[*] Yes

[ ] No

Do you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve?

[ ] Yes

[*] No

If you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve, please elaborate.

Are there other Boards/ Committees in which you are interested? Note: To be appointed to a regulatory board or commitee, you must be a full-time resident and registered voter in Truro. Please list the Boards/ Committees names:

Briefly list your experience working on a committee or team. This can be professional, town, volunteer, charity, etc.

TOWN GOV: Select Board two terms, one as chair. Planning Board two terms. Local Comprehensive Plan Committee, chair. Community Preservation Committee, chair. OTHER: Board Chair, Castle Hill. General Coordinator, Puma Park. Board Dexter KeezerFund. Board Truro Conservation Trust.

Briefly list any other relevant experience such as professional work, training, education, etc. A resume is NOT required. If you choose to attach a resume, it will become a public document.

Primary author of zoning and land use sections of town's LCP. Worked as a strategic planning consultant for the Department of the Interior.

Signature

Curtis Hartman

Date

Nov 20, 2022

Noelle Scoullar

From: Art Hultir
Sent: Thursday, December 8, 2022 2:37 PM
To: Noelle Scoullar
Subject: RE: Application to Serve-Curtis Hartman

Hello Noelle,

Please review this with Barbara Carboni.

Also, please cut and paste these lines as you deem appropriate.

Dear Select Board Members,

Curtis Hartman has been a very good addition to the Zoning Board of Appeals as an Alternate. His experience would make him a great candidate to be a Full Member.

Sincerely,

Art Hultin, Chairman-ZBA

-----Original Message-----
From: Noelle Scoullar <nscoullar@truro-ma.gov>
Sent: Thursday, December 08, 2022 2:08 PM
To: [redacted]
Cc: Nicole Tudor <ntudor@truro-ma.gov>
Subject: FW: Application to Serve-Curtis Hartman

Art,

We are planning on having Curtis at the 12.13 meeting to be interviewed.
The packet is being put together today.
Please send your comments asap.

Noelle

Truro

Application to Serve on a Board or Committee

Last Name

Mckinnon

First Name

Joseph

Middle Initial

Email Address

Phone Number

Address (Street)

39 truro center rd

Address (City)

Truro

Address (State)

MA

Address (Zip Code)

02666

Mailing Address (Please indicate box number and zip code)

PO box 925

Only full-time, registered Truro voters are able to serve on regulatory boards and commissions. All taxpayers/ residents are eligible to serve on non-regulatory boards and commissions.

Are you a full-time resident of Truro?

[*] Yes

[ ] No

Are you registered to vote in Truro?

[*] Yes

[ ] No

What Board/ Committee Are You Applying For?

ZBA

Briefly Describe Why You Wish to Serve on This Board or Committee:

Was recommended to apply after planning board interview

Have you attended a meeting of the committee listed above?

[ ] Yes

[*] No

Have you read the charge of the committee?

[ ] Yes

[*] No

Have you met with the chair of the committee?

[ ] Yes

[*] No

Have you read the Select Board's current Goals and Objectives?

[ ] Yes

[*] No

Do you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve?

[ ] Yes

[*] No

If you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve, please elaborate.

Are there other Boards/ Committees in which you are interested? Note: To be appointed to a regulatory board or commitee, you must be a full-time resident and registered voter in Truro. Please list the Boards/ Committees names:

Briefly list your experience working on a committee or team. This can be professional, town, volunteer, charity, etc.

Work with a big crew out of truro.

Briefly list any other relevant experience such as professional work, training, education, etc. A resume is NOT required. If you choose to attach a resume, it will become a public document.

Im grown up in this town and know every nook and cranny. I pride myself in preserving this town but being realistic as to the change that it desperately needs to be a sustainable town for not only the part time residents and tourist but those like me, still looking for their permanent mark on Truro

Signature

Joe Mckinnon

Date

Nov 02, 2022

Noelle Scoullar

From: Art Hultin
Sent: Tuesday, November 15, 2022 5:55 PM
To: Noelle Scoullar
Subject: ZBA membership

Hi Noelle,

Would you please remind me of the terms of service for each member. I would like to have current alternates apply for any permanent positions that may come available.

Incidentally, Joe McKinnon has never contacted me and, if I do say, his application was not much to reflect upon. At this point, I would not recommend him to the SB.

Best,

Art Hultin

Truro

Application to Serve on a Board or Committee

Last Name

Medoff

First Name

Nancy

Middle Initial

Email Address

Phone Number

Address (Street)

149 Collins Road

Address (City)

Truro

Address (State)

MA

Address (Zip Code)

02666

Mailing Address (Please indicate box number and zip code)

Box 502

Only full-time, registered Truro voters are able to serve on regulatory boards and commissions. All taxpayers/ residents are eligible to serve on non-regulatory boards and commissions.

Are you a full-time resident of Truro?

[*] Yes

[ ] No

Are you registered to vote in Truro?

[*] Yes

[ ] No

What Board/ Committee Are You Applying For?

ZBA

Briefly Describe Why You Wish to Serve on This Board or Committee:

Thank you for your consideration on my appointment as full member of the ZBA. Since becoming an alternate this past June, Iâ€™ve learned a great deal about the reality of serving on this important Board. The cases which come before the ZBA are often times complicated, intricate, and many times emotionally charged. Iâ€™ve also seen the importance of impartiality, objectivity and the ability to make an unpopular decision. I believe my keen interest in listening to all sides, creative problem solving, and my ability to be objective when faced with difficult decisions will enhance this already well-running Board. Often times â€œnoâ€• is not the only answer and I have built a successful career around finding common ground to come up with viable solutions. While this will not always be possible, it is my hope that these skills will help me continue to add value to the Board and to the Town of Truro. My public service over the past three years both as committee member and Committee Chair brings an understanding of town governance and the roles, responsibilities and synergies of the various elected and appointed boards, along with the need to balance growth with safeguarding our environment. This town is now at a tipping point as it relates to land use, building, permitting and growth, and this continues to impact zoning appeals, businesses, home ownership and the people of our town. I would very much like to be a part of the solution.

Have you attended a meeting of the committee listed above?

[*] Yes

[ ] No

Have you read the charge of the committee?

[*] Yes

[ ] No

Have you met with the chair of the committee?

[*] Yes

[ ] No

Have you read the Select Board's current Goals and Objectives?

[*] Yes

[ ] No

Do you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve?

[ ] Yes

[*] No

If you have any questions or concerns about any Select Board Goals that are relevant to the board/committee on which you are applying to serve, please elaborate.

Are there other Boards/ Committees in which you are interested? Note: To be appointed to a regulatory board or commitee, you must be a full-time resident and registered voter in Truro. Please list the Boards/ Committees names:

Briefly list your experience working on a committee or team. This can be professional, town, volunteer, charity, etc.

Current Chair, Charter Review Committee Current Vice Chair, Economic Development Committee Current Member - ZBA (alternate) Past Member - Energy Committee

Briefly list any other relevant experience such as professional work, training, education, etc. A resume is NOT required. If you choose to attach a resume, it will become a public document.

Kindly refer to previous statements, thank you.

Signature

Nancy Medoff

Date

Nov 29, 2022

Noelle Scoullar

From: Art Hultin <
Sent: Thursday, December 8, 2022 2:37 PM
To: Noelle Scoullar
Subject: RE: Application to Serve-Curtis Hartman

Hello Noelle,

Please review this with Barbara Carboni.

Also, please cut and paste these lines as you deem appropriate.

Dear Select Board Members,

Nancy Metoff has been a very good addition to the Zoning Board of Appeals as an Alternate. Her experience would make her a great candidate to be a Full Member.

Sincerely,

Art Hultin, Chairman-ZBA

TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: Administration

REQUESTOR: Stephanie Costigan, Superintendent/ Director of Student Services and John Dundas, Select Board Clerk and Liaison to School Committee

REQUESTED MEETING DATE: December 13, 2022

ITEM: Cape Cod 5 Educational Mini-Grant Announcement for Truro Central School Recipients

EXPLANATION: The following members of the Truro Central School staff are recipients of Cape Cod 5 Educational Mini-Grants:
Amelia Rose (Gr. 2): The Playful Classroom $150
Stacey Klimkosky (Science): Three Season Cutting Garden $500
Josh Paul and John Burns (Gr. 5): Growth Mindset $500
Sherri Stockdale and Hannah King (Gr. 4): U.S. Geography $400
Jennifer Spoor (Reading Intervention): Decodable books

We congratulate all of the recipients and thank them for their work in advocating for and educating Truro's children.

SUGGESTED ACTION: *No action needed. Announcement only.*

ATTACHMENTS: None

Agenda Item: 6A

TOWN OF TRURO

Select Board Agenda Item

BOARD/COMMITTEE/COMMISSION: Select Board

REQUESTOR: John Dundas, Select Board Clerk

REQUESTED MEETING DATE: December 13, 2022

ITEM: Continue Discussion and Potentially Adopt a Community Service Award Program

EXPLANATION: The Select Board discussed the creation of a community service award at the November 15, 2022 meeting. Select Board Clerk Dundas has prepared a revised community service evaluation form for the Board's consideration.

The objective of this recognition is to remind and reinforce the spirit of community service best exemplified by Fred Todd.

On April 16, 2022, Frederick Wilson Todd, long time Truro resident, activist, board member, musician, husband, father, grandfather, and colleague passed away. He was active in many local activities and committees such as planning Puma Park and building local houses for Habitat for Humanity. As a member of the Truro Zoning Board of Appeals Fred was respected as a leader and was admired for his thoughtful contributions. Fred's love of music and community drew him to the Payomet Performing Arts Center, where he started as a volunteer setting up the tent and building the music stage and was elected President of the Board.

In acknowledgement of Fred's service, the Town recognizes a current board of committee member annually for volunteer service to the Town of Truro that best reflects the service and dedication of Fred Todd.

Criteria for Nominations is attached.

FINANCIAL SOURCE (IF APPLICABLE): TBD

IMPACT IF NOT APPROVED: N/A

SUGGESTED ACTION: *Motion to adopt a yearly Community Service Award with the first award to be presented at Annual Town Meeting 2023.*

ATTACHMENTS:

1. Updated Draft of Community Service Evaluation Form

Fred Todd Community Service Award: In recognition of long time Truro resident, activist, board member, and colleague.

In acknowledgement of Fred Todd's volunteer service, the Town recognizes a current board or committee member annually for volunteer service to the Town of Truro that best reflects the selfless service and dedication of Fred Todd.

Screening Criteria (must have):
-Each nominee is a full-time resident. Yes/No
-Each nominee will have served/volunteered at least 5 years total on a Truro Town project, committee, and or a board. No. Of Years_____
-Each nominee is in good standing (attends regularly). Yes/No
-The nominations will be submitted by each committee/board chair NLT 31 JAN of each calendar year (not a mandatory requirement). Date Submitted: _____

Evaluation Criteria (overall assessment)
1. Leadership: displays a sense of unity and purpose in the community (ex: role model, professionalism, creativity, mission focused)

2. Social Responsibility: seeks to improve the community (ex: civic engagement, volunteerism, outreach)

3. Mentorship: demonstrates positive values, consideration, and behavior (ex: through deed and action).

4. Change Agent: influences others to effect positive changes (ex: through trust & credibility, represent stakeholders).

The Select Board will consider all nominations, vote, and announce the winner as part of a regular Select Board Meeting NLT 31 March of each calendar year.

Agenda Item: 7A

TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: Administration

REQUESTOR: Darrin Tangeman, Town Manager

REQUESTED MEETING DATE: December 13, 2022

ITEM: 2022 Annual Town Report Cover and Dedication

EXPLANATION: Each year staff requests suggestions from the Board for a cover/theme for the Annual Town Report and for the report dedication. Previous covers and themes have included Puma Park, town beaches, the Pamet River, and the elders of the community. Prior dedications of the book have been to community members or staff members for years of service. One possible cover/ theme for the 2022 Annual Town Report cover/ theme is *First Response in Truro*. A possible dedication for this year's report is *Truro's youth.*

Staff will compile a list of individuals who passed in 2022 and resignations/ retirements to submit to the Board for consideration. Board members to consider dedication of the report. Other possible dedications could include members of the community or community groups who have made outstanding contributions to Truro.

IMPACT IF NOT APPROVED: If the cover is not decided upon at this meeting it can be determined at a later meeting. The Annual Town Report must be ready two weeks before Annual Town Meeting.

SUGGESTED ACTION: *MOTION TO approve _____ as the cover and theme for the 2022 Annual Town Report and to dedicate the 2022 Annual Town Report to _____.*

ATTACHMENTS:

1. *List of 2022 deaths and retirements—TO BE PROVIDED*

TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: Administration

REQUESTOR: Select Board Members John Dundas and Susan Areson

REQUESTED MEETING DATE: December 13, 2022

ITEM: Discussion and Possible Approval of Letter to Planning Board Related to Select Board FY23 Objective #11

EXPLANATION: The Select Board Goals and Objectives for FY2023 include Objective #11:

> *The Select Board will submit a letter each to the Planning Board and the Economic Development Committee by December 31, 2022 outlining the Select Board's priorities in housing, zoning, land use and economic development in an effort facilitate collaboration and joint efforts.*

Clerk Dundas, with support from Member Areson, prepared the attached letter for consideration by the Select Board.

FINANCIAL SOURCE (IF APPLICABLE): N/A

IMPACT IF NOT APPROVED: No letter will be sent to the Planning Board and Objective #11 will be incomplete.

SUGGESTED ACTION: *Motion to approve and send the letter to the Planning Board.*

ATTACHMENTS:

1. Draft Planning Board Letter

Agenda Item: 7B1

TOWN OF TRURO

P.O. Box 2030, Truro, MA 02666
Tel: 508-349-7004, Extension: 110 or 124 Fax: 508-349-5505

To: Chair of the Planning Board
From: Select Board
Date: (Draft) December 13, 2022
Subject: FY 23 Goals and Objectives: #11 Letter to Planning Board

The Select Board views the work of the Planning Board as vital to a successful planning effort to increase housing opportunities while keeping the Town's unique character as a key consideration.

The Select Board also recognizes that the Planning Board, EDC, Housing Authority and Local Comprehensive Plan Committee are all working on various initiatives to help increase housing opportunities in Truro.

After discussion with chairs of the Planning Board, EDC, and a representative from Truro Zoning Board, the Select Board recommends that you focus on defining when a road or a way can be accepted as a "street" as one way to ease restrictions on development.

This effort will close a longstanding gap in Truro's zoning bylaw.

The intent, as defined by the Planning Board, in revising the definition of "street" would be to reduce the number of "ways" currently disqualified as "streets" and thus reduce the administrative burden on lot owners, town officials and town boards in reviewing proposed development on those "ways."

A revised street definition must also continue to ensure that the practical and functional requirements for street frontage are satisfied.

We recommend that the Planning Board continue to host public hearings on this topic to allow for this change to be brought before Town Meeting voters in April.

This does not preclude other efforts by the Planning Board on the housing front, but we believe it is time to correct this deficiency in our zoning bylaw.

We welcome the continued collaboration among all town boards as we try to address the serious lack of housing accessible to those whom we need to sustain our community -- year-round and seasonally.

TOWN OF TRURO
Select Board Agenda Item

DEPARTMENT: DPW

REQUESTOR: Jarrod J. Cabral, Public Works Director

REQUESTED MEETING DATE: December 13, 2022

ITEM: Discussion and Possible Vote for Mill Pond Road Culvert Replacement State Grant Contract

EXPLANATION: The Mill Pond culvert replacement project has moved into the final design and permitting phase. The attached documents are for funding the final design and permitting. The grant award originated through the Division of Ecological Restoration with a total of $150,000. Select Board approval is needed to move forward with the final design and permitting and to enter into the grant contract.

The Mill Pond Salt Marsh Restoration Project is working to address a tidal restriction along Mill Pond Road caused by an undersized culvert, which will restore tidal flow to 13 acres of upstream salt marsh habitat and reduce storm flooding and erosion damage to infrastructure. This award will advance engineering designs and initiate permitting for the preferred alternative selected by the Town of Truro.

FINANCIAL SOURCE (IF APPLICABLE): Grant award of $150,000 through the Division of Ecological Restoration.

IMPACT IF NOT APPROVED: Final design and permitting will not be funded

SUGGESTED ACTION: *Motion to approve moving forward with the final design and permitting of the recommended 95' open channel breach for Mill Pond Road and authorize the Town Manager to sign the Massachusetts State Contract.*

ATTACHMENTS:

1. Standard Massachussets State Contract with Scope of services

Agenda item: 7C1

COMMONWEALTH OF MASSACHUSETTS ~ STANDARD CONTRACT FORM

This form is jointly issued and published by the Office of the Comptroller (CTR), the Executive Office for Administration and Finance (ANF), and the Operational Services Division (OSD) as the default contract for all Commonwealth Departments when another form is not prescribed by regulation or policy. The Commonwealth deems void any changes made on or by attachment (in the form of addendum, engagement letters, contract forms or invoice terms) to the terms in this published form or to the Standard Contract Form Instructions and Contractor Certifications, the Commonwealth Terms and Conditions for Human and Social Services or the Commonwealth IT Terms and Conditions which are incorporated by reference herein. Additional non-conflicting terms may be added by Attachment. Contractors are required to access published forms at CTR Forms: https://www.macomptroller.org/forms. Forms are also posted at OSD Forms: https://www.mass.gov/lists/osd-forms.

CONTRACTOR LEGAL NAME: Town of Truro (and d/b/a):		COMMONWEALTH DEPARTMENT NAME: Div. of Ecological Restoration MMARS Department Code: FWE	
Legal Address: (W-9, W-4): 24 Town Hall Road, Truro, MA 02666		Business Mailing Address: 251 Causeway Street, Suite 400, Boston, MA 02114	
Contract Manager: Jarrod Cabral	Phone: 508-214-0400	Billing Address (if different):	
E-Mail: jcabral@truro-ma.gov	Fax:	Contract Manager: Beth Lambert	Phone: 617-626-1547
Contractor Vendor Code: VC6000192010		E-Mail: beth.lambert@mass.gov	Fax:
Vendor Code Address ID **(e.g. "AD001"):** **AD**001. (Note: The Address ID must be set up for EFT payments.)		MMARS Doc ID(s): MILLPONDXGRTXXFY2023 RFR/Procurement or Other ID Number: RFR DER 2011-01	

X NEW CONTRACT	___ CONTRACT AMENDMENT
PROCUREMENT OR EXCEPTION TYPE: (Check one option only) __ Statewide Contract (OSD or an OSD-designated Department) __ Collective Purchase (Attach OSD approval, scope, budget) X Department Procurement (includes all Grants - 815 CMR 2.00) (Solicitation Notice or RFR, and Response or other procurement supporting documentation) __ Emergency Contract (Attach justification for emergency, scope, budget) __ Contract Employee (Attach Employment Status Form, scope, budget) __ Other Procurement Exception (Attach authorizing language, legislation with specific exemption or earmark, and exception justification, scope and budget)	Enter Current Contract End Date *Prior* to Amendment: _____, 20___. Enter Amendment Amount: $ _____. (or "no change") AMENDMENT TYPE: (Check one option only. Attach details of amendment changes.) __ Amendment to Date, Scope or Budget (Attach updated scope and budget) __ Interim Contract (Attach justification for Interim Contract and updated scope/budget) __ Contract Employee (Attach any updates to scope or budget) __ Other Procurement Exception (Attach authorizing language/justification and updated scope and budget)

The Standard Contract Form Instructions and Contractor Certifications and the following Commonwealth Terms and Conditions document are incorporated by reference into this Contract and are legally binding: (Check ONE option): X Commonwealth Terms and Conditions __ Commonwealth Terms and Conditions For Human and Social Services __ Commonwealth IT Terms and Conditions

COMPENSATION: (Check ONE option): The Department certifies that payments for authorized performance accepted in accordance with the terms of this Contract will be supported in the state accounting system by sufficient appropriations or other non-appropriated funds, subject to intercept for Commonwealth owed debts under 815 CMR 9.00.
__ Rate Contract. (No Maximum Obligation) Attach details of all rates, units, calculations, conditions or terms and any changes if rates or terms are being amended.)
X Maximum Obligation Contract. Enter total maximum obligation for total duration of this contract (or *new* total if Contract is being amended). $ 150,000.00 .

PROMPT PAYMENT DISCOUNTS (PPD): Commonwealth payments are issued through EFT 45 days from invoice receipt. Contractors requesting accelerated payments must identify a PPD as follows: Payment issued within 10 days __% PPD; Payment issued within 15 days __ % PPD; Payment issued within 20 days __ % PPD; Payment issued within 30 days __% PPD. If PPD percentages are left blank, identify reason: __agree to standard 45 day cycle __ statutory/legal or Ready Payments (M.G.L. c. 29, § 23A); __ only initial payment (subsequent payments scheduled to support standard EFT 45 day payment cycle. See Prompt Pay Discounts Policy.)

BRIEF DESCRIPTION OF CONTRACT PERFORMANCE or REASON FOR AMENDMENT: (Enter the Contract title, purpose, fiscal year(s) and a detailed description of the scope of performance or what is being amended for a Contract Amendment. Attach all supporting documentation and justifications.) Under this grant contract, the Town of Truro will advance the Mill Pond Salt Marsh Restoration as outlined in the tasks within the accompanying Attachment. The Town of Truro will perform the tasks as specified in Attachment A. Please see Attachment A for the approved Scope and Budget.

ANTICIPATED START DATE: (Complete ONE option only) The Department and Contractor certify for this Contract, or Contract Amendment, that Contract obligations:
X 1. may be incurred as of the Effective Date (latest signature date below) and no obligations have been incurred prior to the Effective Date.
__ 2. may be incurred as of _____, 20___, a date LATER than the Effective Date below and no obligations have been incurred prior to the Effective Date.
__ 3. were incurred as of ___ , a date PRIOR to the Effective Date below, and the parties agree that payments for any obligations incurred prior to the Effective Date are authorized to be made either as settlement payments or as authorized reimbursement payments, and that the details and circumstances of all obligations under this Contract are attached and incorporated into this Contract. Acceptance of payments forever releases the Commonwealth from further claims related to these obligations.

CONTRACT END DATE: Contract performance shall terminate as of June 30, 2024 , with no new obligations being incurred after this date unless the Contract is properly amended, provided that the terms of this Contract and performance expectations and obligations shall survive its termination for the purpose of resolving any claim or dispute, for completing any negotiated terms and warranties, to allow any close out or transition performance, reporting, invoicing or final payments, or during any lapse between amendments.

CERTIFICATIONS: Notwithstanding verbal or other representations by the parties, the "Effective Date" of this Contract or Amendment shall be the latest date that this Contract or Amendment has been executed by an authorized signatory of the Contractor, the Department, or a later Contract or Amendment Start Date specified above, subject to any required approvals. The Contractor certifies that they have accessed and reviewed all documents incorporated by reference as electronically published and the Contractor makes all certifications required under the Standard Contract Form Instructions and Contractor Certifications under the pains and penalties of perjury, and further agrees to provide any required documentation upon request to support compliance, and agrees that all terms governing performance of this Contract and doing business in Massachusetts are attached or incorporated by reference herein according to the following hierarchy of document precedence, the applicable Commonwealth Terms and Conditions, this Standard Contract Form, the Standard Contract Form Instructions and Contractor Certifications, the Request for Response (RFR) or other solicitation, the Contractor's Response (excluding any language stricken by a Department as unacceptable, and additional negotiated terms, provided that additional negotiated terms will take precedence over the relevant terms in the RFR and the Contractor's Response only if made using the process outlined in 801 CMR 21.07, incorporated herein, provided that any amended RFR or Response terms result in best value, lower costs, or a more cost effective Contract.

AUTHORIZING SIGNATURE FOR THE CONTRACTOR:	AUTHORIZING SIGNATURE FOR THE COMMONWEALTH:
X: _____. Date: _____. (Signature and Date Must Be Captured At Time of Signature)	X: _____. Date: _____. (Signature and Date Must Be Captured At Time of Signature)
Print Name: _____. Print Title: _____.	Print Name: _____. Print Title: _____.

Scope of Services

Town of Truro
Mill Pond Tidal Restoration
Truro, Massachusetts

I. PROJECT INFORMATION AND APPROACH

Statement of Qualifications

The Town of Truro has led the Mill Pond Tidal Restoration project with support from the Massachusetts Division of Ecological Restoration (DER) and partners since 2011. In addition to the Mill Pond Project, the Town also leads the Eagle Neck Creek DER Priority Project (construction completed in 2022) and the Pamet River DER Priority Project (currently in planning phase) with multiple project partners. The Town of Truro has extensive experience with coastal restoration and infrastructure projects, including project management, grant management and reporting, and working with partners (state, federal and non-profit), consultants and sub-contractors.

Purpose

The Mill Pond Salt Marsh Restoration Project is working to address a tidal restriction along Mill Pond Road caused by an undersized culvert, which will restore tidal flow to 13 acres of upstream salt marsh habitat and reduce storm flooding and erosion damage to infrastructure. This award will advance engineering designs and initiate permitting for the preferred alternative selected by the Town of Truro (The Town).

Background

The Mill Pond Tidal Restoration Project was approved as a DER Priority Project in 2011 and is a priority for the Cape Cod Water Resources Restoration Project managed by the Cape Cod Conservation District and the Natural Resources Conservation Service. Mill Pond is a shallow coastal embayment in Truro, Massachusetts that is connected to the Pamet River Basin through a 33-inch diameter culvert underneath Mill Pond Road. The Pamet River Basin includes the Pamet River, The Town and the Truro Conservation Trust own the land surrounding the Mill Pond culvert. The Mill Pond Road culvert is undersized and has led to degradation of the salt marsh habitat upstream in Mill Pond. In addition to the ecological impacts, this site has been heavily damaged in past storms and the Town is concerned about future storm damage with the potential for failure. A breach through a former railroad berm just downstream of Mill Pond Road was also identified as a potential tidal restriction, however subsequent studies showed that the breach does not significantly restrict tidal flow.

The current effort builds on past work conducted by the Louis Berger Group, and more recently by the Woods Hole Group (WHG). In 2022, WHG with the support of Fuss & O'Neil (F&O), summarized field investigations, hydraulic modeling, structural analyses, and preliminary designs into a technical report that provided four conceptual design alternatives (two breach alternatives that include road

abandonment, and two culvert enlargement alternatives). The Town is currently working with WHG and F&O to present the design alternatives to various Town Departments and Boards, including the Town Select Board. Based on feedback from the Select Board, other Town entities, and the Public, the Town will select a preferred alternative move forward with in this phase of work.

Funding

DER is granting a total of $150,000 in funds. This funding is provided by Section 2A of Chapter 102 of the Acts of 2021 - An Act Relative to Immediate COVID-19 Recovery Needs.

This project was selected as a Priority Project though RFR #DER 2011-01.

II. SCOPE OF WORK

This award is intended to be used by the Town to advance the preferred alternative through permitting level designs and initiate the permitting process. The Town will contract with one or more qualified consultants to advance the scope. The below tasks outline the basic requirements of this award, however detailed tasks, sub-tasks, and schedule for this award will be based on discussions between the Town, DER, partners and the Selected Consultant (The Project Team). It is expected that the Mill Pond Restoration Conceptual Design Report prepared by WHG in 2022 will provide guidance on recommended next steps for designs, public outreach, and permitting.

For deliverables associated with draft and final versions, the Town of Truro will assume one round of DER and partner review and feedback. DER assumes all deliverables will be provided in editable and final formats including (but not limited to) raw data files, models, AutoCAD files, Word documents, PDFs, etc. DER requires all raw data files.

Task 1: Project Management

The Town, with the input of DER, shall hire a qualified consultant to work with the Project Team on the tasks outlined in this contract. Throughout the course of this project, the Town of Truro will ensure that the Selected Consultant shall: coordinate tasks; communicate with DER and partners; schedule work; and maintain and share project files. DER values open and frequent communication and requests, at a minimum, a monthly email update on major tasks, progress, challenges, and opportunities.

The Town will collaborate with the Selected Consultant to:

- Include the DER Project Manager on important project correspondence and major meetings.
- Notify DER of any scheduled site work to give DER opportunity to attend when possible.
- Invite DER (and relevant partners) to comment on all technical work products and draft deliverables.

Deliverables:

- A minimum of monthly email updates on work progress.
- Invitation for DER to participate in the bid process to identify and award a qualified consultant.
- Invitation for DER to review and comment on a draft contract.
- A copy of the final qualified consultant contract.

Task 2: Advance Designs

The Town shall hire a qualified consultant to work with the Project Team to advance the designs of the selected preferred alternative and collect any additional information necessary to support design advancement, preparation for permitting requirements, and information anticipated to be requested by the public and other stakeholders including departments within the Town.

The Town shall use DER granted funds to support the qualified consultant to complete the following advanced design work. Any additional field investigations may incorporate the following, as applicable:

- Discussion, led by the Town, with Town Shellfish Department regarding potential benefits to shellfish resources in the Pamet River Basin.
- Continue to consider the potential shoaling, sediment mobilization, and scour impacts that may result from morphological changes in the channel or pond bed.
- Continue to consider public safety in the design process, especially regarding recreational access and passage at the site.
- Investigate potential future storm surge and wind-generated wave impacts to Depot Road, including the section of road vulnerable to stormwater runoff and the driveway at 50 Depot Road. Additional survey work may be conducted to support this investigation.
- Research the history of the former tidal grist mill location to avoid possible disturbance to ruins during construction and consult an archeology team if necessary.
- If one of the breach alternatives are selected, explore how public benefit could be enhanced by creating public access with a trail over the former roadway.

Deliverables:

- Draft and final permitting-level designs.
- Any associated reports and data associated with additional field and desktop investigations.

Task 3: Initiate Public Outreach and Permitting

The proposed restoration project will have impacts to both environmental resources and regulatory areas that will trigger the need for environmental permits from local, state, and federal agencies. Additionally, a coordinated public outreach effort will be important to explain the project impacts and benefits, and address questions or concerns the public may have. The Town or the Selected Consultant, on behalf of the Town, will work to identify public outreach and permitting tasks that can be completed within the project schedule. While details will be finalized based on the selected alternative it is expected that the following tasks be included:

- Host a Public Outreach meeting prior to initiating the permitting process to engage the public and other stakeholders and incorporate feedback into project designs. Timing of and content of this meeting will be discussed with DER and Partners.
- Schedule a pre-application meeting with regulatory agencies including the Massachusetts Environmental Policy Act Office (MEPA), Massachusetts, Massachusetts Office of Coastal Zone Management (CZM), Massachusetts Department of Environmental Protection (MassDEP), USACE, and others as necessary.
- Contact the Massachusetts Division of Marine Fisheries (DMF) for information regarding essential fish habitat and time of year restrictions for resources occurring in the project area.
- Collect any information required to support submission of materials to the Massachusetts Environmental Policy Act (MEPA) and draft the appropriate MEPA documents based on consultation with MEPA. It is likely that the project will trigger one or more MEPA thresholds and

require a mandatory Environmental Impact Report (EIR), however a waiver can be requested given the environmental benefits associated with this project. It is recommended that an Expanded Environmental Notification Form (EENF) be prepared unless MEPA suggests another course of action in the pre-application meeting.

- The following permits are expected to be required for the project. The decision for which of these permits to prepare for and submit during this phase of work will be made by the Project Team after this grant contract is fully executed.
    - MassDEP Section 401 Water Quality Certificate
    - Conservation Commission Ecological Restoration Notice of Intent
    - U.S. Army Corps of Engineers Permit
    - MassDEP Chapter 91 License
    - Massachusetts Coastal Zone Management Federal Consistency Review
    - MassDOT Chapter 85 Permitting (if selected alternative includes a culvert with a width equal to or greater than 10-ft)

Deliverables:

- One public meeting hosted by the Town prior to initiating permitting, and any supporting presentations or handouts prepared for the meeting.
- Copy DER on email communications with regulatory agencies and provide meeting minutes for any meetings scheduled with regulatory agencies.
- Draft and final materials prepared for permitting requirements.

All deliverables will be provided to DER in electronic form unless otherwise noted.

The Town of Truro shall comply with all other reporting requirements as established in Section III below.

III. REPORTING AND MATCH

Report to DER expenditures or in-kind contributions (i.e. materials, equipment, staff time) which the Town of Truro may make above and beyond the funds provided by this grant. This grant award does not require match. However, it is helpful if DER understands what funds or in-kind contributions, if any, the Town of Truro makes toward the project in conjunction with this award. Use the provided reporting form provided with contract to submit this information.

IV. DESIGNATED REPRESENTATIVES

Town of Truro
Jarrod Cabral
Director of Public Works
24 Town Hall Road
Truro, MA 02666
(508) 214-0400
jcabral@truro-ma.gov

DER Project Manager
Cristina Kennedy

Coastal Wetlands Restoration Specialist
Division of Ecological Restoration
251 Causeway St., Suite 400
Boston, MA 02114
(617) 626-1532
cristina.g.kennedy@mass.gov

DER Fiscal Team
Division of Ecological Restoration
251 Causeway St., Suite 400
Boston, MA 02114
DERinvoicing@mass.gov

V. BUDGET AND PAYMENT

The Town of Truro will submit a Request for Reimbursement to DER's assigned Project Manager and DER's fiscal team (DERinvoicing@mass.gov) via using DER's Reimbursement Form. Requests must be submitted electronically. Requests for Reimbursement should be submitted no more than monthly. The date that a complete Request for Reimbursement and associated deliverables are received electronically by DER is considered the submission date. DER defines a complete Request for Reimbursement as one that includes all required documentation of expenses, including receipts, invoices, and photographic or other backup for charges shown. Mileage charges associated with travel costs will not exceed the current IRS mileage reimbursement rate.

This contract and scope of work will extend through the Commonwealth Fiscal Year 2024 **Project costs are based on the scope of work presented herein with a not-to-exceed total of $150,000. Payment will be made on a reimbursement basis**.

Budget Category		**Budgeted Amount**
Personnel		$0.00
Materials		$0.00
Travel		$0.00
Contractual Services	Task 1: Project Management	$15,000.00
	Task 2: Advance Designs	$100,000.00
	Task 3: Initiate Public Outreach and Permitting	$35,000.00
	TOTAL	**$150,000.00**

The grantee is required to submit any budget amendment requests in writing to DER's designated project manager and DER's fiscal team. DER will reply in writing to either allow or disallow said request. Any changes to Scope of Work that are not preapproved by DER in writing will not be reimbursed. The grantee is required to request a budget amendment via the following steps:

1. Submit a request via email to reallocate a portion of budgeted expenses
2. Provide specific amounts for which predetermined budgeted expenses will change
3. Include changes to tasks and/or deliverables tied to these expenses

VI. SCHEDULE

Work may begin after the grant contract is fully executed by the Department of Fish and Game, Division of Ecological Restoration and a Notice-to-Proceed has been provided to the grantee. All work must be completed by June 30, 2024. Final invoices must be received by July 31, 2024.

VII. SPECIAL PROVISIONS

The Town of Truro shall credit The Massachusetts Department of Fish and Game, Division of Ecological Restoration for the contribution of funds and technical assistance in any public communication regarding the project including, but not limited to signage, press releases, dedication events, etc.

TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: DPW

REQUESTOR: Jarrod J. Cabral, Public Works Director

REQUESTED MEETING DATE: December 13, 2022

ITEM: Discussion and a Possible Vote on Mill Pond Road Culvert Replacement Alternatives

EXPLANATION: The Mill Pond culvert replacement project has moved into the final design and permitting phase with four alternatives to review. This discussion will revolve around two culvert size alternatives and two channel breach alternatives that would require permanent roadway closure. The alternatives were modeled and developed with consideration to 100yr storm events, storm of record, climate change and sea level rise.

FINANCIAL SOURCE (IF APPLICABLE): Not yet formalized. Tentative plans include partial support from USDA.

IMPACT IF NOT APPROVED: Culvert replacement alternative will not be selected, and project will not move forward. If determination is not made at tonight's meeting it may be made at a subsequent meeting.

SUGGESTED ACTION: *Motion to approve moving forward with the final design and permitting of the recommended 95' open channel breach for Mill Pond Rd.*

Or: *Motion to approve moving forward with the final design and permitting of the 8'x8' box culvert replacement alternative for Mill Pond Rd.*

ATTACHMENTS:

1. Conceptual Design Report from Woods Hole Group
2. Alternatives Assessment Technical Memorandum from Fuss & O'Neill

Mill Pond Restoration
Conceptual Design Report
Truro, Massachusetts

June 22, 2022

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1. INTRODUCTION AND BACKGROUND

The work in this report was completed by The Woods Hole Group, Inc. and project partners Fuss & O'Neill for the Division for Ecological Restoration (DER) and Town of Truro under agreement RFR DER 2019-01. The goal of this study was to develop several conceptual restoration alternatives for the undersized culvert under Mill Pond Road, and then select a preferred alternative with the clients and stakeholders to pursue for eventual construction.

1.1. Background

The purpose of this project is to investigate restoring tides and improving storm drainage for Mill Pond by replacing an undersized culvert under Mill Pond Road. This current study will expand on previous work by Woods Hole Group and the Louis Berger Group by developing and evaluating four (4) restoration alternatives using hydrodynamic models based on collected field data. An alternatives analysis will then be conducted to evaluate the improvements to tides and storm drainage while also assessing their impacts to habitat, private property, and the general public. Recommendations on selecting a preferred alternative will be made, and the eventual alternative selected for construction will need to be decided by the client and stakeholders.

Mill Pond is a shallow coastal embayment in Truro, Massachusetts, that is connected to the Pamet River Basin through a culvert underneath Mill Pond Road, and a breach in an abandoned railway berm (Figure 1). The Pamet River Basin includes the Pamet River, Little Pamet River, and Eagle Neck Creek, which are in various phases of restoration by the Town of Truro (Truro) and The Woods Hole Group, Inc. The area of interest for this Scope of Work (SOW) as shown in Figure 1 includes Mill Pond upstream of the Mill Pond Road culvert (yellow outline), the shallow embayment downstream between Mill Pond Road and an abandoned railroad berm (red outline, referred to as "middle basin"), and the breach through the berm that connects the system with Pamet Harbor (purple outline). The Town and the Truro Conservation Trust own the land surrounding the Mill Pond culvert. The downstream side of the former railroad bed is owned by the Pamet Harbor Yacht Club and the upstream side is owned by several private property owners.

The project encompasses two potential tidal restrictions, one at the Mill Pond Road crossing and the second at the former railroad bed breach. Mill Pond Road crossing consists of a 36-inch diameter pipe underneath Mill Pond Road, which is undersized and has led to degradation of the salt marsh habitat upstream in Mill Pond. A second potential tidal restriction occurs at the breach through the former railroad berm that was shown to be a tidal restriction for Eagle Neck Creek restoration project to the south. This has resulted in Mill Pond being recognized as TR-2 in the Cape Cod Atlas of Tidally Restricted Salt Marshes, identified as TR-SM-2 on the Cape Cod Water Resources Restoration Project, and was approved as a DER Priority Project in 2011 (RFR DER 2011-01). Subsequently, the Mill Pond culvert structure was heavily flooded and damaged during the winter 2018 storm season and the Town of Truro is concerned that this culvert structure is at risk to future storm damage and even failure. The Town, with assistance from DER, now seeks to conduct a field investigation as a first step towards assessing potential culvert replacement or flow control alternatives to reduce storm flooding and drainage damage while also providing ecological restoration of salt marsh habitat.

Figure 1. **Overview of the Pamet River Basin showing Mill Pond (yellow outline), the downstream middle basin (red), and Pamet Harbor junction (purple). Also shown are Pamet River, Little Pamet River, and Eagle Neck Creek to the south.**

1.2. History of Mill Pond

A review of historical records revealed that Mill Pond has been tidally restricted since the late 1700s, when a "grist mill" was built just North of the current culvert location (Figure 2). This grist mill was operational until 1859 (Richards, 2021; video link https://youtu.be/ukBAVDtK4W4).

The railroad berm, which runs between the middle basin and Pamet harbor, was built in 1869 and was in operation until the 1960s (MassMoments). The berm blocked flow into the middle basin and Mill Pond, until it was breached during a storm in 1978. The berm was further eroded during a storm of 1991. The culvert under Mill Pond Road was also damaged during the 1991 storm and was replaced with a temporary 3-foot diameter pipe, which is still in place today (Louis Berger Group, 2013). Further damage was reported in 2018, which has led to the current study.

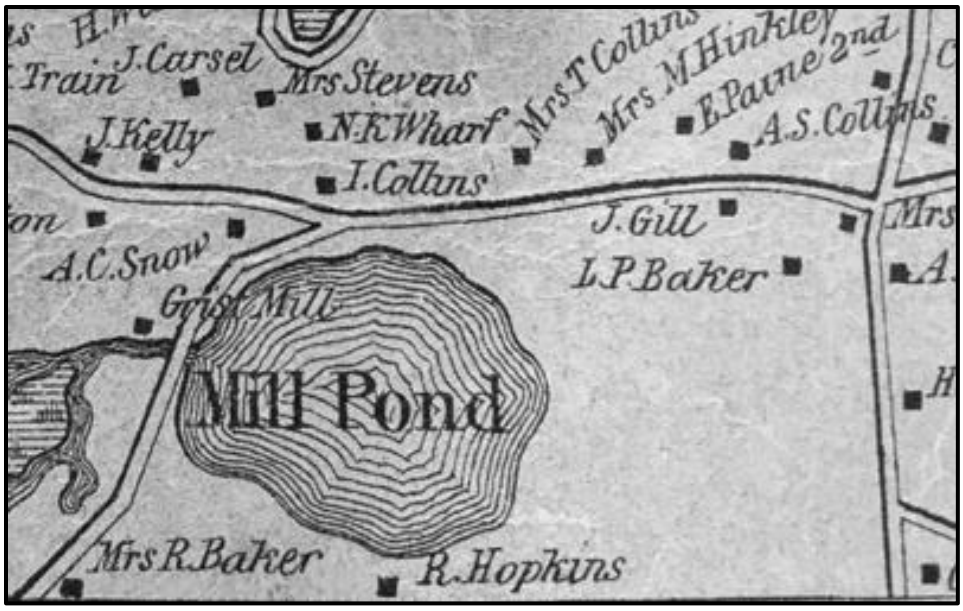

Figure 2. Historic 1858 Map of Mill Pond (Richards, 2021).

1.3. Priors Studies

The Louis Berger Group previously investigated the Mill Pond system with the intentions of replacing the culvert to restore tidal flow. The available documents which are the result of that work are:

- *Mill Pond Tidal Assessment Truro, Massachusetts* prepared by Geosyntec Consultants (June 2011)
- *Mill Pond Mill Pond Road Partial Topographic Survey* prepared by Bryant Associates and the Louis Berger Group (June 27, 2012).
- *Mill Pond Restoration Project Cover Type Map and Report* prepared by the Louis Berger Group for the Department of Fish and Game Division of Ecological Restoration (June 2012).
- *Hydraulic Modeling Report for Mill Pond Restoration Project* prepared by the Louis Berger Group for the Cape Cod Conservation District (January 2013).
- *Mill Pond Restoration Hydraulic Modeling: 15-foot by 7-foot Concrete Culvert Analysis* prepared by the Louis Berger Group (June 19, 2013).

These field investigations included the collection of topographic, tide, and vegetation coverage, and the results were used within a hydraulic model, HEC-RAS 1D, to develop restoration alternatives.

Louis Berger Group modeled several culvert replacement alternatives using HEC-RAS 1D including a 7-foot high box culvert with varying widths of 6, 9, 10, and 15 feet. The model was run in unsteady state mode for tides and was calibrated and verified using the collected tide data. Results showed significant improvements to tidal hydraulics with the smallest alternative (6'Wx7'H) as summarized in Table 1, with the larger culverts eliminating tidal dampening and phase delay. Sea level rise was evaluated based on values determined by the Army Corp in 2011 and therefore needed to be updated to reflect the currently accepted projections.

Table 1. Louis Berger Group 2013 model results for culvert replacement alternatives.

Model Scenario	Tidal Dampening (feet)	Phase Delay (minutes)
Existing Conditions	1.90	102
6'W x 7'H culvert	0.46	24
9'W x 7'H culvert	0.02	0
10'W x 7'H culvert	0	0
15'W x 7'H culvert	0	0

1.4. Purpose of Study

The purpose of this project is to investigate restoring tides and improving storm drainage for Mill Pond by replacing an undersized culvert under Mill Pond Road. This current study will expand on previous work by Woods Hole Group and the Louis Berger Group by developing and evaluating four (4) restoration alternatives using hydrodynamic models based on collected field data. An alternatives analysis will then be conducted to evaluate the improvements to tides and storm drainage while also assessing their impacts to habitat, private property, and the general public. Recommendations on selecting a preferred alternative will be made, and the eventual alternative selected for construction will need to be decided by the client and stakeholders.

2. FIELD INVESTIGATIONS

Field investigations were collected previously by the Louis Berger Group, however, the Woods Hole Group determined that updated and supplemental field data were needed to fulfill anticipated future engineering design and permitting needs. Additionally, much of the older field data was not available in an electronic format. Therefore, a preliminary field investigation was conducted by the Woods Hole Group in 2021, which collected supplemental and updated data needed for evaluating replacement alternatives. Refer to Preliminary Field Investigation for Mill Pond Restoration Project Memo (dated June 30, 2021) for more detailed information, and summary of the data used within this report are described herein. For the tide study consisted of three (3) conductivity, temperature, and pressure (CTD) instruments that were deployed in Pamet Harbor (MP3), the middle basin (MP2), and Mill Pond (MP1), which recorded salinity, water temperature and water surface elevations over a lunar cycle (~30 days). Time series of the tidal study show closely matching water levels in the harbor and middle basin, and a damped signal in Mill Pond (Figure 3). The tides in the Pamet Harbor are semi-diurnal, with a spring-neap cycle. The middle basin is connected to Pamet Harbor through the breach in the railroad berm. Mill Pond is connected to the middle basin by a 3-foot diameter circular culvert, which is 53 feet long, running under Mill Pond Road. The invert elevations are 1.61 (downstream) and 2.03 (upstream) feet NAVD88. There are large scour holes on either side of the culvert between Mill Pond and the middle basin, which are caused by water exiting the culvert at high speeds. Due to these scour holes, the invert elevations of the culvert are lower than the pond bed in Mill Pond. There are tidal flats and salt marsh in the middle basin, and salt marsh in Mill Pond around the culvert outlet and the perimeter of the Pond. The collected tide data (Figure 33) shows that the middle basin has full tidal range, indicating the breach in the railroad berm is large enough to allow full tidal flow in the middle basin. The tidal signal in Mill Pond is attenuated by the undersized culvert as shown by the tidal datums developed from the 2021 field investigation for Mean Higher High Water (MHHW), Mean Higher Water (MHW), Mean Tide Level (MTL), Mean Low Water (MLW), Mean Lower Low Water (MLLW), and Mean Tide Range (MR) in Table 2.

Table 2. **Tidal datums calculated for the CTD instruments deployed at Pamet Harbor, Mill Pond, and the Middle basin in 2021.**

Location	Station	MHHW	MHW	MTL	MLW	MLLW	Mean Tide Range
		Feet-NAVD88					Feet
Harbor	MP-1	4.97	4.47	-0.11	-4.70	-5.13	9.17
Middle Basin	MP-2	5.12	4.64	0.68	-3.27	-3.30	7.91
Mill Pond	MP-3	2.90	2.76	2.03	1.30	1.27	1.46

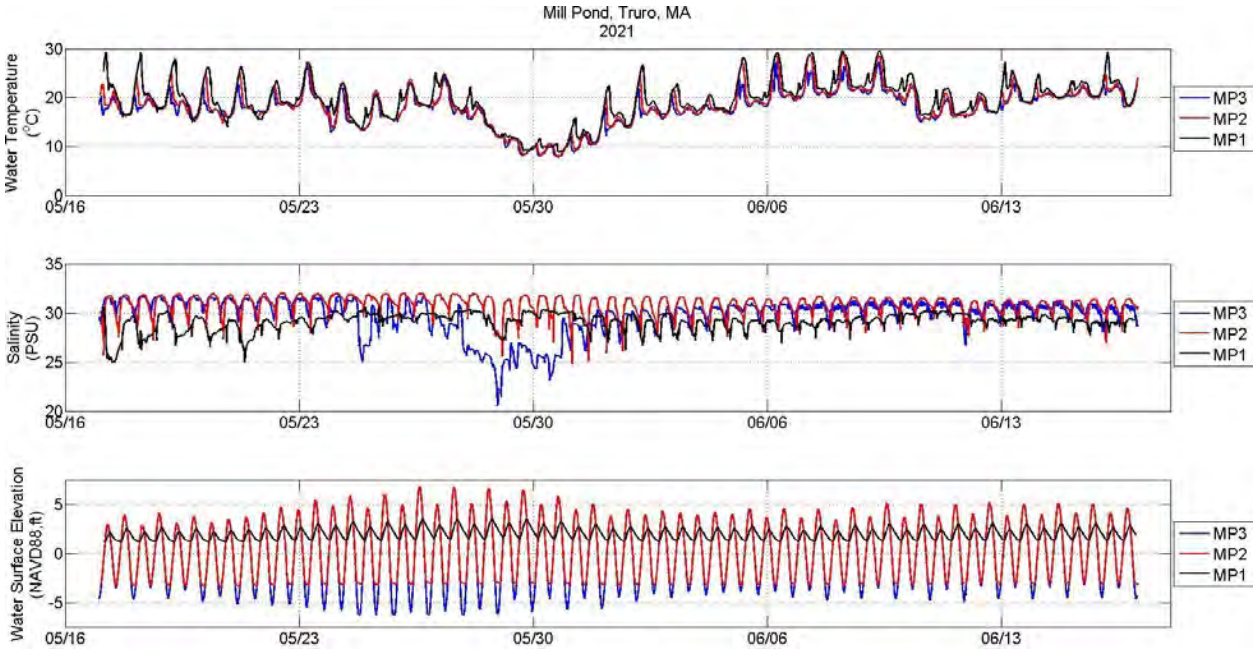

Figure 3. **Time series of the data collected by the CTD instruments. From top to bottom: Water temperature, Salinity, and water surface elevation. MP1 is in Mill Pond, MP2 in the middle basin, and MP3 in the harbor. Note that a rainstorm at the end of May decreased salinity for several days.**

Topographic and bathymetric surveys of the Mill Pond, middle basin, and Pamet Harbor were also conducted to collect elevation data needed for engineering design. These collected data sets were processed in CAD and ArcGIS to create a topobathymetric map of Mill Pond system (Figure 4). A coastal resources delineation was also conducted in 2021 by a Woods Hole Group Professional Wetland Scientist (PWS) who delineated coastal beach, salt marsh, and bordering vegetated wetland (BVW), and the approximate location toe of the coastal bank (Figure 5). Approximately 3 acres of saltmarsh resource area was delineated within Mill Pond. Additionally, Mill Pond is located within the FEMA regulatory floodway, specifically an AE12 flood zone, which means that it is also located with Land Subject to Coastal Storm Flowage (LSCSF). Additionally, geotechnical soil borings were collected at Mill Pond in and analyzed by a

laboratory in 2021, and the results were utilized within a geotechnical analysis in this study by Fuss & O'Neill.

