

**COASTAL RESOURCES  
MANAGEMENT COUNCIL**

**SEMI-MONTHLY  
MEETING**

**TUESDAY, JUNE 12, 2018**

**6:00 P.M.**

**AGENDA**

## Lisa Turner

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**From:** Grover Fugate <gfugate@crmc.ri.gov>  
**Sent:** Wednesday, May 30, 2018 2:17 PM  
**To:** 'Lisa Turner'  
**Subject:** FW: Working with your administrative staff

For the council agenda package.

Grover J. Fugate  
Executive Director  
Coastal Resources Management Council  
State of Rhode Island  
4808 Tower Hill Road  
Wakefield, Rhode Island 02879  
Phone-401-783-3370  
Email- [gfugate@crmc.ri.gov](mailto:gfugate@crmc.ri.gov)  
Web address- <http://www.crmc.ri.gov>

-----Original Message-----

**From:** Bell, Taylor M CIV USARMY CENAE (US) [<mailto:Taylor.M.Bell@usace.army.mil>]  
**Sent:** Wednesday, May 30, 2018 12:44 PM  
**To:** 'Grover Fugate' <[gfugate@crmc.ri.gov](mailto:gfugate@crmc.ri.gov)>  
**Subject:** Working with your administrative staff

Hey Grover,

I just wanted to let you know between Lisa, Jean, Brittany, and whoever else works up front, that they have been incredible helpful whenever I have asked for anything. They have always been very responsive and provided whatever I've asked for very quickly and I just thought you should know.

Taylor

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This email has been checked for viruses by Avast antivirus software.  
<https://www.avast.com/antivirus>



State of Rhode Island and Providence Plantations  
Coastal Resources Management Council  
Oliver H. Stedman Government Center  
4808 Tower Hill Road, Suite 116  
Wakefield, RI 02879-1900

(401) 783-3370  
Fax (401) 783-3767

## **AGENDA**

**Semi-Monthly Meeting – Full Council**

**Tuesday, June 12, 2018; 6:00 p.m.**

**Administration Building; Conference Room A  
One Capitol Hill, Providence, RI 02908**

**Approval of the minutes of the previous meeting – April 10, 2018  
Subcommittee Reports/Staff Reports**

### **APPLICATIONS WHICH HAVE BEEN OUT-TO-NOTICE AND ARE BEFORE THE FULL COUNCIL FOR DECISION:**

- 2018-01-051 TOWN OF BRISTOL** -- Construct and maintain stone masonry and concrete wall repairs; installation of a new timber walkway with timber pile and concrete footing supports; land improvements including a new stone dust pathway, regrading, clearing of vegetation, and installation of new benches; and installation of a new concrete slab walkway. Located at plat 10; lot 21, 22, 69, 72; 201 Thames Street, Bristol, RI.
- 2017-11-051 EAST BEACH FARMS, LLC** -- Create and maintain a six acre oyster farm using the bottom plant method (no gear) in Quonochontaug Pond, Charlestown, RI.
- 2018-02-025 BROWN UNIVERSITY** -- Construct 139 linear feet of new replacement bulkhead along the immediate seaward edge of the existing bulkhead, maintain 80 linear feet of existing riprap revetment by removing remnant pilings and debris and add additional stone to repair the revetment slope; renovate and expand the existing timber pier from 3,161sq. ft. to 3,512 sq. ft., install a new 30 ft. x 30 ft. ramp, shift the existing 16 ft. x 120 ft. terminal float seaward by approximately 25 and add a new 16 ft. x 15 ft. float to the south end of the relocated terminal float, add a new 8 ft. x 70 ft. float and 8 ft. x 55 ft. float on the landward side of the terminal float to be connected to the expanded timber pier by two 3 ft. x 25 ft. gangways (one for each new float). Modify the structural perimeter limit to accommodate the expanded facility. Located at plat 17, lot 54; Marston Boat House, 250 India Street, Providence, RI.

### **PUBLIC HEARING ON SHORELINE CHANGE SPECIAL AREA MANAGEMENT PLAN (BEACH SAMP):**

- Chapter 1 – Introduction**  
**Chapter 2 – Trends and Status: Current and Future Impacts of Coastal Hazards in Rhode Island**  
**Chapter 6 – State and Municipal Considerations**  
**Chapter 7 -- Adaptation Strategies and Techniques for Coastal Properties**

The CRMC intends to adopt these 4 chapters above as part of the Shoreline Change Special Area Management Plan (Beach SAMP). Once fully completed and following approval by NOAA the Beach SAMP will then become part of the CRMC's federally-approved Coastal Resources Management Program (CRMP). The Beach SAMP will be a guidance document and it will not be adopted pursuant to the state Administrative Procedures Act. Accordingly the Beach SAMP will not be assigned a RI Code of Regulations (RICR) number.

**EXECUTIVE SESSION § 42-46-5(2) -- Litigation**



# CRMC DECISION WORKSHEET

2018-01-051

Town of Bristol

Hearing Date:	
Approved as Recommended	
Approved w/additional Stipulations	
Approved but Modified	
Denied	Vote

APPLICATION INFORMATION						
File Number	Town	Project Location		Category	Special Exception	Variance
2018-01-051	Bristol	201 Thames Street		<b>B</b>	<input type="checkbox"/>	<input type="checkbox"/>
		Plat	10			
		<b>Owner Name and Address</b>				
Date Accepted	2/27/18	Town of Bristol		Work at or Below MHW		X
Date Completed	4/24/18	c/o Ed Tanner, Principal Planner 9 Court Street Bristol, RI 02809		Lease Required		<input type="checkbox"/>

## PROJECT DESCRIPTION

Construct and maintain a boardwalk and walkway extension, landscaping improvements and seawall repairs to improve public access along the Town's waterfront.

## KEY PROGRAMMATIC ISSUES

**Coastal Feature:** Manmade Shoreline

**Water Type:** Type 5, Comm/Recreational Harbors, Bristol Harbor

**CRMP:** Sections 1.1.6(F), 1.1.10, 1.2.1(E), 1.2.2(F), 1.2.3, 1.3.1(A), 1.3.1(B), 1.3.1(C), 1.3.1(G), 1.3.1(M), 1.3.1(N), 1.3.5, 1.3.6

**SAMP:** N/A

Variances and/or Special Exception Details:

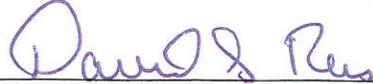
Additional Comments and/or Council Requirements:

Specific Staff Stipulations (beyond Standard stipulations):

## STAFF RECOMMENDATION(S)

Engineer RML Recommendation: Approval  
 Biologist TAS Recommendation: Approval  
 Other Staff \_\_\_\_\_ Recommendation: \_\_\_\_\_

  
 Engineering Supervisor Sign-Off \_\_\_\_\_ date 4/26/18  
  
 Executive Director Sign-Off \_\_\_\_\_ date Apr 30 2018

  
 Supervising Biologist Sign-off \_\_\_\_\_ date 4/26/18  
  
 Staff Sign off on Hearing Packet (Eng/Bio) \_\_\_\_\_ date

Name: Town of Bristol  
CRMC File No.: 2018-01-051  
Staff Report



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
COASTAL RESOURCES MANAGEMENT COUNCIL  
INTER-OFFICE MEMORANDUM

DATE: 25 April 2018  
TO: Grover J. Fugate, Executive Director  
FROM: R. Lucia, T. Silvia, Permitting Section  
SUBJECT: CRMC File No. 2018-01-051

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Applicant's Name: Town of Bristol  
Project: To c/m a boardwalk extension including new timber pile supported walkway, concrete slab walkway, permeable paver pathway, landscaping and seawall repair  
Location: 201 Thames Street, Bristol, plat 10, lot 21,22,69,69,72  
Water Type/Name: Type 5, Bristol Harbor, Comm/Recreational Harbors  
Coastal Feature: Manmade shoreline  
Reviewed Plans: "*Bristol Harbor Boardwalk Extension, Thames Street, Bristol...*" dated January 2018 as last revised 4/17/2018 by J. Matthew Bellisle, RPE, total five (5) sheets.  
Recommendation: Approval

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**STAFF REPORT**

A) Site Conditions & History:

1—The project site is located along the eastern shoreline of Bristol Harbor (*Figure 1*), accessed directly from Thames Street. There are numerous CRMC Assents for Town-controlled projects along this waterfront, including the immediate vicinity of the State Street Pier and Rockwell Park/Marina. CRMC has also issued various permits for construction and improvements to sections of the existing boardwalk located both north and south of the current proposal. The entirety of the shoreline in the project location consists of manmade structures such as seawall or riprap revetment.

2—The Town seeks to construct a northern extension from the existing boardwalk located at Rockwell Park to the existing concrete walkway located at the State Street Pier. Access between the two public sites is currently physically feasible however the Town seeks to upgrade the site conditions and provide an offset from the adjacent fire station, enhancing the likelihood of additional public access along this portion of the waterfront.

B) Proposed Project:

1—The project involves the construction of an 8' wide timber-pile supported walkway at the southern end of the project running north from the existing boardwalk. A portion of this walkway (~69') will be located below MHW. The 8' wide boardwalk then turns west along the existing stone seawall and is partially pile-supported over the existing seawall.

2—An 8' wide permeable paver pathway is proposed north from this section in an area of upland which contains a small shrub buffer. The project terminates with a new 8' wide concrete pathway running west to meet the existing State Street concrete walkway, along the existing seawall. Minor seawall repair work is also proposed within the project scope, as shown on the submitted plans.

C) Project Review and Staff Comments:

1—Staff had pre-application discussions with the Town regarding this project, specifically concerning the need for the portion of the boardwalk proposed over tidal waters. The Town indicated that a greater separation distance was required along the rear of the existing fire station (~4-5' wide access currently exists), which would also meet ADA standards. Additionally, the submitted plans called for removal of the sole area of existing buffer vegetation and replacement with landscaping improvements. The Town has revised the plans to eliminate the landscaping changes at this time and will apply separately in the future in order to preserve and enhance both buffer zone and public access in the upland area.

2—The project received a thirty (30)-day public notice which expired April 5, 2018 without comment. The project was reviewed at an interagency meeting with the ACOE, who determined a Self-Verification eligibility under the GP program on April 6, 2018.

3—Recreational structures in Type 5 tidal waters require Council approval. Per RICRMP Section 1.3.1(C)(E)(c), the boardwalk has been designed and stamped by a RI registered professional engineer.

4—Staff reviewed the project with regard to future sea level rise (RICRMP Section 1.1.10). Based on the ACOE/NOAA estimated sea level rise prediction curves the site may be inundated with a 3-foot sea level rise by 2080 giving a design life for the structure of approximately sixty (60) years. With a 5-foot sea level rise (*Figure 2 STORMTOOLS*), much of the adjacent surrounding area will be underwater. As it is not practicable to elevate the proposed structure (due to existing conditions) at this time, there are no staff objections to the siting of the structure as designed. Future boardwalk repair and improvement projects will likely need to factor in sea level rise conditions.

5—It is staff's opinion that this project will enhance public use of the waterfront in this location as well as provide connectivity along the entire working waterfront adjacent to Thames Street. Staff recommends approval of the project with standard stipulations pending Council's review and decision.

Signature: \_\_\_\_\_  \_\_\_\_\_ Staff Biologist  
Signature: \_\_\_\_\_  \_\_\_\_\_ Staff Engineer

bing maps

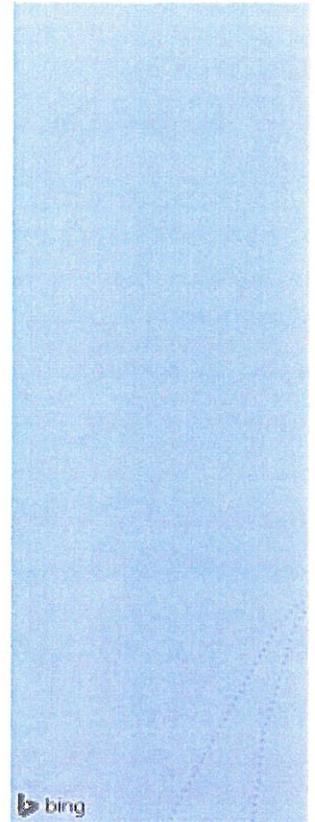
Notes

**FIGURE I**

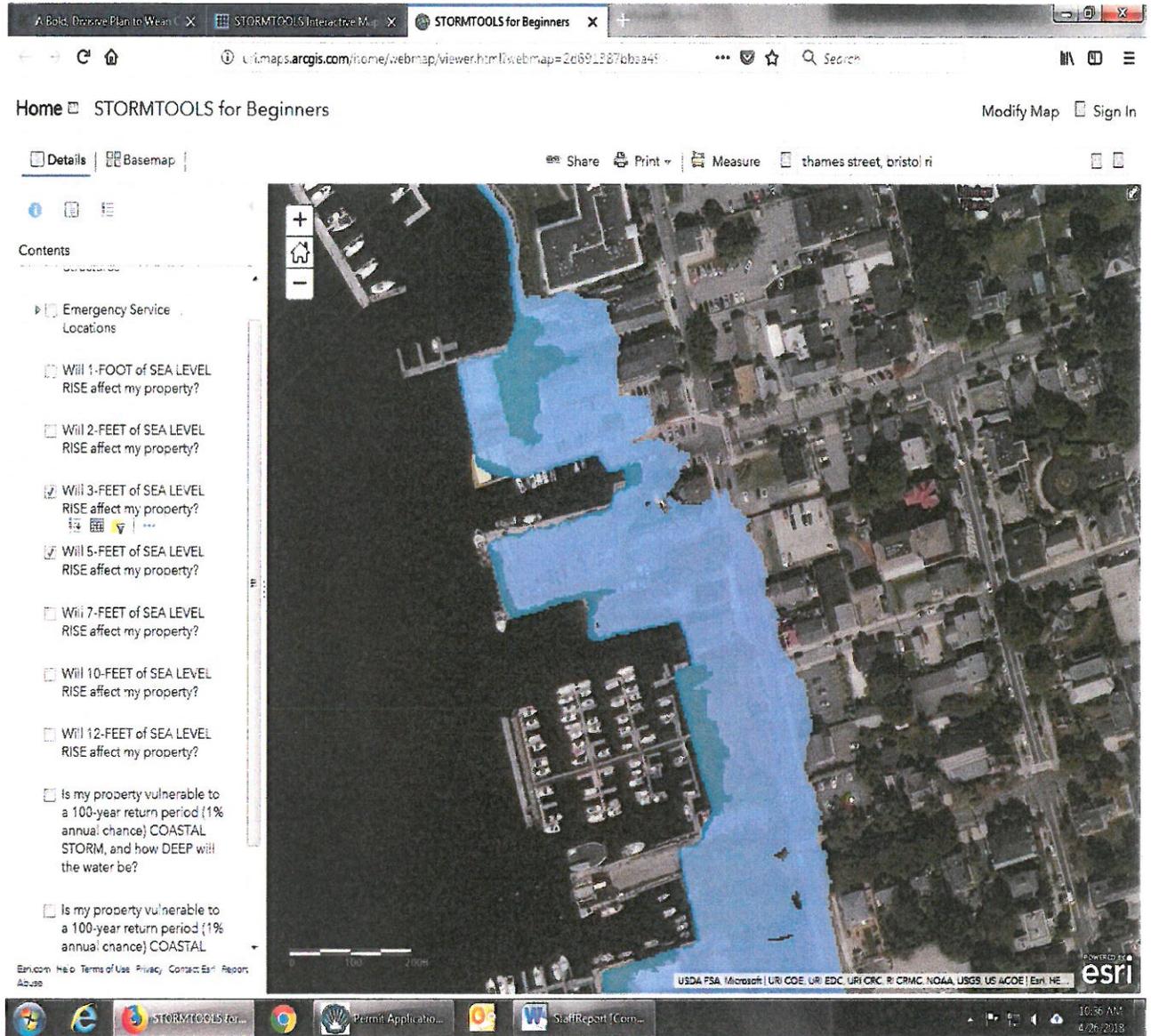
Boardwalk extension, located between State St. Pier and Rockwell Park, off Thames St, Bristol

Town of Bristol

#2018-01-051



**FIGURE 2: Town of Bristol, #2018-01-051**



3-foot and 5-foot sea level rise predictions

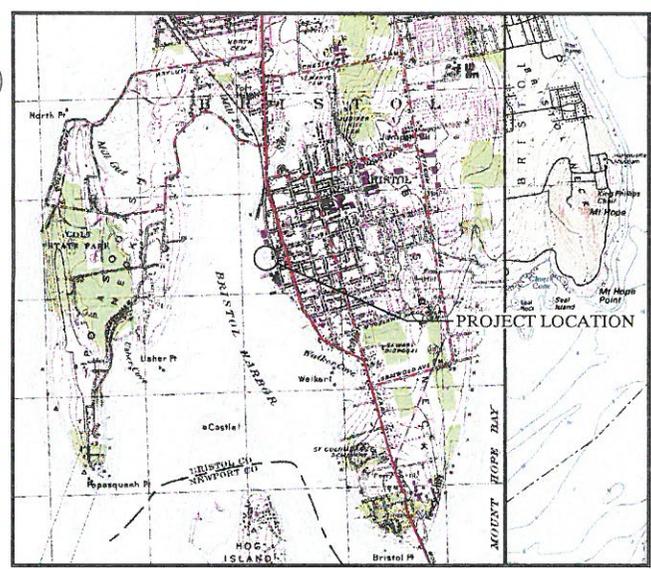
PERMIT SUBMISSION  
NOT FOR CONSTRUCTION

Prepared for The:  
**TOWN OF BRISTOL, RHODE ISLAND**  
**BRISTOL HARBOR**  
**BOARDWALK EXTENSION**  
THAMES STREET  
BRISTOL, RHODE ISLAND

JANUARY 2018

Drawing Index

- 0.0 COVER SHEET
- 1.0 GENERAL NOTES AND LEGEND
- 2.0 EXISTING SITE PLAN
- 3.0 PROPOSED SITE PLAN AND SECTIONS
- 4.0 TIMBER DETAILS
- 4.1 MISCELLANEOUS DETAILS



**LOCUS PLAN**  
SCALE: 1" = 2000'



**AERIAL PLAN**  
SCALE: 1" = 400'

Prepared by:  
**PARE CORPORATION**  
Foxboro, Massachusetts





SCALE ADJUSTMENT  
 GUIDE  
 1" = 10'  
 BAR IS ONE INCH ON  
 ORIGINAL DRAWING

**BRISTOL HARBOR  
 BOARDWALK EXTENSION**  
 THAMES STREET  
 BRISTOL, RHODE ISLAND

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT NO.: 17550.00  
 DATE: JANUARY 2018  
 SCALE: AS NOTED  
 DESIGNED BY: RMM  
 CHECKED BY: RMM  
 DRAWN BY: LHC  
 APPROVED BY: RMM

GENERAL NOTES  
 AND LEGEND

SHEET NO.: **1.0**

**GENERAL NOTES:**

- FOR THE PURPOSE OF THIS PROJECT  
 OWNER - TOWN OF BRISTOL  
 10 COURT STREET  
 BRISTOL, RI 02809  
 ENGINEER - PARE CORPORATION  
 10 LINCOLN ROAD, SUITE 210  
 FOXBORO, MA 02033  
 CONTACT - RYAN MCCOY
- TIMBER BOARDWALK SHALL BE DESIGNED FOR 100PSF LIVE LOAD.
- ALL CONSTRUCTION INDICATED ON THESE PLANS SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE RHODE ISLAND STATE BUILDING CODE, ALL FEDERAL AND MUNICIPAL BUILDING CODES, AND THE SPECIFICATIONS INCLUDED IN THIS CONTRACT. THESE PLANS ARE INCOMPLETE UNLESS ACCOMPANIED BY THE SPECIFICATIONS INCLUDED IN THE CONTRACT DOCUMENTS.
- THE BASE PLAN WAS DEVELOPED BASED UPON THE SURVEY PERFORMED BY BAKER LAND SURVEYING INC., RI ON MAY 6, 2018 AND THE SITE PLAN (SHEET 1 OF 2) OF THE PROJECT TITLED "PROPOSED IMPROVEMENTS STATE STREET PIER, TOWN OF BRISTOL, RI" BY CAPUTO AND WICK LTD., RI, DATED MAY 2011. ANY DISCREPANCIES ON THESE PLANS WITH REGARD TO DIMENSIONS OR CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING WITH THE AFFECTED PORTION OF WORK.
- THE VERTICAL DATUM IS NAVD83. CONTRACTOR SHALL ESTABLISH HORIZONTAL AND VERTICAL CONTROL AS REQUIRED TO ENABLE COMPLETION OF THE WORK.
- CONTRACTOR IS SOLELY RESPONSIBLE FOR MEANS, METHODS, AND SAFETY OF WORK.
- INSTALL PROPER CONSTRUCTION AND TRAFFIC SIGNAGE AT OR NEAR THE PROJECT ENTRANCE(S). COORDINATE WITH LOCAL POLICE WHEN CONSTRUCTION VEHICLE ACTIVITIES OR DELIVERIES COULD POTENTIALLY IMPEDE NORMAL DAILY TRAFFIC AND PEDESTRIAN TRAFFIC.
- ENSURE THAT ADEQUATE SHORING AND FALSEWORK ARE PROVIDED TO THE EXISTING STRUCTURE(S) RESULTING IN A STABLE AND SAFE STRUCTURE AT ALL TIMES.
- PLANS AND SECTIONS ARE APPROXIMATE AND ARE TO BE USED FOR GENERAL LAYOUT. THE CONTRACTOR WILL BE RESPONSIBLE FOR MAKING FIELD MEASUREMENTS TO ASSURE CONSISTENCY WITH THE PROPOSED CONSTRUCTION PLANS. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL CONDITIONS, DIMENSIONS, CLEARANCES, ELEVATIONS, AND OTHER INFORMATION INDICATED IN THE DOCUMENTS PRIOR TO ORDERING ANY MATERIALS, COMMENCING ANY FABRICATIONS, OR PERFORMING ANY WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY FIELD CONDITIONS WHICH MAY DIFFER FROM THAT REPRESENTED PRIOR TO COMMENCING WORK.
- PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL VISIT THE SITE AND SHALL NOTIFY THE ENGINEER OF ANY ADDITIONAL UTILITIES, STRUCTURES, OR ANY OTHER ELEMENTS THAT MAY IMPEDE WORK. UTILITY AND/OR STRUCTURE RELOCATIONS, IF NECESSARY, SHALL BE COORDINATED THROUGH THE OWNER'S ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS. PLANS SHALL NOT BE SCALED FOR DIMENSIONS.
- NOTES, TYPICAL DETAILS AND SCHEDULES APPLY TO ALL WORK UNLESS OTHERWISE NOTED. FOR CONDITIONS NOT SPECIFICALLY SHOWN, PROVIDE DETAILS OF SIMILAR NATURE. VERIFY APPLICABILITY BY SUBMITTING SHOP DRAWINGS FOR REVIEW.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL PROJECT DEMOLITION AND EXCESS MATERIAL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL LAWS.
- THE CONTRACTOR SHALL PROTECT ALL ADJACENT STRUCTURES AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ALL DAMAGE TO ADJACENT STRUCTURES AND UTILITIES AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A CONSTRUCTION SCHEDULE TO THE OWNER WITHIN 5 DAYS OF THE NOTICE OF AWARD. THE CONTRACTOR SHALL UPDATE SCHEDULE AS NEEDED THROUGHOUT THE COURSE OF WORK.
- CONTRACTOR'S STORAGE AREA- DUE TO THE SITE'S WATERFRONT LOCATION, ALL NECESSARY MEASURES SHALL BE TAKEN TO PREVENT BY ANY METHOD, OIL, CONSTRUCTION DEBRIS, STOCKPILED MATERIALS, AND OTHER MATERIALS ON THE SITE, FROM ENTERING THE WATERWAY. ANY DEBRIS FALLING INTO THE WATER SHALL BE RECOVERED AND PROPERLY DISPOSED OF. STAGING/LAYOUT AREAS, AS APPROVED BY THE ENGINEER, SHALL BE RESTORED BY THE CONTRACTOR TO THE EXISTING CONDITION. THE CONTRACTOR SHALL REPLACE ALL DAMAGED MATERIALS AS A RESULT OF HIS OPERATIONS, TO THE SATISFACTION OF THE ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT ALL CONSTRUCTION DEBRIS OR WASTE FROM FALLING INTO THE WATER. ANY DEBRIS FALLING INTO THE WATER SHALL BE RECOVERED AND PROPERLY DISPOSED OF.
- THE CONTRACTOR SHALL MAINTAIN A SECURE SITE AND PROVIDE APPROPRIATE SAFETY MEASURES TO PREVENT ACCIDENTS. THE SAFETY MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO SIGNAGE, BARRICADES, FENCES, FLASHING WARNING LIGHTS, AND POLICING IF NECESSARY.
- IN CASE OF CONTRADICTION BETWEEN THE DRAWINGS, THE SPECIFICATIONS, AND THE CODES, OR IF ANY CHANGE IS REQUIRED, THE CONTRACTOR SHALL INFORM THE ENGINEER IMMEDIATELY. NO CHANGE SHALL BE MADE WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
- UPON COMPLETION OF THE PROJECT, CONTRACTOR IS TO PROVIDE TWO AS-BUILT PLAN SETS TO THE OWNER DEPICTING ANY FIELD CHANGES OF DIMENSION OR DETAIL, LOCATION OF UNDERGROUND STRUCTURES AND/OR UTILITIES, CONSTRUCTION DIVERSIONS, CHANGES DUE TO FIELD OR CHANGE ORDER, AND DETAILS NOT ON THE ORIGINAL DRAWINGS.
- SHOP AND ERECTION DRAWINGS FOR ALL WORK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL AS PER THE SPECIFICATIONS. FABRICATION OF THESE ITEMS SHALL NOT COMMENCE WITHOUT APPROVED SHOP DRAWINGS. SHOP DRAWINGS ARE PREPARED AND USED BY THE CONTRACTOR AS INSTRUMENTS TO SECURE HIS WORK AND TO FACILITATE FABRICATION AND ERECTION. REVIEW OF SHOP DRAWINGS SHALL BE FOR GENERAL DETAIL AND ARRANGEMENT ONLY. CONTRACTOR SHALL BEAR FULL RESPONSIBILITY FOR DIMENSIONS, PROPER FIT, AND DETAILED DESIGN OF CONNECTIONS. THEIR APPROVAL BY THE ENGINEER IS NOT TO BE CONSTRUED AS A WAIVER OF CONSTRUCTION CONTRACT REQUIREMENTS OR RESPONSIBILITIES, UNLESS THE CONTRACTOR HAS BEEN GRANTED A DEVIATION IN WRITING.

**DEMOLITION NOTES:**

- THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS IN THE FIELD PRIOR TO ANY DEMOLITION OR CONSTRUCTION. ANY DISCREPANCIES RELATING TO THE DRAWINGS SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY.
- CONTRACTOR TO BE AWARE OF SELECTIVE DEMOLITION AT ALL SECTIONS OF WORK. CONTRACTOR WILL BE RESPONSIBLE FOR REPLACEMENT IN-KIND OF ALL WORK INADVERTENTLY REMOVED AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL REMOVE ITEMS TO BE DEMOLISHED AS INDICATED ON THE DRAWINGS WITH CARE AND NOT TO DAMAGE ADJACENT STRUCTURES. THE WORK AREA WILL BE LEFT READY TO RECEIVE NEW WORK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OFFSITE DISPOSAL OF ALL PROJECT DEMOLITION MATERIAL, TRASH, AND DEBRIS IN ACCORDANCE WITH LOCAL AND STATE LAWS.
- REFER TO SPECIFICATION SECTION 02100-"DEMOLITION AND REMOVAL" FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

**CONCRETE NOTES:**

- CONCRETE WORK SHALL CONFORM TO THE LATEST EDITION OF ACI 318 - "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE" AND THE RHODE ISLAND STATE BUILDING CODE.
- CONCRETE SHALL BE PROPORTIONED, MIXED, AND PLACED UNDER THE SUPERVISION OF THE APPROVED TESTING AGENCY.
- CONCRETE SHALL BE NORMAL WEIGHT, WITH TYPE II CEMENT, AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 4,000 PSI. ALL CONCRETE DESIGN MIXES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.
- ALL CONCRETE SHALL BE AIR-ENTRAINED WITH AN AIR CONTENT OF 8% +/- 1%.
- ALL EXPOSED EDGES SHALL BE CHAMFERED 1" UNLESS NOTED OTHERWISE.
- WHEN CONCRETE IS PLACED AGAINST PREVIOUSLY HARDENED CONCRETE, THE INTERFACE SHALL BE CLEAN, FREE OF LAITANCE AND INTENTIONALLY ROUGHENED TO FULL AMPLITUDE OF APPROXIMATELY 1/4 INCH.
- CONCRETE WASHOUT OPERATIONS TO OR WITHIN THE WATERWAY MUST NOT TAKE PLACE AT ANY TIME.

**CONCRETE REINFORCING NOTES:**

- REINFORCING BARS SHALL BE DETAILED IN ACCORDANCE WITH ACI 315 - "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT" AND THE RHODE ISLAND STATE BUILDING CODE.
- COMPLETE SHOP DRAWINGS AND SCHEDULES OF ALL REINFORCING STEEL SHALL BE PREPARED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL, PRIOR TO COMMENCEMENT OF THAT PORTION OF THE WORK. ALL ACCESSORIES MUST BE SHOWN ON THE SHOP DRAWINGS.
- REINFORCING BARS SHALL BE EPOXY COATED AND CONFORM TO ASTM A815 OR A706 (WELDABLE) GRADE 60.
- ALL SUPPORTS SUCH AS CHAIRS, BOLSTERS, SPACERS, BLOCKS AND HANGERS SHALL BE OF NON-CORROSIVE MATERIAL. BLOCKS SHALL BE MADE OF 4,000 PSI (UN-REINFORCED) CONCRETE.
- UNLESS NOTED ON THE DRAWINGS, THE MINIMUM CONCRETE PROTECTION (CLEAR COVER) FOR CAST-IN-PLACE CONCRETE COVER SHALL BE AS FOLLOWS:  
 A. FORMED CONCRETE EXPOSED TO EARTH OR WATER: 3"  
 B. CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH: 3"
- MINIMUM REINFORCEMENT DEVELOPMENT LENGTH SHALL BE IN ACCORDANCE WITH ACI 318 UNLESS NOTED ON THE DRAWINGS. LAP SPICE LENGTHS SHALL BE IN ACCORDANCE WITH ACI 318 FOR CLASS B LAPS UNLESS NOTED OTHERWISE.
- ALL REINFORCEMENT SHALL BE CONTINUOUS THROUGH CONSTRUCTION JOINTS. UNLESS NOTED OTHERWISE, BARS SHALL BE CONTINUOUS AND SHALL RUN CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPICES OR HOOKED AT DISCONTINUOUS ENDS.

**LUMBER NOTES:**

- ALL NEW LUMBER SHALL BE SOUTHERN YELLOW PINE NO. 1 OR BETTER (1/2=1,200 PSI).
- NEW LUMBER SHALL BE PRESSURE TREATED TO A MINIMUM NET RETENTION OF 0.8 PCF OF CCA IN ACCORDANCE WITH AWPA STANDARD C19 UNLESS OTHERWISE NOTED.
- ALL FIELD CUTS AND BOLT HOLES SHALL BE PROTECTED IN ACCORDANCE WITH AWPA STANDARD M4.
- LUMBER DIMENSIONS PROVIDED IN THE PLANS ARE DRESSED SIZES UNLESS SPECIFIED OTHERWISE.

**SPILL PREVENTION CONTROL NOTES:**

- SPILLS AND LEAKS SHALL BE AVOIDED THROUGH FREQUENT INSPECTION OF EQUIPMENT AND MATERIAL STORAGE AREAS, AND SHALL BE REMEDIATED AND REPAIRED AS NECESSARY.
- HAZARDOUS MATERIAL STORAGE TO BE PLACED ONLY IN DESIGNATED AREAS. MATERIAL STORAGE AREAS SHALL BE ROUTINELY INSPECTED FOR LEAKY CONTAINERS, OPEN CONTAINERS, OR IMPROPER STORAGE TECHNIQUES THAT MAY LEAD TO SPILLS OR LEAKS.
- APPROPRIATE SPILL REMEDIATION PROCEDURES AND SUPPLIES SHALL BE READILY AVAILABLE ON-SITE. TOOLS AND SUPPLIES SHALL BE CLEARLY MARKED SO THAT ALL PERSONNEL CAN LOCATE AND ACCESS THESE SUPPLIES.
- SPILL REMEDIATION SHALL BE PERFORMED IMMEDIATELY. CONTRACTOR SHALL FOLLOW PROPER RESPONSE PROCEDURES IN ACCORDANCE WITH ANY APPLICABLE REGULATORY REQUIREMENTS.
- AT NO TIME SHALL SPILLS BE DIVERTED TOWARD STORM DRAINS OR TO THE WATERWAY.
- EQUIPMENT/VEHICLE FUELING AND REPAIR/MAINTENANCE OPERATIONS SHALL TAKE PLACE ONLY WITHIN DESIGNATED STAGING AREAS.
- THE EQUIPMENT OPERATOR SHALL FULLY MONITOR FUELING OPERATIONS TO EQUIPMENT AND VEHICLES AT ALL TIMES.
- ANY SPILLAGE SHALL BE IMMEDIATELY CLEANED WITH SPILL KITS KEPT ON SITE.
- IN THE CASE OF SMALL AMOUNTS OF SOIL CONTAMINATION, SUCH SOIL SHALL BE PLACED IN 55 GALLON DRUMS FOR DISPOSAL BY A LICENSED HAZARDOUS WASTE HAULER AT NO ADDITIONAL COST TO THE OWNER.
- IN THE CASE OF A LARGE AMOUNT OF SOIL CONTAMINATION OR DISCHARGE TO THE WATERWAY, RHODE ISLAND DEEM AND APPLICABLE AGENCIES SHALL BE NOTIFIED AS REQUIRED. A HAZARDOUS WASTE REMEDIATION FIRM SHALL BE CONTRACTED TO REMOVE AND DISPOSE OF THE CONTAMINATED MATERIAL OR CONTAIN THE SPILL AT NO ADDITIONAL COST TO THE OWNER.

**EROSION CONTROL NOTES:**

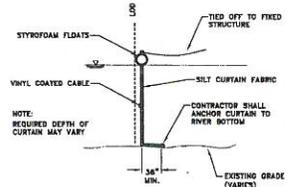
- CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL DEVICES FOR THE DURATION OF THE PROJECT.
- CONTRACTOR SHALL PREVENT SEGMENT FROM ENTERING THE WATERWAY VIA DISCHARGES THROUGH ANY DRAINAGE STRUCTURES OR RUNOFF FROM WITHIN THE LIMITS OF WORK.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING, RESTORING AND REPAIRING ALL DAMAGE AS A RESULT OF UNAUTHORIZED WORK OR DISCHARGES AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL INSTALL AND MAINTAIN TURBIDITY BARRIERS AS INDICATED IN THE CONTRACT DOCUMENTS. TURBIDITY BARRIERS SHALL BE ANCHORED SECURELY AS TO ENSURE COLLECTION OF SEDIMENT AND ENABLE THE WORK TO BE PERFORMED.
- SOIL STOCKPILES SHALL BE A MINIMUM OF 2- FEET FROM THE EDGE OF THE WALL TO LIMIT RUNOFF INTO THE HARBOR.
- THE LIMITS OF EROSION CONTROL BARRIERS SHALL BE ADJUSTED OR EXPANDED AS FIELD CONDITIONS WARRANT.
- ALL EROSION CONTROL BARRIERS SHALL BE INSPECTED AT LEAST ONCE PER WEEK. ANY DAMAGED AREAS OF THE EROSION CONTROL BARRIERS SHALL BE REPAIRED WITHIN 24 HOURS OF DISCOVERY.
- DISCHARGE OF TURBID WATER TO THE WATERWAY IS PROHIBITED.
- THE TURBIDITY BARRIER SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF WORK AND SHALL REMAIN IN PLACE UNTIL ALL PILES AND FOREWORK ARE REPAIRED.

**GENERAL SCOPE OF WORK:**

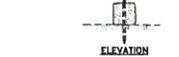
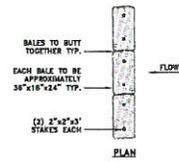
- PRIOR TO PROJECT COMMENCEMENT, NOTIFY AND COORDINATE WITH ALL STATE, LOCAL AND FEDERAL AUTHORITIES AS REQUIRED. DETERMINE TEMPORARY LOCATIONS AND COORDINATE TEMPORARY RELOCATION OF EXISTING VESSELS AS NECESSARY IN ORDER TO PERFORM CONSTRUCTION OPERATIONS.
- MOBILIZE CONSTRUCTION EQUIPMENT AND PERSONNEL TO THE SITE. UTILIZATION OF A STAGING AREA WILL BE COORDINATED WITH THE TOWN OF BRISTOL AS APPROPRIATE AND AS NECESSARY. WATERBARGE OPERATIONS SHALL BE COORDINATED WITH THE TOWN OF BRISTOL.
- REPOINT AND REPAIR STONE MASONRY WALLS TO THE EXTENTS INDICATED ON THE DRAWINGS.
- REMOVE DETERIORATED CONCRETE FROM THE FACE OF THE EXISTING CONCRETE WALL. INSTALL REINFORCING AND APPLY SHOTCRETE AS INDICATED ON THE DRAWINGS.
- REMOVE A PORTION OF THE EXISTING STONE MASONRY WALL AND INSTALL A NEW CONCRETE CAP TO THE EXTENTS INDICATED ON THE DRAWINGS.
- INSTALL NEW TIMBER WALKWAY WITH CONCRETE FOOTINGS, TIMBER PILES, PILE CAPS, STRINGERS, SKIRT BOARDS, DECKING, AND ROPEWALK. REPAIR ADJACENT LAND TO ELEVATIONS SHOWN ON THE DRAWINGS.
- RESET/REALIGN STONES ALONG THE TOP OF THE STONE MASONRY WALL AND INSTALL NEW REINFORCED CONCRETE SLAB PATHWAY AS INDICATED ON THE DRAWINGS.
- INSTALL NEW PERMEABLE PAVEMENT PATHWAY PROVIDED WITH CURBING AS INDICATED ON THE DRAWINGS.
- CLEAR AREA OF VEGETATION AND INVASIVE SPECIES, INSTALL NEW CONCRETE SLAB AND BENCHES, AND PROVIDE NEW PLANTINGS.
- PERFORM SITE CLEANUP AND RE-SEEDING OF AREAS AS NECESSARY. PERFORM FINAL WALK THROUGH WITH KEY PROJECT PERSONNEL UPON COMPLETION.
- COMPLETE DEMOLITION AND PROJECT CLOSURE.

**LEGEND**

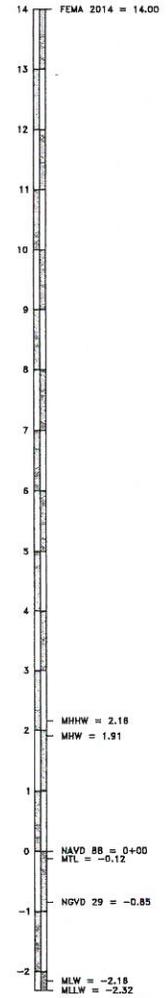
I.R.	IRON ROD
C.B.	CONCRETE BOUND
M.H.W	MEAN HIGH WATER
D.H.	DRILL HOLE
WM	WATER METER
W/S	WATERSTOP
S.M.H	SEWER MANHOLE
G.V	GAS VALVE
L.P	LAMP POST
SC0	SEWER CLEAN OUT
-S-	SEWER LINE
-W-	WATER LINE
-G-	GAS LINE
-OE-	OVERHEAD ELECTRIC LINE
TW	TOP OF SEAWALL
BWG	BASE OF WALL SEA BED
BWG-2+43	ELEVATION NEGATIVE -2+43
(E)20	PROPOSED SPOT ELEVATION



**TURBIDITY BARRIER DETAIL**  
 NOT TO SCALE



**TYPE 1 EROSION CONTROL**  
 NOT TO SCALE



PERMIT SUBMISSION  
 NOT FOR CONSTRUCTION

P7





RECEIVED

JAN 29 2018

COASTAL RESOURCES  
MANAGEMENT COUNCIL

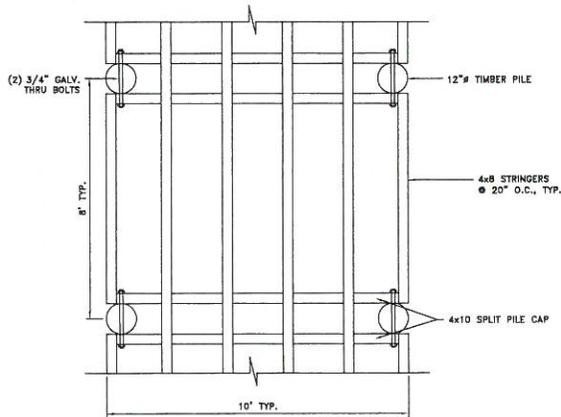


PARE CORPORATION  
ENGINEERS - SCIENTISTS - PLANNERS  
15 LINCOLN ROAD, SUITE 210  
FOXBORO, MA 01937  
508-544-1775

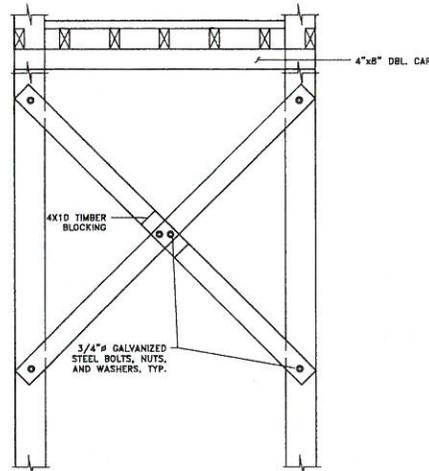


SCALE ADJUSTMENT  
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0" = 1"  
SEE TO ONE INCH ON  
ORIGINAL DRAWING.

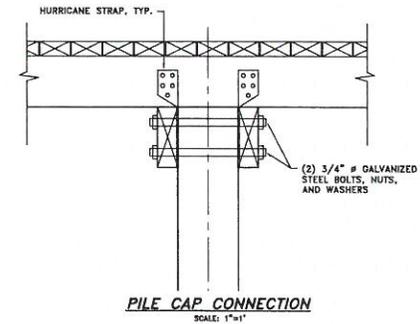
BRISTOL HARBOR  
BOARDWALK EXTENSION  
THAMES STREET  
BRISTOL, RHODE ISLAND



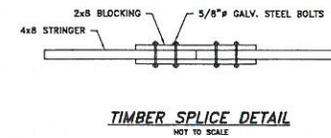
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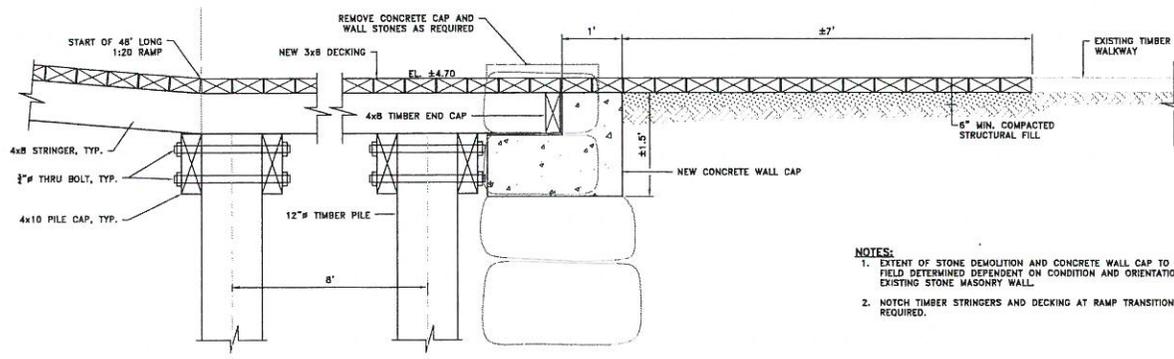
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SCALE: 1"=2'



PILE CAP CONNECTION  
SCALE: 1"=1'



TIMBER SPLICE DETAIL  
NOT TO SCALE



TIMBER PIER CONNECTION DETAIL  
SCALE: 1"=1'

- NOTES:
1. EXTENT OF STONE DEMOLITION AND CONCRETE WALL CAP TO BE FIELD DETERMINED DEPENDENT ON CONDITION AND ORIENTATION OF EXISTING STONE MASONRY WALL.
  2. NOTCH TIMBER STRINGERS AND DECKING AT RAMP TRANSITION AS REQUIRED.

REVISIONS:	

PROJECT NO.: 17050.00  
 DATE: JANUARY 2018  
 SCALE: AS NOTED  
 DESIGNED BY: RMH  
 CHECKED BY: RMH  
 DRAWN BY: LMC  
 APPROVED BY: RMH

TIMBER  
DETAILS

SHEET NO.: 4.0

PERMIT SUBMISSION  
NOT FOR CONSTRUCTION

RECEIVED

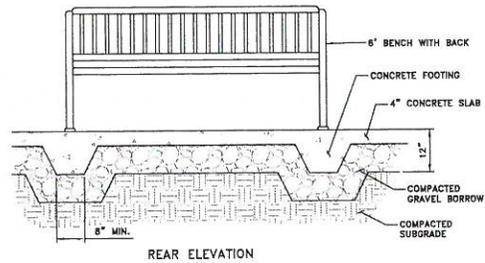
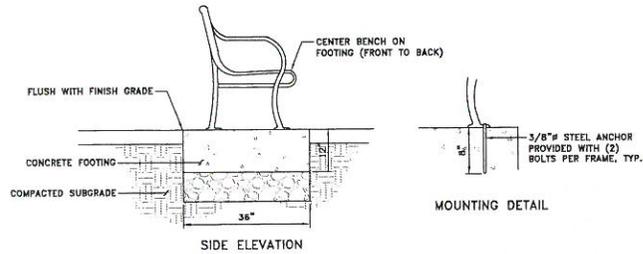
JAN 29 2018

COASTAL RESOURCES  
MANAGEMENT COUNCIL

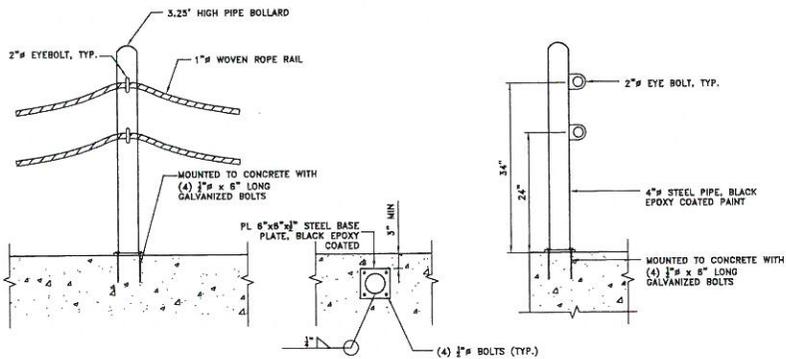


SCALE ADJUSTMENT  
CLUSE  
1" = 1'  
BAR IS ONE INCH ON  
ORIGINAL DRAWING.

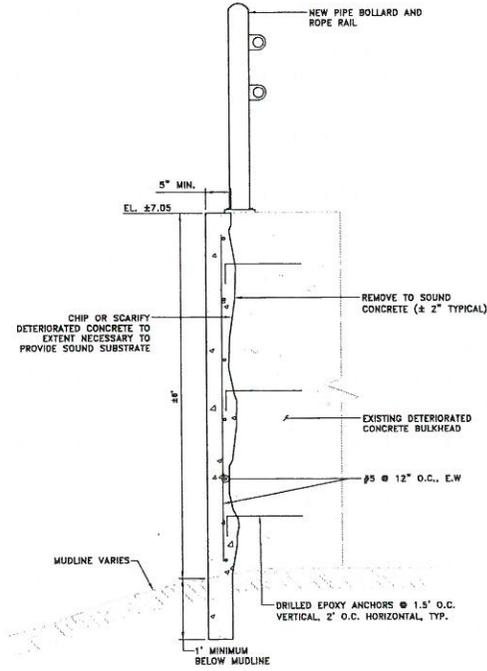
BRISTOL HARBOR  
BOARDWALK EXTENSION  
TEAHAM'S STREET  
BRISTOL, RHODE ISLAND



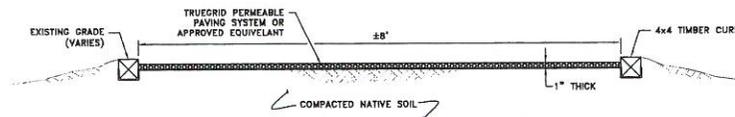
**BENCH DETAIL**  
NOT TO SCALE



**PIPE BOLLARD AND ROPE RAIL  
DETAILS**  
NOT TO SCALE



**SHOTCRETE REPAIR DETAIL**  
NOT TO SCALE



NOTE:  
1. TRUEGRID PERMEABLE PAVING SYSTEM TO BE FILLED WITH CLAMSHELLS TO A DEPTH OF 1".

**PERMEABLE PAVER PATHWAY**  
SCALE: 1"=1'

REVISIONS:

NO.	DESCRIPTION

PROJECT NO.: 17050.00  
DATE: JANUARY 2018  
SCALE: AS NOTED  
DESIGNED BY: RHM  
CHECKED BY: RHM  
DRAWN BY: LMC  
APPROVED BY: RHM

MISCELLANEOUS  
DETAILS

SHEET NO.: 4.1

PERMIT SUBMISSION  
NOT FOR CONSTRUCTION

P11



State of Rhode Island and Providence Plantations  
 Coastal Resources Management Council  
 Oliver H. Stedman Government Center  
 4808 Tower Hill Road, Suite 3  
 Wakefield, RI 02879-1900

RECEIVED  
 JAN 29 2018  
 (401) 783-3370  
 Fax (401) 783-2069  
 COASTAL RESOURCES  
 MANAGEMENT COUNCIL

## APPLICATION FOR STATE ASSENT

To perform work regulated by the provisions of Chapter 279 of the Public Laws of 1971 Amended.

File No. (CRMC use only): <u>2018-01-061</u>		
Project Location: <u>201 Thames Street, Bristol</u>		
Number	Street	City/Town
Owner's Name: Town of Bristol, C/O Ed Tanner, Principal Planner		Plat: <u>10</u> Lot(s): <u>21, 22, 72, 69, 13</u>
Mailing Address: <u>9 Court Street, Bristol RI, 02809</u>		Res. Tel. #: _____ Bus. Tel. #: <u>401-253-7000</u>
Contractor RI Lic. #	Address: Contractor has not yet been selected.	Tel. No.
Designer: Pare Corporation	Address: <u>10 Lincoln Road, Suite 210 Foxboro, MA 02035</u>	Tel. No. <u>(508) 543-1755</u>
Waterway: <u>Bristol Harbor</u>	Est. Project Cost: <u>\$260,000</u>	Fee/Costs: <u>Exempt Request</u>
<b>Description of work proposed (a brief description of all elements of work <u>MUST</u> be included here, additional sheets may be attached):</b> The proposed scope of work consists of stone masonry and concrete wall repairs; installation of a new timber walkway with timber pile and concrete footing supports; land improvements including a new stone dust pathway, regrading, clearing of vegetation, and installation of new benches; and installation of a new concrete slab walkway as described in the attached cover letter.		

Have you or any previous owner filed an application for and/or received an assent for any activity on this property?  
 (If so please provide the file and/or assent numbers): See Attachment A

Is this site within a designated historic district?       YES       NO

Is this application being submitted in response to a coastal violation?       YES       NO

If YES, you must indicate NOV or C&D Number: \_\_\_\_\_

Name and Addresses of adjacent property owners whose property adjoins the project site. (Accurate addresses will insure proper notification. Improper addresses will result in an increase in review time.)

Herold Philip - 227 Thames Street, Bristol RI 02809 (Parcel 10-12)

**STORMTOOLS** (<http://www.beachsamp.org/resources/stormtools/>) is a planning tool to help applicants evaluate the impacts of sea level rise and storm surge on their projects. The Council encourages applicants to use STORMTOOLS to help them understand the risk that may be present at their site and make appropriate adjustments to the project design.

NOTE: The applicant acknowledges by evidence of their signature that they have reviewed the Rhode Island Coastal Resources Management Program, and have, where possible, adhered to the policies and standards of the program. Where variances or special exceptions are requested by the applicant, the applicant will be prepared to meet and present testimony on the criteria and burdens of proof for each of these relief provisions. The applicant also acknowledges by evidence of their signature that to the best of their knowledge the information contained in the application is true and valid. If the information provided to the CRMC for this review is inaccurate or did not reveal all necessary information or data, then the permit granted under this application may be found to be null and void. Applicant requires that as a condition to the granting of this assent, members of the CRMC or its staff shall have access to the applicant's property to make on-site inspections to insure compliance with the assent. This application is made under oath and subject to the penalties of perjury.

08/04

  
 \_\_\_\_\_  
 Owner's Signature (sign and print)

PLEASE REVIEW REVERSE SIDE OF APPLICATION FORM

STATEMENT OF DISCLOSURE AND APPLICANT AGREEMENT AS TO FEES

The fees which must be submitted to the Coastal Resources Management Council are based upon representations made to the Coastal Resources Management Council by the applicant. If after submission of this fee the Coastal Resources Management Council determines that an error has been made either in the applicant's submission or in determining the fee to be paid, the applicant understands that additional fees may be assessed by the Coastal Resources Management Council. These fees must be paid prior to the issuance of any assent by the Coastal Resources Management Council.

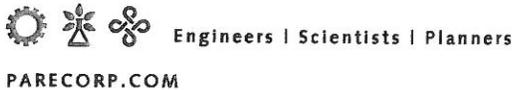
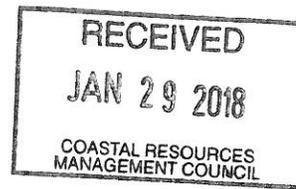
The applicant understands the above conditions and agrees to comply with them.

A FEE WAIVER IS REQUESTED

  
Signature

10/25/17  
Date

STEVEN CONTE, TOWN ADMINISTRATOR  
Print Name and Mailing Address 10 COURT STREET  
BRISTOL, RI 02809



January 26, 2018

Mr. Jeffrey Willis, Deputy Director  
RI Coastal Resources Management Council  
Stedman Government Center  
4808 Tower Hill Road  
Wakefield, RI 02879-1900

RE: **Application for State Assent**  
**Town of Bristol**  
**Bristol Harbor Boardwalk Extension**  
**Bristol, RI**  
Pare No: 17050.00

Dear Mr. Willis:

Attached is a CRMC Application for State Assent submitted on behalf of the Town of Bristol for the proposed boardwalk extension located at 201 Thames Street in Bristol, Rhode Island. The project includes work within areas under the jurisdiction of the Coastal Resources Management Program (CRMP), including Manmade Shoreline, as well as work within 100-year Floodplain.

The proposed extension includes:

- New timber pile supported walkway
- New concrete slab walkway
- New permeable paver pathway
- Site improvements such as public viewing benches
- Existing masonry and concrete wall repairs

Enclosed for your review are four (4) bound copies of application materials consisting of the CRMC Application for State Assent, project narrative, proof of ownership from the Town of Bristol, Building Official's Form, Figures, and annotated photographs of the project area. Four (4) sets of project plans, entitled "Bristol Harbor Boardwalk Extension" prepared by Pare Corporation, dated January 2018 are bound separately.

The applicant is a municipal entity and the project will result in a significant public benefit, and therefore a waiver of the customary filing fee is requested in accordance with CRMC Management Practices Section 4.2.4.

The project narrative provides an overview of the design and permitting background for the project, existing conditions, project need, and descriptions of the proposed work within CRMC jurisdiction.



Mr. Jeffrey Willis

-2-

January 26, 2018

Thank you very much for your consideration and please feel free to contact this office with any questions regarding the submittal.

Sincerely,

Ryan M. McCoy, P.E.  
Senior Project Engineer

Enclosures

cc: Ed Tanner, Principal Planner

Y:\JOBS\17 Jobs\17050.00 Bristol-State St Boardwalk Extension-RI\Permits\CRMC Assent\Cover Letter.doc



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## TABLE OF CONTENTS

### 1. Administrative Documentation

Assent Application Form

Statement of Disclosure

Attachment A: List of Previous Permits

Proof of Ownership

Building Official's Form

### 2. Narrative Project Description

### 3. Figures

Figure 1 – Location Map

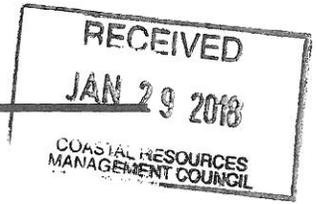
Figure 2 – Annotated Aerial Photograph

Figure 3 – FEMA Flood Insurance Rate Map

### 3. Annotated Site Photographs

### 4. Plans entitled "Bristol Harbor Boardwalk Extension" prepared by Pare Corporation, dated January 2018





## I. Introduction

This narrative has been prepared to supplement a Category B Assent Application, submitted on behalf of the Town of Bristol, Rhode Island for the proposed public boardwalk extension and waterfront/site improvements along Bristol Harbor. The project will significantly improve public access to the shore of Bristol Harbor, and will repair the Historical District's waterfront infrastructure. Overall, the Boardwalk Extension will improve the safety of users while discouraging illegal or unwanted activities in this location.

Pursuant to Management Procedure 4.2 (4) of the Rhode Island Coastal Resources Management Council (CRMC), the applicant is requesting a fee wavier as a public benefit project.

Waterside improvements include stone masonry and concrete wall repairs, and installation of a new timber walkway. Landside improvements include a new permeable paver pathway, vegetation removal, site grading, creation of new walkways, and installation of new public viewing benches.



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## II. Existing Conditions

The proposed Boardwalk Extension is comprised of Lots 13, 21, 22, 69, and 72 on Bristol Assessor's Plat 10, located along the east of Bristol Harbor and the west side of Thames Street. The site is bounded to the north and south by inlets of Bristol Harbor and a site owned by the Town of Bristol, and to the east and west by Thames Street and the Harbor, respectively.

According to historic aerial photographs obtained through the Rhode Island Geographic Information System (RIGIS), the northwestern portion of the site (Lots 13 and 72) has historically been used as parking for recreational boating users. Existing deteriorated timber pilings located near the riprap slope at Lot 72 also indicate possible recreational boating use in the past. Kayak storage racks are located on site and currently being utilized. Currently, the Town will intermittently use Lot 72 as a staging and repair area for waterfront structures such as floating docks.

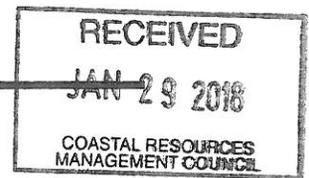
A fire station and two vacant buildings owned by the Town of Bristol are located along the eastern portion of the site adjacent to Thames Street. The fire station will remain active, while the Town is working with a developer to renovate the vacant buildings into mixed use properties.

The southeastern portion of the site abuts the end of Rockwell Park and existing boardwalk. Under existing conditions, pedestrian traffic attempting to access the northern portion of the site from Rockwell Park is informally directed along the concrete seawall behind the fire station. This creates a difficult and potentially dangerous condition due to inadequate railing along the concrete seawall and potential interference with fire station activities.

There is a grass cover on the majority of the site, with vegetation consisting of trees and shrubs located near the riprap slope. There is a small section of concrete walkway atop the concrete wall behind the fire station, which transitions to gravel adjacent to Rockwell Park. Topography on the site generally consists of relatively level land which gradually slopes towards the Harbor.

Bristol Harbor adjacent to the site is classified as Type 5, Commercial and Recreational Harbors.





Coastal features on the site are limited to Manmade Shoreline along the entire harbor frontage. The Manmade Shoreline consists of masonry and concrete walls originally constructed prior to 1963 according to historic aerial imagery provided from NETRonline.

The FEMA Flood Insurance Rate Map (community-panel 445393 0014H, revised July 7, 2014, Figure 3), indicates that the site is completely located within Flood Zone VE-14 (elevation 14).

Review of the online CRMC Permit Database shows several previous CRMC permits for work in the area, as shown in Attachment A.



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### III. Proposed Project

The purpose of the proposed project is to extend the existing boardwalk at Rockwell Park while improving public access to the Bristol waterfront, connecting the park and marina to commercial real-estate to the north, and to restore existing deteriorated waterfront infrastructure. The project will also encourage pedestrian traffic away from the firehouse by providing a new walkway offset from the seawall, and will create an attractive and inviting space along the waterfront.

The character of the proposed timber boardwalk is consistent with the character of the existing boardwalk and buildings, and has been approved and supported by the Bristol Historic Preservation Commission.

The landside improvements are intended to realize the recreational potential of the site as a whole by converting the existing overgrown, inaccessible portion of the site into high quality open space.

The duration of construction for the project is estimated to be approximately 3 months and the estimated project cost is \$260,000. The improvements are described in the following sections.

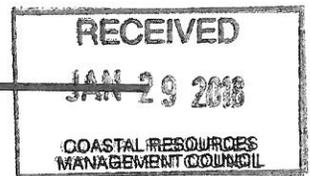
#### **Demolition**

Demolition will include selective removal of the existing concrete wall cap and stones at the southern start of the proposed timber walkway. Wall cap and stone demolition will be determined in the field to the extent necessary to provide a sound connection for a new concrete cap. In addition, existing vegetation will be removed from Lot 72. All demolition is anticipated to be performed using standard means and methods. Prior to demolition, sediment control barriers will be installed around the work area.

#### **Waterside Improvements**

##### *New Timber Pile Supported Walkway*





A new 67-foot long by 8-foot wide timber pile supported walkway will be provided at the end of Rockwell Park, which will extend across Bristol Harbor to Lot 72. Approximately 7-feet of new decking will be provided at the southern start of the pile supported walkway, which will connect the existing park boardwalk to the new extension. The walkway will consist of 12-inch diameter timber piles spaced 8-feet on center, provided with 4-inch by 10-inch split pile caps, 4-inch by 8-inch timber stringers, and 3-inch by 6-inch timber decking. The walkway will turn 90° to the west at the landside connection of Lot 72, and will continue along the top of the existing stone seawall with timber piles seaward and concrete footings landward at 8-feet on center until it terminates near the existing riprap slope. Access ramps will be provided at the northwest corner of the walkway at Lot 72.

#### *Landside Improvements*

To fulfill the project purpose of enhancing public access (both physical and visual) to the Bristol waterfront, it is proposed that vegetation which presents visual obstructions will be cleared near the existing riprap slope. Shorter species of vegetation will be planted, and benches will be provided to allow leisurely views of the Harbor.

Minimal grading of the existing grassed site is proposed, and includes importing new loam to avoid ponding on the site. New grass seed will be spread across the disturbed areas of Lot 72.

#### *New Landside Walkways*

A series of landside walkways will be provided as shown on the project plans. The walkways will meander through the site and connect the timber walkway structure to the north parking area and existing concrete path, while providing access to scenic overlooks.

A new 1-inch thick permeable paver pathway filled with clamshells is proposed along Lot 72 beginning at the termination of the timber walkway and extending to the north end of the lot. The pathway will then fork, leading north to a parking lot and west to a concrete walkway



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surrounding the perimeter of State Street Pier.

An 82-foot long section of new concrete slab walkway is proposed along the topside of the existing State Street Pier stone masonry seawall, and will extend to an existing concrete walkway near the intersection of Lot 72 and 13. The top stones of the seawall will be removed and reset to provide a sound flat surface for the walkway. The concrete slab will be reinforced and 8-inches thick, with new epoxy dowels embedded into existing stone. Minimal grading may be required to match the adjacent slope to existing grades.

### *Seawall Repairs*

Approximately 130-feet of the existing stone masonry seawall is proposed to be reset and repointed. Exposed faces of the wall will predominately be repaired with existing stones recovered from the Harbor bottom. Supplementary wall stones will be imported as required, and will be appropriately sized and shaped to permit proper interlocking with the existing stones. Existing deteriorated mortar shall be removed to sound material, and repaired with new mortar matching the existing color consistency, and composition as closely as possible.

The entire concrete seawall behind the firehouse (approximately 50-feet) is proposed to be repaired with shotcrete. Existing deteriorated concrete will be removed to the extent necessary to provide a sound substrate for the concrete, with 5-inches minimum. New epoxy anchors will be drilled into the existing wall, and reinforcement provided on the face of the scarified surface. Additionally, approximately 120-feet of new pipe bollard and roperrail is proposed along the top of the seawall from the beginning of the timber walkway to the landside connection at Lot 72 to provide safer waterfront access.





#### IV. Consistency with Coastal Resources Management Program

This Assent application covers all the activity associated with the proposed construction and rehabilitation for Bristol Harbor Boardwalk Extension. Several project elements are listed as Category B activities for Type 5 waters and Contiguous Area. According to Table 1 of the Coastal Resources Management Program (the Program), Recreational Structures in Tidal Waters, on Manmade Shorelines, and in Areas of Historic Significance (timber and concrete walkway), and Filling, Removal, and Grading of Shoreline Features in Areas of Historic Significance are Category B activities. The remaining project elements appear to qualify as Category A activities. The following sections are intended to demonstrate that the project as proposed is consistent with the policies for Type 5 waters and complies with the other applicable standards of the Program.

##### Section 220 Areas of Historic and Archaeological Significance

According to information maintained in the RIGIS database (data layers histdist, histsite, histcand, and shrp2p1), the project is located within the Bristol Historic District, however, the intent of the project is to enhance public access to the Harbor while also restoring existing deteriorated infrastructure.

The project has been reviewed and approved by the Bristol Historic Preservation Commission.

##### Section 300.1 Category B Requirements

###### 1. Project Need

This project will significantly improve public access to the Bristol waterfront, providing a larger, more attractive, more accessible, and safer open space than currently exists. Additionally, existing deteriorated historical infrastructure will be repaired, restoring the scenic value of the area.

###### 2. Codes/Ordinances



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The project will comply with all State and local building codes. The Building Official's Form is included as Section 1 of this submittal.

The RIDEM Office of Water Resources was contacted, and indicated that a Water Quality Certificate for this project would not be required.

### *3. Description of Area*

The project area is more completely described in Section II, above and is depicted on the project plans. The area of the tidal Bristol Harbor to be affected by construction of the new timber, concrete, and permeable paver pathway, along with clearing and grading totals approximately 6,500 square feet.

### *4. Impacts to Erosion and/or Deposition Processes*

The proposed timber pile supported walkway will be located within an inlet of Bristol Harbor protected by Manmade Shorelines and existing timber wave fence to the south. Tidal currents will be allowed to flow under the proposed walkway. As such, the walkway is not expected to have a significant effect on tidal currents that result in changes to scour, erosion, or deposition processes.

### *5. Impacts to Plant and Animal Diversity*

The project is not expected to affect animal diversity at the site. Currently, it is anticipated that the site may support resident or transient populations of small mammals, songbirds, and reptiles common in urban areas. This is not expected to change following the construction of the project.

Plant species resulting in visual obstructions of the Harbor near the riprap slope will be removed and replaced with shorter native shrubs to restore the native plant diversity in this location. No submerged Aquatic Vegetation was observed at the waterside activity locations.

### *6. Public Access*





There will be a temporary, short-term interruption of public access to portions of the site during construction. Upon completion of the project, however, public access to the Harbor will be significantly improved over existing conditions.

*7. Water Circulation, Flushing, Turbidity and Sedimentation*

By its nature, construction of the new timber pile supported walkway will alter circulation patterns in the immediate vicinity of the walkway. However, the effect of this alteration is expected to be negligible and will not affect flushing, turbidity, or sedimentation. The timber walkway is proposed to be offset from the concrete seawall behind the firehouse to assist in prevention of flushing and sedimentation alterations. Although it is not expected to become necessary, a floating boom and a suspended silt curtain may be utilized to control turbidity generated during the installation of timber piles. It is noted that background turbidity levels at this location are generally low, with high turbidity during periods of heavy wind or storms.

*8. Water Quality*

It is not anticipated that there will be any impact to water quality. Construction-phase erosion and sediment controls are proposed to minimize the possibility of sediment discharge to the Harbor, and construction equipment will be properly maintained to prevent pollution of groundwater and surface water. The project itself will not introduce pollutants to surface or ground waters.

It is understood that a Water Quality Certificate from RIDEM's Office of Water Resources is not required for this project.

*9. Impacts To Areas Of Historic and/or Archeological Significance*

According to information maintained in the RIGIS database (data layers histdist, histsite, histcand, and shrp2p1), the project is located within the Bristol Historic District, however, the intent of the project is to enhance public access to the Harbor while also restoring existing deteriorated infrastructure.



---

The project has been reviewed and approved by the Bristol Historic Preservation Commission.

*10. Conflicts With Water-Dependent Activities*

The project will not conflict with any other water dependant use upon completion of the work. The intent of the project is to enhance water-dependant recreational uses, and to provide a connection from the Rockwell Park/Marina to the rest of the Bristol waterfront and real-estate to the north.

*11. Scenic Impacts*

The project will not result in permanent negative impacts to the existing scenic values of the area. Scenic values will be enhanced by opening up scenic views, and improving the aesthetics of existing infrastructure and the site as a whole.

**Section 300.2 Filling, Removing, or Grading Shoreline Features**

The project activities subject to Section 300.3 of the Program (timber supported walkway) are proposed to disturb less than 5,000 square feet of land within the Contiguous Area. The area of filling, removal, and/or grading totals less than 15 cubic yards. The project does not involve any of the prohibited activities set forth in Section 300.3.C and all work will be conducted in accordance with the applicable standards of 300.2.D.

**Section 300.3 Residential, Commercial, Industrial, and Recreational Structures**

The timber pile supported walkway totaling approximately 1,370 square feet is located within the 200-foot Contiguous Area. In accordance with 300.3.C., a Building Official's Form, with the signed Building Official's and Zoning Officer's certifications has been obtained and is included in Section 1 of this application submission. The timber walkway is classified as outdoor assembly under the Rhode Island State Building Code (RISBC) and shall be constructed in accordance with all applicable sections of the RISBC. The project does not include construction, repair, or alteration of an Onsite Wastewater Treatment System (OWTS). The walkway will be constructed in accordance





with all state fire, safety, and environmental codes and regulations. Utility connections are not proposed at any location on site.

The project does not involve any of the prohibited activities set forth in Section 300.3.D and all work will be conducted in accordance with the applicable standards of 300.3.E.

The walkway will be located at elevation 4.7, approximately 9 feet below the base flood elevation as determined by FEMA. The walkway is an open structure, and will not require flood insurance.

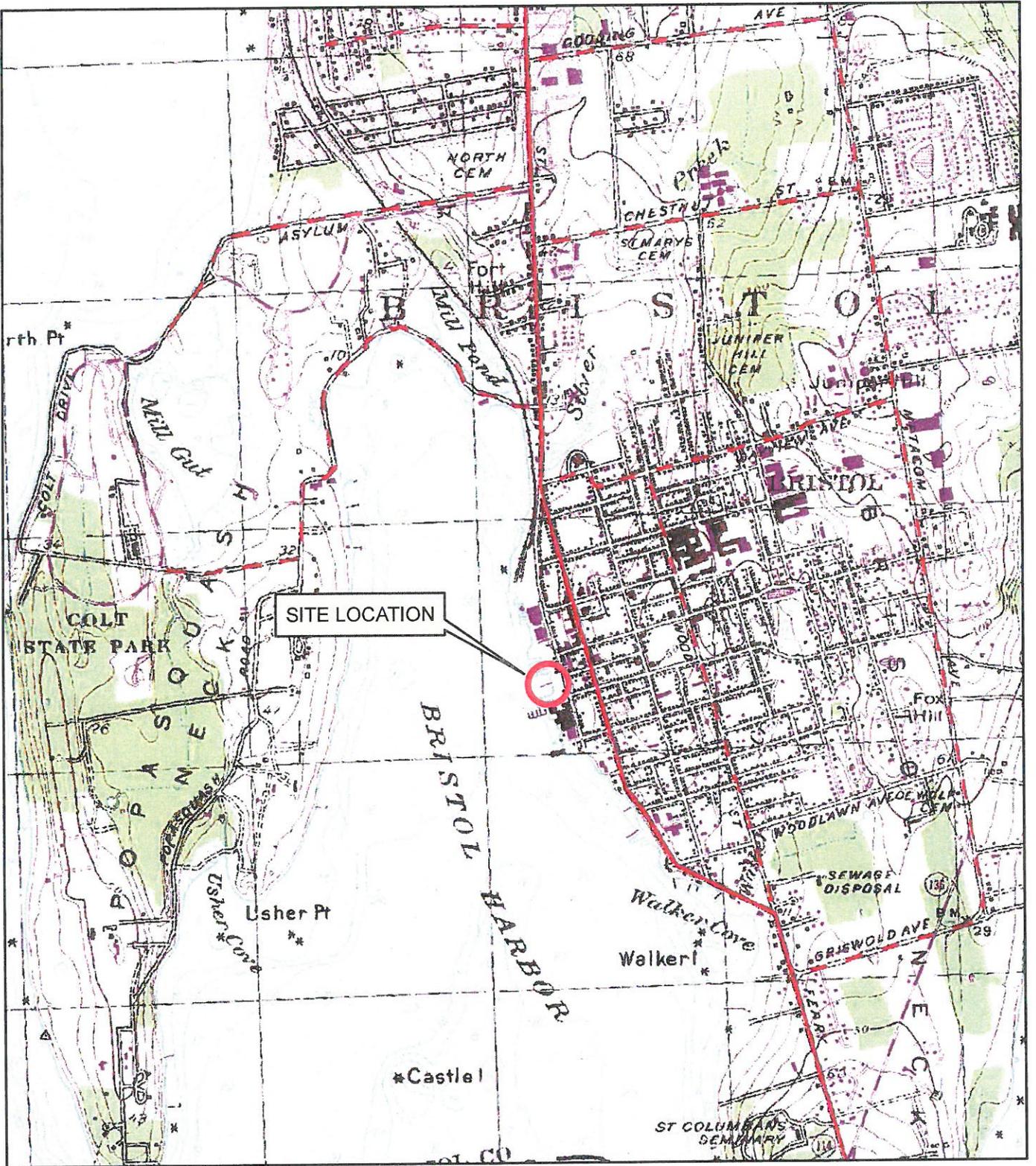
### **Section 300.6 Treatment of Sewage and Stormwater**

The project does not include the addition of new impervious surfaces or alterations to existing discharges. No additional inflow of pollutants carried by surface runoff are proposed. The project does not involve any of the prohibited activities set forth in Section 300.3D and all the work will be conducted in accordance with the applicable standards of 300.6.E.

### **Section 300.10 Filling in Tidal Waters**

The proposed work including the installation of a timber walkway will not result in the placement of fill in tidal waters in accordance with CRMC regulations.





### SITE LOCATION MAP

SCALE: 1"=2,000'

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 MANAGEMENT COUNCIL



8 BLACKSTONE VALLEY PLACE  
 LINCOLN, RI 02865  
 (401) 334-4100

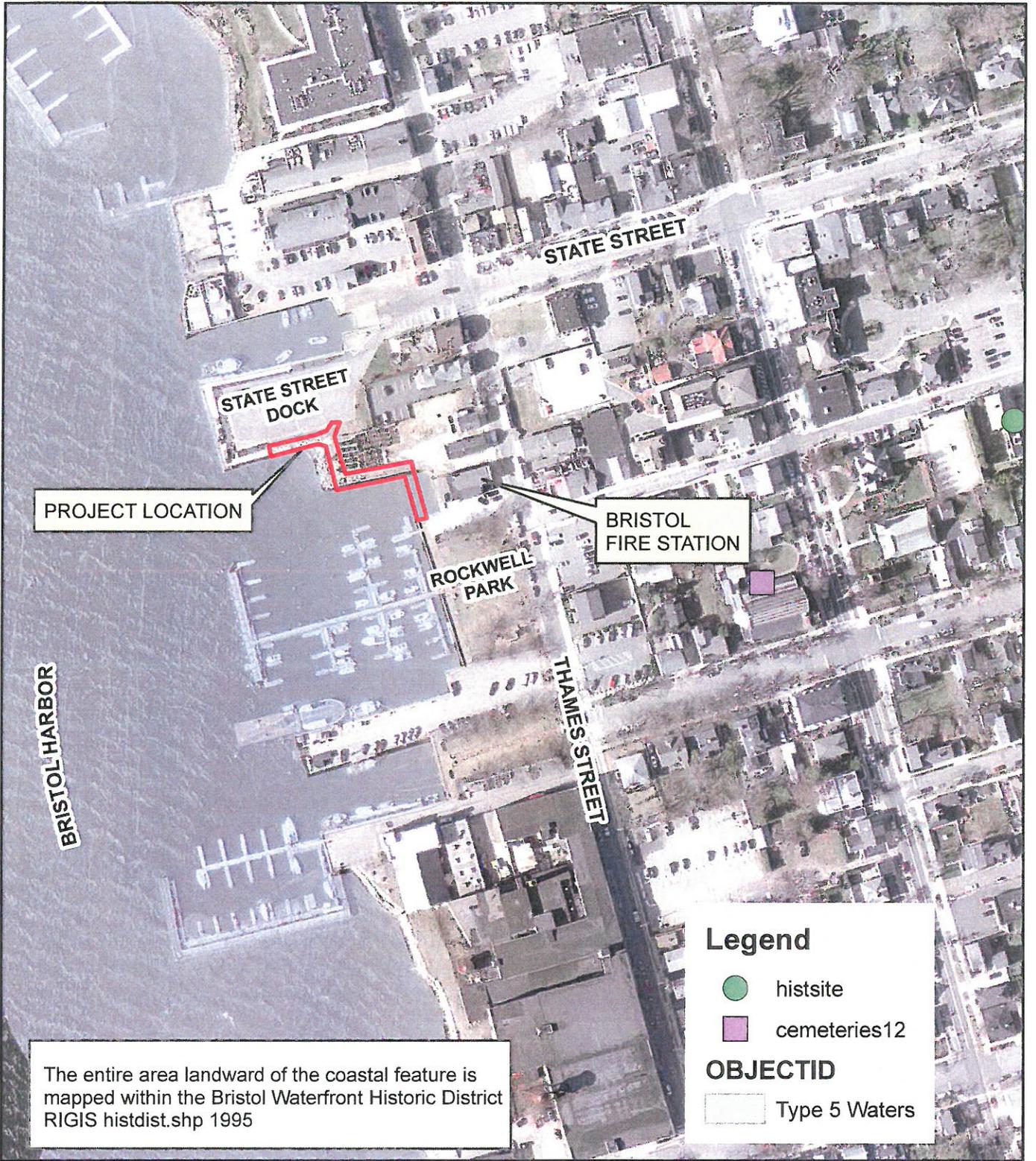
10 LINCOLN ROAD, SUITE 210  
 FOXBORO, MA 02035  
 (508) 543-1755

PARE PROJECT No. 17050.00

JANUARY 2018

## FIGURE 1

BRISTOL HARBOR BOARDWALK EXTENSION  
 BRISTOL, RI



**ANNOTATED AERIAL PHOTOGRAPH**

SCALE: 1"=200'



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 8 BLACKSTONE VALLEY PLACE  
 LINCOLN, RI 02865  
 (401) 334-4100

10 LINCOLN ROAD, SUITE 210  
 FOXBORO, MA 02035  
 (508) 543-1755

PARE PROJECT No. 17050.00      JANUARY 2018

**FIGURE 2**  
 BRISTOL HARBOR BOARDWALK EXTENSION  
 BRISTOL, RI



MAP SCALE 1" = 500'



# NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0014H

## FIRM FLOOD INSURANCE RATE MAP BRISTOL COUNTY, RHODE ISLAND (ALL JURISDICTIONS)

PANEL 14 OF 18  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:  
COMMUNITY NUMBER 445393  
PANEL SUFFIX 0014 H  
BRISTOL, TOWN OF

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  
44001C0014H  
MAP REVISED  
JULY 7, 2014  
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)

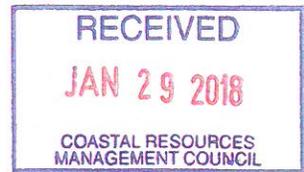


215000 FT

JOINS PANEL 0013

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FIGURE 3



Application for State Assent  
Bristol Harbor Boardwalk Extension

Attachment A: List of Previous CRMC Permits

Name	Lot	File Number	Permit Date
Town of Bristol Community Deve	21	2010-09-109	9/28/2010
Town of Bristol	21,22	2008-09-100	10/3/2008
Town of Bristol	13,22	2011-02-004	6/3/2011
Town of Bristol	13,22	2005-12-076	2/26/2009
Town of Bristol	22	1990-08-004	8/18/1993
Town of Bristol	22	1990-02-026	10/20/1992
Town of Bristol	22	1989-12-016	2/15/1990
Town of Bristol	22	1988-05-076	7/22/1988
Town of Bristol	22	1984-08-32	10/2/1984
Antonio Azevedo	15,20,72	2000-08-085	9/05/2000
Town of Bristol	13	2011-07-021	7/27/2011



## Town of Bristol, Rhode Island

10 Court Street

Bristol, RI 02809

[www.bristolri.us](http://www.bristolri.us)

401-253-7000

January 5, 2018

To Whom It May Concern:

This is to certify that as of 7/10/1973, Town of Bristol is the owner of record at Assessor's Plat 10 Lot 13, also known as Thames Street, Bristol, Rhode Island 02809 (Book 180 Page 919).

Do not hesitate to call or email.

Information deemed reliable, but not guaranteed.

Respectfully,

Michelle DiMeo,  
Tax Assessor/Collector  
10 Court St.  
Bristol, RI 02809  
(401) 253-7000 X 142  
mdimeo@bristolri.us



Photo 1: View of the existing timber walkway and stone masonry seawall/cap at the southern end of the site, facing north.

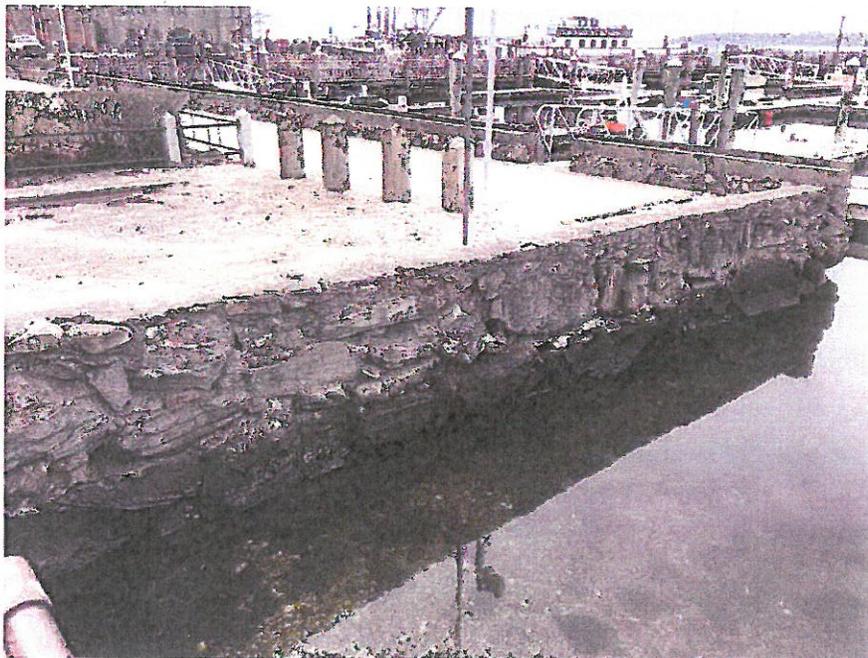


Photo 2: Stone masonry seawall at the southern end of the site.



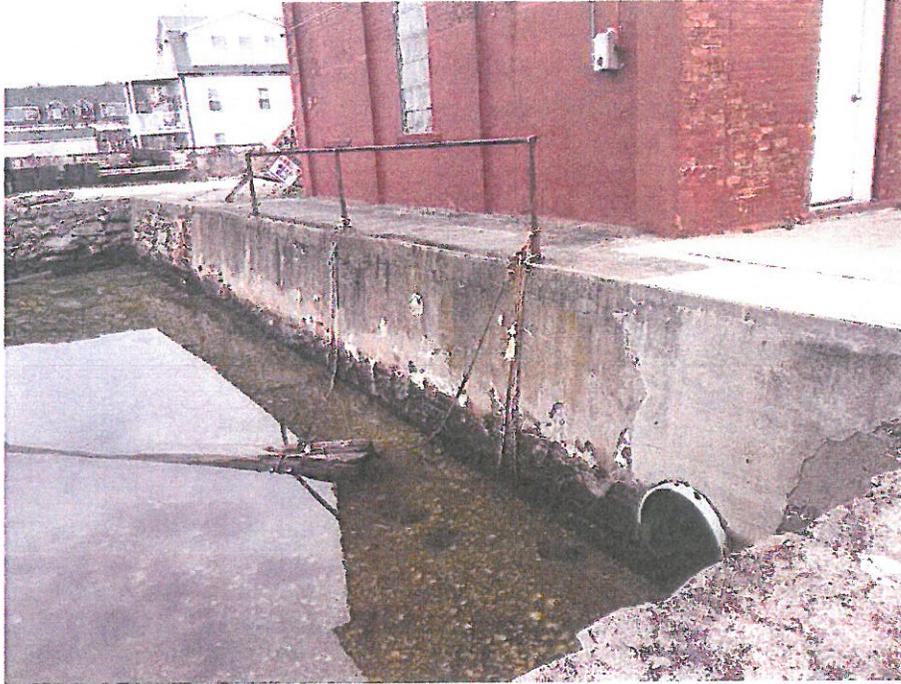


Photo 3: Concrete seawall behind the fire station along the west face of Lot 21, with Bristol Harbor to the west.



Photo 4: Stone masonry wall along the south face of Lot 72 extending into Bristol Harbor.





Photo 5: View of Lot 72 facing west with stone masonry wall extending into Bristol Harbor.



Photo 6: View of riprap slope along the west of Lot 72, facing east.

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Photo 7: View of stone masonry wall and concrete walkway along the north end of Lot 72, facing west.



State of Rhode Island and Providence Plantations  
**Coastal Resources Management Council**  
Oliver H. Stedman Government Center  
4808 Tower Hill Road, Suite 3  
Wakefield, RI 02879-1900

(401) 783-3370  
Fax (401) 783-2069

### PUBLIC NOTICE

File Number: 2018-01-051 Date: March 5, 2018

This office has under consideration the application of:

Town of Bristol  
c/o Ed Tanner, Principal Planner  
9 Court Street  
Bristol, RI 02809

for a State of Rhode Island Assent to construct and maintain:

Stone masonry and concrete wall repairs; installation of a new timber walkway with timber pile and concrete footing supports; land improvements including a new stone dust pathway, regrading, clearing of vegetation, and installation of new benches; and installation of a new concrete slab walkway.

Project Location:	201 Thames Street
City/Town:	Bristol
Plat/Lot:	10 / 21,22,69,69,72
Waterway:	

Plans of the proposed work may be seen at the CRMC office in Wakefield.

In accordance with the Administrative Procedures Act (Chapter 42-35 of the Rhode Island General Laws) you may request a hearing on this matter.

You are advised that if you have good reason to enter protests against the proposed work it is your privilege to do so. It is expected that objectors will review the application and plans thoroughly, visit site of proposed work if necessary, to familiarize themselves with the conditions and cite what law or laws, if any, would in their opinion be violated by the work proposed.

If you desire to protest, you must attend the scheduled hearing and give sworn testimony. A notice of the time and place of such hearing will be furnished you as soon as possible after receipt of your request for hearing. If you desire to request a hearing, to receive consideration, it should be in writing (**with your correct mailing address, e-mail address and valid contact number**) and be received at this office on or before April 5, 2018.

/lat

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PERMIT SUBMISSION  
NOT FOR CONSTRUCTION

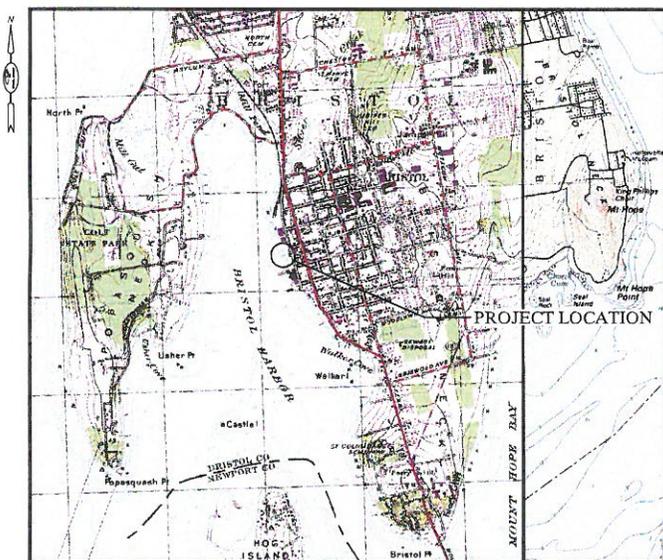
Prepared for The:  
**TOWN OF BRISTOL, RHODE ISLAND**  
**BRISTOL HARBOR**  
**BOARDWALK EXTENSION**

THAMES STREET  
BRISTOL, RHODE ISLAND

JANUARY 2018

Drawing Index

- 0.0 COVER SHEET
- 1.0 GENERAL NOTES AND LEGEND
- 2.0 EXISTING SITE PLAN
- 3.0 PROPOSED SITE PLAN AND SECTIONS
- 4.0 TIMBER DETAILS
- 4.1 MISCELLANEOUS DETAILS



**LOCUS PLAN**  
SCALE: 1" = 2000'



**AERIAL PLAN**  
SCALE: 1" = 400'

Prepared by:  
**PARE CORPORATION**  
Foxboro, Massachusetts



P38

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MANAGEMENT COUNCIL



SCALE ADJUSTMENT  
GUIDE  
BAR IS ONE INCH ON  
ORIGINAL DRAWING

BRISTOL HARBOR  
BOARDWALK EXTENSION  
THAMES STREET  
BRISTOL, RHODE ISLAND

**GENERAL NOTES:**

- FOR THE PURPOSE OF THIS PROJECT  
OWNER - TOWN OF BRISTOL  
10 COURT STREET  
BRISTOL, RI 02809  
ENGINEER - PARE CORPORATION  
10 LINCOLN ROAD, SUITE 210  
FOXBORO, MA 02833  
CONTACT - RYAN MCCOY
- TIMBER BOARDWALK SHALL BE DESIGNED FOR 100PSF LIVE LOAD.
- ALL CONSTRUCTION INDICATED ON THESE PLANS SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE RHODE ISLAND STATE BUILDING CODE, ALL FEDERAL AND MUNICIPAL BUILDING CODES, AND THE SPECIFICATIONS INCLUDED IN THIS CONTRACT. THESE PLANS ARE INCOMPLETE UNLESS ACCOMPANIED BY THE SPECIFICATIONS INCLUDED IN THE CONTRACT DOCUMENTS.
- THE BASE PLAN WAS DEVELOPED BASED UPON THE SURVEY PERFORMED BY BAKER LAND SURVEYING INC., RI ON MAY 6, 2016 AND THE SITE PLAN (SHEET 1 OF 2) OF THE PROJECT TITLED "PROPOSED IMPROVEMENTS STATE STREET PIER, TOWN OF BRISTOL, RI" BY CAPUTO AND WICK LTD., RI, DATED MAY 2011. ANY DISCREPANCIES ON THESE PLANS WITH REGARD TO DIMENSIONS OR CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING WITH THE AFFECTED PORTION OF WORK.
- THE VERTICAL DATUM IS NAVD83. CONTRACTOR SHALL ESTABLISH HORIZONTAL AND VERTICAL CONTROL AS REQUIRED TO ENABLE COMPLETION OF THE WORK.
- CONTRACTOR IS SOLELY RESPONSIBLE FOR MEANS, METHODS, AND SAFETY OF WORK.
- INSTALL PROPER CONSTRUCTION AND TRAFFIC SIGNAGE AT OR NEAR THE PROJECT ENTRANCE(S). COORDINATE WITH LOCAL POLICE WHEN CONSTRUCTION VEHICLE ACTIVITIES OR DELIVERIES COULD POTENTIALLY IMPEDE NORMAL DAILY TRAFFIC AND PEDESTRIAN TRAFFIC.
- ENSURE THAT ADEQUATE SHORING AND FALSEWORK ARE PROVIDED TO THE EXISTING STRUCTURE(S) RESULTING IN A STABLE AND SAFE STRUCTURE AT ALL TIMES.
- PLANS AND SECTIONS ARE APPROXIMATE AND ARE TO BE USED FOR GENERAL LAYOUT. THE CONTRACTOR WILL BE RESPONSIBLE FOR MAKING FIELD MEASUREMENTS TO ASSURE CONSISTENCY WITH THE PROPOSED CONSTRUCTION PLANS. THE CONTRACTOR SHALL FIELD VERIFY ACTUAL CONDITIONS, DIMENSIONS, CLEARANCES, ELEVATIONS, AND OTHER INFORMATION INDICATED IN THE DOCUMENTS PRIOR TO ORDERING ANY MATERIALS, COMMENCING ANY FABRICATIONS, OR PERFORMING ANY WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY FIELD CONDITIONS WHICH MAY DIFFER FROM THAT REPRESENTED PRIOR TO COMMENCING WORK.
- PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL VISIT THE SITE AND SHALL NOTIFY THE ENGINEER OF ANY ADDITIONAL UTILITIES, STRUCTURES, OR ANY OTHER ELEMENTS THAT MAY IMPED THE WORK. UTILITY AND/OR STRUCTURE RELOCATIONS, IF NECESSARY, SHALL BE COORDINATED THROUGH THE OWNER'S ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS. PLANS SHALL NOT BE SCALED FOR DIMENSIONS.
- NOTES, TYPICAL DETAILS AND SCHEDULES APPLY TO ALL WORK UNLESS OTHERWISE NOTED. FOR CONDITIONS NOT SPECIFICALLY SHOWN, PROVIDE DETAILS OF SIMILAR NATURE. VERIFY APPLICABILITY BY SUBMITTING SHOP DRAWINGS FOR REVIEW.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL PROJECT DEMOLITION AND EXCESS MATERIAL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL LAWS.
- THE CONTRACTOR SHALL PROTECT ALL ADJACENT STRUCTURES AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ALL DAMAGE TO ADJACENT STRUCTURES AND UTILITIES AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A CONSTRUCTION SCHEDULE TO THE OWNER WITHIN 5 DAYS OF THE NOTICE OF AWARD. THE CONTRACTOR SHALL UPDATE SCHEDULE AS NEEDED THROUGHOUT THE COURSE OF WORK.
- CONTRACTOR'S STORAGE AREA: DUE TO THE SITE'S WATERFRONT LOCATION, ALL NECESSARY MEASURES SHALL BE TAKEN TO PREVENT BY ANY METHOD, OIL, CONSTRUCTION DEBRIS, STOCKPILED MATERIALS, AND OTHER MATERIALS ON THE SITE, FROM ENTERING THE WATERWAY. ANY DEBRIS FALLING INTO THE WATER SHALL BE RECOVERED AND PROPERLY DISPOSED OF. STAGING/LAYOUT AREAS, AS APPROVED BY THE ENGINEER, SHALL BE RESTORED BY THE CONTRACTOR TO THE EXISTING CONDITION. THE CONTRACTOR SHALL REPLACE ALL DAMAGED MATERIALS AS A RESULT OF HIS OPERATIONS, TO THE SATISFACTION OF THE ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT ALL CONSTRUCTION DEBRIS OR WASTE FROM FALLING INTO THE WATER. ANY DEBRIS FALLING INTO THE WATER SHALL BE RECOVERED AND PROPERLY DISPOSED OF.
- THE CONTRACTOR SHALL MAINTAIN A SECURE SITE AND PROVIDE APPROPRIATE SAFETY MEASURES TO PREVENT ACCIDENTS. THE SAFETY MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO SIGNAGE, BARRICADES, FENCES, FLASHING WARNING LIGHTS, AND POLICING IF NECESSARY.
- IN CASE OF CONTRADICTION BETWEEN THE DRAWINGS, THE SPECIFICATIONS, AND THE CODES, OR IF ANY CHANGE IS REQUIRED, THE CONTRACTOR SHALL INFORM THE ENGINEER IMMEDIATELY. NO CHANGE SHALL BE MADE WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
- UPON COMPLETION OF THE PROJECT, CONTRACTOR IS TO PROVIDE TWO AS-BUILT PLAN SETS TO THE OWNER DEFICITING ANY FIELD CHANGES OF DIMENSION OR LOCATION OF UNDERGROUND STRUCTURES AND/OR UTILITIES, CONSTRUCTION DEVIATIONS, CHANGES DUE TO FIELD OR CHANGE ORDER, AND DETAILS NOT ON THE ORIGINAL DRAWINGS.
- SHOP AND ERECTION DRAWINGS FOR ALL WORK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL AS PER THE SPECIFICATIONS. FABRICATION OF THESE ITEMS SHALL NOT COMMENCE WITHOUT APPROVED SHOP DRAWINGS. SHOP DRAWINGS ARE PREPARED AND USED BY THE CONTRACTOR AS INSTRUMENTS TO SEQUENCE HIS WORK AND TO FACILITATE FABRICATION AND ERECTION. REVIEW OF SHOP DRAWINGS SHALL BE FOR GENERAL DETAIL AND ARRANGEMENT ONLY. CONTRACTOR SHALL BEAR FULL RESPONSIBILITY FOR DIMENSIONS, PROPER FIT, AND DETAILED DESIGN OF CONNECTIONS. THEIR APPROVAL BY THE ENGINEER IS NOT TO BE CONSTRUED AS A WAIVER OF CONSTRUCTION CONTRACT REQUIREMENTS OR RESPONSIBILITIES, UNLESS THE CONTRACTOR HAS BEEN GRANTED A DEVIATION IN WRITING.

**DEMOLITION NOTES:**

- THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS IN THE FIELD PRIOR TO ANY DEMOLITION OR CONSTRUCTION. ANY DISCREPANCIES RELATING TO THE DRAWINGS SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY.
- CONTRACTOR TO BE AWARE OF SELECTIVE DEMOLITION AT ALL SECTIONS OF WORK. CONTRACTOR WILL BE RESPONSIBLE FOR REPLACEMENT IN-KIND OF ALL WORK INADVERTENTLY REMOVED AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL REMOVE ITEMS TO BE DEMOLISHED AS INDICATED ON THE DRAWINGS WITH CARE AND NOT TO DAMAGE ADJACENT STRUCTURES. THE WORK AREA WILL BE LEFT READY TO RECEIVE NEW WORK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OFFSITE DISPOSAL OF ALL PROJECT DEMOLITION MATERIAL, TRASH, AND DEBRIS IN ACCORDANCE WITH LOCAL AND STATE LAWS.
- REFER TO SPECIFICATION SECTION 02100-"DEMOLITION AND REMOVAL" FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

**CONCRETE NOTES:**

- CONCRETE WORK SHALL CONFORM TO THE LATEST EDITION OF ACI 318 - "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE" AND THE RHODE ISLAND STATE BUILDING CODE.
- CONCRETE SHALL BE PROPORTIONED, MIXED, AND PLACED UNDER THE SUPERVISION OF THE APPROVED TESTING AGENCY.
- CONCRETE SHALL BE NORMAL WEIGHT, WITH TYPE II CEMENT, AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 4,000 PSI. ALL CONCRETE DESIGN MIXES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.
- ALL CONCRETE SHALL BE AIR-ENTRAINED WITH AN AIR CONTENT OF 8% +/- 1%.
- ALL EXPOSED EDGES SHALL BE CHAMFERED 1" UNLESS NOTED OTHERWISE.
- WHEN CONCRETE IS PLACED AGAINST PREVIOUSLY HARDENED CONCRETE, THE INTERFACE SHALL BE CLEAN, FREE OF LANTANCE AND INTENTIONALLY ROUGHENED TO FULL AMPLITUDE OF APPROXIMATELY 1/4 INCH.
- CONCRETE WASHOUT OPERATIONS TO OR WITHIN THE WATERWAY MUST NOT TAKE PLACE AT ANY TIME.

**CONCRETE REINFORCING NOTES:**

- REINFORCING BARS SHALL BE DETAILED IN ACCORDANCE WITH ACI 315 - "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT" AND THE RHODE ISLAND STATE BUILDING CODE.
- COMPLETE SHOP DRAWINGS AND SCHEDULES OF ALL REINFORCING STEEL SHALL BE PREPARED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT OF THAT PORTION OF THE WORK. ALL ACCESSORIES MUST BE SHOWN ON THE SHOP DRAWINGS.
- REINFORCING BARS SHALL BE EPOXY COATED AND CONFORM TO ASTM A815 OR A706 (WELDABLE) GRADE 60.
- ALL SUPPORTS SUCH AS CHAIRS, BOLSTERS, SPACERS, BLOCKS AND HANGERS SHALL BE OF NON-CORROSIVE MATERIAL. BLOCKS SHALL BE MADE OF 4,000 PSI (UN-REINFORCED) CONCRETE.
- UNLESS NOTED ON THE DRAWINGS, THE MINIMUM CONCRETE PROTECTION (CLEAR COVER) FOR CAST-IN-PLACE CONCRETE COVER SHALL BE AS FOLLOWS:  
A. FORMED CONCRETE EXPOSED TO EARTH OR WATER: 3"  
B. CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH: 3"
- MINIMUM REINFORCEMENT DEVELOPMENT LENGTH SHALL BE IN ACCORDANCE WITH ACI 318 UNLESS NOTED ON THE DRAWINGS. LAP SPICE LENGTHS SHALL BE IN ACCORDANCE WITH ACI 318 FOR CLASS B LAPS UNLESS NOTED OTHERWISE.
- ALL REINFORCEMENT SHALL BE CONTINUOUS THROUGH CONSTRUCTION JOINTS. UNLESS NOTED OTHERWISE, BARS SHALL BE CONTINUOUS AND SHALL RUN CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPICES OR HOOKED AT DISCONTINUOUS ENDS.

**LUMBER NOTES:**

- ALL NEW LUMBER SHALL BE SOUTHERN YELLOW PINE NO. 1 OR BETTER (1/2=1,200 PSI).
- NEW LUMBER SHALL BE PRESSURE TREATED TO A MINIMUM NET RETENTION OF 0.8 PCF OF CCA IN ACCORDANCE WITH AWPA STANDARD C18 UNLESS OTHERWISE NOTED.
- ALL FIELD CUTS AND BOLT HOLES SHALL BE PROTECTED IN ACCORDANCE WITH AWPA STANDARD M4.
- LUMBER DIMENSIONS PROVIDED IN THE PLANS ARE DRESSED SIZES UNLESS SPECIFIED OTHERWISE.

**SPILL PREVENTION CONTROL NOTES:**

- SPILLS AND LEAKS SHALL BE AVOIDED THROUGH FREQUENT INSPECTION OF EQUIPMENT AND MATERIAL STORAGE AREAS, AND SHALL BE REMEDIATED AND REPAIRED AS NECESSARY.
- HAZARDOUS MATERIAL STORAGE TO BE PLACED ONLY IN DESIGNATED AREAS. MATERIAL STORAGE AREAS SHALL BE ROUTINELY INSPECTED FOR LEAKY CONTAINERS, OPEN CONTAINERS, OR IMPROPER STORAGE TECHNIQUES THAT MAY LEAD TO SPILLS OR LEAKS.
- APPROPRIATE SPILL REMEDIATION PROCEDURES AND SUPPLIES SHALL BE READILY AVAILABLE ON-SITE. TOOLS AND SUPPLIES SHALL BE CLEARLY MARKED SO THAT ALL PERSONNEL CAN LOCATE AND ACCESS THESE SUPPLIES.
- SPILL REMEDIATION SHALL BE PERFORMED IMMEDIATELY. CONTRACTOR SHALL FOLLOW PROPER RESPONSE PROCEDURES IN ACCORDANCE WITH ANY APPLICABLE REGULATORY REQUIREMENTS.
- AT NO TIME SHALL SPILLS BE DIVERTED TOWARD STORM DRAINS OR TO THE WATERWAY.
- EQUIPMENT/VEHICLE FUELING AND REPAIR/MAINTENANCE OPERATIONS SHALL TAKE PLACE ONLY WITHIN DESIGNATED STAGING AREAS.
- THE EQUIPMENT OPERATOR SHALL FULLY MONITOR FUELING OPERATIONS TO EQUIPMENT AND VEHICLES AT ALL TIMES.
- ANY SPILLAGE SHALL BE IMMEDIATELY CLEANED WITH SPILL KITS KEPT ON SITE.
- IN THE CASE OF SMALL AMOUNTS OF SOIL CONTAMINATION, SUCH SOIL SHALL BE PLACED IN 55 GALLON DRUMS FOR DISPOSAL BY A LICENSED HAZARDOUS WASTE HAULER AT NO ADDITIONAL COST TO THE OWNER.
- IN THE CASE OF A LARGE AMOUNT OF SOIL CONTAMINATION OR DISCHARGE TO THE WATERWAY, RHODE ISLAND DEM AND APPLICABLE AGENCIES SHALL BE NOTIFIED AS REQUIRED. A HAZARDOUS WASTE REMEDIATION FIRM SHALL BE CONTRACTED TO REMOVE AND DISPOSE OF THE CONTAMINATED MATERIAL OR CONTAIN THE SPILL AT NO ADDITIONAL COST TO THE OWNER.

**EROSION CONTROL NOTES:**

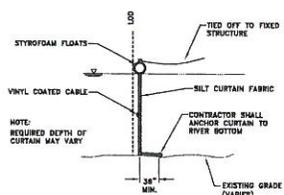
- CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL DEVICES FOR THE DURATION OF THE PROJECT.
- CONTRACTOR SHALL PREVENT SEDIMENT FROM ENTERING THE WATERWAY VIA DISCHARGES THROUGH ANY DRAINAGE STRUCTURES OR RUNOFF FROM WITHIN THE LIMITS OF WORK.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING, RESTORING AND REPAIRING ALL DAMAGE AS A RESULT OF UNAUTHORIZED WORK OR DISCHARGES AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL INSTALL AND MAINTAIN TURBIDITY BARRIERS AS INDICATED IN THE CONTRACT DOCUMENTS. TURBIDITY BARRIERS SHALL BE ANCHORED SECURELY AS TO ENSURE COLLECTION OF SEDIMENT AND ENABLE THE WORK TO BE PERFORMED.
- SOIL STOCKPILES SHALL BE A MINIMUM OF 2- FEET FROM THE EDGE OF THE WALL TO LIMIT RUNOFF INTO THE HARBOR.
- THE LIMITS OF EROSION CONTROL BARRIERS SHALL BE ADJUSTED OR EXPANDED AS FIELD CONDITIONS WARRANT.
- ALL EROSION CONTROL BARRIERS SHALL BE INSPECTED AT LEAST ONCE PER WEEK. ANY DAMAGED AREAS OF THE EROSION CONTROL BARRIER SHALL BE REPAIRED WITHIN 24 HOURS OF DISCOVERY.
- DISCHARGE OF TURBID WATER TO THE WATERWAY IS PROHIBITED.
- THE TURBIDITY BARRIER SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF WORK AND SHALL REMAIN IN PLACE UNTIL ALL PILES AND FORMWORK ARE REMOVED.

**GENERAL SCOPE OF WORK:**

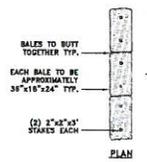
- PRIOR TO PROJECT COMMENCEMENT, NOTIFY AND COORDINATE WITH ALL STATE, LOCAL AND FEDERAL AUTHORITIES AS REQUIRED. DETERMINE TEMPORARY LOCATIONS AND COORDINATE TEMPORARY RELOCATION OF EXISTING VESSELS AS NECESSARY IN ORDER TO PERFORM CONSTRUCTION OPERATIONS.
- MOBILIZE CONSTRUCTION EQUIPMENT AND PERSONNEL TO THE SITE. UTILIZATION OF A STAGING AREA WILL BE COORDINATED WITH THE TOWN OF BRISTOL AS APPROPRIATE AND AS NECESSARY. WATERLODE BARGE OPERATIONS SHALL BE COORDINATED WITH THE TOWN OF BRISTOL.
- REPOINT AND REPAIR STONE MASONRY WALLS TO THE EXTENTS INDICATED ON THE DRAWINGS.
- REMOVE DETERIORATED CONCRETE FROM THE FACE OF THE EXISTING CONCRETE WALL. INSTALL REINFORCING AND APPLY SHOTCRETE AS INDICATED ON THE DRAWINGS.
- REMOVE A PORTION OF THE EXISTING STONE MASONRY WALL AND INSTALL A NEW CONCRETE CAP TO THE EXTENTS INDICATED ON THE DRAWINGS.
- INSTALL NEW TIMBER WALKWAY WITH CONCRETE FOOTINGS, TIMBER PILES, FILE CAPS, STRINGERS, SKIRT BOARDS, DECKING, AND ROPELAP. REGRADE ADJACENT LAND TO ELEVATIONS SHOWN ON THE DRAWINGS.
- RESET/REALIGN STONES ALONG THE TOP OF THE STONE MASONRY WALL AND INSTALL NEW REINFORCED CONCRETE SLAB PATHWAY AS INDICATED ON THE DRAWINGS.
- INSTALL NEW PERMEABLE PAVEMENT PATHWAY PROVIDED WITH CURBING AS INDICATED ON THE DRAWINGS.
- CLEAR AREA OF VEGETATION AND INVASIVE SPECIES, INSTALL NEW CONCRETE SLAB AND BENCHES, AND PROVIDE NEW PLANTINGS.
- PERFORM SITE CLEANUP AND RE-SEEDING OF AREAS AS NECESSARY. PERFORM FINAL WALK THROUGH WITH KEY PROJECT PERSONNEL UPON COMPLETION.
- COMPLETE DEMOLITION AND PROJECT CLOSOUT.