As part of the 2022 scope of work, a survey was conducted by a Woods Hole Group Professional Land Surveyor (PLS) to locate drinking water wells and septic systems on abutting properties for which information was available and that could be located in the field. Locating these systems will allow for the determination of impacts, if any, associated with restored tides or storm flooding from the alternatives. A plan titled *Existing Septic and Well Locations of Properties in Vicinity of Mill Pond Road* was created that shows the location of drinking water wells and septic systems and is included in Attachment A.

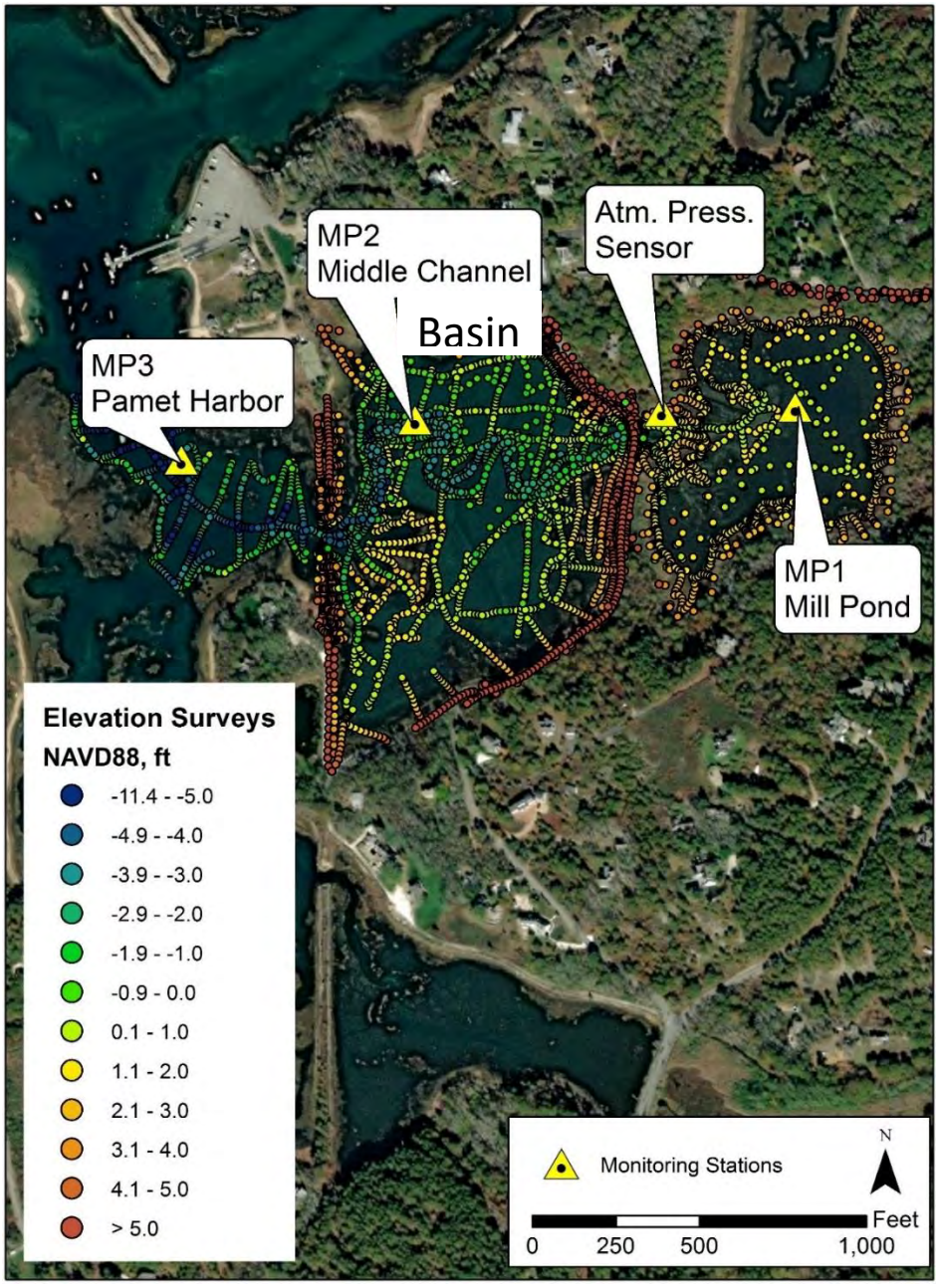

Figure 4. **Map showing the locations of the CTD instruments deployed for the tide study and coverage of the topographic and bathymetric surveys in 2021.**

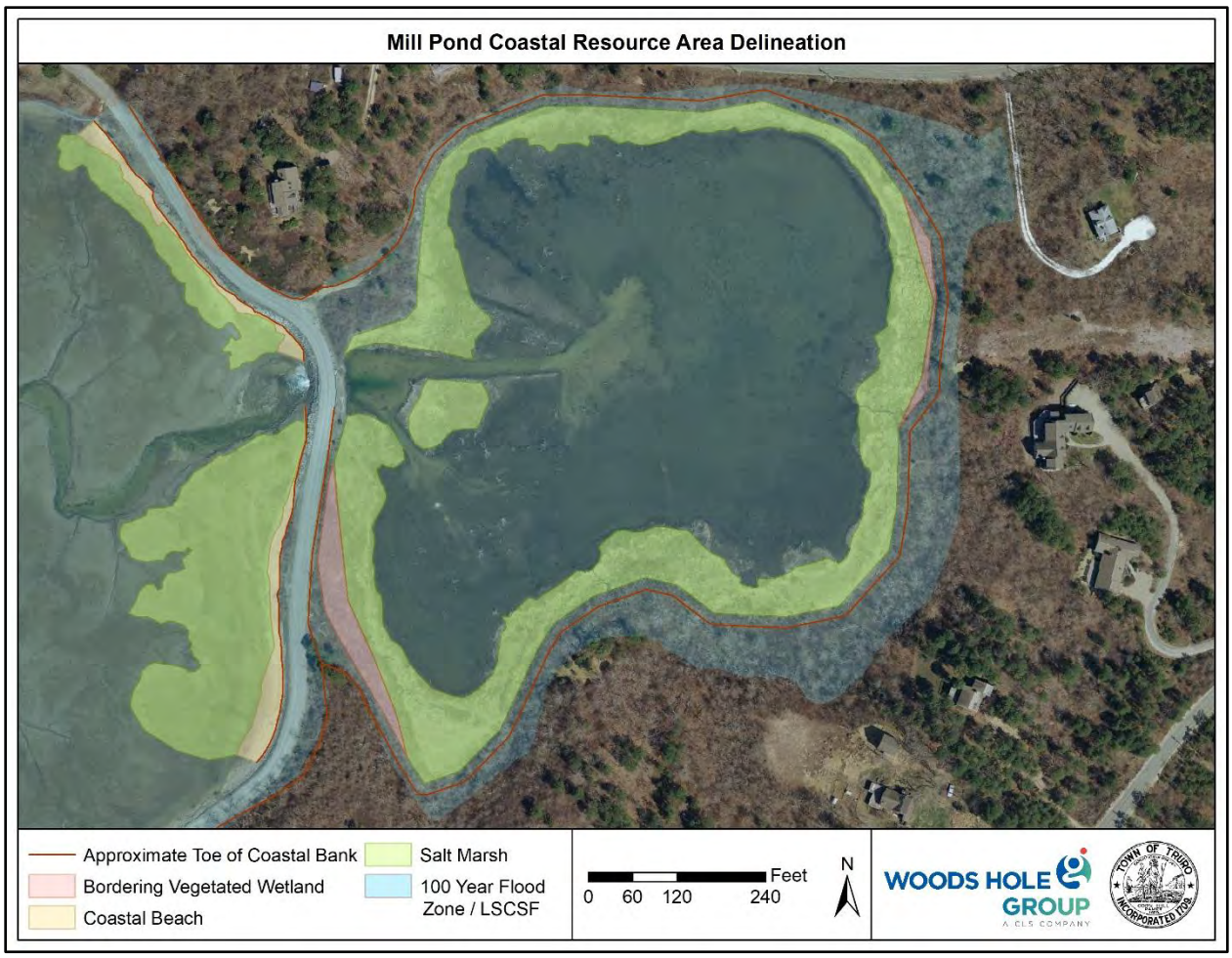

Figure 5. Coastal resource areas delineated in 2021 along Mill Pond Road and Mill Pond basin.

3. HYDRODYNAMIC MODEL

A stepped one-dimensional (1D) and two-dimensional (2D) hydrodynamic model approach was employed to understand the system. First, a hypsometric model was utilized for the 1D approach, which uses water levels, culvert dimensions, and basin geometry to determine the water level response in the basin. This model was calibrated and used to determine the size of the opening(s) needed to restore tidal flow and drainage to Mill Pond. These results were then used to refine the development of alternatives for the 2D model that can more accurately capture the geometry and hydrodynamics of the complicated Mill Pond system.

3.1. Hypsometric Model for Culvert Replacement Sizing

The 1D hypsometric model is an in-house developed model implemented through MATLAB. The model is based on hypsometric curve for a given basin, which is a cumulative distribution function of elevation (topography and bathymetry) used to determine basin volume relative to water levels. Hypsometric curves were previously developed for both the Mill Pond and Middle basin basins based on the topography and bathymetry collected in 2021, which is reproduced below in Figure 6.

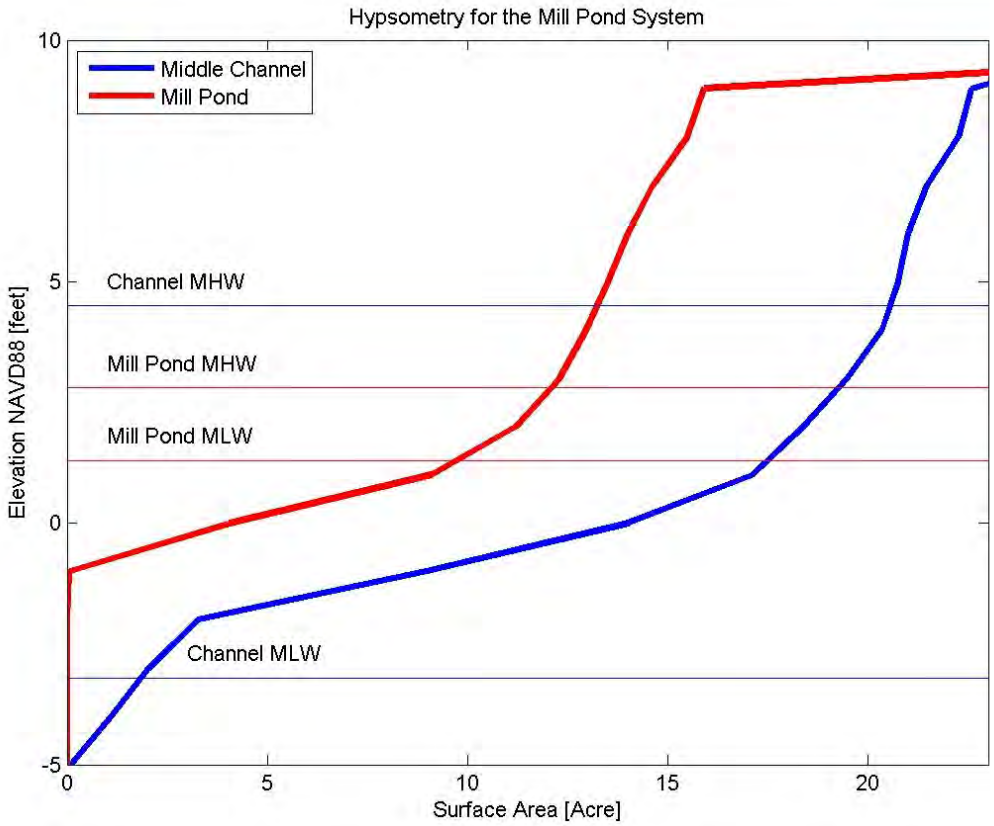

Figure 6. Hypsometric curves for Mill Pond and the downstream Middle Basin plotted with their respective MLW and MHW tidal datums.

The technical approach utilized by the hypsometric model involves a simple procedure for calculating the tidal response in a marsh or pond connected to the ocean by a full or partial opening. The assumptions are that the sea level in the marsh is independent of position, i.e. is constant throughout the marsh, and that the flow through the culvert is described by a standard hydraulic head-loss relationship, depending on the type of flow control structure and depth of flow. Possible flow control structures include a bridge structures, circular pipe culverts, box culverts, weirs, arches, and open channels that are either rectangular or triangular in cross-section. The hydraulic computations for the marsh system are based on the volume conservation equation for the water in each marsh basin:

$$A_{marsh} \frac{dh_{marsh}(t)}{dt} \; Q_{culvert} \qquad \text{Eq. 1}$$

where *t* is time

A_{marsh} is the surface area of the marsh basin

$h_{marsh}(t)$ is the time-varying water surface elevation in the basin

$Q_{culvert}(t)$ is the volume flow rate

Given the assumption of a horizontal sea surface within the marsh, the conservation-of-mass equation for the water in the marsh is

$$A(h_{marsh})\frac{dh_{marsh}}{dt} = Q_{culvert} \quad \text{Eq. 2}$$

$$Q_{culvert} = -au \quad \text{Eq. 3}$$

The surface area of the marsh A is prescribed as a function of marsh *h* through the measured hypsometric relationship; $a(t)$ is the cross-sectional area of flow in the culvert; and $u(t)$ is the average flow velocity in the culvert. Velocity is defined as positive when flowing from the marsh toward the ocean (i.e., downstream). For circular or rectangular pipe culverts, it is straightforward to calculate the relevant geometric parameters required to determine the velocity (cross-sectional area $a(t)$, the wetted perimeter P, and hydraulic radius r).

Using the measured water surface elevation in the middle basin as a boundary condition, and the above equations, we can obtain the flow volumes and velocities through a culvert and water surface elevations in Mill Pond. In calibration of this model, it was found that the invert elevation of the culvert inlet is lower than the bottom elevation of Mill Pond bed, which means that there is the potential for the pond bed to go dry at low tide. However, it was also found that that there is a island at the pond outlet that acts as a weir and drains water through a narrow channel downstream to the Mill Pond culvert inlet (Figure 7). When the water level in the pond is low and the tide going out, the flow through the culvert is controlled by the flow around the island that acts a weir (Figures 8). The equations governing weir flow using Bernoulli are as follows:

$$\boldsymbol{K = 0.4 + 0.5\frac{h}{b}} \quad \text{Eq. 4}$$

$$\boldsymbol{Q = \sqrt{32.2 * 2} * b * h^{\frac{3}{2}}} \quad \text{Eq. 5}$$

$$\boldsymbol{A = b * h} \quad \text{Eq. 6}$$

$$\boldsymbol{V = \frac{Q}{A}} \quad \text{Eq. 7}$$

Tidal flow through the culvert utilized the Manning's flow equations as follows:

$$\boldsymbol{K = 1.49} \quad \text{Eq. 8}$$

$$\boldsymbol{V = \frac{k}{n} * r^{\frac{2}{3}} * (\frac{h}{l})^{\frac{1}{2}}} \quad \text{Eq. 9}$$

$$\boldsymbol{Q = V * A} \quad \text{Eq. 10}$$

Where K is a constant, h is the head difference between the culvert entrance and exit, b the width of the weir, n manning's n, a friction coefficient, r the hydraulic radius, l the length of the culvert, and A the area of flow. The equations solve for either the flow, Q, or the flow velocity, V, and use continuity (equations 7 and 10) to solve for the other.

This 1-D model is computationally efficient and can be run for a variety of culvert sizes to optimize the geometry of the connection to return tidal flow to Mill Pond.

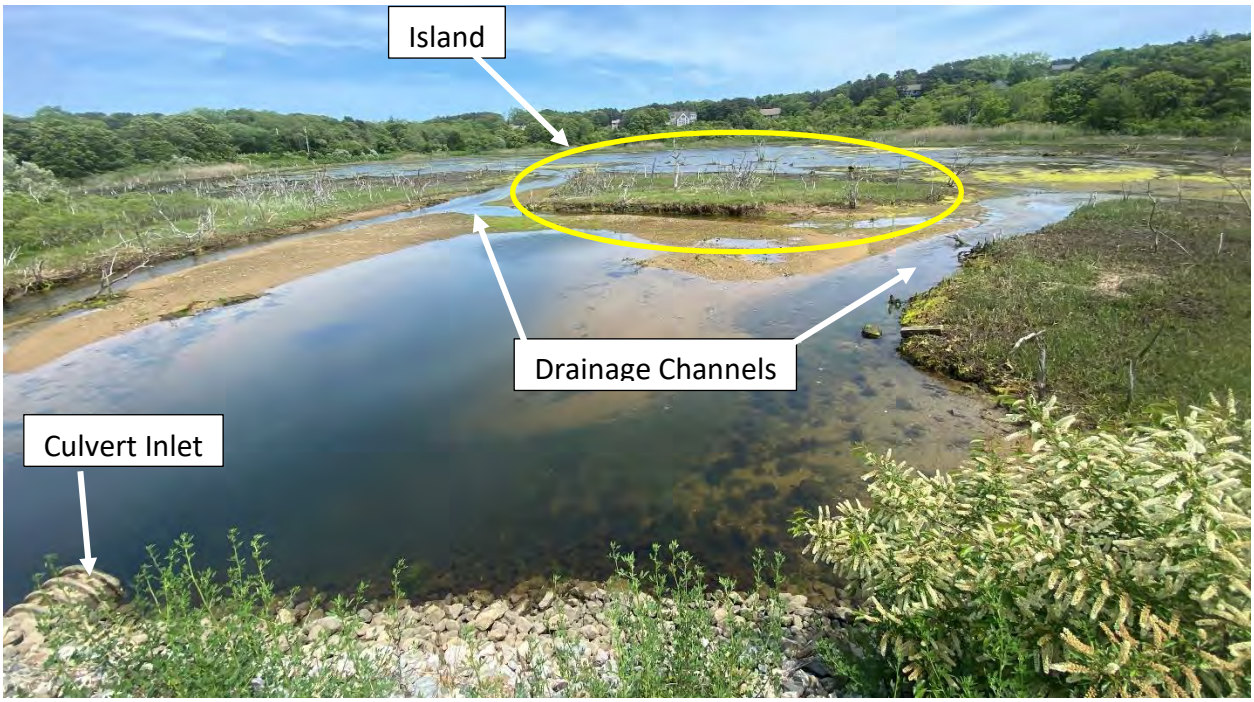

Figure 7. **Photo of the Mill Pond culvert inlet (bottom left), the island (yellow circle) that acts as a weir, and the drainage channels around it.**

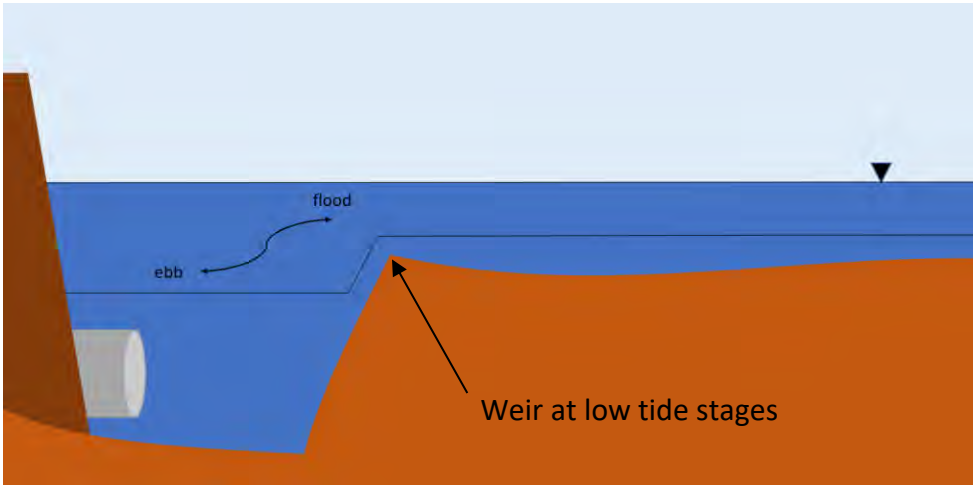

Figure 8. **Sketch of the culvert through the embankment and into Mill Pond, the invert is at a lower elevation than the bed of the pond, which causes a weir effect over the island and into the scour pit that impedes full drainage. Note the graphic is not to scale.**

3.1.1. Calibration

Calibration of the hypsometric model involved varying the geometry, height, and width, of the weir, the threshold at which the outgoing flow switches from pipe flow to weir flow, and the Manning's *n* value for friction for pipe flow and for the mixed weir and pipe flow. Final values and goodness of fit parameters are provided in Table 3.

Table 3. Input parameters and output model statistics for the 1-D hypsometric model

Parameter	Value	Units
Input Parameters		
Manning's n	0.065	--
Manning's n (mixed flow)	0.1	--
Length culvert	53	feet
Diameter culvert	3	feet
Culvert invert elevation	-1.6	feet NAVD
Weir height	0.8	feet
Weir width	6	feet
% weir, % pipe flow	90, 10	%
Output Parameters		
Threshold	1.4	feet
RMSE	0.092	feet
bias	-0.0046	feet

Goodness of fit parameters are the root mean square deviation (RMSE) and bias.

$$\boldsymbol{RMSE} = \sqrt{\frac{\sum(\boldsymbol{P_{mod}} - \boldsymbol{P_{obs}})^2}{\boldsymbol{n}}} \qquad \text{Eq. 11}$$

$$\boldsymbol{Bias} = \frac{\sum \boldsymbol{P_{mod}} - \boldsymbol{P_{obs}}}{\boldsymbol{n}} \qquad \text{Eq. 12}$$

Where P_{mod} are the modeled points, P_{obs} the observed points, and n the number of sample points. With these parameters, the modeled water levels are representative of the observed water levels (Figure 9). The model slightly underestimates the water levels during larger tides, as seen in the figure and by the negative bias value. The RMSE indicates that our modeled values lie on average within 0.09 feet, or 1.1 inches, of the observed values, which is considered a very good fit.

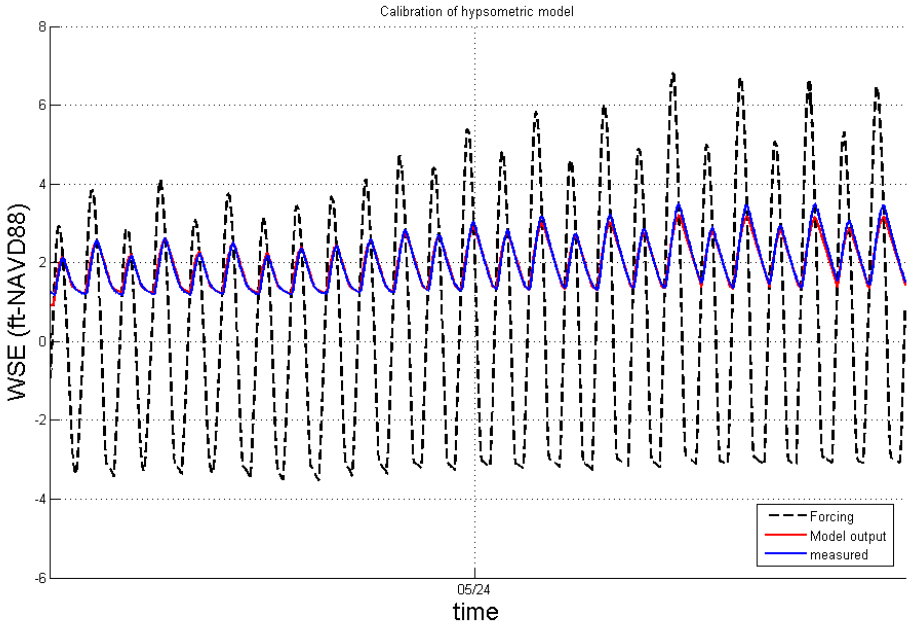

Figure 9. Boundary conditions at Pamet Harbor compared to measured and modeled water levels in Mill Pond based on the hypsometric model.

3.1.2. Results

The hypsometric model was run for a suite of culvert widths ranging from the existing diameter, three feet, and up to 14 feet where the restoration results plateaued. Tidal flow was considered to be restored when the tidal datums in Mill Pond match the water level downstream and there is little to no phase lag between the tidal signals. A 7 ft culvert height was selected initially based on the results of the prior modeling study by Louis Berger Group. Then the hypsometric model was used to evaluate a range of culvert heights, which determined that a taller culvert did not provide any additional tidal restoration upstream in Mill Pond. The results of the hypsometric modeling for the 7-foot high culvert are shown in Figure 10 that plots culvert widths relative to the restored tidal datum elevations in Mill Pond. The hypsometric model results generally indicated the following:

- The high tide elevations for MHW and MHHW increase dramatically as the culvert size increases from the existing 3 foot width to about an 8 foot width and then plateau at the 10-ft culvert width. For a 10-ft wide culvert, the MHW and MHHW datums generally match upstream and downstream of the culvert, and, therefore, culvert widths greater than 10-feet are not likely to provide any further tidal restoration.
- These results corroborate the results of the HEC-RAS 1D modeling conducted by Louis Berger Group, which indicated that a 10-ft wide culvert effectively eliminates tidal dampening.
- An 8-foot wide culvert restores tidal datums to within a few tenths of a foot as compared to the 10-ft wide culvert.
- While there are significant gains for the high tide elevations (MHW & MHHW) in Mill Pond, the low tides do not see similar improvements as the MLW elevation only decreases by a few tenths of a foot. This appears to be related to the weir effect that the island has on limiting drainage from the pond to the culvert inlet.

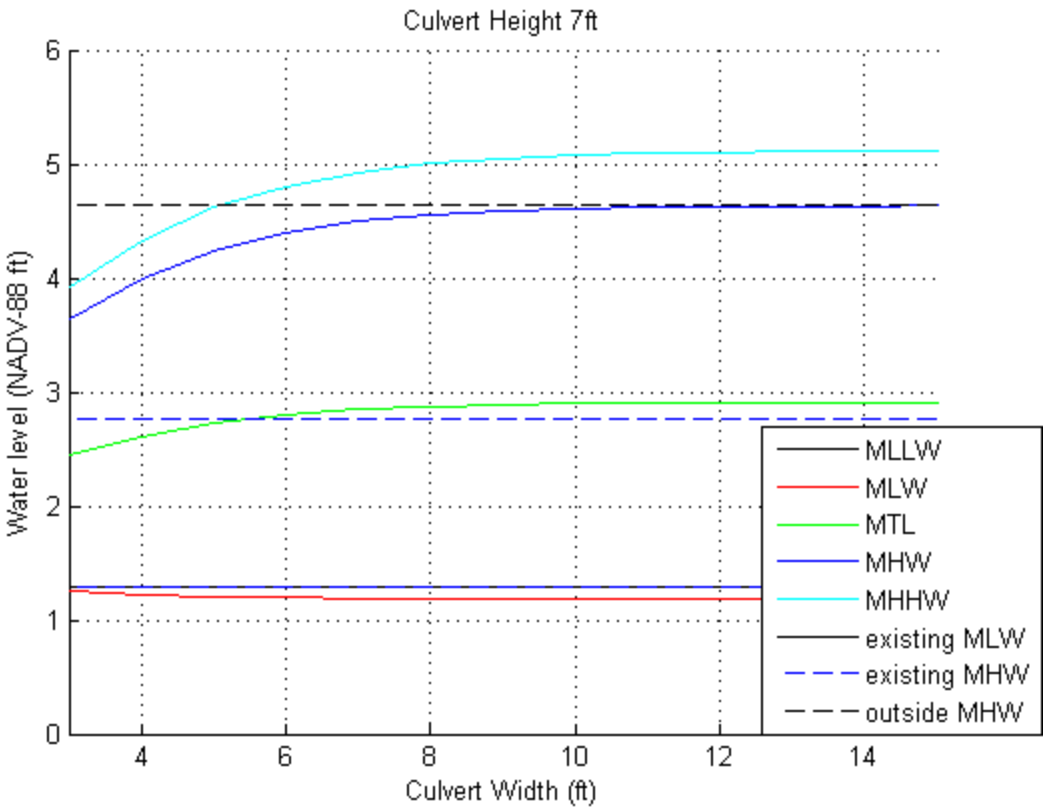

Figure 10. **Hypsometric model results for tidal datums in Mill Pond corresponding to various alternative culvert widths.**

3.2. HEC-RAS 2D Model Development, Calibration, and Validation

Woods Hole Group utilized the US Army Corps of Engineers model HEC-RAS (Brunner, 1995) to simulate two-dimensional (2D) unsteady flow that accounts for tides within the Mill Pond system. The 2D version of HEC-RAS uses a finite-volume solution scheme based on a computational grid mesh instead of the interconnected riverine channel cross-section approach utilized by the one-dimensional (1D) version HEC-RAS employed by Louis Berger Group. While HEC-RAS 1D can still be applicable to Mill Pond system, HEC-RAS 2D is a newer version that tends to perform better in tidal systems where the interconnected grid mesh can capture complex multidirectional flows in channels and marshes due to tidal forcing.

HEC-RAS 2D solves the conservation of mass and the shallow water equations (SWEs) with simplifying assumptions (Equations 10, 11 and 12, respectively). The equations are discretized on a non-uniform cartesian grid using a finite-volume formulation. HEC-RAS is widely used for 2D unsteady flow simulations to aid in engineering projects of roadway crossings with hydraulic openings.

$$\frac{\delta H}{\delta t} + \frac{\delta (hu)}{\delta x} + \frac{\delta (hv)}{\delta y} + q = 0 \qquad \text{Eq 13}$$

Where u and v are velocities in the northward and eastward directions, t is time, x and y are cartesian coordinates, H (h) is the depth, and q is the source/sink flux.

$$\frac{\delta v}{\delta t} + u\frac{\delta v}{\delta x} + v\frac{\delta v}{\delta y} = -g\frac{\delta H}{\delta y} + v_t\left(\frac{\delta^2 v}{\delta x^2} + \frac{\delta^2 v}{\delta y^2}\right) - c_f v + fu \qquad \text{Eq 14}$$

$$\frac{\delta u}{\delta t} + u\frac{\delta u}{\delta x} + v\frac{\delta u}{\delta y} = -g\frac{\delta H}{\delta x} + v_t\left(\frac{\delta^2 u}{\delta u^2} + \frac{\delta^2 v}{\delta y^2}\right) - c_f u + fv \quad \text{Eq 15}$$

Where u and v are velocities in the northward and eastward directions, t is time, x and y are cartesian coordinates, c_f is the bottom friction coefficient, and f is the Coriolis parameter.

In the configuration for this modeling effort, the Diffusion-Wave form of the SWEs was used in place of the full-momentum equations, forming a one-equation model (Eq. 4). This form can be used under the assumption that velocity is a function of the balance between the pressure gradient (from tidal forcing at the boundary) and the bottom friction (represented using Manning's n).

$$V = \frac{-(R(H))^{2/3}}{n}\frac{\nabla H}{|\nabla H|^{1/2}} \quad \text{Eq 16}$$

Where V is the velocity vector, R is the hydraulic radius, H is the surface elevation gradient, and the Manning's *n*.

The grid used for this modeling effort has a resolution of 25 meters (Figure 11, top) with a refinement region to a 10-meter resolution around the culvert (Figure 11, inset). The grid cell elevations were extracted from the collected topographic and bathymetric survey data in 2021, which was supplemented with the 2016 Massachusetts Digital Elevation Model (DEM) that is a compilation of the latest publicly available LiDAR and bathymetric data sets. The culvert location, diameter, and invert elevations were established in the model. A weir was placed along the road since it acts as a weir when overtopped. Two additional weirs were placed across the two channels that drain Mill Pond to the culvert inlet (Figure 7), which captures the behavior of the flow of water to the scour hole (Figure 11). The scour holes themselves had to be inserted by manually lowering the bottom elevation, since these were not captured in the elevation data.

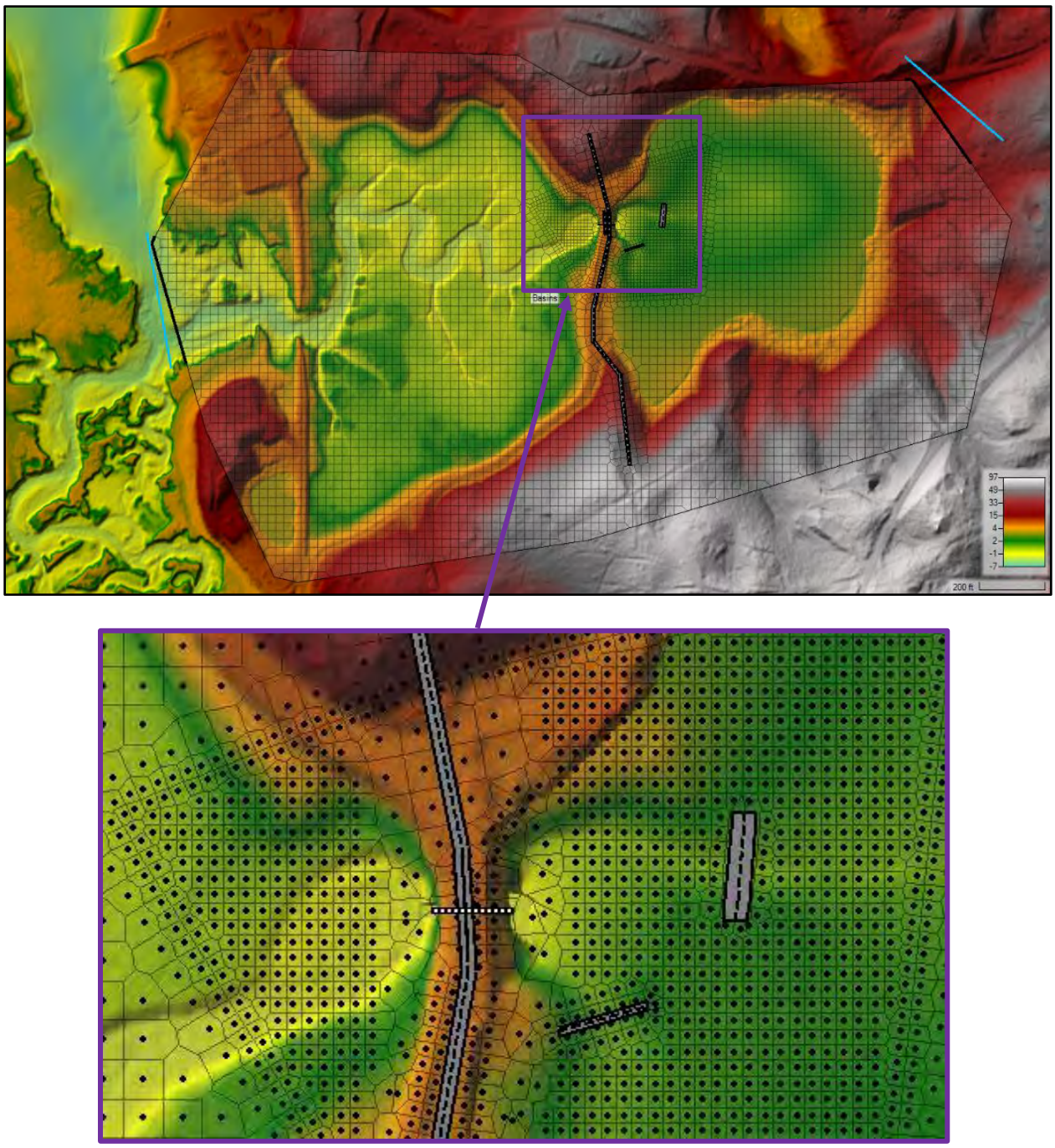

Figure 11. **HEC-RAS 2D model grid domain (top) for the Mill Pond system and the refinement region in the 2D model around the road, culvert and the weirs symbolized as grey rectangles with dashed lines (bottom).**

3.2.1. Boundary Conditions

HEC-RAS 2D was setup and run for existing conditions under normal (daily) tides first to allow for model calibration and verification. Then the model was then run for storm conditions to evaluate the current risks of storm flooding in and around Mill Pond. Finally, both normal tides and storm conditions were

simulated with sea level rise to understand how the tides and storms will change for existing conditions in the future. This modeling provides a baseline to understand existing conditions that will allow for the comparison with alternatives later in this report.

3.2.2. Normal Tides

The 2021 tide gauge data collected in Pamet Harbor (Station MP3 in Figure 4) was used to establish the boundary conditions with which to force the 2D model. The water level observations with the middle basin and Mill Pond, MP2 and MP1, respectively, were used for model calibration and verification. Comparison between these observed water levels show that while the railroad berm does not cause any tidal restriction, the culvert under Mill Pond does causes significant tidal damping and lag as shown in Figure 12.

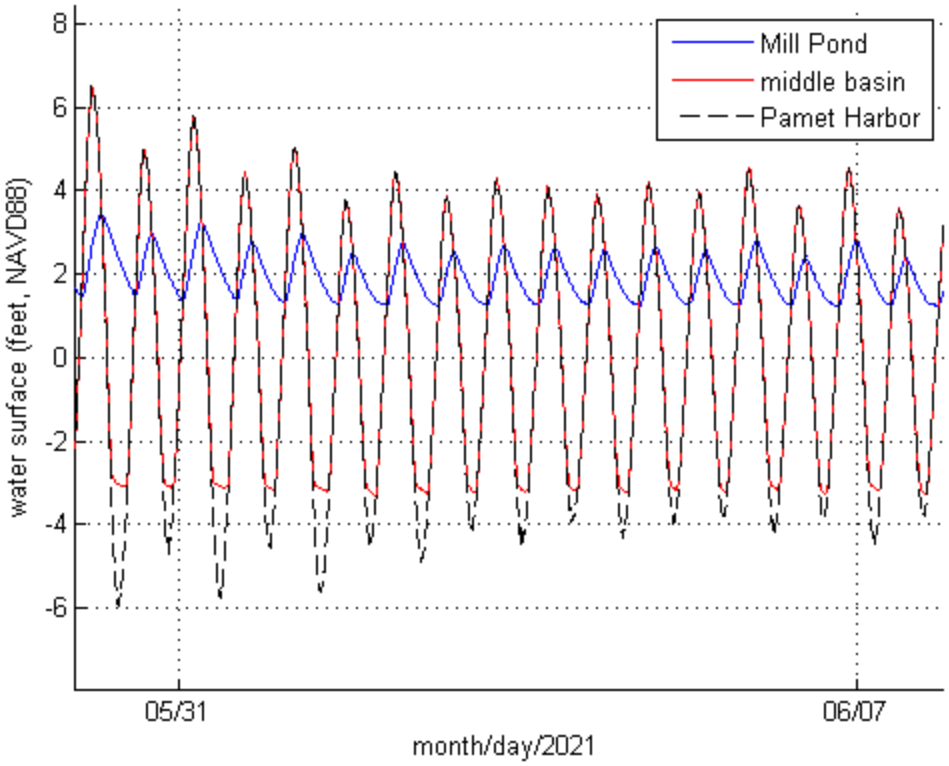

Figure 12. Time series of the observed water levels measured at three CTD instrument locations.

3.2.3. Calibration

HEC-RAS 2D was calibrated for existing conditions and normal tides using the same parameters specified in Table 3 for the hypsometric model. The middle basin was first calibrated, and once that was achieved Mill Pond was calibrated. Manning's n was set to 0.03 for the whole domain, with override values in Mill Pond of 0.065. The parameters for the weir structures were kept as the default. Both basins were calibrated to within two inches of the observed data (Table 4). The difference in Mill Pond is that the water level decreases at a slightly faster rate than observed (Figure 13), which leads to the higher bias value. However, this value is still well within the acceptable range of error.

Table 4. Goodness of fit parameters for the HEC-RAS model of the Mill Pond system.

Basin	RMSE (ft)	Bias (ft)
Middle basin	-0.042	0.088
Mill Pond	0.002	0.130

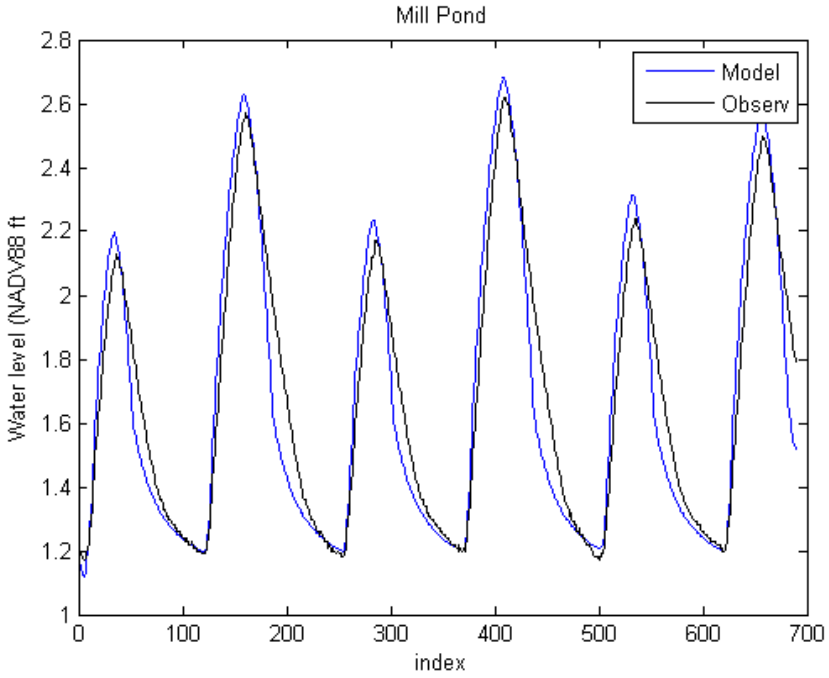

Figure 13. Comparison of the 2D modeled vs observed water surface elevations in Mill Pond.

3.2.4. Sea Level Rise

Sea level rise the increase of the mean sea level over time due to the effects of climate change such ocean expansion and glacial melting. Sea level rise was chosen based on the NOAA sea level projections shown in Figure 14 (*Sea-Level Curve Calculator (army.mil)*). For Mill Pond, a 2070 time horizon was chosen because this is consistent with the typical design lifetime of a flow control structure, which is roughly 50 years. An intermediate-high projection was chosen as a conservative estimate, which resulted in 2 feet of sea level rise for the future year 2070. This is consistent with the year and risk level used for the Eagle Neck Creek culvert replacement project, another MA-DER culvert restoration project located in the Pamet Harbor basin. A sea level rise of 2 feet in 2070 would possibly put the existing Mill Pond Roadway at risk from flooding during monthly spring high tides as shown in Table 5. Additionally, an additional 86,194 square feet (1.97 acres) of Mill Pond would be inundated in 2070 with 2-feet of sea level rise.

Table 5. Tidal datums for Pamet Harbor and Mill Pond simulated for existing conditions in both present day and 2070 with 2 feet of sea level rise.

Location	Year	Tidal Datums (feet-NAVD88)					Tidal Range (feet)	Area Inundated (feet^2)
		MHHW	MHW	MTL	MLW	MLLW		
Harbor	Present	4.97	4.47	-0.11	-4.70	-5.13	9.17	--
	2070	6.97	6.47	1.89	-2.70	-3.13	9.17	--
Mill Pond	Present	2.96	2.82	2.03	1.25	1.25	1.71	430,706
	2070	3.68	3.55	2.54	1.53	1.50	2.18	516,900

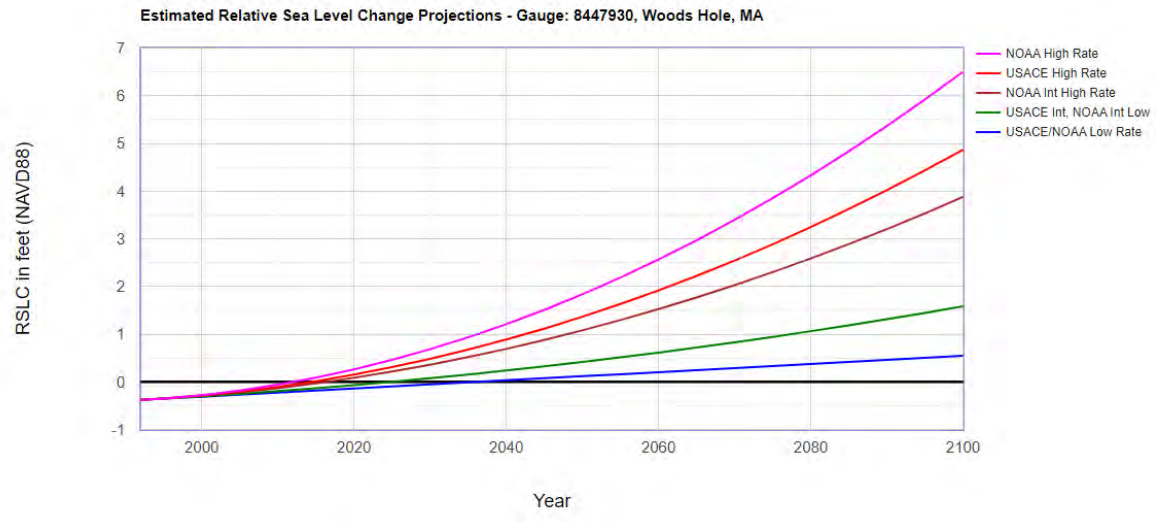

Figure 14. USACE/NOAA sea level rise projection curves. *(Sea-Level Curve Calculator (army.mil)).*

3.2.5. Return Period Storms

Synthetic storm events were created for return period storm including the 2-year, 5-year, 10-year, 20-year, 50-year, and 100-year storm levels, which have an annual percent chance occurrence of 50%, 20%, 10%, 5%, 2%, and 1%, respectively. Water surface elevations associated with return period storm events were taken from the North Atlantic Coastal Comprehensive Study (NACCS) from a point offshore of the Pamet Harbor entrance (USACE, 2015). The observed tidal signal was transformed to match the maximum water elevation during the highest tidal cycle (Figure 15). Wave action was not considered since the upper reaches of Pamet Harbor and Mill Pond are sheltered from offshore waves and have very restricted-fetch basins.

Storm events were simulated in both present day and in 2070 with 2-feet of sea level rise and the resulting maximum water surface levels in Mill Pond associated with return period storm events are shown in Table 6. However, only the 2-year and 5-year return period storms were simulated with sea level rise since larger storms will overtop the roadway (approximately 7.5 feet NAVD88) negating the function and contributions of the culvert to storm flooding. Note that Mill Pond Road is endanger of overtopping from a 10-year return period storm event in present day but this flooding risks increases to a 2-year storm in 2070.

Table 6. Water levels at the boundary condition, Pamet Harbor, for the return period storms in present day and 2070.

Projection	Return Period Storm Interval					
	2-year	5-year	10-year	20-year	50-year	100-year
Present Day	6.69	7.18	7.54	7.87	8.26	8.63
2070 (with 2-feet of SLR)	8.69	9.18	9.54	9.87	10.26	10.63

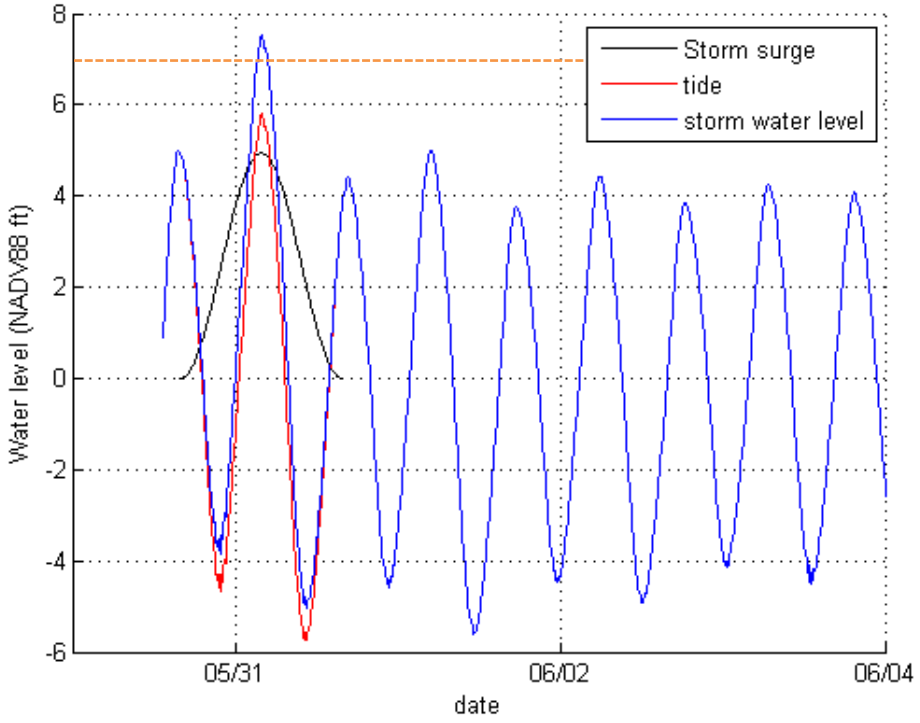

Figure 15. Storm boundary condition (in Pamet Harbor) for the 20-year storm. Mill Pond Roadway elevation shown approximately by the orange dashed line.

Overtopping was determined by looking at the cross section of the lowest point in Mill Pond Road, which lies just south of the existing culvert location (Figure 16). Under existing conditions, overtopping occurs from the middle basin side over the road starting south of the culvert where the roadway elevation is lower. Overtopping with the existing conditions occurs starting with a 10-year storm in present day, and increases to a 2-year storm with an intermediate-high projection of sea level rise (2-feet) in 2070 (

Table 7).

Table 7. **Storm induced maximum water level (feet-NAVD88) in Mill Pond, and whether the road overtops the existing culvert configuration.**

Existing culvert	Maximum water level in Pamet Harbor	Maximum water level in Mill Pond	Road overtopped
2-year	6.69	3.40	No
5-year	7.18	3.51	No
10-year	7.54	3.75	Yes
20-year	7.87	3.77	Yes
50-year	8.26	5.48	Yes
2-year with sea level rise	8.69	8.29	Yes

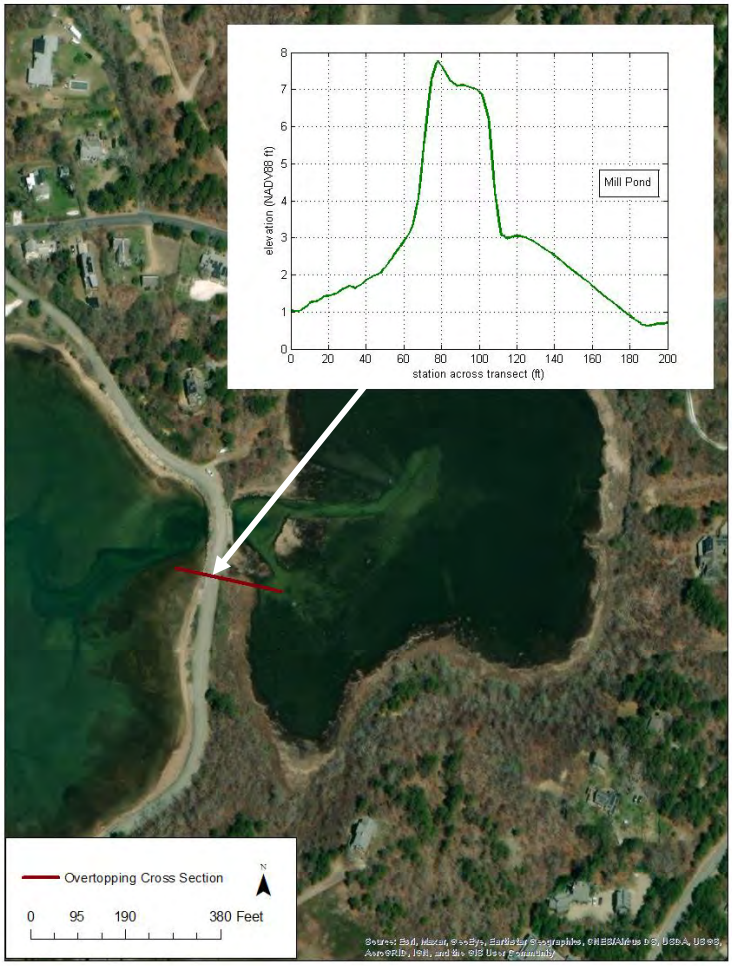

Figure 16 **Cross section of the lowest point of Mill Pond Road used to determine overtopping or wetting of the road. Note that the Mill Pond (upstream) side of the culvert is at a lower elevation than the downstream side.**

3.3. Alternatives Development and Modeling

Culvert replacement alternatives were developed and then evaluated using the hydrodynamic models to determine the potential for improved tidal restoration and drainage as well as potential adverse impacts from flooding to abutters. Replacement alternatives consisted of both culverts and open channel "breach" alternatives. The prior study completed by Louis Berger Group was also consulted as a reference point for development of alternatives. After consideration of a number of alternatives undergoing a preliminary evaluation, a suite of four (4) main alternatives were chosen for further evaluation using the calibrated and verified HEC-RAS 2D model as described in this section.

3.3.1. Alternatives Development

Initially, a suite of preliminary culvert replacement alternatives was considered including different culvert and channel configurations both with and without the roadway. These early alternatives were evaluated using the models, and then screened with the DER and stakeholders to select four (4) alternatives for further evaluation. The 1-D hypsometric model demonstrated that tidal restoration in Mill Pond was directly proportional to increasing culvert width from the existing 3-feet width up to a 10-ft width, where wider culverts did not result in additional restoration. Louis Berger Group had previously determined that a 10-foot-wide by 7-foot-high box culvert would restore the full tidal range to Mill Pond and eliminate any phase lag between peak high and low tides, which was selected as their preferred alternative. This conclusion also aligned with the hypsometric modeling results, which also indicated that there was no additional tide restoration for culverts greater than 7-feet-high. Based on consultations with the project team who wanted to address safety concerns and accommodate recreation use such as paddlers, an 8.5 foot-high-culvert was selected with a width of 10-feet as Alternative 1 as shown in Figure 17. The culvert configuration was chosen as three-sided open bottom box culvert filled with stone in order to provide a natural bottom that also serves as a scour countermeasure. While Alternative 1 consists of a three-sided open bottom culvert, it was simulated as a box culvert in HEC-RAS 2D since they perform the same from a hydrodynamic standpoint.

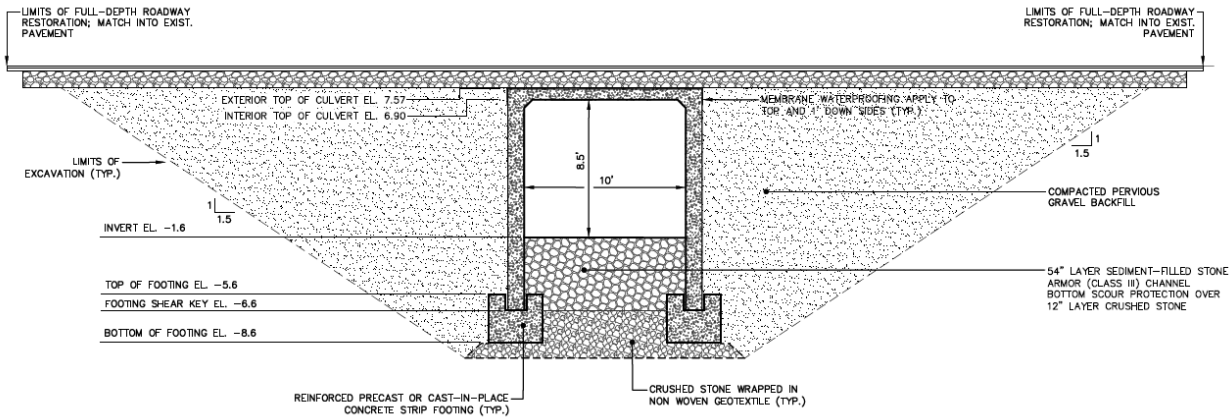

Figure 17. Alternative 1: 10 foot width by 8.5 foot high open bottom culvert.

While a 10-ft wide culvert fully restores tides to Mill Pond according to the hypsometric model, this large opening may be more prone to shoaling due to reduced flow velocities through the culvert relative to the small tidal prism and storage volume in the pond. Additionally, culverts that are 10-feet in width or greater have additional permitting requirements with MassDOT as discussed in Section 5. The hypsometric model determined that the 8 ft wide culvert restored tidal datums in Mill Pond to within a few tenths of a foot of the 10-ft wide culvert, which is still an acceptable level of restoration. The narrower culvert width would

likely increase flow velocity to reduce shoaling while not require additional permitting. Therefore, an 8-ft wide three-sided open bottom culvert was chosen as the second alternative, which was also set to a height of 8.5 ft (Figure 18).

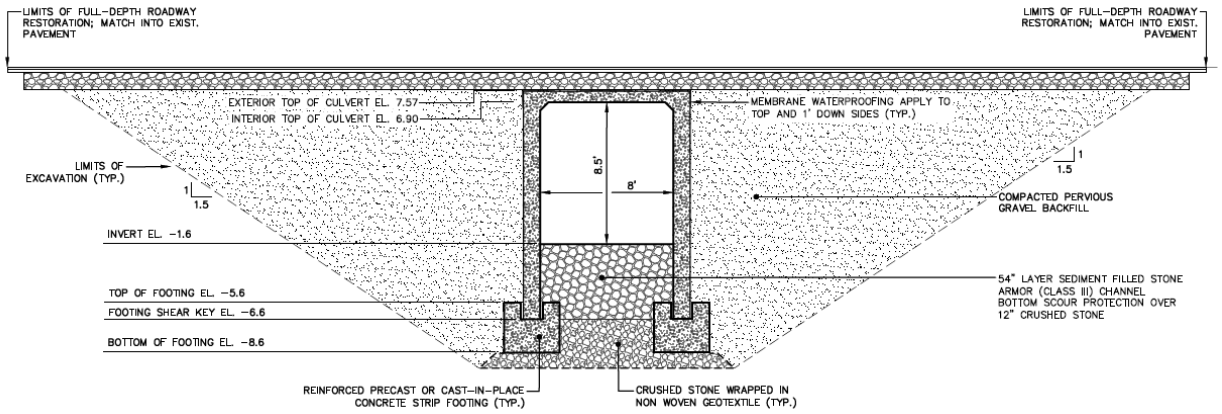

Figure 18. Alternative 2: 8 foot wide by 8.5 foot high open bottom culvert.

During the on-going project discussions with the DER, stakeholders, and project team, a more forward-thinking approach was developed where an open channel "breach" would be constructed in place of the culvert and the roadway would be abandoned. The thinking behind this approach was to plan for future climate change where sea level rise will threaten the roadway requiring increasing its coastal resiliency through more regular maintenance and repairs or by raising the roadway elevation itself. Both of those options come with significant long-term costs, and, therefore, roadway abandonment represents a "retreat" option so that the infrastructure would not have to be maintained or improved by the Town. The "breach" would simply be modeled as open channel without any bridge or roadway overtop.

The Louis Berger Group had previously evaluated a 15-foot-wide culvert that could have a clear span bridge overtop, however, their HEC-RAS modeling determined that there would be no additional hydrodynamic benefits to a culvert wider than 10 feet. This finding was also corroborated by the Woods Hole Group hypsometric modeling as discussed in Section 3.1, and two (2) open channel "breach" alternatives were developed. Alternative 3 is a simple 15-foot-wide breach in place of the existing culvert with no roadway or bridge overtop as shown in Figure 19. While the additional width will not provide any additional tidal restoration, it will provide a larger hydraulic cross section to accommodate storm runoff and drainage. The invert elevation would largely be maintained as compared to the culvert alternatives, and the height of the breach would simply be to the top of the embankment, approximately 10-feet.

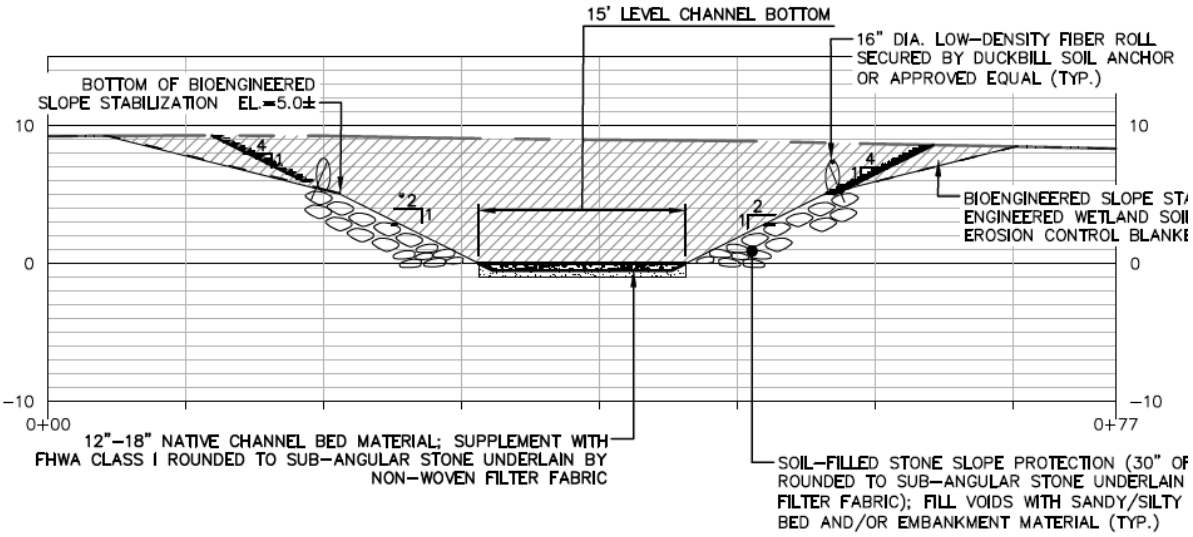

Figure 19. Alternative 3: 15-foot width open channel breach with no roadway overtop.

The fourth and final alternative was selected based on further input from stakeholders who desired to understand how the Mill Pond system may respond to very large opening where additional road surface and embankment would be removed. The intent for Alternative 4 was to try to return the roadway surface and embankment back to its natural state matching the coastal resources present. An initial evaluation determined that this breach could be well over 100-foot in width, which would see the roadway and embankment returned back to the native coastal resources either side. However, the stability of an inlet decreases as its width increases making more prone to sedimentation and shoaling, which could potentially close off the pond if flows are too low. Therefore, the channel width was chosen based on empirical stable inlet equations. These equations give the cross-sectional area of an inlet which will not shoal given the tidal prism, which is related to the velocity through the opening. If velocities are low, the channel will shoal and potentially close off. If velocities are high, the channel will erode and become larger. When the velocity is equal to the equilibrium velocity, the inlet is stable and neither grows nor closes. To determine the stability of the inlet opening, the equilibrium opening size was calculated based on the tidal prism in Mill Pond.

The tidal prism is the product of the average tidal range and the average surface area. Using the restored tidal datums are area for Mill Pond, the maximum restored tidal prism is:

$$(MHW - MLW) * A_{MTL} = 3.12ft * 225{,}080ft^2 = 702{,}250ft^3$$

The equilibrium inlet area, A_{eq}, is defined as:

$$A_{eq} = CP^q$$

Where C and q are empirical constants, and P is the tidal prism in metric units. C is on the order of magnitude $10^{-4} - 10^{-5}$, and q is on the order of 1. Using the larger value of C, 1.08E-4, we get an equilibrium area of 22.8 ft^2. A channel width of 10 feet and depth of 2 feet will approximately achieve the equilibrium area, which is much less than the desired width approaching 100-feet.

With the desire to construct a large breach option that would also be a stable inlet, a hybrid approach was taken for the fourth alternative where an 95-foot-wide breach would be constructed with a 10-foot-wide low flow channel in the middle and 14-foot-wide saltmarsh benches on either side (Figure 20). The

saltmarsh benches would be set to the elevation of the existing saltmarsh platform, and then planted with saltmarsh vegetation. This would allow for higher stages of the tide to flood the salt marsh benches while concentrating low tide flows in the 10-foot-wide channel to prevent sedimentation and shoaling.

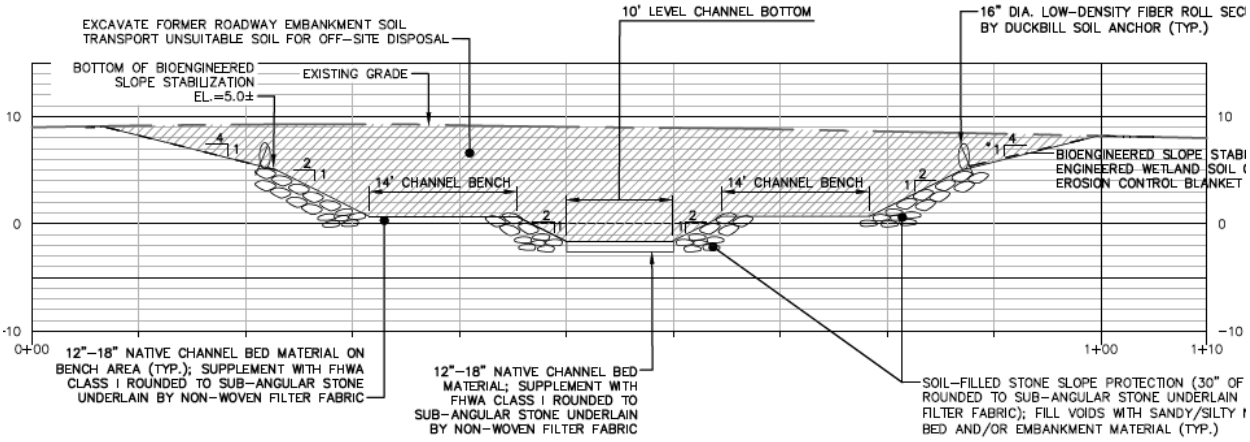

Figure 20. Alternative 4: The ~95-foot-wide breach with a 10-foot-wide inner channel and 14-foto wide saltmarsh benches. No roadway remains overtop.

A summer of the four alternatives developed in this section are presented in Table 8 below.

Table 8. Four alternatives simulated in HEC-RAS 2D.

Alt. #	Alternative Description	Total Width (feet)	Inner Channel width (feet)	Height (feet)	Structure Invert (ft-NAVD88)
1	Culvert 10'Wx8.5'H	10	N/A	8	-1.6
2	Culvert 8'Wx8.5'H	8	N/A	8	-1.6
3	Open Channel 15'W	15	N/A	10	-1.7
4	Open Channel 95'W	95	10	10	-1.7

3.3.2. Alternatives Modeling Results

Each of the four (4) alternatives in Table 8 were modeled with HEC-RAS 2D and the resulting tidal datums and intertidal areas in Mill Pond are presented in Table 9. Overall, the model results are very similar, within a tenth of a foot, between each of the four alternatives where MHW/MHHW increases significantly but MLW/MLLW does not. This result matches the hypsometric modeling results which indicated that the island in Mill Pond acts as a weir that limits drainage as described in Section 3.1. The increase in MHW/MHHW results in an increased intertidal area of approximately 3.5 acres, which is significant. This is also the region typically inhabited by salt marsh vegetation, which is an indicator for potential restoration.

Table 9. Tidal datums, range, and intertidal area for the existing conditions and alternatives.

Alt. #	Alternative Description	MHHW (ft)	MHW (ft)	MTL (ft)	MLW (ft)	MLLW (ft)	Mean Tidal range (ft)	Intertidal (Acres)	Intertidal Area Change (Acres)
--	Existing	2.96	2.81	2.04	1.25	1.25	1.56	7.1	--
1	Culv. 10x8.5	4.74	4.33	2.77	1.21	1.21	3.12	10.6	+3.5
2	Culv. 8x8.5	4.66	4.26	2.74	1.22	1.21	3.04	10.5	+3.4
3	15-ft Breach	4.78	4.37	2.80	1.21	1.21	3.16	10.6	+3.5
4	95-ft Breach	4.78	4.37	2.79	1.21	1.21	3.16	10.6	+3.5

To determine the change in flooding impacts of the four (4) alternatives, return period storms from Table 10 were simulated as described in Section 3.2.5. All four (4) alternatives show similar results for the storm simulations, where maximum flood elevations are within a few tenths of a foot across all alternatives for a given storm. This is due in part to the openings for all four (4) alternatives being so large that they behave similarly hydraulically. Overtopping of Mill Pond Road also occurs for the values highlighted in grey and bolded, which reduces the contributions to flooding from the culvert. Note that the alternatives increase the water surface (i.e. flooding) elevations in Mill Pond during storms over existing conditions, which is expected with such large openings. However, these elevations do not appear to significantly impact properties or structures since the top of the coastal bank, where the structures are, are at a much higher elevation.

Table 10. Maximum water surface elevation in Mill Pond for each storm and alternative. Bolding and shading indicates storms that overtop of the low point of Mill Pond Road (approximately 7.5' NAVD).

Alternative	2-year	5-year	10-year	20-year	50-year	100-year	2-year (SLR 2070)
Existing	3.40	3.51	3.75	**3.77**	**5.48**	**6.09**	**8.29**
8x7 culvert	6.42	6.89	7.23	**7.56**	**8.07**	**8.63**	**8.69**
10x7 culvert	6.63	7.11	**7.46**	**7.79**	**8.24**	**8.63**	**8.69**
15-foot breach	6.69	7.18	**7.54**	**7.87**	**8.26**	**8.63**	**8.69**
90-foot breach	6.69	7.18	**7.54**	**7.87**	**8.26**	**8.63**	**8.69**

3.4. Sediment Mobility and Scour Countermeasures

Sediment mobility within the basin and inlet was evaluated using an analytical sediment transport model for a first level assessment. The sediment mobility model is based on the established concept that sediments begin to move when sufficient stress is applied to the estuary bottom (bed). Typically, a mild, steady flow over a bed of cohesionless grains will not result in sediment transport (Fredsoe & Deigaard, 1992). However, when subjected to a large enough flow, the driving forces impacting sediment grains exceed the stabilizing forces, and sediment will begin to move resulting in scour and accretion.

Replacing the existing 3 ft diameter culvert with a substantially larger culvert will allow for considerably more flow during normal daily tides and especially during significant coastal storms as discussed in the

prior section. Therefore, it is necessary to conduct a scour analysis that will aid in the design of scour countermeasures at both ends of the culvert for the proposed replacement culvert. Woods Hole Group computed scour and designed countermeasures based on the output from the HEC-RAS 2D model and using the Federal Highway Administration (FHWA) Hydraulic Engineering Circular Number 14 (HEC14) *Hydraulic Design of Energy Dissipators for Culverts and Channels*.

The scour calculations were completed for the each alternative based on Equation 5.1 for culverts shown below, and the flow rates through the culvert that were extracted from the HEC-RAS 2D modeling conducted above.

$$\left[\frac{h_s}{R_c}\right] = C_s C_h \left(\frac{\alpha}{\sigma^{1/3}}\right)\left(\frac{Q}{\sqrt{g}R_c^{2.5}}\right)^{\beta}\left(\frac{t}{316}\right)^{\theta} \qquad \text{HEC14 Eqn. 5.1}$$

where,

h_s = scour depth (ft)
R_c = hydraulic radius (ft) = wetted perimeter.
Q = flow discharge (ft^3/sec)
g = acceleration due to gravity (32.2 ft/s^2)
t = time (minutes) = 30 minutes
σ = material standard deviation = $(D_{84}/D_{16})^{0.5}$ = 1.87 for sand
C_s = slope correction coefficient = 1
C_h = drop height adjustment coefficient = 1

The calculations assumed that the culvert was flowing full during storm conditions. Additionally, since the sediment is primarily cohesionless sandy material, σ was set to 1.87 and a recommended duration of 30 minutes were utilized based on HEC14. The resulting total scour depth for the proposed conditions are shown in Table 11 below.

HEC23 was then used to design the scour countermeasures using equation 18.1 and the results are shown in Table 11 below. The results indicated that the minimum median diameter (D50) riprap size is just under a foot, and for design the riprap should be upsized to the next size, class 4, that has a D50 of 14 inches. The minimum layer thickness should be double the D50 of around 28 inches (2.4 feet) at the culvert inlet, outlet, and within the culvert. This scour apron would extend 10 into Mill Pond from the inlet and 20 ft downstream from the outlet based on HEC23 guidance.

$$D_{50\,riprap} = \frac{K_r\, y_0}{(S_g - 1)}\left(\frac{V_{ac}^2}{g y_0}\right)^{0.33} \qquad \text{HEC23 Eqn. 18.1}$$

where,

D_{50} = riprap size (ft)
K_r = sizing coefficient = 0.68 for design
V_{ac} = average culvert velocity (ft^3/sec)
y_0 = average flow depth
S_g = riprip specific gravity = 2.65

Table 11. Modeled velocities and flow rates and calculated scour and countermeasure design.

Alt. #	Alternative	Base Max Velocity (ft/s)	Base Max Flow (cfs)	10yr Max Velocity (ft/s)	10yr Max Flow (cfs)	Scour Depth (feet)	Riprap D_{50} (ft)	Design D_{50} (in)
1	10Wx8.5H	1.8	280.7	2.0	325.0	7.9	0.71	Class 4 14 inches
2	8Wx8.5H	2.9	251.6	2.9	306.6	7.7	0.97	
3	15-foot breach	2.1	346.2	3.2	400.5	8.6	0.78	
4	95-foot breach	1.5	370.0	1.8	415.8	8.7	0.63	

The scour analysis determined that there is the potential for sediments to be scoured and mobilized during high flow events especially during storms. While scour countermeasures will be in place, it is possible that material could be mobilized outside of the armored areas especially in the pond itself.

Through dimensional analysis, Shields (1936) derived an expression that identifies the point where bed stress equals bed resistance. The Shields parameter (ψ) results from equating the driving and stabilizing forces for a flat bed. Once the Shields parameter has been calculated at points of interest, the resulting values can be compared to a critical Shields parameter (Ψ_{cr}) to determine if sediment initiation occurs at each point of interest. The critical value of ψ for the initiation of sediment motion is found by using a methodology to determine the threshold Shields' Criterion, ψ_{cr} (Soulsby, 1997):

$$\psi_{cr} = \frac{0.30}{1+1.2D_*} + 0.055\left[1 - e^{-0.020D_*}\right]$$

where D_* is the dimensionless grain size given by:

$$D_* = \left[\frac{g(s-1)}{\nu^2}\right]^{1/3} d_{50}$$

where *v* is the kinematic viscosity of water.

The Shields' criterion is applicable to cohesionless sediments consistent with sediments found in the Mill Pond culvert vicinity based on the subsurface investigation, however, much finer material was noted in the pond upstream so this analysis may not be as applicable there. However, no sediment data was collected there.

Settling velocity, or fall velocity, is the lower velocity threshold at which a suspended particle settles out of a fluid that would lead to shoaling (accretion). Settling velocity for the 0.54 mm d_{50} sediments was calculated using Stoke's Law (Equation 4)

$$\omega_s = \frac{1}{18}\frac{{d_{50}}^2 g(SG-1)}{\upsilon}$$

where

ω_s is the settling velocity
d_{50} is the median grain size of the sediment (0.54 mm)
g is the acceleration due to gravity (32.2 ft/s^2)

SG is the specific gravity of the particle assumed to be quartz (2.65)
υ is the kinematic viscosity of water ($1x10^{-5}$ ft^2/s).

The settling velocity was calculated to be 0.86 ft/s for a median d_{50} of 0.54 mm, which is less than the modeled peak velocities in Table 12 indicating that accretion is not likely to be significant for peak flows conditions within the culvert or open channels for the alternatives.

Table 12. Sediment Mobility Analysis.

Alternative	Bed shear stress (5% of u_{max})	Shields Parameter	Mobility status?	Settling Velocity ft/s	Channel/culvert Shoaling?
8x8	0.120	0.021	No	0.86	No
10x8	0.085	0.015	No		No
15ft	0.150	0.026	No		No
90ft	0.075	0.013	No		No

4. ALTERNATIVES EVALUATION

An alternatives analyses was conducted that compared each of the four (4) alternatives against each other and to existing conditions based on the model results. This includes evaluating the impacts, both positive and negative, that the alternatives would have on Mill Pond, habitat, infrastructure, and surrounding properties. Overall, each of the four alternatives produce a similar amount of tidal restoration and increased storm drainage, which represents a marketable improvement over existing conditions. A comparison of the four (4) Alternatives and assessment of impacts is provided below:

- **Tidal Restoration:** The HEC-RAS 2D model results indicated that the each of the four (4) alternatives restore a similar level of tides (within a tenth of a foot) to Mill Pond effectively doubling the current mean tide range from approximately 1.5 to 3.1 feet (Table 9). The tidal restoration gains are largely for high tides with minimal gains on the low tides due to the weir effect that the island has on pond drainage as shown in Figure 21 where MLW for the existing and alternatives modeling constitutes the same red line. However, the model cannot predict if this island will remain or not following culvert replacement when full tidal flow is restored, and it is possible that the pond could drain completely during low tides creating a tidal flat in the pond.
- **Storm Flooding Impacts:** The HEC-RAS 2D model results indicated that each of the alternatives produce a similar amount of storm flooding, or storm surge elevations, in Mill Pond since they all are large openings that function similarly hydraulically. Higher flood (storm surge) elevations will occur in Mill Pond over existing conditions due to the larger openings allowing for easier passage of storm flows, however, the larger opening will also allow for better storm drainage, thereby reducing the duration of flooding. While the storm flood elevations in Mill Pond are higher by approximately 2.5 feet for the alternatives (Figure 22) as compared to existing conditions (Figure 23), the flooding does not significantly impact properties since the dwellings/structures are built on higher ground. There is a steep, elevated coastal bank around Mill pond that effectively contains the storms flows.
- **Drainage:** The phase lag time in peak tides was about 102 minutes for the existing culvert, which is effectively reduced to zero for each of the alternatives. This will benefit both

flushing during normal tides to provide greater intertidal area and facilitate storm drainage to reduce the duration of flooding during storms.

- **Railroad Berm Influence:** The 2021 field investigation concluded that the channel through the former railroad berm downstream of Mill Pond, which separates the middle basin from Pamet harbor, does not appear to attenuate the tides. This study utilized the HEC-RAS 2D model to confirm this finding and also determine whether there any additional hindrances for storm flooding or drainage. The HEC-RAS 2D model results were checked and it was confirmed that the former railroad berm has little effect on attenuation of the tides or storm flooding and drainage. Therefore, the existing channel or breach through the railroad is sufficiently already sufficiently sized from a hydrodynamic standpoint.
- **Impacts to Wells and Septics:** Figure 21 demonstrates that there do not appear to be any properties or dwellings that are significantly impacted by the alternatives as compared to existing conditions. The additional flooded areas tend to be low lying areas along the face of the coastal bank. According to the Septic and Well Plan in Attachment A, these systems are located a far enough distance away and elevation above these restored tides meaning that saltwater flooding or intrusion through the groundwater should not impact these systems.
- **Sedimentation Impacts:** It is likely that the channel carves out a more coherent channel and remains sandy. Unclear whether fine sediment in marsh will mobilize….possibly in areas where a drainage pathway/channel could form. However, similar to Stewarts creek just draining the flat may not remove sediment.
- **Habitat Impacts:** Figure 21 demonstrates the additional intertidal area gained for the alternatives, which have very similar results. In total, the gain in intertidal area is about 3.5 acres, which has the potential to create additional saltmarsh and shellfish habitat. The increased tidal range will also certainly benefit these resources by reducing the amount of time during the tidal cycle that they flooded and increasing water quality through improved flushing. Alternative 4 will also create additional saltmarsh by converting roadway embankment directly to saltmarsh.

  Improved tidal flushing and storm drainage will reduce freshwater ponding and increase salinity. Oysters and mussels were observed in abundance downstream of Mill Pond Rd, but not upstream. By restoring habitat connectivity through a larger culvert or opening, it is expected that this may create the potential shellfish habitat.
- **Public Benefit:** The culvert alternatives, #1 and 2, have been designed for sufficient headspace within the culvert to minimize safety hazards and also allow for recreational paddlesport passage. The open channel “breach” alternatives, #3 and 4, have open tops so there is also minimal safety risks and no limits for paddlesports. Additionally, Alternatives 3 and 4 abandon the roadway and could potentially allow for a public access pathway in its pace. However, the impact of abandoning the road on motor vehicles/traffic versus creating additional recreational opportunities and reducing Town maintenance costs will have to be evaluated further.

The alternative analysis is discussed further in the Fuss & O’Neill Conceptual Design Report found in Attachment B, which also includes the Alternatives Analysis comparison table.

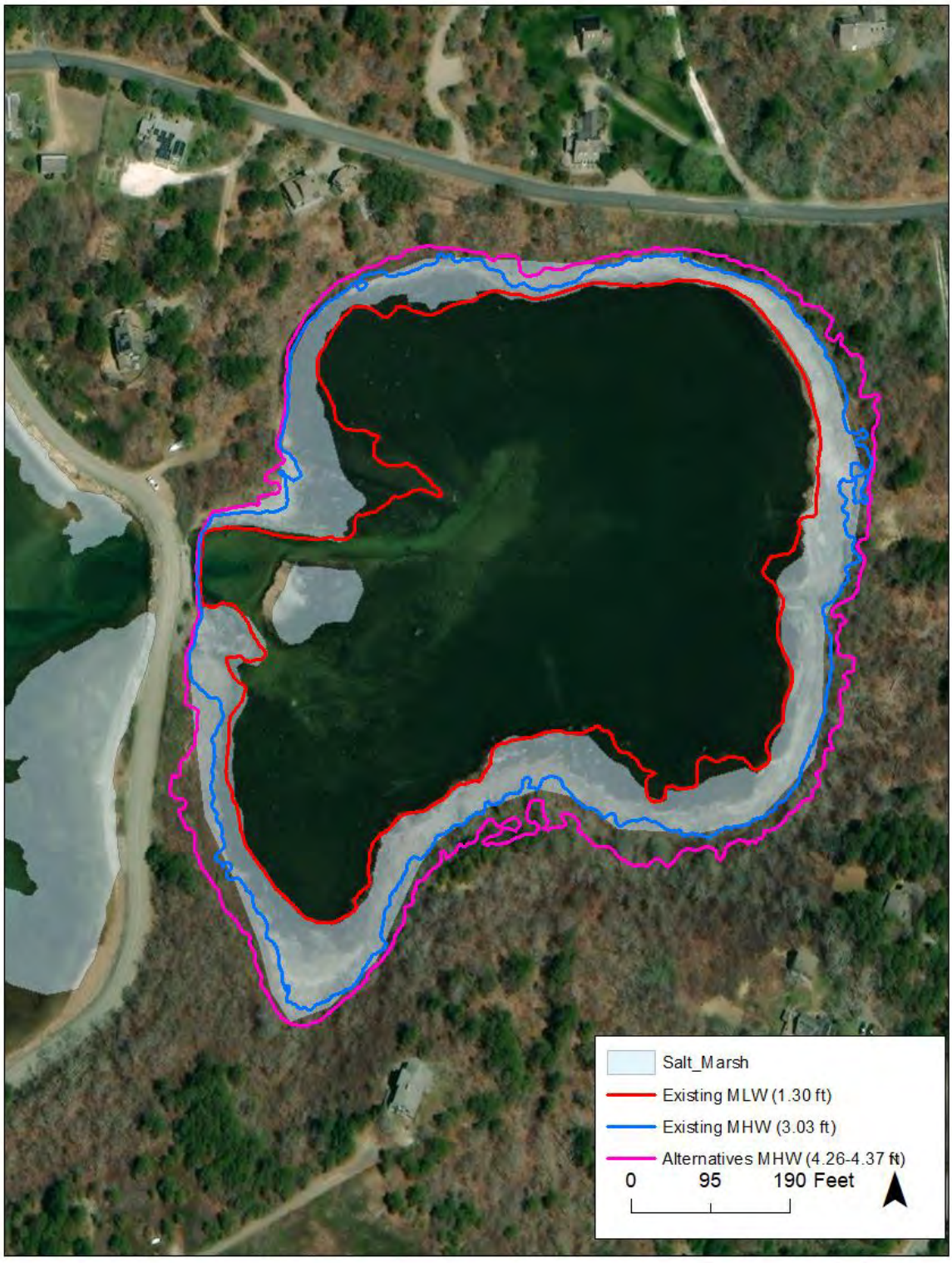

Figure 21. **Comparison of the extent of existing salt marsh relative to MLW and MHW levels for existing conditions (red/blue) and the alternatives (pink).**

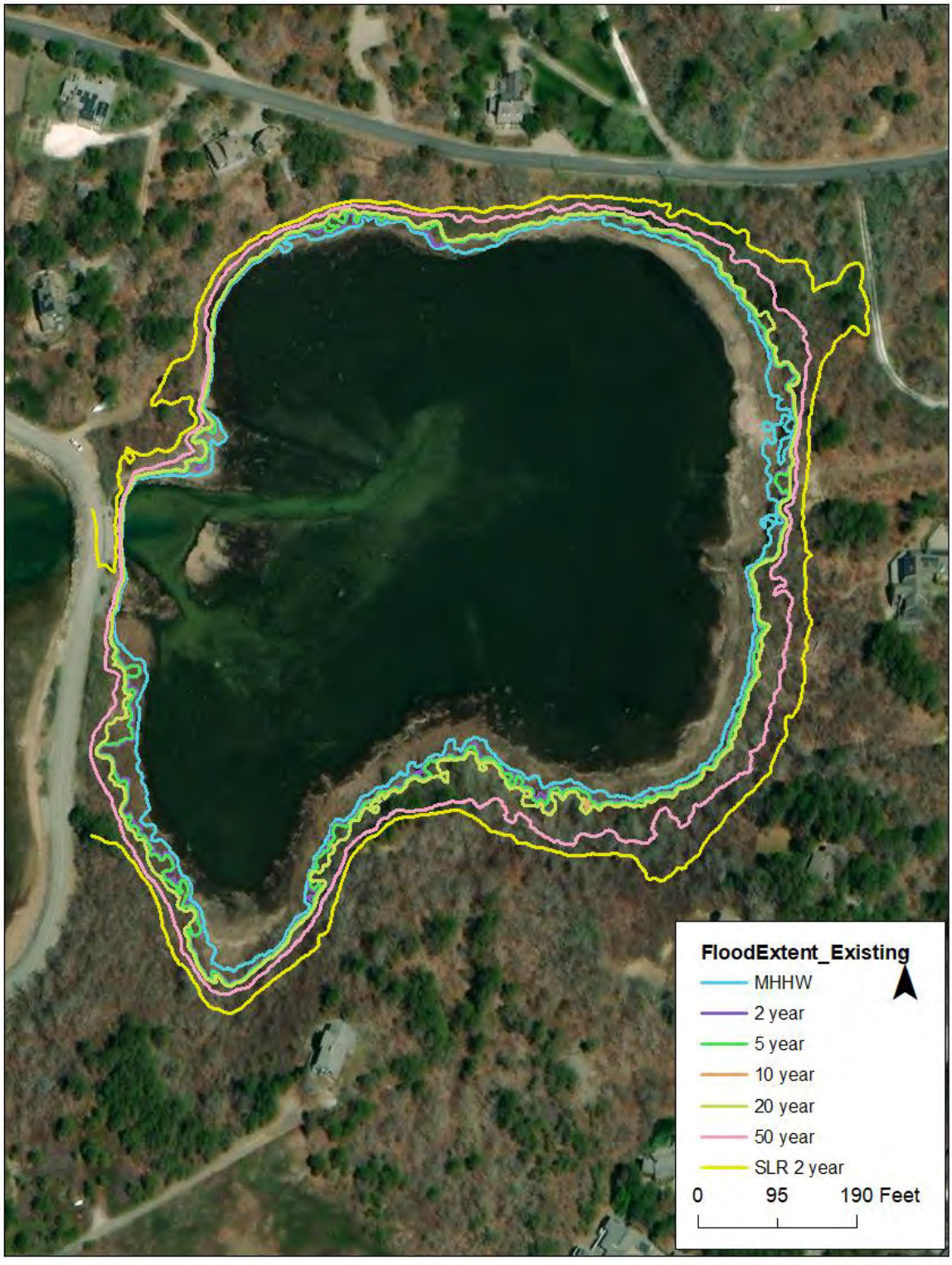

Figure 22. **Comparison of the extent of existing salt marsh relative to return period storms with and without sea level rise (SLR) for existing conditions modeling.**

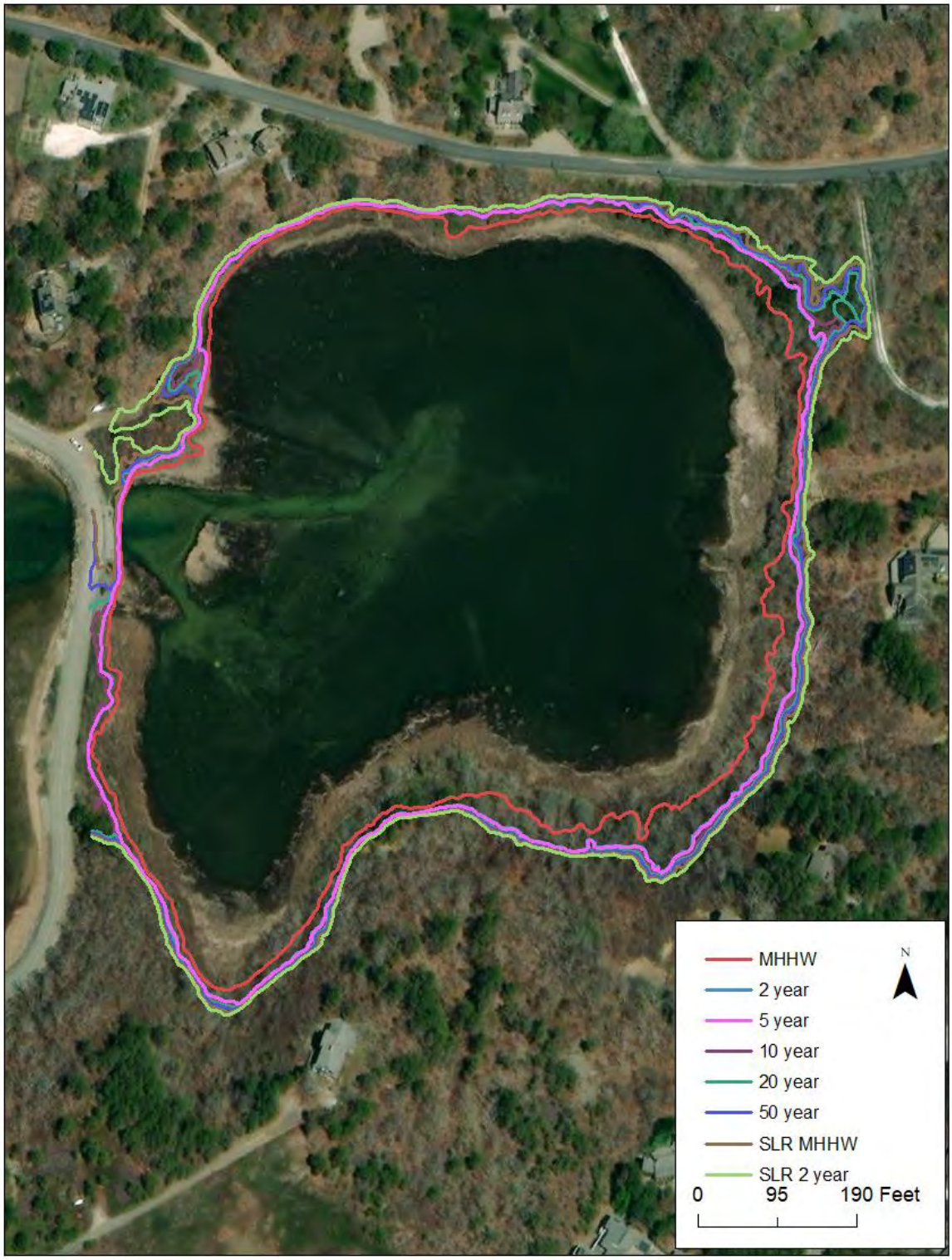

Figure 23. **Comparison of the extent of existing salt marsh relative to MHHW and return period storms with and without sea level rise (SLR) for the alternatives modeling.**

- **Mill Pond Road Coastal Resiliency** – Currently, Mill Pond Rd is vulnerable to overtopping during the relatively small 10-year storm event, but will potentially be at risk from spring high tide flooding with 2-ft of sea level rise in the future (year 2070). This will result in more regular maintenance and repairs and also result in more road closures during flooding and repairs. Therefore, the roadway will have to be made more resilient if it is to be maintained into the future especially if a culvert alternative is chosen as the preferred alternative. One way to increase the coastal resiliency is to redesign and reconstruct the roadway to a higher elevation. Figure 24 shows the peak water surface (surge) elevation associated with return period storms events in present day and 2070 with 2-feet of sea level rise. The figure demonstrates that the lowest portion of the roadway, just south of the culvert, is approximately 7.5 feet NAVD88, which is prone to flooding during the 10-year return period storm in present day. In 2070, the roadway is being overtopped by high spring tides and small-scale storm events. At minimum, the roadway would have to be raised by 2-feet to 9.5 feet NAVD88 to keep up with sea level rise and prevent flooding during the 10-year storm in 2070. This would require raising approximately 1,200 feet of roadway length between 31 Mill Pond Rd just north of the culvert and 15 Mill Pond Rd to south at the intersection with Post Drive. Therefore, roadway raising is not as simple as just addressing the roadway over the culvert, which creates a substantially larger project over a simple culvert replacement.

  Another option is to not to increase the coastal resiliency of the road, but, rather, to abandon and remove the road so that it does not have to be maintained or rebuilt in the future. Road abandonment goes hand in hand with the open channel breach alternatives, since the open channel requires minimal maintenance while also ensuring that there is no aging thoroughfare infrastructure above. There is also potential for further enhancements with this alternative such as removing additional roadway surface beyond the breach area to restore with native habitats and possibly establish a recreational trail and access. Roadway abandonment does need to be fully explored before it can selected as a viable alternative. For instance, Mill Pond Road represents one of two egresses along with Depot Road for vehicles and especially emergency response vehicles to and from Pamet Harbor. Although Depot Road is the main thoroughfare between Pamet Harbor and Route 6, while Mill Pond Road is the smaller, less direct, and less traveled of the two roads.

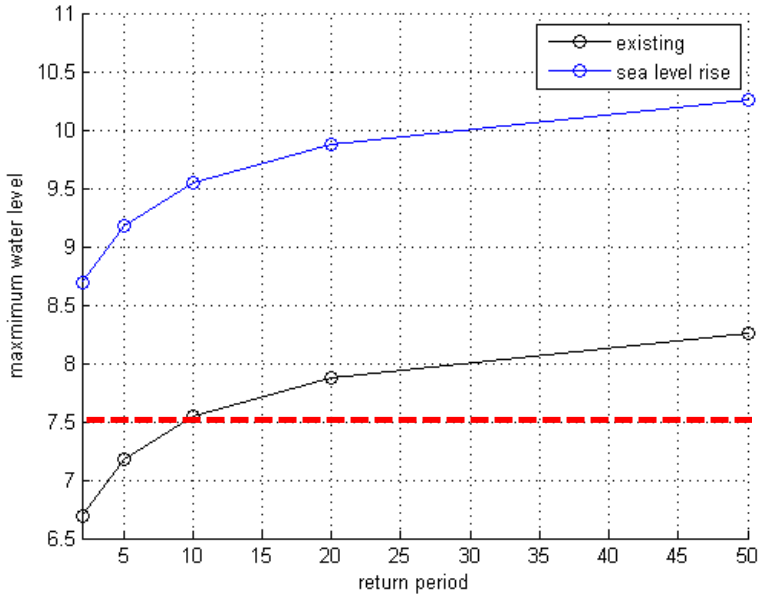

Figure 24 **Maximum water levels at the middle basin side of Mill Pond Road (feet-NAVD) for each return period up to 50-years. Current lowest roadway point is 7.5 feet NAVD as shown by the red line.**

5. PERMITTING PATH

The proposed culvert restoration project proposed herein will have significant impacts to both environmental resources and regulatory areas that will trigger the need for environmental permits from local, state, and federal agencies. The coastal wetland resources that would potentially be impacted would include saltmarsh, land subject to coastal storm flowage, tidal flat, BVW, coastal beach, and land under ocean. However, it is anticipated that regulatory agencies would potentially look favorably on an alternative that would have both ecological habitat restoration and storm drainage benefits. Prior to preparing or filing any permit applications, the Woods Hole Group recommends the following pre-permitting consultations and meetings in order obtain input and/or guidance from the public, stakeholders, and regulators.

- **Public Outreach Meeting:** It is recommended that the Town host a Public Outreach meeting that is intended to engage the public and other stakeholders about the project. The Town will receive that they can incorporate, as necessary, prior to pursuing permits.
- **Pre-Application Meeting with Regulators:** Prior to filing any permit applications, Woods Hole Group recommends to consult with regulatory agencies in a pre-application meeting with the Massachusetts Environmental Policy Act Office (MEPA), Massachusetts Coastal Zone Management (CZM), Massachusetts Department of Environmental Protection (MassDEP), USACE, and others as necessary. The goal would be to gain feedback about the proposed design, resource and property impacts, and permitting path for the project.
- **Massachusetts Division of Marine Fisheries Consultation:** The Massachusetts Division of Marine Fisheries (DMF) should be contacted for information regarding essential fish habitat and time of year restrictions for resources occurring in the Mill Pond project area. The

purpose of this will be to obtain written determinations from DMF indicating whether the project will be subject to time of year restrictions for in-water work.

The project is not located within Natural Heritage's Estimated or Priority Habitat for rare species so they will not need to be consulted. Mill Pond is also not located within an Area of Critical Environmental Concern (ACEC) and does not appear to have any Environmental Justice (EJ) populations within several miles of the site.

Following the pre-permitting consultations and meetings with stakeholders and regulatory agencies, Woods Hole Group anticipates that at least six (6) environmental permits and/or licenses will need to be filed for any of the four (4) alternatives:

1. **Massachusetts Environmental Policy Act Environmental Notification Form:** Since the project will be submitted as a Notice of Intent (NOI) for an Ecological Restoration Project to the Town of Falmouth Conservation Commission, therefore, a Division of Marine Fisheries (DMF) review and a DEP Section 401 Water Quality Certification must be obtained before the Town of Falmouth Order of Conditions can be issued. It is expected that the Mill Pond project will trigger (at a minimum) the Massachusetts Environmental Policy Act (MEPA) Wetlands, Waterways and Tidelands threshold 301 CMR 11.03(3)(a)1.a. for alteration of one or more acres of salt marsh or bordering vegetated wetlands based on a review of the modeling results. This threshold carries the requirement for a mandatory Environmental Impact Report (EIR), and the total area of impact to wetland resources will be required for permitting.

   However, according to 301 CMR 11.11 of the MEPA regulations it is possible to request a waiver from the requirement of an EIR in cases where preparation of the EIR would result in an undue hardship for the proponent, and the EIR would not serve to avoid or minimize damage to the environment. Given the environmental benefits associated with the project and the extensive analyses conducted in support of the project, it is likely that a waiver request would be viewed favorably. As such, the project team proposes the preparation of an Expanded Environmental Notification Form (EENF) that allows for the request for a waiver of the mandatory EIR. The EENF will demonstrate the project meets the standards for a waiver per 301 CMR 11.11(1)(b) and 11.11(3)(a) and (b). The EENF will be prepared following the form and content of an EIR as described in 301 CMR 11.07(6). The document will contain detailed information describing and analyzing the project and its alternatives and will assess the potential environmental impacts and mitigation measures. The stormwater regulations will be reviewed relative to the selected alternative, and, if necessary, a Stormwater Management Plan may need to be developed. Key members of the project team will prepare for and attend the required on-site meeting to present the project to MEPA officials.

2. **MassDEP Section 401 Water Quality Certificate:** Per 314 CMR 9.04(12), an application for a Section 401 Water Quality Certification (WQC) will be required to be filed with the Massachusetts Department of Environmental Protection (MassDEP) Wetlands and Waterways Program if the project will involve dredging of 100 cubic yards or greater material in the area of the culvert and culvert headwall and/or the upstream flood tide shoal to help restore flow. A WQC would require that sediment samples to be collected and tested to show the physical characteristics of the dredge material and compared with regulatory thresholds listed in 314 CMR 9.00 for the proposed placement or disposal

options. Plans for disposal and/or placement of sediment excavated would be described, including procedures and locations for temporary storage and containment, dewatering, points of discharge, construction sequencing, and expected duration of work.