**LEGEND**

- I.R. IRON ROD
- C.B. CONCRETE BOUND
- M.H.W. MEAN HIGH WATER
- D.H. DRILL HOLE
- WM WATER METER
- W/S WATERSTOP
- S.M.H. SEWER MANHOLE
- G.V. GAS VALVE
- L.P. LAMP POST
- SDO SEWER CLEAN OUT
- S— SEWER LINE
- W— WATER LINE
- G— GAS LINE
- OE— OVERHEAD ELECTRIC LINE
- TW TOP OF SEAWALL
- BWG BASE OF WALL SEA BED
- BWG-2+43 ELEVATION NEGATIVE -2+43
- (E243) PROPOSED SPOT ELEVATION



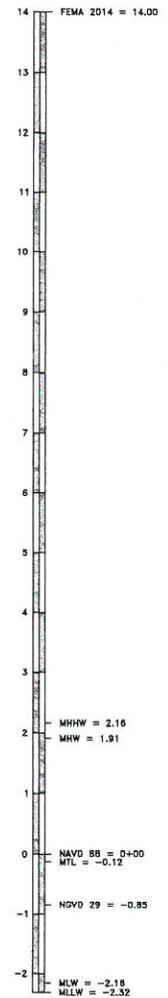
**TURBIDITY BARRIER DETAIL NOT TO SCALE**



**PLAN**

**ELEVATION**

**TYPE 1 EROSION CONTROL NOT TO SCALE**



**REVISIONS:**

NO.	DESCRIPTION

PROJECT NO.: 17050.00  
 DATE: JANUARY 2018  
 SCALE: AS NOTED  
 DESIGNED BY: RMH  
 CHECKED BY: RMH  
 DRAWN BY: LMC  
 APPROVED BY: RMH

**GENERAL NOTES AND LEGEND**

SHEET NO.: 1.0

PERMIT SUBMISSION  
NOT FOR CONSTRUCTION

P39





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JAN 29 2018

COASTAL RESOURCES  
MANAGEMENT COUNCIL

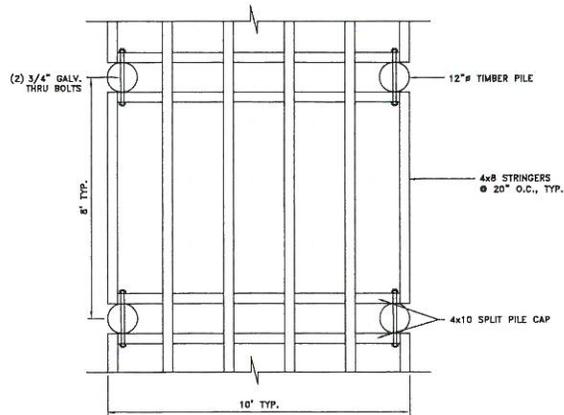


PARE CORPORATION  
ENGINEERS - SCIENTISTS - PLANNERS  
111 LINCOLN ROAD, SUITE 202  
FOXBORO, MA 01521  
508-543-1201

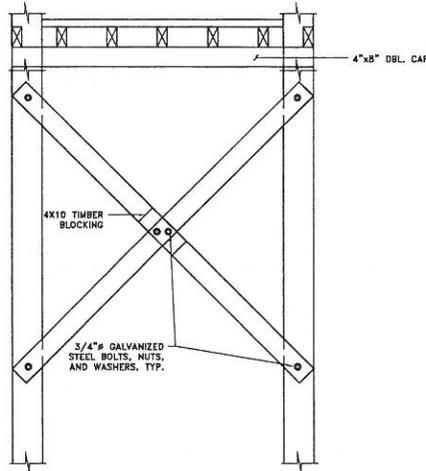


SCALE ADJUSTMENT  
GUIDE  
1" = 1'  
BAR IS ONE INCH ON  
ORIGINAL DRAWING.

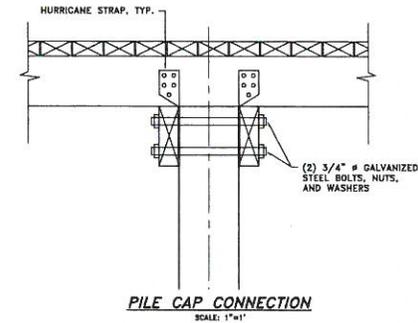
BRISTOL HARBOR  
BOARDWALK EXTENSION  
THAMES STREET  
BRISTOL, RHODE ISLAND



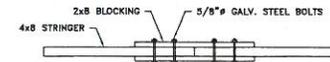
**TIMBER FRAMING PLAN**  
SCALE: 1"=2'



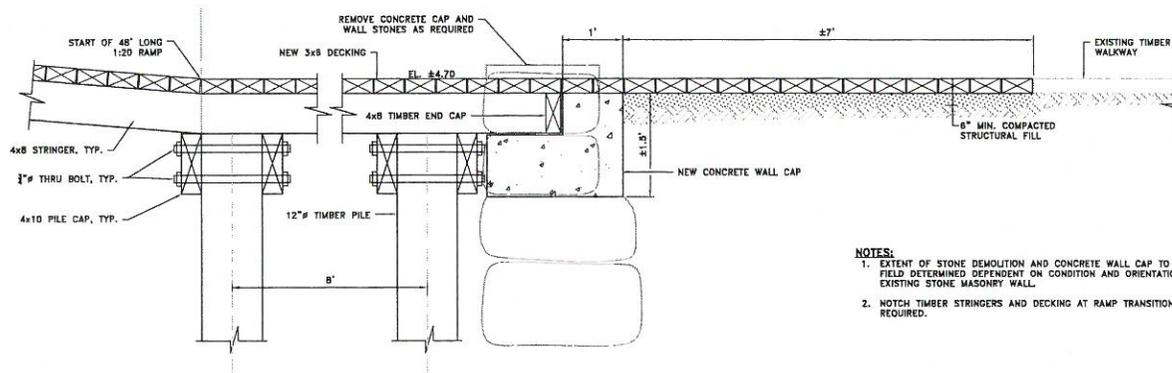
**CROSS BRACE CONNECTION DETAIL**  
SCALE: 1"=2'



**PILE CAP CONNECTION**  
SCALE: 1"=1'



**TIMBER SPLICE DETAIL**  
NOT TO SCALE



**TIMBER PIER CONNECTION DETAIL**  
SCALE: 1"=1'

**NOTES:**

1. EXTENT OF STONE DEMOLITION AND CONCRETE WALL CAP TO BE FIELD DETERMINED DEPENDENT ON CONDITION AND ORIENTATION OF EXISTING STONE MASONRY WALL.
2. NOTCH TIMBER STRINGERS AND DECKING AT RAMP TRANSITION AS REQUIRED.

REVISIONS:

NO.	DESCRIPTION	DATE

PROJECT NO.: 17050.00  
 DATE: JANUARY 2018  
 SCALE: AS NOTED  
 DESIGNED BY: RMM  
 CHECKED BY: RMM  
 DRAWN BY: LMC  
 APPROVED BY: RMM

TIMBER  
DETAILS

SHEET NO:

4.0

PERMIT SUBMISSION  
NOT FOR CONSTRUCTION

P42





# CRMC DECISION WORKSHEET

2017-11-051

East Beach Farms, LLC

Hearing Date:	
Approved as Recommended	
Approved w/additional Stipulations	
Approved but Modified	
Denied	Vote

APPLICATION INFORMATION						
File Number	Town	Project Location		Category	Special Exception	Variance
2017-11-051	Charlestown	Quonochontaug Pond		<b>B</b>	<input type="checkbox"/>	<input type="checkbox"/>
		Plat	Lot			
		<b>Owner Name and Address</b>				
Date Accepted	11-17-2017	East Beach Farms, LLC		Work at or Below MHW	<input checked="" type="checkbox"/>	
Date Completed	3-15-2018	141 Pine Hill Road Wakefield, RI 02879		Lease Required	<input checked="" type="checkbox"/>	

## PROJECT DESCRIPTION

applicant seeking a 6 acre oyster farm

## KEY PROGRAMMATIC ISSUES

**Coastal Feature:** Submerged land

**Water Type:** Type 2, Low Intensity Use

**CRMP:** 1.2.1(B); 1.3.1(A); 1.3.1(K); 1.3.1(R)

**SAMP:**

Variations and/or Special Exception Details:

Additional Comments and/or Council Requirements: waiver marking requirements for summer season

Specific Staff Stipulations (beyond Standard stipulations):

## STAFF RECOMMENDATION(S)

Engineer \_\_\_\_\_ Recommendation: NA

Biologist \_\_\_\_\_ Recommendation: NA

Other Staff [Signature] Recommendation: Approval

\_\_\_\_\_  
Executive Director Sign-Off [Signature] 3/23/18 date

[Signature] 3-23-18 date  
Aquaculture Coordinator Sign-off  
[Signature] 4-26-18 date  
Staff Sign off on Hearing Packet (Eng/Bio)

Name: East Beach Farms, LLC  
CRMC File No.: 2017-11-051  
Staff Report



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
COASTAL RESOURCES MANAGEMENT COUNCIL  
INTER-OFFICE MEMORANDUM

DATE: March 15, 2018  
TO: Grover J. Fugate, Executive Director  
FROM: David Beutel  
SUBJECT: CRMC File No. 2017-11-051

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Applicant's Name: East Beach Farms, LLC  
Project: Six acre bottom plant oyster farm

Location: Quonochontaug Pond, Charlestown  
Water Type/Name: Type 2, Low Intensity Use,  
Coastal Feature: submerged land

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**STAFF REPORT**

This application is for a six acre bottom plant oyster farm in Type 2 waters in Quonochontaug Pond (Attachments 1a and 1b). The RI Coastal Resources Management Program (RICRMP) Section 1.3.1(K)5.a.11 allows up to six acres of bottom plant for a new lease in a coastal pond. East Beach Farms LLC already has a 3.3 acre site using floating gear, cages, and bottom plant for growing oysters in Quonochontaug Pond (Attachment 1b). East Beach Farms LLC has four active sites in Ninigret Pond using 10.37 acres. East Beach Farms LLC fully utilizes all of its acreage. The new application meets the requirements of the RICRMP Section 1.3.1(K)5.a.12 which states that an existing site must be fully utilized before applying for a new site. Staff inspection of site #2015-07-031 found the site fully used and in compliance with the assent. The new six acre site allows for expansion of an existing business using the bottom plant method which has minimal user conflict.

The thirty day public notice period ended on December 21, 2017. The required meetings were completed on February 7, 2018 and CRMC has received the following agency correspondence (Attachments 2-5b):

- RI Historical Preservation and Heritage Commission letter of no significant impact; Nov. 28, 2017

Name: East Beach Farms, LLC  
CRMC File No.: 2017-11-051  
Staff Report

- RI Department of Environmental Management (DEM) Office of Water Resources letter of water quality assessment; Nov. 30, 2017
- RI DEM Division of Fish and Wildlife letter of no objection; December 21, 2017
- RI Marine Fisheries Council letter of consistency with marine fisheries for the area; Feb. 28, 2018
- Please note that Army Corps of Engineers authorization is not required for bottom planted shellfish

CRMC received objections and comments for this application some of which address the criteria of substantive RICRMP Section 1.1.4(G). The correspondence is summarized by individual:

Robert Anderson submitted a conditional letter of support (Attachment 6) if buoys were not used to mark the site during water skiing season; that small buoys be used the remainder of the year; and that harvesting did not occur during July and August. Staff has discussed these concerns with the applicant and have agreed that buoys could be absent during July and August; and that small buoys could be used when the site is marked. It would be difficult to conduct no work on the site during July and August. It could be possible for no harvest to occur in July and August but as the oysters on the applicant's adjacent site mature they will need to be planted on the bottom site. This oyster "planting" can be accomplished easily without buoys marking the site and would not require a lot of time on the site.

Rochelle Levins is concerned that the application is for the maximum bottom plant acreage allowed in an application; that the area should not be "profit for a few;" and that it should be left for everyone to use (Attachment 7). Staff assessment is that this area is within the 5% cap RICRMP Section 1.3.1(K).4.f. for Quonochontaug; that the application met the size standard in RICRMP Section 1.3.1(K).5.a.(11); and that because this application is for bottom planted oysters everyone can continue to use the area. Please note that the site assessment captured zero shellfish in the proposed area (Attachment 8).

Bill Wilson is concerned about the reduced recreational use because of corner markers on the proposed site, and that the corner markers propose a safety hazard. He is against the use of a bay scallop dredge for harvesting oysters (Attachment 9a-9e). As previously stated the applicant is willing to use corner markers only from September through June to minimize perceived use and safety concerns. Bay scallop dredges can damage eelgrass and should not be used on eelgrass beds. The potential damage to eelgrass beds is the reason bay scallop dredge use is prohibited in coastal ponds when harvesting bay scallops. The dredges do not harm areas without protected submerged aquatic vegetation (SAV). The SAV maps of 2009, 2012, and 2016 do not indicate SAV to be present on the proposed site or in anywhere in the vicinity of the proposed site.

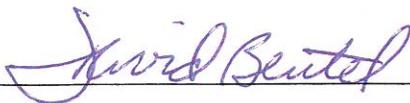
Phil Capaldi submitted a series of communications beginning on December 20, 2017. The first communication was a request for a public hearing. Staff responded on December 26, 2017 and the communications are attachments 10a-10n. The response stamped January 2, 2018 includes the following objections:

- Potential elimination of the proposed area for recreational activities if the proposed area changes its method to floating gear
- It is a recreational shellfish area
- Eelgrass beds were identified by the objector
- Unclear comments regarding applicant language concerning aquaculture site density

Staff will address the four items above in order:

- This application is for bottom planted oysters. Recreation will not be affected, particularly if buoys are not used during the summer. Any future changes to a permitted site require the thirty day public notice process and programmatic review requirements. The Council may wish to stipulate that bottom planting will be the only aquaculture method considered for this six acre site.
- Please see the site assessment for shellfish and the cross section of water depth. The proposed site is in six to eight feet of water at MLW. The site assessment captured zero shellfish. This is not a recreational shellfishing site. Recreational activities including fishing, navigating, water skiing, kayaking, etc. can continue to occur at this location.
- As previously mentioned, the SAV surveys have not shown eelgrass to be present at this site.
- The applicant states that he does not want a site crowded by other aquaculture sites and has therefore chosen the proposed six acre site.

In summary, this application is for six acres of bottom planted oysters in Quonochontaug Pond. The proposed area is six-eight feet deep at MLW. There is no protected SAV in the proposed area, nor is there a significant shellfish harvest. Recreational activities will not be significantly impacted. The applicant has met the requirements of the RICRMP and staff recommends approval of this application.

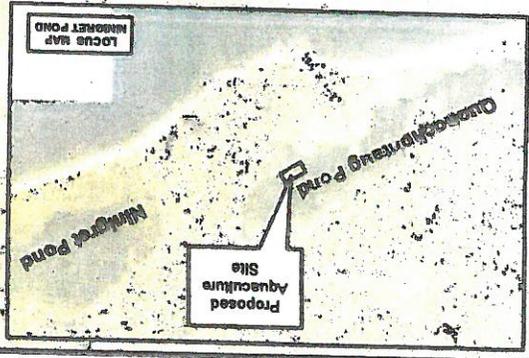
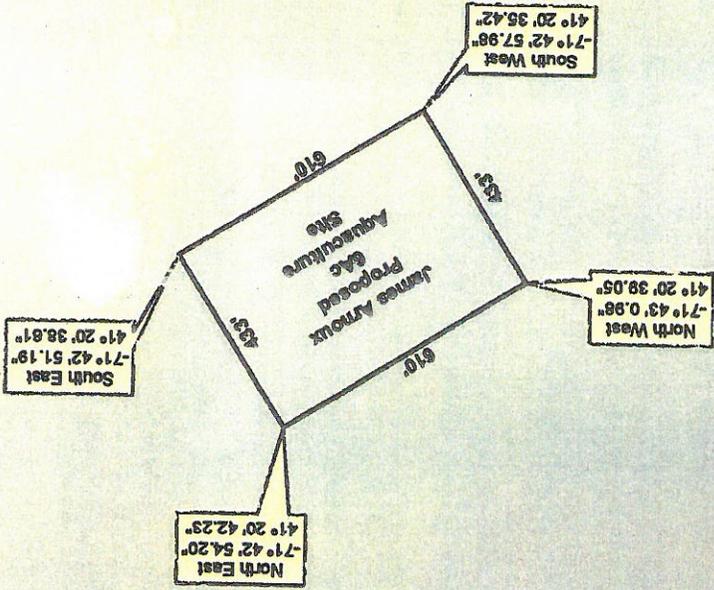


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Aquaculture Coordinator



0 100 200 400 600 800 Feet



PROPOSED  
AQUACULTURE SITES  
JAMES ARNOUX  
QUONOCHONTAUG POND

RECEIVED  
NOV 16 2017  
OCEAN RESOURCES  
MANAGEMENT CORP.



STATEMENT OF DISCLOSURE AND APPLICANT AGREEMENT AS TO FEES

The fees which must be submitted to the Coastal Resources Management Council are based upon representations made to the Coastal Resources Management Council by the applicant. If after submission of this fee the Coastal Resources Management Council determines that an error has been made either in the applicant's submission or in determining the fee to be paid, the applicant understands that additional fees may be assessed by the Coastal Resources Management Council. These fees must be paid prior to the issuance of any assent by the Coastal Resources Management Council.

The applicant understands the above conditions and agrees to comply with them.

  
\_\_\_\_\_  
Signature

11/16/2017  
Date

JAMES ARNOLD 141 Pine Hill Rd Wakefield MA 02879  
Print Name and Mailing Address

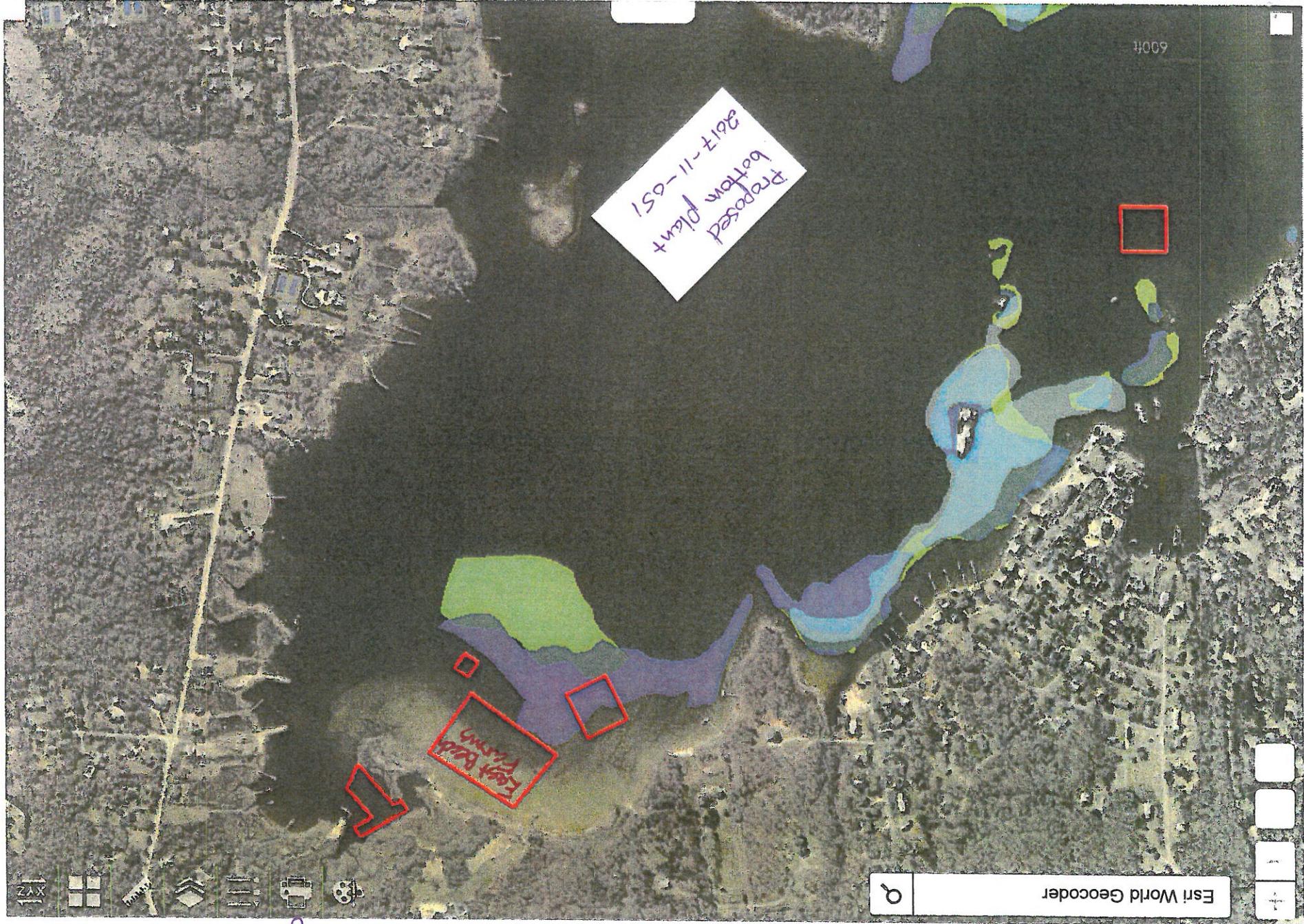


Approved Aquaculture Leases in Rhode Island

Approved Aquaculture Leases in Rhode Island

Need Help?

Current Aquaculture Sites in Red



2



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
HISTORICAL PRESERVATION & HERITAGE COMMISSION  
Old State House • 150 Benefit Street • Providence, R.I. 02903-1209  
TEL (401) 222-2678 FAX (401) 222-2968  
TTY / Relay 711 Website www.preservation.ri.gov

Jennifer R. Cervenka, Chair  
Coastal Resources Management Council  
Oliver H. Stedman Government Center  
4808 Tower Hill Road  
Wakefield, Rhode Island 02879

CRMC File Number: 2017-11-051

Applicant: East Beach Farms LLC

Town: Aquinodunum Pond

Response Date: 11/21/17

Dear Ms. Cervenka:

The Rhode Island Historical Preservation and Heritage Commission (RIHPHC) staff has reviewed the above-referenced project. It is our conclusion that this project will have no effect on any significant cultural resources (those listed on or eligible for listing on the National Register of Historic Places).

These comments are provided in accordance with Section 220 of the Coastal Resources Management Council. If you have any questions, please contact Glenn Modica, Project Review Coordinator, or Charlotte Taylor, archaeologist, at this office.

Very truly yours,

Jeffrey Emidy  
Acting Executive Director, RIHPHC

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NOV 28 2017  
COASTAL RESOURCES  
MANAGEMENT COUNCIL



RHODE ISLAND  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767 TDD 401-222-4462

November 28, 2017  
Dave Beutel Aquaculture Coordinator  
Coastal Resources Management Council  
Wakefield, RI 02879-1900

Dear Mr. Beutel,

I am writing in reference to the Public Notice request by James Arnoux dba East Beach Farms, LLC for the relocation of his aquaculture operation in Quonochontaug Pond (File number 2017-11-051). The proposed location for this site as stated in the Preliminary Determination comment letter from this office dated Sept. 12, 2017 is in waters approved for shellfish harvesting located in Quonochontaug Pond in the town of Charlestown .

The classification of shellfish grounds is an ongoing process based on the principles of the National Shellfish Sanitation Program. The Department of Environmental Management assumes no liability by the leaseholder for changes in classifications that may restrict or prohibit access and/or harvesting from said lease area. While this site currently has an approved classification for the harvesting of shellfish, extraordinary circumstances (i.e., large amounts of rainfall, hurricanes or oil spills) could temporarily halt such harvesting and prohibit work on said lease. If approved please include the following language that CRMC and DEM previously agreed to as a stipulation:

Aquaculturists in areas where emergency shellfish closures have been enacted will be allowed access to their leases for the purposes of preparing for and planting seed and when extreme weather could result in loss or damage of gear to conduct necessary maintenance/retrieval of their equipment. All other activities on the aquaculture lease, including but not limited to the harvest of shellfish, will remain prohibited until the water quality is acceptable to allow for harvest. Aquaculturists seeking permission to access their lease during an emergency closure must seek authorization by contacting Dave Beutel, CRMC's aquaculture coordinator at 783-7587.

In the effort to address increasing water temperatures and the potential threat of a Vibrio Illness outbreaks we are asking all lease holders to monitor water temperature at their lease site and keep records of actual temperatures of bottom, surface and at the depth waters where the shellfish are being grown during the Summer months (June-September). If this project is approved, please include this request in your aquaculture approval document.

Neither a RIPDES permit nor a Water Quality Certificate is required for the proposed facility. Please call me at 222-4700, Ext. 7241 if you have any questions.

Sincerely,

*Lucinda M. Hannus*

Lucinda M. Hannus, Principal Environmental Scientist  
RI DEM  
Office of Water Resources – Shellfish Program

cc Angelo Liberti  
Conor McManus  
Dennis Erkan  
Julia Livermore





Rhode Island  
Department of Environmental Management

DIVISION OF MARINE FISHERIES

3 Fort Wetherill Road  
Jamestown, RI 02835

401 423-1920  
FAX 401 423-1925  
TDD 401 831-5508

December 21, 2017

David Beutel  
Aquaculture Coordinator  
Coastal Resources Management Council  
4808 Tower Hill Road  
Wakefield, RI 02879

Re: James Arnoux Lease Application # 2017-11-051

Dear Mr. Beutel:

The Rhode Island Department of Environmental Management (Department), through the Division of Fish and Wildlife (DFW) and Division of Marine Fisheries (DMF), has received and reviewed the application submitted by James Arnoux (DBA East Beach Farms, LLC) for a proposed 6.06-acre aquaculture lease in Quonochontaug Pond for cultivating eastern oysters (*Crassostrea virginica*) using the bottom plant method.

The DMF and DFW believe that the adverse impacts to marine fisheries and wildlife and their habitat from this prospective site given the work restrictions outlined on page 6 of the public notice document would be minimal. While the aquaculture site is located near an area of recreational clamming, the Department feels that the distance from the area is sufficient to limit interference with recreational activity. The proposed site and hours of operation in this application are the product of the applicant working with DFW and DMF staff to find an area that avoids local concerns of recreational shell fishing and select hours that will limit disturbances to waterfowl, their habitats and the sportsmen and women that hunt them.

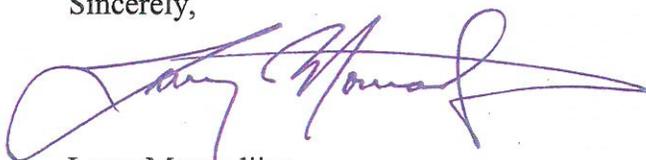
The Department does not object to the application as a whole, however, the Department objects to the applicant's request for a study investigating disturbances to waterfowl resulting from the proposed lease as outlined on page 6. The Department communicated with the applicant and explained that an adequate scientific study would require a minimum of 3 years of observations of waterfowl use or and behaviors on the site and surrounding areas prior to the any aquaculture activity beginning on the lease site. The study would then need to extend for a minimum of 3 years after the aquaculture operation was started to allow a direct comparison of waterfowl use before and after the lease operation was in place. Collection of data for a short period of time immediately before aquaculture activities begin would skew the data and would fail to paint an accurate picture of bird use and activity on and adjacent to the site. It was also communicated that the Department does

4  
b

not have the staff, time, availability or funding to conduct such research at a localized scale for the benefit on an individual or entity. The Department recommended researchers at the University of Rhode Island that have extensive experience conducting the type of research and surveys that would be necessary to answer the questions posed by the applicant.

As such, the Department recommends that the applicant contract with the University of Rhode Island researchers or another private consultant to perform the appropriate research necessary to answer the questions that he has posed. The Department does not have objections to this application, and commends the applicant for working with the DFW and DMF on finding a location and work schedule agreeable for all groups. The Department's acceptance of the current proposal is specific to the location and specifications outlined in the application.

Sincerely,



Larry Mouradjian,  
Associate Director for Natural Resources





# Rhode Island Marine Fisheries Council

3 Fort Wetherill Road Jamestown, Rhode Island 02835  
(401) 423-1920 Fax: (401) 423-1925

Robert Ballou  
Chairman

David Monti  
Vice Chair

Travis Barao

Andrew Dangelo

Jeff Grant

William  
Mackintosh, III

Christopher Rein

Michael Rice, Ph.D.

Michael Roderick

February 28, 2018

Dave Beutel, Aquaculture Coordinator  
Coastal Resources Management Council  
4808 Tower Hill Road  
Wakefield, RI 02879

Re: CRMC Aquaculture Lease Application # 2017-11-051 – East Beach Farms LLC  
Quonochontaug Pond

Dear Mr. Beutel:

Pursuant to RIGL §20-10-5, the above-referenced application was brought before the RI Marine Fisheries Council (hereafter “Council” or “RIMFC), via the Council’s Shellfish Advisory Panel, on February 7, 2018 for review. The Panel found that the proposal poses no inconsistency with competing uses engaged in the exploitation of marine fisheries in the area. In accordance with RIMFC Policy, the recommendation of the Panel constitutes the recommendation of the Council, unless there is a request to bring the matter before the full Council. Given that no such request was made on this matter, the Panel’s recommendation stands and the Council’s review is complete.

Sincerely,

Robert Ballou, Chair  
RIMFC



cc: RIMFC

5  
b

# Shellfish Advisory Panel

February 7, 2018; 4:30PM

URI Bay Campus, Coastal Institute Building, Small Conference Room  
218 S Ferry Road, Narragansett, RI 02874

## MEETING SUMMARY

RIMFC members: J. Grant (Chair)

DEM: C. McManus; E. Schneider; P. Barret; S. Olszewski; P. Duhamel; C. Hannus (Water Resources)

SAP members: K. Eagan; M. McGiveney; R. Tellier; D. Ghigliotty; M. Sousa, R. Rheault (alt. for J. Gardner), G. Schey, R. Pastore, E. Troiano

CRMC: D. Beutel

Public: P. Rasso, J. Arnoux, P. Capaldi, W. Helt, O. Kelly

1. **Introduction of new members:** New members Manuel Sousa and Ed Troiano were introduced and welcomed.
2. **Review of aquaculture lease applications sent to public notice by CRMC:**
  - a. **2017-11-051, East Beach Farms LLC, Quonochontaug Pond:**

The Chair reminded members their aquaculture lease application review criteria as specified in RI Gen. Laws section 20-10-5. *D. Beutel* provided a brief overview of the proposal. He offered that a shellfish survey revealed a density of < 1 shellfish/sq. meter. He offered that of the 30 samples, there were no quahaugs found. He offered that from a CRMC perspective there are “little to no issues” with this site being suitable for aquaculture “in terms of fisheries and user conflicts”. **Motion made by *R. Rheault* to recommend no objection to the application; 2<sup>nd</sup> by *R. Pastore*. The motion passed 9-0.**

b. **2017-11-086, Raso, Potter Pond:**

*D. Beutel* provided a brief overview of the proposal. He offered that multiple objections were received. He offered that the RISSA Kayak committee objected due to conflict with use of waters for striped bass fishing during the Spring cinder-worm hatch. He offered that several objections were received from neighbors. He then offered that he has also received “one letter of support for every objection”. He offered that a shellfish survey revealed a density of 0.88 shellfish/sq. meter. *M. Sousa* offered that he cannot support any lease that uses floating gear; that he can only support bottom culture. *C. McManus* offered that DEM was in receipt of several objections due to conflict with recreational harvest (letters will be provided as an attachment to the minutes). *Mr. Raso* offered that

335 W Beach Rd  
Charlestown, RI 02813  
December 11, 2017



Mr. David Beutel  
Coastal Resources Management Council  
Aquaculture Coordinator  
Oliver Stedman Government Center  
4808 Tower Hill Road  
Wakefield, RI 02879  
401-783-3370

2017-11-051

Dear Mr. Beutel,

This letter is in reference to the application of East Beach Farms, LLC, 141 Pine Hill Road, Wakefield, RI 02879 to create and maintain a six-acre oyster farm using the bottom plant method (no gear) in Quonochontaug Pond.

I am thankful that this application is being made by an existing aquaculture operator with a current mooring in Quonnie Pond and that it is a bottom culture method. I am supportive of this application with a few reservations. My concerns revolve around the four buoys marking the corners of the plot, and harvesting.

Our family frequently engages in watersports on the pond in the vicinity of the buoys. We first observed the buoys while waterskiing this fall and they add to the overall congestion of an already small pond. It is my understanding that the buoys are required by the CRMC. I would request that the buoys not be used at all. If this is not possible, I would suggest that they be completely removed for July and August, and that the smallest possible buoys be used for the rest of the year. Again, this request is based on boater safety concerns. The buoys add another item to be navigated around, and in July and August there are many boats, kayaks, paddleboards, and other watercraft on the pond.

I have read the harvesting restrictions that CRMC has put into effect due to waterfowl. I would also ask that no harvesting, or any other work, take place in July and August, and that this exclusion be specifically noted as a condition of approval because the pond is just too busy in July and August at the proposed aquaculture site.

With these changes, I can fully support the application and wish Mr. Arnoux and East Beach Farms, LLC every success.

Sincerely,

Robert Anderson  
335 W Beach Rd  
c: (860) 514-8610

e: andersonenergysolutions@gmail.com





**Lisa Turner**

---

**From:** Dave Beutel <dbeutel@crmc.ri.gov>  
**Sent:** Monday, November 27, 2017 8:12 AM  
**To:** Lisa Turner; Grover Fugate; Anthony DeSisto  
**Subject:** FW: Oyster farm in Quonnie Pond

-----Original Message-----

**From:** Rochelle Levins [<mailto:rjlevins@icloud.com>]  
**Sent:** Friday, November 24, 2017 10:07 AM  
**To:** [dbeutel@crmc.ri.gov](mailto:dbeutel@crmc.ri.gov)  
**Subject:** Oyster farm in Quonnie Pond

Dear Sir

My concern is that the applied maximum size for the permit should not be allowed . These farms will displace the residents recreational use of the pond along with restricting the long time resident personal use so enjoyed by families. Quonnie should not become a " profit for a few" area. Some things should remain as nature intended and for all people.

Best regards  
Rochelle Levins  
Westerly

Sent from my iPad=

RECEIVED  
JAN 25 2018  
COASTAL RESOURCES  
MANAGEMENT COUNCIL



## Rhode Island Coastal Resources Management Council Aquaculture Site Evaluation

Assessment Date/Time: 1/25/18

File Number: 2017-17-051  
Location: Quonochontaug

Applicant: East Beach  
Water Type: 2

Tidal Stage: Ebb  
Substrate: Muddy Sand

Tidal Flow:  
Shoreline:

Sampling Equipment: tongs

Shellfish Sampling: 6 stations 5 samples/station 0 shellfish captured

Vegetation Observations: None

Marine Invertebrate Species Observed: None

Fish Species Observed: None

Investigator: Beutel

Witnesses: J. Arnoux

Signatures: \_\_\_\_\_

*J. Arnoux*

**Lisa Turner**

---

9

a

**From:** Dave Beutel <dbeutel@crmc.ri.gov>  
**Sent:** Monday, November 20, 2017 12:55 PM  
**To:** Lisa Turner  
**Subject:** FW: Public Notice  
**Attachments:** Oyster Farm Comments EBF 2017.11.051.docx

-----Original Message-----

**From:** Bill Wilson [<mailto:wilson.wm.h@gmail.com>]  
**Sent:** Monday, November 20, 2017 12:11 PM  
**To:** Dave Beutel  
**Subject:** Public Notice

2017.11.051

My concerns - very similar to those presented in the Preliminary application 2017.09.012

Tks Bill

PS - can I be placed on a list to automatically receive Public Notices about aquaculture applications.  
TKs

Charlestown – Coastal Ponds Management Commission  
Dave Beutel – Coastal Resource Management Council  
Oyster Farm Application East West Farm (2017.09.012)

Public Notice 2017.11.051

Submitted by – Bill Wilson, 22 Bay Street, Charlestown RI 02813



This application is for a new location of Quonnie Pond and is for Bottom Planting only. One of the major recreational activities in the proposed location is Water Skiing and Tubing. I am concerned about the reductions in recreational acreage caused by the markers on the corners of this farm and the hazards caused by those buoys.

CRMC Water Type Designations and approved uses –

Type 2 Waters – Low intensity use – High scenic value, low-intensity recreation and residential uses, including seasonal mooring area.

Goal- Maintain scenic value and natural habitat, while providing for low-intensity uses that do not detract from these values.

Area restricted to Low-intensity recreation and residential uses only.

Recreation - What is the effect on recreation

Water Skiing and Tubing – Quonnie Pond is fortunate to have significant deep water areas to support recreational activities and it is rare to have a day when you do not see a boat pulling a Water Skier or Tube. If you look at attachment 1, a map of Quonnie Pond with existing oyster farms (taken from the HMP) the area for recreation seems to be expansive.

Now let's overlay the following obstacles to recreation

- Mooring Fields as outlined in the HMP
- Markers identifying Oyster Farms – create danger to boats and skiers
- Picnic Rock Shallow Rocky area
- Flats to shallow for Boating
- Conservation areas

In Attachment 2, these obstacles have been identified.

The area for recreation will be reduced significantly by the additional farm markers, and these obstacles will create an unsafe condition.

The DEM Boat Launch at the Quonnie Breachway is one of the only free deep water access points for the public. Quonnie Pond is not only used by the local residents but by hundreds if not thousands of others though out the year.

We must decide the future use of the ponds, Wildlife Conservation and Recreation for all or Aquaculture for a few.

9  
c

**Negative impact on Wildlife and Ecology** - The application indicates that the preferred method of harvesting is by dredging, using a bay scallop dredge with 1"-2" rebar teeth that is towed behind a boat. Dredging for Scallops, in the salt ponds, was outlawed years ago due to the devastating effect on the wildlife and ecology of the ponds. This technology outlawed for one application should not be allowed for another.





**From:** Phil Capaldi <philcapaldi@yahoo.com>  
**Sent:** Wednesday, December 20, 2017 8:30 PM  
**To:** cstaff1@crmc.ri.gov; council@crmc.ri.gov; dbeutel@crmc.ri.gov; jboyd@crmc.ri.gov; Lisa.Roccabello@dem.ri.gov; DEM.MarineFisheries@dem.ri.gov; Rayna.Maguire@dem.ri.gov  
**Subject:** Regarding File Number 2017-11-051 Application of East Beach Farms, LLC

***Before the Rhode Island Coastal Resources Management Council***

***In the Matter of East Beach Farms, LLC File Number 2017-11-051***

Dear Members of the Coastal Resource Management Council,

I am a writing to request a hearing regarding file number 2017-11-051 Application of East Beach Farms, LLC 141 Pine Hill Road Wakefield, RI 02879 (Owner/operator James Arnoux) in accordance with Administrative Procedures Act (Chapter 42-35 of Rhode Island General Laws)

I have reviewed the application and plans thoroughly, visited the proposed work site, and will cite the laws, mandates, and regulations that are in violation of the work proposed as specified in the CMRC's Coastal Resources Management Program - Red Book - Part 1.

Paper letters were sent as well to DEM's Wakefield office as suggested in the guidelines - postmarked Dec. 19th.

Sincerely,  
Phil Capaldi  
15 Baneberry Trail  
Saunderstown, RI 02874  
[philcapaldi@yahoo.com](mailto:philcapaldi@yahoo.com)  
401-413-3336

This request is in accordance with Section 1.5.1 (F) of Article 1.5 Notification and Review of Permit Applications within the CRMC Management Procedures 650-RICR-10-00-01 states "In the event that during this thirty (30) day period formal written objection and/or request for hearing is received by Coastal Resources Management Council from an interested party and said formal written objection and/or request for hearing is substantiated by genuine and material reason as outlined in Section 1.1.2 G of the RI CRMP therefore, the matter shall then become a contested case under the rules and regulations of the Council, whereupon a public hearing may be scheduled at a time immediately following the thirty (30) day objection period.

**Cc:**  
Arthur Ganz  
Richard Sartor  
Virginia Lee  
Julie Carroccia  
Denise Rhodes  
Bonnie Van Slyke  
Steven Williams  
Rosanna Cavanagh  
Janet Coit



December 20th, 2017

***Before the Rhode Island Coastal Resources Management Council***

***In the Matter of East Beach Farms, LLC File Number 2017-11-051***

Dear Members of the Coastal Resource Management Council,

I am a writing to request a hearing regarding file number 2017-11-051 Application of East Beach Farms, LLC 141 Pine Hill Road Wakefield, RI 02879 (Owner/operator James Arnoux) in accordance with Administrative Procedures Act (Chapter 42-35 of Rhode Island General Laws)

I have reviewed the application and plans thoroughly, visited the proposed work site, and will cite the laws, mandates, and regulations that are in violation of the work proposed as specified in the CMRC's Coastal Resources Management Program - Red Book - Part 1.

Sincerely,

Phil Capaldi

15 Baneberry Trail

Saunderstown, RI 02874

philcapaldi@yahoo.com

401-413-3336

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**Cc:**

Arthur Ganz

Richard Sartor

Virginia Lee

Julie Carroccia

Denise Rhodes

Bonnie Van Slyke

Steven Williams

Rosanna Cavanagh

Janet Coit

**Dave Beutel**

10c

**From:** Dave Beutel <dbeutel@crmc.ri.gov>  
**Sent:** Tuesday, December 26, 2017 11:08 AM  
**To:** 'Phil Capaldi'; 'cstaff1@crmc.ri.gov'; 'council@crmc.ri.gov'; 'jboyd@crmc.ri.gov'; 'Lisa.Roccabello@dem.ri.gov'; 'DEM.MarineFisheries@dem.ri.gov'; 'Rayna.Maguire@dem.ri.gov'  
**Subject:** RE: Regarding File Number 2017-11-051 Application of East Beach Farms, LLC

Dear Mr. Capaldi,

Please note that you have provided a request for a public hearing but you have not provided a substantive objection to trigger a public hearing. Please submit the reason for the public hearing request so the CRMC may determine whether or not it meets the criteria of substantive objection as found in the "Red Book" cited in your message. Thank you.

Sincerely,

David Beutel  
Coastal Resources Management Council  
Aquaculture Coordinator  
Oliver Stedman Government Center  
4808 Tower Hill Road  
Wakefield, RI 02879  
401-783-3370

---

**From:** Phil Capaldi [<mailto:philcapaldi@yahoo.com>]  
**Sent:** Wednesday, December 20, 2017 8:30 PM  
**To:** [cstaff1@crmc.ri.gov](mailto:cstaff1@crmc.ri.gov); [council@crmc.ri.gov](mailto:council@crmc.ri.gov); [dbeutel@crmc.ri.gov](mailto:dbeutel@crmc.ri.gov); [jboyd@crmc.ri.gov](mailto:jboyd@crmc.ri.gov); [Lisa.Roccabello@dem.ri.gov](mailto:Lisa.Roccabello@dem.ri.gov); [DEM.MarineFisheries@dem.ri.gov](mailto:DEM.MarineFisheries@dem.ri.gov); [Rayna.Maguire@dem.ri.gov](mailto:Rayna.Maguire@dem.ri.gov)  
**Subject:** Regarding File Number 2017-11-051 Application of East Beach Farms, LLC

***Before the Rhode Island Coastal Resources Management Council***

***In the Matter of East Beach Farms, LLC File Number 2017-11-051***

Dear Members of the Coastal Resource Management Council,

I am writing to request a hearing regarding file number 2017-11-051 Application of East Beach Farms, LLC 141 Pine Hill Road Wakefield, RI 02879 (Owner/operator James Arnoux) in accordance with Administrative Procedures Act (Chapter 42-35 of Rhode Island General Laws)

I have reviewed the application and plans thoroughly, visited the proposed work site, and will cite the laws, mandates, and regulations that are in violation of the work proposed as specified in the CMRC's Coastal Resources Management Program - Red Book - Part 1.

Paper letters were sent as well to DEM's Wakefield office as suggested in the guidelines - postmarked Dec. 19th.

Sincerely,  
Phil Capaldi  
15 Baneberry Trail

Saunderstown, RI 02874  
philcapaldi@yahoo.com  
401-413-3336

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**Cc:**

Arthur Ganz  
Richard Sartor  
Virginia Lee  
Julie Carroccia  
Denise Rhodes  
Bonnie Van Slyke  
Steven Williams  
Rosanna Cavanagh  
Janet Coit

104

*Before the Rhode Island Coastal Resources Management Council.*

*In the Matter of East Beach Farms, LLC File Number 2017-11-051*

Dear Members of the Coastal Resource Management Council,

I am a writing to request a hearing regarding file number 2017-11-051 Application of East Beach Farms, LLC 141 Pine Hill Road Wakefield, RI 02879 (Owner/operator James Arnoux) in accordance with Administrative Procedures Act (Chapter 42-35 of Rhode Island General Laws)

As stated in the APPLICATION FOR STATE ASSENT

Section 300.1.B Requirements:

- (1) **Demonstrate the need for the proposed activity:** *"The proposed expansion in Quonochontaug Pond is potentially less threatened in the long term by sea level rise, thereby helping me meet my goals for providing high-quality, sustainable oysters for our customers and creating a lasting family business to pass on to my family"*

**Objections:** Reference 1.1.4 Category B - G. Substantive Objections (formerly 110.3) c. 5 "scenic and/or recreation values.

Comments: I would like to leave a lasting, ecosystem with unique features and great scenic value to pass on to my family. I, just like East Beach Farms, LLC 141 Pine Hill Road Wakefield, RI, do not live in the Town of Charlestown. Please do not confuse my objections with a "not-in-my-backyard" position. Currently, East Beach Farms, LLC operates five leases in Ninigret Pond and one in Quonnie Pond totalling 13.97 acres. The proposed lease site has held recreational value for many people - both residents and non-residents. The proposed 6 acres is located relatively close to a large rock outcropping and a small island. The location has provided recreational anglers many opportunities to catch striped bass, bluefish, and snapper blues April through November. What assurances / memorandum of agreements are in place that this 6 acres will not be amended within the year to become a "floating rack" system without public notification thus eliminating this area to recreation?

- (3) **Describe the boundaries of the coastal waters and land areas anticipated to be affected:** *"or approximately 1000 feet northeast of the intersection of Sunset Drive and West Beach Road in the town of Charlestown"*

**Objections:** Reference 1.1.4 Category B - G. Substantive Objections (formerly 110.3) c. 7 public access to and along the shore.

Comments: Using DEM's Map site, these that current description places the lease in an area that members of the Sunset Drive Association and other homeowners recreationally shellfish. *The actual buoy markers for the site are more accurately represented by the diagram within the lease application.* For the record, I object to the description that places the site within the area at "1000 feet northeast of the intersection of Sunset Drive and West Beach Road". Conversations with residents also indicate a strong desire to keep impact to areas traditionally recreationally shellfished to a minimum. Many residents were unaware of the notification process regarding how to be included in the permit application. If using the description in the application, it would conflict with equitable access for all users. On a side note, there are currently 4 buoys south of Bill's Island marked only with "CRMC aquaculture". This area is accessible via walking at low tide from Quonochontaug Breachway as well as the Sunset Drive Association and Central Beach Association access on Sunset Drive. (see photographs)

JAN 02 2018

**(5) Impacts to the abundance and diversity of plant and animal life:** *“Eelgrass has not been historically mapped in the area of the proposed expansion, but has mapped out to the west towards the breachway channel entrance.”*

**Objections:** Reference 1.1.4 Category B - G. Substantive Objections (formerly 110.3) c.3 biological communities, including vegetation, shellfish and finfish resources, and wildlife habitat.

**Comments:** In addition, at easternmost point of the lease, small distinct beds of eelgrass were identified when investigated this past month (December) - and warrant further ground-truth data before proceeding.

As stated in the Tier 1 Mapping of Submerged Aquatic Vegetation (SAV) in the Rhode Island and 20 year Change Analysis. *“Ground-truthing in the field was conducted by boat or kayak between September and October 2016 (nine field days total). Observations of eelgrass wrack lines were also made as an indicator of the presence of an eelgrass bed in the area. SAV photo-signatures from true-color aerial photographs can be highly variable and flight specific, thus ground-truthing was conducted during the same year the photographs were taken. The presence of SAV was determined using an underwater video camera (SeaViewer, Inc). Not all polygons were ground-truthed this year.”*

**In the application for Assent (abstract section)**

*“Since the inception of the lease in 2014, there have been several new leases granted adjacent to my lease as well as several other entering the application process. After working diligently to begin farming this lease in isolation from other farms, I am now concerned about the effects of being surrounded by other leases. These effects are difficult to correlate directly to the addition of the adjacent farms, by my experience has shown that when multiple oyster farms are clustered together without a coordinated effort to maintain low stocking densities, there can be negative impacts on growth, meat condition, disease, and/or mortality rates. It is by interest to mitigate my concerns with an application that is located away from this developing cluster”*

As stated in **K. Aquaculture (formerly 300.11) 1. Policies a.** “The CRMC recognizes that commercial aquaculture is a viable means for supplementing the yields of marine fish and shellfish food products, and shall support commercial aquaculture in those locations where it can be accommodated among other uses of Rhode Island waters. The CRMC recognizes that responsible shellfish aquaculture has a net positive effect on the environment, and therefore it is permissible in all water types. As any human activity can have adverse environmental effects, the council recognizes the possibility of setting scientifically defensible limits on aquaculture leasing in any particular water body. The CRMC also recognizes that in the framework of adaptive management protocols, research into the ecology of coastal waters and our understanding of ecosystem carrying capacity is constantly evolving and improving.”

**Objections:** A. Category B Requirements (formerly 300.1) e. Demonstrate that the alteration or activity will not result in significant impacts on the abundance and diversity of plant and animal life, 3. Additional Category B. Requirements. (5) the cumulative impact of a particular aquaculture proposal in an area, in addition to other aquaculture operations already in place.

**Comments:** East Beach Farms, LLC states that that management of existing aquaculture leases in Quonochontaug Pond have negatively impacted his investment and potentially the native stocks that had been introduced in the areas of the initial lease. Why would the CRMC and the Town of Charlestown proceed with this lease application without reverting the initial lease to a non-viable aquaculture parcel? In addition, East Beach Farms, LLC is raising the issue regarding the limits on aquaculture in the proposal. The application itself should serve as the indicator that management protocols need to be improved.

107

Sincerely,

*Phil Capaldi*

Phil Capaldi  
15 Baneberry Trail  
Saunderstown, RI 02874  
philcapaldi@yahoo.com  
401-413-3336

This request is in accordance with Section 1.5.1 (F) of Article 1.5 Notification and Review of Permit Applications within the CRMC Management Procedures 650-RICR-10-00-01 states "In the event that during this thirty (30) day period formal written objection and/or request for hearing is received by Coastal Resources Management Council from an interested party and said formal written objection and/or request for hearing is substantiated by genuine and material reason as outlined in Section 1.1.2 G of the RI CRMP therefore, the matter shall then become a contested case under the rules and regulations of the Council, whereupon a public hearing may be scheduled at a time immediately following the thirty (30) day objection period.

Bill's Island Photos

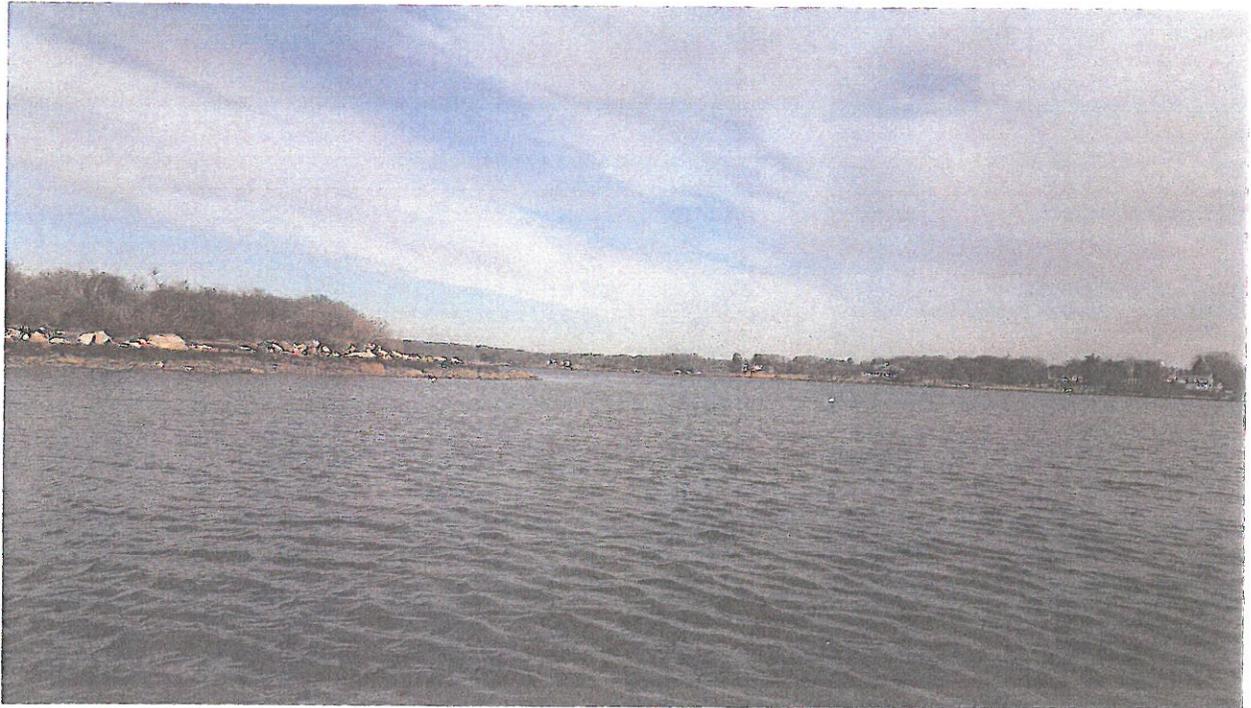
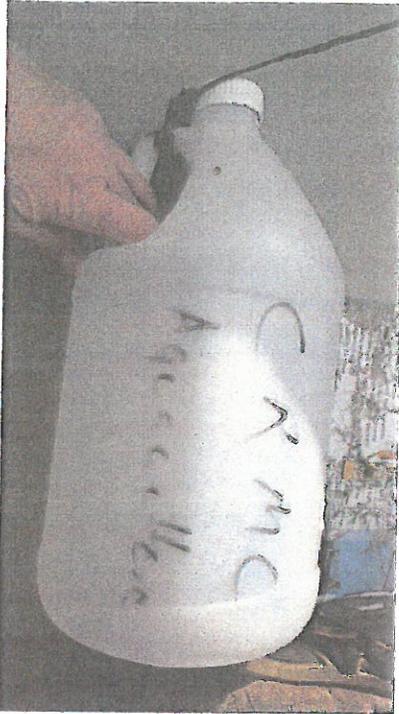


Bill's Island

Sunset Drive

JAN 02 2010

10g



10h





cstaff1@crmc.ri.gov

**From:** Phil Capaldi <philcapaldi@yahoo.com>  
**Sent:** Monday, January 22, 2018 8:15 PM  
**To:** lisa.roccabello@dem.ri.gov; council@crmc.ri.gov; cstaff1@crmc.ri.gov; Dave Beutel; dem.marinefisheries@dem.ri.gov; jboyd@crmc.ri.gov; Maguire Rayna (DEM)  
**Cc:** Virginia Lee; Janet Coit; RISAA Kayak Committee; Steve Medeiros; Salt Ponds Coalition; Julie A. Carroccia; Justin Vail; Mark Stankiewicz; mgreene@clf.org; e-info@clf.org; Todd Corayer  
**Subject:** RE: Regarding File Number 2017-11-051 Application of East Beach Farms, LLC  
**Attachments:** USPS com® USPS Tracking® Results.png

Dear Mr. Beutel,

On Dec 26th, you mentioned that I needed to send you specific objections to File Number 2017-11-051. (Quonochontaug Pond) Since I was unaware, based on all the documents that I have read by CRMC - that responding via email was the procedure/policy, I sent my objections certified mail that was received on Jan 2nd. (I have attached a pic of the notification that it was received)

R. Maguire, L. Roccabello, J Boyd, CRMC staff, J. McNamee also were sent U.S Certified Mail - my letter that listed the objections and the request for a hearing. Again - that was received on Jan 2nd.