3. **Conservation Commission Ecological Restoration Notice of Intent:** An application for an Ecological Restoration Notice of Intent (NOI) to the Truro Conservation Commission will be prepared and submitted following the receipt of the MEPA and Water Quality certificates for the project. Documentation will be provided showing that the Mill Pond project meets the definition of Ecological Restoration per 310 CMR 10.04, and that the project meets the eligibility criteria for a Tidal Restoration Order of Conditions per 310 CMR 10.13(5). An Operation and Management Plan (O&MP) will be prepared and consist of a general document (i.e., not an adaptive monitoring and management plan) prescribing basic requirements for operations, inspection and maintenance of the site. Following the filing of the Ecological Restoration NOI, the application will be heard by the Truro Conservation Commission at a public hearing to obtain a Restoration Order of Conditions (ROOC) for the project (as long as does not trigger a Limited Project).

4. **U.S. Army Corps of Engineers Permit:** An application for a US Army Corps of Engineers (USACE) Permit will be prepared and submitted to the New England District office. Prior to preparation of the permit application the USACE will be consulted regarding the relevant permitting process and whether a Section 404 General Permit or Individual Permit is required. It is likely that due to the resource impacts that a more extensive Individual Permit could be required. Alternatively, this project could potentially be eligible for an aquatic ecosystem restoration project under Section 206 of the USACE's Continuing Authorities Program if it could be demonstrated that historic marsh habitat was lost by the Bikeway embankments/culverts and that restoration of tidal flow and flushing will reintroduce salinity that would eliminate Phragmites restoring native marsh. Documentation will be developed in consultation with the MA Historical Commission (MHC) during the Section 106 compliance process, as well as results of an archaeological survey and consultations with the local tribal organizations.

5. **MassDEP Chapter 91 License:** Per 310 CMR 9.05(2), an application for a Chapter 91 License will be required to be filed with the MassDEP Wetlands and Waterways Program because the project will involve work that includes excavation and dredging in navigable waterways of the Commonwealth (i.e., below the MHW line). The filing will include a narrative with site maps and engineering plans. This application will be filed after a ROOC for the project has been obtained from the Truro Conservation Commission.

6. **Massachusetts Coastal Zone Management Federal Consistency Review:** An application to MA Coastal Zone Management (CZM) for Federal Consistency Review will be prepared and submitted due to the trigger for a WQC and USACE permits. The application will address consistency of the project will all applicable CZM policies.

7. **MassDOT Chapter 85 Permitting:** Additionally, culverts with a width equal to or greater than 10-ft in will require Chapter 85 Permitting with MassDOT. Therefore, if Alternative 1, the 10-foot-wide by 8.5-foot-wide culvert is selected as the preferred alternative then it would require Chapter 85 permitting with MassDOT. This would add significant time and costs to the permitting scope. The 8-ft wide culvert and breach alternatives would be exempt.

6. FUSS & O'NEILL CONCEPUTAL DESIGN REPORT

Project partner Fuss & O'Neill conducted a separate engineering design analysis for the four (4) alternatives presented herein and then drafted conceptual design drawings. The details of the work are found in Attachment B and included the following items:

- Conceptual layout and cross-section drawings for each of the four (4) alternatives.
- A preliminary geotechnical analysis based on the soil borings collected in 2021.
- Scour countermeasures will be developed based on Woods Hole Group scour calculations.
- Opinion of construction and long-term maintenance costs
- Alternatives analysis table

7. DISCUSSION AND RECOMMENDATIONS

The goal of this study was to develop conceptual restoration alternatives for the existing, undersized culvert underneath Mill Pond Road that would restore tidal flow, enhance habitat, and improve storm drainage in Mill Pond while minimizing impacts to abutters. Woods Hole Group developed a hydrodynamic model, HEC-RAS 2D, for the Mill Pond system based on collected field data and available data sets to evaluate existing conditions. This study confirmed that the existing 3-foot-diameter culvert under Mill Pond Road attenuates the tidal flow into Mill Pond and causes high flow velocities that have resulted in scour holes on either side of the culvert. However, the model results also determined that the former railroad berm did not have a significant influence on tides or storm flooding and drainage, indicating that there is likely no action needed there to improve the hydrodynamics of the Mill Pond system.

Woods Hole Group then developed four (4) alternatives based on prior studies that were then evaluated using the HEC-RAS 2D hydrodynamic model including:

- Alternative 1 – 10 foot wide by 8.5 foot high open bottom culvert.
- Alternative 2 – 8 foot wide by 8.5 foot high open bottom culvert.
- Alternative 3 – 15 foot wide open channel "breach" with 2H:1V sideslopes
- Alternative 4 – 95 foot wide breach with a 10-foot-wide inner channel, 14-foot-wide saltmarsh benches, and 2H:1V and 4H:1V sideslopes.

A 1D hypsometric model was used to help determine the optimal hydraulic opening sizes, which corroborated the Louis Berger Group studies that indicated a 10-foot-wide culvert would restore full tidal flow and minimize lag time in drainage. The model results determined that the each of the four (4) alternatives provided similar levels of tidal restoration and storm drainage improvements, and which were all improvements over existing conditions. Increasing the tidal range will potentially increase the habitat available for salt marsh and shellfish species by upwards of 3.5 acres. Each of the alternatives will also open the provide more passage for recreational use such as paddlers while reducing safety hazards by providing plenty of headspace.

The maximum storm surge water levels in Mill Pond are similar for all 4 alternatives as well and are increased over existing conditions; however, there do not appear to be any additional significant impacts to private property, dwellings, structure, wells, or septic systems at this time. The roadway overtops during storms larger than the 10-year storm event, which reduces the contributions of storm flooding through the culvert for larger storms anyways.

Since each of the four alternatives produces similar model results, selecting a preferred alternative to pursue final design, permitting, and construction becomes more of a decision based whether there is a preference by the community to maintain the road and install a culvert using Alternatives 1 or 2, or abandon the road and create in an open channel using Alternative 3 or 4. If the road is kept, it is likely to be at risk from flooding during high spring tides in 2070, which is on the order of the design lifetime of a culvert. Therefore, the coastal resiliency of the road will have to be improved through armoring of the embankment and raising the roadway surface at least 2-feet to keep pace with sea level rise. A road raising of 2-feet would require over 1,200 feet of roadway to be raised, which is a significant effort that is likely much more costly than the culvert replacement itself. These issues will be raised during subsequent presentations to the Truro Board of Selectmen in an effort to receive support for an alternative to pursue final engineering design, permitting, and construction. It will take the community coming together to make some hard decisions about what direction that the Town should take for Mill Pond Road and its culvert.

Future considerations that should be considered for the next phase of work include the following:

- Research the history of the historic Grist Mill location to avoid possible disturbance to ruins during construction. It may be necessary for the Town to consult with an archelogy team to determine whether a dig needs to be conducted.
- The 15-ft and 90-ft wide breach options have the potential to allow for wave transmission that is currently attenuated by the roadway and culvert. While these would most likely be small, locally generated wind-waves within Pamet Harbor, it is possible that they could still cause adverse impacts to the shoreline and coastal bank that have not been exposed to any wave energy in recent time. Therefore, it is recommended that a wind-wave generation and transmission analysis be conducted if one of the breach alternatives, #3 or 4, are chosen.
- Both the hypsometric 1D model and HEC-RAS 2D model determined that the island located approximately 100-feet upstream of the Mill Pond inlet causes a weir effect that impedes drainage of Mill Pond. This results in the low tide elevation (i.e. MLW) not to change appreciably from existing to proposed (alternatives) conditions. It is not clear whether increased tidal flow from implementing one of these alternatives will erode this feature and negate this weir effect or whether it will remain since it is located over 100-feet from the culvert.
- No sediment data is available from within the pond so it is unclear whether any of the fine sediment will be mobilized once tidal flow is fully restored. The fine material tends to be cohesive in nature meaning that it can resist mobilization by flows as compared to fine sand. Collection of shallow push cores in the pond may help determine the depth of this fine layer, and whether there is any native marsh peat or sand underneath. This may provide some insight with regards to whether there is the potential for a large release of fine material from Mill Pond.
- Dredging of the island and even Mill Pond bed could be explored to remove the weir effect and fine material on the surface, however, that would constitute a significant additional effort in terms of analyses, engineering design, and permitting. It may be advantageous to implement an alternative prior to going through a significant additional effort to permit new dredging within a wetland resource area for possibly minimal gains since Mill Pond has such as small surface area.
- If one of the breach alternatives are selected, the Town should further explore enhancing public benefit of the project by creating public access with a trail over the former roadway.

- Town should continue its public outreach especially if a breach alternative is chosen since road abandonment is likely to be a highly debated topic.

8. REFERENCES

Brunner, G. W. "HEC-RAS River Analysis System. Hydraulic Reference Manual. Version 1.0." Hydrologic Engineering Center Davis CA. 1995.

Cialone, et al. USACE. North Atlantic Coast Comprehensive Study (NACCS) Coastal Storm Model Simulations: Waves and Water Levels. January 2015.

The Louis Berger Group, inc. "Hydraulic Modeling Report for Mill Pond Restoration Project", January 2013.

NOAA. Job 634448. Topobathymetric Model for the New England Region States of New York, Connecticut, Rhode Island, and Massachusetts, 1887 to 2016.

NOAA, 2017. Global and Regional Sea Level Rise Scenarios for the U.S., Technical Report NOS CO-OPS 083, Silver Spring, MD, Unites States.

NRCC Cornell University. 2016. Extreme Precipitation in New York and New England. Technical documentation and user manual.

Richards, Tim. *Discovering A Tide Mill in Truro.* 7 February 2021. The Tide Mill Institute. https://www.tidemillinstitute.org/discovering-a-tide-mill-in-truro/

Woods Hole Group, 2018. Eagle Neck Creek Salt Marsh Restoration Project Technical Memorandum, *Task 2: Existing Culvert Sizing and Hydrologic & Hydraulic Assessment,* dated March 08, 2018, E. Falmouth, MA.

US ACOE. North Atlantic Coast Comprehensive Study: Resilient Adaptation to Increasing Risk. Final Report January 2015.

Unknown. *First Train Reaches Provincetown.* MassMoments. https://www.massmoments.org/moment-details/first-train-reaches-provincetown.html

Attachment A – Existing Septic and Well Locations of Properties in Vicinity of Mill Pond Road

Location Map Not to Scale

LEGEND	
⊛	WELL
× ⊗ ◉ ▭	SEPTIC

Graphic Scale

100 50 0 100 300

1" = 100'

18-0189_SEPTICS5.DWG

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Surveyed By:

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107 Waterhouse Road
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Title:

Existing Septic and Well Locations of Properties in the Vicinity of Mill Pond Road Prepared For: Town of Truro, MA

Project Number:	18-0189-02
Dwg File:	18-0189_SEPTICS5.dwg
Scale:	1" = 100'
Date:	04/29/2022
Approved:	Joel Kubick
Drawn:	Lindsay Pisapio

Attachment B – Fuss & O'Neill Conceptual Design Report

Mill Pond Salt Marsh Restoration Alternatives Assessment Technical Memorandum

Town of Truro

Truro, MA

June 2022

FUSS & O'NEILL

317 Iron Horse Way, Suite 204
Providence, RI 02908

Project No. 20181290.A10

FUSS & O'NEILL

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Attachments **End of Report**

FUSS & O'NEILL

Executive Summary

Currently, the Mill Pond Road culvert restricts tidal flow into Mill Pond from Pamet Harbor and, ultimately, Cape Cod Bay. The purpose of this project is to replace the damaged and undersized culvert at the Mill Pond Road dike with a larger structure or alternative breach design.

Structural, geotechnical analyses, and this technical memorandum were developed by Fuss & O'Neill, Inc. (F&O) in conjunction hydrologic/hydraulic analyses performed by Woods Hole Group (WHG). These analyses were completed to assess conditions and support development of 30% conceptual design drawings for the proposed alternatives to replace the of the existing 36-inch corrugated polyethylene pipe culvert on Mill Pond Road. A total of four alternatives were considered in the development of this report including two larger open bottom precast culverts and two embankment breach formations.

To assess the severity of the restriction and the potential for ecological restoration, the anticipated effects of replacing the undersized culvert with a larger culvert structure or open channel entailing abandonment of the road were evaluated. Woods Hole Group, Inc. (WHG) assessed the current and proposed alternative culvert and breach scenarios and provided recommendations for channel bed scour [protection measures for respective alternatives.

- 8'W x 8.5'H Three-Sided Box Culvert
- 10'W x 8.5'H Three-Sided Box Culvert
- Breach Channel with 65' top width
- Breach Channel with 95' top width

An assessment of the above alternatives was completed, entailing consideration of construction costs, operation and maintenance costs and consideration of other evaluation criteria. Upon completing this assessment, it was determined that a breach channel with a 65-foot top width is the preferred alternative for subsequent design and implementation, subject to review and discussion with the Truro Selectboard and receipt of public input from ongoing outreach efforts

FUSS & O'NEILL

1 Project Description and Purpose

1.1 General Site Description and Project Purpose

The Project Site (Site) is located on Mill Pond Road (MPR) where the roadway crosses over a tidal creek referred to as the Mill Pond Channel stemming from Pamet Harbor to Mill Pond in Truro, Massachusetts. The Mill Pond Channel conjoins with the Pamet River and subsequently forms Pamet Harbor.

The earthen causeway supporting Mill Pond Road (MPR) effectively functions as a dike restricting tidal flows to, and drainage flows from, the Mill Pond impoundment. A 32-inch corrugated polyethylene pipe (CPP) conveys drainage from Mill Pond to the Pamet River (Figure 1).
Mill Pond has an extensive usage history dating back to the Revolutionary War Period. During the mid-19th century, Truro and other Cape Cod towns enjoyed economic success as major producers of salt from its shoreline waters. Mill Pond was regularly used as one of the largest salt works in New England. In 1869, a railroad bed was constructed across Pamet Harbor, which restricted Tidal Flows to Mill Pond, converting the impoundment to a freshwater marsh.

Figure 1 — Mill Pond Road Culvert Location

The freshwater condition remained until large storm events in 1978 and 1991 completely breached the former railroad embankment. The existing 32-inch CPP pipe was installed after the 1991 storm as a

temporary measure, with the intent to subsequently install a larger timber bridge as a permanent structure. The bridge was never constructed and the 32-inch CPP remains today.

The roadway embankment covering over the culvert is subject to wave and roadway runoff erosion, resulting in a narrowing of the roadway shoulders over the culvert, and requiring regular repair and replenishment of stone armor scour protection.

The purpose of this project is to replace the undersized culvert that tidally restricts Mill Pond with a larger structure or channel breach alternative that will allow increased tidal flushing to restore degraded salt march resources, provide water quality improvements, and improve drainage runoff flows from the impounded system under both normal and storm flow conditions.

Woods Hole Group (WHG) is currently completing refined hydraulic modeling of alternative culvert sizes and configurations, in conjunction and collaboration with the structural and civil layout assessments described in this technical memorandum. The results of WHG's analyses and recommendations are contained in a separate technical memorandum to be provided to the Town of Truro in support of this project.

1.2 Existing Conditions

Conditions observed at the project site in May and June 2021 are described in the following sections. An existing conditions survey with current tidal elevations is provided as Attachment A.

1.2.1 Culvert and Downstream Channel/ Riverbank

The existing 32-inch diameter CPP below MPR has a total length of approximately 54 feet and is sloped from east to west at approximately 0.7 percent, having invert elevations of -2.03 and -1.6 (NAVD88) at its downstream (west) and upstream (east) ends, respectively. The downstream end of the culvert emerges from the causeway into a stone armored channel that discharges to the downgradient connecting to Pamet River.

Figure 2 — Downstream Culvert Outlet and Stone Armor Slope Protection (Facing North)

The areas surrounding the Mill Pond Channel are dominated by tidal conditions and supports a saltwater environment exhibited by the channel being surrounding by salt marsh vegetation and marsh flats farther downstream. The downstream channel is bounded by the Pamet Harbor Yacht Club to the north and Mill Pond Road/Post Drive to the south.

Approximately 1,600 feet downstream of the CPP, a breached former railroad embankment conveys tidal flow from Mill Pond to Pamet Harbor. The former railroad embankment appears to consist of sand with former railroad abutments of cut stone exposed in places at the breach..

The downstream face of the embankment is currently in poor condition as exhibited by displaced slope protection and debris build up around the culvert discharge point. The Town of Truro completes maintenance on the embankment annually to restore displaced riprap and repair areas of erosion. In addition, a scour hole is positioned at the discharge area at the beginning of the Mill Pond Channel.

Figure 3 — Upstream Culvert Outlet, Scour hole and Shoaled Sediment (facing east)

1.2.2 Upstream Channel and Impundment

The Mill Pond tidal impoundment upstream of the culvert receives water from upland areas via groundwater and overland runoff. The impoundment is bounded by salt marsh and other intertidal habitat around its perimeter, with forested residential properties bording the wetlands to the south, east and north, with a portion of the impoundment northern bank formed by the embankment slope supporting Depot Road.

Figure 4 — Upstream Culvert Outlet and Stone Armor Slope Protection (facing south)

The upstream end of the CPP projects from the earthen causeway supporting MPR, which is partially covered by stone armor protection over and adjacent to the culvert. Indications of a tidal restriction near the culvert's end include a scour hole with an intertidal island formed by shoaled sediment, a significant tidal lag and muting, poor drainage during inland precipitation events, and bank erosion adjacent to the culvert.

1.2.3 Roadway Approaches

The existing paved surface of MPR consists of two travel lanes (one lane in each direction) with a total width of approximately 18 feet. Metal beam guardrails are located on both sides of the roadway at its

crossing over the culvert, with approximately 12-inches of clearance from the guardrail face to the edge of pavement (little to no shoulder).

Embankment slopes behind the guardrails exhibit signs of erosion and steepening, providing inadequate lateral support to the guardrail system, as indicated by leaning posts supporting the horizontal rail on the roadway's southbound (western) travel lane. Concrete posts are positioned beyond the ends of the metal beam guardrails in both directions at an approximate 8 foot spacing.

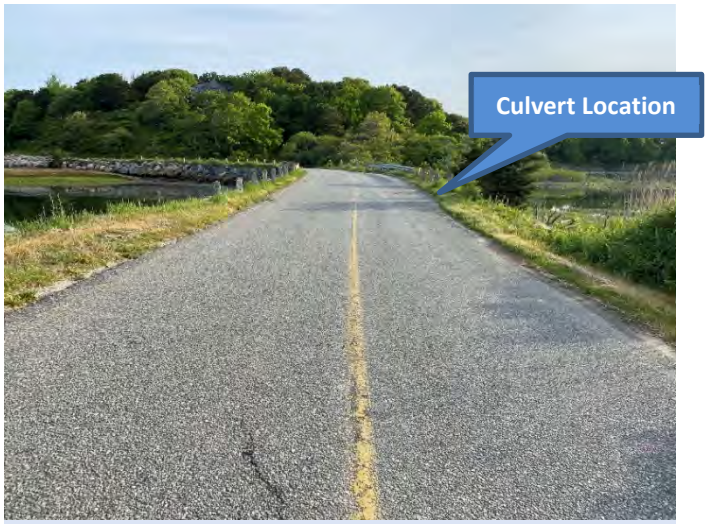

Figure 5 — Mill Pond Culvert Roadway Approach (facing north)

Survey measurements along the roadway's centerline profile on both sides of the culvert indicate low points approximately 80 feet north and 115 feet south of the culvert (0.1 feet and 0.65 feet lower, respectively, than the roadway elevation at the culvert). The roadway is pitched to the upstream (east) slope in proximity to the culvert, with a small section south of the culvert nearly flat.

1.2.4 Roadway Stormwater Drainage

Stormwater runoff north of the culvert generally flows along the roadway's curb at the edge of pavement, with a leaching catch basin on the southbound (west) lane approximately 420 feet north of the culvert providing partial drainage. Runoff continuing past this drainage structure generally is generally conveyed as sheet flow to the shoulder and adjacent land along the northbound (east) lane, with the majority of runoff discharging from the road at the low point immediately north of the culvert and adjacent to a secondary residential driveway and sandy pull-out area.

Runoff arriving at the culvert from the north continues to the low point south of the culvert, where it generally is conveyed as sheet flow to Mill Pond as along the northbound shoulder and slope. A leaching catch basin is located on the northbound shoulder approximately 160 feet south of the culvert.

1.2.5 Flood Zones

Federal Emergency Management Agency (FEMA) Flood Map No. 25001C0227J for Barnstable County (with an effective date of July 16, 2014) depicts the project site as being located within a 'Zone AE' special flood hazard area with a 1% annual chance base flood elevation of 12 feet (NAVD88). The downstream tidal channel west of MPR is designated as a 'Zone AE' special flood hazard area with a 1% annual chance base flood elevation of El 13 feet (NAVD88). FEMA Flood Zone boundaries are depicted on the Existing Conditions Plan provided as Attachment A.

1.2.6 Contaminated/Hazardous Materials

There are no known or expected hazardous materials or contaminants located within the roadway and in off-roadway areas within the Project Site that would need to be managed during construction associated with the replacement of the existing culvert or excavation of an open channel alternative. Supplemental investigations of the environmental quality of soils comprising the causeway embankment are recommended in the subsequent project phase to confirm the above understanding.

1.3 Scope of Report

The primary scope of this report is to present findings of preliminary geotechnical and structural analyses completed to date and provide conceptual layouts for replacement culvert and open channel alternatives following removal of the Mill Pond Road culvert to improve tidal flows to Mill Pond and restore deteriorated salt marsh areas.

2 Geotechnical Investigation and Design Evaluation

The following sections summarize findings from a geotechnical investigation and preliminary design analysis completed in support of the replacement of the existing culvert. The contents of this section are subject to the limitations provided as Attachment B.

2.1 Program Objective

The objectives of the subsurface investigation was to assess subsurface conditions at the Mill Pond Road culvert (Site). To achieve these objectives, Fuss & O'Neill completed the following field investigation:

- Conduct two (2) geotechnical boreholes (B-1 and B-2) at the Site and collect soil samples
- Visually classify soil samples
- Complete three (3) gradation analyses on selected representative soil samples

Prior to conducting this investigation, the Natural Resources Conservation Service (NRCS) soil report for the Site, provided as Attachment C, was reviewed. The results of the subsurface investigation and laboratory testing, and preliminary design assessments, are presented below.

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2.2 Subsurface Exploration Program

The subsurface exploration program consisted of two (2) boreholes (B-1 and B-2) completed by Soil X, Corp of Leominster, Massachusetts under subcontract to Fuss & O'Neill, Inc. Boreholes were completed on June 1 and 2, 2021 utilizing a truck-mounted drill rig. Hollow-stem augers were used to set the casing at each borehole. Boreholes were advanced using 4-inch inner-diameter flush wall casing and tricone roller bit. The approximate locations of the borings are depicted in Figure 7. All borings were observed and logged by a Fuss & O'Neill engineer. Boring logs are provided as Attachment D.

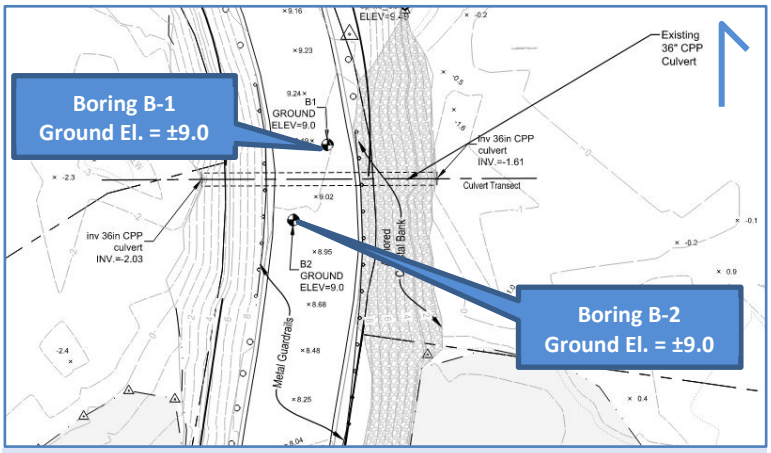

Figure 6 — Subsurface Boring Locations

Borings were advanced to depths ranging from 51 feet to 80 feet below the existing ground surface. Split spoon soil samples were obtained continuously to about 21 feet and then at intervals of 5 feet thereafter using the Standard Penetration Test (SPT) per ASTM D-1586 at each borehole location. The SPT consists of driving a 2-inch outside-diameter split spoon sampler 24 inches with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler from 6 to 18 inches is the Standard Penetration Resistance, also known as the SPT N-value, which is a relative indicator of the *in-situ* soil relative density or consistency. Boreholes were backfilled with tamped soil cuttings upon completion covered with cold patch asphalt prior to leaving the site.

During explorations, subsurface soils were visually classified utilizing the Burmister Classification System. This system describes soil composition based upon the percentage of soil particle size present in the sample with the major soil particle size listed first following other soil components described as "and" (indicating 35-50% by weight), "some" (indicating 20-35% by weight), "little" (indicating 10-20% by weight), or "trace" (indicating 0-10% by weight). Descriptions of each soil strata encountered during the investigations are provided in the Subsurface Profile section below.

Borehole B-1 was terminated without refusal at a depth of approximately 80 feet below the ground surface. The casing was driven to a depth of 74 feet below the ground surface and the split spoon sampler was advanced to the termination depth. Borehole B-2 was terminated without refusal at a depth of approximately 51 feet below the ground surface. The casing was driven to a depth of 49 feet below the ground surface and the split spoon sampler was advanced to the termination depth.

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2.3 Subsurface Profile

Generalized subsurface conditions at the Site are described below, based on the results of the explorations and observations at the time of drilling.

- **General Description:** Brown sandy fill over brown to reddish brown native sand.

- **Fill:** Very loose to medium dense, brown, fine to medium sand with varying amounts of fine gravel and trace amounts of silt. One sample within the fill material contained trace amounts of woody fibrous material. Approximately seven (7) feet of sandy fill material was encountered in borings B-1 and B-2.

- **Native Sand:** Loose to medium dense, brown to reddish brown, fine to coarse sand with varying amounts of fine to coarse gravel and trace amounts of silt. At the transition point between the fill material and the native sand two samples had a main constituent of fine gravel with some fine to coarse sand and trace silt. The native sand layer was encountered beneath the fill in both borings and extended to the termination of each boring.

2.4 Laboratory Testing

Laboratory testing consisted of three (3) grain size analyses (per ASTM D6913) performed by Thielsch Engineering of Cranston, Rhode Island. Testing was performed to confirm visual classification of soils in the field. The results of the sieve analyses are included as Attachment E and are summarized below in Table 1.

Table 1
Summary of Laboratory Test Results

Sample No.	Identification Test		
	Sieve Analysis (ASTM D6913)		
	% Gravel	% Sand	% Silt
B-1 / S-2	0.0	97.7	2.3
B-2 / S-5	5.9	93.1	1.0
B-2 / S-12	6.8	92.0	1.2

2.5 Groundwater Conditions

Surveyed ground surface elevations at borings B-1 and B-2 are reported by Woods Hole Group at EL. 9.03 and 8.97 (NAVD88), respectively. Due to the tidal influence present at Mill Pond and the Pamet Harbor, groundwater elevations may fluctuate due to the tidal cycle, in additional to seasonally and due to storm- or drought-related events.

Groundwater was observed at the time of the subsurface investigation in each boring at depth of 7 feet below the ground surface. Since the borings were advanced utilizing cased borehole techniques involving water being poured into the boreholes during the driving process, natural groundwater levels are expected to vary from the measured values. Groundwater observation wells were not installed at the site.

A summary of groundwater elevations measured within the boreholes is provided in Table 2.

Table 2
Summary of Boring Groundwater Elevations

Boring No.	Date	Groundwater	
		Depth Below Ground (ft)	Approx. Elev. (ft, NAVD88)
1	6/1/2021	7	2.03
2	6/2/2021	7	1.97

2.6 Geotechnical Design Evaluations and Recommendations

Geotechnical design evaluations and recommendations presented below were developed by RMA GeoEnvironmental (RMA) under subcontract to Fuss & O'Neill. RMA was provided the geotechnical data report developed as part of the initial subsurface investigation as well as preliminary conceptual drawings for the culvert alternatives under consideration, in support of their preliminary design evaluations and foundation recommendations.

2.6.1 Seismic Design Parameters and Liquefaction Potential

Lower zones within the subsurface profile appear to have the potential for liquefaction under potential future seismic events and should be evaluated further under future design analyses. Depending on the results of those future analyses, alternative ground improvement methods should be considered and identified for potential implementation during the project's construction phase, as described in Section 2.6.2 below.

2.6.2 Recommended Foundation

A preliminary bearing capacity analysis was completed by RMA utilizing the subsurface investigation information and conceptual design drawings provided by Fuss & O'Neill. The analysis was completed using three independent bearing capacity equations (Bowles, Terzaghi, and Vesic) in accordance with established engineer practice and accepted principles of soil mechanics. These methodologies rely on weighted average of the N-values obtained during the subsurface investigation for footing influence depths that are corrected for field conditions, overburden, and groundwater table condition along with strength parameters (unit weight, friction angle, etc.) correlated from boring information.

Based on the results of the analysis, allowing for one-inch of total long-term settlement, the wingwalls and strip footings depicted on the conceptual drawings will provide adequate support for the proposed culvert structure, provided that the footings bear on a minimum of 12 inches of compacted crushed

stone wrapped in non-woven geotextile fabric, as shown. This evaluation assumes a bearing pressure of 3,500 pounds per square foot (psf) for the culvert structures under consideration; as shown on the conceptual drawings, recommended footings should be designed with a width of 4 feet and be embedded below the scour depth determined from WHG's scour analyses.

Due to the loose lower zones observed within the boring's soil profile, a ground improvement method such as rammed aggregate piers should be considered to reduce the potential for settlement under a potential future seismic event. The scope of future investigations should consider the identified preferred alternative from the current evaluation; ground improvement methods would only be warranted for an alternative to construct a replacement culvert, and would not be required under either breach scenario.

Rammed aggregate piers (RAPs) consists of vertical columns of aggregate installed on a grid within the footprint of the construction. Piers are installed by placing and mechanically tamping lifts of aggregate through a bottom-fed pipe. The pipe is driven to the bottom of the pier depth and subsequently withdrawn and tamped downward during installation of the aggregate, forming bulbs along the length of the pier. Aggregate piers improve conditions at the site by displacing, and thereby, densifying the surrounding soil at each column and transferring loads from the spread footings to the underlying suitable soil.

Spread footings at the wingwalls and along the length of the alternative culvert walls and wingwalls will be constructed over the improved area following implementation of the rammed aggregate piers. As there is no dewatering required and the installation process does not generate any spoils during construction, this soil improvement approach is typically used to reduce the potential for long-term settlement where liquifiable conditions are identified under potential future seismic events.

2.6.3 Embankment Considerations

Within the limits of proposed excavation, sections of the embankment that are disturbed as part of activities to construct the replacement structure will be reconstructed to provide vertical and lateral support for both the new structures and the overlying roadway. This will be achieved by placement of an appropriate structural backfill (e.g., gravel borrow) and ensuring placement of this material under controlled conditions to achieve the required compaction and in-place density stated in the project's technical specifications.

For any construction during freezing weather, soil bearing surfaces in exposed culvert footing excavations should be protected from frost by use of insulated blankets, ground heaters or other acceptable methods. Specifications for protection and placement of materials would be developed under future phases of design entailing a replacement culvert structure, and would not apply for either alternative open channel configuration.

It is understood that potential increases of the embankment's crest (roadway) elevation may be evaluated as potential variants of the culvert alternatives assessment presented in the sections below. Considerations relative to either raising or not raising the embankment crest include the following:

- Not raising the embankment crest will result in more frequent and severe future inundation/overtopping conditions under sea level rise projections outlined by Woods Hole Group's June 2022 Hydraulic Analysis Report. These overtopping events will impact usability of MPR for normal and emergency response uses. In addition, overtopping events will result in increased maintenance and repair of the road and slopes due to scour erosion.
- Raising the embankment crest will reduce, and possibly avoid depending on the magnitude of the increase, the impacts noted above however will require supplemental field investigations and analyses to evaluate horizontal layout and structural considerations in designing a higher embankment configuration that would be structurally adequate to support a public road.
    - Horizontal considerations include potential impacts to adjacent wetland resources by the increased base with of the embankment's cross-section that would be entailed with slopes remaining at their current configuration (i.e., not increasing the proposed slopes, which would increase stability concerns).
        - Such impacts to adjacent wetlands may be prohibitive considering the length of road that would need to be raised (approximately 1,600 feet). In addition, soils adjacent to the existing embankment may not be structurally suitable to support the weight of soils placed as to laterally expand the embankment, and thus would need to be excavated and replaced with suitable soil or augmented by geosynthetics or other ground improvement methods.
    - Structural considerations include potentially incorporating retaining walls along the top and/or bottom of the embankment to provide lateral support for soils placed to increase the embankment crest in order to avoid or minimize the extent of encroachment into adjacent wetlands (that would otherwise result from a widening of the embankment's base, as described above).
        - A number of wall structure types and configurations could be evaluated. Supplemental subsurface investigations would be required to evaluate soil properties along the length of the embankment in support of subsequent design analyses. If unsuitable soil conditions are identified, improvement methods and/or deeper wall configurations would likely be required.

2.7 Geotechnical Construction Considerations

2.7.1 Surface and Groundwater Management

As noted above, water elevations within the boreholes were measured at El. 1.91 – 2.03 feet (NAVD88) during subsurface exploration. These observed elevations are in the vicinity to the Mean High-Water elevation (El. 2.75 feet, NAVD88) immediately upstream of MPR. Water levels are expected to fluctuate moderately with the varying tidal elevations and seasonal conditions during construction.

Based on the proposed culvert invert elevation (El. -1.6, NAVD88) and conceptual culvert/foundation system developed from preliminary foundation design evaluations to date, it is expected that excavations may be required to El. -9.6 or lower, which is approximately 12-feet below observed groundwater levels

within the causeway. Temporary seepage cutoff (e.g., steel sheeting) and groundwater dewatering systems will need to be designed and implemented by the contractor to maintain adequately dewatered conditions for construction of the foundation elements.

As part of these measures, surface water flowing within the channel will need to be maintained throughout the period of construction. It is expected that flow will be maintained through the existing culvert during the period of construction of the proposed culvert or open channel. Upon completion of construction of the replacement culvert, or partial construction of the alternative breach channel, the existing culvert will be abandoned in place or removed and replaced with compacted backfill.

2.7.2 Excavations

It is expected that approximately 19 vertical feet of embankment fill material will need to be excavated below the roadway surface to remove embankment (fill) soil supporting MPR and underlying native soil to allow placement of proposed foundation elements and culvert/wall structures on a suitable subgrade surface.

Temporary excavation slopes will range between a maximum of 1.5H:1V to 2H:1V for culvert alternatives, unless otherwise reinforced or shored, to allow construction equipment to safely reach the deepest/interior work areas. Consideration of the type of equipment expected for construction will affect the configuration of shoring systems and platforms for position of equipment required to construct culvert structures, if selected. It is expected that embankment breach alternatives can be constructed without any temporary shoring systems.

While other cutoff and shoring systems may also provide suitable conditions for mobilization of materials and equipment in support of construction operations, it is expected that steel sheeting would be most cost effective given the limited area and depth of excavation required below expected groundwater elevations, as well as this type of system being most widely used by contractors in the region.

2.7.3 Obstructions

Based on our observations at the site and review of available reports and records, it does not appear that structures or other objects that would obstruct excavation work associated with the alternative culvert structure or channel configurations under consideration. If such structures or objects are encountered and are determined to be abandoned or remnant structures, it is expected that they will be partially or completely removed as required to allow placement of proposed materials and structures in accordance with the developed drawings and specifications.

2.7.4 Protection of Adjacent Structures

Adjacent structures include the paved roadway beyond the proposed work limits depicted on the conceptual alternative drawings and the leaching catch basin to the south of the MPR culvert. It is expected that proposed construction activities will be conducted in a manner avoiding interruption to, or temporary relocation of, this structure. Temporary steel sheeting is expected to be installed if a culvert

alternative is selected, to limit the extent of impacts resulting from excavation to the depths required for construction of the proposed structure.

It is also noted that existing steel guardrails in the immediate vicinity of the culvert will be removed and replaced with steel-backed timber guardrails if either replacement culvert alternative is selected.

2.7.5 Additional Earthwork Considerations

The following controls or methods should be employed during construction of either culvert alternative to ensure that the structures are not compromised by inadequate structural fill or improper construction techniques.

- Fill used as gravel borrow for bridge/footing foundations or for embankment fill should meet the gradation requirements of MassDOT Item No. M1.03.0 Type b and should be free of organic material, construction debris, ice, snow, and other deleterious material. The on-site fill may be selectively reused as bedding and backfill materials adjacent to the culvert structure, subject to inspection and testing to verify gradation requirements are met in other excavation areas. The existing native soils are not suitable for reuse for these applications.
- Crushed Stone may be used for wet subgrades, as a replacement for fill used below foundation level. This material is to be a crusher-run stone quarry product, should meet the gradation requirements of MassDOT Item M2.01.4 (minus ¾-inch crushed stone), and should be wrapped in a geotextile separation fabric.
- Fill placed above footings should be placed in loose lifts not to exceed 12 inches in thickness and should be compacted to 95 percent of maximum dry density as determined by ASTM 1557, Method C.

Excavation, fill placement, and footing construction for cul;vert alternatives should be conducted under dry conditions. Excavation shoring and side slopes, where used, should be in accordance with Occupational Safety and Health Administration (OSHA) standards. This will require that methods be developed and implemented to bypass tidal and storm flows at the site through temporary structures while the replacement structure is being constructed. It will also require the cutoff and drawdown of groundwater within the excavated areas until constructed features are backfilled to a high enough elevation that structures and materials are not potentially compromised by natural high surface water and/or groundwater conditions (e.g., floods, seasonal high tides, storm surges, etc.).

Dewatering within excavated areas would likely be most effectively completed by installing and operating appropriately sized and spaced conventional groundwater dewatering sumps. These sumps should be employed in concert with positive cutoff methods provided by driven cofferdam/shoring sheets in order to maintain water levels sufficiently below the ground surface to allow placement of soil materials and structures under controlled conditions. The contractor will be responsible for design of these provisions, which will subsequently be reviewed for acceptance by the design engineer.

3 Culvert Structure Alternatives Assessment

The following sections summarize the results of assessments of alternative culvert structure configurations at the Project Site.

3.1 Culvert Structure Design Criteria

Alternative culvert structures evaluated would meet applicable requirements of the American Association of State Highway and Transportation Officials (AASHTO) Load Resistance and Factor Design (LRFD) Specifications and MassDOT's Bridge Manual and Highway Specifications. Primary conceptual design parameters are listed below.

Vehicle Loading:	HL-93
Vehicle Speed:	25 MPH
Overhead Clearance:	18" over MHW

There is no current or proposed marine traffic that affects the structure's layout. There is potential that this channel is, or will be, used by recreational paddlers and fish passage. Therefore, the height of the structure was set strictly based on hydraulic modeling recommendations, recreational access and fish passage as outlined by Woods Hole Group.

3.2 Alternative Culvert Structure Configurations

Two precast concrete open bottom culvert configurations were evaluated, both of which would meet the project's restoration objectives by increasing tidal volumes and elevations to/from Mill Pond while also improving drainage from Mill Pond following large storm events (dimensions indicated are hydraulic opening sizes):

- **Culvert Alternative No. 1:** Single 8'-0"W x 8'-6"H Three-Sided Precast Concrete Box Culvert
- **Culvert Alternative No. 2:** Single 10'-0"W x 8'-6"H Three-Sided Precast Concrete Box Culvert

Plan, profile and section views of these alternatives are provided on drawings Culvert Alt-1 and Culvert Alt-2 included in Attachment F. The following general considerations are noted for both culvert alternatives.

- The structure's configuration is compatible (i.e., construction- and cost-effective) with the geotechnical foundation recommendations outlined above.
- The structure's configuration supports placement of sediment within voids of stone armor scour protection to provide a natural channel substrate through the culvert.
- The alternative culvert opening sizes provide improved tidal volumes and ranges to support restoration of salt marsh areas within Mill Pond, and improve post-storm drainage conditions (i.e., allowing impounded water to drain out more quickly vs. existing conditions).

- A replacement culvert would maintain MPR as a local roadway for normal use and emergency response. The elevation of MPR could potentially be increased in the future in response to sea level rise conditions.
- Maintaining the culvert and embankment reduces energy within Mill Pond during coastal storm events, in comparison to breach channel alternatives being considered.

These and other considerations are further evaluated in relation to the two culvert configurations and breach alternatives in Section 6 below.

3.3 Culvert Structure Span and Foundation

The subsurface investigation observed unsuitable (non-structural) soil forming the embankment, with traces of organic material (timber) observed in one of the borings. This fill material would be excavated and removed/replaced with compacted structural backfill adjacent to/over the culvert structures.

As noted above, based on the findings of the subsurface investigation and preliminary geotechnical design analyses, the culverts and wingwalls can be placed on concrete spread footings with the potential need for supplemental ground improvement within the footprint of the footings depending on the results of future design analyses. Both culvert structure alternatives would have a span of approximately 32 feet based on conceptual layout analyses conducted to date. Other relevant design considerations include the following:

- The conceptual wingwall configuration will minimize impacts to adjacent wetlands by reducing the amount of fill that would otherwise be required to provide stable embankment slopes, and by reducing discharge velocities emerging from the culvert structure.
- Stone armor channel and slope protection will be placed along the beyond the limits of the culvert for additional scour protection and to protect embankment slopes during higher energy storm conditions.

Future design evaluations in the project's next phase will further assess scour countermeasures that would be required within and beyond the limits of the culvert and on embankment slopes (i.e., based on wave generation analyses, and stormwater drainage analyses for the roadway).

3.4 Culvert and Tidal Channel Alignment

The conceptual culverts alignments included in Attachment F position the proposed precast concrete culverts immediately south of the existing CPP and channel. Offsetting the proposed culverts would allow tidal and drainage flows to be maintained through the existing CPP during construction of the new culvert, at which point flow would be diverted through the new culvert to allow removal of the existing CPP (or removal/burial of the CPP ends and infilling the remaining central section with flowable fill).

Shifting the culverts south maintains general alignment with the existing tidal channel to Pamet Harbor and would direct flow within Mill Pond toward the shoaled area shown on Figure 5. Future layout analyses may entail adjusting the alignment further to discharge flows into Mill Pond north of the shoaled area, however that may result in a conflict with the existing culvert and/or reduce alignment

with the tidal channel to Pamet Harbor. Future supplemental field investigations of sediment properties on both sides of MPR would also be considered in potential dredging and/or grading sediment to create continuous channels from the culvert's ends to existing channels in Mill Pond and leading to Pamet Harbor.

3.5 Channel and Bank Protection

The channel bottom within the culvert and immediately adjacent to the ends of the culvert (to the limits of the splayed wingwalls) will be stabilized with sediment-filled stone armor as scour protection upstream and downstream of the culverts. The dimensions of the scour aprons beyond ends of the culvert would be evaluated and updated in future design analyses. Embankment slopes immediately adjacent to the culvert openings (to the extent of excavation required for placement of the culver) would be protected by vegetated soil-filled stone armor and toe protection. Based on preliminary scour assessments by Woods Hole Group, it is expected that stone armor would be required to meet Federal Highway Administration (FHWA) Class III sizing (D_{50} of 11 -14 inches) and be placed in layer 42" thick over a crushed stone bedding layer underlain by geotextile filter fabric. Embankment slopes would be seeded and covered with a biodegradable erosion control blanket to establish coastal grass vegetation for additional surface stabilization.

As shown on the drawings included in Attachment F, the open-bottom culvert would be configured with sediment-filled stone armor placed to provide a natural channel substrate. A concrete cutoff wall has been included in the conceptual layout drawings to provide additional protection against movement of armor stones within the culvert due to excessive scour velocities, however would be evaluated in future design phases to determine if it is required or other measures could be incorporated to provide improved protection against potential movement (e.g., increasing stone size, or grouting lower ¼ of stones before placing infilled sediment). It is expected that future design evaluations would also consider the cross-sectional configuration of the channel bottom within the culvert to improve channel conditions (e.g., water depths) for aquatic animals and/or paddlecraft passing through the structure.

3.6 Roadway Layout and Drainage

Mill Pond Road's cross-section over the embankment and culvert currently consists of two approximately 9-foot wide travel lanes (no outer stripes) with approximate 12-inch wide grassed shoulders inside the face of metal beam guardrails bordering the embankment over the tidal channel, as shown on Figure 7. The conceptual roadway section depicted on drawings included in Attachment F maintains existing travel lane widths within the limits of excavation required to construct the culvert, which conforms to the Town's requirements for

Figure 7 — Mill Pond Road Layout (facing south)

a 'Type B' roadway (defined as a road serving 5-10 residential properties). Steel-backed timber guardrails are conceptually proposed to replace the existing metal beam guardrails. Standard MassDOT guardrail section requirements including a minimum of 24-inches of compacted soil behind guardrails to provide lateral support for driven posts, as shown on Figure 8. Guardrails are conceptually depicted along both lanes within the limits of excavation associated with th culvert, and would be evaluated in future design phases to adjacent the extent required along both lanes to provide adequate protection to prevent errant vehicles from striking the bridge's wingwalls or entering the steeply sloped banks and open water.

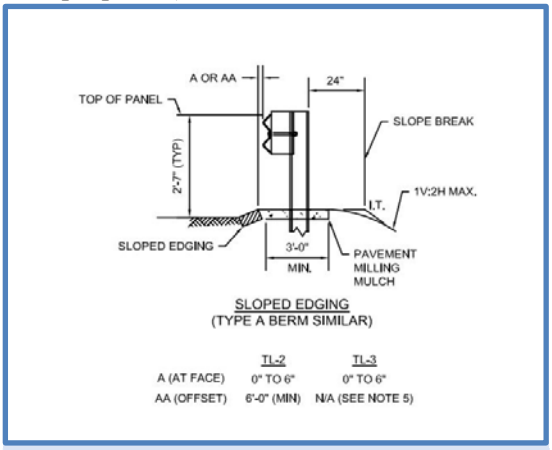

Figure 8 — Typical MassDOT Guardrail Section

The conceptual embankment/roadway section depict the faces of guardrails a minimum offset of 3-feet from the edges of pavement, providing an standard shoulder along both travel lanes and the 24-inch minimum width of level soil being the both guardrails. Future design phases would determine how respective segments of the roadway approaching the culvert and over the culvert would be crowned or pitched uniformly to provide positive drainage from the road to existing or additional drainage structures conveying runoff to adjacent wetlands and open water areas.

3.7 Operation and Maintenance

Operation and maintenance guidelines for respective elements associated with the culvert alternatives are outlined below. Specific and more detailed requirements, including inspection and recordkeeping frequencies, would be developed as part of an Operation and Maintenance Plan in support of future permitting activities.

- Concrete Culvert and Headwall/Wingwall Structures
  - Inspection and maintenance/repair of concrete surfaces for damage and deterioration (e.g., cracks, delamination, exposed reinforcing steel).
- Stone Armor Scour and Slope Protection
  - Inspection and maintenance/repair of stone armor if displaced or damaged from storm events, runoff or anthropogenic factors.
- Vegetative Stabilization
  - Inspection and maintenance to assure that embankment slopes and other areas subject to runoff erosion are stable.

4 Causeway Breach Alternatives Assessment

The following sections summarize the results of conceptual design evaluations of the proposed breach alternatives to remove the existing culvert and create an open channel through the causeway supporting

MPR. These alternatives would result in elimination of Mill Pond Road as a pedestrian and vehicle travelway between Depot Road and Post Drive.

4.1 Breach Channel Design Criteria

Breach channel alternatives considered would provide increased tidal and drainage conveyance to/from Mill Pond in comparison to either culvert alternatives. Hydraulic modeling analyses by Woods Hole Group have evaluated upstream water levels and conditions affecting bordering properties and the embankment supporting Depot Road on Mill Pond's northern bank. Sizing of the channel alternatives have been developed to achieve restoration objectives without causing impacts to bordering upland properties.

Channel banks on both sides of alternative breach channels would incorporate stone armor slope protection on lower elevations and bioengineered bank stabilization on upper intertidal portions to protect the adjacent embankment soils from scour, wave and runoff erosion.

As noted above, any breach alternative would result the loss of pedestrian/vehicular traffic between Depot Road and Post Drive. Pavement would be maintained to the residential property south of the intersection with Depot Road through Mill Pond Road to maintain access to that residence. Remaining segments of the embankment would have pavement removed and be restored to a natural (soil or vegetated) surface. Considerations for emergency vehicle access and maneuvering on the resulting cul-de-sac roadway segments would need to be identified (if any) and evaluated to determine if additional layout modifications (e.g., to accommodate the turning radius of an emergency response vehicle) would need to be incorporated in a future design phase.

While it is not anticipated that the channel would be navigated by powered watercraft, it is likely that the channel would provide adequate widths and water depths for small boats to access Mill Pond.

4.2 Alternative Breach Channel Configurations

Two alternative breach configuration were evaluated and are described in the following sections, as depicted on drawings Breach Alt-1 and Breach Alt-2 included in Attachment F

- **Breach Alternative No. 1:** 15' Bottom Width with Uniform Channel Banks
- **Breach Alternative No. 2:** 10' Bottom Width with Adjacent 15' Elevated Benches

The following general considerations are noted for both breach alternatives.

- As noted above, both alternatives would allow increased inundation into Mill Pond during coastal storm events. Potential impacts to the Depot Road embankment and other adjacent properties, and potential protection/mitigation measures, would need to be evaluated in a future design phase.

- Public access accommodations including vehicle parking, pedestrian access and provisions for potential emergency response would need to be evaluated in a future design phase.
- Both breach configurations would significantly improve passage conditions for aquatic life and recreational paddlers.
- Embankment slopes bordering the breach channel would incorporate vegetated stabilization practices to provide wetland habitat bordering the waterway.

4.3 Channel Improvements

Both breach alternatives would improve tidal exchange and drainage from Mill Pond, and improve resiliency of the system to withstand future climate changes (both anticipated increased precipitation and sea level rise), in comparison to both existing conditions and both culvert alternatives.