I have not seen a document that states the objections need to be sent to the aquaculture permit list via email. I did see that multiple copies needed to be sent to CRMC - which is how I proceeded.

Is responding to the email list how the request for hearing process happens? If so - please provide a link to the documentation/state regulation that as such.

Finally, a public hearing is occurring on Jan 26th regarding a pending application involving seaweed, so it appears the turn around time is quicker than the original Dec 20th request for hearing regarding File Number 2017-11-051. Does CRMC have a response for my request for a hearing - or just ignoring the request?

Hearings are granted based on the merit of the objections, rather than the number of people who object correct?

Sincerely,

Phil Capaldi  
 15 Baneberry Trail  
 Saunderstown, RI 02874  
 401-413-3336

**Dave Beutel**

10j

**From:** Dave Beutel <dbeutel@crmc.ri.gov>  
**Sent:** Tuesday, January 23, 2018 11:30 AM  
**To:** 'Phil Capaldi'; 'lisa.roccabello@dem.ri.gov'; 'council@crmc.ri.gov'; 'cstaff1@crmc.ri.gov'; 'dem.marinefisheries@dem.ri.gov'; 'jboyd@crmc.ri.gov'; 'Maguire Rayna (DEM)'  
**Cc:** 'Virginia Lee'; 'Janet Coit'; 'RISAA Kayak Committee'; 'Steve Medeiros'; 'Salt Ponds Coalition'; 'Julie A. Carroccia'; 'Justin Vail'; 'Mark Stankiewicz'; 'mgreene@clf.org'; 'e-info@clf.org'; 'Todd Corayer'  
**Subject:** RE: RE: Regarding File Number 2017-11-051 Application of East Beach Farms, LLC  
**Attachments:** 2017 East Beach Farms.pdf

Please note that the outline of the site that is included in your correspondence is not the proposed lease area. The plastic buoys shown in the photographs are not for this application. Please look at the map in the attached application for the correct location.

David Beutel  
Coastal Resources Management Council  
Aquaculture Coordinator  
Oliver Stedman Government Center  
4808 Tower Hill Road  
Wakefield, RI 02879  
401-783-3370

---

**From:** Phil Capaldi [mailto:philcapaldi@yahoo.com]  
**Sent:** Tuesday, January 23, 2018 8:51 AM  
**To:** lisa.roccabello@dem.ri.gov; council@crmc.ri.gov; cstaff1@crmc.ri.gov; dem.marinefisheries@dem.ri.gov; jboyd@crmc.ri.gov; 'Maguire Rayna (DEM)'; Dave Beutel  
**Cc:** 'Virginia Lee'; 'Janet Coit'; 'RISAA Kayak Committee'; 'Steve Medeiros'; 'Salt Ponds Coalition'; 'Julie A. Carroccia'; 'Justin Vail'; 'Mark Stankiewicz'; mgreene@clf.org; e-info@clf.org; 'Todd Corayer'  
**Subject:** Re: RE: Regarding File Number 2017-11-051 Application of East Beach Farms, LLC

Mr. Beutel,

Attached you will find the objections - again. My apologies. Rest assured, legal council will continue to make certain my voice as a resident of Rhode Island is being heard.

Thank you for your public service.

In addition - I have enclosed it as a PDF file to pair with the mailings that were already sent to CRMC, Point of interest are the additional CRMC plastic bottle markers without permit number south of Bill's Island. The Weekapaug Foundation has been contacted regarding this as well.

Sincerely,  
Phil Capaldi  
15 Baneberry Trail  
401-413-3336

***Before the Rhode Island Coastal Resources Management Council.***

10K

## Dave Beutel

---

**From:** Dave Beutel <dbeutel@crmc.ri.gov>  
**Sent:** Thursday, February 08, 2018 8:51 AM  
**To:** Phil Capaldi (philcapaldi@yahoo.com)  
**Subject:** FW: [RISAA-Kayak] Not sure if you saw this - [1 Attachment]  
**Attachments:** RI Marine Fisheries Agenda - 2-7-18 (1).pdf

Phil,

Please don't malign CRMC inappropriately. The e-mail list comment below was unnecessary as it was not a CRMC meeting and we did not send any notice out because it was the RIMFC responsibility. You have received every notice that I have sent since you asked to be on the e-mail list.

Dave

David Beutel  
Coastal Resources Management Council  
Aquaculture Coordinator  
Oliver Stedman Government Center  
4808 Tower Hill Road  
Wakefield, RI 02879  
401-783-3370

---

**From:** Dave Beutel [<mailto:dbeutel@crmc.ri.gov>]  
**Sent:** Wednesday, February 07, 2018 8:12 AM  
**To:** Grover Fugate; Jeff Willis; Anthony DeSisto ([adlawllc@gmail.com](mailto:adlawllc@gmail.com))  
**Subject:** FW: [RISAA-Kayak] Not sure if you saw this - [1 Attachment]

FYI. Incorrect comments to RISAA kayak committee..

David Beutel  
Coastal Resources Management Council  
Aquaculture Coordinator  
Oliver Stedman Government Center  
4808 Tower Hill Road  
Wakefield, RI 02879  
401-783-3370

---

**From:** [RISAA-Kayak@yahoogroups.com](mailto:RISAA-Kayak@yahoogroups.com) [<mailto:RISAA-Kayak@yahoogroups.com>]  
**Sent:** Tuesday, February 06, 2018 8:59 PM  
**To:** Art Ganz; Mark Bullinger; Salt Ponds Coalition; Steve Medeiros; Mike Krul; Julie A. Carroccia; Virginia Lee; Martha Capaldi; Philip Shea; RISAA Kayak Committee; Annemarie Alberino; Onowr9  
**Subject:** [RISAA-Kayak] Not sure if you saw this - [1 Attachment]

Hello All,

My apologies for this last minute email. This notification just came to me by way of a NY resident - and summer resident of South Kingstown who lives on Segar Cove. I guess being a part of the CRMC email list on aquaculture permits excludes me from notification on this side. Strange!

Hope you can make it.

Phil Capaldi

[View attachments on the web](#)

Posted by: Phil Capaldi <[philcapaldi@yahoo.com](mailto:philcapaldi@yahoo.com)>

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The RISAA Kayak Committee  
**VISIT YOUR GROUP**



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From: Phil Capaldi [philcapaldi@yahoo.com]

Sent: Wednesday, February 21, 2018 10:20 PM

To: Janet Coit

Cc: Virginia Lee; Julie A. Carroccia; Denise Rhodes; Bonnie Van Slyke; Maguire Rayna (DEM)

Subject: Shellfish Advisory Council and the Process

Dear Mrs Coit,

My name is Phil Capaldi. I attended the public meeting on (2/7/18) regarding the aquaculture applications for Quonochontaug Pond and Potter's Pond. (#2017-11-051, #2017-11-061, #2017-11-086)

I have waited for the minutes to be posted on the state website - and realize that we are still within the 35 day window for posting the minutes - but this email can wait no longer. I am reaching out to you directly.

Since the original RI Marine Fisheries Council's email regarding the minutes for this meeting stated under "fine print", that the conversation would be limited to impact of the shellfishery, I attended to observe the process. It was an eye-opener.

Please understand. I am an advocate for shellfish and a champion of balance between societal impact and biological impact of aquaculture. I have recreationally quahogged and razor clammed since I was young in the salt ponds here in Rhode Island. I recreationally fish as well. I totally understand that shellfish grown in coastal waters. I remember getting scallops by the bushel in the late '70's in Quonnie Pond. I'm happy to see their resurgence too.

10M

I was amazed how Mr. Beutel could falsely represent the objections presented regarding these leases. Particularly, the Quonochontaug application. He stated that he had only one objection and it related to water-skiing markers. Why, if the focus of the panel was on the shellfish and finfish, would this be mentioned? More importantly, if my objection, one that is on file with CRMC before this meeting and within the public posting window, was not even mentioned as being the "second" objection. (That objection was sent certified mail to 4 individuals at CRMC. Nevertheless, Mr. Beutel chose not to mention it - or forgot. Be the effect was the same to the panel)

It was clear after the meeting that Mr. Beutel's influence is vast. I did introduce myself and call him on the Quonochontaug application. The question becomes - is it appropriate for an independent council that informs the Rhode Island Marine Fisheries Council to take information from the one organization that will ultimately grant or deny an aquaculture application and more specifically the aquaculture coordinator?

The objections, the calls for hearings, biological surveys and studies all seem to lead to one individual. But that is conjecture. With the help of lawyers, due process, APRA public records, and more courageous individuals with larger financial resources, the path and arc of the process will become transparent.

I would encourage your leadership to urge the committee to review all applications independently prior to discussing the impact- without influence of Mr. Beutel. How many Shellfish Advisory Panel meetings in the past has Mr. Beutel attended? What effect did that have to the process?

Finally, my goal in sending this email to you would be that you read this email - then listen to the DEM recorded minutes as an audio file (in its purest form) and make your own opinion and course of action.

1011

Many people invested their time and expertise to create the governance and policy procedures regarding the leasing of Rhode Island's state governed waters to have it undermined during the process.

I have included the members of the Charlestown Town Council for they have a stake in this procedural process as Ninigret Pond is reaching (or reached) its 5% state statute limit for aquaculture. I venture to guess that it will be increased to 10% with political advocacy for aquaculture and the fact that the shellfish growers own access to the pond at Lavin's Landing.

Let's all advocate for keeping Quonochontaug Pond a sanctuary before it is gone for recreational use forever.

Sincerely,

Phil Capaldi

15 Baneberry Trail

Saunderstown, RI 02874

401-413-3336

Cc. Members of the Charlestown Town Council



Coastal Resources Management Council  
 Oliver H. Stedman Government Center  
 4808 Tower Hill Road, Suite 3  
 Wakefield, RI 02879-1900

(401) 783-3370  
 Fax (401) 783-2069  
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**NOV 16 2017**  
 COASTAL RESOURCES  
 MANAGEMENT COUNCIL

**APPLICATION FOR STATE ASSENT**

To perform work regulated by the provisions of Chapter 279 of the Public Laws of 1971 Amended.

Applicant's Name: <u>EAST BEACH FARMS, LLC</u>	File No (CRMC use only):
Mailing Address: <u>141 PINE HILL ROAD</u>	Res. Tel. # <u>(401) 742-0817</u>
City/Town: <u>WAKEFIELD</u> State: <u>RI</u> Zip Code <u>02879</u>	Bus. Tel. # <u>(401) 742-0817</u>
Waterway: <u>QUONONCHATTUCK POND</u> Est. Project Cost \$ <u>100,000</u>	Fee/Costs: \$
Longitude/latitude of all corners of Proposed Aquaculture Project Location (preferably in decimal degrees):	
<u>71° 43' 0.98" / 41° 20' 39.05"</u>	<u>71° 42' 54.20" / 71° 42' 51.19"</u>
<u>71° 42' 57.98" / 41° 20' 35.42"</u>	<u>41° 20' 42.23" / 41° 20' 38.61"</u>

Have you or any previous owner filed an application for and/or received an assent for any activity on this site? (If so please provide the file and/or assent numbers).

Is this application being submitted in response to a coastal violation?

Yes \_\_\_\_\_ No

If yes, you must indicate NOV or C&D Number \_\_\_\_\_

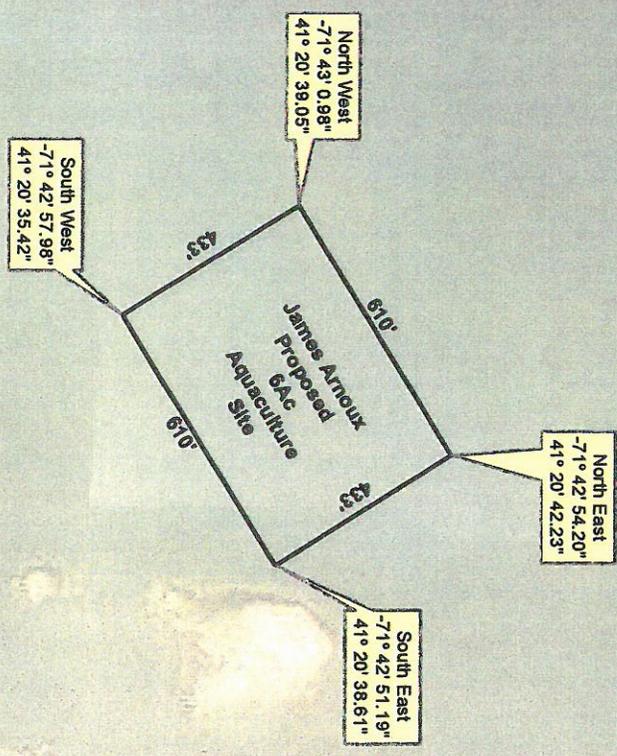
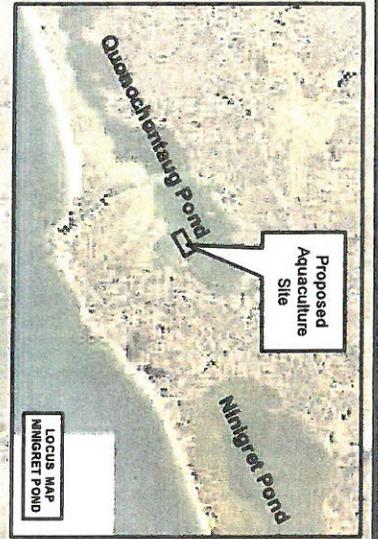
Is this site within a designated historic district? NO

\_\_\_\_\_  
 Owner's Signature (sign and print)

**STORMTOOLS (<http://www.beachsamp.org/resources/stormtools/>) is a planning tool to help applicants evaluate the impacts of sea level rise and storm surge on their projects. The Council encourages applicants to use STORMTOOLS to help them understand the risk that may be present at their site and make appropriate adjustments to the project design.**

NOTE: The applicant acknowledges by evidence of their signature that they have reviewed the Rhode Island Coastal Resources Management Program, and have, where possible, adhered to the policies and standards of the program. Where variances or special exceptions are requested by the applicant, the applicant will be prepared to meet and present testimony on the criteria and burdens of proof for each of these relief provisions. The applicant also acknowledges by evidence of their signature that to the best of their knowledge the information contained in the application is true and valid. If the information provided to the CRMC for this review is inaccurate or did not reveal all necessary information or data, then the permit granted under this application may be found to be null and void. Applicant requires that as a condition to the granting of this assent, members of the CRMC or its staff shall have access to the applicant's property to make on-site inspections to insure compliance with the assent. This application is made under oath and subject to the penalties of perjury. 01/17

PLEASE REVIEW REVERSE SIDE OF APPLICATION FORM



RECEIVED  
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 COASTAL RESOURCES  
 MANAGEMENT COUNCIL

PROPOSED  
 AQUACULTURE SITES  
 JAMES ARNOUX  
 QUONOCHONTAUG POND



East Beach Farms, LLC (owned and operated by James Arnoux) currently holds a 3.3 acre commercial aquaculture lease in the northeastern corner of Quonochontaug Pond. The lease was originally approved by CRMC as a commercial viability site on May 28, 2013. Approximately 10,000 oyster seed were planted in two cages on July 30, 2013. The site met expectations as a commercially viable site and in 2014 a full commercial lease application was submitted and approved by CRMC. In 2016, an expansion was granted to increase the size of the lease by approximately 2.5 acres utilizing bottom culture methods.

The first season of bottom culture was moderately successful despite the presence of a harmful algae bloom that occurred for a substantial part of the summer and fall. The 2.5 acre expansion was planted to near capacity and has been harvested and replanted this year.

Since the inception of the lease in 2014, there have been new several new leases granted adjacent to my lease as well as several others entering the application process. After working diligently to begin farming this lease in isolation from other farms, I am now concerned about the effects of being surrounded by other leases. These effects are difficult to correlate directly to the addition of adjacent farms, but my experience has shown that when multiple oyster farms are clustered together without a coordinated effort to maintain low stocking densities, there can be negative impacts on growth, meat condition, disease, and/or mortality rates. It is in my interest to mitigate my concerns with an application that is located away from this developing cluster.

Therefore, I am submitting this application to request a 6 acre bottom culture site for oysters to the south of the current lease and to the northeast of Bill's Island. I believe this is the lowest impact method and location to maintain a lease that would mitigate these potential impacts.

Harvesting would be accomplished by hand sorting oysters caught by bullraking, dredging, and/or diving. The dredge used is a small bay scallop dredge with 1" - 2" rebar teeth that is towed behind the work boat. This style dredge is used on several other leases in RI with success. As a member of the Ocean State Shellfish Cooperative, all oysters will be sold to the Cooperative where they are shipped weekly to regional and national distributors, several of which are located in Rhode Island.



Access for site maintenance will be accomplished aboard a 22' pontoon boat kept on a permitted mooring. When harvesting, oysters will be delivered to the Ocean State Shellfish Cooperative refrigerated truck at the Quonochontaug Breachway parking lot, typically once per week on Monday or Wednesday. This offloading takes 5-10 minutes maximum and is often a good opportunity to explain to members of the public about aquaculture activities in the pond. All work would be performed within the lease area aboard the work vessel of at the existing lease. Harvest at this site would be conducted almost entirely between the months of November - June while vessel traffic in the pond and car traffic at the Breachway parking lot is relatively minimal. The breachway parking lot would not be used for offloading harvests during the months of peak usage (June - August).

The proposed work hours at the site would be as follows:

November 1-Close of waterfowl season annually (~January 20<sup>th</sup>): 10am-2pm with dredging permitted no more than 1 day/week (this period is during the open waterfowl season).

Close of waterfowl season ~January 20-April 1: 8am-4pm, no more than 2 days/week,

Close of waterfowl season ~January 20-April 1: 10am-2pm on the remaining 5 days/week from the provided that no dredging occurs on these additional days.

April 1 - October 31: No restrictions, although harvest activities would be limited during the summer months and would avoid weekends to the maximum extent possible.

These hours were developed at the request of RI DEM Fish & Wildlife Staff. Staff has insisted that my farm activities will cause unacceptable disturbances to waterfowl if conducted more frequently than proposed. If this application is approved, I strongly suggest that Staff observe and research these effects while I am working the site. Should it be found that the actual level of disturbance or displacement of waterfowl due to the farm activity is insignificant, I would seek to submit an assent modification to expand these hours of operation in the future for the period between the close of waterfowl season to April 1st.



SECTION 300.1 B Requirements:

(1) *Demonstrate the need for the proposed activity:* The proposed lease site is sought primarily to both preserve and increase current production by utilizing bottom culture techniques. Demand for our sustainable farmed oysters continues to outstrip our ability to produce them. Bottom culture methods provide a lower-impact way to increase production in the salt ponds where user conflicts (both actual and perceived) have increased as the industry grows.

Additionally, coastal flooding risks posed by hurricanes and sea-level rise may someday threaten the leases held by the company behind East Beach in Ninigret Pond. The proposed expansion in Quonochontaug Pond is potentially less threatened in the long-term by sea level rise, thereby helping me meet my goals of providing high-quality, sustainable oysters for our customers and creating a lasting family business to pass on to my family.

(2) *Demonstrate all local building codes and local ordinances will be met:* No land-based or non-tidal activities will be used in conjunction with the proposed lease that would violate local codes. The mooring used is a permitted mooring. All other activities involved in the operation of the lease are based out of Ninigret Landing Marina in Charlestown which is zoned for commercial use.

(3) *Describe the boundaries of the coastal waters and land areas anticipated to be affected:* The proposed lease will be to the northeast of Bills Island in Quonochontaug Pond, or approximately 1000 feet northeast of the intersection of Sunset Drive and West Beach Road in the town of Charlestown. The CRMC classification for the waters is Type II (Low Intensity Use), as is all of Quonochontaug Pond. The adjacent shoreline of Bills Island is unoccupied, and preserved (to my knowledge) by the Weekapaug Foundation. There is a Town of Charlestown mooring field located to the southeast of the proposed expansion. Bottom culture of oysters and harvest activities will not impede or prevent access to these moorings.

(4) *Impacts to erosion and/or deposition processes:* Oysters planted as bottom culture are dispersed widely (roughly 10 -12 animals per square meter) and will not alter these processes.

(5) *Impacts to the abundance and diversity of plant and animal life:* Shellfish aquaculture has been proven to enhance marine habitat and diversity in the area it occupies. Eelgrass has not been historically mapped in area of the proposed expansion, but has been mapped to the west towards the breachway channel entrance. As part of the leasing process, eelgrass surveys will be conducted in the areas proposed for expansion if required by CRMC. Noise impacts will be limited to hand labor and a small four-stroke outboard motor run at low RPM's, which should not cause significant or long-term adverse impacts to wildlife.

(6) *Demonstrate that the alteration will not unreasonably interfere with, impair, or significantly impact existing public access to, or use of tidal waters and/or the shore:* The proposed site has been chosen for a variety of reasons, including impacts to the use of tidal waters. I have



observed occasional water skiing and tubing near the proposed lease area during the summer months. However, harvest will be conducted infrequently or not at all in the summer, nor does the presence of the four corner marker buoys prevent this activity from continuing in the future. If allowed by CRMC, I can remove the corner buoys during the months of July and August to reduce interference with boating activity as well.

Recreational shellfishing frequently occurs in the shallows adjacent to Bill's Island, but primarily on the south side of the island, not the north side nearer to the proposed lease. In either case, the depth of the proposed lease precludes typical recreational harvesting.

Harvesting activities consist of anchoring with a bullrake or slowly towing a small dredge through the lease. The proposed operation plan calls for harvest to take place between November and June when recreational activity is virtually non-existent. Should harvest be required outside of these months, it would be limited to weekdays only. However, the goal is to let the animals grow undisturbed during the summer and early fall months.

(7) *Impacts to water circulation, flushing, turbidity, and sedimentation:* Bottom culture will not significantly impact any of these processes, as the oysters tend to settle into the sediment slightly and stay two-dimensional.

(8) *Demonstrate that there will be no significant deterioration of water quality in the immediate vicinity:* Shellfish aquaculture has been proven to increase water quality due to the filtering action of shellfish. The site will be accessed using a 22' pontoon boat equipped with a small four stroke engine with all labor performed by hand.

(9) *Demonstrate that the activity will not result in significant impacts to areas of historic or archaeological significance:* There are no known historic or archaeological resources within the proposed site. If any were discovered, the presence of oysters on the bottom will not disturb objects. Harvesting is accomplished with small-scale tools and scrapes the oysters off bottom with impacts no greater than the disturbance from typical storms.

(10) *Demonstrate the activity will not result in significant conflicts with water-dependent uses:* The proposed site was chosen in part due to the distance from known areas of heavy recreational use. Fishing, swimming, watersports, and kayaking will not be restricted by the presence of shellfish grown on the bottom. I have not witnessed any commercial shellfish harvesting or other commercial harvesting activities in the proposed lease area for the past three years.

(11) *Demonstrate that measures have been taken to minimize adverse scenic impacts:* The proposed expansion of the lease will utilize bottom culture methods which will result in no scenic impacts other than the required four corner buoys.

OPERATIONAL PLAN FOR PROPOSED SITE:



1. *Name and address:* James Arnoux - Owner, East Beach Farms, LLC, 141 Pine Hill Road, South Kingstown, RI 02879
2. *CRMC lease #:* Not assigned yet
3. *Aquaculture Permit:* DEM Aquaculture License #056
4. *Type of facility:* Commercial shellfish aquaculture lease site utilizing bottom culture methods.
5. *Location:* The proposed lease site is located in southeast corner of Quonochontaug Pond, Charlestown, RI.
6. *Species cultured:* Eastern oysters (*Crassostrea virginica*) to be grown at facility. Seed is either to be transferred from CRMC lease #2014-01-007 in Quonochontaug Pond or from CRMC permitted leases located in Ninigret Pond and/or purchased from approved source(s) pending pathology certifications and permission from the Biosecurity Board. Current hatcheries and farms used to supply seed for the site include Fishers Island Oyster Farm (NY), Oyster Seed Holdings (VA), Mook Sea Farm (ME), and Ocean State Shellfish Hatchery (RI). The majority of the oysters planted from the site will come from the lease #2014-01-007 located in Quonochontaug Pond.
7. *Structures used at facility:* No structures used.
8. *Lease markers:* Four 12" round white buoys with 3" CRMC lease numbers weighted with 100 lb. mooring anchors are to be used to mark the lease corners. These may be removed during July and August to reduce interference with boat traffic.
9. *DEM Water Classification:* Proposed lease area is located in approved waters.
10. *Contamination Prevention:* All fueling will be done prior to launching using approved portable containers. Temperature control of shellstock is to be achieved by storing market ready oysters in wire trays at nearby lease #2014-01-007 after culling. After a minimum of seven days holding time in trays, oysters are loaded into totes and/or vats with ice prior to departure from the lease, shaded, and immediate pick-up of shellstock within 1 hour of removal from water by the Ocean State Shellfish Cooperative refrigerated truck (of which East Beach Farms is a member of). During the months outside of the vibrio control plan, the same procedure is followed except for discontinuation of ice for November - April.
11. *Methods to transition shellfish through growth:* Shellfish will be grown out to approximately 1.5" - 2.0" in shell height at other lease sites and then manually spread out on the bottom for a minimum of 3-6 months before harvest. Harvesting will be performed by hand sorting the catch from bullraking, dredging, or diving.



12. *Record keeping*: Records are maintained weekly at each currently held lease using a spreadsheet application. Each trawl of cages or line of trays is given a unique designated number (i.e A1, A2, B1, B2, etc.) to form a basic grid system. The following information is recorded each time the particular line of gear is hauled: hatchery where seed originated from, size grade, and date last hauled. For any seed originating from uncertified waters, the notes shall include an asterisk and the month/year the seed was planted in certified waters on the lease (example: Row A1 = Muscongus 5/12\* 1" grade, hauled 7/01/12).

When seed is transferred to the proposed site, a GPS will be used to create track lines of the oysters that are planted. Each track can be named by planting date.

A handwritten logbook is also kept aboard the work vessel as a back-up to record the original planting dates.

13. *Record keeping for seed purchased outside of RI*: Any out-of-state seed purchases are made only after the approval of the Biosecurity Board pending disease certifications from the relevant hatchery. Record keeping for seed purchases is outlined above in item #12.

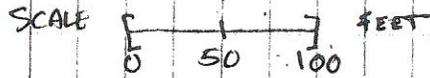
14. *Seed in upwellers located in prohibited waters*: No upwellers located in prohibited waters will be used in conjunction with this lease.

15. N/A at this time, seed is purchased from approved waters. If seed is purchased from prohibited waters in the future, record keeping practices will continue as described in item 12, and the operational plan shall be updated and resubmitted. Additional measures would include marking GPS tracks that corresponds to the record keeping log (i.e. A1, A2, etc.).

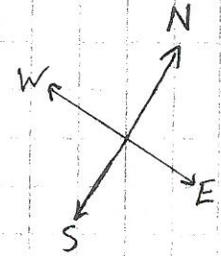


APPLICANT: EAST BEACH FARMS, LLC / JAMES ARNOUX

DATE: 11/16/2017

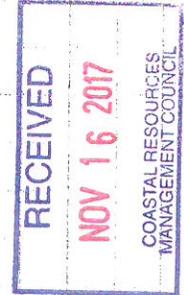
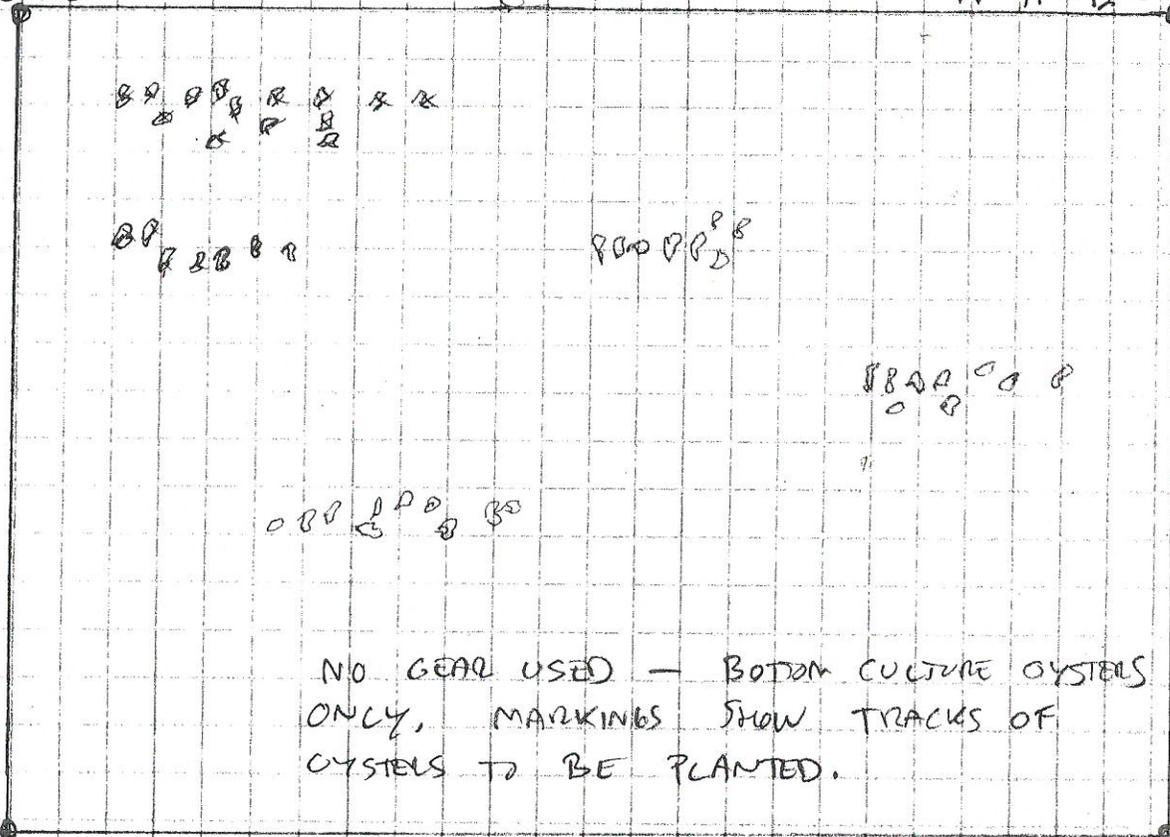


PLAN VIEW OF PROPOSED GEAR LAYOUT



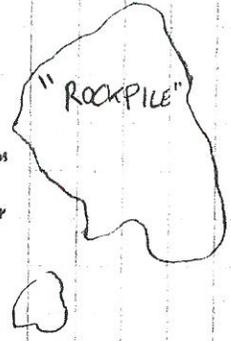
N 41°20'39.05"  
W 71°43'0.98"

N 41°20'38.61"  
W 71°42'54.20"



N 41°20'35.42"  
W 71°42'57.98"

N 41°20'38.61"  
W 71°42'51.19"

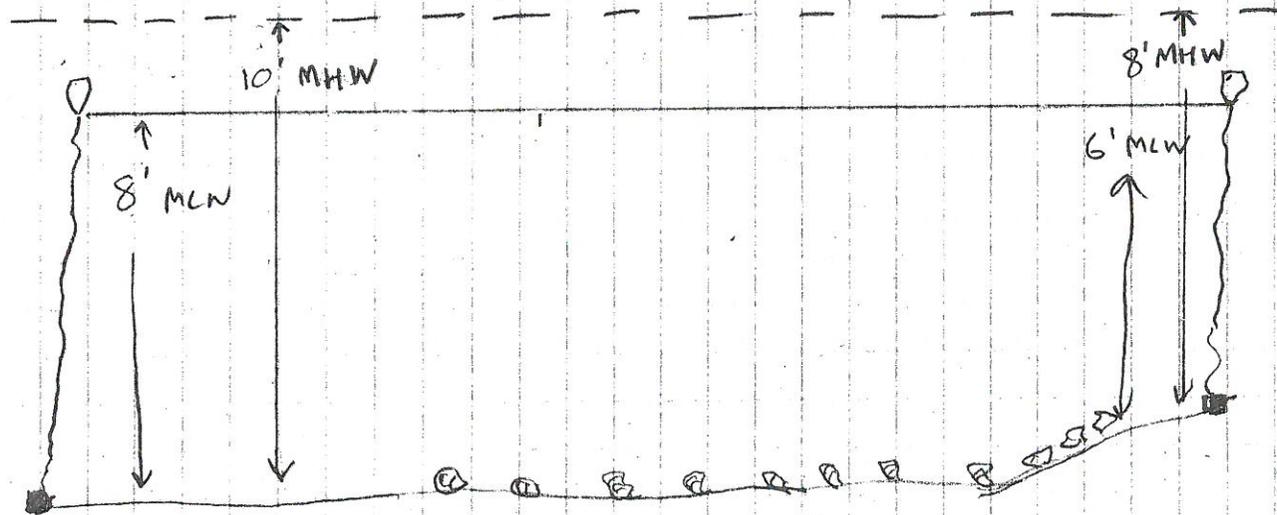
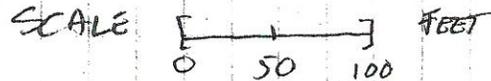


APPLICANT: EAST BEACH FARMS, LLC / JAMES ARNOUX

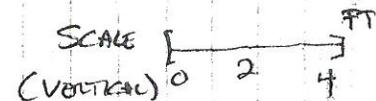
DATE: 11/16/2017

CROSS-SECTION VIEW OF PROPOSED LEASE

(HORIZONTAL)



OYSTERS PLANTED DIRECTLY  
ON BOTTOM - NO GEAR EXCEPT FOR  
MANDATED CORNER MARKER BUOYS





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11/20/17



State of Rhode Island and Providence Plantations  
Coastal Resources Management Council  
Oliver H. Stedman Government Center  
4808 Tower Hill Road, Suite 3  
Wakefield, RI 02879-1900

(401) 783-3370  
Fax (401) 783-2069

**PUBLIC NOTICE**

File Number: 2017-11-051

Date: November 20, 2017

This office has under consideration the application of:

East Beach Farms, LLC  
141 Pine Hill Road  
Wakefield, RI 02879

for a State of Rhode Island Assent to create and maintain: a six acre oyster farm using the bottom plant method (no gear) in Quonochontaug Pond. Please see the attached map.

Project Location:	Quonochontaug Pond
City/Town:	Charlestown
Waterway:	Quonochontaug Pond

Plans of the proposed work may be seen at the CRMC office in Wakefield.

In accordance with the Administrative Procedures Act (Chapter 42-35 of the Rhode Island General Laws) you may request a hearing on this matter.

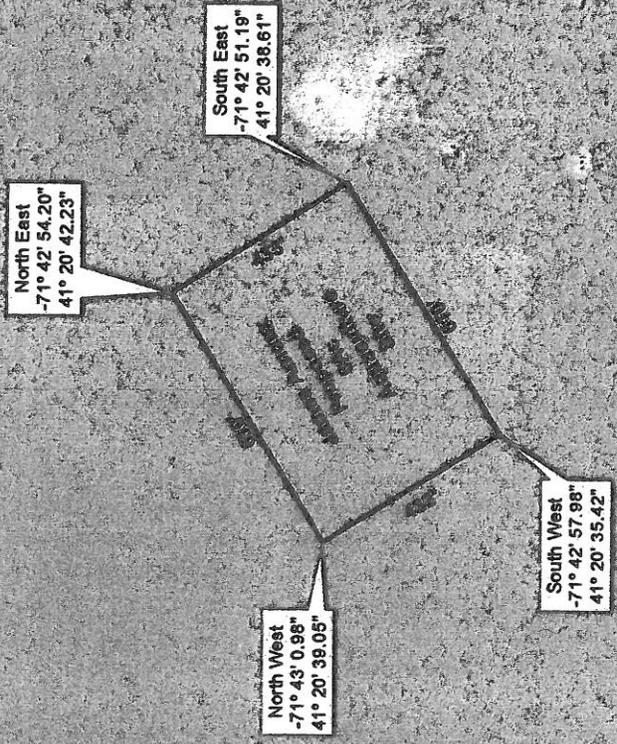
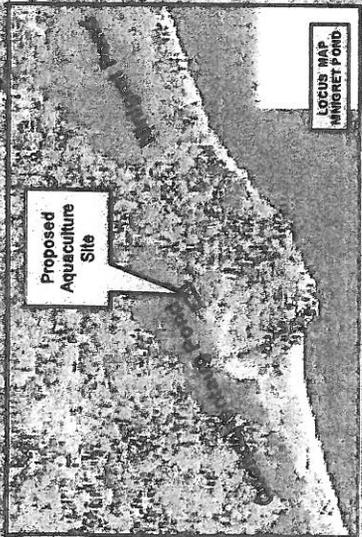
You are advised that if you have good reason to enter protests against the proposed work it is your privilege to do so. It is expected that objectors will review the application and plans thoroughly, visit site of proposed work if necessary, to familiarize themselves with the conditions and cite what law or laws, if any, would in their opinion be violated by the work proposed.

If you desire to protest, you must attend the scheduled hearing and give sworn testimony. A notice of the time and place of such hearing will be furnished you as soon as possible after receipt of your request for hearing. If you desire to request a hearing, to receive consideration, it should be in writing (with your correct mailing address, e-mail address and valid contact number) and be received at this office on or before December 21, 2017.

/lat

**PROPOSED  
AQUACULTURE SITES  
JAMES ARNOUX  
QUONOCHONTAUG POND**

RECEIVED  
NOV 16 2017





# CRMC DECISION WORKSHEET

File No. 2018-02-025

Brown University

Hearing Date:	
Approved as Recommended	
Approved w/additional Stipulations	
Approved but Modified	
Denied	Vote

APPLICATION INFORMATION						
File Number	Town	Project Location		Category	Special Exception	Variance
2018-02-025	Providence	Marston Boat House 250 India Street Providence		<b>B</b>	<input type="checkbox"/>	<input type="checkbox"/>
		Plat	Lot			
		<b>Owner Name and Address</b>				
Date Accepted	2/13/2018	Brown University Department of Facilities Mgmt. Box 1941, 295 Loyd Ave. Providence, RI 02912		Work at or Below MHW		<input checked="" type="checkbox"/>
Date Completed	4/18/2018			Lease Required		<input type="checkbox"/>

## PROJECT DESCRIPTION

Construct 139 linear feet of new replacement bulkhead along the immediate seaward edge of the existing bulkhead, maintain 80 linear feet of existing riprap revetment by removing remnant pilings and debris and add additional stone to repair the revetment slope; renovate and expand the existing timber pier from 3,161sq. ft. to 3,512 sq. ft., install a new 30 ft. x 30 ft. ramp, shift the existing 16 ft. x 120 ft. terminal float seaward by approximately 25 and add a new 16 ft. x 15 ft. float to the south end of the relocated terminal float, add a new 8 ft. x 70 ft. float and 8 ft. x 55 ft. float on the landward side of the terminal float to be connected to the expanded timber pier by two 3 ft. x 25 ft. gangways (one for each new float).

## KEY PROGRAMMATIC ISSUES

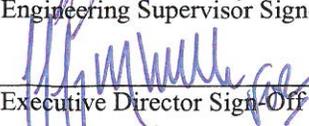
**Coastal Feature(s)** Manmade shoreline – revetment, bulkhead  
**Water Type** Type 4 Seekonk River  
**CRMP** 1.1.6(E), 1.2.1(D), 1.2.2.(F), 1.3.1(C), 1.3.1(G), 1.3.1(N), 1.3.6  
**SAMP** N/A

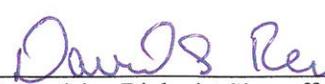
**Variations and/or Special Exception Details:** None

**Additional Comments and/or Council Requirements:** See Staff Reports

## STAFF RECOMMENDATION(S)

Biologist DR Recommendation: Approve  
 Engineer DG Recommendation: Approve

  
 Engineering Supervisor Sign-Off \_\_\_\_\_ date \_\_\_\_\_  
  
 Executive Director Sign-Off \_\_\_\_\_ date 4/19/2018

  
 Supervising Biologist Sign-off \_\_\_\_\_ date 4/19/18  
  
 Staff Sign off on Hearing Packet (Eng/Bio) \_\_\_\_\_ date 4/26/18

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
COASTAL RESOURCES MANAGEMENT COUNCIL  
STAFF BIOLOGIST'S REPORT

TO: Grover J. Fugate  
DEPT: CRMC Executive Director  
FROM: David S. Reis  
DEPT: CRMC Biology Section

DATE: April 18, 2018  
PAGE: 1 of 2

RE: CRMC File No. 2018-02-025

**Applicant's Name:** Brown University

**Project:** Construct 139 linear feet of new replacement bulkhead along the immediate seaward edge of the existing bulkhead, maintain 80 linear feet of existing riprap revetment by removing remnant pilings and debris and add additional stone to repair the revetment slope; renovate and expand the existing timber pier from 3,161sq. ft. to 3,512 sq. ft., install a new 30 ft. x 30 ft. ramp, shift the existing 16 ft. x 120 ft. terminal float seaward by approximately 25 and add a new 16 ft. x 15 ft. float to the south end of the relocated terminal float, add a new 8 ft. x 70 ft. float and 8 ft. x 55 ft. float on the landward side of the terminal float to be connected to the expanded timber pier by two 3 ft. x 25 ft. gangways (one for each new float).

**Location:** 250 India Street, Providence

**Water Type/Name:** Type 4, Multipurpose Waters, Seekonk River

**Coastal Feature:** Manmade shoreline – bulkhead, riprap revetment

A. **Staff Analysis:** The proposed project consists of manmade shoreline maintenance activities including reconstruction of an existing riprap revetment and installation of a new bulkhead along the immediate seaward face of an existing bulkhead (see CRMC Staff Engineer's report). The existing pier facility will also be repaired and maintained. In addition, proposed improvements to the facility include:

- Expansion of the existing timber pier (by 351 s.f.)
- Install a new 30' x 30' ramp which will shift the existing terminal float 25' seaward.
- Add a 240 s.f. float addition to the south side of the terminal float.
- Add two new floating docks with gangways on the inboard side of the terminal float.

The application narrative for this work states the **University's Rowing Program** has expanded significantly and the waterfront infrastructure has not kept pace with the program's needs. The University specifically notes that limited space requires coach boats to raft alongside each other resulting in the need to climb across multiple boats to reach the outmost vessel. (See application narrative for additional detail.)

Due to the existing developed nature of the shoreline in this area, the proposed work does not raise any significant biological concerns. Further, due to the "tucked-in-close-to-shore" location of the existing facility and the limited seaward expansion proposed (25'), there does not appear to be any impact on navigation or other uses of tidal waters.

Signed: \_\_\_\_\_

*David S. Reis*

Supervising Environmental Scientist

Pursuant to RICRMP Section 1.3.6, commercial redevelopment projects and marina expansions require the submission of a "public access plan". The applicant originally submitted a variance request (to not provide public access) due to limited space and security concerns. However, since the submission of the application, CRMC Staff have worked with the University and City of Providence to develop an off-site public access improvement plan as allowed by RICRMP Section 1.3.6.D.3. The improvement plan now proposed is to relocate and repair an existing public walkway which has been damaged by tidal erosion at India Point Park which occurs just south of the project site. Letters of support/agreement from both the City and the university are included in the Council's agenda packet.

The University has submitted RICRMP Section 1.3.1(A) (Category B requirements – formerly 300.1). CRMC staff review of these responses indicates they have been adequately addressed and, on this basis, there are no staff objections or concerns. (See staff engineer's report regarding seaward "expansion" of the shoreline bulkhead.)

The project was put out to public notice on March 9, 2018 and the notice expired April 9, 2018. No public comments were received. At the time of this report writing, comments were outstanding from the Historical Preservation and Heritage Commission (HPHC). CRMC Staff will work with HPHC to obtain their comments prior to the Council hearing on this matter.

**B. Recommendations:** There are no environmental objections to this application, and on that basis the staff environmental scientist recommends approval of the application subject to the following stipulations:

- 1. Public access compensation:** As proposed, Brown University shall work with the City of Providence by providing a contribution for relocation of the public walkway at India Point Park. Brown University shall inform the CRMC in writing when this contribution is provided and when the actual work to relocate the walkway is completed.
- 2. Piling removal:** As proposed, all remnant/abandoned pilings and debris in the vicinity of the riprap revetment to be repaired shall be removed from tidal waters and properly disposed of at an off-site location. If creosote treated pilings are encountered, such pilings shall be disposed of at a facility authorized to dispose of such waste in accordance with applicable RI waste management rules.

Signed: \_\_\_\_\_

*David S. Poirer*

Supervising Environmental Scientist

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
COASTAL RESOURCES MANAGEMENT COUNCIL  
ENGINEERING REVIEW**

TO: Grover J. Fugate, Executive Director  
DEPT: Coastal Resources Management Council  
FROM: Danni Goulet, PE  
DEPT: CRMC Engineering Section

Date: April 19, 2018

SUBJ: **CRMC File No.:** A2018-02-025

**Owner:** Brown University

**Site Address:** 250 India Street Plat: 17 Lot: 54

**Site Town:** Providence

**Water Type/Name:** Type 4, Multipurpose Waters

**Coastal Feature:** Manmade Shoreline

**Project:** Brown University – Marston Boathouse

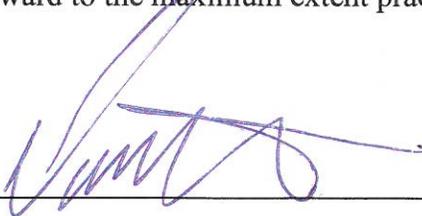
Construct 139 linear feet of new replacement bulkhead along the immediate seaward edge of the existing bulkhead, maintain 80 linear feet of existing riprap revetment by removing remnant pilings and debris and add additional stone to repair the revetment slope; renovate and expand the existing timber pier from 3,161sq. ft. to 3,512 sq. ft., install a new 30 ft. x 30 ft. ramp, shift the existing 16 ft. x 120 ft. terminal float seaward by approximately 25 and add a new 16 ft. x 15 ft. float to the south end of the relocated terminal float, add a new 8 ft. x 70 ft. float and 8 ft. x 55 ft. float on the landward side of the terminal float to be connected to the expanded timber pier by two 3 ft. x 25 ft. gangways (one for each new float).

This report is limited to the engineering issues related to the replacement bulkhead.

**Staff Comments:** The replacement bulkhead which is proposed to be 139 feet long and installed 18 inches from the existing bulkhead is located in front of the existing building which is not directly behind the wall. The existing wall and building essentially form a capitol letter A with the northern end the top of the letter which is also where the property line is located. This northern area has significant damage with the tie-back wale failed and on the ground in front of the wall along with a void between the sheetpile wall and the concrete return that extends west along the property line. This void allows fill from behind the wall to be pulled out by the tides and cause sink holes in front of the building. At this northern end there are existing decks that overhang the bulkhead and will make the sheetpile installation in this area challenging.

The proposed work would qualify as a maintenance project if it were not part of a larger Category B project so long as the proposal met the RICRMP Section 1.3.1(G)6 requirement that “to the maximum extent practical there shall be no farther seaward expansion of structural shoreline protection facilities as a result of repair of maintenance activities”. It is the opinion of the staff engineer that proposed repair meets the RICRMP standard that the maintenance activity is no further seaward to the maximum extent practical for this location.

Signed \_\_\_\_\_



Staff Engineer



April 10, 2018

Mr. David Reis  
RI Coastal Resources Management Council  
4808 Tower Hill Road, Suite 3  
Wakefield, RI 02879

RE: Marston Boathouse Waterfront Improvements  
250 India Street, Providence, RI

Dear Mr. Reis:

In order to comply with the CRMC public access requirement for the Brown University dock reconstruction project, Brown will assist the Providence Parks Department with a project to relocate a section of walkway in the India Point Park. Encroaching SLR/tidal inundation damaged the walkway and the adjacent seawall. The walkway relocation will accommodate continued and enhanced public access and allow reconstruction of the adjacent seawall section.

Brown University and the City of Providence have reached an agreement as described in the attached Parks Department letter. The Parks Department is in the process of the final stage of design/engineering and permitting for this project, and will be going out to bid once all requisite approvals have been received.

Sincerely,

Michael Guglielmo, Jr.  
Vice President for Facilities Management

Attachment

cc: Mr. Dan Goulet, CRMC



WENDY NILSSON  
Superintendent of Public Parks



JORGE O. ELORZA  
Mayor

CITY OF PROVIDENCE  
PARKS DEPARTMENT

April 5, 2018

Courtney McCracken, PE  
Project Manager  
Brown University, Department of Facilities Management  
401-228-5790  
Providence, RI 02903

Dear Courtney,

I am writing to express my gratitude for Brown University's contribution toward the India Point Park walkway relocation in connection with CRMC issuing a permit for the University's Boathouse dock reconstruction project.

As you know, the walkway project is a vital component of the India Point Park seawall restoration project. We are in the process of proceeding to the final stage of design/engineering and permitting for this project, and will be going out to bid once all requisite approvals have been received.

Please let me know if you need any additional information. I am looking forward to seeing you at the ribbon cutting for this project once completed!

Sincerely,

A handwritten signature in black ink, appearing to read "Wendy Nilsson".

Wendy Nilsson  
Superintendent





Oliver Stedman Government Center  
 4808 Tower Hill Road; Suite 116  
 Wakefield, RI 02879  
 401-783-3370

**PUBLIC NOTICE**

File Number: 2018-02-025

Date: March 9, 2018

This office has under consideration the application of: **Brown University**, Department of Facilities Management, Box 1941, 295 Lloyd Avenue, Providence, RI 02912

for a State of Rhode Island Assent to:

**Construct 139 linear feet of new replacement bulkhead along the immediate seaward edge of the existing bulkhead, maintain 80 linear feet of existing riprap revetment by removing remnant pilings and debris and add additional stone to repair the revetment slope; renovate and expand the existing timber pier from 3,161sq. ft. to 3,512 sq. ft., install a new 30 ft. x 30 ft. ramp, shift the existing 16 ft. x 120 ft. terminal float seaward by approximately 25 and add a new 16 ft. x 15 ft. float to the south end of the relocated terminal float, add a new 8 ft. x 70 ft. float and 8 ft. x 55 ft. float on the landward side of the terminal float to be connected to the expanded timber pier by two 3 ft. x 25 ft. gangways (one for each new float). Modify the structural perimeter limit to accommodate the expanded facility.**

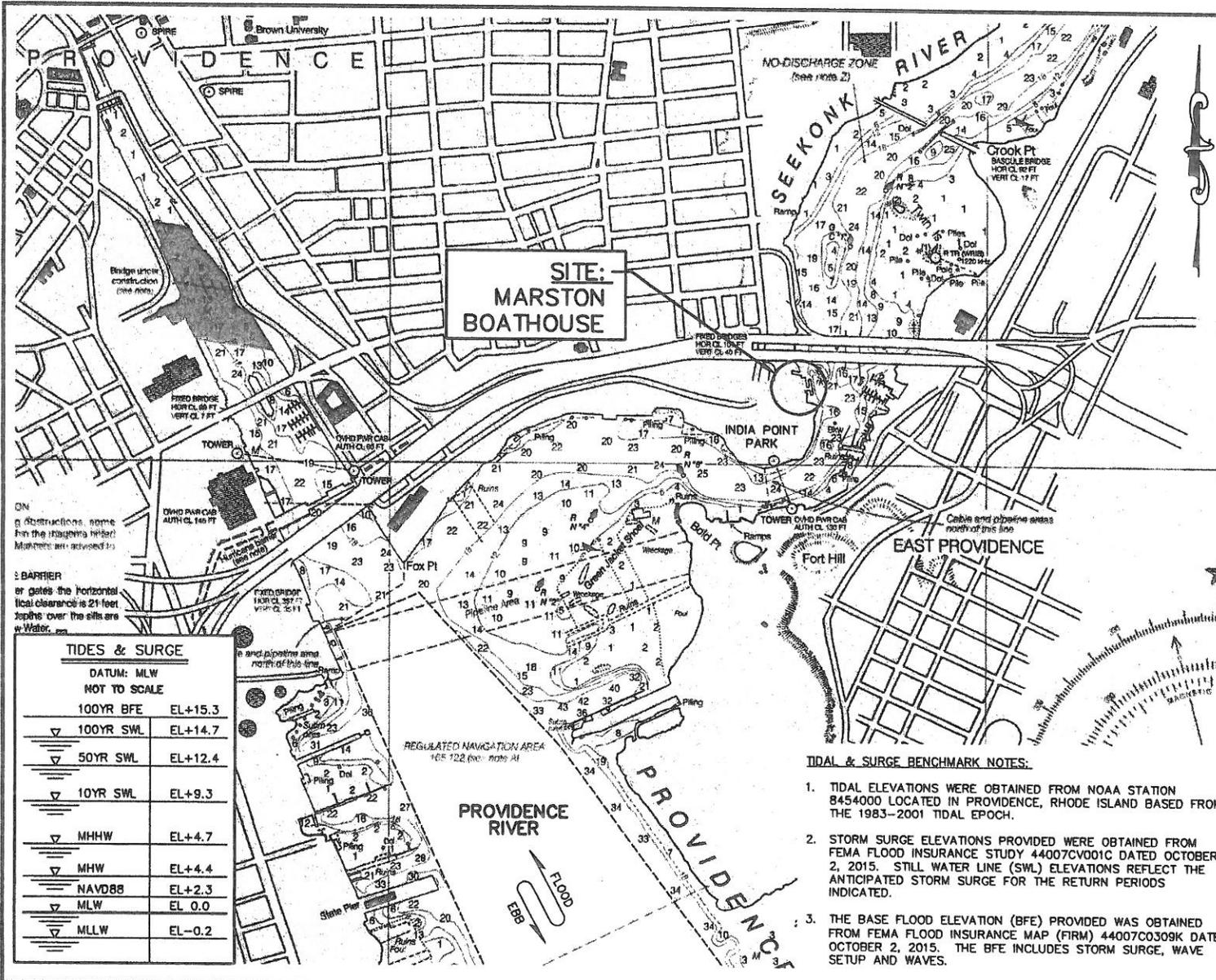
Project Location:	Marston Boat House – 250 India Street
City/Town:	Providence
Plat/Lot:	Plat 17, Lot 54
Waterway:	Seekonk River

Plans of the proposed work may be seen at the CRMC office in Wakefield.

In accordance with the Administrative Procedures Act (Chapter 42-35 of the Rhode Island General Laws) you may request a hearing on this matter.

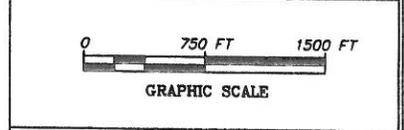
You are advised that if you have good reason to enter protests against the proposed work it is your privilege to do so. It is expected that objectors will review the application and plans thoroughly, visit site of proposed work if necessary, to familiarize themselves with the conditions and cite what law or laws, if any, would in their opinion be violated by the work proposed.

If you desire to protest, you must attend the scheduled hearing and give sworn testimony. A notice of the time and place of such hearing will be furnished you as soon as possible after receipt of your request for hearing. If you desire to request a hearing, to receive consideration, it should be in writing (with your correct mailing address, e-mail address and valid contact number) and be received at this office on or before April 9, 2018.



**HE**  
**HARBOR ENGINEERING, LLC**  
 26 BOSWORTH STREET  
 BARRINGTON, RI 02806  
 (401) 829-4870  
 harboreng.com

No.	Revision	Date	App.



Client/Owner:  
**BROWN UNIVERSITY**  
 MARSTON BOATHOUSE  
 SITE LOCATION:  
 250 INDIA STREET; PROVIDENCE, RI

Issued for:  
 REGULATORY REVIEW  
 NOT FOR CONSTRUCTION

Drawing Title:  
**VICINITY CHART**  
 NOAA CHART #13225 (APRIL, 2016)  
 MARSTON BOATHOUSE  
 WATERFRONT IMPROVEMENTS

**TIDES & SURGE**  
 DATUM: MLW  
 NOT TO SCALE

100YR BFE	EL+15.3
100YR SWL	EL+14.7
50YR SWL	EL+12.4
10YR SWL	EL+9.3
MHHW	EL+4.7
MHW	EL+4.4
NAVD88	EL+2.3
MLW	EL 0.0
MLLW	EL-0.2

- TIDAL & SURGE BENCHMARK NOTES:**
- TIDAL ELEVATIONS WERE OBTAINED FROM NOAA STATION 8454000 LOCATED IN PROVIDENCE, RHODE ISLAND BASED FROM THE 1983-2001 TIDAL EPOCH.
  - STORM SURGE ELEVATIONS PROVIDED WERE OBTAINED FROM FEMA FLOOD INSURANCE STUDY 44007CV001C DATED OCTOBER 2, 2015. STILL WATER LINE (SWL) ELEVATIONS REFLECT THE ANTICIPATED STORM SURGE FOR THE RETURN PERIODS INDICATED.
  - THE BASE FLOOD ELEVATION (BFE) PROVIDED WAS OBTAINED FROM FEMA FLOOD INSURANCE MAP (FIRM) 44007C0309K DATED OCTOBER 2, 2015. THE BFE INCLUDES STORM SURGE, WAVE SETUP AND WAVES.

Date: 1/25/2018  
 Scale: 1"=750FT

Designed By: AJK  
 Drawn by: AJK  
 Checked by: MNG  
 Project Number: 2017-16  
 Sheet 1 of 8  
 Drawing Number: V-1

No. 7949  
**AUGUST J. KREUZKAMP, III**  
 REGISTERED PROFESSIONAL ENGINEER  
 CIVIL 1/25/2018

RECEIVED  
 MAR 08 2018  
 COASTAL RESOURCES

This plan is a reduced reproduction and not plotted to the specified scale. For accurate measurement of dimensions and distances, refer to the original (full size) plan.

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- UPLAND SITE INFORMATION INCLUDING PROPERTY BOUNDS, EXISTING CONDITIONS, FLOOD ZONES, AND WASHINGTON STREET BRIDGE WAS OBTAINED FROM THE SITE PLAN TITLED, "PLAN OF LAND" PREPARED BY SOUTH COUNTY SURVEY COMPANY DATED DECEMBER 14, 2017.
- THE BATHYMETRY DEPICTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY SEAVISION UNDERWATER SOLUTIONS, INC. ON DECEMBER 12, 2017 AND CAN ONLY BE CONSIDERED TO INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.
- HYDROGRAPHIC SOUNDINGS OR CONTOURS PRESENTED HEREIN REPRESENT DEPTHS IN FEET FROM MEAN LOW WATER DATUM (MLWD). ALL BATHYMETRIC CONTOURS AND/OR SOUNDINGS ARE NEGATIVE UNLESS DENOTED WITH A PLUS (+).

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- ARMOR STONE SPECIFICATIONS CONFORM WITH CRMP 650 RICR 20-00-01.3.1.G.5.g. FOR A LOCATION WITH AN EXPOSED FETCH OF 1 MILE.

LEGEND	
	PROPERTY LINE
	APPROX. ABUTTER'S PROPERTY LINE
	TOPOGRAPHIC CONTOUR LINE
	FEMA SFHA DELINEATION*
	CHAIN LINK FENCE
	UNDERGROUND DRAINAGE LINE
	UNDERGROUND TELECOM. LINE
	SPOT ELEVATION (MLWD)
	CATCH BASIN
	DRAIN MANHOLE
	TELECOM. MANHOLE
	UTILITY POLE
	GUY WIRE

  
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No.	Revision	Date	App.

Client/Owner:

**BROWN UNIVERSITY**  
 MARSTON BOATHOUSE  
 SITE LOCATION:  
 250 INDIA STREET, PROVIDENCE, RI

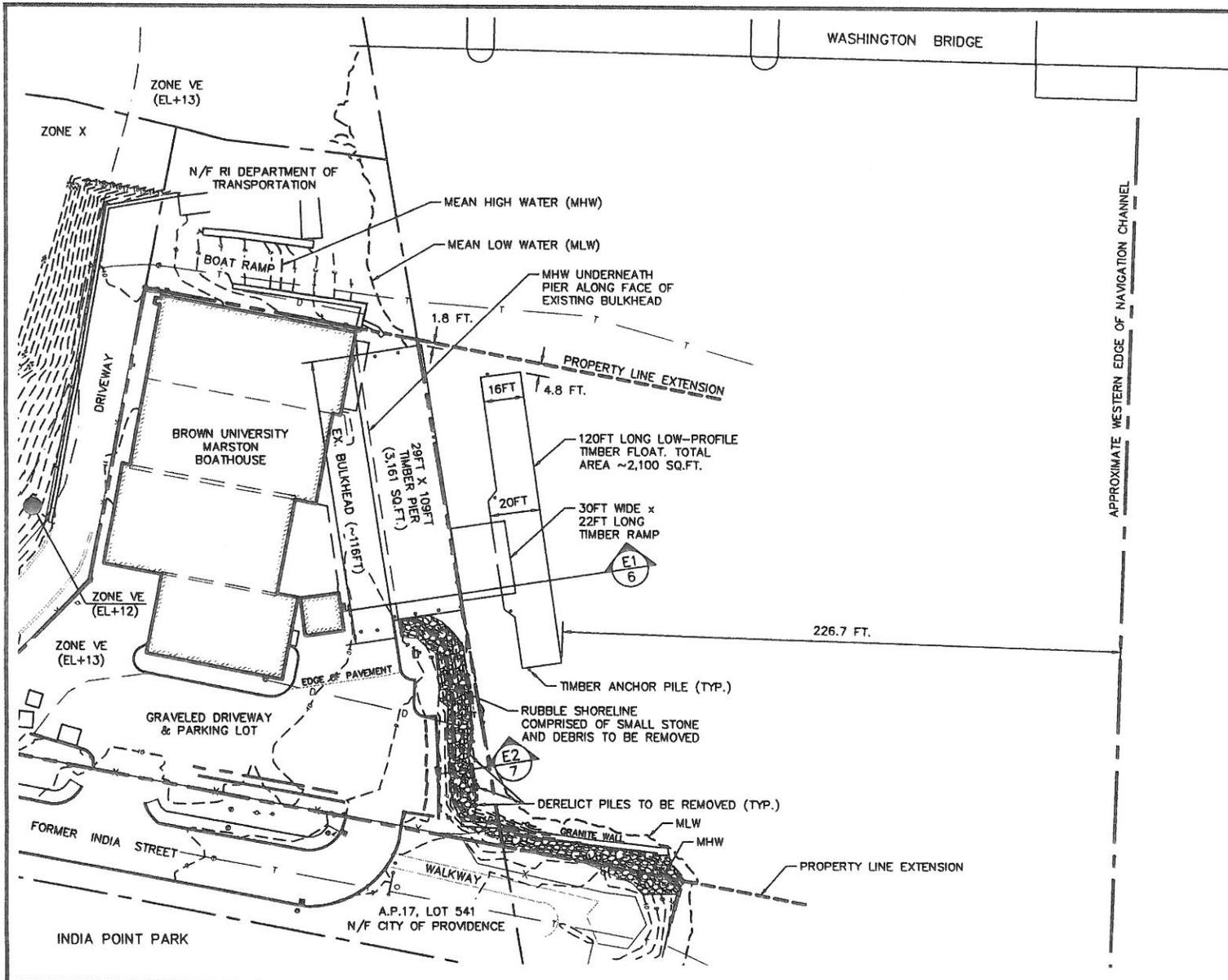
Issued for:  
 REGULATORY REVIEW  
 NOT FOR CONSTRUCTION

Drawing Title:  
**PROJECT NOTES**  
 PROJECT NOTES  
 MARSTON BOATHOUSE  
 WATERFRONT IMPROVEMENTS

 AUGUST J. KREUZKAMP, III No. 7949 REGISTERED PROFESSIONAL ENGINEER CIVIL 1/25/2016	Date: 1/25/2018
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	Drawn by: AJK
	Checked by: MNG
	Project Number: 2017-16
Shoot 2 of 8	
Drawing Number: N-1	

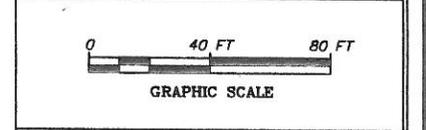
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 MANAGEMENT COUNCIL

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Client/Owner:  
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 SITE LOCATION:  
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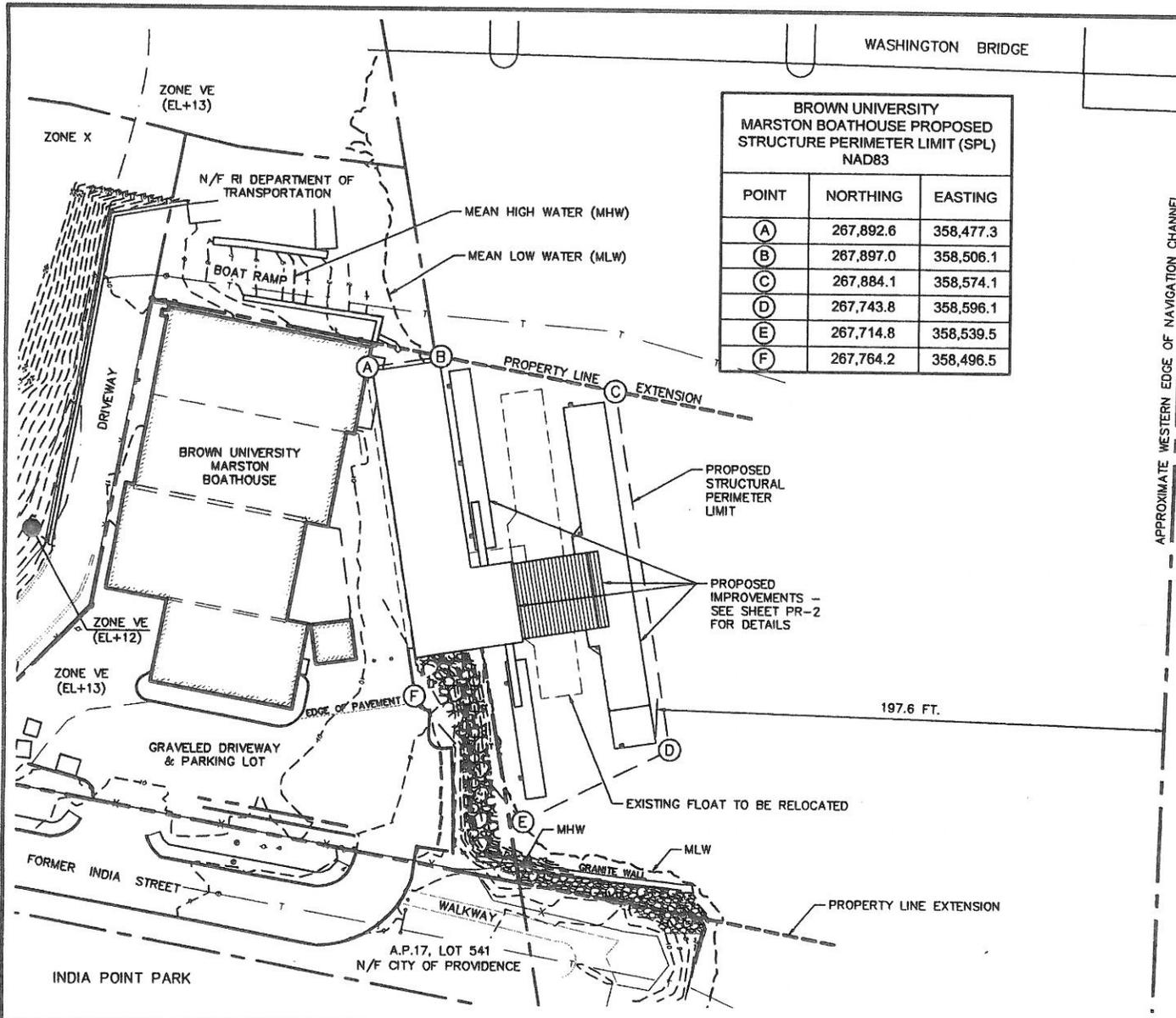
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**EXISTING CONDITIONS**  
 SITE PLAN (MLWD)  
 MARSTON BOATHOUSE  
 WATERFRONT IMPROVEMENTS

	Date: 1/25/2018
	Scale: 1"=40FT
	Designed By: AJK
	Drawn by: AJK
	Checked by: MNG
Project Number: <b>2017-16</b>	
Sheet <b>3</b> of <b>8</b>	
Drawing Number: <b>EX-1</b>	

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P10



BROWN UNIVERSITY  
MARSTON BOATHOUSE PROPOSED  
STRUCTURE PERIMETER LIMIT (SPL)  
NAD83

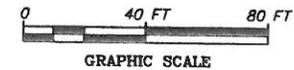
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(B)	267,897.0	358,506.1
(C)	267,884.1	358,574.1
(D)	267,743.8	358,596.1
(E)	267,714.8	358,539.5
(F)	267,764.2	358,496.5

**HE**

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MARSTON BOATHOUSE  
SITE LOCATION:  
250 INDIA STREET; PROVIDENCE, RI

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Drawing Title:  
**PROPOSED SITE PLAN**  
& STRUCTURAL PERIMETER LIMIT  
MARSTON BOATHOUSE  
WATERFRONT IMPROVEMENTS

Date: 1/25/2018  
Scale: 1"=40FT

Designed By: AJK  
Drawn by: AJK  
Checked by: MNG

Project Number:  
**2017-16**

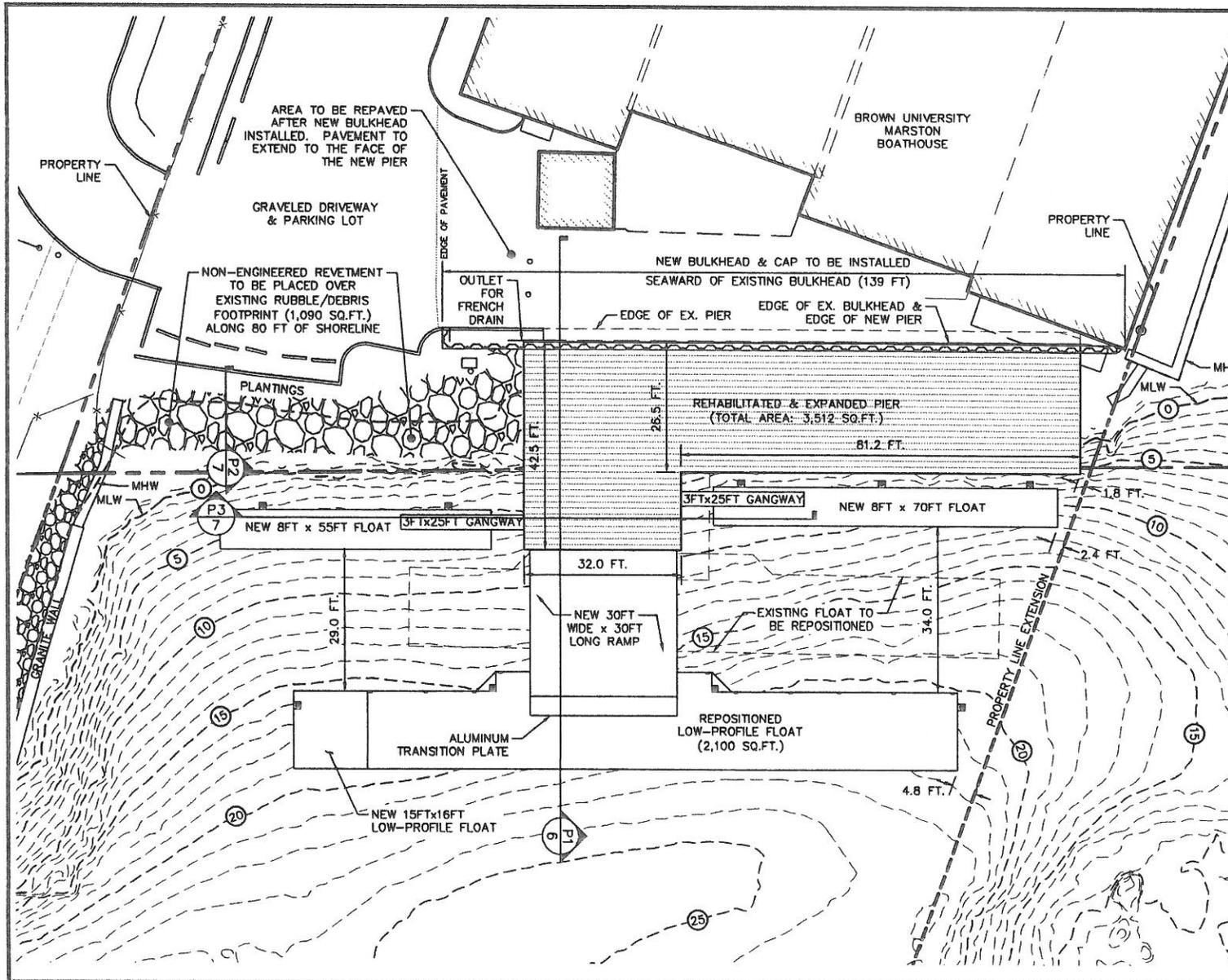
Sheet 4 of 8  
Drawing Number:  
**PR-1**

No. 7949

**REGISTERED**  
PROFESSIONAL ENGINEER  
CIVIL 1/27/2018

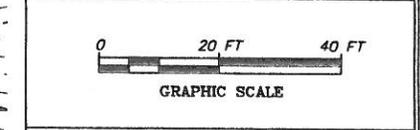
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Client/Owner:  
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 MARSTON BOATHOUSE  
 SITE LOCATION:  
 250 INDIA STREET, PROVIDENCE, RI

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Drawing Title:  
**PROPOSED SITE PLAN**  
 & AREA BATHYMETRY (MLWD)  
 MARSTON BOATHOUSE  
 WATERFRONT IMPROVEMENTS

Date: 1/25/2018  
 Scale: 1"=20FT

**AUGUST J. KREUZKAMP, III**

No.  7949

DESIGNED BY: AJK  
 DRAWN BY: AJK  
 CHECKED BY: MNG

Project Number:  
 2017-16

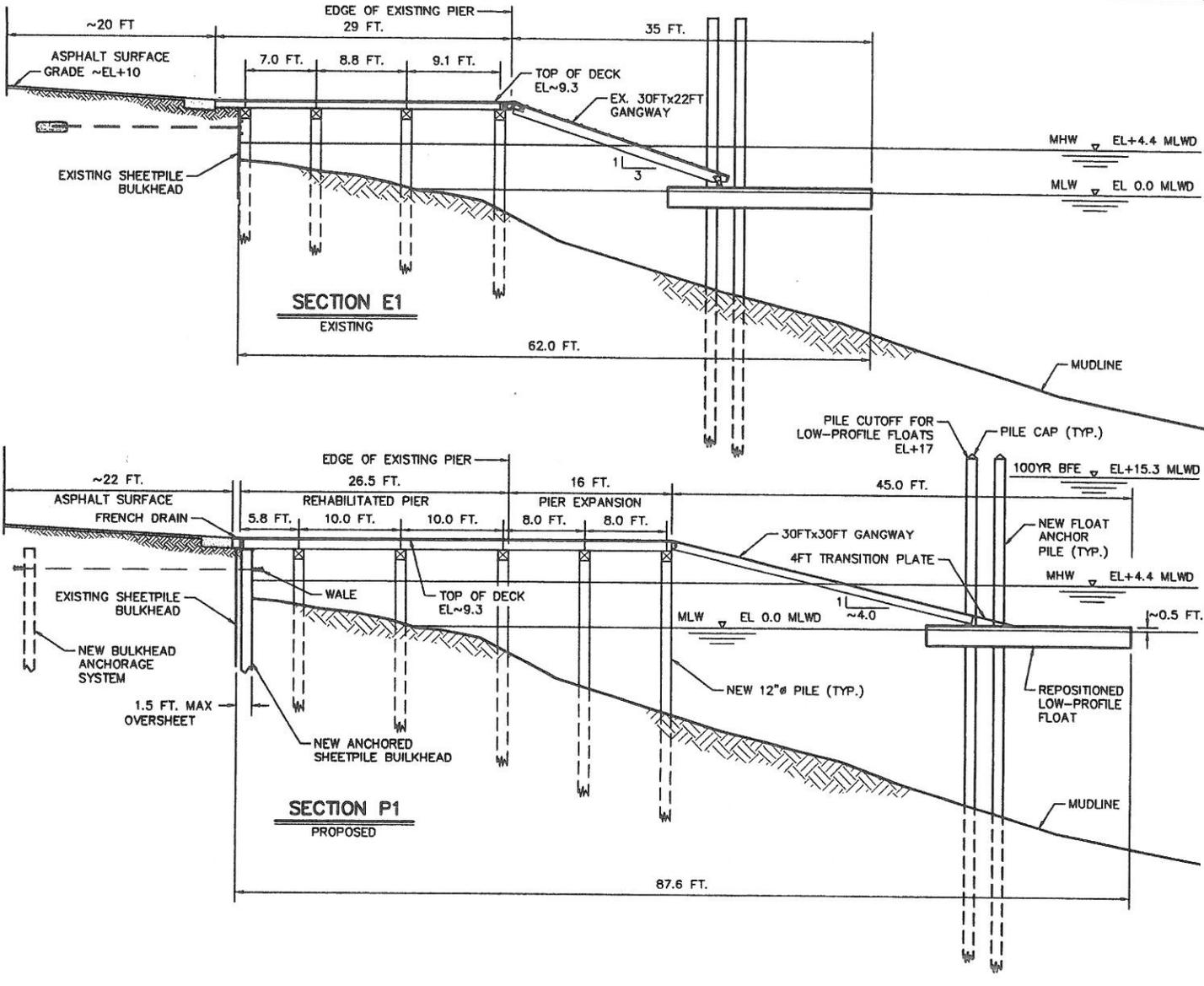
Sheet 5 of 8  
 Drawing Number:  
 PR-2

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 MANAGEMENT COMMISSION

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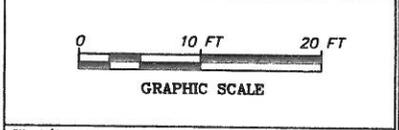
P12

P13



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No.	Revision	Date	App.



Client/Owner:  
**BROWN UNIVERSITY**  
 MARSTON BOATHOUSE  
 SITE LOCATION:  
 250 INDIA STREET; PROVIDENCE, RI

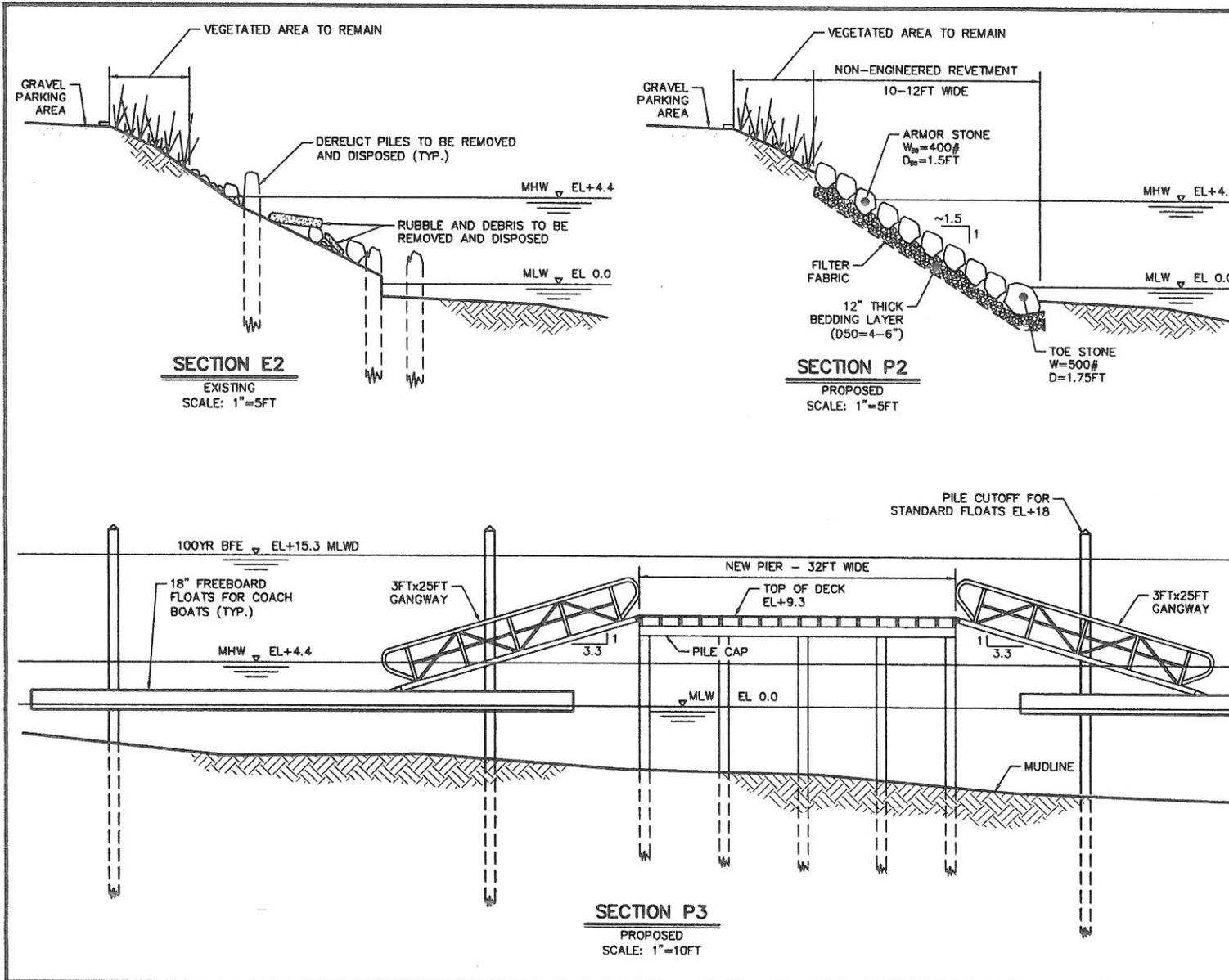
Issued for:  
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Drawing Title:  
**CROSS-SECTIONS**  
 E1 & P1  
 MARSTON BOATHOUSE  
 WATERFRONT IMPROVEMENTS

	Date: 1/25/2018
	Scale: 1"=10FT
	Designed By: AJK
	Drawn by: AJK
	Checked by: MNG
Project Number: 2017-16	
Sheet 6 of 8	
Drawing Number: X-1	

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 COASTAL RESOURCES  
 MANAGEMENT COUNCIL

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BARRINGTON, RI 02806  
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No.	Revision	Date	App.



Client/Owner:  
**BROWN UNIVERSITY**  
MARSTON BOATHOUSE  
SITE LOCATION:  
250 INDIA STREET, PROVIDENCE, RI

Issued for:  
REGULATORY REVIEW  
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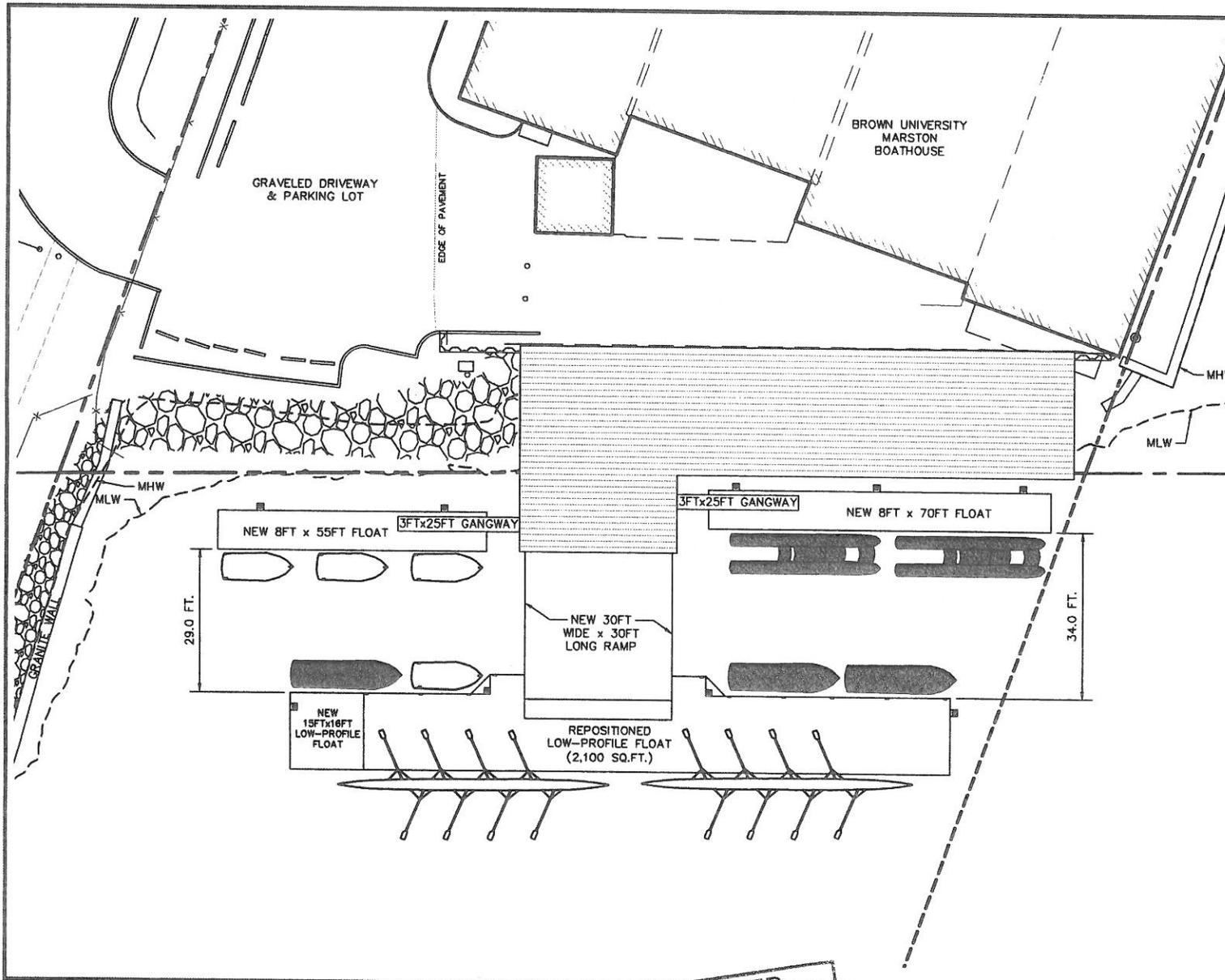
Drawing Title:  
**CROSS-SECTIONS**  
E2, P2 & P3  
MARSTON BOATHOUSE  
WATERFRONT IMPROVEMENTS

	Date:	1/25/2018
	Scale:	VARIES
	Designed By:	AJK
	Drawn by:	AJK
	Checked by:	MNG
	Project Number:	2017-16
Sheet	7 of 8	
Drawing Number:	X-2	

RECEIVED  
MAR 08 2018  
COASTAL RESOURCES

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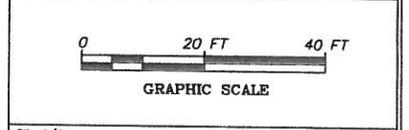
P14



P15

**HE**  
**HARBOR ENGINEERING, LLC**  
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No.	Revision	Date	App.



Client/Owner:  
**BROWN UNIVERSITY**  
 MARSTON BOATHOUSE  
 SITE LOCATION:  
 250 INDIA STREET; PROVIDENCE, RI

Issued for:  
 REGULATORY REVIEW  
 NOT FOR CONSTRUCTION

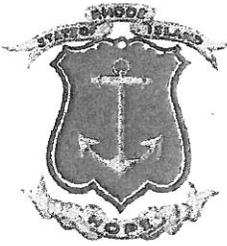
Drawing Title:  
**PROPOSED VESSEL**  
 DOCKING CONFIGURATION  
 MARSTON BOATHOUSE  
 WATERFRONT IMPROVEMENTS

AUGUST J. KREUZKAMP, III  
  
 No. 7949  
 REGISTERED  
 PROFESSIONAL ENGINEER  
 CIVIL 1/23/2018

Date:	1/25/2018
Scale:	1"=20FT
Designed By:	AJK
Drawn by:	AJK
Checked by:	MNG
Project Number:	2017-16
Sheet	8 of 8
Drawing Number:	B-1

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**MAR 08 2018**  
 COASTAL RESOURCES  
 MANAGEMENT COUNCIL

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State of Rhode Island and Providence Plantations  
Coastal Resources Management Council  
Oliver H. Stedman Government Center  
4808 Tower Hill Road, Suite 116  
Wakefield, RI 02879-1900

(401) 783-3370  
Fax (401) 783-3767

## MEETING NOTICE

April 19, 2018

Site Address: 250 India Street; plat 17, lot 54  
Site Town: Providence  
Proj. Desc: Renovate existing pier, revetment, remove derelict piles

The application for State Assent of Brown University CRMC File Number 2018-02-025 will be reviewed at the next meeting of the Coastal Resources Management Council. If you are the applicant, it is necessary that you be present at the meeting to answer any questions that may arise. Please be advised that a copy of the CRMC staff engineer and biologist reports may be obtained from the CRMC offices in Wakefield for the applicant or his/her attorney. Interested parties may attend and present evidence for or against, or for informational purposes in accordance with CRMC rules. Parties interested in this matter are encouraged to review the latest information contained in this file and also should refer to Management Procedures 5.3(8) among others for additional information.

The meeting is to be held at **6:00 p.m.** (*please be advised that the CRMC Educational series begins at 6:00 p.m.*) on Tuesday, May 8, 2018 in Conference Room A, at the Administrative Building, One Capitol Hill, Providence, RI. Evidence or testimony regarding this case may be submitted at the time of the meeting (see CRMC Management Procedures). The CRMC office policy for public review of files scheduled for review by the full Council states that they are available to the public until 12:00 p.m. on the day of the meeting. **Please confirm application's hearing status via CRMC website ([www.crmc.ri.gov](http://www.crmc.ri.gov)) or by calling 401-783-3370.**

Parties interested in/or concerned with the above mentioned matter are invited to be present and/or represented by counsel at the above mentioned time and place. This meeting place is accessible to individuals with disabilities. The meeting location is accessible to handicapped persons. Any individual requiring a reasonable accommodation in order to participate in this meeting should contact CRMC offices at least 72 hours prior to the meeting.

Sincerely yours,

Lisa A. Turner, Office Manager  
Coastal Resources Management Council

/lat

Mailing List for CRMC File Number 2018-02-025  
Brown University

Brown University  
Attn: Michael Guglielmo, Jr.  
Dept of Facilities Management  
Box 1941  
295 Lloyd Avenue  
Providence, RI 02912

Harbor Engineering, LLC  
26 Bosworth Street, Suite F  
Barrington, RI 02806

City of Providence  
25 Dorrance Street  
Providence, RI 02903

RIDOT  
2 Capitol Hill  
Providence, RI 02903

CRMC (File No. 2018-02-025)  
O. S. Government Center  
4808 Tower Hill Road  
Wakefield, RI 02879



State of Rhode Island and Providence Plantations  
**Coastal Resources Management Council**  
 Oliver H. Stedman Government Center  
 4808 Tower Hill Road, Suite 3  
 Wakefield, RI 02879-1900



## APPLICATION FOR STATE ASSENT

To perform work regulated by the provisions of Chapter 279 of the Public Laws of 1971 Amended.

File No. (CRMC use only): <u>2018-02-025</u>		
Project Location:	250 India Street	Providence
	Number Street	City/Town
Owner's Name:	Brown University	Plat: <u>17</u>
		Lot(s): <u>54</u>
Mailing Address:	Department of Facilities Management Box 1941; 295 Lloyd Avenue; Providence, RI 02912	Res. Tel. #: _____ Bus. Tel. #: <u>(401) 863-7802</u>
Contractor RI Lic. #	Address:	Tel. No.
Designer: Harbor Engineering, LLC	Address: <u>26 Bosworth Street; Suite F; Barrington RI 02806</u>	Tel. No. <u>(401) 519-6103</u>
Waterway: <u>Seekonk River</u>	Est. Project Cost: <u>\$1,500,000</u>	Fee/Costs: <u>\$7,750</u>
<p><b>Description of work proposed (a brief description of all elements of work <u>MUST</u> be included here, additional sheets may be attached):</b></p> <p>The Applicant is seeking to maintain its rowing facilities including 139 feet of new steel bulkhead to oversheet the existing, maintain 80 feet of sloped shoreline by removing derelict piles and debris and placing a none-engineered revetment, renovating and expanding the existing timber pier from 3,161 sq.ft. to 3,512 sq.ft. installing a 30ft x 30ft ramp, shifting the existing low profile float seaward approximately 25 feet, adding a 15ft x 16ft low profile float, and adding 8ft x 70ft and 8ft x 55ft floats with two (2) 3ft x 25ft gangways. See Attachment A (Project Description) and Attachment C (Plans) for additional information.</p>		

Have you or any previous owner filed an application for and/or received an assent for any activity on this property?  
 (If so please provide the file and/or assent numbers): 1994-05-161, 2009-07-021, 2013-09-091

Is this site within a designated historic district?       YES       NO

Is this application being submitted in response to a coastal violation?       YES       NO

If YES, you must indicate NOV or C&D Number: \_\_\_\_\_

Name and Addresses of adjacent property owners whose property adjoins the project site. (Accurate addresses will insure proper notification. Improper addresses will result in an increase in review time.)

SOUTH: City of Providence; 25 Dorrance Street; Providence, RI 02903

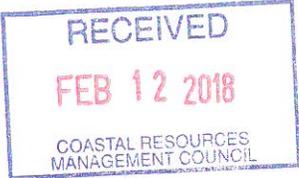
NORTH: RIDOT; 2 Capitol Hill; Providence, RI 02903

**STORMTOOLS** (<http://www.beachsamp.org/resources/stormtools/>) is a planning tool to help applicants evaluate the impacts of sea level rise and storm surge on their projects. The Council encourages applicants to use STORMTOOLS to help them understand the risk that may be present at their site and make appropriate adjustments to the project design.

NOTE: The applicant acknowledges by evidence of their signature that they have reviewed the Rhode Island Coastal Resources Management Program, and have, where possible, adhered to the policies and standards of the program. Where variances or special exceptions are requested by the applicant, the applicant will be prepared to meet and present testimony on the criteria and burdens of proof for each of these relief provisions. The applicant also acknowledges by evidence of their signature that to the best of their knowledge the information contained in the application is true and valid. If the information provided to the CRMC for this review is inaccurate or did not reveal all necessary information or data, then the permit granted under this application may be found to be null and void. Applicant requires that as a condition to the granting of this assent, members of the CRMC or its staff shall have access to the applicant's property to make on-site inspections to insure compliance with the assent. This application is made under oath and subject to the penalties of perjury.

Owner's Signature (sign and print)

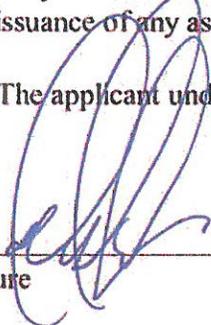
PLEASE REVIEW REVERSE SIDE OF APPLICATION FORM



**STATEMENT OF DISCLOSURE AND APPLICANT AGREEMENT AS TO FEES**

The fees which must be submitted to the Coastal Resources Management Council are based upon representations made to the Coastal Resources Management Council by the applicant. If after submission of this fee the Coastal Resources Management Council determines that an error has been made either in the applicant's submission or in determining the fee to be paid, the applicant understands that additional fees may be assessed by the Coastal Resources Management Council. These fees must be paid prior to the issuance of any assent by the Coastal Resources Management Council.

The applicant understands the above conditions and agrees to comply with them.

  
\_\_\_\_\_  
Signature

2/9/18  
\_\_\_\_\_  
Date

Michael Guadalupe, Jr. Brown University, Box 1941, Prov RI  
Print Name and Mailing Address 02912

TO: Coastal Resources Management Council  
4808 Tower Hill Road Suite 3  
Wakefield, RI 02879  
Phone: (401) 783-3370



FROM: Building Official

DATE: 1/19/2018

SUBJ: Application of: Brown University Boathouse Waterfront Improvements

Location: 250 India Street in Providence RI. (Seekonk River)

Address: 250 India Street Plat No. 17 Lot No. 54

To Construct: Maintain existing revetted shoreline and bulkhead, and expand waterfront infrastructure by adding additional pier, ramps and floats to provide additional berths to accommodate existing coach boats.

I hereby certify that I have reviewed \_\_\_\_\_ foundation plan(s).  
 plan(s) for entire structure  
 site plans

Titled: Marston Boathouse Waterfront Improvements

Date of Plan (last revision): 1/25/2018

and find that the issuance of a local building permit is not required as in accordance with Section \_\_\_\_\_ of the Rhode Island State Building Code.

and find that the issuance of a local building permit is required. I hereby certify that this permit shall be issued once the applicant demonstrates that the proposed construction/activity fully conforms to the applicable requirements of the RISBC.

and find that a Septic System Suitability Determination (SSD) must be obtained from the RI Dept. of Environmental Management.

and find that a Septic System Suitability Determination (SSD) need not be obtained from the RI Dept. of Environmental Management.

and find that said plans conform with all elements of the zoning ordinance, and that if said plans require zoning board approval, that the applicant has secured such approval and that the requisite appeal period has passed with no appeal filed or appeal is final. The Zoning Board approval shall expire on \_\_\_\_\_.

[Signature] 7 FEB 2018  
Building Official's Signature Date

and find that said plans conform with all elements of the zoning ordinance, and that if said plans require zoning board approval, that the applicant has secured such approval and that the requisite appeal period has passed with no appeal filed or appeal is final.

[Signature] 01/30/18  
Zoning Officer's Signature Date





## Harbor Engineering, LLC

26 Bosworth Street; Suite F  
Barrington, RI 02806

Tel: (401) 829-4870  
Website: [harboreng.com](http://harboreng.com)

February 9, 2018

RI Coastal Resources Management Council  
4808 Tower Hill Road; Suite 3  
Wakefield, RI 02879

RE: Marston Boathouse Waterfront Improvements  
250 India Street; Providence, RI



To whom it may concern:

On behalf of our client, the *Brown University (BROWN)* Department of Facilities Management, it is our pleasure to offer the enclosed Application for State Assent. Please find the enclosed plans entitled *Marston Boathouse Waterfront Improvements* dated January 25, 2018.

The existing facility is within a RICRMC 'Type 4' Water Type on the western shore of the Seekonk River adjacent to India Point Park. The improvements to the waterfront are to include maintenance of the existing rubble shoreline and steel bulkhead, maintenance and expansion of the existing pier, relocation and expansion of the existing main float and ramp, and the installation of two (2) additional floats and gangways. The assembled application includes the RICRMC Assent application form along with the following attachments:

- Attachment A: Project Discussion
- Attachment B: Representative Site Photographs
- Attachment C: Project Plans
- Attachment D: RICRMC Standards
- Attachment E: Variance Request
- Attachment F: Property Owner Information
- Attachment G: Local Building & Zoning Acknowledgement
- Attachment H: Letter of support from northern neighbor
- Attachment I: Letter of exemption from the Providence Historic District

Please do not hesitate to contact the undersigned should you have any questions or require additional information to facilitate your review of the application.

Very Truly Yours,  
**Harbor Engineering, LLC**

Mark Georgian  
Project Engineer

Enclosures: Application Fee (Check No. 1926)  
CD with PDF file

Copy: Courtney McCracken, Project Manager (Brown University)

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**Waterfront Planning, Permitting & Design**



## Background

Brown University's Hunter S. Marston Boathouse is situated immediately north of India Point Park and south of the Washington Bridge (Route 195). The Boathouse's waterfront lies within a RICRMC 'Type 4' Water Type (Multipurpose Waters) on the western shore of the Seekonk River. Since its dedication in 1967, the boathouse has been used to support Brown University's crew program including the training of its student athletes and the hosting of intercollegiate competitions.

The existing shoreline is in need of repair to provide continued support and protection of the upland structures and property. The bulkhead is undersized and is significantly deteriorated. Several of the wales and tie rods have snapped causing a loss of support, and the shape of the sheet piles provides little strength (section modulus and moment of inertia) by typical industry standards. Maintaining the bulkhead is essential to retain the soil around the boathouse. The rubble slope (primarily comprised of small stones, concrete rubble, timber piles and miscellaneous debris) is deteriorated, unsightly and leaves portions of the shoreline vulnerable to erosion.

The University's rowing program has expanded significantly since the boathouse was originally dedicated. To address the needs of the expanding program, the boathouse was remodeled in 1994; however, the waterfront infrastructure has not kept pace with the needs of the teams and has been undersized for many years. This has led to the crowding of coach boats, which are essential to providing safety and instruction to student athletes. Currently, the limited space requires that coach boats be rafted alongside one another. This slows down access to the boats, which would be problematic in the event of an emergency requiring rescue by boat. Furthermore, the current layout requires the operators of the vessels to climb across multiple boats to reach the outermost vessel, increasing the likelihood of a fall.

## Description of Work Proposed

There are two primary components of the proposed work. One component is to preserve the integrity of the shoreline (bulkhead and rubble slope) so it may continue to support and protect the upland structures and property. The other component improves the capacity of the facility, enabling it to provide the necessary berthing for up to nine (9) coach boats needed to properly support the University's Men's and Women's Crew Teams.

The proposed improvements include:

- Maintain the existing shoreline by removing rubble and deteriorated piles from the intertidal portion of 80 feet of existing shoreline and install a non-engineered revetment to match the existing slope. The non-engineered slope will protect the property and prevent sediment from entering the river and channel by preventing erosion of the shoreline. The landscaped area landward of the existing rubble slope is to remain.

- Replace the existing deteriorated bulkhead by oversheeting it with a new anchored steel sheetpile bulkhead. The new bulkhead will be approximately 139 feet in length, placed no more than 18 inches seaward of the existing bulkhead. The gap between the bulkheads will be filled with crushed stone. After the bulkhead is installed a French drain will be installed immediately landward of the bulkhead and the asphalt surface will be repaved.
- Maintain the existing 29' x 109' (3,161 ft<sup>2</sup>) pier by replacing its decking, stringers, pile caps and piles as needed and install an additional 351ft<sup>2</sup>. of pier of similar construction to provide additional space required for vessel berths and a landing area needed for gangways in order to access the proposed floating docks.
- Relocate the existing 2,200 ft<sup>2</sup> low-profile float approximately 25' seaward (east) and 8' downstream (south).
- Install a 15' x 16' (240 ft<sup>2</sup>) extension to the south side of the repositioned low-profile dock. This expansion will enable the main float to safely accommodate four (4) coach boats alongside the float. The proposed layout including the repositioned main float and new southern appendage will leave approximately 198' of clear space between the outermost float and the navigation channel.
- Install a new 8' x 55' (440 ft<sup>2</sup>) float and 3' x 25' gangway to the south of the proposed pier extension to provide berthing for three (3) smaller coach boats.
- Install a new 8' x 70' (560 ft<sup>2</sup>) float and 3' x 25' gangway to the north of the proposed pier extension to provide berthing for two (2) larger coach boats.
- Replace the existing 30' x 22' gangway with a new 30' x 30' gangway relocated approximately 7' downstream (south). The longer gangway will help reduce the slope when the float is sitting near low tide from 1V:3H to 1V:4H and avoids the need to extend the pier extension 8 feet further seaward to make the room needed for vessel berthing inside the main float.

### **Anticipated Water Quality Impacts**

No long-term water quality impacts are anticipated because of the proposed work. Shoreline maintenance efforts will prevent retained soil from entering the Seekonk River and the additional floats and piles to be installed for this project will not appreciably reduce tidal flushing or streamflow for the area.

Since the University's coach boats and rowing shells do not have heads, there is no need for a pumpout station at this location. Men's and Women's bathrooms are located inside the boathouse.



### Attachment D: RICRMP Standards

The following items are provided to address the Category B requirements outlined in RICRMP 1.3.1A (formerly 300.1):

1) *Demonstrate the need for the proposed activity or alteration;*

**The Marston Boathouse waterfront has not been updated for nearly 50 years. As such, its shoreline (including rubble slope and bulkhead) is deteriorated and there is insufficient berthing available to support the number of coach boats needed to provide adequate support to the student athletes that are training on the water regularly.**

**The existing bulkhead is severely weakened and requires replacement in the immediate future. The rubble slope at the south end of the property is comprised of unsuitable material (derelict piles, undersized stone and debris) that is ineffective and unsightly. The proposed replacement of the bulkhead and maintenance of the slope is necessary to avoid a structural failure and mitigate the threat of erosion to the upland property. Without these improvements to the shoreline, it is likely that unsuitable soil will be deposited into the Seekonk River.**

**With limited dock space, coaches are required to raft their boats together in a limited area while navigating in a strong current. Rafting boats presents additional challenges including having to manage walking over boats to access rafted boats while carrying portable fuel tanks and planning when coach boats can leave based on the order they arrived the day before.**

2) *Demonstrate that all applicable local zoning ordinances, building codes, flood hazard standards, and all safety codes, fire codes, and environmental requirements have or will be met; local approvals are required for activities as specifically prescribed for nontidal portions of a project in §§ 1.3.1(B), (C), (F), (H), (I), (K), (M), (O) and (Q) of this Part; for projects on state land, the state building official, for the purposes of this section, is the building official;*

**The proposed project is consistent with the various codes and standards that are applicable for this type of project. With this application, please find the Providence Building Official's and Zoning Official's required sign-off for the proposed work. To address flood hazard standards, all piles will be extended above the FEMA Base Flood Elevation as required by the RICRMP.**

**The slope of proposed main gangway has been decreased from 1V:3H (existing) to 1V:4H. This is especially important for the safety of the team as they carry the rowing shells up and down the gangway daily.**

3) *Describe the boundaries of the coastal waters and land area that are anticipated to be affected;*

**The facility is located within a RICRMC 'Type 4' Multipurpose Waters on the western shore of the Seekonk River. The Site has a developed waterfront including a deteriorated rubble slope and a steel sheetpile bulkhead. The river bed in the area includes both rocky and muddy/silty areas. No submerged aquatic vegetation exists**



near the proposed work area.

Immediately landward of the existing bulkhead is a section of bituminous concrete pavement and boathouse. Immediately landward of the rubble slope is a graveled driveway and parking lot. To the north of the Site is property owned by RIDOT that includes an outfall, boat ramp and the Washington Bridge (route 195). To the south of the Site is land owned by the City of Providence that includes the former India Street and India Point Park that includes 18 acres of open space and 3,600 feet of shoreline.

- 4) *Demonstrate that the alteration or activity will not result in significant impacts on erosion and/or deposition processes along the shore and in tidal waters;*

The existing rubble slope is inadequate and at risk of eroding, leaving the area vulnerable to anthropogenic siltation of the River. The proposed improvements to the armored shoreline will reduce the risk of erosion of material that is undesirable for depositional processes.

The aged existing bulkhead has sections that have broken off and lacks a terminus at the northern end. The gap at the north end of the bulkhead is approximately 1' wide and extends from the mudline to the top of the wall. The gap permits retained material to discharge into the River (see Attachment B-Representative Site Photographs). Further deterioration of the bulkhead is likely to result in holes developing in the corroded sheeting, which will allow more retained soil to wash into the River. The oversheeting solution will address the gap at the northern terminus of the wall and address issues stemming from the condition of the existing bulkhead.

The pile supported pier and floats will have a minimum impact on the existing flow in the area. Consequently, the piles are not anticipated to cause additional erosion or deposition.

- 5) *Demonstrate that the alteration or activity will not result in significant impacts on the abundance and diversity of plant and animal life;*

No submerged aquatic vegetation was noted within or adjacent to the area of the proposed work, so impacts to plant diversity are negligible. The river bed adjacent to the existing bulkhead is intertidal and primarily consists of gravel and cobbles. The river bed material transitions to mud/silt in the subtidal zone.

The proposed non-engineered armor stone will replace the existing rubble armored slope. The proposed maintenance uses clean reasonably sized stone to match the existing slope. Minimal impact to the diversity of plant and animal life are anticipated due to the similarities of the existing and proposed materials and grade.

The proposed oversheeting will be installed as near to the existing bulkhead as practicable. The design is anticipated to extend no further than 18 inches from the existing bulkhead and will replace the existing pile bent nearest to the shore. The



remaining piles below the exiting pier that are in fair condition or better will be rehabilitated by jacketing to limit impacts to the surrounding area.

The proposed pier expansion and the floats are pile supported which will minimize the area of the river bed that is occupied by the structure.