The channel bed for both alternatives would be stabilized with native channel substrate incorporating natural cobbles sized to remain stable potential future storm events that would be evaluated in a future design phase. Similarly, armor protection for channel banks would be sized baased on future supplemental hydraulic and wave generation analyses by Woods Hole Group.

The increased width of both breach alternatives would provide improved connectivity for aquatic organisms and enhance natural processes including sediment transport and elevated salinity levels and lower low tides supportive of degrading salt marsh resources bordering Mill Pond.

As noted above, the channel opening would increase water levels and wave energy within the Mill Pond impoundment, both of which could potentially affecting the stability of the embankment slope supporting Depot Road. This potential concern would need to be investigated/evaluated in a future design phase.

4.4 Pavement Removal and Embankment Restoration

Figure 9 — Limit of Pavement Removal South of Mill Pond Road / Depot Road Intersection (facing south)

Both breach alternatives involve abandonment of Mill Pond Roadway due to the breach through the causeway, with the asphalt pavement to be removed and conceptually replaced with a gravel walking path bordered by grassed shoulders. As shown in Figure 9, pavement would be removed from the northern segment of Mill Pond approximately 150 feet south of the intersection of Mill Pond Road and Depot Road and continue to a location immediately north of the culvert, as shown in Figure 10. The limit of pavement removal will maintain access to a residential driveway at 40 Mill Pond Road, which is north of the limit of pavement removal shown in Figure 9.

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Pavement removal on Mill Pond Road's southern segment would begin approximately 150 feet east of the Post Drive/Mill Pond Road intersection and continue to the southern limit of the conceptual breach channel, as shown in Figures 11 and 12, respectively.

Boulders (or a lockable reflectorized swing gate) would be placed at the ends of pavement removal north and south of the breach channel to prevent vehicular access while still providing access for maintenance and emergency vehicles. Consultation would likely be required to determine access requirements to the secondary informal access to a residential property at 31 Mill Pond Road (shown in the background in Figure 10), which has its primary driveway at 62 Depot Road.

At each of limits of pavement removal, it is anticipated that a crushed stone apron would be constructed, and/or a stormwater biowswale or other infiltration practice constructed, to prevent erosion from precipitation runoff draining from upgradient paved areas.

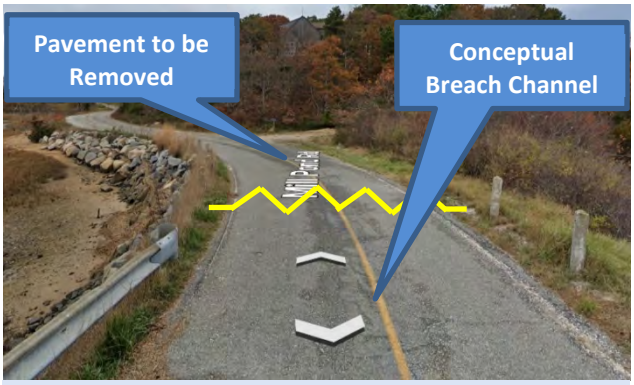

Figure 10— Approximate Limit of Pavement Removal and Channel Breach North of Mill Pond Culvert (facing north)

Figure 11 — Limit of Pavement Removal South of Mill Pond Road / Post Drive Intersection (facing north)

Figure 12 — Approximate Limit of Pavement Removal and Channel Breach South of Mill Pond Culvert (facing south)

4.5 Operation and Maintenance

Operation and maintenance guidelines for respective elements associated with the breach alternatives are outlined below. It is not anticipated that a formal Operation and Maintenance Plan would be required for a breach channel as it is expected to be resilient to current and future environmental conditions at the site.

- Stone Armor and Bioengineered Channel Bank and Embankment Slope Stabilization
  - Inspection and maintenance/repair to assure that channel banks subject to channel, runoff and/or wave erosion remain stable.
- Channel Bed Scour Protection
  - Inspection and maintenance/repair of channel bed if scour erosion undermines, or could potentially undermine, adjacent channel banks.
- Gravel Pathway and Vegetated Shoulders
  - Inspection and maintenance/repair of the gravel pathway and vegetated shoulders for signs of erosion from stormwater runoff from paved areas.

5 Construction Phase Issues Assessment

The following sections outline evaluations completed to address construction phase issues associated with construction of respective culvert and breach alternatives.

5.1 Sequence of Construction

5.1.1 Culvert Alternatives

The anticipated sequence of construction for both culvert alternatives is described below. It is noted that the contractor would be responsible for establishing and implementing its own construction sequence and phasing based on its selected means and methods of construction, which must be developed in compliance with future permit authorizations and performance requirements established in the (future) contract specifications.

Phase 1

1. Establish survey control, traffic controls, and staging areas.
2. Install erosion & sedimentation controls and perform any necessary clearing required to construct modifications and improvements.
3. Remove and dispose the existing pavement on Mill Pond Road within the limits of excavation necessary to construct the new culvert structure.
4. Install "Phase 1" temporary cofferdamming to enable excavation and installation of temporary shoring around the footprint of the proposed culvert structure. The existing 36-inch CPP culvert would remain in place to maintain tidal/drainage flows between Mill Pond and Pamet

Harbor until the new culvert is in place.

5. Dewater area as required within limits of the "Phase 1" cofferdam. Discharge from dewatering pumps shall be discharged into a dewatering basin prior to being released to the environment. Contractor's proposed methods shall be described in a water control plan submittal, submitted for engineer's review and acceptance.
6. Construct culvert, wingwalls and associated structures. Construct proposed in-river improvements including channel realignment, channel scour and slope protection practices and establish vegetation in disturbed areas.

Phase 2

1. Remove the "Phase 1" cofferdam around the new culvert to allow tidal/drainage flows through this structure.
2. Install "Phase 2" cofferdamming (if/as required) around the existing culvert to allow is removal (or abandonment in place by placement of flowable fill into the culvert and removal/burial of exposed ends).
3. Construct remaining embankment slope and toe protection.
4. Construct roadway and stormwater improvements including, curbing/berm, guardrails, the pavement surface course and roadway striping.
5. Place seed and install plantings along the roadway shoulders and restore all disturbed areas.
6. Remove perimeter erosion and sedimentation controls upon establishing stable vegetation.

5.1.2 Breach Alternatives

The anticipated sequence of construction activities for both breach alternatives is described below. As for the culvert alternatives, the contractor would be responsible for establishing and implementing its own construction sequence and phasing in compliance with permitting and contract specification requirements.

1. Establish survey control, traffic controls, and staging areas.
2. Install erosion & sedimentation controls and perform any necessary clearing that will be required to construct modifications and improvements.
3. Remove and dispose the existing pavement on Mill Pond Road from the upper limits of pavement removal to the limit of the excavation necessary to complete the desired breach formation.
4. Install "Phase 1" temporary cofferdamming around the portion of the breach section that does not obstruct flow through the existing culvert.
5. Complete channel bed grading, grade breach side slopes and construct stone armor bank protection and bioengineered bank stabilization in the "Phase 1" work area.
6. Remove temporary "Phase 1" cofferdamming and divert flows through the partially-constructed breach channel.
7. Install temporary "Phase 2" cofferdamming around the existing culvert and proposed breach

channel and banks.

8. Remove the existing culvert and embankment soils.
9. Complete channel bed grading, grade breach side slopes and construct stone armor bank protection and bioengineered bank stabilization in the "Phase 2" work area.
10. Remove temporary "Phase 2" cofferdamming and restore tidal flow through the complete breach channel.
11. Construct gravel pathway and install boulders/gates at pavement limits north and south of the breach channel.
12. Place seed and install plantings within the "Phase 2" work area, along the pathway shoulders and restore all disturbed areas .
13. Remove perimeter erosion and sedimentation controls upon establishing stable vegetation.

5.2 Temporary Traffic Detour and Management

Traffic would be detoured during construction of both culvert and breach alternatives as closure of MPR would be required. The closure would enable continued access to residential properties near Depot Road and at Post Drive. It is estimated the construction associated with both culvert alternatives would require approximately 4-5 months to complete.

The temporary detour, which would entail use of Depot Road and Old County Road, would need to be reviewed and approved by Truro Public Safety officials prior to construction.

5.3 Temporary Cofferdamming and Control of Water

Surface water control will be required for both culvert and breach channel alternatives, and groundwater control will be required for construction of both culvert alternatives due to the need for deeper excavations associated with construction of the culvert foundations and channel bed scour countermeasures. Surface water bypass flow diversion measures will be required to maintain tidal and drainage flows to/from Mill Pond during the entire period of construction for all alternatives.

While specific practices employed to bypass surface water around active construction areas will be determined by the contractor based upon its preferred means/methods and construction sequence, as noted above all measures would be required to comply with permit and contract specification performance requirements, and be reviewed and accepted by the engineer prior to implementation. Primary elements for control of water at the site for respective alternatives are outlined below.

- The existing culvert will be used to maintain tidal/drainage flows to/from Mill Pond during initial phases of construction.

- Large bulk sandbag cofferdams or steel sheeting will likely be used to temporarily prevent surface water and tidal flows from entering active work areas upstream and downstream of MPR.
- It is anticipated that a steel sheeting cofferdam would be utilized for culvert alternatives to provide groundwater cutoff for the lowered excavations association with construction of the culvert foundation. Groundwater dewatering would be employed to dewater the work area and allow culvert construction to occur in a controlled environment. Specific measures employed for groundwater dewatering will be determined by the contractor based on its proposed means and methods, where such practices would need to comply with permitting and contract specification performance requirements, respectively.

5.4 Preliminary Opinion of Probable Construction Cost

The budgetary opinion of construction cost associated with respective culvert and breach channel alternatives are summarized in Table 3 below. All conceptual alternative costs include a 20 percent contingency and are typically expected to be accurate within -30% to +50% (depending on market conditions and other factors at the time of construction), resulting in a stated construction cost range.

These costs do not include future costs for supplemental field investigations, engineering analyses, design development, permitting, and construction oversight. It should also be noted that the costs only include fees associated with the construction cost and do not include long-term operation and maintenance costs. Detailed opinions of cost are provided in Attachment G, based on assessments of material quantities corresponding to conceptual drawings included in Attachment F.

Table 3
Order-of-Magnitude Opinions of Probable Construction Cost for Conceptual Alternatives

Conceptual Alternative	Order of Magnitude Opinion of Cost	-30%	+50%
Culvert Alternative No. 1	$1.56M	$1.17M	$2.20M
Culvert Alternative No. 2	$1.71M	$1.49M	$2.42M
Breach Alternative No. 1	$795K	$596K	$1.13M
Breach Alternative No. 2	$1.05M	$785K	$1.48M

6 Salt Marsh Restoration Alternatives Assessment

An assessment of each alternative was performed under consideration of identified criteria including site compatibility/natural resources criteria, construction phase criteria and long-term operation and maintenance criteria.

The following sections provide brief descriptions of respective criteria considered for this assessment, followed by a review of assessment matrices developed to evaluate each alternative. A preliminary recommendation for the preferred alternative, subject to receipt and incorporation of input from project partners, property owners and other project stakeholders, is provided at the end of this section.

6.1 Evaluation Criteria

Respective criteria identified to assess relative advantages/disadvantages for each alternative are described in following sections.

6.1.1 Site Compatibility/Natural Resources Criteria

The following site compatibility and natural resources criteria were considered in assessing each alternative.

6.1.1.1 Environmental Impacts

- Minimizing environmental impacts, requirements, regulatory barriers
- Minimizing number of permit applications under consideration of the following programs:
    - Massachusetts Environmental Protection Agency Environmental Notification Form
    - Notice of Intent
    - MADEP Chapter 91 License
    - Army Corps of Engineers Section 404 Permit
    - MADEP Section 401 Water Quality Certification
    - MA Coastal Zone Management

6.1.1.2 Wave Action and Vulnerability

- Minimizing the potential for wave action during coastal storm events to destabilize the slope supporting Depot Road and private properties bordering Mill Pond
- Minimize vulnerability of bordering private properties to increased tides

6.1.1.3 Ecological Restoration

- Maximize aquatic passage and ecological restoration
- The extent to which the alternatives maximize sediment transportation
- Increasing tidal flushing and enhancement of bordering salt marsh areas
- Enhance shellfish habitat
- Improve water quality

6.1.1.4 Emergency Response

- Minimize impacts to emergency response vehicles for private properties on Mill Pond Road and public recreation within Mill Pond

6.1.1.5 Recreation

- Maximize recreational passage for paddlecraft and motorcraft users
- Maximize safety for recreational boating

6.1.2 Construction Phase Criteria

The following construction phase criteria were considered in assessing each alternative.

6.1.2.1 Minimize Construction Cost

- Minimize the overall cost for construction

6.1.2.2 Minimize Construction Duration

- Minimize the duration of construction

6.1.3 Long-Term Operation and Maintenance

The following long-term operations criteria were considered in assessing each alternative.

6.1.3.1 Minimize Operation/ Maintenance Costs

- Minimize repair or future replacement costs.
- Minimize the overall cost for future operation and maintenance

6.1.3.2 Maximize Resiliency to Climate Change

- Maximize adaptability to climate change and sea level rise

6.2 Alternatives Assessment and Recommended Alternative

Comparative criteria evaluation matrices have been developed addressing considerations, advantages and

disadvantages for each alternative in relation to respective criterion, based on our project's team's assessments to date. Respective matrices reflect weighted and unweighted criteria based on initial evaluations by the engineering assessment, with weighted criteria subject to revision based upon input received from the Town and project partners.

Within each matrix, brief descriptions of assessment results and relative numeric scores are provided for each alternative/criterion. Scores as based on a scale of 1 to 5, with 5 being most advantageous and 1 being most disadvantageous, with respect to other alternatives. Scores for each alternative are aggregated across all criteria to identify an overall score representing relative rankings with respect to other alternatives.

It is noted that the matrices are intended as a decision-making tool to facilitate aggregation of multiple layers of information within a single document, thus providing a clearly documented and transparent mechanism to communicate assessment results within a project team. Its value is in providing a collaborative platform to inform decision-making where multiple, and sometimes conflicting considerations, present a complex environment from which to advance subsequent project development with the support of all interested parties.

The weighted and unweighted assessment matrices developed through project evaluations and consultations with project partners are included in Attachment H, and a summary of overall scores is provided below in Table 4.

Table 4
Overall Alternatives Assessment Matrix Scores

Conceptual Alternative	Unweighted Evaluation Matrix Score	Weighted Evaluation Matrix Score
Culvert Alternative No. 1	2.67	2.66
Culvert Alternative No. 2	2.67	2.69
Breach Alternative No. 1	3.78	3.80
Breach Alternative No. 2	3.67	3.74

Based on the results of evaluations for alternatives, the 65-foot wide breach alternative has been preliminarily identified as the preferred alternative. Further investigations, hydraulic modeling, and design evaluations, and consultations with the Town of Truro and project partners are recommended to confirm or revise this preliminary determination.

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Attachment A

FEMA Flood Zone Mapping

PRELIMINARY - FOR REVIEW ONLY

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography. Basemap files were provided in digital form by Massachusetts Geographic Information System (MassGIS). Ortho imagery was produced at a scale of 1:5000 and is dated April 2009. The projection used in the preparation of this map is Massachusetts State Plane Mainland (FIPSZONE2001). The horizontal datum is NAD 83, GRS1980 spheroid.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) LEGEND

11-16-1990 CBRS Area
FLOOD INSURANCE NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON OR AFTER NOVEMBER 16, 1990 IN DESIGNATED CBRS AREAS.

Boundaries of the John H. Chafee Coastal Barrier Resources System (CBRS) shown on this FIRM were transferred from the official CBRS source map(s) for this area and are depicted on this FIRM for informational purposes only. The official CBRS maps are enacted by Congress via the Coastal Barrier Resources Act, as amended, and maintained by the U.S. Fish and Wildlife Service (FWS). The official CBRS maps used to determine whether or not an area is located within the CBRS are available for download at http://www.fws.gov. For an official determination of whether or not an area is located within the CBRS, or for any questions regarding the CBRS, please contact the FWS field office for this area at 603-223-2541.

Only coastal structures that are certified to provide protection from the 1-percent-annual chance flood are shown on this panel. However, all structures taken into consideration for the purpose of coastal flood hazard analysis and mapping are present in the DFIRM database in S_Gen_Struct.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

Limit of Moderate Wave Action

Limit of Moderate Wave Action coincident with Zone Break

~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section line
(23) - - - - (23)	Transect line
	Culvert
	Bridge
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 M	1000-meter grid values: Massachusetts State Plane Mainland Zone (FIPS Zone 2001), Lambert Conformal Conic projection
4989000m N	1000-meter Universal Transverse Mercator ticks, zone 19N
DX5510 X	Bench mark (see explanation in Notes to Users section of this FIRM panel)

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
July 16, 2014

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0227J

FIRM

FLOOD INSURANCE RATE MAP

BARNSTABLE COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 227 OF 875
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
TRURO, TOWN OF	255222	0227	J

-NOTE-
THIS MAP INCLUDES BOUNDARIES OF THE COASTAL BARRIER RESOURCES SYSTEM ESTABLISHED UNDER THE COASTAL BARRIER RESOURCES ACT OF 1982 AND/OR SUBSEQUENT ENABLING LEGISLATION.

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25001C0227J

EFFECTIVE DATE
JULY 16, 2014

Federal Emergency Management Agency

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Attachment B

Geotechnical Limitations

GEOTECHNICAL LIMITATIONS

Explorations

1. The generalized soil profiles described in the text are intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.

2. Water level readings have been made in the boreholes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors occurring during the exploration program and since the date and time when measurements were made.

Review

3. In the event that any changes in the nature, design or location of the proposed culverts are planned, it is recommended that this firm be provided the opportunity to conduct additional explorations and/or interpret exploration program results.

Use of Report

4. This report has been prepared for the exclusive use of the Town of Truro, for specific application to the proposed replacement culverts as part of the Mill Pond Salt Marsh Restoration Project in Truro, Massachusetts in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made.

5. This geotechnical report has been prepared for this project by Fuss & O'Neill, Inc. This report is for initial evaluation purposes only and is not sufficient to prepare an accurate bid. Contractors requesting a copy of the report, or any portion thereof, may secure it with the understanding that its scope is limited to design considerations only.

FUSS & O'NEILL

Attachment C

NRCS Soil Report

United States Department of Agriculture

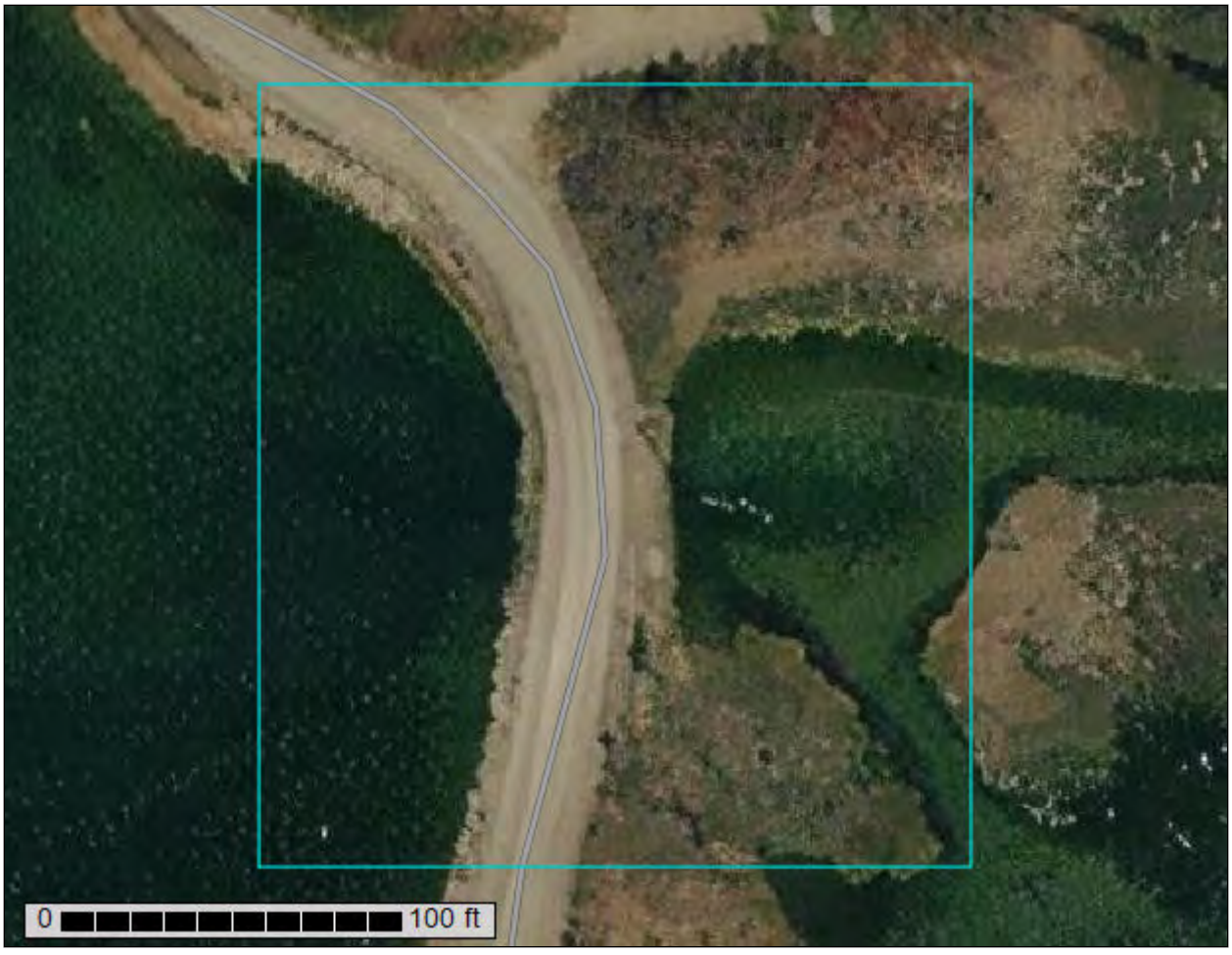
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Barnstable County, Massachusetts

Mill Pond Road, Truro MA



May 15, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:494 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 20 40 80 120

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Barnstable County, Massachusetts
Survey Area Data: Version 18, Sep 1, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Apr 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	0.6	52.4%
66A	Ipswich - Pawcatuck - Matunuck complex, 0 to 2 percent slopes, very frequently flooded	0.3	24.7%
252C	Carver coarse sand, 8 to 15 percent slopes	0.3	23.0%
Totals for Area of Interest		**1.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Barnstable County, Massachusetts

55A—Freetown coarse sand, 0 to 3 percent slopes, sanded surface

Map Unit Setting

National map unit symbol: 2t2qj
Elevation: 0 to 180 feet
Mean annual precipitation: 40 to 52 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 190 to 250 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Freetown, sanded surface, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown, Sanded Surface

Setting

Landform: Kettles, bogs, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy human-transported material over highly decomposed organic material

Typical profile

^Ap - 0 to 15 inches: coarse sand
2Oa - 15 to 79 inches: muck

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 20.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Swansea, sanded surface, inactive

Percent of map unit: 5 percent
Landform: Kettles, bogs, depressions

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Rainberry, sanded surface

Percent of map unit: 4 percent
Landform: Kettles, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Udipsamments, wet substratum

Percent of map unit: 3 percent
Landform: Dikes on bogs
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Hydric soil rating: No

Tihonet

Percent of map unit: 3 percent
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

66A—Ipswich - Pawcatuck - Matunuck complex, 0 to 2 percent slopes, very frequently flooded

Map Unit Setting

National map unit symbol: 2tyqm
Elevation: 0 to 10 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Ipswich and similar soils: 50 percent
Pawcatuck and similar soils: 25 percent
Matunuck and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ipswich

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Partially- decomposed herbaceous organic material

Typical profile

Oe - 0 to 42 inches: mucky peat
Oa - 42 to 59 inches: muck

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.14 to 99.90 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to strongly saline (1.0 to 112.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water supply, 0 to 60 inches: Very high (about 26.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: R144AY002CT - Tidal Salt High Marsh mesic very frequently flooded, R144AY001CT - Tidal Salt Low Marsh mesic very frequently flooded
Hydric soil rating: Yes

Description of Pawcatuck

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Partially- decomposed herbaceous organic material over sandy mineral material

Typical profile

Oe - 0 to 46 inches: mucky peat
Cg - 46 to 60 inches: mucky sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.14 to 99.90 in/hr)

Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to strongly saline (1.0 to 112.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water supply, 0 to 60 inches: Very high (about 21.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: R144AY002CT - Tidal Salt High Marsh mesic very frequently flooded, R144AY001CT - Tidal Salt Low Marsh mesic very frequently flooded
Hydric soil rating: Yes

Description of Matunuck

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Partially- decomposed herbaceous organic material over glaciofluvial deposits and/or sandy marine deposits

Typical profile

Oe - 0 to 12 inches: mucky peat
Cg - 12 to 72 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.14 to 99.90 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to strongly saline (1.0 to 112.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: R144AY002CT - Tidal Salt High Marsh mesic very frequently flooded, R144AY001CT - Tidal Salt Low Marsh mesic very frequently flooded
Hydric soil rating: Yes

Minor Components

Hooksan

Percent of map unit: 5 percent

Landform: Dunes
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Succotash

Percent of map unit: 5 percent
Landform: Spits on back-barrier flats
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

252C—Carver coarse sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2y07z
Elevation: 0 to 250 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Carver, coarse sand, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carver, Coarse Sand

Setting

Landform: Moraines, outwash plains
Landform position (two-dimensional): Shoulder, footslope, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Sandy glaciofluvial deposits

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
Oe - 2 to 3 inches: moderately decomposed plant material
A - 3 to 7 inches: coarse sand
E - 7 to 10 inches: coarse sand
Bw1 - 10 to 15 inches: coarse sand
Bw2 - 15 to 28 inches: coarse sand
BC - 28 to 32 inches: coarse sand

C - 32 to 67 inches: coarse sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F149BY005MA - Dry Outwash
Hydric soil rating: No

Minor Components

Deerfield

Percent of map unit: 10 percent
Landform: Kame terraces, outwash deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, kames, outwash deltas, outwash terraces, moraines, outwash plains, kame terraces
Landform position (two-dimensional): Footslope, shoulder, backslope, summit, toeslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Kame terraces, outwash deltas, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the following National Soil Survey Handbook link: “National Soil Survey Handbook.”

ABC soil

A soil having an A, a B, and a C horizon.

Ablation till

Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

AC soil

A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil

The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil

Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone

A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

Alluvial fan

A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium

Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Alpha,alpha-dipyridyl

A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

Animal unit month (AUM)

The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions

Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon

A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo

The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in unconsolidated material. It is usually dry but can be transformed into a temporary watercourse or short-lived torrent after heavy rain within the watershed.

Aspect

The direction toward which a slope faces. Also called slope aspect.

Association, soil

A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity)

The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low: 0 to 3
Low: 3 to 6
Moderate: 6 to 9
High: 9 to 12
Very high: More than 12

Backslope

The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp

A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

Badland

A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

Bajada

A broad, gently inclined alluvial piedmont slope extending from the base of a mountain range out into a basin and formed by the lateral coalescence of a series of alluvial fans. Typically, it has a broadly undulating transverse profile, parallel to the mountain front, resulting from the convexities of component fans. The term is generally restricted to constructional slopes of intermontane basins.

Basal area

The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation

The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology)

A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding plane

A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology)

from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedding system

A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock

The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography

A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace

A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum

Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout (map symbol)

A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed. The adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

Borrow pit (map symbol)

An open excavation from which soil and underlying material have been removed, usually for construction purposes.

Bottom land

An informal term loosely applied to various portions of a flood plain.

Boulders

Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks

A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

Breast height

An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management

Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte

An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

Cable yarding

A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil

A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche

A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.

California bearing ratio (CBR)

The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy

The leafy crown of trees or shrubs. (See Crown.)

Canyon

A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

Capillary water

Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena

A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation

An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity

The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps

See Terracettes.

Cement rock

Shaly limestone used in the manufacture of cement.

Channery soil material

Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment

Control of unwanted vegetation through the use of chemicals.

Chiseling

Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque

A steep-walled, semicircular or crescent-shaped, half-bowl-like recess or hollow, commonly situated at the head of a glaciated mountain valley or high on the side of a mountain. It was produced by the erosive activity of a mountain glacier. It commonly contains a small round lake (tarn).

Clay

As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions

See Redoximorphic features.

Clay film

A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clay spot (map symbol)

A spot where the surface texture is silty clay or clay in areas where the surface layer of the soils in the surrounding map unit is sandy loam, loam, silt loam, or coarser.

Claypan

A dense, compact subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. The layer restricts the downward movement of water through the soil. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community

The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil

Sand or loamy sand.

Cobble (or cobblestone)

A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material

Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility)

See Linear extensibility.

Colluvium

Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope

Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil

A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions

See Redoximorphic features.

Conglomerate

A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system

Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage

A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil

Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping

Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section

The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat)

A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

Corrosion (geomorphology)

A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations)

Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop

A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management

Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system

Growing crops according to a planned system of rotation and management practices.

Cross-slope farming

Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown

The upper part of a tree or shrub, including the living branches and their foliage.

Cryoturbate

A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying material.

Cuesta

An asymmetric ridge capped by resistant rock layers of slight or moderate dip (commonly less than 15 percent slopes); a type of homocline produced by differential erosion of interbedded resistant and weak rocks. A cuesta has a long, gentle slope on one side (dip slope) that roughly parallels the inclined beds; on the other side, it has a relatively short and steep or clifflike slope (scarp) that cuts through the tilted rocks.

Culmination of the mean annual increment (CMAI)

The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave

The walls of excavations tend to cave in or slough.

Decreasers

The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing

Postponing grazing or resting grazing land for a prescribed period.

Delta

A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer

A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depression, closed (map symbol)

A shallow, saucer-shaped area that is slightly lower on the landscape than the surrounding area and that does not have a natural outlet for surface drainage.

Depth, soil

Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Desert pavement

A natural, residual concentration or layer of wind-polished, closely packed gravel, boulders, and other rock fragments mantling a desert surface. It forms where wind action and sheetwash have removed all smaller particles or where rock fragments have migrated upward through sediments to the surface. It typically protects the finer grained underlying material from further erosion.

Diatomaceous earth

A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

Dip slope

A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace)

A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming

A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural)

Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface

Runoff, or surface flow of water, from an area.

Drainageway

A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Draw

A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

Drift

A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

Drumlin

A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

Duff

A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune

A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

Earthy fill

See Mine spoil.

Ecological site

An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation

The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation

A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit

Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Ephemeral stream

A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation

A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion

The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (accelerated)

Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion (geologic)

Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion pavement

A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

Erosion surface

A land surface shaped by the action of erosion, especially by running water.

Escarpment

A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Escarpment, bedrock (map symbol)

A relatively continuous and steep slope or cliff, produced by erosion or faulting, that breaks the general continuity of more gently sloping land surfaces. Exposed material is hard or soft bedrock.

Escarpment, nonbedrock (map symbol)

A relatively continuous and steep slope or cliff, generally produced by erosion but in some places produced by faulting, that breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow soil.

Esker

A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left

behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

Extrusive rock

Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.

Fallow

Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan remnant

A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Fertility, soil

The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat)

The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity

The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope

A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil

Sandy clay, silty clay, or clay.

Firebreak

An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom

An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

Flaggy soil material

Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone

A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain

The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms

A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain splay

A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

Flood-plain step

An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial

Of or pertaining to rivers or streams; produced by stream or river action.

Foothills

A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

Footslope

The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb

Any herbaceous plant not a grass or a sedge.

Forest cover

All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type

A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan

A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil

The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai

Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glaciofluvial deposits

Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

Glaciolacustrine deposits

Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

Gleyed soil

Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping

Growing crops in strips that grade toward a protected waterway.

Grassed waterway

A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel

Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravel pit (map symbol)

An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel.

Gravelly soil material

Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gravelly spot (map symbol)

A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area that has less than 15 percent rock fragments.

Green manure crop (agronomy)

A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water

Water filling all the unblocked pores of the material below the water table.

Gully (map symbol)

A small, steep-sided channel caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage whereas a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock

Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim

Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan

A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope (geomorphology)

A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat)

Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops

Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill

A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope

A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil

A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon: An organic layer of fresh and decaying plant residue.

L horizon: A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon: The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon: The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon: The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon: The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon: Soft, consolidated bedrock beneath the soil.

R layer: Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

M layer: A root-limiting subsoil layer consisting of nearly continuous, horizontally oriented, human-manufactured materials.

W layer: A layer of water within or beneath the soil.

Humus

The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups

Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock

Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation

The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil

A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers

Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration

The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity

The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate

The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate

The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Very low: Less than 0.2
Low: 0.2 to 0.4
Moderately low: 0.4 to 0.75
Moderate: 0.75 to 1.25
Moderately high: 1.25 to 1.75
High: 1.75 to 2.5
Very high: More than 2.5

Interfluve

A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology)

A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream

A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders

On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions

See Redoximorphic features.

Irrigation

Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin: Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border: Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding: Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation: Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle): Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow: Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler: Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation: Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding: Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame

A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

Karst (topography)

A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

Knoll

A small, low, rounded hill rising above adjacent landforms.

Ksat

See Saturated hydraulic conductivity.

Lacustrine deposit

Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain

A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lake terrace

A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landfill (map symbol)

An area of accumulated waste products of human habitation, either above or below natural ground level.

Landslide

A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones

Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lava flow (map symbol)

A solidified, commonly lobate body of rock formed through lateral, surface outpouring of molten lava from a vent or fissure.

Leaching

The removal of soluble material from soil or other material by percolating water.

Levee (map symbol)

An embankment that confines or controls water, especially one built along the banks of a river to prevent overflow onto lowlands.

Linear extensibility

Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit

The moisture content at which the soil passes from a plastic to a liquid state.

Loam

Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess

Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength

The soil is not strong enough to support loads.

Low-residue crops

Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Marl

An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Marsh or swamp (map symbol)

A water-saturated, very poorly drained area that is intermittently or permanently covered by water. Sedges, cattails, and rushes are the dominant vegetation in marshes, and trees or shrubs are the dominant vegetation in swamps. Not used in map units where the named soils are poorly drained or very poorly drained.

Mass movement

A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses

See Redoximorphic features.

Meander belt

The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

Meander scar

A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

Meander scroll

One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment

Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil

Very fine sandy loam, loam, silt loam, or silt.

Mesa

A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

Metamorphic rock

Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth’s crust. Nearly all such rocks are crystalline.

Mine or quarry (map symbol)

An open excavation from which soil and underlying material have been removed and in which bedrock is exposed. Also denotes surface openings to underground mines.

Mine spoil

An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil

Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage

Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area

A kind of map unit that has little or no natural soil and supports little or no vegetation.

Miscellaneous water (map symbol)

Small, constructed bodies of water that are used for industrial, sanitary, or mining applications and that contain water most of the year.

Moderately coarse textured soil

Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil

Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon

A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine

In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

Morphology, soil

The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil

Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain

A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can

occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Muck

Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mucky peat

See Hemic soil material.

Mudstone

A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

Munsell notation

A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon

A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil

A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules

See Redoximorphic features.

Nose slope (geomorphology)

A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant

Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter

Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low: Less than 0.5 percent
Low: 0.5 to 1.0 percent
Moderately low: 1.0 to 2.0 percent
Moderate: 2.0 to 4.0 percent
High: 4.0 to 8.0 percent
Very high: More than 8.0 percent

Outwash

Stratified and sorted sediments (chiefly sand and gravel) removed or “washed out” from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

Outwash plain

An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace

An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan

A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material

The unconsolidated organic and mineral material in which soil forms.

Peat

Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped

An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment

A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedon

The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation

The movement of water through the soil.

Perennial water (map symbol)

Small, natural or constructed lakes, ponds, or pits that contain water most of the year.

Permafrost

Ground, soil, or rock that remains at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

pH value

A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil

A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping

Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting

Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plastic limit

The moisture content at which a soil changes from semisolid to plastic.

Plasticity index

The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology)

A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Playa

The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff. Playa deposits are fine grained and may or may not have a high water table and saline conditions.

Plinthite

The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan

A compacted layer formed in the soil directly below the plowed layer.

Ponding

Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded

Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings

See Redoximorphic features.

Potential native plant community

See Climax plant community.

Potential rooting depth (effective rooting depth)

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning

Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil

The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil

A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use

Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and

promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland

Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil

A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid: Less than 3.5
Extremely acid: 3.5 to 4.4
Very strongly acid: 4.5 to 5.0
Strongly acid: 5.1 to 5.5
Moderately acid: 5.6 to 6.0
Slightly acid: 6.1 to 6.5
Neutral: 6.6 to 7.3
Slightly alkaline: 7.4 to 7.8
Moderately alkaline: 7.9 to 8.4
Strongly alkaline: 8.5 to 9.0
Very strongly alkaline: 9.1 and higher

Red beds

Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations

See Redoximorphic features.

Redoximorphic depletions

See Redoximorphic features.

Redoximorphic features

Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix

See Redoximorphic features.

Regolith

All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief

The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material)

Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill

A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser

The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut

A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments

Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop (map symbol)

An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where “Rock outcrop” is a named component of the map unit.

Root zone

The part of the soil that can be penetrated by plant roots.

Runoff

The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil

A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Saline spot (map symbol)

An area where the surface layer has an electrical conductivity of 8 mmhos/cm more than the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has an electrical conductivity of 2 mmhos/cm or less.

Sand

As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone

Sedimentary rock containing dominantly sand-sized particles.

Sandy spot (map symbol)

A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils in the surrounding map unit is very fine sandy loam or finer.

Sapric soil material (muck)

The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturated hydraulic conductivity (Ksat)

The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are:

Very high: 100 or more micrometers per second (14.17 or more inches per hour)

High: 10 to 100 micrometers per second (1.417 to 14.17 inches per hour)

Moderately high: 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour)

Moderately low: 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour)

Low: 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour)

Very low: Less than 0.01 micrometer per second (less than 0.001417 inch per hour).

To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

Saturation

Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification

The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock

A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum

A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil

A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Severely eroded spot (map symbol)

An area where, on the average, 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units in which “severely eroded,” “very severely eroded,” or “gullied” is part of the map unit name.

Shale

Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion

The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Short, steep slope (map symbol)

A narrow area of soil having slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.

Shoulder

The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell

The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Shrub-coppice dune

A small, streamlined dune that forms around brush and clump vegetation.

Side slope (geomorphology)

A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silica

A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio

The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt

As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone

An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils

Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole (map symbol)

A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

Site index

A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides (pedogenic)

Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slide or slip (map symbol)

A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces.

Slope

The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope alluvium

Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill

The slow filling of ponds, resulting from restricted water transmission in the soil.

Slow water movement

Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

Sodic (alkali) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodic spot (map symbol)

An area where the surface layer has a sodium adsorption ratio that is at least 10 more than that of the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has a sodium adsorption ratio of 5 or less.

Sodicity

The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight: Less than 13:1
Moderate: 13-30:1
Strong: More than 30:1

Sodium adsorption ratio (SAR)

A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock

Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil

A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates

Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand: 2.0 to 1.0
Coarse sand: 1.0 to 0.5
Medium sand: 0.5 to 0.25
Fine sand: 0.25 to 0.10
Very fine sand: 0.10 to 0.05
Silt: 0.05 to 0.002
Clay: Less than 0.002

Solum

The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Spoil area (map symbol)

A pile of earthy materials, either smoothed or uneven, resulting from human activity.

Stone line

In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones

Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony

Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stony spot (map symbol)

A spot where 0.01 to 0.1 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surrounding soil has no surface stones.

Strath terrace

A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace

One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping

Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil

The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are:

Platy: Flat and laminated
Prismatic: Vertically elongated and having flat tops
Columnar: Vertically elongated and having rounded tops
Angular blocky: Having faces that intersect at sharp angles (planes)
Subangular blocky: Having subrounded and planar faces (no sharp angles)
Granular: Small structural units with curved or very irregular faces

Structureless soil horizons are defined as follows:

Single grained: Entirely noncoherent (each grain by itself), as in loose sand
Massive: Occurring as a coherent mass

Stubble mulch

Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil

Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling

Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum

The part of the soil below the solum.

Subsurface layer

Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow

The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit

The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer

The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil

The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus

Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts

Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terminal moraine

An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

Terrace (conservation)

An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field

generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology)

A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Terracettes

Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

Texture, soil

The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer

Otherwise suitable soil material that is too thin for the specified use.

Till

Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

Till plain

An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

Tilth, soil

The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope

The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil

The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements

Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread

The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Tuff

A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

Upland

An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Valley fill

The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variegation

Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve

A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very stony spot (map symbol)

A spot where 0.1 to 3.0 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surface of the surrounding soil is covered by less than 0.01 percent stones.

Water bars

Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering

All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded

Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wet spot (map symbol)

A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit.

Wilting point (or permanent wilting point)

The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow

The uprooting and tipping over of trees by the wind.

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Attachment D

Boring Logs

PRELIMINARY - FOR REVIEW ONLY

FUSS & O'NEILL

SOIL BORING LOG

BORING NO.: 1

Project:	Mill Pond Road	**Project No.:**	20181291.A10
Location:	Turo, Massachusetts	**Project Mgr:**	Nils Weiberg
Client:	Town of Turo	**Field Eng. Staff:**	Derek Newhall
Drilling Co.:	Soil X Corp.	**Date Started:**	June 1, 2021
Driller:	Don Leger	**Date Finished:**	June 1, 2021

Elevation: See plan ft. **Vertical Datum:** **Boring Location:** See Plan **Coord.:** Not Surveyed **Horizontal Datum:** NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HW	SS	-
Length (ft)	5	2	-
Inside Dia. (in.)	4	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Acker 82

- ☑ Truck ☐ Tripod ☐ Cat-Head
- ☐ Rubber Tire ☐ Geoprobe ☐ Winch
- ☐ Track ☐ Air Track ☑ Roller Bit
- ☐ Skid ☐ _____ ☐ Cutting Head

Hammer Type

- ☐ Safety
- ☐ Doughnut
- ☑ Automatic
- ☐ _____

Drilling Fluid

- ☐ Bentonite
- ☐ Polymer
- ☐ Water
- ☑ None

Drill Rod Size:

Casing Advance

4" Flushwall Casing

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec / Pen. (in)	Sample Blows per 6"	Stratum Graphic	USCS Symbol Group	Visual - Manual Identification & Description* (density/consistency, color, Group Name & Symbol, maximum particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	Field Tests: Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
						12" Bituminous concrete					
						1.0					
	S-1 1.0'- 3.0'	11/24	6 4 5 3		FILL	Loose, Brown, fine to medium SAND, trace Silt, trace fine Gravel, Dry	-	-	-	-	
	S-2 3.0'- 5.0'	17/24	7 4 4 4		FILL	Loose, Brown, fine to medium SAND, trace Silt, trace fine Gravel, Dry	-	-	-	-	
5	S-3 5.0'- 7.0'	12/24	3 2 1 2		FILL	Very loose, Brown, fine to medium SAND, trace fine Gravel, trace Silt, Moist	-	-	-	-	
						7.0					
	S-4 7.0'- 9.0'	19/24	3 3 4 6		SP	Loose, Brown, medium SAND, little fine Gravel, trace Silt, Wet	-	-	-	-	3" fiburous material at the bottom of the spoon, mostly wood
10	S-5 10.0'- 12.0'	18/24	1 1 3 3		SP	Loose, Brown, medium SAND, trace Silt, trace fine Gravel, Wet	-	-	-	-	
	S-6 12.0'- 14.0'	7/24	5 9 10 10		SP	Medium dense, Brown, fine to coarse SAND, little fine Gravel, trace Organics, trace Silt, Wet	-	-	-	-	
						14.0					
15	S-7 14.0'- 16.0'	5/24	5 8 13 13		GP	Medium dense, Gray, fine GRAVEL, some medium to coarse Sand, trace Silt, Wet	-	-	-	-	
						16.0					
	S-8 16.0'- 18.0'	14/24	12 13 15 9		SP	Medium dense, Red, medium to coarse SAND, little fine Gravel, trace Silt, Wet	-	-	-	-	
						19.0					
20	S-9 19.0'- 21.0'	1/24	6 3 6 4		GP	Loose, Gray, fine GRAVEL, trace medium Sand, trace Silt, Wet	-	-	-	-	Majority of split spoon sample washed out
						24.0					
	S-10	1/24	5 5		SP	Loose, Red to brown, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet: Bottom of Hole	Depth in feet: Water

Minor Constituent Proportions

And	35 - 50%
Some	20 - 35%
Little	10 - 20%
Trace	<10%

Soil Density

Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	>50

Soil Consistency

Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	>30

Sample Type

- **SS** Split Spoon
- **ST** Shelby Tube
- **GS** Grab Sample
- **ET** Extruded Tube
- **RC** Core Sample

Notes:

Ground water encountered at a depth of 7 feet below existing grade

Boring No.: **1**

Field Test Legend:

Dilatancy: N - None S - Slow R - Rapid
Toughness: L - Low M - Medium H - High
Plasticity: NP - Non-Plastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: Soil identifications and field tests based on visual-manual methods per ASTM D2488 and using the modified Burmister System

FUSS & O'NEILL

SOIL BORING LOG
(continued)

BORING NO.: 1

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec / Pen. (in)	Sample Blows per 6"	Stratum Graphic	USCS Symbol Group	Visual - Manual Identification & Description* (density/consistency, color, Group Name & Symbol, maximum particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	Field Tests: Dilatancy	Toughness	Plasticity	Dry Strength	Remarks*
	24.0'-26.0'		4 6								
30	S-11 29.0'-31.0'	0/24	7 5 6 6		SP	No Recovery	-	-	-	-	
35	S-12 34.0'-36.0'	4/24	6 5 5 5		SP	Medium dense, Red to brown, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
40	S-13 39.0'-41.0'	6/24	6 5 5 6		SP	Medium dense, Red to brown, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
45	S-14 44.0'-46.0'	6/24	4 4 4 5		SP	Loose, Light brown, fine to coarse SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
50	S-15 49.0'-51.0'	.5/24	4 3 5 5		SP	Loose, Light brown, fine to medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
55	S-16 54.0'-56.0'	7/24	12 9 7 8		SP-SM	Medium dense, Red to brown, medium to coarse SAND, little fine Gravel, trace Silt, Wet	-	-	-	-	
	S-17	8/24	4		SP-SM	Medium dense, Gray, medium SAND, little fine Gravel, little Silt, Wet	-	-	-	-	

NOTES:

PROJECT NO.: 20181291.A10

BORING NO.: 1

NOTES: Soil identifications and field tests based on visual-manual methods per ASTM D2488 and using the modified Burmister System

FUSS & O'NEILL

SOIL BORING LOG
(continued)

BORING NO.: 1

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec / Pen. (in)	Sample Blows per 6"	Stratum Graphic	USCS Symbol Group	Visual - Manual Identification & Description* (density/consistency, color, Group Name & Symbol, maximum particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	Field Tests: Dilatancy	Toughness	Plasticity	Dry Strength	Remarks*
60	59.0'-61.0'		4 7 8								
	S-18 64.0'-66.0'	7/24	2 3 5 8		SP	Loose, Gray, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
65											
	S-19 69.0'-71.0'	2/24	4 4 6 8		SP	Loose, Light brown, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
70											
	S-20 74.0'-76.0'	11/24	5 6 11 13		SP	Medium dense, Brown, medium to coarse SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
75											
80						80.0 Boring terminated at 80 feet without refusal	-	-	-	-	Advanced split spoon sampler to depth of 80 feet, No refusal
85											
90											

NOTES:

PROJECT NO.: 20181291.A10

BORING NO.: 1

NOTES: Soil identifications and field tests based on visual-manual methods per ASTM D2488 and using the modified Burmister System

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FUSS & O'NEILL

SOIL BORING LOG

BORING NO.: **2**

Page **1** of **2**

Project:	Mill Pond Road	**Project No.:**	20181291.A10
Location:	Turo, Massachusetts	**Project Mgr:**	Nils Weiberg
Client:	Town of Turo	**Field Eng. Staff:**	Derek Newhall
Drilling Co.:	Soil X Corp.	**Date Started:**	June 2, 2021
Driller:	Don Leger	**Date Finished:**	June 2, 2021

Elevation: See plan ft. **Vertical Datum:**

Boring Location: See Plan

Coord.: Not Surveyed

Horizontal Datum: NAD 1983

Item	Casing	Sampler	Core Barrel
Type	HW	SS	-
Length (ft)	5	2	-
Inside Dia. (in.)	4	1.375	-
Hammer Wt. (lb.)	140	140	-
Hammer Fall (in.)	30	30	-

Rig Make & Model: Acker 82

- ☑ Truck ☐ Tripod ☐ Cat-Head
- ☐ Rubber Tire ☐ Geoprobe ☐ Winch
- ☐ Track ☐ Air Track ☑ Roller Bit
- ☐ Skid ☐ _____ ☐ Cutting Head

Hammer Type

- ☐ Safety
- ☐ Doughnut
- ☑ Automatic
- ☐ _____

Drilling Fluid

- ☐ Bentonite
- ☐ Polymer
- ☐ Water
- ☑ None

Drill Rod Size:

Casing Advance

4" Flushwall Casing

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec / Pen. (in)	Sample Blows per 6"	Stratum Graphic	USCS Symbol Group	Visual - Manual Identification & Description* (density/consistency, color, Group Name & Symbol, maximum particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	Field Tests: Dilatancy	Toughness	Plasticity	Dry Strength	Remarks
						12" Bituminous concrete					
						1.0					
	S-1 1.0'- 3.0'	12/24	9 8 6 5		FILL	Medium dense, Brown, fine to medium SAND, trace fine Gravel, trace Silt, Dry	-	-	-	-	
	S-2 3.0'- 5.0'	8/24	5 4 5 4		FILL	Loose, Brown, fine to medium SAND, trace fine Gravel, trace Silt, Dry	-	-	-	-	
5	S-3 5.0'- 7.0'	13/24	3 3 4 3		FILL	Loose, Brown, fine to medium to coarse SAND, trace fine Gravel, trace Silt, Moist	-	-	-	-	
						7.0					
	S-4 7.0'- 9.0'	18/24	1 1 1 3		SP	Very loose, Brown, fine to medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
	S-5 9.0'- 11.0'	14/24	2 2 10 15		SP	Medium dense, Brown, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
10	S-6 11.0'- 13.0'	17/24	14 8 5 14		SP	Medium dense, Brown, medium to coarse SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
	S-7 14.0'- 16.0'	9/24	7 7 8 9		SP	Medium dense, Light brown, fine to coarse SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
15	S-8 16.0'- 18.0'	18/24	3 7 7 7		SP	Medium dense, Brown, fine to coarse SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
	S-9 19.0'- 21.0'	1/24	5 6 9 8		SP	Medium dense, Light brown, fine to coarse SAND, and fine Gravel, trace Silt, Wet	-	-	-	-	
20											
	S-10	0/24	8 6		SP	No Recovery	-	-	-	-	

Water Level Data

Date	Time	Elapsed Time (hr)	Depth in feet: Bottom of Hole	Depth in feet: Water

Minor Constituent Proportions

And	35 - 50%
Some	20 - 35%
Little	10 - 20%
Trace	<10%

Soil Density

Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	>50

Soil Consistency

Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	>30

Sample Type

- **SS** Split Spoon
- **ST** Shelby Tube
- **GS** Grab Sample
- **ET** Extruded Tube
- **RC** Core Sample

Notes:

Ground water encountered at a depth of 7 feet below existing grade

Boring No.: **2**

Field Test Legend:

Dilatancy: N - None S - Slow R - Rapid

Toughness: L - Low M - Medium H - High

Plasticity: NP - Non-Plastic L - Low M - Medium H - High

Dry Strength: N - None L - Low M - Medium H - High VH - Very High

NOTES: Soil identifications and field tests based on visual-manual methods per ASTM D2488 and using the modified Burmister System

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SOIL BORING LOG
(continued)

Depth/ Elev. (ft)	Sample No. / Interval (ft)	Rec / Pen. (in)	Sample Blows per 6"	Stratum Graphic	USCS Symbol Group	Visual - Manual Identification & Description* (density/consistency, color, Group Name & Symbol, maximum particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	Field Tests: Dilatancy	Toughness	Plasticity	Dry Strength	Remarks*
	24.0'-26.0'		8 8								
30	S-11 29.0'-31.0'	4/24	6 6 6 5		SP	Medium dense, Red to brown, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
35	S-12 34.0'-36.0'	8/24	5 4 4 5		SP	Loose, Brown, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
40	S-13 39.0'-41.0'	8/24	6 4 5 5		SP	Loose, Light brown, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
45	S-14 44.0'-46.0'	8/24	4 3 4 4		SP	Loose, Light brown, medium SAND, trace fine Gravel, trace Silt, Wet	-	-	-	-	
50	S-15 49.0'-51.0'	10/24	4 5 6 7		SP	Medium dense, Brown, medium SAND, trace fine Gravel, trace Silt, Wet 51.0 Boring terminated at 51 feet without refusal	-	-	-	-	
55											

NOTES:

PROJECT NO.: 20181291.A10

BORING NO.: 2

NOTES: Soil identifications and field tests based on visual-manual methods per ASTM D2488 and using the modified Burmister System

FUSS & O'NEILL

Attachment E

Soil Laboratory Analytical Test Results

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THIELSCH ENGINEERING

195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
Fuss & O'Neill
Providence, RI
PM: Derek Newhall
Assigned By: Derek Newhall
Collected By: Client

Project Information:
Mill Pond Road
Truro, MA
F&O Project Number: 20181291.A10
Summary Page: 1 of 1
Report Date: 06.07.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-F-118

Source	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D854			D1557						
B-1	S-2	3-5	21-S-2107				0.0	97.7	2.3											Brown poorly graded sand
B-2	S-5	9-11	21-S-2108				5.9	93.1	1.0											Brown poorly graded sand
B-2	S-12	34-36	21-S-2109				6.8	92.0	1.2											Light Brown poorly graded sand

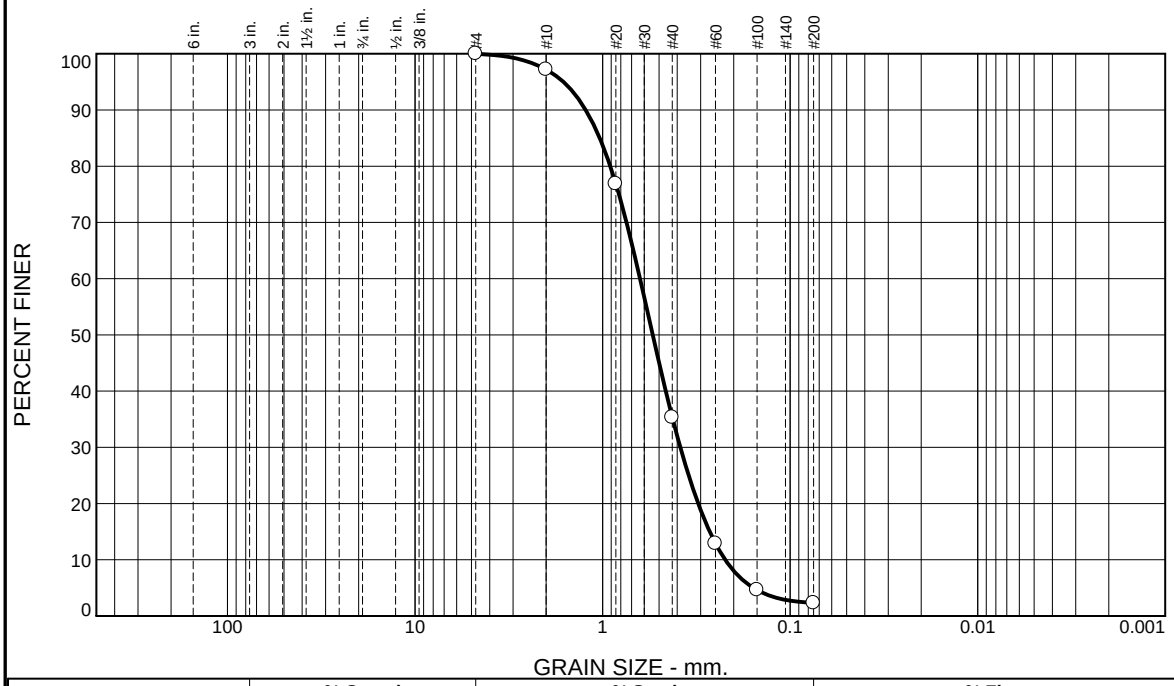
Date Received: *06.03.21*

Reviewed By:

Date Reviewed: *06.07.21*

PRELIMINARY - FOR REVIEW ONLY

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	2.8	61.9	33.0	2.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	97.2		
#20	76.9		
#40	35.3		
#60	12.9		
#100	4.6		
#200	2.3		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.2302 D_{85}= 1.0363 D_{60}= 0.6319
D_{50}= 0.5402 D_{30}= 0.3852 D_{15}= 0.2684
D_{10}= 0.2219 C_u= 2.85 C_c= 1.06

Remarks

Date Received: 06.03.21 **Date Tested:** 06.07.21

Tested By: AV / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 3-5' **Date Sampled:** 06.01.21

Sample Number: B-1 / S-2

Thielsch Engineering Inc.