- 6) *Demonstrate that the alteration will not unreasonably interfere with, impair, or significantly impact existing public access to, or use of, tidal waters and/or the shore;*

The proposed improvements are located in an area that is not frequented by fishermen or recreational boaters. The proposed improvements will take place over the same total length of shoreline and extend out into the River only 25 feet more than the footprint that is currently utilized. The improvements, located within the extensions of the abutting property lines, will leave ~198' of clear space from the outermost float to the navigation channel.

- 7) *Demonstrate that the alteration will not result in significant impacts to water circulation, flushing, turbidity, and sedimentation;*

The proposed enhancements to the facility will involve the oversheeting of a sheet pile bulkhead, wrapping or replacing existing piles, and the installation of additional floats and piles in the waters of the Seekonk River. The large openings/gaps between the piles will not inhibit natural processes including water circulation, flushing, turbidity, and sedimentation. The 18" maximum seaward extension of the oversheeting repair is relatively small compared to the ~600' wide River that has water depths reaching 25 feet below Mean Low Water (MLW).

Work to be done in southern and western portions of the Site will have little, if any, impact on the overall flow of the River considering the abrupt bottleneck located immediately downstream of the site.

The eastern end requires the float be shifted seaward by 25 feet where water depths are approximately 5 feet deeper and the float will be increased in size by only 11%. No additional piles will be needed to anchor the float. Given the float's limited increase in size, placement in deeper water with the same number of piles, no impacts are expected to water circulation, flushing, turbidity and sedimentation.

- 8) *Demonstrate that there will be no significant deterioration in the quality of the water in the immediate vicinity as defined by DEM;*

The proposed improvements will be constructed consistent with typical marine construction methods and materials. Neither the proposed improvements nor the related activities will deteriorate the local water quality, undesirable sediment will be prevented from entering the River, and the proposed structures will not restrict tidal or stream flow.

- 9) *Demonstrate that the alteration or activity will not result in significant impacts to areas of historic and archaeological significance;*

**There are no known areas of archaeological significance within the area of the proposed activity.**

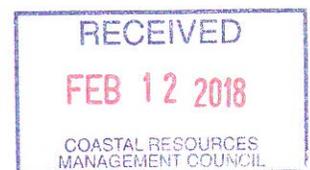
**The Site is within the Providence Landmark District-Industrial and Commercial Buildings. The Providence Historic District Commission has been contacted, and at the Commission's request, a copy of the attached plans have been provided to them.**

- 10) *Demonstrate that the alteration or activity will not result in significant conflicts with water-dependent uses and activities such as recreational boating, fishing, swimming, navigation, and commerce, and;*

**The facility is located within a RICRMC 'Type 4' Multipurpose Waters. This category includes open waters adjacent to shorelines that can support water dependent commercial, industrial, and/or high intensity recreational activities. The proposed improvements to the Site are consistent with the existing uses in the area and will not have any impact on the River's navigation channel with nearly 200 feet of buffer between. The proposed project will also have no impact to the local fishing since area fisherman do not frequent this area, finding other areas on the River or on Narragansett Bay to be more vibrant fishing grounds.**

- 11) *Demonstrate that measures have been taken to minimize any adverse scenic impact (see § 1.3.5 of this Part).*

**As part of the proposed project, most of the existing infrastructure including the bulkhead, shoreline, pier and main ramp will be replaced. The proposed improvements will dramatically enhance the appearance of the shoreline and area waterfront.**



**Variance Request:**



The Applicant seeks a variance from RICRMP Section 1.3.1.C.1.b which states:

*It is the Council's policy to require a public access plan, in accordance with § 1.3.6, as part of any application for a commercial or industrial development or redevelopment project in or impacting coastal resources. In accordance with § 1.1.5, a variance from this policy may be granted if an applicant can demonstrate that no significant public access impacts will occur as result of the proposed project.*

**The focus of the proposed activity is centered on maintenance and safety. The existing facility is aged, and its waterfront infrastructure is in need of replacement. In addition, the proposed expansion is the minimum needed to provide similar accommodations for the University's rowing teams while providing additional dockage needed to allow for the coaching staff to be able to dock coach boats safely at the facility. Unfortunately, due to the lack of space available on site, security problems in the past and the fundamental need to keep student athletes safe, public access can not be accommodated.**

The following discussion supports this variance request as required in RICRMP § 1.1.5:

**Criteria**

- (1) *The proposed alteration conforms with applicable goals and policies of the RI Coastal Resources Management Program.*

**The proposed activity meets all other applicable standards concerning a commercial boating facility. As part of this Application for an Assent, the Applicant meets all applicable goals and policies as outlined in Parts 2 & 3 of the RICRMP for the construction of a commercial dock structure within Type 4 Waters. The proposed project will not occupy any additional shoreline and the expanded float plan will extend out only 25 additional feet into the Seekonk River, leaving approximately 200 feet between the facility and the western edge of the navigation channel.**

- (2) *The proposed alteration will not result in significant adverse environmental impacts or use conflicts, including but not limited to, taking into account cumulative impacts.*

**Users of the local waterbody include local rowing teams and boaters that use the navigation channel. The proposed project will not conflict with these users. Although the public will not be able to access the Site's shoreline, immediately to the south is India Point Park which offers 18 acres of open space and 3,600 feet of shoreline that overlooks Narragansett Bay and the confluence of the Providence and Seekonk Rivers.**

(3) *Due to conditions at the site in question, the applicable standard cannot be met.*

**The Site, which includes the boathouse and a parking lot, is fully developed and utilized; leaving no space available for public access without compromising security and student safety.**

(4) *The modification requested by the applicant is the minimum variance to the applicable standard necessary to allow a reasonable alteration or use of the site.*

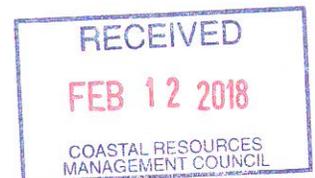
**The modification requested is the only variance being requested in order to allow the Applicant the ability to maintain its facilities and expand them as required so they can provide sufficient dockage for coaching staff.**

(5) *The requested variance to the applicable standard is not due to any prior action of the applicant or the applicant's predecessors in title. With respect to subdivisions, the Council will consider the factors as set forth in (B) below in determining the prior action of the applicant.*

No

(6) *Due to the conditions of the site in question, the standard will cause the applicant an undue hardship. In order to receive relief from an undue hardship an applicant must demonstrate inter alia the nature of the hardship and that the hardship is shown to be unique or particular to the site. Mere economic diminution, economic advantage, or inconvenience does not constitute a showing of undue hardship that will support the granting of a variance.*

**As discussed previously, based on the size and lack of space available it is not possible to offer public access on site without compromising security and the safety of the University's student athletes that use the facility daily.**





STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
HISTORICAL PRESERVATION & HERITAGE COMMISSION

Old State House • 150 Benefit Street • Providence, R.I. 02903-1209  
TEL (401) 222-2678 FAX (401) 222-2968  
TTY / Relay 711 Website [www.preservation.ri.gov](http://www.preservation.ri.gov)

Jennifer R. Cervenka, Chair  
Coastal Resources Management Council  
Oliver H. Stedman Government Center  
4808 Tower Hill Road  
Wakefield, Rhode Island 02879

CRMC File Number: *2018-02-025*

Applicant: *Brown University*

Town: *Providence*

Response Date: *2/19/18*

Dear Ms. Cervenka:

The Rhode Island Historical Preservation and Heritage Commission (RIHPHC) staff has reviewed the above-referenced project. It is our conclusion that this project will have no effect on any significant cultural resources (those listed on or eligible for listing on the National Register of Historic Places).

These comments are provided in accordance with Section 220 of the Coastal Resources Management Council. If you have any questions, please contact Glenn Modica, Project Review Coordinator, or Charlotte Taylor, archaeologist, at this office.

Very truly yours,

Jeffrey Emidy  
Acting Executive Director, RIHPHC





OFFICE OF THE DIRECTOR

Department of Transportation  
Two Capitol Hill  
Providence, RI 02903

Office 401-222-2481  
Fax 401-222-2086  
[www.dot.ri.gov](http://www.dot.ri.gov)

January 30, 2018

Rhode Island Coastal Resources Management Council  
Grover Fugate, Executive Director  
Stedman Government Center  
Suite 116  
4808 Tower Hill Road  
Wakefield, RI 02879-1900

Re: Brown University Boathouse Expansion

Dear Mr. Fugate,

I would like to take this opportunity to write to you regarding an application for Regulatory Review by the CRMC for a project that will replace the rowing dock at the Brown University boathouse next to India Point in Providence.

Rhode Island Department of Transportation, which owns property adjacent and to the north of Brown's at 250 India Street, Providence, RI, has no objection to the project (Number 2017-16), also known as the Marston Boathouse Proposed Waterfront Plan of October 25, 2017. In fact, the Department views Brown to be a good neighbor in this Gano Gateway District and has been cooperative partner as we discuss ways to improve that portion of Providence.

We at RIDOT believe a new dock would go a long way towards the beautification improvements sought in that area by the state, City of Providence and its neighbors.

If you need anything else regarding this matter, please don't hesitate to contact me.

Sincerely,

Peter Alviti, Jr., P.E.

Director

Rhode Island Department of Transportation





## Providence Historic District Commission

**Jorge O. Elorza**  
Mayor

January 29, 2018

Mark Georgian  
Project Engineer  
Harbor Engineering, LLC  
26 Bosworth Street  
Barrington, RI 02806

Re: 250 India Street (AP 17, Lot 54), Providence Landmarks District-Industrial & Commercial Buildings

Dear Mark:

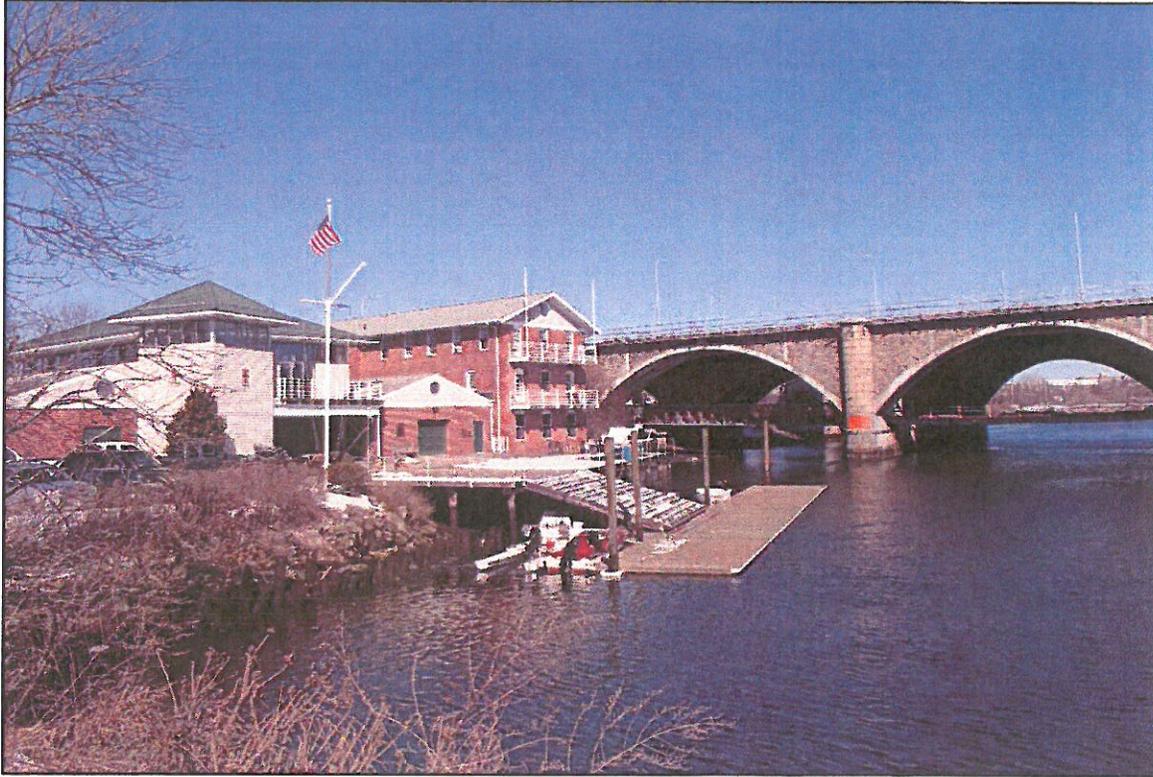
In response to your inquiry, I have evaluated the proposed work to the property located at 250 India Street (i.e.: American Oyster Company, Marston Boathouse, AP 17, Lot 54). It is my determination that the proposed exterior work to conduct shoreline preservation and improve boat berthing, as per submitted plans dated 01/25/18 is exempt from review by the Providence Historic District Commission.

Please take this letter with you or your representative to the Department of Inspection & Standards so that you are able to receive any necessary building permits.

Best,

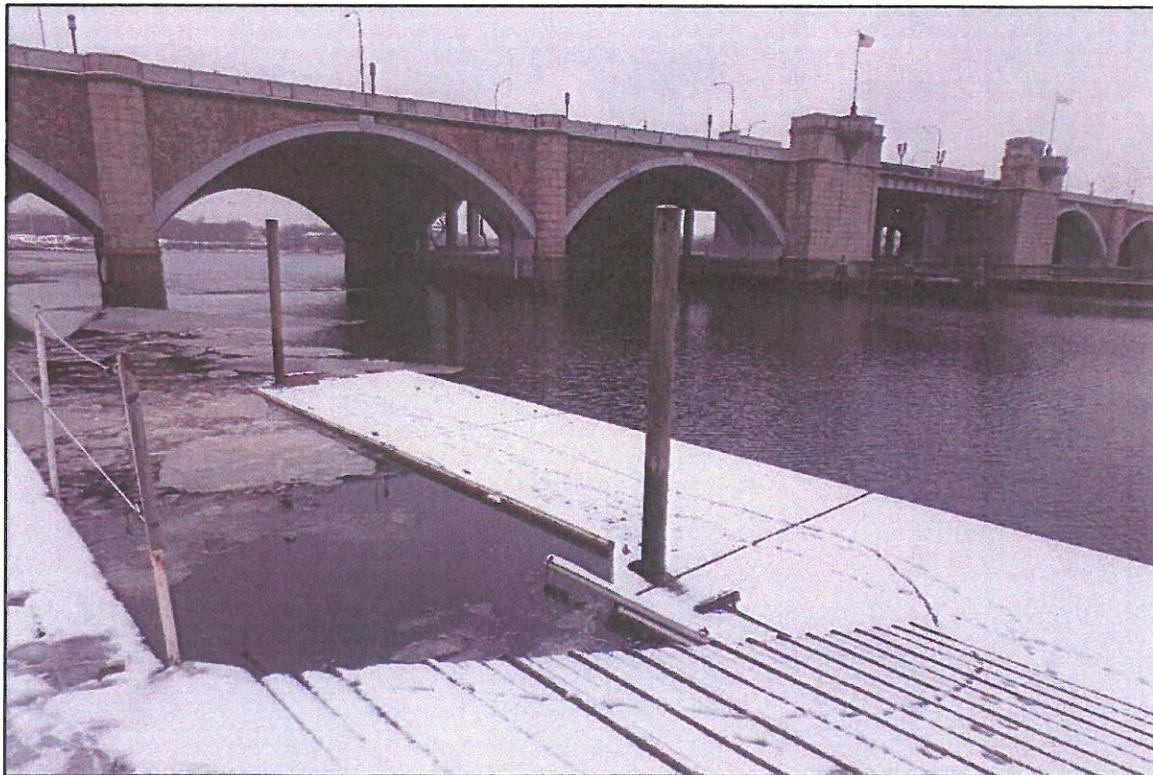
Jason D. Martin  
*Principal Planner/PHDC Staff*





RECEIVED  
FEB 12 2018  
CIVIL RESOURCES  
MANAGEMENT COUNCIL

**PHOTO 1: View of the site looking north from the adjacent shore**



**PHOTO 2: View of the float and gangway looking north from the timber pier**



PHOTO 3: View of the float and gangway looking south from the timber pier

RECEIVED  
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COASTAL ENGINEERING



PHOTO 4: View of the coach boats rafted alongside

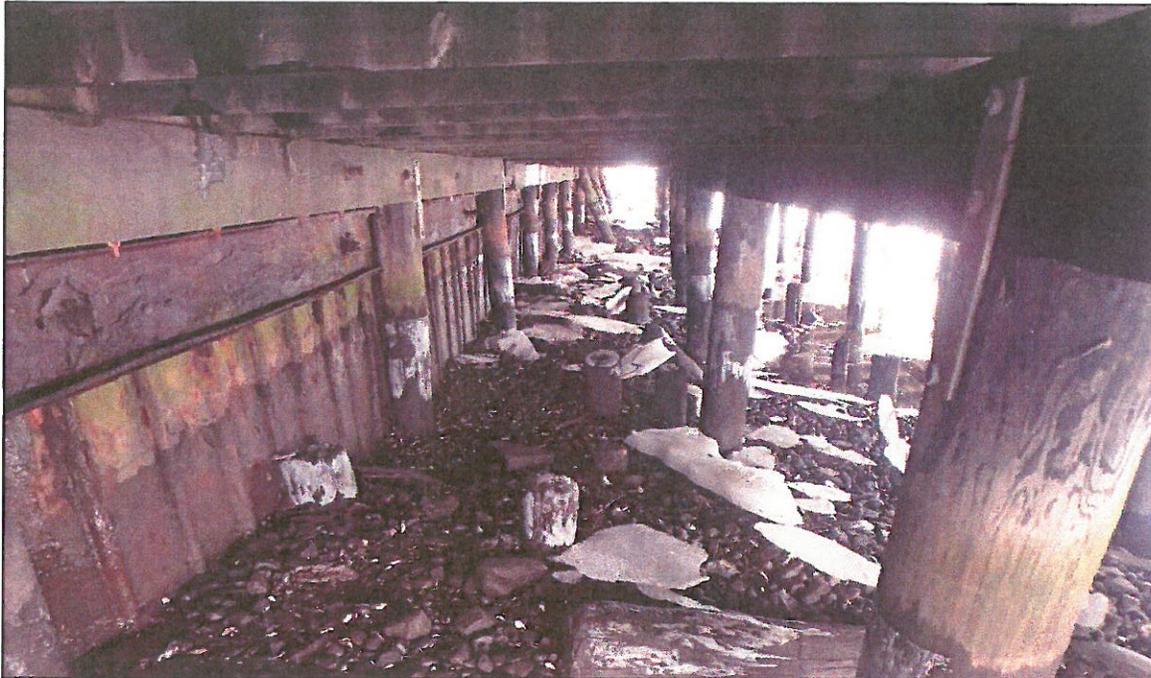


PHOTO 5: A view of the underside of the pier looking north



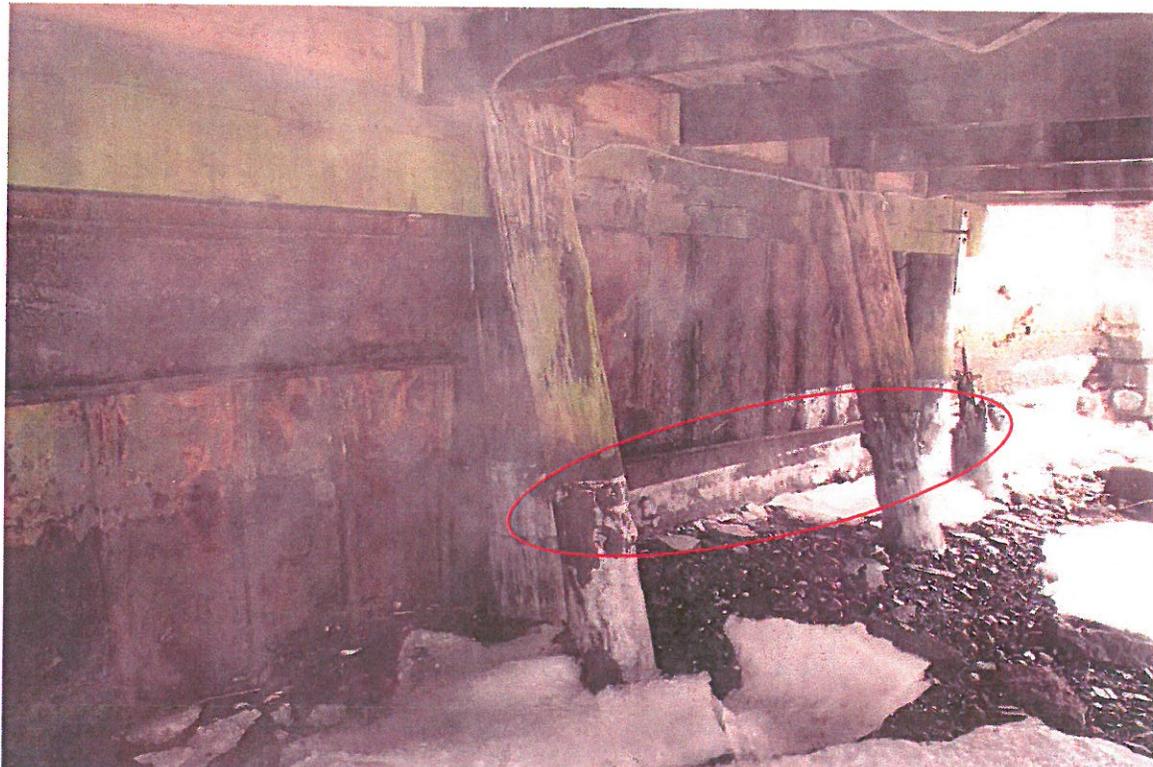
PHOTO 6: A view of a typical section of the steel bulkhead

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COASTAL RESOURCES

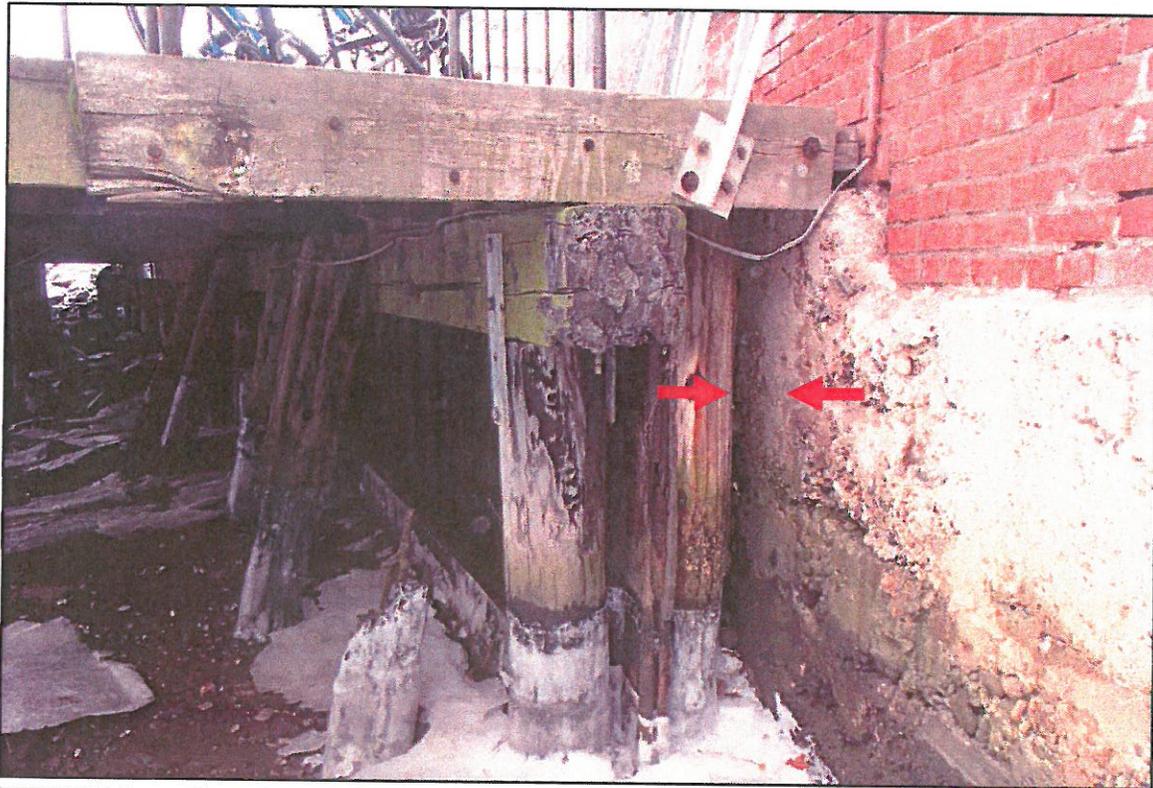


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FEB 12 2018  
COASTAL RESOURCES  
MANAGEMENT COUNCIL

**PHOTO 7:** A severely corroded tie rod adjacent to a failed tie rod



**PHOTO 8:** The wale at the north end of the bulkhead has failed and sits along the mudline



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FEB 12 2018  
COASTAL RESOURCES  
MANAGEMENT COUNCIL

**PHOTO 9:** Opening at the northern terminus of the existing bulkhead that permits retained material to discharge into the river.



**PHOTO 10:** A view of the rubble shore line looking south

**PUBLIC HEARING ON SHORELINE CHANGE SPECIAL AREA MANAGEMENT PLAN  
(BEACH SAMP):**

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## Memorandum

To: Jennifer Cervenka, CRMC Chair and Council members  
From: Grover Fugate, CRMC Executive Director   
Date: June 7, 2018  
Re: **CRMC Shoreline Change (Beach) SAMP** – Proposed changes to Beach SAMP chapters for Council consideration

The CRMC with assistance from the URI Coastal Resources Center developed the draft chapters 1 through 7 for the CRMC's Shoreline Change Special Area Management Plan (Beach SAMP) to address coastal hazard risk assessment and analysis, including recommendations to mitigate property risk from sea level rise, shoreline erosion, and coastal storm surge flooding. The Beach SAMP document will be adopted as a guidance document in conformance with the requirements of R.I. Gen. Laws § 42-35-2.12, and accordingly will not be adopted pursuant to the Administrative Procedures Act. The Beach SAMP coastal hazard analysis detailed in chapter 5 (CRMC Coastal Hazard Application Guidance) will be implemented in a future amendment to § 1.1.6 of the Red Book (650-RICR-20-00-1).

Following a 30-day public notice issued on February 20, 2018 the Council adopted Beach SAMP chapters 3, 4, and 5 during a public hearing held on April 10, 2018. Comments were received from the Conservation Law Foundation (March 23). Since the April 10 Council adoption, I have two amendments that I'd like the Council to consider for chapters 3 and 5 as follows:

1. Add new section 3.3 - Future Research Needs to chapter 3 that summarizes recommended research opportunities to enhance the suite of STORMTOOLS including a Coastal Environmental Risk Index (CERI) mobile application, estimation of wind damage from coastal storms, and real time application of CERI, among other tool extensions.
2. Modify Table 1 Sea Level Rise (SLR) Projections in chapter 5 to correct for the upper 83 percentile values for the NOAA derived SLR projections for Newport, RI using the NOAA high curve (9.61 feet by 2100).

The CRMC issued a second public notice on April 12 for Beach SAMP chapters 1, 2, 6, and 7 and comments were received from the Conservation Law Foundation (May 14) and Save The Bay (May 14). Based on those comments the following edits are recommended for Chapter 7:

1. Section 7.1.1.2 - revise text to read: It is important to note that adaptation strategies and tools included in this chapter are not necessarily limited to those that are currently eligible for permitting by all relevant regulatory agencies, including CRMC, and some adaptation measures may require permitting by other agencies and/or may be prohibited by those agencies.
2. Section 7.2.1.1 - revise text to read: It is important to note that adaptation strategies and tools included here are not necessarily limited to those that are currently eligible for permitting by all relevant regulatory agencies, including CRMC, and some adaptation measures may require permitting by other agencies and/or may be prohibited by those agencies.
3. Section 7.2.8.1 – revise last sentence to read: Additionally, the CRMC favors non-structural methods of shoreline protection (see the RICRMP §1.3.1(G)(1)); the reasons for this are enumerated in Chapter 4, Section 4.3.1.5, “Shoreline Protection Structures.”

In addition to the above substantive changes a number of minor editorial changes (e.g., spelling, word substitutions, etc.) that were non-substantive have been incorporated within the chapters base on stakeholder comments.



State of Rhode Island and Providence Plantations  
**Coastal Resources Management Council**  
Oliver H. Stedman Government Center  
4808 Tower Hill Road, Suite 3  
Wakefield, RI 02879-1900

(401) 783-3370  
Fax (401) 783-3767

## **PUBLIC NOTICE**

Pursuant to the provisions of R.I. Gen. Laws Chapter 46-23, as amended, the Rhode Island Coastal Resources Management Council (CRMC) hereby gives notice of its intention to afford the public an opportunity to offer written comment and attend a public hearing at which oral and written comments may be offered concerning the CRMC's intention to adopt the following chapters (1, 2, 6 and 7) for the **Shoreline Change Special Area Management Plan (Beach SAMP)**. Please click on the hyperlinks below to download a .PDF file copy of each individual chapter.

[Chapter 1 –Introduction](#)

[Chapter 2 – Trends and Status: Current and Future Impacts of Coastal Hazards in Rhode Island](#)

[Chapter 6 – State and Municipal Considerations](#)

[Chapter 7 - Adaptation Strategies and Techniques for Coastal Properties](#)

The CRMC intends to adopt these 4 chapters above as part of the Shoreline Change Special Area Management Plan (Beach SAMP). Once fully completed and following approval by NOAA the Beach SAMP will then become part of the CRMC's federally-approved Coastal Resources Management Program (CRMP). The Beach SAMP will be a guidance document and it will not be adopted pursuant to the state Administrative Procedures Act. Accordingly the Beach SAMP will not be assigned a RI Code of Regulations (RICR) number.

A **public hearing** will be held at **6:00p.m. on May 22, 2018** in the Conference Room A at the Department of Administration, One Capitol Hill, Providence, RI. The room is accessible to the disabled and persons requesting interpreter services for the hearing impaired must notify the Council office at 401-783-3370 or RI 711 at least three (3) business days in advance of the hearing date so that such assistance can be provided at no cost to the person requesting.

All interested persons are invited to **submit written comments** on the proposed Beach SAMP chapters 1, 2, 6 and 7 **by May 14, 2018** to provide advance notice to the Council prior to the public hearing. Comments may be submitted via email to [cstaff1@crmc.ri.gov](mailto:cstaff1@crmc.ri.gov) or by letter directed to Grover J. Fugate, Executive Director, at the

CRMC address above.

Due to the large number of pages the proposed Beach SAMP chapters are not attached to this public notice. However, electronic .PDF file copies of the subject chapters listed above are available on the CRMC web site by clicking on the chapter hyperlinks above or by [clicking here](#). Further information may be obtained by contacting the Coastal Resources Management Council offices at 783-3370.

Signed this 12th day of April, 2018.



---

Jeffrey M. Willis, Deputy Director  
Coastal Resources Management Council



**For a thriving New England**

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Providence, RI 02908  
P: 401.351.1102  
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May 14, 2018

**By email: [cstaff1@crmc.ri.gov](mailto:cstaff1@crmc.ri.gov)**

Coastal Resources Management Council  
Oliver H. Stedman Government Center  
4808 Tower Hill Road, Suite 3  
Wakefield, RI 02879

Re: Comments on Rhode Island Shoreline Change Special Area Management Plan  
Chapter 1: Introduction  
Chapter 2: Trends and Status: Current and Future Impacts of Coastal Hazards in Rhode Island  
Chapter 6: State and Municipal Considerations  
Chapter 7: Adaptation Strategies and Techniques for Coastal Properties

Coastal Resources Management Council:

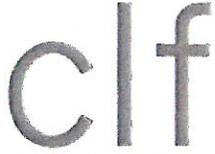
We appreciate the opportunity to comment on Chapters 1, 2, 6, and 7 of the Rhode Island Shoreline Change Special Area Management Plan (Shoreline Change SAMP). The Conservation Law Foundation (CLF) applauds the Coastal Resources Management Council (CRMC) for the excellent and comprehensive work that has been done on the Shoreline Change SAMP to date. CLF is grateful for your extensive outreach and willingness to engage stakeholders, especially your efforts to allow participation by video.

### **General Comment**

The Shoreline Change SAMP as a whole would benefit from the addition of a glossary of terms. Readers may not be familiar with the many acronyms and technical terms used throughout. Consider either italicizing or using a different font in the text when a defined term is used, as this will signal to readers that they can turn to the glossary for more information on the term.

### **Chapter 1: Introduction**

Please consider being more direct and explicit about climate change from the start, both in the Vision section and the Goals and Principles section. In the Vision section, number 3, you



conservation law foundation

might also highlight STORMTOOLS as a key resource. Thank you for recognizing in principle 5 that the SAMP aims to consider public access.

Please include the particulars of CRMC’s jurisdiction as compared to the geographic jurisdiction of the Shoreline Change SAMP area boundary, perhaps in the Vision section, paragraph 5. Given the frequent mention of both CRMC’s jurisdiction and the Shoreline Change SAMP Boundary, an explanation here will alert the reader early on to be mindful of the differences.

## **Chapter 2: Trends and Status: Current and Future Impacts of Coastal Hazards in Rhode Island**

While the first paragraph of the Overview recognizes “our changing climate,” the Shoreline Change SAMP could more directly and explicitly recognize climate change. Thank you for discussing the impacts on groundwater and saltwater intrusion in section 2.3.3 as this is an important part of the conversation. In 2.4.1, the Shoreline Change SAMP might elaborate further on the shortcomings of FEMA maps as well as how these shortcomings impact flood insurance.

## **Chapter 6: State and Municipal Considerations**

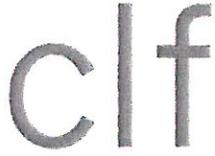
CLF appreciates the extensive recommendations in this chapter related to how municipalities can incorporate tools and other elements of the Shoreline Change SAMP into their land use planning and related policies, particularly in areas that are outside the jurisdiction of CRMC.

In paragraph 2 of the Overview, consider reiterating the difference between CRMC jurisdiction and the Shoreline Change SAMP Boundary. In section 6.3, at the end of the first paragraph, you might encourage municipalities to formally adopt CRMC’s Coastal Hazard Application Guidance. In paragraph 7 of section 6.3, it may be helpful to elaborate on “the inaccuracy of existing FEMA maps for Rhode Island,” even if only by referencing articles in a footnote.

Thank you for including CLF’s Climate Adaptation and Liability report in paragraph 5 of section 6.6.2.

## **Chapter 7: Adaptation Strategies and Techniques for Coastal Properties**

In 7.1.1 Chapter Objectives, perhaps in a new paragraph 5, please consider adding a warning that some of the adaptation measures discussed may be prohibited or require permits in some areas. For example, someone might read the section on fill and incorrectly think that adding fill to a wetland is an appropriate resiliency measure. In addition to including cautionary



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language at the start of the chapter, you might also consider inserting a new sentence in the first paragraph of 7.3 reiterating that some of the adaptation measures discussed may require permits or be prohibited in certain areas.

While this chapter clearly articulates Rhode Island’s prohibition of “new structural shoreline protection measures on barriers classified as undeveloped, moderately developed, and developed, as well as on all shorelines adjacent to Type I waters,” it would be useful to provide more context to the reader as to why these structural measures are prohibited, including their negative impacts on natural coastal ecosystems.

We appreciate you noting synergistic effects of storm surge, coastal erosion, and sea level rise, as well as expressing a preference for natural and nature-based infrastructure.

Thank you again for posting these four chapters and soliciting feedback. We appreciate the opportunity to comment and look forward to a more comprehensive review of the entire document when it is complete.

Sincerely,

A handwritten signature in blue ink that reads 'Amy E. Moses'.

Amy E. Moses  
Vice President and Rhode Island Director



100 Save The Bay Drive  
Providence, RI 02905

F: 401-273-7153  
SAVEBAY.ORG

May 14, 2018

Beach SAMP Team  
Coastal Resources Center  
URI Graduate School of Oceanography  
220 South Ferry Road  
Narragansett, RI 02882

**Re: Shoreline Change SAMP – Chapters 1 & 2**

Dear Team,

Thank you for the opportunity to review and provide comment on Chapters 1 and 2 of the Shoreline Change Special Area Management Plan. Specific comments and recommendations are provided below.

Chapter 1:

No comments

Chapter 2:

*Section 2.2.1.1.2* Change 0.90 feet to inches to keep it consistent with the rest of the document

*Section 2.4.1.2a* Add a comma after FUNWAVE...

*Section 2.4.2.3* Fifth sentence – replace the word “but” with “by”

Thank you for your consideration of our comments. Please let us know if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "David Prescott". The signature is fluid and cursive.

David Prescott  
South County Coastkeeper

# CHAPTER 1

## Introduction

### Table of Contents

1.1	Vision, Purpose, and Context of the Shoreline Change Special Area Management Plan ...	2
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DRAFT

## 1.1 Vision, Purpose, and Context of the Shoreline Change Special Area Management Plan

1. The coastline of Rhode Island is one the state's most iconic and treasured assets. The 420 miles of barrier beaches, historic waterfronts, bluffs, headlands and salt marsh make Rhode Island the 'Ocean State' and give rise to major sectors in the state's economy including tourism and marine trades.
2. It is the Rhode Island Coastal Resources Management Council's responsibility to ensure that decisions made concerning Rhode Island's coastline are well thought out and based on the best available science. **Toward that end, the vision of the Rhode Island Shoreline Change Special Area Management Plan (SAMP) is to provide guidance and tools for state and local decision makers to prepare and plan for, absorb, recover from, and successfully adapt to the impacts of coastal storms, erosion, and sea level rise.**
3. The Shoreline Change SAMP is a collaborative effort between the state's coastal agency, the CRMC, and a University of Rhode Island (URI) team comprised of both researchers from the College of the Environment and Life Sciences [CELS], the Graduate School of Oceanography, the College of Engineering, and outreach experts from the Coastal Resources Center/Rhode Island Sea Grant College Program [CRC/Sea Grant]. Invaluable expertise is also provided by Roger Williams Law School's Marine Affairs Institute, the Rhode Island Sea Grant Legal Program, and Eastern Connecticut State University. Close collaboration with other state agencies and coastal municipalities is also a key component of the Shoreline Change SAMP. This collaboration ensures that cutting-edge science informs an inclusive policy development process focused on practical solutions and outcomes.
4. Because planning for storms, erosion, and sea level rise is so closely tied to land use decision making at the local level, the research, tools and strategies presented in the Shoreline Change SAMP were developed with coastal municipalities and state agencies in mind. The Shoreline Change SAMP has been designed purposefully to be a guidance and planning document rather than a more prescriptive regulatory document with explicit policies, regulations or standards, in order to provide the flexibility to local and state decision makers on the frontline in protecting the health and welfare of their residents, to identify strategies most appropriate for a specific community.
5. The guidance offered by this Shoreline Change SAMP is primarily for applicants seeking coastal permits from CRMC. CRMC is proposing a requirement that coastal permit applicants complete a five-step risk assessment process for proposed developments within CRMC's jurisdiction as part of the permit application.

6. Other audiences for this SAMP, in addition to CRMC members, staff, and coastal permit applicants, are decision makers, planners, boards and commissions in Rhode Island's 21 coastal communities who are principally responsible for coping with the impacts of storms, coastal erosion, and sea level rise outside of CRMC's jurisdiction. The Shoreline Change SAMP is also intended to aid other state and federal agencies responsible for coastal resources, assets and property in Rhode Island in future planning and decision making.
7. Rhode Island's coastline is continuously shaped by storms, erosion, and tidal inundation. As the climate changes, the impacts of these natural coastal processes and hazards are increasingly threatening coastal properties, infrastructure, and social, cultural and environmental assets throughout the state.
8. Rhode Island has long been a leader in innovative thinking and the successful management of its most prized coastal features and resources. While coastal resilience has now become a modern day buzz word following major storm events such as Hurricane Katrina in 2005 and Hurricane ("Superstorm") Sandy in 2012, resilience has long been a part of the fabric and tradition of Rhode Island. One only has to look back to Rhode Island's history in colonial times to see examples of innovation in policy and technology, or to the recovery from the Great Hurricane of 1938 to see the resilience of Rhode Islanders and the coastal communities and ecosystems that make up the state.
9. Dynamic storm events can highlight the damaging impacts of storm surge and flooding on coastal communities, the migratory nature of the coastal barriers along Rhode Island's southern coast, and the importance of preparedness and planning at both the state and local level to expedite recovery. For example, Superstorm Sandy, a hybrid tropical/extratropical storm that made landfall in October 2012, affected the Rhode Island coastline with several days of storm surge and waves but very little rainfall. National Ocean Service tide gauges reported storm surges of 5.3ft and 6.2ft in Newport and Providence respectively, with maximum sustained winds of 64 mph (56kts) and gusts from 81-86mph (70-75kts) (National Hurricane Center, 2013). The damage was felt heavily across the southern coast of the state from Narragansett to Westerly. Ultimately, this storm affected approximately 300,000 Rhode Island residents (28% of the state's population); resulted in over \$12.6 million in requested public assistance from the Federal Emergency Management Agency; and \$24 million in claims to the National Flood Insurance Program just for damage in Washington County (RI Office of Housing and Community Development, 2013). However, despite the damage along the south shore, this storm wasn't a hurricane or even a once in 100-year (1% annual chance) storm event when it made landfall in Rhode Island, rather it was a once in 25-year storm (4% annual chance) event for Westerly, and a much less intense storm event for the rest of the state. Had this storm been a hurricane or a 1% annual chance storm event, impacts would have much greater.

10. Tide gauge observations in Newport indicate a rate of 10.8 inches (27.4 cm) of relative sea level rise over the last century or 2.74 mm per year<sup>1</sup>. However, the rate of sea level rise globally and in Rhode Island specifically is accelerating. The CU Sea Level Research Group reports current satellite altimetry measurements of the rate of global sea level rise of 3.3 +/-0.4 mm per year since 1993. Relative sea level rise in Rhode Island measured more than 4 millimeters per year between 1983 and 2009 (Carey et al. 2015). Since the start of this Shoreline Change SAMP effort in 2012, NOAA's sea level rise projections have changed several times. In 2015, NOAA projected the range in sea level rise above 1990 levels to be a maximum of approximately 1 foot by 2035, 2 feet by 2050, and 7 feet by 2100.<sup>2</sup> Currently, NOAA's 2017 "high curve" projections for Newport, Rhode Island suggest that by 2100 sea levels may rise as much as 10 feet above 1990 levels.<sup>3</sup>
11. Looking forward, as sea level rises both hurricanes and "nor'easters" will be more damaging, and the flooding effects will be felt farther inland. Storm surge and wave heights will increase as sea level rises resulting in more properties being damaged or destroyed during a storm, including inland properties that have never before experienced flood damage. Furthermore, not only will the extent of flooding expand and storm surge levels rise during storm events like "Superstorm" Sandy, but more areas will be affected by high tides on a daily basis. Frequent tidal inundation of coastal properties, roadways and parking lots is already an issue in many coastal communities in Rhode Island from Watch Hill, to Wickford, to Warren and Providence.
12. The state's coastal wetlands are highly vulnerable to accelerating sea level rise; essentially they are drowning in place. Permanent flooding of Rhode Island's wetlands is already occurring, as these wetlands cannot gain sufficient elevation to keep up with sea level rise. This trend will continue into the future causing significant loss of habitat for fish, shellfish, birds, and other wildlife, and recreation areas. The loss of coastal wetlands also means a loss of the protection they provide to coastal communities as an important natural barrier to storm surge. In addition, the loss of coastal wetland will reduce the overall carbon storage potential of these ecosystems and result in an increased contribution of CO<sup>2</sup> concentrations to the atmosphere. A recent statewide analysis of sea level rise impacts to salt marshes conducted by CRMC and partners estimates a 52% and 87% loss in existing salt marsh with three and five feet of sea level rise, respectively. Therefore, it is imperative that state and local planning and adaptation efforts start now (see Technical Report #1 in Volume 2 for more information).

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<sup>1</sup> NOAA Tide Gauge Data for Newport, RI:

[http://tidesandcurrents.noaa.gov/sltrends/sltrends\\_station.shtml?stnid=8452660](http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8452660)

<sup>2</sup> These planning horizons are have been proposed to be included in CRMC's Climate Change and Sea Level Rise Policy (Section 145 of the Coastal Resources Management Program (a.k.a. Red Book).

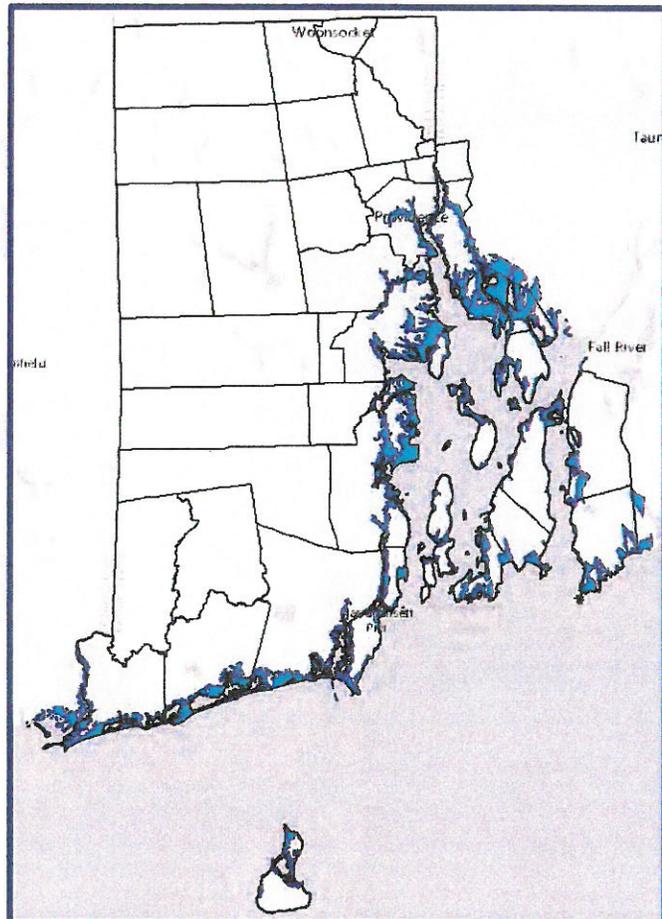
<sup>3</sup> U.S. Army Corps of Engineers and NOAA Sea Level Rise Curves <http://www.corpsclimate.us/ccaceslcurves.cfm>

13. The Shoreline Change SAMP offers adaptation strategies that coastal permit applicants and the other audiences listed above can consider during the planning and design development phase of their project to protect their assets, accommodate changing coastal conditions, or relocate/retreat from high hazard areas in changing coastal areas.

## 1.2 The Shoreline Change SAMP Scope and Project Boundary

1. This SAMP is focused on the coastal effects of rising sea levels and the increased frequency and severity of coastal storm events. Other climate change impacts caused by increased precipitation, riverine flooding, heat, etc. are not addressed in this document.

2. The study area for this SAMP encompasses the entire coastal zone of Rhode Island and all 21 coastal communities impacted by sea level rise, storm surge and tidal flooding, as well as coastal erosion. The planning boundary for the Shoreline Change SAMP was identified through the development and application of STORMTOOLS, a cloud-based online mapping tool that illustrates various storm surge and sea level rise scenarios for all 420-miles of Rhode Island's Coastline. Because CRMC adopted the NOAA High Curve in 2016 as its reference for future sea level rise projections, CRMC has defined the Shoreline Change SAMP Planning Boundary as the 7-feet of sea level rise with a 100-year return period storm event, which can be equated to the water levels documented in Rhode Island during 1954's Hurricane Carol. For more information on sea level rise data, see Section 1.1.5.



**Figure 1. Shoreline Change SAMP Planning Boundary**

3. CRMC's jurisdiction does not cover all the land area within the Shoreline Change SAMP Planning Boundary. For this reason, the Shoreline Change SAMP also includes recommendations and guidance to assist other state agencies and municipal governments with decision making for high hazard coastal areas that are out of CRMC's jurisdiction.

### 1.3 Goals and Principles of the Shoreline Change SAMP

1. **The Rhode Island Shoreline Change SAMP provides state and local decision makers with information, guidance and a suite of tools to assess, plan for, recover from and adapt to the impacts of coastal storms and sea level rise.** To accomplish this goal, new data and information will be collected and modeled to illustrate areas, resources and infrastructure that may be impacted under different storm and sea level rise scenarios. Planning tools, adaptation strategies and best practices relevant to Rhode Island will be compiled and shared to inform state and local decision making. Tailored technical assistance will be provided to the maximum extent possible to local and state officials to assist in the implementation and use of the information, guidance and tools developed through this SAMP.
2. **Provide a forum for public discourse on current and future impacts and how best to adapt to the short and long-term impacts of coastal storm events and rising tide levels.** The Rhode Island Shoreline Change SAMP stakeholder process will be designed so that information can be shared on how sea level rise, storm events and coastal erosion will impact the people, places and resources in Rhode Island. In addition, this public forum will provide an avenue for two-way exchange of ideas and concerns regarding adaptation, planning and response to these impacts at both the state and local level.
3. **The Rhode Island Shoreline Change SAMP informs revisions to the policies and standards in the Rhode Island Coastal Resources Management Program and existing CRMC SAMPs to better address the risks posed by erosion, coastal storms and sea level rise.** The Shoreline Change SAMP research, tools and stakeholder process will provide the scientific evidence, background information, and best practices to support updates to Rhode Island's coastal policies aimed at increasing coastal resilience throughout the State.
4. **Minimize the impacts of coastal hazards through proactive planning.** Following the federal mandate set forth in the Coastal Zone Management Act, the development of the Shoreline Change SAMP will aim to provide guidance on how to minimize the impacts and consequences caused by improper development in areas at risk to coastal hazards

including erosion, storm surge and sea level rise. Guidance will be focused on reducing damage and supporting wise investments in sustainable coastal development

- 5. Maximize the protection of public access, recreation and sensitive coastal resources.** Guidance developed through the Shoreline Change SAMP will consider how public access, recreation and sensitive coastal resources will be impacted by coastal hazards and how planning, development standards, adaptation strategies, or policies can protect or minimize negative impacts.

#### Guiding Principles of the Shoreline Change SAMP

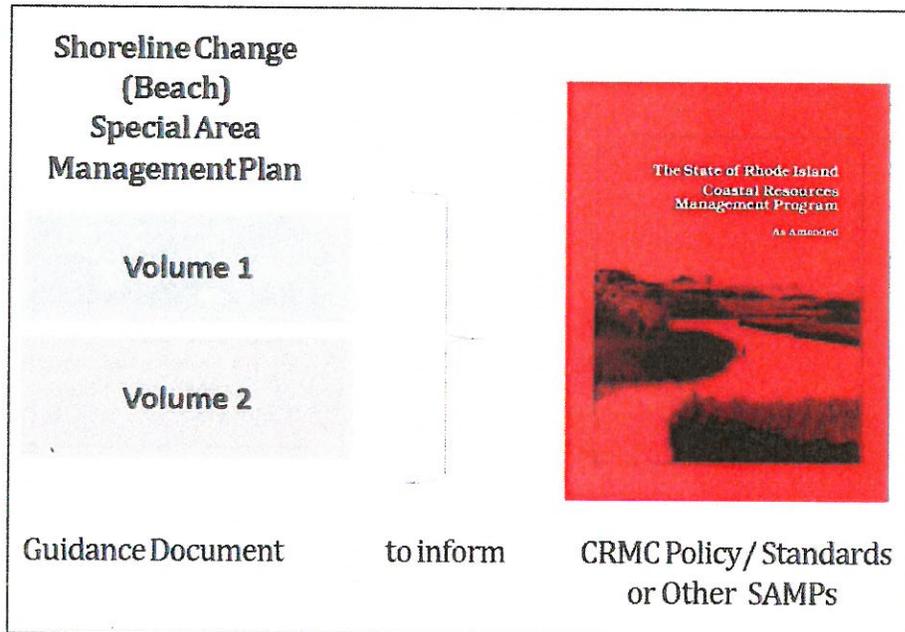
- Serve as a guidance document to support regulatory changes (CRMC policy and standards), and any regulatory changes will be made to the Red Book and other existing SAMPs;
- Be developed in a transparent manner;
- Use best science available to understand changing conditions of Rhode Island's shoreline and help develop appropriate strategies for response;
- Consider synergistic long-range impacts over time of sea level rise, coastal storms, and erosion;
- Incorporate risk identification and awareness in design and development;
- Identify early actions and recommended strategies to monitor, evaluate, and readjust;
- Encourage incremental phasing of adaptation strategies and actions, and keep flexibility in the system;
- Maximize agency coordination and public participation; and
- Emphasize "No Regrets" decisions.

## 1.4 Contents of Shoreline Change SAMP Document

1. The Shoreline Change SAMP is comprised of two volumes. Volume 1 provides: a synthesis of the current scientific understanding of sea level rise, storm surge, tidal flooding, and coastal erosion, as well as the impacts these hazards pose to infrastructure, other developed property such as municipal buildings and residential properties, and the social, environmental and cultural assets in Rhode Island; a description of the tools developed to model and map potential future impacts from these coastal hazards; a discussion of risk and risk management within the coastal zone; and recommendations for best management practices and adaptation strategies or techniques to be employed at both the state and local level to minimize future risk. Volume 2 contains all the technical reports that support the new research conducted as part of the SAMP project. These technical reports contain more detailed information on research methodology and findings and ultimately support the synthesis provided in Volume 1.
  
2. Volume 1 of the Shoreline Change SAMP contains the following chapters:
  - **Chapter 1- Introduction:** This chapter outlines the purpose and structure of Shoreline Change SAMP.
  - **Chapter 2- Trends and Status: Current and Future Impacts of Coastal Hazards:** This chapter summarizes the best available science on coastal erosion, storm and sea level rise trends in Rhode Island.
  - **Chapter 3 Assessing Coastal Hazard Risk:** The purpose of this chapter is to define coastal risk, resilience & related terms, present future planning scenarios that illustrate risk from storm events with projected sea level rise, and present the various mapping and modeling tools developed as part of the Shoreline Change SAMP to aid planning and decision making.
  - **Chapter 4 Rhode Island's Exposure to Coastal Hazards** - This chapter summarizes how current and future coastal hazards may impact infrastructure, property, and the social, environmental and cultural assets in Rhode Island.
  - **Chapter 5- RI CRMC Coastal Hazard Application Guidance.** This chapter presents a five-step process for how CRMC intends to require coastal development permitting applications to consider the impacts of current and future coastal hazards.
  - **Chapter 6- State and Municipal Considerations:** The purpose of this chapter is to provide guidance on how to incorporate coastal hazards into state agency and municipal planning and decision making.
  - **Chapter 7- Adaptation Strategies & Techniques:** The focus of this chapter is on presenting an array of best management practices to improve state and local planning and decision making with respect to shoreline change and coastal

hazards. In addition, physical adaptation techniques, retrofits and structural design considerations are also discussed.

- **Chapter 8- Future Research Needs:** This final chapter summarizes the data gaps and research needs identified throughout the Shoreline Change SAMP process.