Cranston, RI

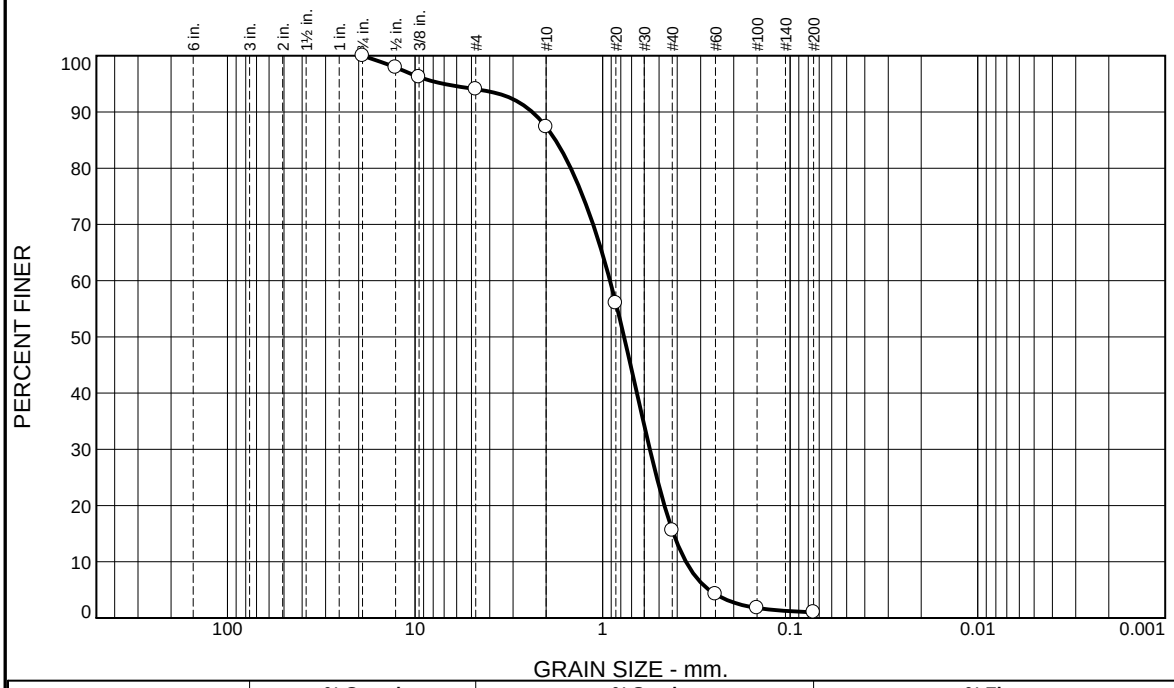
Client: Fuss & O'Neill

Project: Mill Pond Road
Truro, MA

Project No: 20181291.A10 **Figure** 21-S-2107

PRELIMINARY - FOR REVIEW ONLY

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.9	6.7	71.8	14.6	1.0	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	97.9		
0.375"	96.2		
#4	94.1		
#10	87.4		
#20	56.0		
#40	15.6		
#60	4.2		
#100	1.8		
#200	1.0		

* (no specification provided)

Material Description

Brown poorly graded sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.3710 D_{85}= 1.7830 D_{60}= 0.9133
D_{50}= 0.7686 D_{30}= 0.5597 D_{15}= 0.4187
D_{10}= 0.3593 C_u= 2.54 C_c= 0.95

Remarks

Date Received: 06.03.21 **Date Tested:** 06.07.21

Tested By: AV / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 9-11' **Date Sampled:** 06.02.21
Sample Number: B-2 / S-5

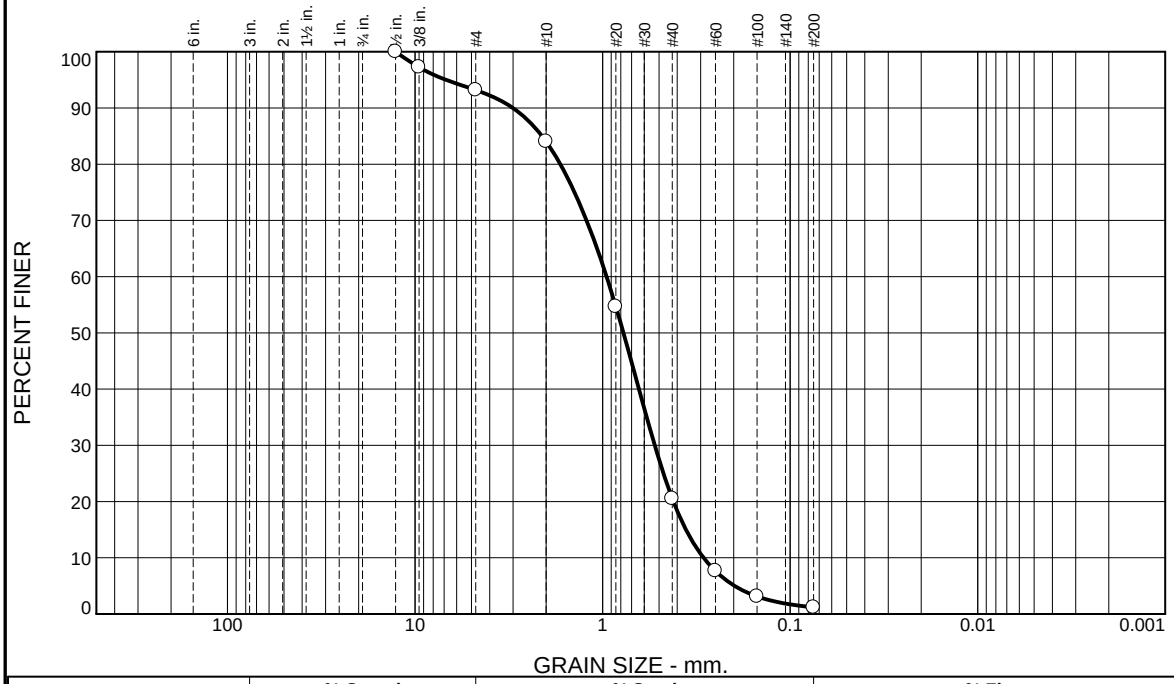
Thielsch Engineering Inc.

Cranston, RI

Client: Fuss & O'Neill
Project: Mill Pond Road
Truro, MA
Project No: 20181291.A10 **Figure** 21-S-2108

PRELIMINARY - FOR REVIEW ONLY

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.8	9.2	63.5	19.3	1.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5"	100.0		
0.375"	97.2		
#4	93.2		
#10	84.0		
#20	54.7		
#40	20.5		
#60	7.6		
#100	3.1		
#200	1.2		

* (no specification provided)

Material Description

Light Brown poorly graded sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 3.0072 D_{85}= 2.1030 D_{60}= 0.9523
D_{50}= 0.7744 D_{30}= 0.5270 D_{15}= 0.3595
D_{10}= 0.2894 C_u= 3.29 C_c= 1.01

Remarks

Date Received: 06.03.21 **Date Tested:** 06.07.21

Tested By: AV / JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 34-36' **Date Sampled:** 06.02.21

Sample Number: B-2 / S-12

Thielsch Engineering Inc.

Cranston, RI

Client: Fuss & O'Neill

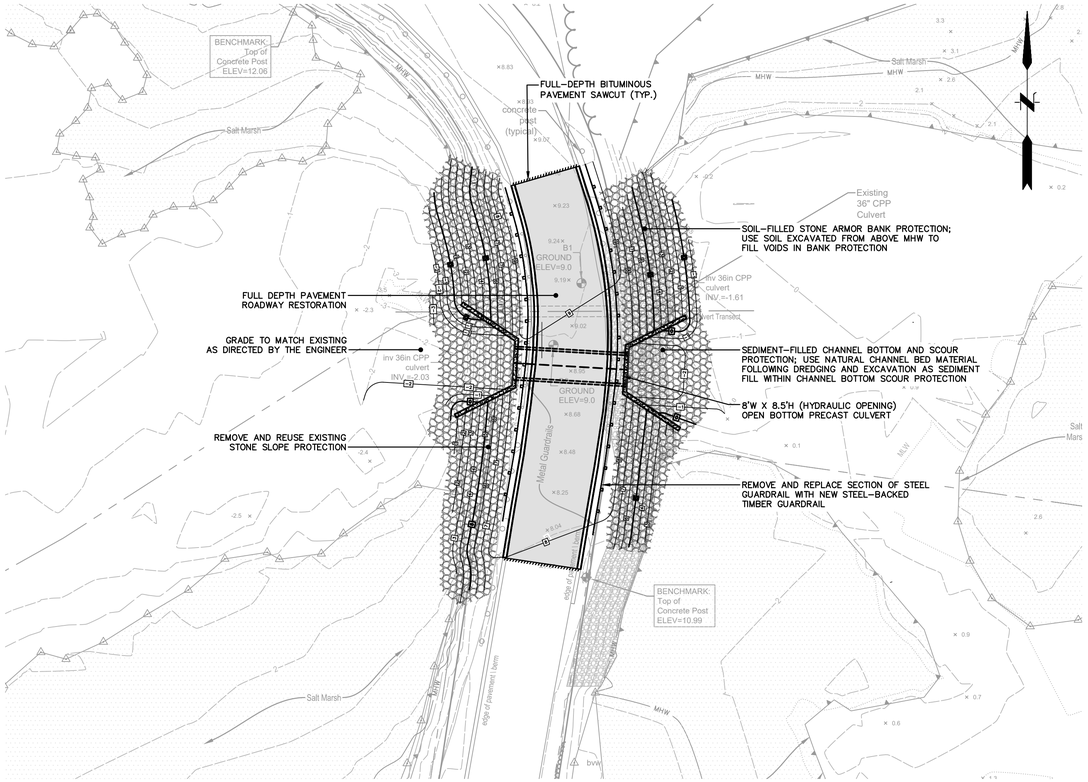
Project: Mill Pond Road
Truro, MA

Project No: 20181291.A10 **Figure** 21-S-2109

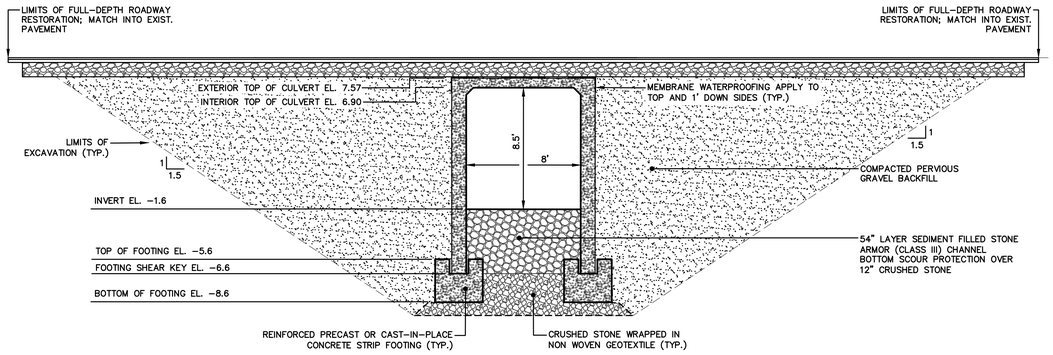
FUSS & O'NEILL

Attachment F

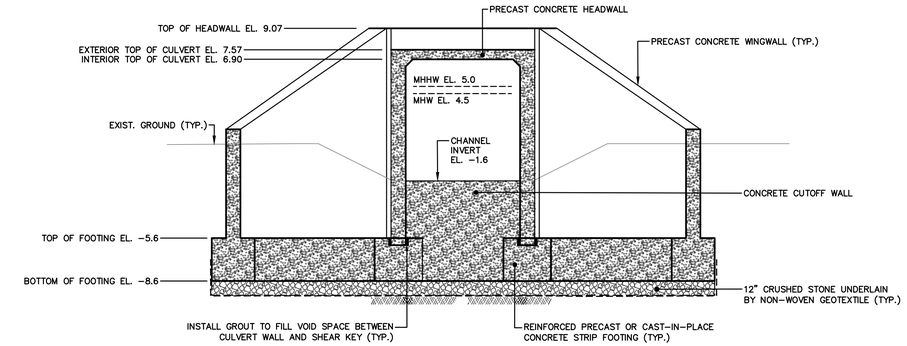
Conceptual Alternatives Drawings



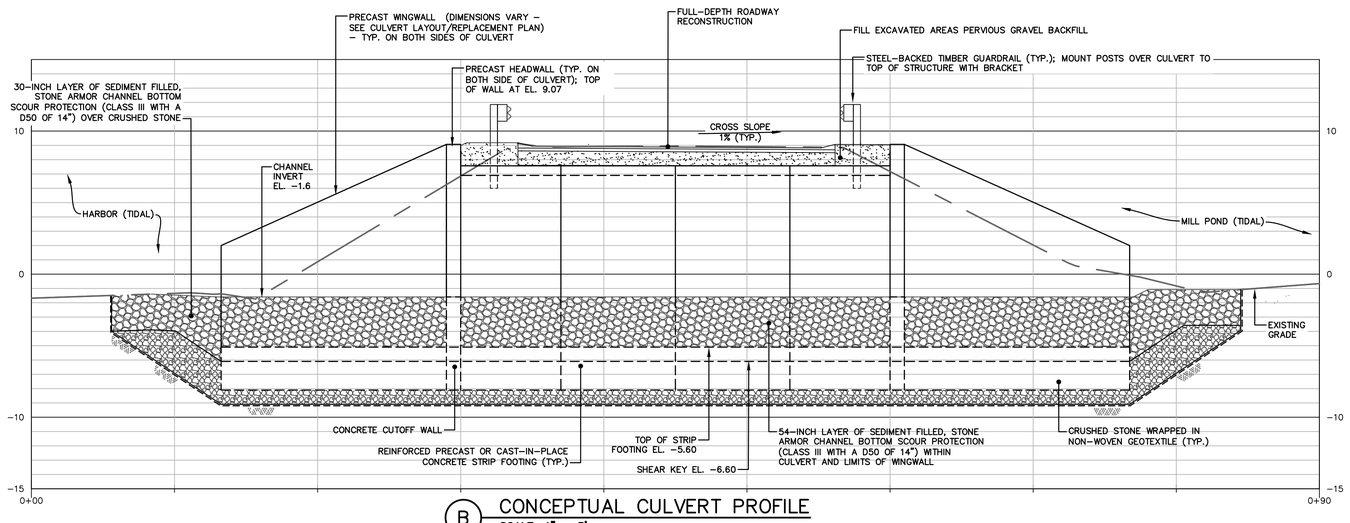
A CONCEPTUAL CULVERT PLAN
SCALE: 1" = 20'



C CONCEPTUAL TYPICAL CULVERT SECTION
SCALE: 1" = 5'



D CONCEPTUAL CULVERT END SECTION
SCALE: 1" = 5'



B CONCEPTUAL CULVERT PROFILE
SCALE: 1" = 5'

DEMOLITION NOTES

1. ALL EXCESS EXCAVATED MATERIALS, EXCESS FILL, EXCESS CONSTRUCTION MATERIALS, AND DEBRIS (THAT ARE NOT IDENTIFIED FOR RE-USE) SHALL BE REMOVED FROM THE SITE AND SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS.
2. EXISTING SALT MARSH VEGETATION TO BE DISTURBED SHALL BE REMOVED IN SECTIONS AND TEMPORARILY STORED AT THE EXISTING ELEVATION AND REPLACED ON/ADJACENT TO THE PROPOSED SALT MARSH RESTORATION AREA.
3. TREES AND OTHER VEGETATION NOT DESIGNATED FOR REMOVAL SHALL REMAIN AND BE PROTECTED AS REQUIRED.
4. EXISTING FEATURES, STRUCTURES, AND UTILITIES NOT DESIGNATED FOR REMOVAL SHALL REMAIN AND BE PROTECTED THROUGHOUT CONSTRUCTION.
5. REMOVE AND STOCKPILE EXISTING ROADWAY GRAVEL BASE MATERIALS FOR POTENTIAL RE-USE FOR THE RECONSTRUCTION OF THE ROADWAY GRAVEL BASE MATERIALS. PERFORM A SIEVE ANALYSIS OF THE EXISTING ROADWAY BASE MATERIAL TO ENSURE THAT IT MEETS THE REQUIREMENTS AS A SUITABLE STABILIZED GRAVEL BASE MATERIAL IN ACCORDANCE WITH THE PROJECT MANUAL. IF THE MATERIAL DOES NOT MEET SPECIFICATIONS, THEN DISPOSE AND REPLACE WITH IMPORTED GRAVEL SURFACE AND BASE MATERIALS AS SPECIFIED IN PROJECT MANUAL.

PRELIMINARY - FOR REVIEW ONLY

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
DATUM:
HORZ.: AS NOTED
VERT.: AS NOTED
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

TOWN OF TRURO
CONCEPTUAL RESTORATION CULVERT ALTERNATIVE 1 IMPROVEMENT PLAN
MILL POND SALT MARSH RESTORATION
TRURO MASSACHUSETTS

PROJ. No.: 20181291.A10
DATE: JUNE 2022

CULVERT ALT-1

File: J:\DWG\P2018\12911A10\Civil\Plan\20181291A10_STP01.dwg Layout: CS-102_ALT1 Plotted: 2022-06-22 10:07 PM Saved: 2022-06-22 10:05 PM User: NWiberg
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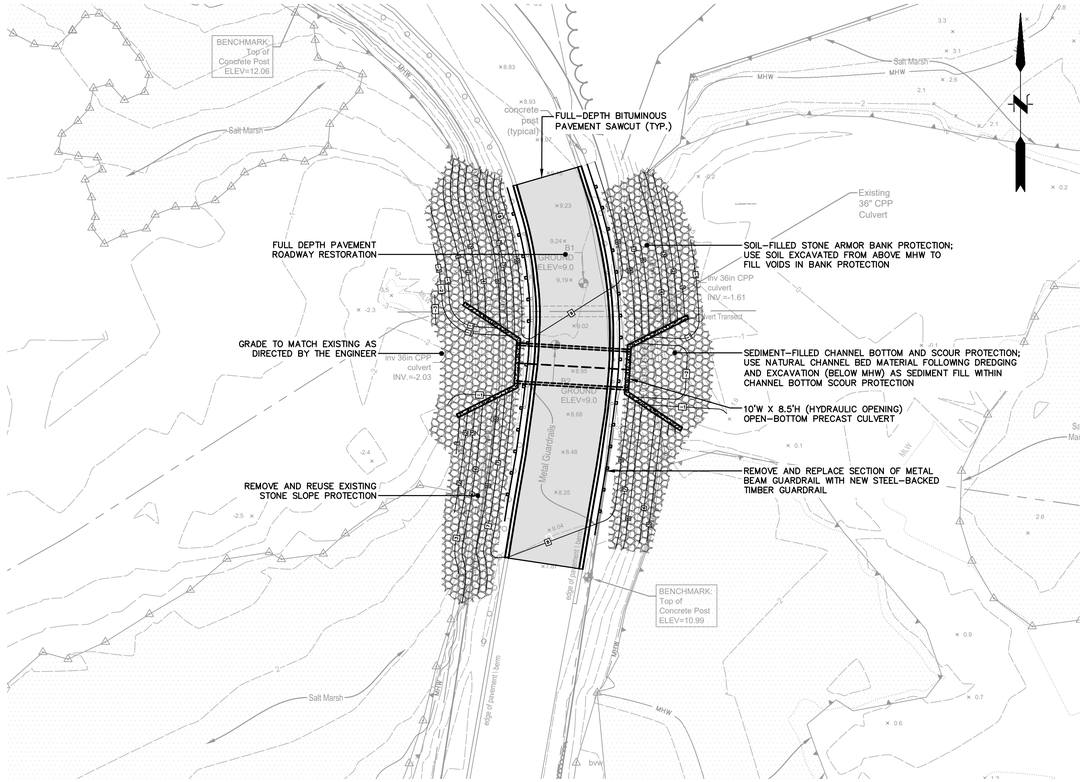
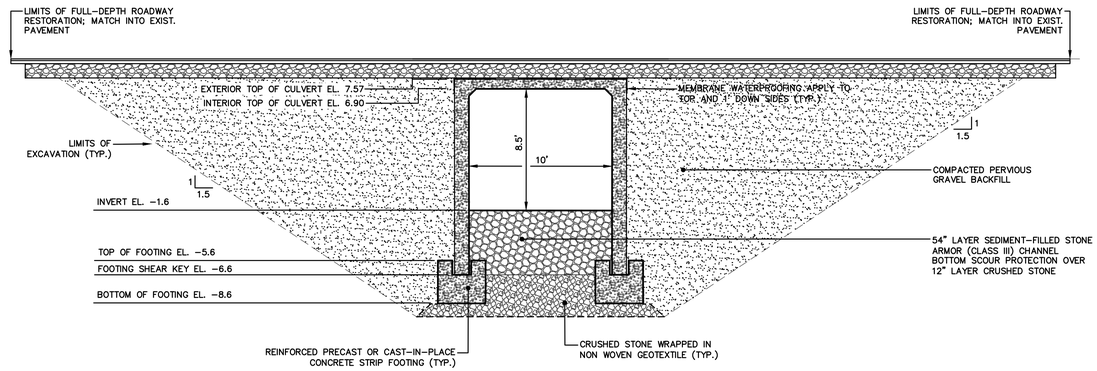
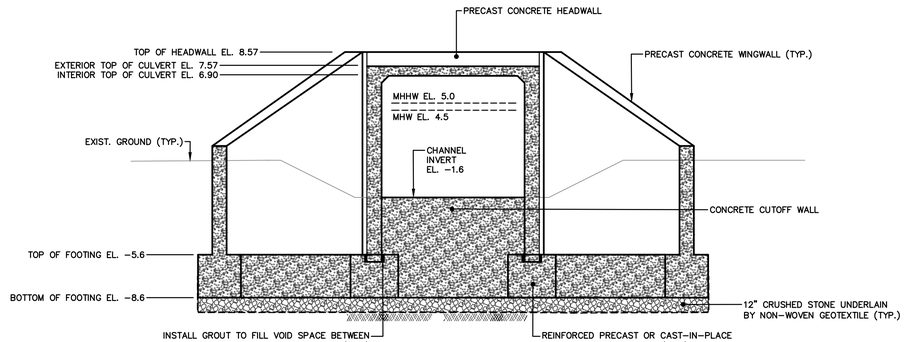


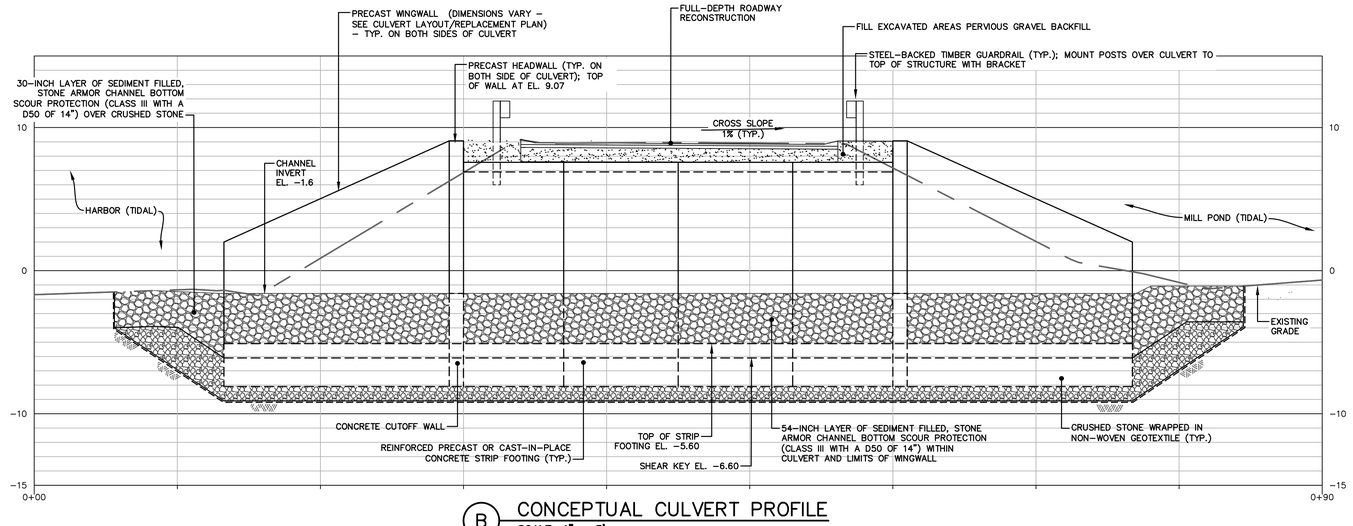
A CONCEPTUAL CULVERT PLAN
SCALE: 1" = 20'



C CONCEPTUAL TYPICAL CULVERT SECTION
SCALE: 1" = 5'



D CONCEPTUAL CULVERT END SECTION
SCALE: 1" = 5'



B CONCEPTUAL CULVERT PROFILE
SCALE: 1" = 5'

DEMOLITION NOTES

1. ALL EXCESS EXCAVATED MATERIALS, EXCESS FILL, EXCESS CONSTRUCTION MATERIALS, AND DEBRIS (THAT ARE NOT IDENTIFIED FOR RE-USE) SHALL BE REMOVED FROM THE SITE AND SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS.
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PRELIMINARY - FOR REVIEW ONLY

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: AS NOTED
VERT.: AS NOTED
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

TOWN OF TRURO
CONCEPTUAL RESTORATION CULVERT ALTERNATIVE 2 IMPROVEMENT PLAN
MILL POND SALT MARSH RESTORATION
TRURO MASSACHUSETTS

PROJ. No.: 20181291.A10
DATE: JUNE 2022

CULVERT ALT-2

File: J:\DWG\P2018\1291A10\Civil\Plan\20181291A10_STP01.dwg Layout: CS-103_ALT2 Plotted: 2022-06-22 10:08 PM Saved: 2022-06-22 10:05 PM User: NWiberg
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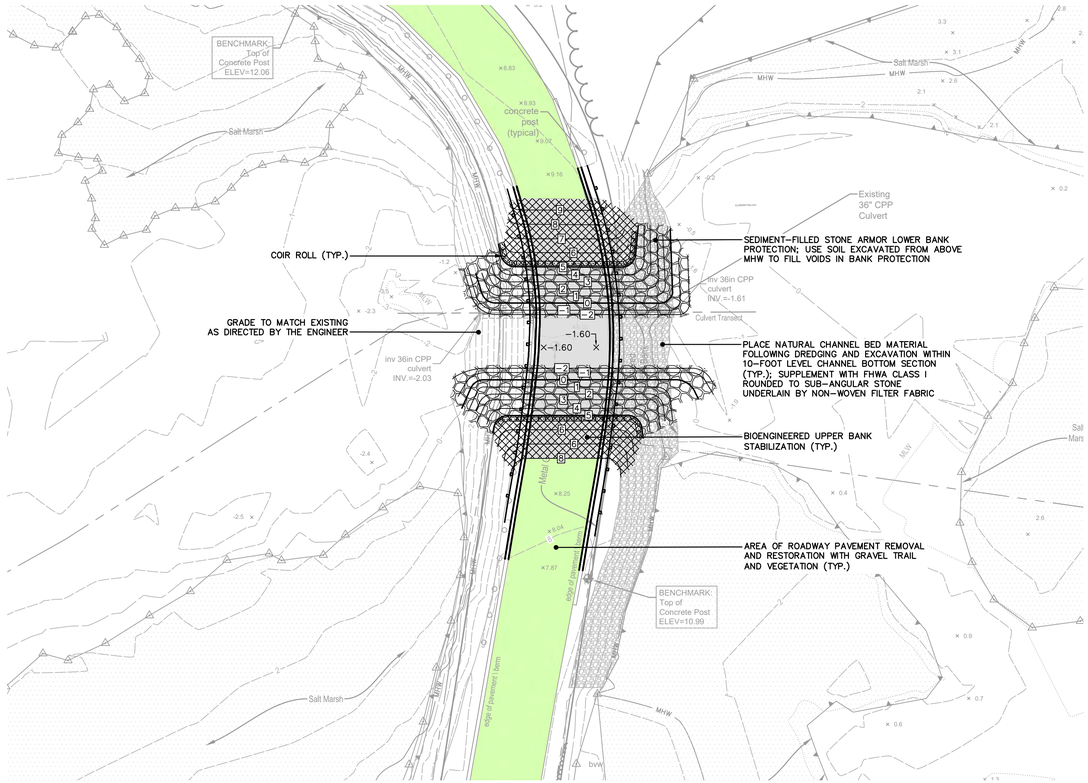
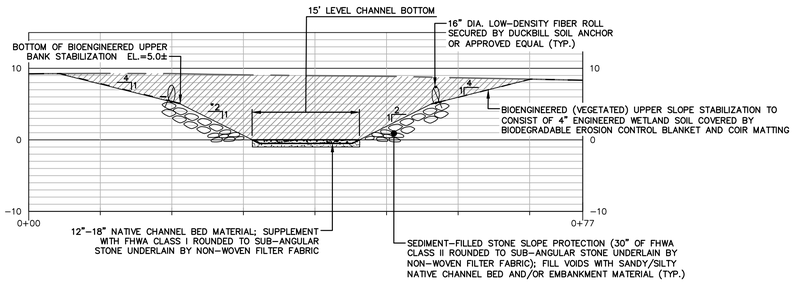


A CONCEPTUAL CHANNEL GRADING PLAN
SCALE: 1"= 20'



B CONCEPTUAL CHANNEL SECTION
SCALE: 1"= 10'

DEMOLITION NOTES

1. ALL EXCESS EXCAVATED MATERIALS, EXCESS FILL, EXCESS CONSTRUCTION MATERIALS, AND DEBRIS (THAT ARE NOT IDENTIFIED FOR RE-USE) SHALL BE REMOVED FROM THE SITE AND SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS.
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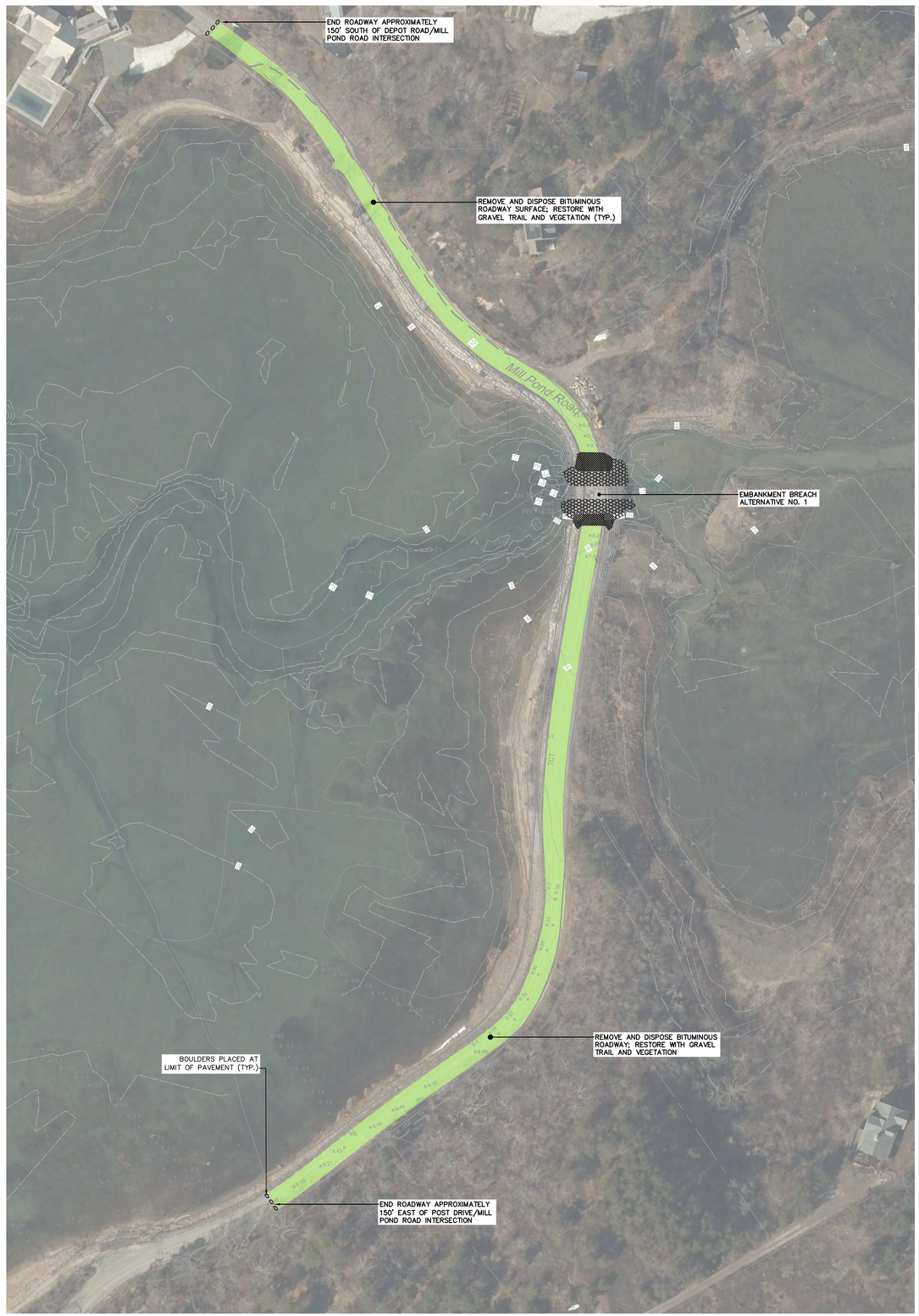
PRELIMINARY - FOR REVIEW ONLY



C CONCEPTUAL EMBANKMENT RESTORATION PLAN
SCALE: 1"= 60'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: AS NOTED
VERT.: AS NOTED
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

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317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

TOWN OF TRURO
CONCEPTUAL RESTORATION BREACH ALTERNATIVE 1 IMPROVEMENT PLAN
MILL POND SALT MARSH RESTORATION
TRURO MASSACHUSETTS

PROJ. No.: 20181291.A10
DATE: JUNE 2022

BREACH ALT-1

File: J:\DWG\P20181291A10\Civil\Plan\20181291A10_STP01.dwg Layout: CS-104_ALT3 Plotted: 2022-06-22 10:08 PM Saved: 2022-06-22 10:05 PM User: NWiberg
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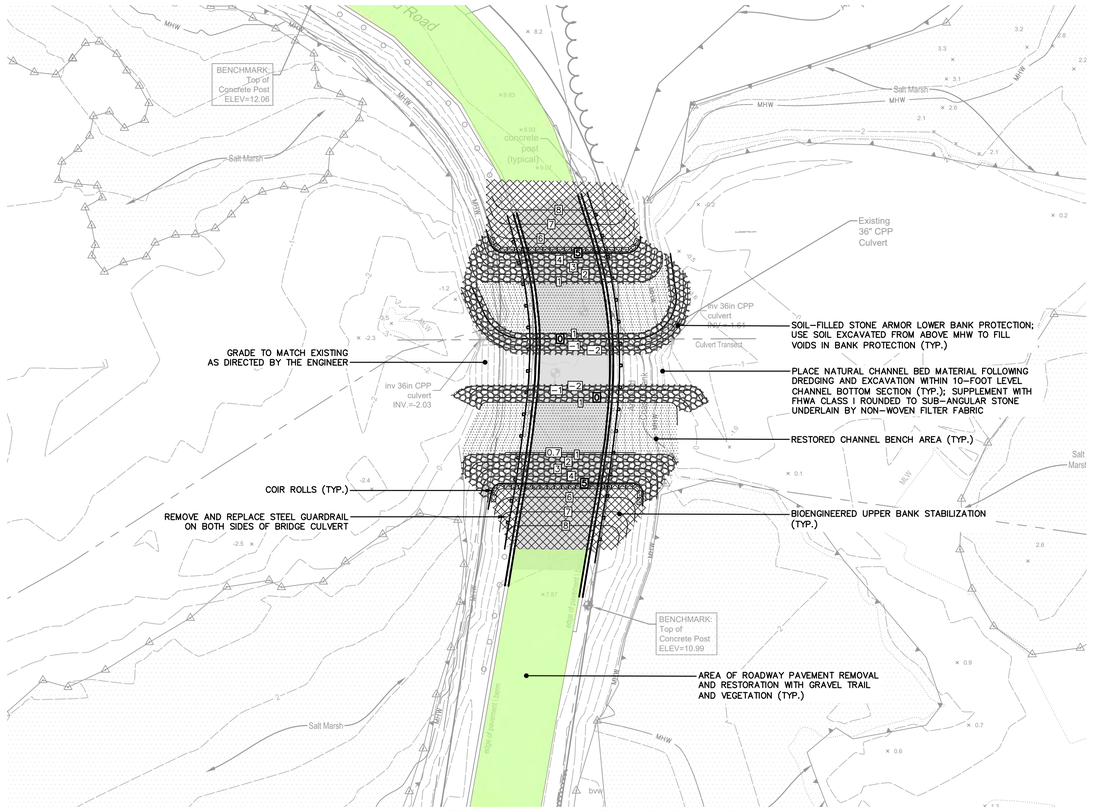
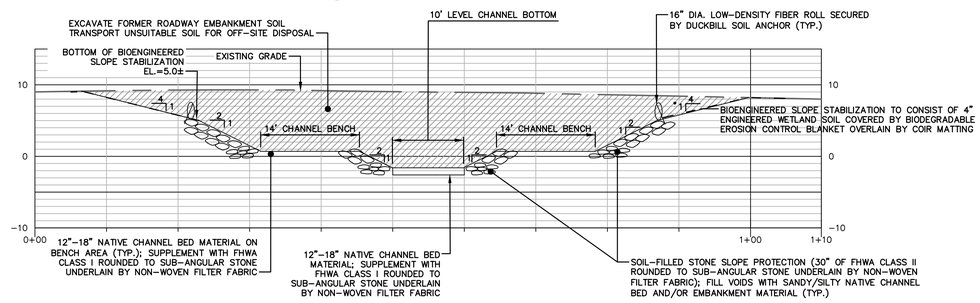


A CONCEPTUAL CHANNEL GRADING PLAN
SCALE: 1"= 20'



B CONCEPTUAL CHANNEL SECTION
SCALE: 1"= 10'

DEMOLITION NOTES

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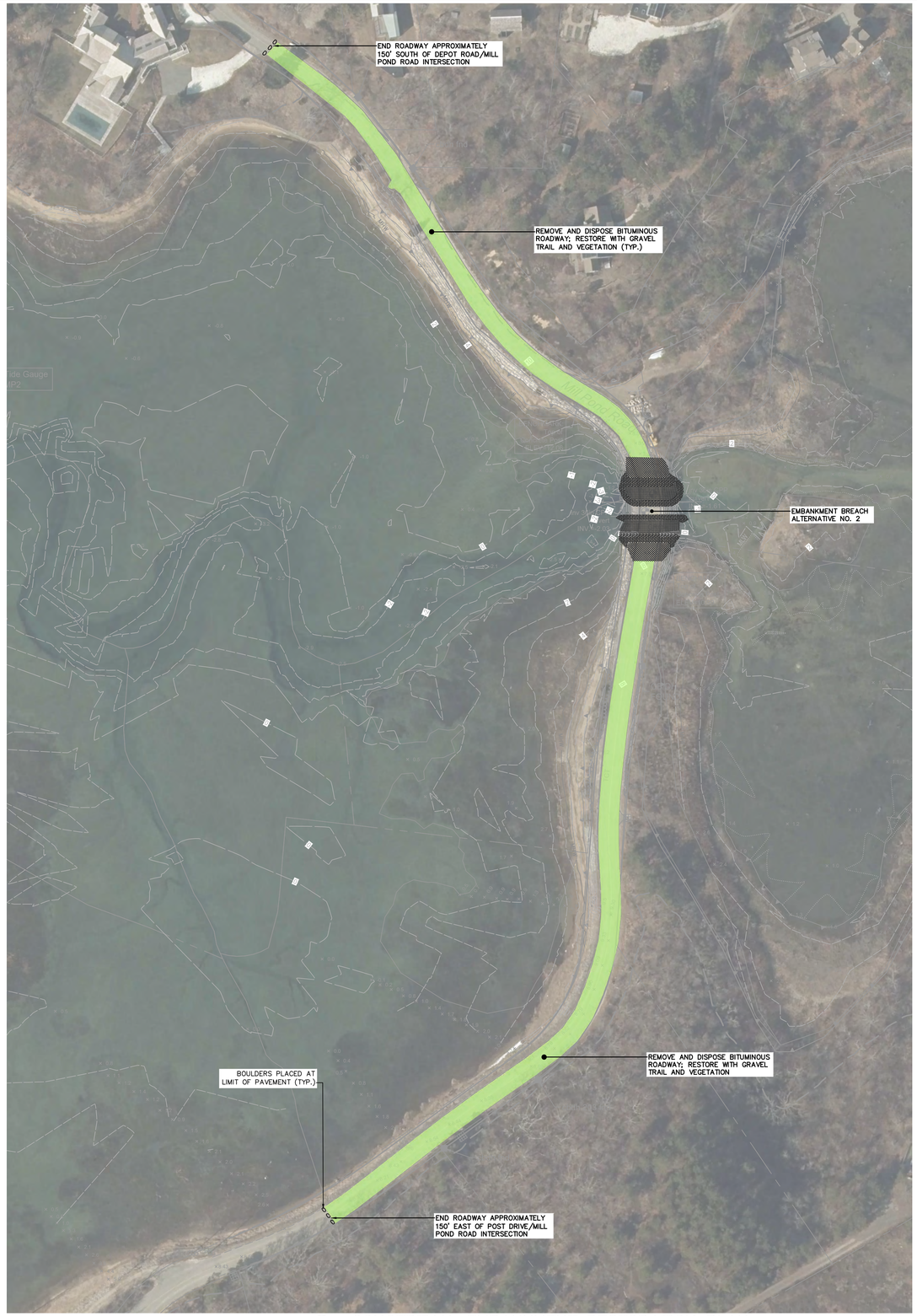
PRELIMINARY - FOR REVIEW ONLY



C CONCEPTUAL EMBANKMENT RESTORATION PLAN
SCALE: 1"= 60'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: AS NOTED
VERT.: AS NOTED
DATUM:
HORZ.: NAD83
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0
GRAPHIC SCALE

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TOWN OF TRURO
CONCEPTUAL RESTORATION BREACH ALTERNATIVE 2 IMPROVEMENT PLAN
MILL POND SALT MARSH RESTORATION
TRURO MASSACHUSETTS

PROJ. No.: 20181291.A10
DATE: JUNE 2022

BREACH ALT-2

File: J:\DWG\P2018\1291\A10\Civil\Plan\20181291A10_STP01.dwg Layout: CS-105_ALT4 Plotted: 2022-06-22 10:08 PM Saved: 2022-06-22 10:05 PM User: NWiberg
PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

FUSS & O'NEILL

Attachment G

Order of Magnitude Opinions of Construction Cost

PRELIMINARY - FOR REVIEW ONLY

FUSS & O'NEILL, INC.
317 Iron Horse Way
Providence, RI 02908

BUDGETARY OPINION OF COST		DATE PREPARED : 06/11/2022	SHEET 1 OF 1
PROJECT : **Mill Pond Salt Marsh Restoration**		BASIS :	2022 Mass Highway Weighted Average Bid Prices, 2022 ConnDOT Cost Estimating Guidelines, and previous construction projects.
LOCATION : **Truro, Massachusetts**			
DESCRIPTION **Culvert Alternative No. 1**			
DRAWING NO. **Culvert Alt-1**		ESTIMATOR : KMB	CHECKED BY : SDA/NSW

Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s)' methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.

ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST
1	**General Conditions and Requirements**				
	Mobilization & Demobilization	LS	1	$38,000	$38,000
	General Conditions	LS	1	$130,000	$130,000
	Construction Survey Layout and As-Built Mapping	LS	1	$17,000	$17,000
	Field and Laboratory Testing	LS	1	$11,000	$11,000
	Insurance and Bonds	LS	1	$27,000	$27,000
	GENERAL CONDITIONS AND REQUIREMENTS SUBTOTAL				**$223,000**
2	**Site Preparation**				
	Temporary Traffic Control	LS	1	$15,000	$15,000
	Temporary Erosion/Sedimentation Controls	LS	1	$33,000	$33,000
	Control of Water	LS	1	$300,000	$300,000
	SITE PREPARATION SUBTOTAL				**$348,000**
3	**Site Construction and Restoration**				
	Full Depth Sawcut	FT	36	$75	$2,700
	Pavement Removal	SY	185	$20	$3,700
	Earth Excavation	CY	580	$45	$26,100
	Stone Armor Slope Protection, Toe Protection and Scour Apron (Class III)	TON	730	$150	$109,500
	Guardrail	LF	180	$85	$15,300
	Superpave Surface Course	TON	15	$350	$5,300
	Superpave Intermediate Course	TON	25	$350	$8,750
	Compacted Gravel Base Layer	CY	65	$125	$8,130
	Precast Concrete Culvert	LS	1	$250,000	$250,000
	Precast Concrete Wingwalls	LS	1	$200,000	$200,000
	Cast-in-Place Concrete Cutoff Wall	LS	1	$10,000	$10,000
	Sediment Filled Stone Armor Culvert Bottom	TON	40	$150	$6,000
	Crushed Stone Base Layer	TON	90	$75	$6,750
	Geotextile	SY	85	$12	$1,020
	Pervious Gravel Backfill	CY	425	$65	$27,630
	Salt Marsh Restoration	LS	1	$40,000	$40,000
	Seeding and Planting Disturbed Areas	SY	520	$20	$10,400
	SITE CONSTUCTION AND RESTORATION SUBTOTAL				**$731,280**
	OVERALL SUBTOTAL				**$1,302,280**
	CONTINGENCY (20%)				$260,500
	OVERALL TOTAL INCLUDING CONTINGENCY				**$1,563,000**
	SUBTOTAL -30% TO +50% (ROUNDED TO NEAREST $1,000)		**$1,172,000**	**TO**	**$2,214,000**

Notes: 1. Yellow Highlighted sections show changes.

PRELIMINARY - FOR REVIEW ONLY

FUSS & O'NEILL, INC.
317 Iron Horse Way
Providence, RI 02908

BUDGETARY OPINION OF COST		DATE PREPARED : 06/11/2022	SHEET 1 OF 1
PROJECT : **Mill Pond Salt Marsh Restoration**		BASIS :	2022 Mass Highway Weighted Average Bid Prices, 2022 ConnDOT Cost Estimating Guidelines, and previous construction projects.
LOCATION : **Truro, Massachusetts**			
DESCRIPTION **Culvert Alternative No. 2**			
DRAWING NO. **Culvert Alt-2**		ESTIMATOR : KMB	CHECKED BY : SDA/NSW

Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s)' methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.

ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST
1	**General Conditions and Requirements**				
	Mobilization & Demobilization	LS	1	$42,000	$42,000
	General Conditions	LS	1	$142,000	$142,000
	Construction Survey Layout and As-Built Mapping	LS	1	$18,000	$18,000
	Field and Laboratory Testing	LS	1	$12,000	$12,000
	Insurance and Bonds	LS	1	$30,000	$30,000
	GENERAL CONDITIONS AND REQUIREMENTS SUBTOTAL				**$244,000**
2	**Site Preparation**				
	Temporary Traffic Control	LS	1	$15,000	$15,000
	Temporary Erosion/Sedimentation Controls	LS	1	$37,000	$37,000
	Control of Water	LS	1	$310,000	$310,000
	SITE PREPARATION SUBTOTAL				**$362,000**
3	**Site Construction and Restoration**				
	Full Depth Sawcut	FT	36	$75	$2,700
	Pavement Removal	SY	185	$20	$3,700
	Earth Excavation	CY	725	$45	$32,630
	Stone Armor Slope Protection, Toe Protection and Scour Apron (Class III)	TON	770	$150	$115,500
	Steel-Backed Timber Guardrail	LF	180	$85	$15,300
	Superpave Surface Course	TON	15	$350	$5,300
	Superpave Intermediate Course	TON	25	$350	$8,750
	Compacted Gravel Base Layer	CY	65	$125	$8,130
	Precast Concrete Culvert	LS	1	$325,000	$325,000
	Precast Concrete Wingwalls	LS	1	$200,000	$200,000
	Cast-in-Place Concrete Cutoff Wall	LS	1	$12,000	$12,000
	Sediment Filled Stone Armor Culvert Bottom	TON	48	$150	$7,200
	Crushed Stone Base Layer	TON	90	$75	$6,750
	Geotextile	SY	100	$12	$1,200
	Pervious Gravel Backfill	CY	400	$65	$26,000
	Salt Marsh Restoration	LS	1	$40,000	$40,000
	Seeding and Planting Disturbed Areas	SY	520	$20	$10,400
	SITE CONSTUCTION AND RESTORATION SUBTOTAL				**$820,560**
	OVERALL SUBTOTAL				**$1,426,560**
	CONTINGENCY (20%)				$285,400
	OVERALL TOTAL INCLUDING CONTINGENCY				**$1,712,000**
	SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST $1,000)		**$1,498,000**	**TO**	**$2,425,000**

Notes: 1. Yellow Highlighted sections show changes.

PRELIMINARY - FOR REVIEW ONLY

FUSS & O'NEILL, INC.
317 Iron Horse Way
Providence, RI 02908

BUDGETARY OPINION OF COST		DATE PREPARED : 06/11/2022	SHEET 1 OF 1
PROJECT :	**Mill Pond Salt Marsh Restoration**	BASIS :	2022 Mass Highway Weighted Average Bid Prices, 2022 ConnDOT Cost Estimating Guidelines, and previous construction projects.
LOCATION :	**Truro, Massachusetts**		
DESCRIPTION	**Breach Alternative No. 1**		
DRAWING NO	**Breach Alt-1**	ESTIMATOR : KMB	CHECKED BY : SDA/NSW

Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s)' methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.

ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST
1	**General Conditions and Requirements**				
	Mobilization & Demobilization	LS	1	$20,000	$20,000
	General Conditions	LS	1	$66,000	$66,000
	Construction Survey Layout and As-Built Mapping	LS	1	$9,000	$9,000
	Field and Laboratory Testing	LS	1	$6,000	$6,000
	Insurance and Bonds	LS	1	$14,000	$14,000
	GENERAL CONDITIONS AND REQUIREMENTS SUBTOTAL				**$115,000**
2	**Site Preparation**				
	Temporary Traffic Control	LS	1	$15,000	$15,000
	Temporary Erosion/Sedimentation Controls	LS	1	$22,000	$22,000
	Control of Water	LS	1	$250,000	$250,000
	SITE PREPARATION SUBTOTAL				**$287,000**
3	**Site Construction and Restoration**				
	Full Depth Sawcut	FT	36	$75	$2,700
	Pavement Removal	SY	3085	$20	$61,700
	Earth Excavation	CY	600	$45	$27,000
	Disposal of Excavated Soil	CY	600	$125	$75,000
	Stone Armor Slope and Scour Protection	TON	380	$150	$57,000
	Restore Former Roadway to Gravel Walking Path	CY	340	$50	$17,000
	Loam for Former Roadway Shoulders	CY	85	$60	$5,100
	Seeding and Planting Disturbed Areas	SY	750	$20	$15,000
	SITE CONSTRUCTION AND RESTORATION SUBTOTAL				**$260,500**
	OVERALL SUBTOTAL				**$662,500**
	CONTINGENCY (20%)				$132,500
	OVERALL TOTAL INCLUDING CONTINGENCY				**$795,000**
	SUBTOTAL -30% TO +50% (ROUNDED TO NEAREST $1,000)		**$596,000**	**TO**	**$1,126,000**

Notes:

FUSS & O'NEILL, INC.
317 Iron Horse Way
Providence, RI 02908

BUDGETARY OPINION OF COST

DATE PREPARED : 06/11/2022 | SHEET 1 OF 1

PROJECT : **Mill Pond Salt Marsh Restoration**

LOCATION : **Truro, Massachusetts**

DESCRIPTION **Breach Alternative No. 2**

DRAWING NO **Breach Alt-2**

BASIS : 2022 Mass Highway Weighted Average Bid Prices, 2022 ConnDOT Cost Estimating Guidelines, and previous construction projects.

ESTIMATOR : KMB | CHECKED BY : SDA/NSW

Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s)' methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.

ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST
1	**General Conditions and Requirements**				
	Mobilization & Demobilization	LS	1	$26,000	$26,000
	General Conditions	LS	1	$87,000	$87,000
	Construction Survey Layout and As-Built Mapping	LS	1	$11,000	$11,000
	Field and Laboratory Testing	LS	1	$8,000	$8,000
	Insurance and Bonds	LS	1	$19,000	$19,000
	GENERAL CONDITIONS AND REQUIREMENTS SUBTOTAL				**$151,000**
2	**Site Preparation**				
	Temporary Traffic Control	LS	1	$15,000	$15,000
	Temporary Erosion/Sedimentation Controls	LS	1	$23,000	$23,000
	Control of Water	LS	1	$300,000	$300,000
	SITE PREPARATION SUBTOTAL				**$338,000**
3	**Site Construction and Restoration**				
	Full Depth Sawcut	FT	36	$75	$2,700
	Pavement Removal	SY	3085	$20	$61,700
	Earth Excavation	CY	1150	$45	$51,750
	Disposal of Excavated Soil	CY	1150	$125	$143,750
	Stone Armor Slope and Scour Protection	TON	570	$150	$85,500
	Restore Former Roadway to Gravel Walking Path	CY	340	$50	$17,000
	Loam for Former Roadway Shoulders	CY	85	$60	$5,100
	Seeding and Planting Disturbed Areas	SY	750	$20	$15,000
	SITE CONSTRUCTION AND RESTORATION SUBTOTAL				**$382,500**
	OVERALL SUBTOTAL				**$871,500**
	CONTINGENCY (20%)				$174,300
	OVERALL TOTAL INCLUDING CONTINGENCY				**$1,046,000**
	SUBTOTAL -30% TO +50% (ROUNDED TO NEAREST $1,000)		**$785,000**	**TO**	**$1,482,000**

Notes:

FUSS & O'NEILL

Attachment H

Comparative Criteria Analysis Matrices

PRELIMINARY - FOR REVIEW ONLY

Mill Pond Salt Marsh Restoration
Weighted Alternatives Evaluation Matrix
June 23, 2022

Culvert Structure Alternative	Site Compatibility/Natural Resources Criteria					Construction Phase Criteria		Long-Term Operation and Maintenance Criteria		OVERALL SCORE
	Minimize Environmental Impacts and Regulatory Barriers (Type and Number of Applications and Review Agencies)	Minimize Wave Action and Vulnerability of Depot Road and Private Properties to Higher Tides and Storm Events	Maximize Ecological Restoration Benefits (Aquatic Passage, Sediment/Salt Marshes, Shellfish, Water Quality)	Minimize Emergency Response and Vehicle Accessibility Impacts to General Public and Private Properties with Driveways on Mill Pond Road	Maximize Recreational Paddlecraft Passage and Safety	Minimize Construction Costs	Minimize Construction Duration	Minimize Operation/Maintenance, Repair and Future Replacement Costs	Maximize Resilience/ Adaptability to Sea Level Rise Conditions	
Criteria Weighting	4	3	5	4	3	4	3	4	5	
Culvert Alternative No. 1 - 8'W x 8.5'H 3-Sided Culvert	3	5	2	4	1	2	2	2	3	2.66
Culvert Alternative No. 2 - 10'W x 8.5'H 3-Sided Culvert	3	4	3	4	2	1	2	2	3	2.69
Breach Alternaitve No. 1 - Open Channel with 50' Top Width	4	3	4	2	4	5	4	4	4	3.80
Breach Alternative No. 2 - Open Channel with 90' Top Width	4	2	5	2	4	4	4	4	4	3.74

NOTE: ALL CRITERIAL WEIGHTING RATINGS AND SCORES ARE BASED ON A SCALE OF 1 - 5.

PRELIMINARY - FOR REVIEW ONLY

Mill Pond Salt Marsh Restoration
Unweighted Alternatives Evaluation Matrix
June 23, 2022

Culvert Structure Alternative	Site Compatibility/Natural Resources Criteria					Construction Phase Criteria		Long-Term Operation and Maintenance Criteria		OVERALL SCORE
	Minimize Environmental Impacts and Regulatory Barriers (Type and Number of Applications and Review Agencies)	Wave Action and Vulnerability of Depot Road and Private Properties to Higher Tides and Storm Events	Maximize Ecological Restoration (Aquatic Passage, Sediment/Salt Marshes, Shellfish, Water Quality)	Minimize Emergency Response and Vehicle Accesability Impacts to General Public and Private Properties with Driveways on Mill Pond Road	Maximize Recreational Paddlecraft Passage and Safety	Minimize Construction Costs	Minimize Construction Duration	Minimize Operation/Maintenance, Repair and Future Replacement Costs	Maximize Resilience/ Adaptability to Sea Level Rise Conditions	
Criteria Weighting	5	5	5	5	5	5	5	5	5	
Culvert Alternative No. 1 - (8'W x 8.5'H 3-Sided Culvert)	3	5	2	4	1	2	2	2	3	2.67
Culvert Alternative No. 2 - (10'W x 8.5'H 3-Sided Culvert)	3	4	3	4	2	1	2	2	3	2.67
Breach Alternaitve No. 1 - Open Channel with 50' Top Width	4	3	4	2	4	5	4	4	4	3.78
Breach Alternaitve No. 2 - Open Channel with 90' Top Width	4	2	5	2	4	4	4	4	4	3.67

NOTE: ALL CRITERIAL WEIGHTING RATINGS AND SCORES ARE BASED ON A SCALE OF 1 - 5.

Consent Agenda Item: 8C

TOWN OF TRURO

Select Board Agenda Item

DEPARTMENT: Licensing Department

REQUESTOR: Nicole Tudor, Executive Assistant

REQUESTED MEETING DATE: December 13, 2022

ITEM: Approval of Renewal of 2023 Seasonal Business Licenses:

- **North Truro Camping Area** and **Adventure Bound Camping Resort** Transient Vendor
- **Truro Vineyards-**Lodging House License

EXPLANATION: These licenses are under the authority of the Select Board as the Local Licensing Authority. If you approve these licenses for renewal, the licenses will be issued only upon compliance with all regulations, receipt of the necessary fees, proof of taxes paid in full for the fiscal year. The Food Service Licenses for all applicants have been issued by the Health Agent. There were no reported issues with these establishments in 2023.

Mass General Law	Licenses & Permits Issued by Select Board	Names of Businesses
Chapter 101 § 2	**Transient Vendor** (Seasonal Retail)	**Adventure Bound Camping Resort at Horton's North Truro Camping Area**
Chapter 140 § 23	**Lodging House License**	**Truro Vineyards of Cape Cod**

IMPACT IF NOT APPROVED: The applicants will not be issued their Licenses to operate.

SUGGESTED ACTION: *MOTION TO approve the 2023 Transient Vendor Licenses for North Truro Camping Area and Adventure Bound Camping Resort at Horton's and the 2023 Lodging License for Truro Vineyards of Cape Cod the upon compliance with all regulations and receipt of the necessary fees.*

ATTACHMENTS:

1. Renewal Application for 2023: North Truro Camping Area
2. Renewal Application for 2023: Adventure Bound Camping Resort at Horton's
3. Renewal Application for 2023: Truro Vineyards

Number:2023-023 **Fee: $50.00**

Town of Truro Board of Health
24 Town Hall Road, Truro, MA 02666
Campground

This is to certify that **Wayne Klekamp, mgr., James Bourne, on-site mgr., d/b/a Adventure Bound Camping Resort at Hortons**

67 South Highland Rd

Has Been Granted A License to Operate **Recreational Camps, Overnight Camps or Trailer Coach Parks**

This license is issued in conformity with the authority granted to the Truro Board of Health, by Chapter 140, Sections 32A, 32B, 32C, 32D, 32E as amended, and is subject to the provisions of the Laws of the Commonwealth of Massachusetts relating thereto, and upon such terms and conditions, and to the rules and regulations in regard to said Camps or Cabins so licensed as adopted by the Truro Board of Health and expires **December 31, 2023** unless sooner suspended or revoked.

Date December 5, 2022

#of units: **218 sites**

Emily Beebe, RS

Agent to the Truro Board of Health

Number: 2023-023A **Fee $75.00**

Town of Truro Board of Health

24 Town Hall Road, Truro, MA 02666

Permit To Operate A Food Establishment

In accordance with Regulations promulgated under authority of Chapter 111, Section 127A of the General Laws a Permit is hereby granted to:

Wayne Klekamp, mgr., James Bourne, on-site mgr., d/b/a Adventure Bound Camping Resort at Horton's

Highland Dairy General Store

Whose place of business is **67 South Highland Rd**

Type of business and any restrictions **General Store (prepackaged & microwave food items/dry goods)**

To operate a food establishment in **Truro**

Permit Expires: **December 31, 2023**

Date Issued:
December 5, 2022

Emily Beebe, R.S.
Agent to the Truro Board of Health

Camp # 2023-023

PAID 5853

TOWN OF TRURO

PO Box 2030, Truro MA 02666
Tel: 508-349-7004, Extension: 131 or 124 Fax: 508-349-5508

LICENSE APPLICATION: Condominiums, Cottage Colonies, Motels, Campgrounds, Lodging, Gas Station/Retail Service, Transient Vendor

Section 1 – LICENSE TYPE

Please check the appropriate box the best describes the license type(s).

☐ New ☒ Renewal/No Changes (Skip to Section 3)

FACILITY:

☐ Motel-$50 ☐ Cottage Colony-$50 ☐ Condominium-$50 # Units____ ☐ Lodging-$50

☐ Transient Vendor-$75____ ☑ Campground-$50____ ☐ Gas Station*-$25

*Gas Station-$25 ***(Please submit your Service Station Compliance Form & Third Part Underground StorageTank Inspection Report (FP 289))***

Section 2 – BUSINESS INFORMATION

Federal Employers Identification Number (FEIN/SS) _____

_____ A/C Mobile home Park, Inc at Hortons

Print Name of Applicant — Business Name

_____

Owner Name

_____

Street Address of Business — Mailing Address of Business

_____

Business Phone Number — Business E-Mail Address

Section 3-HOURS OF OPERATION

☐ Annual ☒ Seasonal Opening Date: 4/1/23 Closing Date: 11/9/23

Days of the Week Open: Mon - Sun

HEALTH DEPARTMENT
TOWN OF TRURO
4 2 2022
RECEIVED BY

☐ Check if New Manager (if checked, MUST submit Application to Name a Manager)

Section 4-MANAGER INFORMATION

Name of Onsite Manager:

Name: James Bourne Unit Number: _____

Mailing Address: PO Box 365 North Truro MA 02652

Phone: (24 Hour Contact): [redacted] Email Address: [redacted]

James D Bourne

Manager's Signature (REQUIRED)

Name of Offsite Manager:

Name: same Business Name: _____

Business Address: _____

Phone: (24 Hour Contact): _____ Email Address: _____

James D Bourne

Manager's Signature (REQUIRED)

Name of Co- Manager:

Name: _____ Business Name: _____

Business Address: _____

Phone: (24 Hour Contact): _____ Email Address: _____

Co-Manager's Signature (REQUIRED)

Section 5 – ATTESTATION

Pursuant to M.G. L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all local state taxes required under law and the information I have provided is true and accurate. Any misstatement in this application, or violation of state or applicable town bylaws or regulations, shall be considered sufficient cause for refusal, suspension or revocation of the license.

Signature of Applicant Print Name 11/18/22 Date

Additional Applications & Documentation

REQUIRED FOR ALL MOTELS, COTTAGE COLONIES, CONDOMINIUMS & CAMPGROUNDS

☐ Smoke detector/CO detector/fire protection certification

☐ IF YOU HAVE EMPLOYEES- Workers Compensation Affidavit & Certificate of Insurance

☐ IF YOU DO NOT HAVE EMPLOYEES- Workers Compensation Affidavit

ADDITIONAL (SEPARATE) APPLICATIONS THAT MAY PERTAIN TO YOUR OPERATION

☐ Application for Pool or Hot Tub Permit ☐ Application to Name a Manager

☐ Entertainment License ☐ Application to sell Tobacco ☐ Application for Food Service Permit

☐ Business certificate with the clerk's office

☐ Septic System Inspection Report (submitted every 3 years)

(rev. 10/2022)

FB# 2023-023A PAID 5853

Town of Truro

Board of Health

24 Town Hall Road, P.O. Box 2030, Truro, MA 02666
Tel: 508-349-7004, Extension: 131 Fax: 508-349-5508
Email: ibudnick@truro-ma.gov or nrichey@truro-ma.gov

NOV 22 2022
RECEIVED BY:

APPLICATION FOR FOOD SERVICE – COMMON VICTUALER

Name of Business: A/C Mobile Home Park @ Hortons

☐ New ☒ Renewal/**No Changes (Skip to Section 3)**

Section 1 – License Type

Type of License: ☐ **Food Service** ☐ **Common Victualer ($50)**

Type of Food Service Establishment:

☐ Food Service (restaurant or take out)/ $75
☐ Retail Food (commercially prepared foods)/$15
☐ Residential Kitchen $25
☐ Bed & Breakfast w/Continental Breakfast
☐ Catering/ $50
☐ Manufacturer of Ice Cream/Frozen Dessert / $10
☐ Bakery $10

Section 2 – Business/Owner/Manger Information

Federal Employers Identification Number (FEIN/SS) _____

Business Name: _____

Owner Name: _____ **Email Address:** _____

Mailing Address: _____

Phone No: _____

Section 3 – Business Operation Details

Number of Seats: Inside: 0 Outside: _____ Number of Employees: 0

Length of Permit: ☐ **Annual** ☒ **Seasonal Operation**

Hours of Operation: 8 To 8

Days Closed Excluding Holidays: none

If Seasonal: Approximate Dates of Operation: 04 / 01 / 23 To 11 / 09 / 23

Person Directly Responsible for Daily Operations: (Owner, Person in Charge, Supervisor, Manager)

Name: James Bourne **Email Address:** [redacted]

Mailing Address: 67 Highland Road North Truro, MA 02652

Phone No: 508 487-1847 **24 Hour Emergency:** _____

Certified Food Manager(s) (attach copy): (at least 1 full-time equivalent PER SHIFT required)

Allergen Awareness Certification (attach copy):

Has your menu changed from last year? ☐ Yes ☒ No

If yes please attach copy of menu or provide description of food to be prepared and sold:

Section 4 - Attestation

Attestation

I, the undersigned, attest to the accuracy of the information provided in this application and further agree to allow the regulatory authority access to the food service establishment as specified under § 8-402.11. I affirm that the food establishment operation will comply with 105 CMR 590.000, Truro Board of Health Regulation Section X, Food Service Regulations and all other applicable laws. Pursuant to MGL Ch. 62C § 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid state and local taxes required by law.

[redacted] **Date:** 11/18/2022

****

Application Checklist:

☐ **Food Service Permit Application**

☐ **Smoke Detector/Fire Protection Certification**

☐ **Workers Compensation Affidavit/Certificate of Insurance**

☐ **Copy of Inspection of Kitchen Equipment: Commercial Hood and Ventilation System Report**

☐ **Copy of Service report of mechanical washing equipment (Dishwasher)**

☐ **Copy of ServSafe Certification and Allergy Awareness**

☐ **Copy of Choke Saver (for food service establishment w/seating capacity of 25 or more)**

FOR HEALTH DEPARTMENT USE ONLY

Comments:

Review by Date

The Commonwealth of Massachusetts
Department of Industrial Accidents
1 Congress Street, Suite 100
Boston, MA 02114-2017
www.mass.gov/dia

Workers' Compensation Insurance Affidavit: General Businesses.
TO BE FILED WITH THE PERMITTING AUTHORITY.

Applicant Information **Please Print Legibly**

Business/Organization Name: A/C Mobile Home Park, Inc at Hortons

Address: 67 Highland Road

City/State/Zip: North Truro, MA 02652 Phone #: 508 487-1847

Are you an employer? Check the appropriate box:

1. ☒ I am a employer with seasonal employees (full and/ or part-time).*
2. ☐ I am a sole proprietor or partnership and have no employees working for me in any capacity. [No workers' comp. insurance required]
3. ☐ We are a corporation and its officers have exercised their right of exemption per c. 152, §1(4), and we have no employees. [No workers' comp. insurance required]**
4. ☐ We are a non-profit organization, staffed by volunteers, with no employees. [No workers' comp. insurance req.]

Business Type (required):

5. ☐ Retail
6. ☐ Restaurant/Bar/Eating Establishment
7. ☐ Office and/or Sales (incl. real estate, auto, etc.)
8. ☐ Non-profit
9. ☐ Entertainment
10. ☐ Manufacturing
11. ☐ Health Care
12. ☒ Other Campground

*Any applicant that checks box #1 must also fill out the section below showing their workers' compensation policy information.
**If the corporate officers have exempted themselves, but the corporation has other employees, a workers' compensation policy is required and such an organization should check box #1.

I am an employer that is providing workers' compensation insurance for my employees. Below is the policy information.

Insurance Company Name: National Casualty Co

Insurer's Address: 1100 Locust St

City/State/Zip: Des Moines, IA 50391

Policy # or Self-ins. Lic. #: [redacted] Expiration Date: 04/01/2023

Attach a copy of the workers' compensation policy declaration page (showing the policy number and expiration date).

Failure to secure coverage as required under Section 25A of MGL c. 152 can lead to the imposition of criminal penalties of a fine up to $1,500.00 and/or one-year imprisonment, as well as civil penalties in the form of a STOP WORK ORDER and a fine of up to $250.00 a day against the violator. Be advised that a copy of this statement may be forwarded to the Office of Investigations of the DIA for insurance coverage verification.

I do hereby certify, under the pains and penalties of perjury that the information provided above is true and correct.

Signature: Date: 11/18/2022

Phone #: [redacted]

Official use only. Do not write in this area, to be completed by city or town official.

City or Town: **Permit/License #**

Issuing Authority (circle one):
1. Board of Health 2. Building Department 3. City/Town Clerk 4. Licensing Board 5. Selectmen's Office
6. Other

Contact Person: **Phone #:**

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 04/12/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER K&K INSURANCE GROUP, INC. P.O. BOX 2338 FORT WAYNE, IN 46801	**CONTACT NAME:** LEISURE **PHONE (A/C, No, Ext):** 877-355-0315 **FAX (A/C, No):** 260-459-5990 **E-MAIL ADDRESS:**
INSURED H. WAYNE KLEKAMP, INC. (SEE SCHEDULE) DBA : ADVENTURE BOUND CAMPING RESORTS 905 16TH PL VERO BEACH, FL 32960	**INSURER(S) AFFORDING COVERAGE** — **NAIC #** **INSURER A:** NATIONAL CASUALTY COMPANY — 11991 **INSURER B:** **INSURER C:** **INSURER D:** **INSURER E:** **INSURER F:**

COVERAGES **CERTIFICATE NUMBER: C140188** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR X LIQUOR LIMITS - $1,000,000/$1,000,000 AGG GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PROJECT X LOC OTHER:	Y		[redacted]	4/1/2022 12:01 AM	4/1/2023 12:01 AM	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea Occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS – COMP/OP AGG LEGAL LIAB TO PARTICIPANTS PROFESSIONAL LIABILITY	[redacted] EXCLUDED [redacted]
A	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY HIRED AUTOS ONLY SCHEDULED AUTOS NON-OWNED AUTOS ONLY			[redacted]	4/1/2022 12:01 AM	4/1/2023 12:01 AM	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	[redacted]
	UMBRELLA LIAB OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION						EACH OCCURRENCE AGGREGATE	
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/ EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		[redacted]	4/1/2022 12:01 AM	4/1/2023 12:01 AM	X PER STATUTE OTHER E.L. EACH ACCIDENT E.L. DISEASE – EA EMPLOYEE E.L. DISEASE – POLICY LIMIT	
	PARTICIPANT ACCIDENT						AD&D Primary Medical Excess Medical Weekly Indemnity	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER IS ADDED AS ADDITIONAL INSURED, BUT ONLY FOR LIABILITY CAUSED, IN WHOLE OR IN PART, BY THE ACTS OR OMISSIONS OF THE NAMED INSURED.

RE: CAPE COD-NORTH TRURO: 42-44-46-48 HIGHLAND ROAD, NORTH TRURO, MA & CAPE COD-HORTONS: 67-71 SOUTH HIGHLAND ROAD, NORTH TRURO, MA

CERTIFICATE HOLDER	CANCELLATION
TOWN OF TRURO LICENSING DEPARTMENT PO BOX 2030 TRURO, MA 02666	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Scott Turkel

TRURO FIRE RESCUE

Truro Public Safety Facility
344 Route 6 Truro, MA 02666

FIRE PROTECTION SYSTEMS ANNUAL TEST REPORT

BUSINESS NAME: A/C Mobile Home Park Inc at Hortons

OWNER/MANAGER: _____

ADDRESS: 67 Highland Road

PHONE #: [redacted] NUMBER OF UNITS: _____

CONTACT PERSON: James Bourne

ADDRESS: _____

TESTING COMPANY: Fire Equipment Inc

TESTING ELECTRICIAN/TECHNICIAN: _____

COMPANY PHONE #: _____ ~~HOME~~ PHONE #: 508 775-3473

LICENSE #: 6025

The fire protection system (s) including, but not limited to, (Sprinkler Systems) (Range Hood Systems) (Fire Extinguishers) (Type I II III Fire Alarm Systems) (C.O. Detectors) at the above mentioned business address, were tested, (CERTIFIED) the add parts of the systems, were found to be, or corrected to be, fully operational.

COMMENTS: _____

DATE OF CERTIFICATION: 11/14/2022 BY: see attached report - James Spinosa

Signature of Licensed Electrician

THIS REPORT MUST BE FILLED OUT AND SUBMITTED, PRIOR TO THE ISSUANCE OF, OR RENEWAL OF A LICENSE TO OPERATE WITHIN THE TOWN OF TRURO.

FIRE EQUIPMENT INCORPORATED

Work Order Report

Work Order Details:

Account Name: Horton Camp Resort

Site Address: 71 South Highland Road, North Truro, MA 02652

Work Order Number: WO-00259225

Products:

Product Name:	Equipment #:	Equipment Location:
Portable Fire Extinguisher	FE 00075202	Building

Description:

Purpose of Visit: PM Inspection

Worked Performed:

Work Performed: Extinguisher inspection

Technician Information:

Item	Technician Name	Hours
1	James Spinosa	1

Closed On: Nov 14, 2022

Signature:

Date: Nov 09, 2022

TOTAL # OF EXTINGUISHERS – 3

EXTINGUISHERS DUE SERVICE NEXT YEAR –

New Equipment -

DRY CHEM 2.5 ABC		DRY CHEM 5 ABC		DRY CHEM 10 ABC		DRY CHEM 20 ABC	

DRY CHEM 10 BC		DRY CHEM 20 BC		DRY CHEM 10 PK		DRY CHEM 20 PK	
CO2 5lb		CO2 10lb		CO2 15.5lb		CO2 20lb	
Pressurized Water		K Class		Halotron 2.5lb		Halotron 5lb	
Halotron 11lb		Halotron 15lb		Emergency Lights		Exit Lights	
Other							

Inspection/Recertification –

DryChem	3	KClass		Pressurized Water		Halotron	
CO2		Conductivity Test		Wheeled Unit		Emergency Light	
Exit Light		Other Insp					

Recharges –

Dry Chem 2 1/2 lb		Dry Chem 5 lb		Dry Chem 10lb		Dry Chem 20lb	
CO2 5 lb		CO2 10 lb		CO2 15 lb		CO2 20 lb	
Pressurized Water		K Class .61		2,5G		Halotron 2.5 lb	
Halotron 5 lb		Halotron 11 lb		Halotron 15.5 Lb		Conductivity Tests	

Service –

6 YR Maintenance Halotron		Hydrotest Dry Chem	
6 YR Maintenance Other		Hydrotest Other	

Parts –

Service Collar		ORing		Check Stem		Pull Pin	
Vehicle Bracket		Heavy Duty Bracket		Batteries		Battery Disposal	
Wall Hook		M1 - 5lb		M2 -10lb		20lb	
Bulbs		Replacement Cover		Gauge		FEC Cover	
Other Parts		DOT		OSHA		PWM 90	
BL Series Vinyl		Type					
RP Series Plastic		Types					

FIRE EXTINGUISHERS ARE IN COMPLIANCE WITH NFPA 10 CODE –

Recommendations -

Comments -

TOWN OF TRURO

P.O. Box 2030, Truro, MA 02666
Tel: 508-349-7004, Extension: 10 or 24 Fax: 508-349-5505

TAX STATUS REQUEST FOR LICENSING

Date 11/23/2022

Request is coming from the Selectmen's Office_____Health Office X

Owner's Name: Beach Point Co-op recreational housing association ltd.

Business Name North Truro Camp Area at Hortons

Residential Address: 67 South Highland Road

Map and Parcel: 37-15

Please verify whether the Real Estate and Personal Property taxes to this property are up to date for the current fiscal year.

Tax Collector's Signature

11.25.2022
Date

Consent Agenda Item: 8C2

Number: 2023-022 **Fee: $50.00**

Town of Truro Board of Health
24 Town Hall Road, Truro, MA 02666
Campground

This is to certify that **James Bourne, mgr., d/b/a North Truro Camping Area**
46 Highland Rd

Has Been Granted a License to Operate **Recreational Camps, Overnight Camps or Trailer Coach Parks**

This license is issued in conformity with the authority granted to the Truro Board of Health, by Chapter 140, Sections 32A, 32B, 32C, 32D, 32E as amended, and is subject to the provisions of the Laws of the Commonwealth of Massachusetts relating thereto, and upon such terms and conditions, and to the rules and regulations in regard to said Camps or Cabins so licensed as adopted by the Truro Board of Health and expires **December 31, 2023** unless sooner suspended or revoked.

Date Dec. 2, 2022

# of units: **330 sites**

Emily Beebe, R.S.
Agent to the Truro Board of Health

Number: 2023-022A **Fee $75.00**

Town of Truro Board of Health

24 Town Hall Road, Truro, MA 02666

Permit To Operate A Food Establishment

In accordance with Regulations promulgated under authority of Chapter 111, Section 127A of the General Laws a Permit is hereby granted to:

Wayne Klekamp, mgr., James Bourne, on-site mgr., d/b/a Adventure Bound Camping

North Truro Camping Area

Whose place of business is **46 South Highland Rd**

Type of business and any restrictions **General Store (prepackaged & microwave food items/dry goods)**

To operate a food establishment in **Truro**

Permit Expires: **December 31, 2023**

Date Issued:
December 5, 2022

Emily Beebe, R.S.
Agent to the Truro Board of Health

Fire Exp: 11/13/2023
last septic = (esposits

Camp# 2023-022

PAID 5851

TOWN OF TRURO

PO Box 2030, Truro MA 02666
Tel: 508-349-7004, Extension: 131 or 124 Fax: 508-349-5508

LICENSE APPLICATION: Condominiums, Cottage Colonies, Motels, Campgrounds, Lodging, Gas Station/Retail Service, Transient Vendor

Section 1 – LICENSE TYPE

Please check the appropriate box the best describes the license type(s).

☐ New ☒ Renewal/No Changes **(Skip to Section 3)**

FACILITY: North - Truro - Campground

☐ Motel-$50 ☐ Cottage Colony-$50 ☐ Condominium-$50 # Units____ ☐ Lodging-$50

☐ Transient Vendor-$75_____ ☑ Campground-$50_____ ☐ Gas Station*-$25

*Gas Station-$25 ***(Please submit your Service Station Compliance Form & Third Part Underground StorageTank Inspection Report (FP 289))***

Section 2 – BUSINESS INFORMATION

Federal Employers Identification Number (FEIN/SS) _____

A/C Mobile home Park, Inc at Cape Cod

Print Name of Applicant **Business Name**

Owner Name

Street Address of Business **Mailing Address of Business**

Business Phone Number **Business E-Mail Address**

Section 3-HOURS OF OPERATION

☐ Annual ☒ Seasonal **Opening Date:** 4/1/23 **Closing Date:** 11/9/23

Days of the Week Open: Mon - Sun

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NOV 22 2022
TOWN OF TRURO
HEALTH DEPARTMENT

☐ Check if New Manager (if checked, MUST submit Application to Name a Manager)

Section 4-MANAGER INFORMATION

Name of Onsite Manager:

Name: James Bourne Unit Number: _____

Mailing Address: PO Box 365 North Truro, MA 02652

Phone: (24 Hour Contact) [redacted] Email Address: [redacted]

James D Bourne

Manager's Signature (REQUIRED)

Name of Offsite Manager:

Name: Same Business Name: _____

Business Address: _____

Phone: (24 Hour Contact): _____ Email Address: _____

James D Bourne

Manager's Signature (REQUIRED)

Name of Co- Manager:

Name: _____ Business Name: _____

Business Address: _____

Phone: (24 Hour Contact): _____ Email Address: _____

Co-Manager's Signature (REQUIRED)

Section 5 – ATTESTATION

Pursuant to M.G. L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all local state taxes required under law and the information I have provided is true and accurate. Any misstatement in this application, or violation of state or applicable town bylaws or regulations, shall be considered sufficient cause for refusal, suspension or revocation of the license.

Signature of Applicant Print Name 11/18/22 Date

Additional Applications & Documentation

REQUIRED FOR ALL MOTELS, COTTAGE COLONIES, CONDOMINIUMS & CAMPGROUNDS

☐ Smoke detector/CO detector/fire protection certification

☐ IF YOU HAVE EMPLOYEES- Workers Compensation Affidavit & Certificate of Insurance

☐ IF YOU DO NOT HAVE EMPLOYEES- Workers Compensation Affidavit

ADDITIONAL (SEPARATE) APPLICATIONS THAT MAY PERTAIN TO YOUR OPERATION

☐ Application for Pool or Hot Tub Permit ☐ Application to Name a Manager

☐ Entertainment License ☐ Application to sell Tobacco ☐ Application for Food Service Permit

☐ Business certificate with the clerk's office

☐ Septic System Inspection Report (submitted every 3 years)

TRURO FIRE RESCUE

Truro Public Safety Facility
344 Route 6 Truro, MA 02666

FIRE PROTECTION SYSTEMS
ANNUAL TEST REPORT

BUSINESS NAME: A/C Mobile Home Park Inc at Cape Cod

OWNER/MANAGER: _____

ADDRESS: 46 Highland Road

PHONE #[redacted] NUMBER OF UNITS: _____

CONTACT PERSON: James Bourne

ADDRESS: _____

TESTING COMPANY: Fire Equipment Inc

TESTING ELECTRICIAN/TECHNICIAN: _____

COMPANY PHONE #: _____ ~~HOME~~ PHONE #: [redacted]

LICENSE #: 6025

The fire protection system (s) including, but not limited to, (Sprinkler Systems) (Range Hood Systems) (Fire Extinguishers) (Type I II III Fire Alarm Systems) (C.O. Detectors) at the above mentioned business address, were tested, (CERTIFIED) the add parts of the systems, were found to be, or corrected to be, fully operational.

COMMENTS: _____

DATE OF CERTIFICATION: 11/13/2022 BY: see attached report - James Spinosa

Signature of Licensed Electrician

THIS REPORT MUST BE FILLED OUT AND SUBMITTED, PRIOR TO THE ISSUANCE OF, OR RENEWAL OF A LICENSE TO OPERATE WITHIN THE TOWN OF TRURO.

HEALTH DEPARTMENT
NOV 22 2022
RECEIVED BY

FS# 2023-022A

PAID 5851

Town of Truro

Board of Health

24 Town Hall Road, P.O. Box 2030, Truro, MA 02666
Tel: 508-349-7004, Extension: 131 Fax: 508-349-5508
Email: lbudnick@truro-ma.gov or nrichey@truro-ma.gov

APPLICATION FOR FOOD SERVICE – COMMON VICTUALER

Name of Business: A/C Mobile Home Park @ Cape Cod

☐ New ☒ Renewal/**No Changes (Skip to Section 3)**

Section 1 – License Type

Type of License: ☐ **Food Service** ☐ **Common Victualer ($50)**

Type of Food Service Establishment:

☑ Food Service (restaurant or take out)/ $75
☐ Retail Food (commercially prepared foods)/$15
☐ Residential Kitchen $25
☐ Bed & Breakfast w/Continental Breakfast
☐ Catering/ $50
☐ Manufacturer of Ice Cream/Frozen Dessert / $10
☐ Bakery $10

Section 2 – Business/Owner/Manger Information

Federal Employers Identification Number (FEIN/SS) _____

Business Name: _____

Owner Name: _____ **Email Address:** _____

Mailing Address: _____

Phone No: _____

Section 3 – Business Operation Details

Number of Seats: Inside: 0 Outside: _____ Number of Employees: 0

Length of Permit: ☐ **Annual** ☒ **Seasonal Operation**

Hours of Operation: 8 To 8

Days Closed Excluding Holidays: none

If Seasonal: Approximate Dates of Operation: 04 / 01 / 23 To 11 / 09 / 23

Person Directly Responsible for Daily Operations: (Owner, Person in Charge, Supervisor, Manager)

Name: James Bourne **Email Address:** [redacted]

Mailing Address: 46 Highland Road North Truro, MA 02652

Phone No: 508 487-1847 **24 Hour Emergency:** _____

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Rev 9/22

Certified Food Manager(s) (attach copy): (at least 1 full-time equivalent PER SHIFT required)

_____ _____ _____

Allergen Awareness Certification (attach copy):

_____ _____ _____

Has your menu changed from last year? ☐ Yes ☒ No
If yes please attach copy of menu or provide description of food to be prepared and sold:

_____

_____

Section 4 - Attestation

Attestation
I, the undersigned, attest to the accuracy of the information provided in this application and further agree to allow the regulatory authority access to the food service establishment as specified under § 8-402.11. I affirm that the food establishment operation will comply with 105 CMR 590.000, Truro Board of Health Regulation Section X, Food Service Regulations and all other applicable laws. Pursuant to MGL Ch. 62C § 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid state and local taxes required by law.

[redacted] _____ **Date:** 11/18/2022

****

Application Checklist:

☐ **Food Service Permit Application**

☐ **Smoke Detector/Fire Protection Certification**

☐ **Workers Compensation Affidavit/Certificate of Insurance**

☐ **Copy of Inspection of Kitchen Equipment: Commercial Hood and Ventilation System Report**

☐ **Copy of Service report of mechanical washing equipment (Dishwasher)**

☐ **Copy of ServSafe Certification and Allergy Awareness**

☐ **Copy of Choke Saver (for food service establishment w/seating capacity of 25 or more)**

FOR HEALTH DEPARTMENT USE ONLY

Comments: _____

_____

Review by Date

The Commonwealth of Massachusetts
Department of Industrial Accidents
1 Congress Street, Suite 100
Boston, MA 02114-2017
www.mass.gov/dia

Workers' Compensation Insurance Affidavit: General Businesses.
TO BE FILED WITH THE PERMITTING AUTHORITY.

Applicant Information **Please Print Legibly**

Business/Organization Name: A/C Mobile Home Park, Inc at Cape Cod

Address: 46 Highland Road

City/State/Zip: North Truro, MA 02652 Phone #: 508 487-1847

Are you an employer? Check the appropriate box:

1. ☒ I am a employer with seasonal employees (full and/ or part-time).*
2. ☐ I am a sole proprietor or partnership and have no employees working for me in any capacity. [No workers' comp. insurance required]
3. ☐ We are a corporation and its officers have exercised their right of exemption per c. 152, §1(4), and we have no employees. [No workers' comp. insurance required]**
4. ☐ We are a non-profit organization, staffed by volunteers, with no employees. [No workers' comp. insurance req.]

Business Type (required):

5. ☐ Retail
6. ☐ Restaurant/Bar/Eating Establishment
7. ☐ Office and/or Sales (incl. real estate, auto, etc.)
8. ☐ Non-profit
9. ☐ Entertainment
10. ☐ Manufacturing
11. ☐ Health Care
12. ☒ Other Campground

*Any applicant that checks box #1 must also fill out the section below showing their workers' compensation policy information.
**If the corporate officers have exempted themselves, but the corporation has other employees, a workers' compensation policy is required and such an organization should check box #1.

I am an employer that is providing workers' compensation insurance for my employees. Below is the policy information.

Insurance Company Name: National Casualty Co

Insurer's Address: 1100 Locust St

City/State/Zip: Des Moines, IA 50391

Policy # or Self-ins. Lic. #: [redacted] Expiration Date: 04/01/2023

Attach a copy of the workers' compensation policy declaration page (showing the policy number and expiration date).

Failure to secure coverage as required under Section 25A of MGL c. 152 can lead to the imposition of criminal penalties of a fine up to $1,500.00 and/or one-year imprisonment, as well as civil penalties in the form of a STOP WORK ORDER and a fine of up to $250.00 a day against the violator. Be advised that a copy of this statement may be forwarded to the Office of Investigations of the DIA for insurance coverage verification.

I do hereby certify, under the pains and penalties of perjury that the information provided above is true and correct.

Signature: Date: 11/18/2022

Phone #: [redacted]

Official use only. Do not write in this area, to be completed by city or town official.

City or Town: **Permit/License #**

Issuing Authority (circle one):
1. Board of Health 2. Building Department 3. City/Town Clerk 4. Licensing Board 5. Selectmen's Office
6. Other

Contact Person: **Phone #:**

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 04/12/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: LEISURE
K&K INSURANCE GROUP, INC. P.O. BOX 2338 FORT WAYNE, IN 46801	PHONE (A/C, No, Ext): 877-355-0315 FAX (A/C, No): 260-459-5990 E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A: NATIONAL CASUALTY COMPANY	11991
INSURER B:	
INSURER C:	
INSURER D:	
INSURER E:	
INSURER F:	

INSURED
H. WAYNE KLEKAMP, INC. (SEE SCHEDULE)
DBA : ADVENTURE BOUND CAMPING RESORTS
905 16TH PL
VERO BEACH, FL 32960

COVERAGES **CERTIFICATE NUMBER:** C140188 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY	Y		[redacted]	4/1/2022 12:01 AM	4/1/2023 12:01 AM	EACH OCCURRENCE	$1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea Occurrence)	$300,000
	X LIQUOR LIMITS - $1,000,000/$1,000,000 AGG						MED EXP (Any one person)	EXCLUDED
	GEN'L AGGREGATE LIMIT APPLIES PER:						PERSONAL & ADV INJURY	$1,000,000
	POLICY PROJECT X LOC						GENERAL AGGREGATE	$3,000,000
	OTHER:						PRODUCTS – COMP/OP AGG	$3,000,000
							LEGAL LIAB TO PARTICIPANTS	
							PROFESSIONAL LIABILITY	
A	AUTOMOBILE LIABILITY			[redacted]	4/1/2022 12:01 AM	4/1/2023 12:01 AM	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	
	DED RETENTION							
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/ EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below Y/N	N/A		[redacted]	4/1/2022 12:01 AM	4/1/2023 12:01 AM	X PER STATUTE OTHER	
							E.L. EACH ACCIDENT	
							E.L. DISEASE – EA EMPLOYEE	
							E.L. DISEASE – POLICY LIMIT	
	PARTICIPANT ACCIDENT						AD&D	
							Primary Medical	
							Excess Medical	
							Weekly Indemnity	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER IS ADDED AS ADDITIONAL INSURED, BUT ONLY FOR LIABILITY CAUSED, IN WHOLE OR IN PART, BY THE ACTS OR OMISSIONS OF THE NAMED INSURED.
RE: CAPE COD-NORTH TRURO: 42-44-46-48 HIGHLAND ROAD, NORTH TRURO, MA & CAPE COD-HORTONS: 67-71 SOUTH HIGHLAND ROAD, NORTH TRURO, MA

CERTIFICATE HOLDER

TOWN OF TRURO
LICENSING DEPARTMENT
PO BOX 2030
TRURO, MA 02666

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Scott Turbert

FIRE EQUIPMENT
INCORPORATED

Work Order Report

Work Order Details:

Account Name: Adventure Bound

Site Address: 46 Highland Road, North Truro, MA 02652

Work Order Number: [redacted]

Products:

Product Name:	Equipment #:	Equipment Location:
Portable Fire Extinguisher	FE 00075201	Building

Description:

Purpose of Visit: PM Inspection

Worked Performed:

Work Performed: Extinguisher inspection

Technician Information:

Item	Technician Name	Hours
1	James Spinosa	1

Closed On: **Nov 13, 2022**

Signature: James Spinosa

Date: Nov 10, 2022

HEALTH DEPARTMENT
TOWN OF TRURO
NOV 22 2022
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TOTAL # OF EXTINGUISHERS – 13

 # EXTINGUISHERS DUE SERVICE NEXT YEAR –

New Equipment -

DRY CHEM 2.5 ABC		DRY CHEM 5 ABC		DRY CHEM 10 ABC		DRY CHEM 20 ABC	

DRY CHEM 10 BC		DRY CHEM 20 BC		DRY CHEM 10 PK		DRY CHEM 20 PK	
CO2 5lb		CO2 10lb		CO2 15.5lb		CO2 20lb	
Pressurized Water		K Class		Halotron 2.5lb		Halotron 5lb	
Halotron 11lb		Halotron 15lb		Emergency Lights		Exit Lights	
Other							

Inspection/Recertification –

DryChem	13	KClass		Pressurized Water		Halotron	
CO2		Conductivity Test		Wheeled Unit		Emergency Light	
Exit Light		Other Insp					

Recharges –

Dry Chem 2 1/2 lb		Dry Chem 5 lb		Dry Chem 10lb		Dry Chem 20lb	
CO2 5 lb		CO2 10 lb		CO2 15 lb		CO2 20 lb	
Pressurized Water		K Class .61		2,5G		Halotron 2.5 lb	
Halotron 5 lb		Halotron 11 lb		Halotron 15.5 Lb		Conductivity Tests	

Service –

6 YR Maintenance Halotron		Hydrotest Dry Chem	2 10lb abc
6 YR Maintenance Other		Hydrotest Other	

Parts –

Service Collar	2	ORing	2	Check Stem		Pull Pin	
Vehicle Bracket		Heavy Duty Bracket		Batteries		Battery Disposal	
Wall Hook		M1 - 5lb		M2 -10lb		20lb	
Bulbs		Replacement Cover		Gauge		FEC Cover	
Other Parts		DOT		OSHA		PWM 90	
BL Series Vinyl		Type					
RP Series Plastic		Types					

FIRE EXTINGUISHERS ARE IN COMPLIANCE WITH NFPA 10 CODE –

Recommendations -

Comments -

TOWN OF TRURO

P.O. Box 2030, Truro, MA 02666
Tel: 508-349-7004, Extension: 10 or 24 Fax: 508-349-5505

TAX STATUS REQUEST FOR LICENSING

Date 11/23/2022

Request is coming from the Selectmen's Office_____ Health Office X

Owner's Name: Beach Point Co-op recreational housing association ltd.