**Figure 1. The Shoreline Change SAMP will be a guidance document that is used to inform regulatory changes to the Rhode Island Coastal Resources Management Program.**

3. All new or revised CRMC policies and standards concerning sea level rise, storm events and erosion developed through the Shoreline Change SAMP process will be made directly to the RICRMP (also referred to as the Red Book) or existing SAMP policies and standards (see Figure 1). As a result, there will not be a section or chapter within Volume 1 of the Shoreline Change SAMP that lists new policies.

---

## 1.5 References

Allison, I., Bindoff, N.L., Bindschadler, R.A., Cox, P.M., de Noblet, N., England, M.H., Francis, J.E., Gruber, N., Haywood, A.M., Karoly, D.J., Kaser, G., Le Quéré, C., Lenton, T.M., Mann, M.E., McNeil, B.I., Pitman, A.J., Rahmstorf, S., Rignot, E. Schellnhuber, H.J, Schneider, S.H., Sherwood, S.C., Somerville, R.C.J., Steffen, K., Steig, E.J., Visbeck, M. and A.J. Weaver. 2009. The Copenhagen Diagnosis: Updating the World on the Latest Climate Science. The University of New South Wales Climate Change Research Centre (CCRC), Sydney, Australia. 60pp.

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## CHAPTER 2

# Trends and Status: Current and Future Impacts of Coastal Hazards in Rhode Island

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## 2.1 Overview

1. The purpose of this chapter is to provide a brief synopsis of the scientific basis underlying the Shoreline Change Special Area Management Plan. The Shoreline Change SAMP is focused on three sources of coastal hazard risk: **storm surge**, **coastal erosion**, and **sea level rise**. Whereas Rhode Island coastal communities have been grappling with these sources of risk for some time, our changing climate is exacerbating these sources of risk. This has driven the CRMC to develop the Shoreline Change SAMP in order to help coastal property owners and state and local decision-makers plan for changing future conditions. The science in this chapter provides a foundation for this document by characterizing trends in our changing climate and describing how those trends are influencing sources of coastal hazard risk.
2. This chapter is not intended to be an exhaustive discussion of the science of climate change, nor of all of the coastal and other hazards which may be influenced by climate change. These areas of science are complex and rapidly changing. Given this dynamism, CRMC chose to develop this chapter as a brief summary that is designed for ease of updating in the future as new data are available.
3. This chapter includes a brief summary of the most updated science available on these topics. It includes a brief, general discussion of the trends associated with climate change that are most relevant to changing conditions on Rhode Island's coast, as well as a summary of the physical effects associated with these trends, both globally and regionally. Discussion is narrowly focused on changing conditions on Rhode Island's coast and in particular on the three sources of coastal hazard risk, in order to retain a focus on the structures within the coastal zone that are under CRMC's jurisdiction and exposed to these sources of coastal hazard risk. The chapter concludes with discussion of future research needs related to these topics.
4. This chapter does not include detailed discussion about the exposure of Rhode Island's coastal communities and coastal resources to storm surge, coastal erosion and sea level rise. Please see Chapter 4 for a detailed discussion of Rhode Island's exposure.
5. CRMC recognizes that its policy and planning horizons will need to be regularly updated into the future as the science changes. CRMC's sea level rise policy is formulated to

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address the dynamic nature of this science. CRMC policy, as reflected in Section 145 of the RICRMP, relies upon the “high” sea level change curve included in the most recent NOAA sea level rise (SLR) data. The latest “high” curve can be viewed using the U.S. Army Corps of Engineers (USACE) Sea Level Change Curve Calculator at <http://www.corpsclimate.us/ccaceslcurves.cfm>. This allows CRMC to always base policy decisions on the most recent SLR projections. CRMC expects to update the Shoreline Change SAMP document, planning tools and analyses on an ongoing basis, using the most recent SLR scenarios, as resources allow.

6. Further, coastal conditions are rapidly changing. In late 2017, three hurricanes – Harvey, Irma, and Maria – hit U.S. coastal communities in rapid succession. These three hurricanes are now among the top five most expensive hurricanes in U.S. history (NOAA National Hurricane Center 2018; NOAA National Centers for Environmental Information 2018). Further, the intensity of these three storms is consistent with scientific predictions that climate change would result in the increasing intensification of storms (see e.g. Sneed 2017).

## 2.2 Trends

### 2.2.1 Sea Level Rise

#### 2.2.1.1 Historic Sea Level Rise

1. Sea levels are rising, caused by rising sea temperatures, which causes thermal expansion, and rising air temperatures, which causes melting glaciers and ice sheets.
2. **Sea levels have risen**, both in Rhode Island and around the world. In Rhode Island, sea levels have risen over 10 inches (0.25 meters) since 1930, as measured at the Newport tide gauge. The historic rate of SLR at this gauge, measures from 1930 to 2017, is 0.11 inches (2.75 mm) a year. This is equivalent to a change of 0.90 feet (0.27 meters) in 100 years (NOAA n.d.; see also RI EC4 STAB 2017). Rhode Island’s rate of SLR is slightly higher than global SLR statistics. Global mean SLR rose by 7.48 inches (0.19 meters) between 1901 and 2010, at an average rate of 0.07 inches (1.7 mm) a year (Intergovernmental Panel on Climate Change (IPCC) 2014). See Table 1 for a summary of these data.

3. **Sea level rise is accelerating**, both in Rhode Island and globally. In Rhode Island, the mean annual rate of SLR at Newport, is 0.16 inches (3.98 mm) a year over the 30-year period of 1986-2017 (31 years) as measured by the Permanent Service for Mean Sea Level (Permanent Service for Mean Sea Level n.d.) Again, Rhode Island's recent rate of SLR is slightly higher than the global average. The rate of global mean SLR, as measured by satellite altimetry, increased over the period from 1993 to 2017 (24 years) to a rate of 0.12 inches (3.1 mm) a year (University of Colorado CU Sea Level Research Group 2018). However, short-term datasets (less than 30 years) should be used with caution, because of inherently large regression errors and the anomalous sea level increase during 2009-2010 due to a slowdown in the Atlantic Meridional Overturning Circulation (Goddard et al 2015). See Table 1 for a summary of these data.

*Table 1. Historic sea level rise and annual SLR rates, Rhode Island and global average*

	Historic sea level rise	Annual rate of SLR	Annual rate – recent acceleration
Rhode Island	10 in (0.25 m) (1930 to 2017)	0.11 in (2.75 mm)/yr (1930 to 2017)	0.16 inches (3.98 mm)/yr (1986-2017)
Global average	7.48 inches (0.19 m) (1901 to 2010)	0.07 inches (1.7 mm)/yr (1901 to 2010)	0.12 inches (3.1mm)/yr (1993-2017)

4. **Rhode Island is part of an accelerated sea level rise “hotspot.”** The above statistics have shown that observed sea level rise in Rhode Island is higher than the global average. This is consistent with a regional trend along the entire North American Atlantic coast between the Canadian Maritimes and North Carolina. Sallenger et al. (2012) found that SLR in this Atlantic coast region was 3-4 times higher than the global average between 1950-1979 and 1980-2009, describing this region as a “hotspot”.

#### 2.2.1.2 Projected Sea Level Rise

1. **Further sea level rise is projected for Rhode Island.** At the time of this writing, the National Oceanic and Atmospheric Administration (NOAA) **projects up to 9.6 feet of SLR in Rhode Island by 2100.** This projection is based on NOAA's 2017 analysis of SLR scenarios, and this particular statistic is based on the “high” curve and is estimated at the 83% confidence interval. NOAA's 2017 analysis also included an “extreme” curve which projected up to 11.7 feet of SLR at the 83% confidence

interval in Rhode Island by 2100. In the shorter term, the latest NOAA “high” curve projects 1.67 feet of SLR for 2030, 3.25 feet for 2050, and 6.69 feet for 2080, all at the 83% confidence level (NOAA 2017) (see Table 2 and Figure 1).

Table 2. Sea level rise projections for Rhode Island

	2030	2050	2080	2100
NOAA 2017 projections based on “high curve”	1.67 feet (83% CI)	3.25 feet (83% CI)	6.69 feet (83% CI)	9.6 feet (83% CI)

- Importantly, NOAA also provides SLR projections at the 17% and 50% confidence intervals, but CRMC has adopted the NOAA high curve at the 83% confidence interval, which represent more extreme SLR scenarios, for two reasons. First, NOAA (2017) has recommended using the “worst-case” or “extreme” scenario to guide overall and long-term risk and adaptation planning. Second, CRMC views use of worse-case scenarios as a way to hedge against the uncertainties inherent in projecting future SLR.

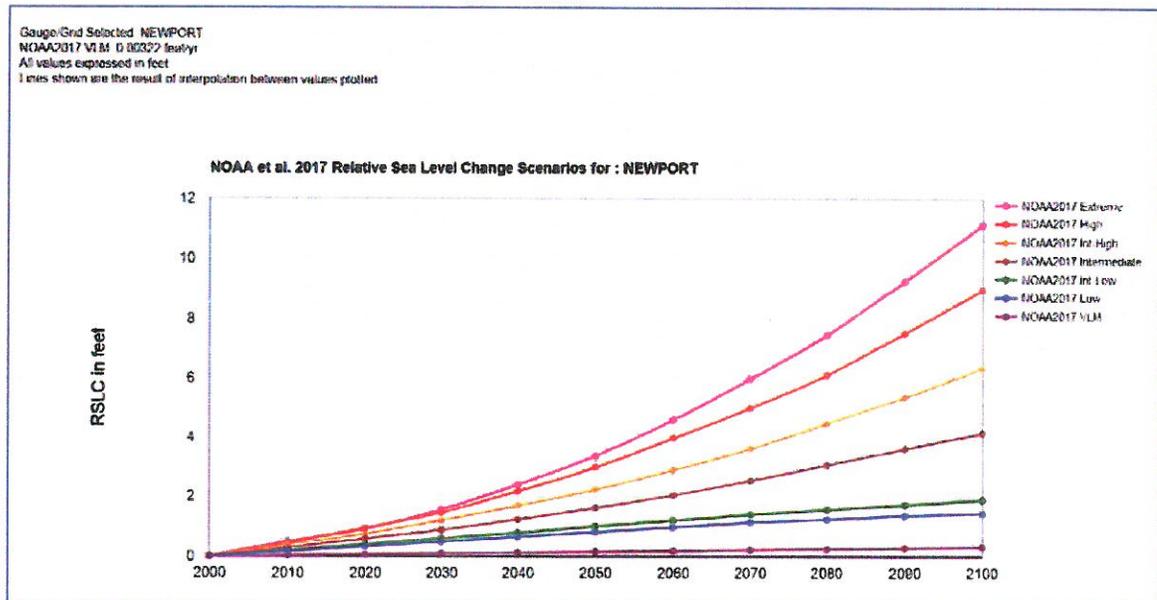


Figure 1. Relative Sea Level Change Scenarios for Newport, RI (NOAA, 2017).

- Sea level rise projections have changed.** Importantly, scenarios developed for the Shoreline Change SAMP document, planning tools and analyses are based on 2012

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NOAA SLR analyses which projected up to 6.6 feet of SLR in Rhode Island in 2100 under the high curve. In the shorter term, the NOAA 2012 SLR scenarios predicted 0.75 feet of SLR by 2030, 1.9 feet by 2050, and 4.39 feet by 2080 (NOAA 2012). **Scenarios in the Shoreline Change SAMP are based on these 2012 projections because these were the best available data at the time when Shoreline Change SAMP analyses and tools were undergoing development.** CRMC plans to update Shoreline Change SAMP tools and analyses with the newest SLR projections as time and resources allow.

- 4. Sea level rise projections continue to change.** Just as observed sea level rise has accelerated in recent years (see discussion above), so has the development of new sea level rise projections. Over the course of the Shoreline Change SAMP development process (2011 to 2018), three different sets of sea level rise projections have been in use. Early Shoreline Change SAMP analyses and tools began with consideration of 3- 5 feet of SLR by 2100, which was determined by a team of scientific advisors to the CRMC, based on Rahmstorf 2007 and Rahmstorf et al. 2011, and was incorporated into CRMC policy (see RICRMP section 1.1.10). NOAA's 2012 SLR scenarios offered new projections of up to 6.6 feet of SLR by 2100 under the high curve, and NOAA's most recent 2017 SLR scenarios offered newer projections of up to 9.6 feet of SLR under the high curve and the 83% confidence interval. See Figure 2 for a comparison of 2012 and 2017 SLR projections. This rapid succession of SLR scenarios illustrates the rapidly changing nature of the science and the need for policymakers to be prepared to absorb and incorporate new data and science on these sources of coastal hazard risk.

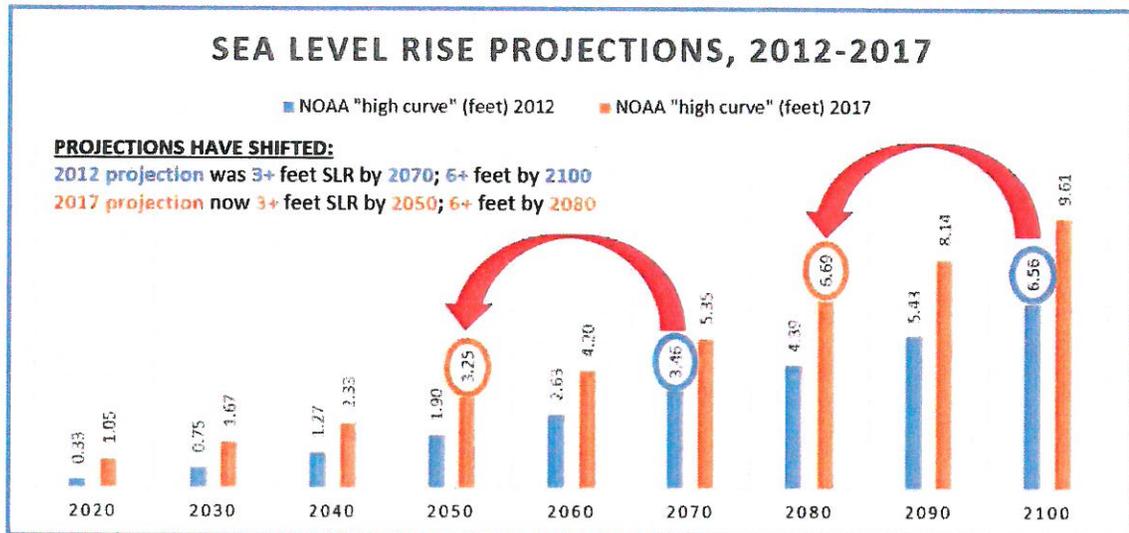


Figure 2. Comparison of NOAA 2012 and NOAA 2017 SLR projections (data sources: NOAA 2012; NOAA 2017)

5. **CRMC has adopted the NOAA high curve.** The CRMC has adopted the NOAA "high curve" at the 83% confidence interval as the foundation of its sea level rise policy as reflected in the Shoreline Change SAMP as well as the RICRMP. CRMC has adopted NOAA's SLR scenarios as foundational to the Shoreline Change SAMP because NOAA, as the nation's leading ocean and atmospheric science agency, has a wealth of experience and longstanding credibility in performing cutting-edge research using high-tech instrumentation to understand and predict changes in climate, weather, oceans, and coasts. CRMC has adopted the high curve and 83% confidence interval, a worse-case scenario, for two reasons. First, NOAA (2017) has recommended using the "worst-case" or "extreme" scenario to guide overall and long-term risk and adaptation planning. Second, CRMC views use of worse-case scenarios as a way to hedge against the uncertainties inherent in projecting future SLR.
  
6. **CRMC has adopted the U.S. Army Corps of Engineers Sea Level Change Curve Calculator.** The CRMC has also adopted the USACE's sea level change curve calculator for use in identifying and plotting sea level change scenarios. This online calculator offers a simple way for decision-makers to view, for themselves, the

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latest SLR scenarios and to view short, mid, and long-range SLR projections in both graph and table form. The CRMC has adopted this calculator because of ease of access and use, both for state and local decision-makers and individual coastal property owners. The calculator is online here:

<http://www.corpsclimate.us/ccaceslcurves.cfm>.

### 2.2.2 Storm Intensity

1. **Hurricanes and tropical storms *may* be impacted by a changing climate.** The physics driving climate are complex, making it difficult to determine how a changing climate will affect hurricanes and other tropical storms (RI EC4 STAB 2016). Whereas rising sea surface temperatures associated with climate change could influence the frequency and strength of such storms, other effects, such as increasing upper troposphere temperature and vertical wind shear, are detrimental to storm development and intensification (see NOAA GFDL 2018 and the sources cited therein).
2. **The extent to which climate change has affected hurricanes and other tropical storms is unclear.** A recent research review by the NOAA Geophysical Fluid Dynamics Laboratory concluded that it is premature to conclude that climate change has had a detectable impact on Atlantic hurricanes and tropical storms. However, NOAA notes that changes may already be occurring but are undetectable due to observational limitations and other constraints (NOAA GFDL 2018).
3. **Climate change is expected to result in the intensification of hurricanes and tropical storms worldwide.** Research predicts a global increase in the intensity of such storms on average, by to 2 to 11% based on IPCC mid-range emission scenario projections (Knutson et al. 2010), as well as a poleward expansion in the latitude range at which storms reach their highest intensity (Kossin et al. 2014). This increase in intensity also includes higher rainfall rates (discussed below). This increase in very intense storms is expected to take place despite a likely decrease or small change in the number of tropical cyclones worldwide (see NOAA GFDL 2018 and the sources cited therein). Some experts have noted that the three massive storms that characterized the 2017 hurricane season – Harvey, Irma, and Maria – are consistent with this expected intensification (see e.g. Sneed 2017).

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- 4. Hurricanes and tropical storms are likely to increase in intensity in the Atlantic basin, including the U.S. East Coast.** Overall, based on a synthesis of current science, NOAA GFDL (2018) reported with medium confidence that hurricane and tropical storms will be more intense on average in the coming century (as indicated by higher peak wind speeds and lower central pressures). Bender et al. (2010) projected a significant increase in the frequency of very intense storms (Category 4 and 5), although this increase may not be seen until the latter half of the century. However, based on Knutson et al. (2013) and a review of other studies, NOAA scientists reported *low* confidence that there will be an increase in these very intense Category 4 and 5 hurricanes in the Atlantic basin (NOAA GFDL 2018). Further, a reduction in the number of tropical storms and hurricanes is predicted for the Atlantic basin (Knutson et al. 2008, 2013). This does not, however, change the projection that future storms may be more intense on average (although not reaching the high intensity of a Category 4 or 5 storm).
  - 5. The frequency and intensity of extra-tropical storms is expected to increase.** The IPCC AR5 (2014) predicts an increase in both the frequency and intensity of extra-tropical storms for the U.S. East Coast. However, less research has been conducted on extra-tropical storms in comparison to hurricanes and tropical storms.

### 2.2.3 Increasing Precipitation

- 1. Hurricanes and tropical storms are expected to result in more rainfall.** This increase has been observed and is expected both globally (IPCC 2014) and for the Atlantic basin, including the U.S. east coast. Based on a synthesis of current science, NOAA GFDL reported with high confidence that Atlantic hurricanes and tropical storms in the coming century will have higher rainfall rates than present storms, particularly near the storm center (see NOAA GFDL 2018 and the sources cited therein). 2017's Hurricane Harvey, which resulted in a record 51.9" (1318 mm) of rainfall at one station west of Houston, Texas (van Oldenborgh et al. 2017), is one recent example of this trend (see further discussion below).
- 2. Heavy precipitation events are becoming more frequent and intense.** Whether a hurricane, tropical storm, or extra-tropical storm (e.g. a nor'easter), there has been a global increase in both the frequency and the intensity of heavy precipitation events (NCA 2017, IPCC 2014). This trend is consistent with physical responses to a warming climate, e.g. an increased amount of moisture in the atmosphere. This

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trend has both been observed and is expected to continue. An important recent example is 2017's Hurricane Harvey, which resulted in record rainfall in Houston, Texas. Both van Oldenborgh et al. (2017) and Risser and Wehner (2017) found that the extreme precipitation and flooding associated with Harvey was likely enhanced climate change (see also Waldman 2017).

3. Within the United States, this trend is most pronounced in the Northeast. For example, the NCA (2017) reports that between 1958 and 2016, this region has experienced a 55% increase in precipitation events that exceed the 99<sup>th</sup> percentile, and a 92% in the number of 2-day events exceeding the largest amount that is expected to occur over a 5-year period. Walsh et al. (2014) studied rainfall from 1901 to 2012 in New England and found that the intense rainfall events (heaviest 1% of all daily events) have increased 71% since 1958, although the 1960s were a particularly drought-prone time in the region. For further discussion and more sources please see RI EC4 STAB 2016.

## 2.3 Coastal Hazards Resulting from These Trends

### 2.3.1 Flooding

1. **Flooding is expected to increase as a result of sea level rise, increasing intensity of storms, and increased precipitation.** In the coastal environment, this includes both nuisance (tidal) flooding and storm surges, and other coastal flooding events. Inland, this includes riverine flooding. The U.S. Global Change Research Program indicates that both tidal and storm-related flooding are expected to increase in frequency and depth in the U.S. due to these drivers (NCA 2017). The IPCC (2014) found that "coastal systems and low-lying areas will increasingly experience submergence, flooding and erosion throughout the 21<sup>st</sup> century and beyond, due to sea level rise (*very high confidence*)." Further, the IPCC identified flooding and associated damages as a "key risk" for eastern North America due to its expected large magnitude, high probability or irreversibility of impacts, vulnerability or exposure of the region, and limited potential to reduce risk through adaptation or mitigation. Importantly, increased flooding means both an increase in the *areas* which are flooded as well as the *depth* of floodwaters. This is because sea level rise will expand existing floodplains, causing flooding in places which have not previously experienced flooding, and resulting in deeper floodwaters in previously-

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flooded areas.

2. **Nuisance flooding** is also sometimes called tidal or high tide flooding, and increasingly occurs in coastal locations both locally and globally as a result of sea level rise, which in turn causes higher than normal high tides. Nuisance flooding may affect individual coastal properties as well as roads, parking lots, and other public or commercial infrastructure in low-lying areas. The U.S. Global Change Research Program (2017) reported that this type of flood event has increased 5 to 10-fold since the 1960s in several U.S. coastal cities, and that rates of increase are accelerating in over 25 cities on the U.S. Atlantic and Gulf coasts. They further reported that this type of flooding will continue increasing in depth, frequency and extent over the 21<sup>st</sup> century.
3. **In Rhode Island**, nuisance flooding is already occurring in numerous low-lying locations around the state. STORMTOOLS can be used to view potential inundation in Rhode Island associated with nuisance flood events (1, 3, 5, and 10-year return period storms). Please see [www.beachsamp.org](http://www.beachsamp.org).
4. **Storm surge** refers to the rise of water levels caused explicitly by a storm, and is measured as the height above the normal predicted tide. The combination of sea level rise and increased storm intensity causes storm surges characterized by higher water levels that may extend further inland, causing greater damage. The U.S. Global Change Research Program (2017) reported that this type of extreme flooding is expected to increase due to both sea level rise and increased storm intensity, and associated sea level rise with increased storm surge flooding at a very high confidence level. The IPCC (2014) found that increasing storm surges and other forms of coastal flooding have the potential to disrupt livelihoods and create severe health risks across various sectors.
5. Storm surges are often described with an associated return period, or recurrence interval, which is an estimate of the likelihood that the storm or flooding event will occur (for further discussion see Shoreline Change SAMP Chapter 4). This concept is also useful in illustrating how, over time, rising sea levels result in more damaging storm surges. Over time, as sea levels rise, water levels associated with what is thought of as today's 100-year return period storm will increase, because a higher base sea level will increase the extent and depth of storm-related flooding. As a

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result, the 100-year return period storm of the future could result in much more flood-related damage than the 100-year return period storm of today. Further, from the perspective of water levels, SLR will cause today's 100-year return period storm to become a more regularly-occurring storm. For example, a future 20-year return period storm on top of a 2-foot SLR will have the same water level and depth as today's 100-year return period storm. For further discussion, please see Shoreline Change SAMP Chapter 4.

6. ***In Rhode Island***, many coastal communities, including individual residential properties as well as commercial and industrial properties, are highly exposed to storm surges. For example, a CRMC-led assessment found that 27,431 (11.5%) of the residential structures in Rhode Island's coastal communities are exposed to the combined effects of sea level rise and storm surge under the Shoreline Change SAMP's Long-range Planning Scenario (a 7-foot SLR + 100-year storm surge, inundating approximately 65 square miles of Rhode Island's existing coastline). STORMTOOLS and the Shoreline Change SAMP provides numerous tools and analyses to help coastal residents and decision-makers understand their exposure under different scenarios representing both storm surge and varying levels of sea level rise. Please see Chapter 3 for discussion of the storm surge scenarios used as planning scenarios in the Shoreline Change SAMP, and please see Chapter 4 for a detailed discussion of the exposure of Rhode Island's coastal communities under a range of storm surge scenarios. Please also see [www.beachsamp.org](http://www.beachsamp.org) to use STORMTOOLS to view other storm surge scenarios.
7. **Riverine flooding** refers to flooding that takes place throughout the watershed (i.e. inland) along the banks and in the floodplains of rivers and streams. Riverine flooding is expected to be exacerbated by increased storm intensity as well as increased precipitation. The IPCC (2017) identifies inland flooding in some urban regions as a "key risk" in North America which may result disrupt livelihood and result in severe health risks. Importantly, riverine flooding and coastal flooding due to sea level rise can have a coupling effect. Rising seas can set a new flood stage in riverine systems, thus increasing flood risk in inland areas adjacent to rivers (Garcia and Loáiciga 2014; Hashemi et al. 2017).
8. ***In Rhode Island***, increased precipitation has been observed and is expected to continue. Increased precipitation, in particular, is expected to increase stream flow

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in the Northeastern U.S., contributing to increases in flooding risk due to increases in 3-day peak flows (Demara et al. 2015). Vallee and Giuliano (2014) reported a doubling of the frequency of flooding and an increase in the magnitude of flood events, many of which are riverine flooding events, such as in 2010, when the Pawtuxet River crested and caused extensive inland flooding following a series of heavy rain storms that took place over a 5-week period. A great deal of research is needed on projected riverine flooding in Rhode Island, specifically on the coupling effects within Rhode Island watersheds of storm surge and precipitation events, sea level rise and flooding events; please see Chapter 4 for further discussion.

9. Scientists' understanding of these sources of coastal hazard risk are rapidly evolving, and further research is needed on all of these topics. Please see section 2.4, Future Research Needs, for a discussion of some research needs identified by the Shoreline Change SAMP team.
10. Please see Chapter 4, "Rhode Island's Exposure to Coastal Hazards," for a detailed discussion of Rhode Island's exposure to all of these hazards. This includes a detailed discussion of the exposure of both the built and the natural environment to sea level rise and/or storm surge scenarios, as well as future scientific needs associated with these topics.

### 2.3.2 Coastal Erosion

1. **Coastal erosion is expected to increase due to the increase in storm intensity and associated flooding.** The IPCC (2017) found that coastal and low-lying areas have been experiencing increased erosion, and will continue to do so, due to sea level rise, in North America and throughout the world. Erosion has been noted to be of particular concern in the northeastern U.S. (Horton et al. 2014). In their study of climate change impacts in the Northeastern U.S., Horton et al. (2014) noted that increased rates of coastal erosion are likely to compromise aging coastal infrastructure, including transportation, communications, and energy infrastructure.
2. ***In Rhode Island***, coastal erosion is of particular concern because it is characterized by a storm-driven coastline. This is especially the case on Rhode Island's south shore, which has been found to be largely erosional (Boothroyd et al. 2016). Studies of shoreline change in Rhode Island have documented an average annualized rate

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of shoreline change of 0.57 meters/year (1.9 feet/year), though these annualized rates should be used with caution because coastal erosion is not a gradual process, but rather the result of abrupt changes due to storms. Some of the highest rates of change occur along the Matunuck Headline, where the annualized rate of change exceeds 1.4 meters/year (4.7 feet/year), and total erosion since 1951 has approached 90 meters (300 feet) (Boothroyd et al. 2016). It is difficult to project future rates of shoreline change, but one Shoreline Change SAMP analysis suggested that the RI south shore could experience a total change of 89 meters (292 feet) by 2065 and 216 meters (708 feet) by 2100 (Oakley et al. 2016). These results should be used with caution given the uncertainty associated with projecting future shoreline change.

3. Scientists' understanding of coastal erosion and other coastal processes is rapidly evolving, particularly with regard to how processes are changing due to changing climate trends and what may happen in the future. Please see Chapter 4 for a detailed discussion of what is known about coastal erosion in Rhode Island, and please see section 2.4 Future Research Needs, for a discussion of some research needs identified by the Shoreline Change SAMP team

### 2.3.3 Groundwater and Saltwater Intrusion

1. **Groundwater levels are expected to increase with rising sea levels, resulting in saltwater intrusion for any structures and systems below grade along the coast.** Research on coastal groundwater systems in Connecticut, New Hampshire, and Massachusetts has suggested that groundwater levels will not only rise with rising sea levels, but are expected to extend farther inland than surface water (Bjerklie et al. 2012, Knott et al. 2017, and Walter et al. 2016). Increases in coastal groundwater levels can: impact the ability of stormwater to infiltrate in coastal areas, increasing the risk of localized flooding and ponding (Bjerklie et al. 2012); pose an increased risk of groundwater seepage into basements of existing buildings and underground infrastructure (Bjerklie et al. 2012); impact the structural integrity and reduce the lifespan of built infrastructure (Walter et al. 2016, Knott et al. 2017); cause wetlands to expand and possibly form in areas they didn't exist before (Knott et al. 2017); and change the health of natural ecosystems (Knott et al. 2017).
2. **In Rhode Island,** many coastal properties rely on onsite wastewater treatment systems (OWTS, a.k.a., septic systems) for wastewater disposal, and private wells

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for drinking water. Research at the University of Rhode Island suggests that as coastal groundwater is projected to rise, the soil volume that is designed around an OWTS to absorb and treat effluent will decrease, thereby potentially resulting in contaminant transport within the water table, and a threat to aquatic and ecosystem health (Cooper et al. 2016). Additionally, research on sea level rise and salt water intrusion in coastal aquifers and private drinking water well systems along Rhode Island's coast was funded and is underway in 2018. For more information, contact Dr. Soni Pradhanang at the University of Rhode Island's Department of Geosciences.

3. Scientists' understanding of these sources of coastal hazard risk are rapidly evolving, and further research is needed on all of these topics. Please see section 2.4, Future Research Needs, for a discussion of some research needs identified by the Shoreline Change SAMP team.

## 2.4 Future Research Needs

### 2.4.1 Flooding

1. Under the STORMTOOLS effort, flooding maps have been generated for once in 25, 50, 100, and 200-year return period storms, with sea level rise (SLR) ranging from 2 to 10-feet. Maps have also been prepared for 2, 3, 5 and 10-year return period nuisance flooding events to assist in emergency response. In addition, maps of inundation from sea level rise from 2- to 10-feet have also been prepared. Through the Coastal Environmental Risk Index (CERI) initiative that set out to assess the risk and damage to structures, STORMTOOLS design elevation maps (SDEs) (including the effects of SLR), which explicitly include surge, coastal erosion, and wave conditions and central to the CRMC permitting process, have been completed for Warwick, Barrington, Bristol, Warren, and Charlestown. Generation of SDE maps for the other coastal communities in the state is currently in progress. The SDE maps are comparable to the FEMA Base Flood Elevation (BFE) maps, with the important exception that they include SLR effects and address a number of technical weaknesses with the FEMA Flood Insurance Rate Maps (FIRMs). Flooding maps for the Pawtuxet River watershed have also been prepared by application of high resolution hydrologic models to the system, with a focus on flood control and management. The riverine flooding maps vs selected return periods are currently

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available via the STORMTOOLS web site.

2. Continue to bring in new data and modeling that builds on flood risk tools that have been completed or in progress, the following are recommended:

- a) ***Enhancement in wave and associated damage modeling in CERI.*** Theory and field studies show that dynamic wave setup and run-up can extend the inundation zone well beyond that inundated by the storm surge alone. This extended inundation zone is defined as the *swash* zone and is characterized by periodic extreme water elevation (periods on the order of 10 to 100 seconds) with associated high velocities and force. Run-up can significantly increase the coastal hazard and the risk in coastal areas characterized by steep slopes or vertical walls (e.g. Dean and Bender 2005) (selected locations along the southern RI coastline). The method currently employed to model wave dynamics for the SDEs and as input to CERI, uses a phase average model (e.g. STWAVE) that unfortunately does not resolve time dependent processes such as wave diffraction, reflection, and run-up in the swash zone. Phase resolving models (time dependent models of individual wave events) that would address this problem are currently available but the high computational cost has, to date, precluded their routine use in practical applications. Li et al. (2018) have demonstrated the importance of using a phase resolving model to fully represent the damage due to wave run-up and overtopping. URI is part of the team developing a phase-resolving model, FUNWAVE (Shi et al. 2012) and has developed extensive experience in the use of the model (e.g. Shelby et al. 2016; Grilli et al. 2016). With access to high performance computational systems, this proposed effort would apply phase resolving models to predict wave dynamics in exposed southern RI coastal communities and result in improvements in both SDE maps and CERI damage estimates.

CERI currently uses damage curves for both inundation and waves developed as part of the Army Corp of Engineers North Atlantic Comprehensive Coastal Study (NACCS) based on field surveys performed after hurricane Sandy impacted the NY-NJ area. The uncertainty in the estimates of wave damages, parameterized in terms of upper, mean, and lower values, are quite large. With more detailed modeling of wave dynamics available from FUNWAVE it will be possible to substantially improve damage estimates, including the proximity of other structures, using methodologies based on impulse forces on structures.

- b) **Modeling of riverine flooding in remaining RI watersheds.** It is proposed to apply the existing hydrologic model suite to the remaining watersheds in the state (Blackstone, Ten Mile/Seekonk, Woonasquatucket, Moshassuck, Warren, Hunt, Taunton, Narrow, and Pawcatuck) to predict flooding in response to changing climate conditions (rainfall rates, sea level rise). This will complete flooding (inland) maps for all riverine systems in the state. It will also allow improvement in flooding estimates where riverine and coastal systems meet. All mapping products will be available via the STORMTOOLS web site.

#### 2.4.2 Coastal Erosion

1. There is a significant need to fund the ongoing and expanded study of shoreline change in Rhode Island. Shoreline change monitoring has been a longstanding practice in Rhode Island but is currently running on diminishing funds and/or volunteer efforts which are insufficient given the importance of this issue. Efforts beyond 2018 to expand these efforts and to continue measuring conditions within Block Island Sound remain unfunded. These previous and ongoing efforts, and the funding status of each, are detailed below.
2. Rhode Island has had long-term monitoring of the shoreline using beach profiles/transects for >50 years. This represents a wealth of data at the short-term (event scale (storms + recovery)) and long-term (annual – decadal) scale along the Rhode Island south shore (RISS). The Graduate School of Oceanography has maintained seven profiles along the RISS for several decades. The GSO beach survey was established in the early 1960s and expanded to the current scope by the late 1970s. Currently, these profiles are run by the King Lab at URI-GSO, funded by a graduate assistantship and the King Lab.
3. Jon Boothroyd (now deceased), URI Geosciences Professor and RI State Geologist measured various profiles along the RISS, with the primary profile located on the Charlestown Barrier (CHA-EZ) measured near weekly since 1977. Two of Jon’s profiles (CHA-EZ and SK-TB (south Kingstown Town Beach) continue to be measured by Scott Rasmussen, URI-EDC, funded by RICRMC. Additional profiles are measure by Bryan Oakley (Eastern Connecticut State University (ECSU)): Napatree Point (5 profiles) (2013-present) measured quarterly and post-storm; and Misquamicut State Beach (five profiles) also measured quarterly and post-storm. These profiles

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began in 2014 in response to beach replenishment. An additional 8 profiles initiated by Oakley are measured on Block Island (monthly 2013-2017; quarterly 2018-present) but citizen scientists who send the data to ECSU for interpretation and archiving. These profiles have contributed greatly to the understanding of the RISS, published in numerous theses, papers, conference presentations and have helped to inform RICRMC policy greatly over the last 30 years.

4. Recent acquisition and a successful proof of concept for terrestrial laser scanning (TLS), a method of measuring elevations from a mobile platform (boat), coupled with swath bathymetric mapping shows that this technology could become a significant component of a robust coastal monitoring program. Boat-based TLS coupled with swath bathymetric mapping can be rapidly mobilized, providing a coast-wide assessment of the shoreline shortly after a storm event, in addition to periodic seasonal monitoring surveys.
5. Significant challenges remain for keeping these efforts funded in the long-term. Profiles measured by the URI-EDC remain funded by the RICRMC but are not a permanent line item in their budget. URI-GSO profiles depend on a research assistantship for a graduate student from the university, as well as in-kind support (equipment, vehicles, personnel) from the King Lab. ECSU profiles on Block Island and Misquamicut had some initial funding from the RIBRWCT, however these remain volunteer efforts by Oakley, citizen scientists and ECSU students. Napatree profiles are supported by the Watch Hill Conservancy. No current funding has been identified to incorporate TLS into the current coastal monitoring efforts.
6. While the current and historic coastal monitoring provides insight along the beaches of the RISS, significant data gaps exist in the offshore environment. Understanding the response of the shoreface (area from the beach extending offshore) at similar time scales as the beach profiles (event to decadal scale) remains a significant data gap along the RISS. The shoreface represents potentially a significant source and sink of sediment for the shoreline, and a lack of observations limits understanding of the complex relationships between the shoreface characteristics (sediment type, morphology) and coastal processes.
7. There is a DOI-NFWF funded project underway to deploy four ADCP wave/tide sensors along the RISS and four water level monitoring stations within the coastal

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ponds, and will be maintained through 2018. This will provide similar data products to Woods Hole Group (2012). This represents important information on the real conditions during a storm. Coupled with coastal monitoring, the resulting parameterization of environmental data offers opportunities to use detailed observations to calibrate and expand the recent modeling efforts along the RISS

8. Geologic habitats mapped on the shoreface numerous times in part over the last 3 decades (Morang, JCB, Oakley, King) including recent mapping in 2015/2016 (DOI-NFWF funded). This provides baseline information on the extent and distribution of geologic habitats on the upper shoreface, as well as thickness and volume of sand on the uppermost shoreface.

#### **2.4.3 Groundwater and Saltwater Intrusion**

1. Future research is needed on the effects that sea level rise will have on groundwater dynamics and saltwater intrusion impacts within coastal areas. Research specific to the Rhode Island coastline that is modeled after current research on coastal groundwater systems in Connecticut, New Hampshire, and Massachusetts (as discussed in Section 2.3.3), is needed to determine:
  - a. the inland extent of impacts from groundwater levels increasing with rising sea levels;
  - b. the ability of stormwater to infiltrate in coastal areas, and impacts caused by related flooding and ponding;
  - c. impacts of groundwater seepage into basements of existing buildings and underground infrastructure;
  - d. impacts to the structural integrity and lifespan of built infrastructure;
  - e. expansion of wetland areas in the coastal zone;
  - f. changes to the overall health of coastal and inland freshwater ecosystems;
  - and
  - g. contaminant transport within coastal groundwater systems.

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## CHAPTER 6

# State and Municipal Considerations

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## 6.1 Overview

### 6.1.1 Chapter Objectives

1. This chapter outlines how CRMC's Coastal Hazard Application Guidance might be applied to other Rhode Island state agencies or to municipal governments. With the development of the CRMC Coastal Hazard Application Guidance, CRMC is actively amending its program to be forward-thinking about coastal resilience and adaptation to coastal risk, and is one of the first coastal regulatory programs in the U.S. to put forward permit requirements that address future risk from storm surge, coastal erosion, and projected sea level rise. CRMC hopes this process will be a model to other state agencies and municipal governments, and programs can be adapted and evolve accordingly.
2. The Shoreline Change SAMP Planning Boundary includes land area exposed to water levels from a modeled 100-year return period storm, similar to 1954's Hurricane Carol, plus seven-feet of sea level rise. Accordingly, the Shoreline Change SAMP Boundary extends inland beyond CRMC's jurisdiction, demonstrating that there is a substantial amount of land area at risk from coastal hazards but outside of CRMC's jurisdiction, and likely outside of currently-mapped FEMA Special Flood Hazard Areas.
3. CRMC has set the stage for risk assessment process in providing STORMTOOLS to each of the 21 municipalities along Rhode Island's coastline. Through development of STORMTOOLS, offering high resolution scenario-based coastal inundation mapping, Rhode Island has provided the ability to assess risk at the individual structure and parcel level for all properties along the coast and within the Shoreline Change SAMP Project Boundary.

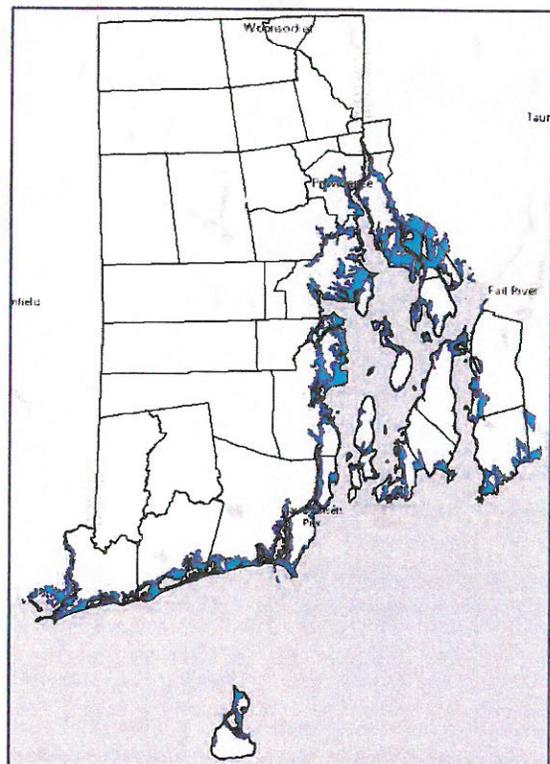


Figure 1. Shoreline Change SAMP Planning Boundary

4. State agencies embarking on state or regionally significant projects will benefit from a process by which they evaluate future conditions to ensure public dollars are spent wisely. Municipal decision makers, including elected officials, staff, and board/commission members, will be making decisions on future use of land within the Shoreline Change SAMP Planning Boundary, and must be aware of current and future risks of flooding across properties along the coast that may not be adequately represented in current flood risk maps.
5. Enacting CRMC's Coastal Hazard Application Guidance serves to educate municipal staff and decision makers, and especially coastal property owners who are considering the long-term viability of their coastal dwelling or development. CRMC's adoption of the five-step application process outlined in Chapter 5 serves as a model for municipalities and could offer the cities and towns protection from development challenges if they choose to follow the state's lead in communicating and assessing coastal risks in their community.
6. As of 2017, municipal board and commission members are required to receive two-hours of training every two years on, "...the effects of development in a flood plain and the effects of sea-level rise..." per RI General Laws 45-22-7. There are several sources of trainings available, but in 2017 Rhode Island launched a series of video training modules called PREP-RI, Providing Resilience Education for Planning in Rhode Island (<http://prep-ri.seagrant.gso.uri.edu/>), that are targeted to municipal volunteer board and commission members. These video modules cover the following topics: Climate Change in Rhode Island, Infrastructure, Stormwater, Flooding, Mapping Tools, and Adaptation.

## 6.2 Projects of State or Regional Significance

1. CRMC is providing forward-thinking guidance and related regulations, as well as decision support tools to guide responsible development in the coastal zone that addresses current risk from hazards, and anticipates future risk from storms, coastal erosion, and sea level rise. CRMC's Coastal Hazard Application Guidance outlined in Chapter 5 is well-suited for evaluating the risk profile of state-sponsored projects in coastal high risk areas. To ensure that federal, state, and other public funds are applied to projects in a manner that minimizes long-term losses and reflects the intended design life of the project, project coordination among federal and state agencies is strongly encouraged. Coordination and review of site risk from coastal hazards early in the project planning process has shown to be an effective strategy to ensure all relevant considerations are

discussed up front, thus preventing delays due to redesign of projects in later stages of a project's schedule.

2. Throughout the Shoreline Change SAMP effort, CRMC staff consulted on large-infrastructure projects, including transportation and wastewater management, and used STORMTOOLS to illustrate and inform project planning and engineering teams on the coastal forces that are projected to impact the project today and in the future. Because FEMA maps do not adequately illustrate risk from current and future conditions, specifically pertaining to sea level rise, CRMC encourages other state agencies to use STORMTOOLS and the SDE maps for planning and design purposes.
3. CRMC expects to continue the service of bringing the best available coastal risk and hazard information to other state agencies to consult on infrastructure projects in both the current CRMC jurisdiction, and also in the Shoreline Change SAMP planning boundary representing a 100-year return period storm plus 7-feet of sea level rise. Long-term funds for maintenance and management of STORMTOOLS are being sought to ensure this invaluable mapping tool, specific to the state of Rhode Island's 420-miles of coastline, will be available for state agencies and municipalities in the future for project planning and evaluation.
4. For state agencies considering projects in the coastal zone, both currently within CRMC's jurisdiction from the inland edge of the coastal feature, and for projects that lie within the Shoreline Change SAMP boundary (as illustrated in STORMTOOLS' 100-year return period storm plus 7-feet of sea level rise layer), a Pre-Application coordination meeting early in the project planning process with CRMC is required within its jurisdiction. For projects outside of CRMC's jurisdiction, but within the Shoreline Change SAMP project boundary, the state agency leading the project is encouraged to include both the municipality and CRMC staff in early stages of project planning. As an example, considering that resiliency to the impacts of climate change is stated as a "Cost Effectiveness" principle driving the State Transportation Improvement Program<sup>1</sup>, and this program is likely to include projects within CRMC's jurisdiction, a coordination meeting with CRMC could help RI Statewide Planning Program staff with site evaluation and selection for projects proposed within the Shoreline Change SAMP Planning Boundary. In addition, the RI Department of Transportation (RIDOT) is encouraged to address shoreline risk in the assessment of projects considered for inclusion in the State Transportation Improvement Program. They could assign specific point criteria for projects that remove risk from direct impact of sea level rise and associated storm

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<sup>1</sup> RI Statewide Planning Program. 2015. "An Overview of TIP Guiding Principles: Federal Fiscal Years 2017-2025." <http://www.planning.ri.gov/planning-areas/transportation/tip.php>

surges. In the alternative, the RIDOT could establish a new category of projects entitled: “Coastal Resiliency Projects”. This category would separate out those projects in need of action in the 10 year STIP timeframe to eliminate risk of impact from sea-level rise and storm-surge damage. It would target projects for funding based on the immediacy of the need.

5. In the case of post-storm response and recovery, Section 1.1.14 (Formerly Section 180) of the RICRMP details the procedures for securing Emergency Assents and post-storm permits from CRMC. This section emphasizes the importance of state agencies and municipalities having emergency permitting procedures in place to, “speed appropriate reconstruction and minimize adverse economic and environmental impacts.” (RICRMP 1.1.14.C.2). Procedures for enacting a post-storm moratorium to allow for adequate assessment of damage and potential for rebuilding are outlined, as are a strategy for prioritizing, “...emergency alterations, reconstruction, or replacement of essential public facilities, such as roads, bridges, and public utilities.” (RICRMP 1.1.14.C.4).
6. Communities have expressed concern over the long-term resilience of state and local roads shown to be at risk from coastal hazards, and the ability to fund implementation actions and construction projects.

### **6.3 Municipal Application of RI CRMC Coastal Hazard Application Guidance**

1. RI CRMC’s Coastal Hazard Application Guidance outlined in Chapter 5 of this Shoreline Change SAMP provides a model process that municipalities can voluntarily apply to projects within the flood envelope of the Shoreline Change SAMP Project Boundary, but outside of CRMC’s current jurisdiction.
2. Currently at the municipal level, for land outside of the FEMA-defined Special Flood Hazard Area (SFHA), there are no flood-related regulations that exist to guide development for land projected to be inundated as a result of future sea level rise. Outside of CRMC’s jurisdiction, the municipality has jurisdiction for land development within the Shoreline Change SAMP Boundary. By using STORMTOOLS, municipalities can apply the best available mapping tools provided by the state of Rhode Island, and apply these tools to advise applicants as to whether proposed developments are designed to adequately address future risk, thus overcoming the identified limitations of the existing FEMA Flood Insurance Rate Maps (FIRMS).

3. In order for municipalities to implement the five-step CRMC Coastal Hazard Application Guidance, and follow the state's lead in evaluating coastal development projects for their exposure to coastal risks, adequate staffing and changes to local site plan application procedures will be needed. Considering that CRMC's five-step Coastal Hazard Application Guidance process for development proposals may not be immediately adopted by municipalities, municipalities have suggested expanding CRMC's jurisdiction within the full expanse of the Shoreline Change SAMP Boundary. At this time, however, CRMC does not have the statutory authority, nor additional resources to address all future development applications that may be put forward in the Shoreline Change SAMP Project Boundary.
4. Depending on municipal staff availability and support from local elected officials and boards/commissions, municipalities could refer applicants to the mapping tools offered by CRMC, and encourage voluntary use of the 5-step process outlined in Chapter 5 of this document. As an example, municipalities could require submittal or reference to this material as part of the application process. CRMC's 5-step Coastal Hazard Application Guidance process, and related mapping tools, are designed to be user-friendly to multiple audiences and are intended to educate applicants on the risk profile for the development, potentially reducing risk from coastal hazards and in turn, flood insurance premiums, over the near and long term.
5. Strategies that municipalities may consider as short-term demonstration or pilot projects to replicate CRMC's 5-step Coastal Hazard Application Guidance process at the local level might include:
  - a. Establish thresholds for types of development that are subject to this process, and apply the CRMC risk assessment process only to projects that meet specific criteria. For example, municipalities could test this process on projects that are triggered by existing stormwater management regulations, or on larger-scale projects with a specified minimum building footprint or that propose to add fill or materials in excess of a defined area or volume.
  - b. Hold advisory pre-application site plan meetings with property owners and developers to share CRMC's risk assessment tools. Advise applicants during this meeting to identify design life of their proposed development, identify a date that relates to future conditions, and consider the relationship of their proposed development with future flood and erosion scenarios. Discuss with applicants the uncertainty of future conditions, including flood insurance premiums, in order to relay that a decrease in the risk profile for a property will likely result in

- a decrease in long-term flood insurance premiums. Municipal staffers can make CRMC's risk assessment tools and resources available to applicants, without requiring they be used.
- c. Consider incentives for applicants who voluntarily follow the CRMC Coastal Hazard Application Guidance process and submit those findings to the town for building permits outside of CRMC's jurisdiction. Examples of incentives could include decreased application fees or expedited review or permitting for projects that apply CRMC's five-step Coastal Hazard Application Guidance.
6. For significant infrastructure or transportation projects that fall within the Shoreline Change SAMP Boundary but lie outside of CRMC's jurisdiction, municipalities are encouraged to use the risk assessment tools (STORMTOOLS or CERI, as available), to evaluate future conditions for these projects and coordinate with CRMC and other relevant agencies to enact a procedure to review project alternatives. For example, if a road project submitted for funding under the State Transportation Improvement Program (STIP) identifies a road for resurfacing, but the area is showing exposure or long-term impact from current or future coastal hazards, planners from the municipality and the Statewide Planning Program are encouraged to reconsider investment in that project until a more thorough analysis is completed to consider the long-term cost/benefits of improving or enhancing that roadway.
  7. Municipalities must decide how they want to offer CRMC's voluntary design elevation levels to educate and inform permit seekers of future coastal hazard risk. Considering the inaccuracy of existing FEMA maps for Rhode Island, and the uncertainty of how FEMA will handle these changes in the future, the STORMTOOLS Design Elevation (SDE) maps described in Chapters 3 and 5 will assist municipalities in evaluating the future risk profile in coastal areas under varying sea level and storm scenarios with a 95% confidence level that the flood water will not exceed that depth during defined storm scenarios. Because the FEMA-defined "special flood hazard area" and related V and A zones are expected to shift inland as conditions change into the future, CRMC is also mapping where potential V and A zones could be as a result of changing coastal conditions and related hazards. Surge and wave will be higher in these zones. These forces act higher on the structure, increasing damage potential.
  8. Additionally, municipalities are encouraged to use CRMC's maps and data to evaluate the assessed value of coastal structures at risk and the potential threat to tax base and municipal finance. For future municipal financial stability, it is important to consider and develop decision support strategies related to uncertainty with the long-term

market value of homes in high hazard areas, and resulting implications on municipal tax base. Moody's Investors Service is currently considering future risk conditions attributed to climate change when determining municipal bond ratings.<sup>2</sup>

## 6.4 Addressing Coastal Risk in Municipal Planning Initiatives

1. Municipal governments are responsible for defining a future vision for the growth and management of land uses, and for documenting strategies for addressing local hazards to protect public health, safety and welfare. Two municipal tools that guide local planning and emergency management are the Comprehensive Plan and the Hazard Mitigation Plan.
2. A local Comprehensive Plan is 20-year "blueprint" for a municipality that defines aspirations for growth and strategies for implementing projects that support the vision outlined in the plan.<sup>3</sup> In the 2012 update to Rhode Island's Comprehensive Planning and Land Use Act, section § 45-22.2-6(10) added a requirement for Comprehensive Plans to address natural hazards, including, "...the effects of sea-level rise, flooding, storm damage, drought, or other natural hazards." Local Comprehensive Plans are prepared by each municipality in coordination with the state's Division of Planning/Statewide Planning Program.
3. The 2014 Rhode Island State Hazard Mitigation Plan states its vision as, "Rhode Island is resilient to natural hazards and climate change."<sup>4</sup> and states as one of its goals, "Local communities address natural hazards and long-term risk reduction in local decision making and planning." Local hazard mitigation plans are prepared by each municipality in coordination with the Rhode Island Emergency Management Agency.

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<sup>2</sup> Moody's Investors Service. 2017. "Environmental Risks -- Evaluating the impact of climate change on US state and local issuers." [https://www.moody.com/research/Moodys-Climate-change-is-forecast-to-heighten-US-exposure-to--PR\\_376056](https://www.moody.com/research/Moodys-Climate-change-is-forecast-to-heighten-US-exposure-to--PR_376056)

<sup>3</sup> RI Statewide Planning Program. 2015. *Comprehensive Planning Guidance Handbook #1: The Comprehensive Plan 101*. [http://www.planning.ri.gov/documents/comp\\_handbook/1\\_CompPlan101.pdf](http://www.planning.ri.gov/documents/comp_handbook/1_CompPlan101.pdf)

<sup>4</sup> RI Emergency Management Agency. 2014. *Rhode Island Hazard Mitigation Plan Update*.