Business Name North Truro Camping Area

Residential Address: 46 Highland Road

Map and Parcel: 36-174

Please verify whether the Real Estate and Personal Property taxes to this property are up to date for the current fiscal year.

Tax Collector's Signature

11.25.2022
Date

TOWN OF TRURO

PO Box 2030, Truro MA 02666
Tel: 508-349-7004, Extension: 131 or 124 Fax: 508-349-5508

LICENSE APPLICATION: Condominiums, Cottage Colonies, Motels, Campgrounds, Lodging, Gas Station/Retail Service, Transient Vendor

Section 1 – LICENSE TYPE

Please check the appropriate box the best describes the license type(s).

☐ New ☒ Renewal/No Changes **(Skip to Section 3)**

FACILITY:

☐ Motel-$50 ☐Cottage Colony-$50 ☐ Condominium-$50 # Units_____ ☒Lodging-$50

☐Transient Vendor-$75_____☐Campground-$50_____☐Gas Station*-$25

*Gas Station-$25 ***(Please submit your Service Station Compliance Form & Third Part Underground StorageTank Inspection Report (FP 289))***

Section 2 – BUSINESS INFORMATION

Federal Employers Identification Number (FEIN/SS) _____

_____

Print Name of Applicant Business Name

_____

Owner Name

_____

Street Address of Business Mailing Address of Business

_____

Business Phone Number Business E-Mail Address

Section 3-HOURS OF OPERATION

☒ Annual ☐ Seasonal Opening Date:_____ Closing Date: _____

Days of the Week Open: Thur-Mon NOV-April
7 days may-oct

RCVD 2022NOV21 AM11:30

ADMINISTRATIVE OFFICE

TOWN OF TRURO

☐ Check if New Manager (if checked, MUST submit Application to Name a Manager)

Section 4-MANAGER INFORMATION

Name of Onsite Manager:

Name: Kristen Roberts Unit Number: _____

Mailing Address: P.O. Box 834 North Truro, MA 02652

Phone: (24 Hour Contact) _____ Email Address: kristen@trurovineyardsofcapecod.com

_____

Manager's Signature (REQUIRED)

Name of Offsite Manager:

Name: _____ Business Name: _____

Business Address: _____

Phone: (24 Hour Contact): _____ Email Address: _____

_____

Manager's Signature (REQUIRED)

Name of Co- Manager:

Name: _____ Business Name: _____

Business Address: _____

Phone: (24 Hour Contact): _____ Email Address: _____

_____

Co-Manager's Signature (REQUIRED)

Section 5 – ATTESTATION

Pursuant to M.G. L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all local state taxes required under law and the information I have provided is trueand accurate. Any misstatement in this application, or violation of state or applicable town bylaws or regulations, shall be considered sufficient cause for refusal, suspension or revocation of the license.

Signature of Applicant | Kristen Roberts Print Name | 11/17/2022 Date

---

Additional Applications & Documentation

REQUIRED FOR ALL MOTELS, COTTAGE COLONIES, CONDOMINIUMS & CAMPGROUNDS

☐ Smoke detector/CO detector/fire protection certification
☐ IF YOU HAVE EMPLOYEES- Workers Compensation Affidavit & Certificate of Insurance
☐ IF YOU DO NOT HAVE EMPLOYEES- Workers Compensation Affidavit

ADDITIONAL (SEPARATE) APPLICATIONS THAT MAY PERTAIN TO YOUR OPERATION

☐ Application for Pool or Hot Tub Permit ☐ Application to Name a Manager
☐ Entertainment License ☐ Application to sell Tobacco ☐ Application for Food Service Permit
☐ Business certificate with the clerk's office
☐ Septic System Inspection Report (submitted every 3 years)

(rev 10/2022)

The Commonwealth of Massachusetts
Department of Industrial Accidents
1 Congress Street, Suite 100
Boston, MA 02114-2017
www.mass.gov/dia

Workers' Compensation Insurance Affidavit: General Businesses.
TO BE FILED WITH THE PERMITTING AUTHORITY.

Applicant Information **Please Print Legibly**

Business/Organization Name: Truro Vineyards of Cape Cod

Address: 11 Shore Road

City/State/Zip: North Truro, MA 02652 Phone #

Are you an employer? Check the appropriate box:

1. ☒ I am a employer with 35 employees (full and/ or part-time).*
2. ☐ I am a sole proprietor or partnership and have no employees working for me in any capacity. [No workers' comp. insurance required]
3. ☐ We are a corporation and its officers have exercised their right of exemption per c. 152, §1(4), and we have no employees. [No workers' comp. insurance required]**
4. ☐ We are a non-profit organization, staffed by volunteers, with no employees. [No workers' comp. insurance req.]

Business Type (required):

5. ☐ Retail
6. ☐ Restaurant/Bar/Eating Establishment
7. ☐ Office and/or Sales (incl. real estate, auto, etc.)
8. ☐ Non-profit
9. ☐ Entertainment
10. ☐ Manufacturing
11. ☐ Health Care
12. ☒ Other winery/distillery

*Any applicant that checks box #1 must also fill out the section below showing their workers' compensation policy information.
**If the corporate officers have exempted themselves, but the corporation has other employees, a workers' compensation policy is required and such an organization should check box #1.

I am an employer that is providing workers' compensation insurance for my employees. Below is the policy information.

Insurance Company Name: Mark Sylvia Insurance Agency

Insurer's Address: 464 main st.

City/State/Zip: Centerville, MA 02632

Policy # or Self-ins. Lic. # Expiration Date: 6/5/2023

Attach a copy of the workers' compensation policy declaration page (showing the policy number and expiration date).

Failure to secure coverage as required under Section 25A of MGL c. 152 can lead to the imposition of criminal penalties of a fine up to $1,500.00 and/or one-year imprisonment, as well as civil penalties in the form of a STOP WORK ORDER and a fine of up to $250.00 a day against the violator. Be advised that a copy of this statement may be forwarded to the Office of Investigations of the DIA for insurance coverage verification.

I do hereby certify, under the pains and penalties of perjury that the information provided above is true and correct.

Signature: Date: 11/17/2022

Phone #

Official use only. Do not write in this area, to be completed by city or town official.

City or Town: **Permit/License #**

Issuing Authority (circle one):
1. Board of Health 2. Building Department 3. City/Town Clerk 4. Licensing Board 5. Selectmen's Office 6. Other

Contact Person: **Phone #:**

TRURO FIRE DEPARTMENT

344 ROUTE 6
POST OFFICE BOX 2013
TRURO, MASSACHUSETTS 02666

TIMOTHY COLLINS
CHIEF

PHONE: (508) 487-7548
FAX (508) 487-6808

NOVEMBER 29, 2022

FIRE ALARM TEST REPORT

OCCUPANCY: TRURO VINEYARDS

OWNER/MANAGER: DAVE ROBERTS

ADDRESS: 11 SHORE ROAD

PHONE #: 508-487-6200

NUMBER OF UNITS: GIFT SHOP – BARN- BARREL ROOM-DISTILLERY

CONTACT PERSON: AMY ROBERTS

ADDRESS: SAME

PHONE #: SAME

ALARM TESTING COMPANY: **LONG POINT ELECTRIC, INC.**

TESTING ELECTRICIAN/TECHNICIAN: Michael Wisniewski

LICENSE #: **17239A**

PHONE #: **(508) 487-2056**

THE FIRE ALARM SYSTEM AT THE ABOVE-MENTIONED BUSINESS ADDRESS WAS TESTED, AND ALL PARTS OF THE SYSTEM WERE FOUND TO BE, OR CORRECTED TO BE, FULLY OPERATIONAL.

COMMENTS:

DATE OF TEST: 11/29/22 BY: Michael Wisniewski

THIS REPORT MUST BE FILLED OUT PRIOR TO THE ISSUANCE OF, OR RENEWAL OF, A LICENSE TO OPERATE WITHIN *THE TOWN OF TRURO.*

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 11/21/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	Benson Young & Downs Ins 56 Howland Street PO Box 559 Provincetown MA 02657-0559	CONTACT NAME: Barbara O'Sullivan PHONE (A/C, No, Ext): FAX (A/C, No): (508) 487-4135 E-MAIL ADDRESS: barbaraosullivan@byandd.com	
		INSURER(S) AFFORDING COVERAGE	NAIC #
		INSURER A : Admiral Insurance Company	
INSURED	Robert's Family Property, LLC and Truro Vineyards of Cape Cod, LLC ATIMA PO Box 834 North Truro MA 02652-	INSURER B :	
		INSURER C :	
		INSURER D :	
		INSURER E :	
		INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	☐ CLAIMS-MADE ☐ OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	☐ POLICY ☐ PRO-JECT ☐ LOC						PRODUCTS - COMP/OP AGG	$
	☐ OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	☐ ANY AUTO						BODILY INJURY (Per person)	$
	☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	☐ HIRED AUTOS ONLY ☐ NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	☐ UMBRELLA LIAB ☐ OCCUR						EACH OCCURRENCE	$
	☐ EXCESS LIAB ☐ CLAIMS-MADE						AGGREGATE	$
	☐ DED ☐ RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N						☐ PER STATUTE ☐ OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? ☐ N/A (Mandatory in NH)						E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$
A	Liquor Liability		X		11/15/2022	11/15/2023	Liquor Limit	$1,000,000
							Liquor Aggregate	$2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
Winery & Distillary with Retail Sales

CERTIFICATE HOLDER

Town of Truro
Licensing Department
PO Box 2030
Truro MA 02666-

AI 045639

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Barbara O'Sullivan

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 11/17/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Donna Ostrowski
Mark Sylvia Insurance Agency, LLC 404 Main Street Centerville, MA 02632	PHONE (A/C, No, Ext): (508)957-2125 FAX (A/C, No): (508)957-2781 E-MAIL ADDRESS: mark@marksylviainsurance.com
	INSURER(S) AFFORDING COVERAGE — NAIC #
	INSURER A : Farm Family Casualty Insurance
INSURED Truro Vineyards of Cape Cod, LLC 11 Shore Road PO Box 834 North Truro MA 02652	INSURER B : INSURER C : INSURER D : INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [X] POLICY [ ] PRO-JECT [ ] LOC [ ] OTHER:	N	N		11/15/2022	11/15/2023	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 100,000 $ 5,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
A	AUTOMOBILE LIABILITY [ ] ANY AUTO [ ] OWNED AUTOS ONLY [X] SCHEDULED AUTOS [X] HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY	N	N		11/15/2022	11/15/2023	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
A	[X] UMBRELLA LIAB [X] OCCUR EXCESS LIAB [ ] CLAIMS-MADE DED RETENTION $	N	N		11/15/2022	11/15/2023	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $ 5,000,000
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N [Y] If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	N		6/05/2022	6/05/2023	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

WINERY

Insurance coverage is limited to the terms, conditions, exclusions, other limitations and endorsements. Nothing contained in the certificate of insurance shall be deemed to have altered, waived or extended the coverage provided by the policy provisions.

CERTIFICATE HOLDER

Town of Truro
24 Town Hall Road
PO Box 2030
Truro MA 02666

Fax:5083495505 Email:

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

TOWN OF TRURO

P.O. Box 2030, Truro, MA 02666
Tel: 508-349-7004, Extension: 110 or 124 Fax: 508-349-5505

TAX STATUS REQUEST FOR LICENSING

Date 11/09/2022

Request is coming from the Selectmen's Office ✓

Owner's Name Kristen Roberts / Roberts Fam. Prop. LLC

Business Name Truro Vineyards

Business Address 11 Shore Rd.

Map and Parcel 39-137

Please verify whether the Real Estate and Personal Property taxes to this property are up to date for the current fiscal year.

Tax Collector's Signature — **Date** 11/09/2022

The Commonwealth of Massachusetts

Town of Truro

New and Renewal Certificate of Inspection

In accordance with **780 CMR, Chapter 1** *(The Ninth Edition of the Massachusetts State Building Code)* and **Chapter 304 of the Acts of 2004** *(an Act to further enhance fire and life safety)*, this certificate of inspection is issued to the premise or structure or part thereof as herein identified.

Issued to	*Identify Name of Establishment*					*Certificate No.*
	Truro Vineyards of Cape Cod, LLC					**23-001**
Located at	*Identify property address including street number, name, city or town and county*					*Certificate Expiration*
	11 Shore Rd Map 39 Parcel 137					**11/01/2023**
	Basement	*First Floor*	*Second Floor*	*Third Floor*	*Fourth Floor*	*Other*
Use Group Classification		**Mercantile & 2 units, R-1**	**3 Units, R-1**			
Allowable Occupant Load		**35**	**6**			

This *certificate of inspection* is hereby issued by the undersigned to certify that the premise, structure or portion thereof as herein specified has been inspected for general fire and life safety features. This certificate shall be framed behind clear glass and\or laminated and posted in a conspicuous place within the space as directed by the undersigned. ***Failure to post or tampering with the contents of the certificate is strictly prohibited.***

Name of Municipal Fire Chief	TIMOTHY COLLINS	Name of Municipal Building Inspector	RICHARD STEVENS	Date of Inspection	**11/10/2022**
Signature of Municipal Fire Chief		Signature of Municipal Building Inspector		Date of Issuance	**11/10/2022**

Special Joint Select Board & Planning Board Meeting Minutes **Consent Agenda Item: 8D1**

October 25, 2022, Meeting

Via GoToMeeting Platform

Select Board Members Present: Kristen Reed-Chair, Robert Weinstein-Vice Chair, John Dundas-Clerk, Stephanie Rein-Member

Select Board Members Absent: Susan Areson-Member

Planning Board Members Present: Anne Greenbaum-Chair, Rich Roberts-Vice Chair, Jack Riemer-Clerk, Ellery Althaus-Member, Paul Kiernan-Member, Caitlin Townsend-Member

Others Present: Kelly Clark-Assistant Town Manager, Barbara Carboni-Town Planner/Land Use Counsel, Steven Stahl-Applicant, Joseph McKinnon-Applicant, Ginny Frazier-Applicant, Karen Ruymann-Applicant

CONVENE THE SELECT BOARD SPECIAL MEETING

Chair Reed called the meeting to order at 2:30 pm and introduced the present Members of the Select Board and introduced the Town staff present. Chair Reed then turned over the meeting to Chair Greenbaum to open the Planning Board meeting.

CONVENE PLANNING BOARD SPECIAL MEETING

Chair Greenbaum opened the Planning Board meeting at 2:33 pm and stated that the purpose of tonight's joint meeting was to interview applicants for the one vacancy on the Planning Board. The selected finalist will be appointed to a 6-month term. Members of the Planning Board who were present introduced themselves. Chair Greenbaum announced the process and stated that the process was reviewed by Chair Reed, Town Manager Tangeman, and Town Planner/Land Use Counsel Carboni. Chair Greenbaum stated that each applicant would receive the exact same questions to answer and then thanked the applicants for their interest.

INTERVIEW APPLICANTS FOR PLANNING BOARD

Prior to the interviews commencing, Chair Reed thanked the Applicants for their interest and then announced that she had a brief statement to read.

Chair Reed stated that something important had come to the attention of the Select Board. Chair Reed stated that she and the Select Board had an obligation to share what had occurred as the appointment process should be pristine, transparent and reflect good governance. Chair Reed announced that she and the Select Board, on Thursday, October 20, 2022, were made aware from a constituent that Chair Greenbaum had previously conducted 1-on-1 private interviews with three of the four applicants. One applicant declined to participate in an interview. Once the information was received, Chair Reed asked Town Manager Tangeman to obtain a legal opinion on this matter from Town Counsel John Giorgio of KP Law, P.C.

Chair Reed then read Town Counsel's legal opinion. Town Counsel opined that this was not a violation of Massachusetts' General Law, or the Town Charter, for a Member to conduct private 1-on-1 interviews outside the public interview process but cautioned that it was not a best practice. Town Counsel further added that it was not a technical violation of the Massachusetts' Open Meeting Law if the Member did not share the responses from the applicants with other Members, or if the Member did not share his/her opinions, thoughts, or impressions with the other Members outside of the public meeting forum. Town Counsel further opined that a better practice was to reserve specific questions for each applicant in the interview portion of a public meeting so all the Members can hear the applicant's response at the same time. Chair Reed then asked Chair Greenbaum, in the spirit of transparency, to explain why these private 1-on-1 interviews had occurred and the nature of the conversations.

Chair Greenbaum stated that she had not interviewed any applicant outside of the process. Chair Greenbaum added that she had reached out to each applicant and offered to answer any questions which the applicant may have of her.

Chair Reed then recognized Member Kiernan who asked if the Truro board application will be changed as there is a question on the current application that asks if an applicant has met with a board Member. Member Kiernan noted that if there is to be no outside communication with an applicant perhaps this question should be removed from the application. Chair Reed thanked Member Kiernan for his comment and said that this will be addressed by the Select Board as the application used in this matter was specifically for appointment of advisory committee members by the Select Board. Referring to the Town Clerk's date stamped meeting minutes from the Planning Board's meeting on September 28, 2022, Chair Reed replied that the issue of outside communication with an applicant was discussed at that meeting and Town Planner/Land Use Counsel Carboni had opined that outside communication with an applicant was not a best practice.

Chair Reed recognized Vice Chair Weinstein who commented that the reason for this meeting was due to the recent resignation of Bruce Boleyn, a Member of the Planning Board. Vice Chair Weinstein thanked Mr. Boleyn for his service to the Town. Chair Reed thanked Vice Chair Weinstein for his acknowledgement.

Chair Reed recognized Chair Greenbaum who announced that the interviews would occur in the order in which the applications were received at Town Hall. Chair Greenbaum added that the standard questions would be asked in order to each applicant. For each applicant, the first standard question was asked by a Member of the Planning Board. Once answered by the applicant, a Member of the Select Board asked the next question. This was the sequence of standard questions for each applicant's interview. Once the standard questions were asked and answered, Chair Greenbaum invited Members to ask any follow-up questions if they had any.

At the start of each applicant's interview, Chair Greenbaum asked each applicant to introduce themselves and explain why they were interested in serving on the Planning Board.

The interviews were conducted in the following order:

a. Steven Stahl
b. Joseph McKinnon
c. Ginny Frazier
d. Karen Ruymann

Prior to Ms. Ruymann's interview, Chair Reed announced that she and Ms. Ruymann had joint financial interests in Chequessett Chocolate. Chair Reed added that previously she had consulted with Chair Greenbaum, Town Counsel Giorgio and Town Planner/Land Use Counsel Carboni and then submitted a Chapter 268A form so she could participate in the interviews, deliberations, and voting process for an appointee to join the Planning Board. Chair Greenbaum thanked Chair Reed for her disclosure and reiterated that Chair Reed could participate in this process objectively and fairly.

BOARD DELIBERATIONS

Prior to the Members' deliberations, Chair Reed asked Chair Greenbaum how much time was allotted for deliberations and Chair Greenbaum replied that the deliberations would be 10-15 minutes. Members discussed various strengths of each applicant that included: level of interest, qualifications, previous board experience, personal or professional ties to Truro, attention to the issues facing Truro as well as participation in solving those challenges, and finally, preparedness for the interview.

Chair Greenbaum asked if Members would like to either rank order the applicants and provide the information to Town Planner/Land Use Counsel Carboni who would add the information to an Excel spreadsheet and share it; or continue the discussion. Members were generally in agreement that the respective Chairs should make the determination.

Chair Greenbaum asked the Members to rank order the applicants from #1 (best applicant) to #4 (last choice). Member Riemer was recognized and asked if an alternate Member could be selected, and Town Planner/Land Use Counsel Carboni opined that there was no such position exists so it would have to be an action decided upon at Town Meeting. Members, in reverse order of seniority, provided their rankings to Town Planner/Land Use Counsel Carboni who recorded the Members' rankings on a shared Excel spreadsheet. Once recorded, Members considered the two top ranked applicants as finalist candidates for appointment: Ms. Frazier and Mr. Stahl.

Chair Greenbaum thanked Ms. Ruymann and Mr. McKinnon for their interest and hoped that they would still participate in the community. Chair Reed announced that she shared the same sentiment as Chair Greenbaum. Chair Reed then announced that the rank order data indicated a top finalist, Ms. Frazier, and that Chair Reed would entertain a motion to vote on Ms. Frazier's appointment.

ROLL CALL VOTE TO APPOINT PLANNING BOARD MEMBER

Vice Chair Weinstein made a motion to appoint Ginny Frazier to fill the unexpired position on the Planning Board that will expire next Annual Town Election in May 2023.
Member Kiernan seconded the motion.
Roll Call Vote:
Chair Greenbaum - Aye
Vice Chair Weinstein – Aye
Member Kiernan - Aye

Member Dundas – Aye
Member Townsend – Aye
Member Ellery – Aye
Member Riemer – Nay
Vice Chair Roberts – Aye
Chair Reed – Aye
Member Rein - Aye
So voted, 9-1-0, motion carries.

Chair Reed congratulated Ms. Frazier and instructed Ms. Frazier to swear to the Oath of Office at the Town Clerk's office. Ms. Frazier thanked the Members and will be sworn in the morning. Ms. Frazier added that she will participate in the Planning Board's meeting tomorrow evening.

Chair Reed recognized Chair Greenbaum, who congratulated Ms. Frazier and welcomed her to the Planning Board.

ADJOURN PLANNING BOARD SPECIAL MEETING

Member Kiernan made a motion to close the Planning Board meeting.
Vice Chair Roberts seconded the motion.
Roll Call Vote:
Chair Greenbaum – Aye
Member Townsend – Aye
Member Ellery – Aye
Member Riemer – Aye
Member Kiernan – Aye
Vice Chair Roberts – Aye
So voted, 6-0-0, motion carries.

ADJOURN SELECT BOARD SPECIAL MEETING

Member Dundas made a motion to adjourn at 4:36 pm.
Vice Chair Weinstein seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 4-0-0, motion carries.

Respectfully submitted,

Alexander O. Powers

_____

Darrin K. Tangeman Under the Authority of the Truro Select Board

Public Records Material Attachments

Legal Notice
Application to Serve-Steven Stahl
Application to Serve-Joseph McKinnon
Application to Serve-Ginny Frazier
Application to Serve-Karen Ruymann

Select Board Meeting Minutes **Consent Agenda Item: 8D2**

October 25, 2022, Meeting

Via GoToMeeting Platform

Select Board Members Present: Kristen Reed-Chair, Robert Weinstein-Vice Chair, John Dundas-Clerk, Stephanie Rein-Member

Select Board Members Absent: Susan Areson-Member

Others Present: Darrin Tangeman-Town Manager, Kelly Clark-Assistant Town Manager, Kaci Fullerton-Town Clerk, Town Planner/Land Use Counsel Barbara Carboni, Katy Ward-Communications and Marketing Coordinator, Bike and Walkways Committee Chair Susan Roderick, Bike and Walkways Member Isadora Medley, Bike and Walkways Member Eric Mays, Kate Lena-Substance Use Prevention Program Manager of Barnstable County Department of Human Services

Chair Reed called the meeting to order at 5:00pm.

PUBLIC COMMENT

There were no public comments.

PUBLIC HEARINGS

None

INTRODUCTION OF NEW EMPLOYEES

None

BOARD/COMMITTEE/COMMISSION APPOINTMENTS

Steven Tribastone – Election Warden for the Town of Truro

Chair Reed recognized Town Clerk Fullerton who introduced Mr. Tribastone and provided a brief overview of his qualifications. Town Clerk Fullerton expressed her support of Mr. Tribastone's appointment. Mr. Tribastone thanked the Members for this opportunity and briefly commented on his experience in Massachusetts related to this role. Chair Reed recognized Member Dundas and Member Rein who expressed their support for Mr. Tribastone's appointment. Vice Chair Weinstein asked Mr. Tribastone to describe his responsibilities as an Election Warden and Mr. Tribastone reviewed those responsibilities. Chair Reed asked Mr. Tribastone if the role was a volunteer or paid position and Mr. Tribastone replied that it was a paid position funded by the Town Clerk's Department. Chair Reed thanked Mr. Tribastone for applying for this role.

Member Dundas made a motion to appoint Steven Tribastone as Election Warden for a 1-year term expiring August 15, 2023.
Member Rein seconded the motion.
Roll Call Vote:
Member Dundas – Aye
Vice Chair Weinstein - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 4-0-0, motion carries.

Chair Reed congratulated Mr. Tribastone on his appointment and Mr. Tribastone thanked the Members.

STAFF/COMMITTEE UPDATES

Bike and Walkways Survey Presentation—Bike and Walkways Committee (BWC) Chair Susan Roderick

Chair Reed recognized Chair Roderick who confirmed that she had a quorum of BWC members present. Chair Roderick introduced BWC members Isadora Medley and Eric Mays who were present and thanked Assistant Town Manager Clark for her assistance in preparing the BWC survey presentation. Chair Roderick reported that there were 689 responses to the survey and then reviewed the survey responses, as well as survey respondents' comments, with the Select Board. In general, results indicated that Route 6 was dangerous for bicyclists and pedestrians and other roads were safer than Route 6. Safety is still a major concern for bicyclists and pedestrians. Chair Roderick added that she had shared relevant survey results with the Walsh Property Community Planning Committee (WPCPC).

Chair Roderick summarized the following takeaways from the survey: biking is popular and useful (for commuting), major concerns on safety, lack of infrastructure deters biking and walking, strong support for a fully separated path along Route 6, majority support for HAWK crossing lights, strong support for dotted bike lanes on roads, and strong support for bike and pedestrian use at the Walsh property.

BWC Member Mays commented on the number of survey respondents and the interest in e-bikes. BWC Member Medley commented that she is very excited about the future of biking and walking in Truro.

When asked by Chair Reed as to which other Cape Cod towns are moving forward with great biking and walking initiatives, Chair Roderick replied that the Commonwealth of Massachusetts wants effective biking and pedestrian pathways from Bourne to Provincetown as Massachusetts is the 3rd biking and walking friendliest state in the USA.

Vice Chair Weinstein commented that the Department of Transportation (DOT) has a plan for a "pavement preservation" project to resurface and repaint Route 6 from Wellfleet to Provincetown. Vice Chair Weinstein suggested that the BWC contact DOT prior to the execution of the work to address Truro issues regarding bicycle and motor vehicular traffic. Vice Chair Weinstein noted that the roads were designed at the turn of the century and do not accommodate modern motor vehicles and the increase in population which erode the longevity of the roadways.

Chair Roderick replied with information regarding several suggestions, including information on a shared pathway along Route 6 from the Route 6/6A light in Truro to Provincetown. An update will also be provided to the BWC, by a state representative, in March of 2023, regarding potential shared pathways

along Route 6 from the Wellfleet Public Safety Facility along Route 6 to Provincetown. Chair Roderick will also share the survey results with DOT. Chair Roderick added that the survey results will help the BWC develop goals for the future.

Chair Reed thanked Chair Roderick and requested that Chair Roderick keep the Select Board informed as to its activities. Chair Roderick thanked Chair Reed and left the meeting.

TABLED ITEMS

None

SELECT BOARD ACTION

A. Presentation Regarding the Opioid Abatement Funds Presenter: Kate Lena, Substance Use Prevention Program Manager, Barnstable County Department of Human Services

Chair Reed recognized Ms. Lena who introduced herself and shared a slide deck with the Members and the public. Ms. Lena provided an overview of the county's Substance Use Prevention Program and its role working with the Cape Cod communities. The genesis of this program was a result of a federal legal settlement of $26B with opioid distributors with $500M earmarked for Massachusetts. Municipalities are encouraged to pool abatement funds to increase their impact. Ms. Lena reviewed Massachusetts guidelines for municipal spending, regional staff general recommendations, prevention, recovery, treatment, example program, references and resources, procurement guidance, and pooling funds.

A brief discussion ensued with the Members and Ms. Lena regarding the use of funds for a paid Truro coordinator, the increased rate of overdose and addictions versus the allocation of funds to meet the needs of the community, and potential cooperation between treatment facilities and the Barnstable County Sheriff's office.

Chair Reed thanked Ms. Lena and she departed the meeting.

B. Review and Approve the Annual Municipal Calendar for 2023 Annual Town Meeting and the Fiscal Year 2024 Budget Preparation Presenter: Darrin Tangeman, Town Manager

Chair Reed confirmed with Assistant Town Manager Clark that the dates for the calendar had been vetted to ensure not being scheduled on holidays to include religious holidays. Assistant Town Manager Clark confirmed that they had been. Assistant Town Manager Clark added that some meetings are Charter mandated.

Chair Reed recognized Town Manager Tangeman who reviewed the meeting dates and there were no questions or concerns expressed by the Members.

Vice Chair Weinstein made a motion for the Select Board to approve the Annual Municipal Calendar for the 2023 Annual Town Meeting and the Fiscal Year 2024 Budget Preparation.
Member Dundas seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye

Member Dundas - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 4-0-0, motion carries.

CONSENT AGENDA

Chair Reed led the discussion with Members regarding the Consent Agenda and the decision was made to remove the review and approval of the Select Board Minutes and move them to the Select Board meeting on November 9, 2022.

A. Review/Approve and Authorize Signature: None
B. Review and Approve Appointment Renewals: 1. DPW Staff Jarrod Cabral (Forest Warden and Tree Warden) and Kyle Halvorsen (Tree Warden)
C. Review and Approve Select Board Minutes: May 17, 2022, Regular Meeting Minutes; September 13, 2022, Regular Meeting Minutes **(Removed from tonight's Consent Agenda and moved to the Select Board meeting on November 9, 2022)**

Member Dundas made a motion to accept the Consent Agenda as printed in the packet.
Vice Chair Weinstein seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas – Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 4-0-0, motion carries.

SELECT BOARD REPORTS/COMMENTS

Vice Chair Weinstein briefly admonished those unknown individuals who are using Old King's Highway as a dumping area for old furniture without any regard for the community and the National Seashore. Vice Chair Weinstein thanked those who were involved in the joint meeting with the Town of Provincetown and the Town of Truro regarding Truro's provision of public water to Provincetown. Both towns have gone to exceptional lengths to protect the water source and the meeting was extremely important and he encouraged Truro residents to watch the meeting's video.

Member Dundas thanked Vice Chair Weinstein for his comments on the importance of the joint meeting between Provincetown and Truro. Member Dundas thanked Katy Ward for helping to market an important survey out to the public.

Member Rein echoed that residents should watch last night's joint meeting between Truro and Provincetown as there is beneficial information for the public regarding Truro's providing public water to Provincetown. Member Rein encouraged the community to watch tomorrow's Walsh Property Community Planning Committee (WPCPC) meeting live online as there are opportunities for residents to voice public comments, opinions, and concerns.

Chair Reed said that she also agreed with the previous comments of the Members regarding last night's joint meeting, the support of Town staff, and the importance of the public's participation in the Walsh

property discussions. Chair Reed thanked the Planning Board for the earlier joint meeting this evening and congratulated Ginny Frazier for her appointment to the Planning Board.

TOWN MANAGER REPORT

Town Manager Tangeman announced that the Childcare Voucher Program applications are due on October 31, 2022, at 4 pm. The application may be found on the Truro website. Budget templates will be sent out to the staff next week. The completed budget templates will be reviewed during the Budget Task Force meetings. There will be a Flu/COVID vaccine clinic this Thursday and more information is on the Truro website. Elections will occur on Tuesday, November 8, 2022, so eligible voters please come out and vote. Chair Reed asked Town Manager Tangeman to ensure that these items be put out on Truro's social media pages.

NEXT MEETING AGENDA

Town Manager Tangeman provided an overview of the agenda for the next regular meeting on Wednesday, November 9, 2022. Due to the election this meeting will start at 4 pm and any executive session will have to occur before 4 pm or after the regular meeting. Members preferred the executive session following the regular meeting. Topics on the agenda: board/commission appointments, staff committee updates, committee service award in honor of Fred Todd, and a Select Board vote for the approval of the expansion water demand analysis for Provincetown which will then go to the Finance Committee for funding.

There were no additional requested agenda items by the Members.

Member Dundas made a motion to adjourn at 6:35 pm.
Vice Chair Weinstein seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 4-0-0, motion carries.

Respectfully submitted,

Alexander O. Powers

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Darrin K. Tangeman Under the Authority of the Truro Select Board

Public Records Material Attachments

Legal Notice
Bike Survey Presentation
BCDHS Memo on Settlement Funds
Barnstable County Opioid Settlement MA-Subdivision Agreement v. McKesson-CardinalAmBergen-JNJ 3-8-22
Barnstable County Towns Opioid Settlement Estimates
Menu of Program Examples
Resources
Opioid Recovery and Remediation Funds PowerPoint Presentation
Annual Municipal Calendar for 2023 ATM and Fiscal Year 2024 Budget Preparations

Select Board Meeting Minutes

November 9, 2022, Meeting

Via GoToMeeting Platform

Select Board Members Present: Kristen Reed-Chair, Robert Weinstein-Vice Chair, John Dundas-Clerk, Susan Areson-Member, Stephanie Rein-Member

Select Board Members Absent:

Others Present: Darrin Tangeman-Town Manager, Kelly Clark-Assistant Town Manager, Nick Norman-Co-Chair of Open Space Committee, Jarrod Cabral-DPW Director, Kevin Grunwald-Housing Authority Chair, Attorney Katherine Klein-KP Law, Jon Nahas-Principal Assessor, Katherine Winkler (Applicant for 6 Holsbery Road), Olivia Ketchum (Representative for 12 North Pamet Road)

Chair Reed called the meeting to order at 4:00 pm.

PUBLIC COMMENT

There were no public comments.

PUBLIC HEARINGS

None

INTRODUCTION TO NEW EMPLOYEES

None

BOARD/COMMITTEE/COMMISSION APPOINTMENTS

A. Alice Gong-Truro Cultural Council
B. Scott Donnelly-Pamet Harbor Commission

Chair Reed led the interview of Ms. Gong with the Members.

Member Rein made a motion to appoint Alice Gong to the Truro Cultural Council for a 3-year term expiring June 30th, 2025.
Member Dundas seconded the motion.
Roll Call Vote:
Member Dundas – Aye
Vice Chair Weinstein – Aye
Member Areson - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 5-0-0, motion carries.

Chair Reed congratulated Ms. Gong on her appointment and Ms. Gong thanked the Members.

Chair Reed then led the interview of Mr. Donnelly with the Members.

Vice Chair Weinstein made a motion to appoint Scott Donnelly to the Pamet Harbor Commission for a 3-year term expiring June 30th, 2025.
Member Areson seconded the motion.
Roll Call Vote:
Member Dundas – Aye
Vice Chair Weinstein – Aye
Member Areson - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 5-0-0, motion carries.

Chair Reed congratulated Mr. Donnelly on his appointment and Mr. Donnelly thanked the Members.

STAFF/COMMITTEE UPDATES

Open Space and Recreation Plan Update – Nick Norman (Presenter), Co-Chair of Open Space Committee

Chair Reed recognized Co-Chair Norman who announced that there was an opening on the Open Space Committee before presenting the 2023 Open Space and Recreation Plan (OSRP) update. Co-Chair Norman noted that it is essential for Truro to have a current plan to be eligible for certain Massachusetts grants. The 2015 OSRP expired in October 2021 and Jeff Thibodeau, of Helios Land Design, is an outside consultant assisting with the OSRP. The OSPR Survey's responses are due on November 30th, 2022, and public meeting input opportunities, as well as key milestones, were provided.

Next steps include Survey Tabulation, Text Preparation, Table of Contents, Plan Preparation and Approval Milestones, and Milestones and Goals.

Town Manager Tangeman, Members, and Co-Chair Norman briefly commented on the process and certain components of the OSRP with a focus on more affordable housing and recreational opportunities utilizing open space in Truro.

TABLED ITEMS

None

SELECT BOARD ACTION

A. Discussion and Possible Approval of Curb Cut Applications (6 Holsbery Road and 10 North Pamet Road)-Presenter: Jarrod Cabral, DPW Director

Chair Reed recognized DPW Director Cabral who stated that the Applicant of 6 Holsbery Road had begun construction without submitting a Curb Cut application so the Building Permit was denied. Since that time, the Applicant has submitted a new Curb Cut application, so DPW Director Cabral recommended

that the new application be approved. DPW Director Cabral noted that the Applicant, Katherine Winkler, was present. Ms. Winkler noted that they are trying to update the old house and was willing to abandon the current curb cut once the construction was completed. DPW Director Cabral agreed to this.

Chair Reed recognized Member Rein who announced that she would recuse herself as a Member voting on this application as she resides on Holsbery Road; however, as a resident, Member Rein stated that she supported the new application.

Vice Chair Weinstein made a motion to approve the application on 6 Holsbery Road for a curb cut, and upon completion of construction, abandon the current curb cut.
Member Dundas seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas - Aye
Member Areson - Aye
Member Rein - Abstained
Chair Reed - Aye
So voted, 4-0-1, motion carries.

Chair Reed congratulated Ms. Winkler upon the approval with conditions and Ms. Winkler thanked the Members.

Chair Reed recognized DPW Director Cabral who said that the Applicant of 10 North Pamet Road had originally requested two curb cuts. DPW Director Cabral was contacted earlier today by the Applicant who wanted to rescind the request for one of the curb cuts. DPW Director Cabral said that he recommended approval for the curb cut application in the highlighted segment in the Members' packet. DPW Director Cabral noted that the Applicant's representative, Olivia Ketchum, was present to answer any questions. Ms. Ketchum confirmed with DPW Director Cabral that the new curb cut application was for 12 North Pamet Road and not 10 North Pamet Road. Member Rein asked DPW Director Cabral if 10 North Pamet Road and 12 North Pamet Road were owned by the same property owner (Tim McNulty) and DPW Director Cabral confirmed.

Vice Chair Weinstein expressed concerns that a curb cut plan was not detailed enough and that the grade may destroy the hillside. Vice Chair Weinstein said that he was reluctant to vote in favor of this application until an engineer stamps the plan. Ms. Ketchum replied that she was a new project manager but had asked the engineer, who has submitted numerous plans to Truro, for more detailed information.

Chair Reed explained to Ms. Ketchum that the requested information will need to be received and that the Members look forward to moving forward on this matter very soon. Chair Reed asked Town Manager Tangeman to communicate with Ms. Ketchum as to what information was required. Ms. Ketchum thanked Chair Reed and departed the meeting.

B. Approval of Joining Provincetown in an Expanded Analysis of Future Water Demand-Presenter: Darrin Tangeman, Town Manager

Chair Reed recognized Town Manager Tangeman who provided an overview of the recent joint meeting between Provincetown and Truro regarding water capacity. Town Manager Tangeman stated that it is a

necessity for the Town be a part of the analysis and the estimated cost for the expanded analysis for Truro is $20,000.

Town Manager Tangeman and Members discussed the following: the National Seashore's participation in the expanded analysis (as well to pay for part of it) as the National Seashore has nearly four million visitors annually; what the $20,000 request would cover; Truro must protect its water resources; and the impact of Cloverleaf and the Walsh property regarding the additional daily water consumption.

Vice Chair Weinstein made a motion to join Provincetown in an expanded analysis of future water demand and to support the Town Manager's request for a reserve fund transfer in the amount of $20,000 to cover this purpose.
Member Dundas seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas - Aye
Member Areson - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 5-0-0, motion carries.

Chair Reed congratulated Town Manager Tangeman and noted that he could move this request forward to the Finance Committee.

C. Review and Authorize Truro Housing Authority's Community Preservation Act Application-Presenter: Kevin Grunwald, Housing Authority Chair

Chair Reed recognized Chair Grunwald who reviewed the Community Preservation Act application as well as an application for $50,000 to hire a housing consultant. Chair Grunwald noted that this may be the genesis for the town to create a housing coordinator position as the Town will require expertise and and continue efforts that have increased housing activity. Chair Grunwald and Members discussed the reasons why there was a $20,000 increase over last year to hire a housing consultant. Chair Grunwald noted that the increase was necessary to hire the right housing consultant who will possess the expertise, experience, remediation of work with other consultants, and community outreach efforts necessary for the town.

Member Areson made a motion to authorize the Truro Housing Authority to submit two applications to the CPC for funding of the Truro Affordable Housing Trust Fund and for the Town's housing consultant in the FY2023 funding route.
Member Dundas seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas - Aye
Member Areson - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 5-0-0, motion carries.

Chair Reed thanked Chair Grunwald and Chair Grunwald thanked the Members. Before his departure, Chair Grunwald stated that he had recently attended an exciting meeting with a new collaborative

organization, Housing to Protect Cape Cod, with 400 other interested individuals. Chair Grunwald requested that the organization's information be distributed to Members and Chair Reed commented that the information had been forwarded to Town Manager Tangeman and Assistant Town Manager Clark for distribution to the Members.

D. Vote to Execute the Order of Taking for the Permanent Easement and Temporary Easement at Old County Road-Presenter: Attorney Katherine Klein, KP Law and Darrin Tangeman, Town Manager

Chair Reed recognized Town Manager Tangeman who stated that this was an administrative action involving the Town of Wellfleet and the National Seashore. Attorney Klein reminded the Members that this was the one private property in Truro impacted by this action. Attorney Klein added that the property owner has signed a waiver permitting this project to move forward as well as waived any claim to seek compensation. Members had no questions.

Member Dundas made a motion to execute the order of taking for the permanent easement and temporary easement for the premises pertaining to 125A Old County Road with the authority of the vote taken under Article 30 on April 30th, 2022, at the Annual Town Meeting.
Vice Chair Weinstein seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas - Aye
Member Areson - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 5-0-0, motion carries.

E. Discussion on Potential Land Swap Related to Affected National Seashore Property by Herring River Restoration Project-Presenter: Attorney Katherine Klein, KP Law; Darrin Tangeman, Town Manager; Jon Nahas, Principal Assessor

Chair Reed introduced Town Manager Tangeman who said that this was a similar situation and had Principal Assessor Nahas conduct analysis. Town Manager Tangeman stated that this was necessary to give the Town the ability to negotiate with the National Seashore as there are several issues raised by the National Seashore which need to be validated regarding two other parcels. Assistant Town Manager Clark confirmed with Attorney Klein that Truro will have to enter an intermunicipal agreement with Wellfleet to mitigate the issue of .2 acres on Old County Road. Member Areson asked for clarification from Attorney Klein to ensure that Truro would mitigate the .2 acres and not Wellfleet. Attorney Klein replied in the affirmative.

Town Manager Tangeman then read a prepared motion for the Members to adopt and vote upon:

"The motion would be to commit Truro to mitigate the .2 acres of National Seashore land on Old County Road affected the Herring River Restoration Project by conducting land exchange negotiations with the National Seashore. Authorize the Town Manager to conduct such negotiations on behalf of the Town of Truro to notify the Town of Wellfleet and the friends of Herring River of the proposed land swap so that the intermunicipal agreement may be completed."

Member Areson moved the motion as read above by Town Manager Tangeman.
Vice Chair Weinstein seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas - Aye
Member Areson - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 5-0-0, motion carries.

F. Budget Discussion for Multi-Member Bodies-Presenter: Darrin Tangeman, Town Manager

Chair Reed recognized Town Manager Tangeman who led the discussion on this topic as there are 35 committees in Truro so there is a need for a policy that establishes a defined process for all to follow. There is currently no such established policy. Town Manager Tangeman expressed concern that some committees are submitting budget requests directly to the Budget Task Force and bypassing the staff lduring the budget process. Town Manager Tangeman and Members discussed the budget process among committees, department heads, Town staff, Budget Task Force, and the Select Board. Chair Reed suggested the addition of an application to accompany budget requests and Members, as well as Town Manager Tangeman, discussed this suggestion briefly weighing the pros and cons of an application.

G. Discussion and Possible Adoption of Civility Pledge-Presenter: Sue Areson, Select Board

Chair Reed recognized Member Areson who provided background regarding the Civility Pledge and responded to several comments. Member Areson wishes to see a change to end the division that exists in Town and then read the proposed Civility Pledge. The Civility Pledge would be read by the respective Chair of each elected or appointed board/committee at the start of each meeting. Chair Reed and Members discussed opinions regarding the Civility Pledge specifically on the topics of the need for such a pledge, protected speech, civility, tone, demeanor, and cooperation.

Member Areson noted that she is authoring a Code of Conduct Policy and that the Civility Pledge could be included in that. Member Areson said that she has worked on these items as Members had added them to the Select Board's goals and objectives. Chair Reed commented that there have been situations of hate speech at meetings and to equip chairs with a policy regarding incivility and protocols would be a balance to the Civility Pledge. Members expressed support for Member Areson's efforts and to continue her work on the Code of Conduct Policy and the Civility Pledge.

CONSENT AGENDA

Chair Reed led the discussion with Members regarding the Consent Agenda and specifically brought forward the Select Board Minutes from 5/17/22, Regular Meeting Minutes with submitted revisions by Member Areson and Member Dundas. Member Areson stated that she had written her suggested revision and that Member Dundas had agreed to her revision, but she would let Member Dundas make his own comments. After Member Areson read her suggested revision, Member Dundas stated that he agreed with Member Areson's comments and that he was supportive of her suggested revision. Member Dundas stated that he wished that Member Areson's suggested revision be included in the minutes. Chair Reed confirmed this with Member Dundas.

Chair Reed noted that the minutes, as submitted, were accurate and she would abstain from voting on any suggested revisions. Member Rein and Vice Chair Weinstein commented that the minutes should remain as submitted. Vice Chair Weinstein also added that he felt that the suggested revision appeared to be mean spirited and unnecessary.

Chair Reed recognized Member Areson who stated that a split vote on leadership for a board that a reason for the split vote should be reflected in the minutes. Member Areson added that the suggested revision to the minutes would not pass but she would like her memorandum with the suggested revision to be included in the record for tonight's meeting. Chair Reed noted that she is concerned about precedence as this would be the first time during her time on the Select Board that minutes be changed due to a vote on leadership.

Chair Reed recognized Member Dundas who said that he will not stand by, abide, watch, or observe things to allow things which are counter to the Select Board's oath and obligation especially when in session. Member Dundas added that the Select Board must set the highest standard and that the "azimuth check" has been accomplished. Member Dundas wished that this revision would be included in the minutes, and he encouraged Members to vote in favor of the revision as suggested by Member Areson.

Chair Reed recognized Member Areson who suggested a slight grammatical change to the 9/27/22 minutes regarding the attendance at the Local Comprehensive Plan Committee meeting.

A. Review/Approve and Authorize Signature:
    1. Special One Day Entertainment Licenses-Truro Vineyards (11/25/22, 11/26/22 and 12/11/22)
B. Review and Approve Appointment Renewals: None
C. Declaration of DPW John Deere Excavator as Surplus
D. Review and Approve Select Board Minutes: 5/17/22, Regular Meeting Minutes; 9/27/22, Regular Meeting Minutes

Member Areson made a motion to approve the Meeting Minutes of 5/17/22 with the suggested revision included in her memorandum to the Select Board.
Member Dundas seconded the motion along with his comments included in the transcript.
Roll Call Vote:
Vice Chair Weinstein - Nay
Member Dundas – Aye
Member Areson - Aye
Member Rein - Nay
Chair Reed - Abstained
So voted, 2-2-1, motion does not carry.

Member Dundas made a motion to accept the Consent Agenda as printed in the packet minus the suggested changes from Member Areson and Member Dundas for the Meeting Minutes of 5/17/22 and the amended grammatical error for the Meeting Minutes of 9/27/22.
Vice Chair Weinstein seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas – Aye

Member Areson - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 5-0-0, motion carries.

SELECT BOARD REPORTS/COMMENTS

Vice Chair Weinstein said that he had no comments.

Member Dundas thanked the Clerk's office, volunteers, law enforcement, and Town staff for the smooth election yesterday. Member Dundas also updated Members on a meeting last week with the Chair of the Planning Board and a representative from the Zoning Board.

Member Areson stated that the Local Comprehensive Plan Committee will come up with a draft Vision Statement and Growth Policy Statement which will be available for review in mid-to-late January 2023.

Member Rein thanked Town staff and volunteers for a successful fun and safe Halloween event.

Chair Reed said that she will be working behind the scenes with the Truro Housing Authority, and the current housing consultant working on a Housing Handbook. Chair Reed hoped that there would be interest in working on the Housing Handbook and that a meeting will be scheduled in the future to discuss the Housing Production Plan.

TOWN MANAGER REPORT

Town Manager Tangeman announced that there would be another Select Board meeting next week.

NEXT MEETING AGENDA

Town Manager Tangeman provided an overview of the agenda for the next regular meeting on Wednesday, November 17th, 2022, followed by an Executive Session.

Member Dundas made a motion to adjourn at 7:00 pm.
Vice Chair Weinstein seconded the motion.
Roll Call Vote:
Vice Chair Weinstein - Aye
Member Dundas - Aye
Member Areson - Aye
Member Rein - Aye
Chair Reed - Aye
So voted, 5-0-0, motion carries.

Respectfully submitted,

Alexander O. Powers

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Darrin K. Tangeman Under the Authority of the Truro Select Board

Public Records Material Attachments

Legal Notice
Application to Serve with Chair's Comments (Alice Gong)
Application to Serve with Chair's Comments (Scott Donnelly)
2023 Open Space and Recreation Plan Update
Curb Cut Application and Supporting Documents for 6 Holsbery Road
Curb Cut Application and Supporting Documents for 12 North Pamet Road
CPC Application-Housing Consultant
CPC Application-Affordable Housing Trust Fund
Article 30, Annual Town Meeting 2022
Order of Taking
Waiver for 125A Old County Road (signed by property owner)
Plan Referenced in Order of Taking
Draft Civility Pledge
Applications for Weekday Entertainment License Approved by Chief of Police
Policy #67