[http://www.riema.ri.gov/resources/emergencymanager/mitigation/documents/RI%20HMP\\_2014\\_FINAL.pdf](http://www.riema.ri.gov/resources/emergencymanager/mitigation/documents/RI%20HMP_2014_FINAL.pdf)

6.4.1 Model Process for Coastal Risk Assessment and Local Comprehensive Plans

1. In 2014, the RI Statewide Planning Program worked with the University of Rhode Island’s Coastal Resources Center to develop a pilot project for the town of North Kingstown focused on adaptation to future sea level rise conditions.<sup>5</sup> This document analyzed parcels within 12 sub-areas of the town within a one, three, and five-foot sea level rise scenario, and went on to identify adaptation strategies for 18 different sectors of the town that corresponded to different sections of the Comprehensive Plan. This pilot project formed the basis of a statewide “model process” for coastal risk assessment that other coastal communities in Rhode Island could follow to address the “Natural Hazards” requirement in their Comprehensive Plan.

2. In 2015, RI Statewide Planning and the URI Coastal Resources Center produced, *“Resilient Communities: Natural Hazards & Climate Change Adaptation, a how-to guide on incorporating natural hazards planning and climate change adaptation into local comprehensive plans.”*<sup>6</sup> This “model process” document outlined the base information that communities could use to meet the requirement of the 2012 Comprehensive Plan Act update requiring Rhode Island municipalities to include natural hazards and climate change into municipal comprehensive plans.

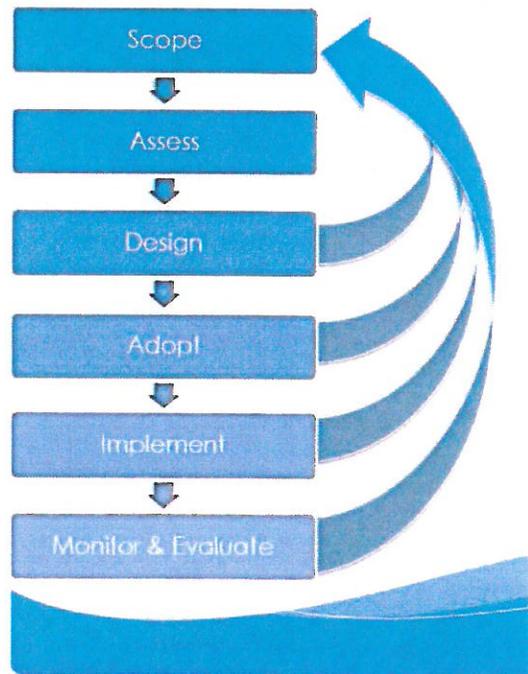


Figure 2. Model process for Community Resilience.

3. Upon completion of the North Kingstown pilot project and the release of the “model process” document described above, RI Statewide Planning then compiled this information with other data and process offered by the RI Emergency Management

<sup>5</sup> Crean, T., M. Carnevale, P. Rubinoff. 2014. Adaptation to Natural Hazards and Climate Change in North Kingstown, RI. Narragansett, RI. <http://rhody.crc.uri.edu/acckn/sample-page/>

<sup>6</sup> Crean, T., Carnevale, M. and Rubinoff, P. 2015. Resilient Communities: Natural Hazards & Climate Change Adaptation, a how-to guide on incorporating natural hazards planning and climate change adaptation into local comprehensive plans. University of Rhode Island Coastal Resources Center and Rhode Island Sea Grant College Program, Narragansett, RI. <http://www.beachsamp.org/relatedprojects/>

Agency to produce, “The Rhode Island Comprehensive Planning Standards, Guidance Handbook #12, Planning for Natural Hazards and Climate Change.” This guidance document has been in place since 2016 and is an invaluable resource being used by Rhode Island cities and towns to meet the Natural Hazards requirement of the 2012 Comprehensive Plan Act update. The handbook offers all 39 Rhode Island cities and towns a step-by-step process to consider relevant hazards, exposed and vulnerable resources, assets, populations, a one-stop menu of adaptation strategies that can be applied to their municipality, a strategy to develop priorities for implementation.

4. Since a local Comprehensive Community Plan serves as a 20-year blueprint for a municipality, it is important to consider that, as mentioned throughout this Shoreline Change SAMP document, the science is rapidly changing and the conditions along Rhode Island coast are also rapidly changing. As discussed in Section 6.3 of this chapter, municipalities are encouraged to coordinate closely with CRMC to ensure the best available science and updated tools are being applied to evaluate existing and future risk from coastal hazards. Municipalities also have an opportunity to apply a natural hazards and climate change “lens” to all the elements of a Comprehensive Plan, and consider where the exposed and vulnerable assets valued by the municipality can be protected in the face of future coastal flood risk.
5. Considering that the RI Statewide Planning Comprehensive Plan Guidebook is not being continually updated, municipalities are encouraged to refer to CRMC for the most current data and trends related to shoreline change and coastal hazards in Rhode Island. See Chapter 2 of this Shoreline Change SAMP for more information.
6. Local Comprehensive Community Plans are encouraged to reference the Shoreline Change SAMP process and tools, include a map of the SAMP planning boundary, and recommend that development plans are reviewed based on the CRMC Coastal Hazard Application Guidance.

#### 6.4.2 Local Hazard Mitigation Plans & Community Rating System

1. In order to receive FEMA grant funds per the Disaster Mitigation Act of 2000, municipalities must have an approved local Hazard Mitigation Plan (HMP). HMP’s are written as a 5-year plan that set out policies and actions to prepare for and reduce risk and losses from natural hazards. The HMPs are guided, in part, by a Statewide Hazard Mitigation Plan that is managed and administered by the Rhode Island Emergency Management Agency (RIEMA). RIEMA assists Rhode Island municipalities with development of the local HMPs by offering report templates, funds, and technical

assistance to municipalities by the State Hazard Mitigation Officer (SHMO).

2. The Community Rating System (CRS) program is a voluntary effort administered by FEMA/RIEMA that allows municipalities to offer flood insurance premium reductions across their city or town upon documentation of the municipality meeting or exceeding targets for floodplain management and risk reduction. CRS ratings range from a score of “1” to “9,” and correspond to savings on flood insurance premiums in increments of five percent. For example, a community with a CRS rating of “9” is the first level in the CRS and allows a 5% reduction in flood insurance premiums for all flood insurance policy holders in that municipality, while a CRS rating of “7” means a community has met even more targets to reduce risk and manage floodplains across the municipality, resulting in a 15% reduction in flood insurance premiums for all policy holders.
3. STORMTOOLS, the Coastal Environmental Risk Index (CERI), and the STORMTOOLS Design Elevation (SDE) maps offer methods to document both current and future risk from coastal hazards in the LHMP and CRS programs. Integrating the Shoreline Change SAMP tools into these RIEMA–managed programs can ultimately offer financial benefits that are passed on to taxpayers through grant programs and savings on flood insurance premiums, and tangible implementation actions across the community that protects public health, safety, and welfare by reducing the overall risk profile and threat of losses from coastal hazards.

## 6.5 Relationship of State Law to CRMC's Coastal Hazard Application Process and Municipal Implementation

1. Rhode Island's cities and towns have authority over several aspects of building and land development in the coastal area that are granted to them by the RI Legislature through enabling legislation. Because of the statewide application of this enabling legislation, the authority to regulate development extends beyond CRMC's jurisdiction but within the Shoreline Change SAMP Boundary (land area inland of CRMC's legal jurisdiction). This presents an opportunity for coastal communities to implement the CRMC's five step Coastal Hazard Application Guidance as a means to educate property owners.
2. Because the enabling legislation described below does apply on a statewide basis, many of the recommendations that are intended to address resiliency and climate change preparedness can be applied outside of the SAMP Boundary and to inland areas of Rhode Island as well, which have their own unique challenges related to changing weather patterns.
3. Considering the CRMC five-step Coastal Hazard Application Guidance, as outlined in Chapter 5, may not be immediately adopted by the municipalities, suggestions of expanding CRMC's jurisdiction to educate property owners within the full expanse of the Shoreline Change SAMP Boundary may be considered desirable by local officials. As mentioned in Section 6.3.4, CRMC does not currently have the statutory authority, nor additional resources to address all future development applications that may be put forward within the Shoreline Change SAMP Project Boundary.

### 6.5.1 State Building Code, Rhode Island General Laws 23-27.3

1. Municipalities cannot require applicants to build to standards that exceed the State Building Code, but can recommend or suggest voluntary strategies that are allowable but not mandated by the State Building Code. As described in Chapter 3, the Building Code Commission's purpose is to establish minimum building code requirements for the protection of public health, safety, and welfare in the built environment. Building code requirements address coastal hazards in numerous ways; for example, the RI State Building Code incorporates the vast majority of the NFIP floodplain management requirements. Towns in turn use the design standards set by the state building code. For further information please see <http://www.ribcc.ri.gov/>.
2. As mentioned in Chapter 5, Section 23-27.3-100.1.5.5 of the RI State Building

Code defines hurricane, storm, and flood standards:

*The state building code standards committee has the authority in consultation with the building code commissioner, to adopt, maintain, amend, and repeal code provisions, which shall be reasonably consistent with recognized and accepted standards and codes, including for existing buildings, for storm and flood resistance. Such code provisions shall, to the extent reasonable and feasible, take into account climatic changes and potential climatic changes and sea level rise. Flood velocity zones may incorporate freeboard calculations adopted by the Coastal Resources Management Council pursuant to its power to formulate standards under the provisions of § 46-23-6.*

3. The RI State Building Code lays out requirements for construction of different categories of structures, and outlines details of load requirements to withstand high winds and flooding; lowest floor elevation requirements, including basements; and design parameters to address hydrostatic flood forces in accordance with standards defined by the American Society of Civil Engineers (ASCE). For example, for One and Two Family Dwellings, the RI State Building Code section R322.3.6.1 addresses Flood Hazard Certificates. Certifications for construction in flood hazard areas both with and without high-velocity wave action are defined in the code, and are required to be submitted to municipal building officials.
4. The RI Building Code Commission is the only authority who can change or increase the resiliency requirements of the State Building Code. Municipalities can only encourage or incentivize voluntary actions that surpass the requirements of the building code. Examples could include increased freeboard or application of the FORTIFIED standard, both of which are discussed in more detail in Chapter 7.

#### 6.5.2 Rhode Island Comprehensive Planning and Land Use Act 45-22.2

1. Section § 45-22.2-3 of the Rhode Island General Laws outlines the Comprehensive Planning and Land Use Act that guides municipalities in developing a Comprehensive Community Plan to serve as the 20-year “blueprint” for the municipality as a whole, and serves as the guiding document to which all zoning changes must be consistent.
2. Section 45-22.2-6 outlines the required content of a comprehensive plan, which includes maps illustrating existing conditions, land use, housing density, zoning, roads, water and sewer service areas, cultural resources, open space, and

natural resources, including floodplains. The Comprehensive Plan's featured map illustrates "future land use" and indicates where the municipality envisions its growth and change over the course of the 20-year planning horizon of the plan.

3. In 2012, the Comprehensive Planning and Land Use Act was updated to require that Rhode Island cities and towns address "Natural Hazards" in their municipal Comprehensive Plans. Section 45-22.2-6(b)(10) lists this requirement as:

*Natural hazards. The plan must include an identification of areas that could be vulnerable to the effects of sea-level rise, flooding, storm damage, drought, or other natural hazards. Goals, policies, and implementation techniques must be identified that would help to avoid or minimize the effects that natural hazards pose to lives, infrastructure, and property.*

4. Section 45-22.2-4. defines "Floodplains" or "flood hazard area" as:  
*...an area that is subject to a flood from a storm having a one percent (1%) chance of being equaled or exceeded in any given year, as delineated on a community's flood hazard map as approved by the federal emergency management agency pursuant to the National Flood Insurance Act of 1968, as amended (P.L. 90-448), 42 U.S.C. § 4011 et seq.*
5. As outlined in this Shoreline Change SAMP, the FEMA floodplain maps for Rhode Island, while still regulatory for purposes of determining flood insurance premiums for policy holders, have been determined to be inaccurate and not appropriate for projecting future risk along the Rhode Island coast. For this reason, as mentioned in Chapter 5, CRMC has developed STORMTOOLS Design Elevation (SDE) maps to illustrate future risk to coastal developments and offer a recommended design elevation for use in design and construction.
6. Considering that stated goals of comprehensive plans in Section 45-22.2 include promotion of suitability of land for use that protects public health 45-22.2-6(c)(1), and encourages use of innovative development regulations that promote suitable land development while protecting valued resources, 45-22.2-6(c)(6), evaluating long-term coastal risk and the exposure of valued resources in the coastal zone is necessary to meet these goals. Through this Shoreline Change SAMP, and the associated mapping tools offered through STORMTOOLS, the Coastal Environmental Risk Index (CERI) (where available), and the SDE maps, local comprehensive plans are now able to appropriately document this risk and

indicate through the Future Land Use Map how the municipality might adjust land use patterns within the Shoreline Change SAMP Planning Boundary.

6.5.3 Zoning Ordinances, Rhode Island General Laws 45-24

1. The Rhode Island Zoning Enabling Act of 1991 requires that zoning ordinances for each municipality be consistent with the adopted Comprehensive Community Plan (see 6.2.2). Zoning ordinances are regulatory and define current and future community needs, enforce standards and procedures for management and protection of natural resources, emphasize current concepts that address emerging demand for land use, and consider economic impacts of proposed changes. (R.I. Gen. Laws §45-24-29)
2. The general purposes of zoning ordinances stated in R.I. Gen. Laws § 45-24-30(a) that are relevant to the Shoreline Change SAMP and present opportunities for municipalities to expand CRMC's Coastal Hazard Application Guidance to municipal jurisdiction beyond CRMC's jurisdiction include:

*(1) Promoting the **public health, safety, and general welfare.***

*(2) Providing for a range of uses and intensities of use appropriate to the character of the city or town and reflecting current and **expected future needs.***

*(3) Providing for orderly growth and development that recognizes:*

*(i) The goals and patterns of land use contained in the **comprehensive plan** of the city or town adopted pursuant to chapter 22.2 of this title;*

*(ii) The **natural characteristics of the land**, including its suitability for use based on soil characteristics, topography, and susceptibility to surface or groundwater pollution;*

*(iii) The **values and dynamic nature of coastal and freshwater ponds, the shoreline, and freshwater and coastal wetlands;***

*(iv) The **values of unique or valuable natural resources and features;***

*(v) The **availability and capacity of existing and planned public and/or private services and facilities;***

*(vi) The **need to shape and balance urban and rural development;** and*

*(vii) The use of **innovative development regulations and techniques.***

*(4) Providing for the **control, protection, and/or abatement of air, water, groundwater, and***

**noise pollution, and soil erosion and sedimentation.**

(5) Providing for the **protection of the natural, historic, cultural, and scenic character** of the city or town or areas in the municipality.

(7) Providing for the **protection of public investment** in transportation, water, stormwater management systems, sewage treatment and disposal, solid waste treatment and disposal, schools, recreation, public facilities, open space, and other public requirements.

(10) Promoting **safety from fire, flood, and other natural or unnatural disasters.**

(15) Providing for **procedures for the administration of the zoning ordinance**, including, but not limited to, variances, special-use permits, and, where adopted, procedures for modifications.

3. Considering the purposes listed above, coupled with direct input from municipal planning officials throughout the Shoreline Change SAMP process, amending the purposes of zoning to include resiliency provisions that reflect the best available science related to climate change, storm surge, coastal erosion, sea level rise is encouraged to increase overall resiliency of Rhode Island's coastal communities.
4. As an example, in 2017, R.I. Gen. Laws § 45-24-31 of the Zoning Enabling Act was amended to allow for additional freeboard and height allowances for properties elevating to reduce their flood risk in coastal high hazard areas.

*For a vacant parcel of land, building height shall be measured from the average existing grade elevation where the foundation of the structure is proposed. For an existing structure, building height shall be measured from average grade taken from the outermost four (4) corners of the existing foundation. In all cases, building height shall be measured to the top of the highest point of the existing or proposed roof or structure. This distance shall exclude spires, chimneys, flag poles, and the like. For any property or structure located in a Special flood hazard area, as shown on the official FEMA Flood Insurance Rate LC004786/SUB A/2 - Page 3 of 10 1 Maps (FIRMs), where freeboard as defined in this section, is being utilized or proposed, such 2 freeboard area, not to exceed five feet (5'), shall be excluded from the building height calculation.*

5. As mentioned in 6.2.3.4 above, CRMC is currently developing STORMTOOLS Design Elevations (SDEs) that will offer a recommended base flood elevation to account for sea level rise when comparing with the base flood elevation in the FEMA FIRMs. Municipalities have the option of sharing the SDEs with property owners as developers submit plans to the cities and towns for review outside of CRMC's jurisdiction. R.I. Gen. Laws § 45-24-47(c) of the Zoning Enabling Act outlines special provisions for land development projects that may

be amended to reflect: (1) “future conditions” as a special provision for land development projects, thus reflecting new data and information available to increase coastal resilience, (2) the guiding principles of the Shoreline Change SAMP, including a requirement to document the SDE in development applications, and (3) relevant resiliency measures to be consistent with the adopted local Comprehensive Plan.

6.5.4 Subdivision of Land, Rhode Island General Laws Chapter 45-23

1. The Rhode Island Land Development and Subdivision Review Enabling Act of 1992 requires that all municipalities: (a) adopt land development and subdivision review regulations; and (b) establish the standard review procedures for local land development and subdivision review and approval that are thorough, orderly, and lead to expeditious processing of development project applications. (R.I. Gen. Laws § 45-23-26.)

2. The following five bullets in R.I. Gen. Laws § 45-23-29, “Legislative findings and intent”, illustrate potential to implement the Shoreline Change SAMP by requiring documentation of future risk consistently among several municipal planning tools to assist municipalities in addressing future risk from coastal hazards:

*(1) That the land development and subdivision enabling authority contained in this chapter provide all cities and towns with the ability to adequately address the **present and future needs** of the communities;*

*(2) That the land development and subdivision enabling authority contained in this chapter require each city and town to develop land development and subdivision regulations **in accordance with the community comprehensive plan, capital improvement plan, and zoning ordinance** and to ensure the consistency of all local development regulations;*

*(3) That **certain local procedures** for review and approval of land development and subdivision **are the same** in every city and town;*

*(4) That the local procedure for **integrating the approvals of state regulatory agencies** into the local review and approval process for land development and subdivision is the same in every city and town; and*

*(5) That all proposed land developments and subdivisions are **reviewed by local officials**, following a standard process, prior to recording in local land evidence records.*

3. For properties that sit outside of CRMC’s jurisdiction, municipalities can utilize STORMTOOLS to educate property owners on flood risk for proposed developments on one parcel, or for proposals that recommend subdivision of land into two or more lots. Chapter 3, Section 3.2.3.4 also explains that CRMC has developed STORMTOOLS Design Elevations (SDEs) that will offer a recommended base flood elevation to account for sea level rise when comparing with the base flood elevation in the FEMA FIRMs. Municipalities have the option of sharing the SDEs with property owners as developers submit plans to the cities and towns for review. The municipalities can consider several approaches to share the coastal risk profile of a particular development with applicants proposing development outside of CRMC’s jurisdiction:
  - a. Replicate CRMC’s proposed five-step process as outlined in Chapter 5 of this Shoreline Change SAMP document, and consider requirements for (1) type of development; (2) procedures for evaluating risk assessment; and (3) design standards; or
  - b. Require the developer complete an online assessment developed by the University of Rhode Island, known as a Rapid Property Assessment for Coastal Exposure (Rapid PACE). This tool can be used to compile all state data illustrating coastal risk for individual properties across all 420 miles of Rhode Island’s coastline.
  
4. Considering that documentation of current and future risks, as stated in R.I. Gen. Laws § 45-23-29 (see 6.5.3.2 above), is an intent of the legislation, the data and tools presented in this Shoreline Change SAMP can be used to revise the “required findings” outlined in R.I. Gen. Laws § 45-23-60 of the Land Development and Subdivision Review Enabling Act of 1992 and offer municipalities clear strategies for requiring applicants to document future risk. The “required findings” for location regulations regarding land development and subdivision review currently include:
  - (a) All local regulations shall require that for all administrative, minor, and major development applications the approving authorities responsible for land development and subdivision review and approval shall address each of the general purposes stated in § R.I. Gen. Laws § 45-23-30 and make positive findings on the following standard provisions, as part of the proposed project’s record prior to approval:*
    - (1) The proposed development is **consistent with the comprehensive community plan** and/or has satisfactorily addressed the issues where there may be inconsistencies;*
    - (2) The proposed development is **in compliance** with the standards and provisions of the*

*municipality's zoning ordinance;*

*(3) There will be no significant negative environmental impacts from the proposed development as shown on the final plan, with all required conditions for approval;*

*(4) The subdivision, as proposed, will not result in the creation of individual lots with any physical constraints to development that building on those lots according to pertinent regulations and building standards would be impracticable. (See definition of Buildable lot). Lots with physical constraints to development may be created only if identified as permanent open space or permanently reserved for a public purpose on the approved, recorded plans; and*

*(5) All proposed land developments and all subdivision lots have adequate and permanent physical access to a public street. Lot frontage on a public street without physical access shall not be considered in compliance with this requirement.*

*(b) Except for administrative subdivisions, findings of fact must be supported by legally competent evidence on the record which discloses the nature and character of the observations upon which the fact finders acted.*

5. To adequately address coastal change as documented throughout this Shoreline Change SAMP, a future amendment to R.I. Gen. Laws § 45-23-60, specifically to sections (a)(4) and (a)(5) stated above, could include documentation of “future conditions” as a required finding. For example, municipalities could consider future conditions that they can enact without changes to current state zoning law when determining considering permanent access to lots, developments, structures, such as prohibiting new public or private streets within defined coastal and riverine Special Flood Hazard Areas (SFHAs).
6. Considering that CRMC’s STORMTOOLS, CERI (where available), and the SDE maps provide more accurate and reliable mapping of the Rhode Island landscape and coastal flooding scenarios – both from twice daily tides from projected sea level rise, and from episodic coastal storm events – documentation of the risk profile of any development within the Beach SAMP Project Boundary would illustrate the risk of various properties within the high-hazard coastal areas, and alert the municipality and any prospective buyers of that property of the risk they are buying into.
7. Strengthening the language regarding the documentation of future risk in the Subdivision Review Act, especially related to preventing or mitigating negative environmental impacts, avoiding areas with physical constraints to development and ensuring permanent physical access, can be applied to all land developments and subdivisions not just those potentially impacted by coastal hazards. These include areas

subjected to inland flooding, high winds and severe erosion.

#### 6.5.5 Highways and Mapped Streets

1. An additional consideration for long-term resilience at the municipal level is the location, management, and long-term maintenance of highways and mapped streets, and their exposure and vulnerability to recurring damage from storms, coastal erosion and sea level rise. The “Highways” and “Mapped Streets” sections of Rhode Island General Laws included below will be important to consider as future risks and associated costs/benefits of capital improvement investments are evaluated.

2. Rhode Island General Laws § 24-8-1.2, “Highways,” defines the establishment of the Rhode Island highway system:

*There is hereby established a Rhode Island highway system which shall include state roads and municipal roads. The determination of those roads designated as state roads and those designated as municipal roads shall be based upon a functional classification system, as established by the state planning council.*

3. Rhode Island General Laws § 45-23.1, “Towns and Cities,” addresses mapped streets and the establishment of official maps.

*R.I. Gen Laws § 45-23.1-2 (e) The locating, widening, or closing, or the approval of the locating, widening, or closing of streets by the city or town, under provisions of law other than those contained in this chapter, are deemed to be changes or additions to the official map, and are subject to all the provisions of this chapter except provisions relating to public hearing and referral to the plan commission.*

4. Rhode Island General Laws Chapter 24-6, “Highways,” addresses Abandonment By Towns:

*R.I. Gen Laws § 24-6-3 Damages payable to abutting landowners. – The owners of land abutting upon a highway or driftway in any town shall be entitled, upon the abandonment of the highway or driftway, either wholly or in part, to receive compensation from the town for the damages, if any, sustained by them by reason of the abandonment; and the town council, whenever it abandons the whole or any part of a public highway or driftway, shall at the same time appraise and award the damages.*

5. The concern with long term resilience of coastal roads is if a shore-parallel roadway, as seen in many coastal communities throughout Rhode Island (Atlantic Avenue in Westerly, Matunuck Beach Road in South Kingstown, etc.), becomes damaged abruptly from a coastal storm, or over time by sea level rise and gradual erosion, the state and town are responsible for providing access from that roadway to the properties it was designed to serve.

Abandoning these roadways could result in a financial burden to the municipality if they are required to compensate landowners, which could lead to decisions to continue investing funds into roadways in high risk coastal hazard zones that will eventually be inundated on a regular basis from future sea level conditions, or undermined by future coastal erosion. As the expense of the maintenance cost for these roads or the cost to reimburse property owners is expected to place an extra financial burden on communities in the future, a statutory revision that defines and limits community financial exposure related to coastal and other natural hazards will be needed. Additionally, establishing special assessment or tax districts could be evaluated to determine if improvements in high risk or hazard areas can be supported by the property owners in that specific area.

#### 6.5.6 Other Land Use Considerations

1. In addition to suggestions outlined above to strengthen state regulations in support of coastal resilience measures, several other issues and concerns have been raised during the Shoreline Change SAMP process that are worthy of future policy review and consideration:
  - a. **Debris management for properties in coastal high hazard areas with first floor enclosures below the FEMA-designated Base Flood Elevation (BFE).** First floor enclosures that are subject to flooding have the potential to create debris if the first floor enclosure is damaged or flooded during a storm event. Drafting regulations that regulate construction and contents of first floor enclosures below BFE would help minimize damage created by storm-related debris and reduce public expenditures for cleanup and disaster relief.
  - b. **Long-term impacts of structures that are designed to weather future storm events, but are in active erosion areas with shorelines that are projected to migrate inland.** Consideration of future coastal conditions will serve to address land use policy conflicts that may arise when structures along the coast are designed to be more resilient to extreme storm events, but the land around those structures is projected to erode. Stipulations in CRMC assents for future structure removal or relocation in “active erosion” areas, including barriers and beaches on headlands, could be considered for future permit requirements.

## 6.6 Future Research Needs

### 6.6.1 Financial Impacts, Incentives, and Cost/Benefit Analyses

1. The Shoreline Change SAMP has created tools for assessing risk across all 420 miles of Rhode Island's coastline. This baseline information of risk exposure can serve as the foundation for municipal cost/benefit analysis to begin assessing feasibility of implementing adaptation measures, some of which are described in Chapter 7 of this document. For example, assessed property values for each municipality have been compiled for all 21 coastal towns during the course of the Shoreline Change SAMP effort. From the assessed value data, a similar exposure assessment can be completed as was done for the e-911 data presented in the CRMC Exposure Assessment described in Section 4.5.1. Analyzing the assessed value of structures in each coastal flooding scenario can illustrate potential implications to a town's tax base and overall municipal finance strategy, and broader economic impacts of coastal hazards at a municipal scale. Defining different scenarios, financial implications, adaptation measures and potential return on investment of implementation strategies can assist cities and towns in sound decision making and wise investment of capital improvement funds.
2. For both regulators and individual property owners, information and decision support tools related to market forces and the potential for enacting financial and other incentives that encourage implementation of resiliency measures are needed. For example, defining tax incentives for property owners who voluntarily implement and document accepted measures to address resiliency, and ensuring those property owners are not penalized with higher property tax after their property is improved and valued at a higher assessment. Additionally, identification of financing strategies for making improvements that can be amortized over a defined period of time could assist property owners in making improvements in the near term to reduce their risk from projected future conditions outlined in this Shoreline Change SAMP.
3. Following resilience initiatives in other flood-prone states and in communities with a high coastal risk profile such as Norfolk, Virginia, will allow decision makers in Rhode Island to evaluate "lessons learned" in other communities and techniques that might be feasible in Rhode Island coastal cities and towns. As mentioned in Section 6.3.8, Moody's Investors Service is considering future risk conditions attributed to climate change when determining municipal bond ratings. A case study like Norfolk, VA where the city's involvement in the "100 Resilient Cities" initiative is helping to assess strategies that could protect the city's bond rating over the long term, could offer

strategies to protect and sustain long term financial stability in Rhode Island’s high-risk coastal municipalities.

#### 6.6.2 Municipal Liability

1. The process of adopting the CRMC’s Coastal Hazard Application Guidance into the RI Coastal Resources Management Program will require coastal permit applicants to complete and submit a risk assessment for their proposed development that will then be attached to the Council Assent. This initiative will allow CRMC to disclose risk from coastal hazards to those who wish to own and occupy property in high hazard coastal areas, and ensure that the best available science is made available to those property owners.
2. Roger Williams University School of Law produced a technical memorandum<sup>7</sup> titled “RI CRMC Liability Exposure for Permit Granting in Flood-Risk Areas,” summarizing potential for state liability, public duty defense, special duty, and egregious conduct, and presenting examples of case law as “cautionary tales” for wrongful permitting. This type of effort would also assist municipalities in considering their liability for issuing building permits in areas of high coastal risk recently identified by CRMC in their decision support mapping tools, but outside of CRMC’s jurisdiction.
3. In December of 2015, a conversation with municipal solicitors was initiated through a one-day event at Roger Williams University that addressed emerging legal issues related to coastal hazards and land use, including municipal liability and takings law, among other topics. Video and presentations from that event can be found on line <https://law.rwu.edu/academics/marine-affairs-institute/research-and-outreach/symposiaconferences/legal-aspects-coastal-adaptation-resilience-ri-dec-2015>
4. Future contributions to Rhode Island’s body of knowledge could include national case law monitoring by the Roger Williams School of Law, Marine Affairs Institute and the RI Sea Grant Legal Program.
5. The Conservation Law Foundation’s (CLF) 2018 document, “Climate Adaptation and Liability: A Legal Primer and Workshop Summary Report,”<sup>8</sup> addresses not only government sector liability, but also liability for design and environmental professionals. The workshops held by CLF resulted in recommendations summarized in this document

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<sup>7</sup> Ryan-Henry, J. and D. Esposito. 2014. Technical Memorandum, “RI CRMC Liability Exposure for Permit Granting in Flood-Risk Areas.” Roger Williams University. Bristol, RI.

<sup>8</sup> Moran, D. and E. Mihaly. 2018. *Climate Adaptation and Liability: A Legal Primer and Workshop Summary Report*. Conservation Law Foundation. Boston, MA.

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that include continuing dialogue and education among the private-sector design community and regulators at different levels of government, as well as exploration of standards and codes that consider disclosures, incentives, and financing for long-term climate adaptation.

#### 6.6.3 Site Systems and Groundwater Dynamics

1. As outlined at the end of Chapter 4 of this Shoreline Change SAMP document, future research is needed on the effects that sea level rise will have on groundwater. For state permitting and municipal decision making on land development projects, the considerations include saltwater intrusion into drinking water supplies, contaminant mobilization throughout groundwater systems, and reduction of efficiency of on-site wastewater treatment and stormwater management systems.

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## CHAPTER 7

# Adaptation Strategies and Techniques for Coastal Properties

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## 7.1 Overview

1. Chapter 7, “*Adaptation Strategies and Techniques for Coastal Properties*,” is intended to support CRMC’s vision of providing guidance and tools for property owners and state and local decision-makers to proactively prepare and plan for, absorb, recover from, and successfully adapt to changing conditions associated with storm surge, coastal erosion and sea level rise. Information and tools contained in this chapter are designed to encourage “no regrets” decision-making within the Rhode Island Shoreline Change SAMP area.
2. This chapter is the culminating chapter of the Shoreline Change SAMP. It provides adaptation strategies and techniques that support Stage 3, “Choose measures of adaptation,” of the overarching coastal risk assessment and management process discussed in Chapter 3. These adaptation strategies and techniques also provide specific options supporting Step 4, “Design Evaluation,” of CRMC’s Coastal Hazard Application Guidance for property owners, detailed in Chapter 5.

### 7.1.1 Chapter Objectives

1. This chapter provides an overview of adaptation strategies and tools that Rhode Island coastal property owners may be able to use in order to prepare their properties for the effects of climate change. Specifically, this chapter focuses on adaptation measures which can help property owners prepare for the risk associated with storm surge, coastal erosion and sea level rise. This chapter includes a definition of adaptation, discussion of associated concepts, and an explanation of how this relates to CRMC’s regulatory authority and the goals, objectives and components of the Shoreline Change SAMP. Additionally, it includes short descriptions of a number of coastal adaptation strategies and techniques coupled with suggestions of sources of more information about these and other adaptation strategies.
2. Adaptation strategies and tools discussed in this chapter are suggested for possible use within the entire Shoreline Change SAMP area, including areas outside of CRMC jurisdiction. ***It is important to note that adaptation strategies and tools included in this chapter are not necessarily limited to those that are currently eligible for permitting by all relevant regulatory agencies, including CRMC.*** Rather, CRMC has included a broad suite of strategies and tools here in order to encourage consideration of the full range of

options that may need to be considered in order to adapt Rhode Island's coastal communities to the full range of possible impacts associated with storm surge, coastal erosion and sea level rise. Please refer to the RICRMP for current CRMC regulations.

3. CRMC recommends that coastal property owners adapt to the coastal hazards associated with climate change. This is recommended because of the risk associated with storm surge, coastal erosion, and sea level rise, coupled with the exposure and vulnerability of Rhode Island's coastal communities. Coastal communities will experience increasing damage to coastal properties, which may impact coastal communities and economies in a number of ways. Rhode Islanders' best protection against these damages is to begin implementing adaptation measures today.
4. This chapter focuses specifically on technical adaptation measures which can be implemented at the individual site or structural level by individual coastal property owners. This distinguishes this chapter from other adaptation guidance available from other state and federal agencies and non-governmental organizations, which often focus on planning, policy and legal solutions to be implemented at larger scales. Sources referenced in this chapter include some of the best available information on individual site or structural adaptation measures, and include publications from government entities, non-governmental organizations, scientists, and private companies known for their research on adaptation techniques.

### 7.1.2 Defining Adaptation and Associated Concepts

1. According to the Intergovernmental Panel on Climate Change (IPCC), adaptation refers to "the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects" (Agard *et al.* 2014). Within the context of the Shoreline Change SAMP, adaptation refers to moderating or avoiding harm in Rhode Island's coastal communities by making adjustments to existing and future coastal development, whether on the structural, site-specific, or community-wide scales.
2. Proactive adaptation tools and strategies are typically framed within three main categories: protection, accommodation, and retreat. **Protection** strategies typically

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include use of either engineered or natural structures or measures to shield adjacent development or infrastructure from coastal hazards, without modifying the development or infrastructure itself. Coastal protection strategies are typically divided into so-called “**hard**” measures (e.g. seawalls or bulkheads) and “**soft**” measures (e.g. dunes or wetlands). **Accommodation** strategies typically include those involving the modification of the development or infrastructure (e.g. through elevation or retrofitting). **Retreat** strategies include those involving moving or removing development or infrastructure (e.g. moving a structure further inland on a waterfront parcel) (California Coastal Commission 2015). This chapter includes discussion of adaptation strategies fitting into all three categories. Each adaptation strategy discussed herein is framed within the context of these categories.

3. Adaptation measures can include both **technical** approaches (e.g. elevating a home) and **policy or planning** approaches (e.g. developing an overlay zone). Additionally, adaptation measures can be applied to a range of scales, from the **individual structure** (e.g. a home), to a **site** (e.g. the parcel on which the home is based), to a **community or entire municipality**. Some adaptation measures are appropriate for retrofitting existing sites or structures, while others are intended only for new sites or structures. Last, different types of adaptation measures can be used independently or in combination (sometimes called “hybrid” approaches), depending on the unique needs of the site(s) and/or structure(s) in question. This chapter focuses primarily on technical adaptation measures appropriate for individual structures or sites on coastal properties, but illustrates those which can be applied across this full range of scales and for both existing and new sites or structures. This chapter includes explanation of the appropriate scale(s) of each adaptation strategy discussed herein.
4. Importantly, adaptation should not be confused with other approaches to emergency management. Emergency management, with regard to coastal hazards and other sources of risk, is typically framed as four phases: **mitigation, preparedness, response, and recovery**.
5. **Preparedness** typically refers to preparing for a coastal hazard immediately before a storm event (e.g. placing sandbags in front of your home). **Response** typically refers to actions taken during or immediately after a storm event to protect people and property (e.g. removing storm debris to gain access to your damaged home). **Recovery** typically refers to actions taken in the weeks or months following a storm event (e.g. rebuilding

- your home). By contrast, **mitigation** refers to changes to the building or site that are designed long before a storm that will reduce exposure. These changes can be solutions that do not require pre-storm preparedness actions, e.g. elevating your home, or solutions that require pre-planned preparedness actions using designed devices.
6. This document, and this chapter in particular, focuses primarily on adaptation as a type of **mitigation**. It does not address short-term preparedness actions. However, employing adaptation techniques may help coastal property owners reduce their overall risk by mitigating potential storm impacts, reducing the need for some types of preparedness actions, and reduce their post-storm recovery time.

### 7.1.3 Choosing to Adapt: Choices and Challenges

1. While this chapter lays out a broad range of adaptation choices, it is important to emphasize that Rhode Island's coastal property owners *must* adapt – because the coastal hazards that are the focus of the Shoreline Change SAMP will require proactive planning in order to avoid future economic, environmental, and personal harm. Coastal property owners and decision-makers will need to choose *which* adaptation measures are most appropriate for use at the structure, site or area under consideration.
2. While adaptation may seem costly and inconvenient to some, it can actually be a significant cost savings in the long run. A 2017 study by the National Institute of Building Sciences found that investments in mitigation measures in new construction that exceeded provisions of 2015 model building codes resulted in a benefit-cost ratio of 5 to 1 for riverine flood hazards and 7 to 1 for hurricane surge hazards. In other words, for every \$1 spent on adaptation, \$5 is saved with regard to riverine flood risk and \$7 is saved with regard to hurricane surge risk. Further, this study found that in Rhode Island, choice of first floor building height above BFE (2 to 6 feet) resulted in a benefit-cost ratio of 6.7 to 3.8. For further information, please see National Institute of Building Sciences 2017.
3. In all cases, choice of adaptation measure(s) is context-specific. Individual coastal property owners and decision-makers must evaluate the specific structure, site, or area in question, and what is known about the exposure of that structure or site to sources of coastal hazard risk. The property owner and decision-maker can then use this contextual

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information to select adaptation measures that best suit the structure or site as well as the sources of risk.

4. Coastal property owners attempting to proactively choose adaptation measures will be challenged to look to the future, beyond existing regulatory requirements. For example, over time, rising sea levels may cause an area in a mapped FEMA A Zone, subject to at least a 1% annual chance flood event, to be remapped in the future as a V Zone, with the same annual flood chance but now subject to severe wave action. In another example, an area that is *outside* of the current mapped FEMA floodplain may be remapped in the future as *inside* the floodplain.<sup>1</sup> (For information on how property owners can use CERI STORMTOOLS Design Elevations to address this problem, see Shoreline Change SAMP Chapter 3.) This future scenario would require different adaptation measures. While uncertainty about this and other aspects of the changing coast creates challenges for choosing adaptation measures, it also underscores the importance of proactive planning for the future.
5. Choice of adaptation measure(s) to apply to a specific structure, site or region must take into account all coastal hazard risk factors. The Shoreline Change SAMP is focused on three sources of coastal hazard risk: storm surge, coastal erosion, and sea level rise. Choice of adaptation measure must consider all three of these risk factors as well as the synergistic effects of these sources of risk. Further, adaptation measures must be evaluated for potential inclusion in the design phase of a new construction project, or for the feasibility of using in the modification or retrofit of an existing structure. Additionally, adaptation choice must consider tradeoffs between different adaptation measures that address different sources of risk. For example, a property owner concerned about flooding associated with storm surge and sea level rise may choose elevation as an appropriate adaptation measure. However, while elevation might *reduce* a structure's exposure to flooding, it may *increase* that structure's exposure to high winds. Further, elevation may increase the likelihood of damage to infrastructure which cannot be elevated, such as onsite wastewater treatment systems, utility connections, decks, and stairways.

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<sup>1</sup> The A and V flood zones were designed for insurance rate pricing for the National Flood Insurance Program (NFIP) and for regulatory enforcement rather than an acceptable risk for the building owner. History has shown nature does not care about regulations; Hurricanes Katrina, Sandy, and Harvey are examples where the flooding exceeded the mapped regulatory boundaries/flood elevations and thus had severe impact on the flooded properties.

6. Choice of adaptation measure must also include consideration of its effect on shoreline public access. CRMC requires that any adaptation measures implemented avoid loss of shoreline public access.
7. Choice of adaptation measure(s) to apply, and how best to apply them, must be informed by context, i.e. the specific attributes of the structure, site, or region as well as what is known to date about the exposure of that place to storm surge, coastal erosion, and sea level rise. This must include consideration of the **design life** of the structure (s) in question.
8. Choice of adaptation measure must also include consideration of the **best available projections of flood risk** at that site. As discussed in Chapter 3, STORMTOOLS Design Elevations, under development for all Rhode Island coastal communities, will provide alternative base flood elevation (BFE) estimates for 100-year storms that can be used to guide site-specific adaptation decisions.

#### 7.1.4 Adaptation: A Rapidly Developing Field

1. The field of adaptation is rapidly evolving, along with scientists' and managers' understanding of climate change and the associated sources of coastal hazard risk. New adaptation strategies, tools and technologies are being developed and existing adaptation measures improved at a rapid pace. As such, it is not possible to include an exhaustive list of all potential adaptation strategies and tools here, nor to include all of the most current development in the field. This chapter is thus intended to introduce coastal property owners and decision-makers to the concept of adaptation; provide examples of the range of adaptation options which may be available; and direct readers to sources of more detailed or up-to-date information.
2. Given the rapidly-evolving nature of the adaptation field, many adaptation techniques are not yet allowable under existing state and municipal permitting programs or in all potentially vulnerable areas. Individual coastal property owners should check with their regulatory agencies regarding the potential use of specific adaptation techniques in specific sites.

## 7.2 Adaptation Tools and Strategies for Coastal Properties

### 7.2.1 CRMC Guidance on Coastal Property Adaptation Tools and Strategies

1. This section includes brief descriptions of a range of adaptation tools and strategies which property owners and decision-makers may choose to consider for use at individual coastal properties. **It is important to note that adaptation strategies and tools included here are not necessarily limited to those that are currently eligible for permitting by all relevant regulatory agencies, including CRMC. Please refer to the RICRMP for current CRMC regulations.**
2. In general, the CRMC prefers “natural” or “nature-based infrastructure” solutions for adaptation; many such solutions are described below in section 7.2.6. Such solutions are often particularly appropriate at the site level. However, the CRMC recognizes that so-called “grey infrastructure” solutions, such as those described below in section 7.2.7 and section 7.2.8, are appropriate in certain cases, particularly for public infrastructure.
3. Table 1 includes a summary of the coastal property adaptation tools and strategies discussed in this chapter. Each tool and strategy is detailed in the chapter text. Additionally, references are included throughout the chapter and at the end for more information on each adaptation measure.

Table 1. Summary table of coastal property adaptation tools and techniques

Strategy	Existing or New Construction	Protection, Accommodation or Retreat	Site or Structure
Site selection	New	Accommodation or Retreat	Site or structure
Distance inland	Existing or new	Retreat	Site or structure
Elevation	Existing or new	Accommodation	Site or structure
<i>Terrain management</i>			
Site grading	New	Accommodation	Site
Site layout	New	Accommodation	Site
Drainage	Existing or new	Accommodation	Site or structure
<i>Natural or nature-based measures</i>			
Coastal bank protection	Existing or new	Protection	Site
Living breakwaters	Existing or new	Protection	Site
Dune restoration	Existing or new	Protection	Site
Beach replenishment	Existing or new	Protection	Site

<b>Coastal wetland or enhancement</b>	Existing or new	Protection	Site
<b><i>Flood barriers</i></b>			
<b>Floodwalls</b>	Existing or new	Protection	Site
<b>Temporary flood barriers</b>	Existing or new	Protection	Site
<b>Floodgates and tide gates</b>	Existing or new	Protection	Site
<b>Berms</b>	Existing or new	Protection	Site
<b><i>Structural shoreline protection measures</i></b>			
<b>Seawalls</b>	Existing or new	Protection	Site
<b>Revetments</b>	Existing or new	Protection	Site
<b>Bulkheads</b>	Existing or new	Protection	Site
<b><i>Wet Floodproofing</i></b>			
<b>Choice of building materials</b>	Existing or new	Accommodation	Structure
<b>Wall openings and vents</b>	Existing or new	Accommodation	Structure
<b>Protect underside of elevated buildings</b>	Existing or new	Accommodation	Structure
<b>Elevation of utilities and living quarters</b>	Existing or new	Accommodation	Structure
<b>Breakaway walls</b>	Existing or new	Accommodation	Structure
<b><i>Dry Floodproofing</i></b>			
<b>Impermeable building materials or sealants</b>	Existing or new	Protection	Structure
<b>Watertight doors or windows</b>	Existing or new	Protection	Structure
<b>Pumps and drains</b>	Existing or new	Protection	Structure
<b>Backflow valves</b>	Existing or new	Protection	Structure
<b><i>Other Retrofitting Techniques</i></b>			
<b>Fortified™</b>	Existing or new	Protection	Structure
<b><i>Relocation or Managed Retreat</i></b>			
<b>Site selection</b>	Existing or new	Retreat	Site or structure
<b>Construct moveable structure</b>	New	Retreat	Structure
<b>Relocate</b>	Existing	Retreat	Site or structure

**Box 1. FM GLOBAL: A RHODE ISLAND-BASED SOURCE OF INFORMATION  
ON ADAPTATION STRATEGIES**

FM Global is a property insurance company with corporate headquarters in Johnston, RI dedicated to helping businesses manage risk, prevent losses and build resilience to a broad range of natural and human-made hazards. CRMC has drawn upon FM Global's expertise in developing the Shoreline Change SAMP because the Rhode Island-based company is widely recognized as a leader in conducting adaptation research and certifying new adaptation products, and has developed an approach to the adaptation process that CRMC considers useful for individual coastal property owners. FM Global is known for its work developing adaptation solutions to facilitate property and business continuity; their business model is based on working with the corporate clients they insure to help them design resilient infrastructure and systems. They conduct engineering research on adaptation for use with their own clients and to enhance external standards and codes. A wealth of this information is available in the form of FM Global data sheets. Detailed data sheets are available on general topics such as floods, green roof systems, and wind design, as well as specific strategies for types of infrastructure including electrical systems and fire suppression. While this information is primarily assembled for business clients, many of these adaptation strategies are appropriate for residential coastal property owners. Data sheets can be accessed at [www.fmglobaldatasheets.com](http://www.fmglobaldatasheets.com).

### 7.2.2 Site Selection

1. Site selection is one of the most important adaptation strategies, and is recommended as the place to start, when considering **new construction**. New construction can include either partial construction (e.g. an addition or modification of an existing structure) or full construction, and can include either development of a previously undeveloped site, or demolition and reconstruction of a developed site. This adaptation measure, a form of **accommodation**, can apply to either **the entire site** (in other words, the parcel of land being purchased and developed) or to the specific building site on the parcel where **structures** or infrastructure will be developed.
- 2: In some cases, a prospective property owner may be choosing among possible coastal parcels for purchase and development. When choosing among parcels, site selection should be informed by the best available science showing the exposure of that parcel to storm surge, coastal erosion and sea level rise. Additionally it should consider other potential risks, including but not limited to riverine flooding or ponding from insufficient

stormwater drainage. Further, it should consider both horizontal and vertical dimensions – in other words, **elevation** above projected flood areas as well as **distance** inland (see below for further discussion). Choice of a parcel that is minimally exposed to sources of coastal hazard risk is one of the most effective adaptation strategies and can be much easier and less expensive than implementing adaptation at a highly-exposed site.

3. In other cases, a property owner may already own a parcel, but may be able to choose among possible sites on that parcel for building a home or other structure. When choosing a building site on a given parcel, site selection should similarly consider both horizontal and vertical dimensions – **elevation** above projected flood areas as well as **distance** inland (see below for further discussion). Building site selection at this scale could make a significant difference in reducing a property’s exposure to sources of coastal hazard risk.
4. Whether at the scale of an entire parcel or a specific structure, site selection must also include **site access**. Site access includes transportation routes facilitating access to/from the parcel (e.g. public or private roads), as well as driveways, parking areas, paths, and other means of access on the parcel to/from the buildings themselves. It also includes access for other infrastructure, including power, water, and sewer. Again, property owners should consider both **elevation** above projected flood areas as well as **distance** inland. Choice of low-exposure access areas is critical for enabling safe access to/from the site in the event of a storm.
5. For example, FM Global recommends that sites be chosen where the entire site and all access routes are outside of 500-year return period flood areas, by both elevation and footprint. They further recommend that sites where structures will be placed be above the 500-year return period flood area as well as an additional 1 to 2 feet of freeboard. Last, they suggest that the building site be at least 500 feet away from areas of direct wave impacts and/or high flood velocities (FM Global 2016). Importantly, these recommendations do not consider projected sea level rise. CRMC recommends that coastal property owners consider all three coastal hazards addressed in the Shoreline Change SAMP – storm surge, coastal erosion, and projected sea level rise – when selecting a site.

### 7.2.3 Distance Inland

1. Distance inland is another important and effective adaptation strategy that allows for **accommodation** of changing coastal conditions. This strategy was discussed above within the context of site selection, but is further detailed here because of its fundamental importance as an adaptation measure. This strategy can be applied to both **new construction** and **existing construction**, and to both the **entire site** or to individual **structures**. Selection of an appropriate distance inland enables property owners to avoid direct wave impacts or high flood velocities (FM Global 2016). When considering distance inland, property owners should consider the best available site-specific information about potential exposure to storm surge, coastal erosion, and sea level rise.
2. In cases of **new construction**, choice of distance inland can inform both selection of the overall site as well as where on the site buildings and infrastructure are constructed (e.g. a home could be constructed on a waterfront parcel, but as far inland as possible). In cases of **existing construction**, there may be opportunities to modify existing structures with consideration of distance inland. For example, an addition onto an existing building could be designed and constructed on the upland side of the building, or an entire building could be relocated toward the upland side of an existing parcel. The latter can be considered a form of **managed retreat**, which is further discussed below in section 7.2.11.

### 7.2.4 Elevation

1. A widely-used adaptation technique is **elevation** of either an entire site or of individual buildings and/or key equipment on that site. This strategy was discussed above within the context of site selection, but is further detailed here because of its fundamental importance as an adaptation measure. Elevation is a form of **accommodation**. While it may mitigate exposure to flooding, it does not reduce exposure to erosion. When applied at a **site** scale, elevation involves filling or regrading a site to a height above a given predicted flood elevation, and is more commonly applied in cases of new construction. At the **structural** scale, elevation involves designing a new building or retrofitting an existing building to raise it above flood elevation through the use of raised foundations or elevated structures. In some cases, buildings may be elevated on piles; in other cases, primary living quarters and utilities may be elevated to the second floor, minimizing the exposure of first-floor infrastructure to flooding (Snow and Presad 2011). FM Global (2016) recommends additional considerations, including not building

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- foundations in areas subject to high or moderate velocity flows; building structures to resist all flood-related loads and conditions; ensuring consideration of other applicable loads, such as gravity and wind; considering all appropriate load combinations; and using load combinations, load factors, and resistance factors as specified in governing model codes and standards (FM Global 2016).
2. One challenge with the use of elevation as an adaptation measure is elevating on fill. Elevation is required in certain FEMA mapped flood zones to meet minimum heights in accordance with mapped FEMA base flood elevations (BFEs). Some forms of elevation may involve fill. However, fill is prohibited as a means of structural support in FEMA mapped V-zones (44 CFR 60.3(e)(6); see generally the FEMA National Flood Insurance Program's floodplain management regulations for more information). Further, using fill to elevate homes may not always be an appropriate solution. Use of fill in coastal areas can be very costly. Fill can also have downstream impacts because it is susceptible to erosion (e.g. FEMA 2009) - for example, a flood event could wash fill material into adjacent coastal wetlands or other sensitive habitat types. Further, fill can increase flooding and/or erosion on the site and/or on adjacent properties.
  3. A critical consideration for elevation, whether at the site or structural scale, is what height to which the site or structure should be raised. The FEMA National Flood Insurance Program requires the lowest floor of structures built in Special Flood Hazard Areas, areas FEMA deems to be exposed to the 100-year return period flood event, to be at or above the base flood elevation shown on Flood Insurance Rate Maps (FIRMs). These maps are based on past conditions and do not account for projected sea level rise. FM Global recommends additional precautions, elevating buildings above the predicted 500-year flood elevation and including 1 to 2 feet of freeboard (FM Global 2016). The STORMTOOLS Design Elevation (SDE) maps produced through the Shoreline Change SAMP provide information that will enable homeowners to take further precautions by elevating to a height that considers projected sea level rise. For more information, please see Chapter 3 as well as [www.beachsamp.org](http://www.beachsamp.org).

#### **7.2.5 Terrain Management**

1. This section describes some commonly-used terrain management adaptation strategies. Terrain management strategies are generally reserved for FEMA mapped A Zones, because V Zones are subject to wave attack. Some terrain management strategies may

also be considered standard construction practices, while others may also be considered forms of natural or nature-based adaptation. Other adaptation strategies described below in Section 7.2.6, Natural and Nature-Based Adaptation Strategies, and Section 7.2.7, Site Protection Through Flood Barriers, may also be considered forms of terrain management; please refer to those sections accordingly.

2. Terrain management strategies to address flooding include a range of related adaptation strategies that can be applied at the **site** scale as means of **accommodation**. In some cases, adaptation strategies described in this section may also be built into a **structure**. These strategies help manage flood waters by ensuring that flood exposure is neither created nor exacerbated by site layout, grading, and flood and stormwater (e.g. rain and melting snow) management.
3. Specific means of managing terrain to manage floodwaters include: **grading** a site such that flood and stormwater flows away from buildings and infrastructure; designing **site layout** such that runoff from off-site areas is considered and that water routing is planned to avoid contact with buildings and infrastructure; and designing site-wide **drainage systems** to accommodate flood and stormwater volumes and velocities associated with future storm events and to avoid potential clogging due to storm debris or landscaping materials (FM Global 2016). There are many natural or nature-based techniques that can be incorporated into terrain management strategies to further manage flooding; please see section 7.2.6 below.

**Box 2. THE STATE OF THE PRACTICE OF LIVING SHORELINES IN NEW ENGLAND**

In 2017, the Northeast Regional Ocean Council (NROC) partnered with The Nature Conservancy (TNC) under a grant from NOAA to assess the state of practice of living shorelines in New England. NROC and TNC hired Woods Hole Group, which completed a comprehensive review of the state of the practice of coastal natural and nature-based adaptation approaches in New England. This project, "Living Shorelines in New England: State of the Practice," culminated in a comprehensive report, a series of profiles of living shoreline techniques, and a living shorelines applicability index. These resources provide Rhode Island coastal property owners and decision-makers with an up-to-date and accessible review of natural and nature-based adaptation techniques that can work in New England, despite limitations such as colder waters and a shorter growing season. Of particular use are the profile pages, which provide a comprehensive overview of design recommendations, siting criteria, and regulatory information for eight different living shoreline types (natural or engineered dunes; beach replenishment; natural or engineered coastal banks; marsh creation/enhancement, either natural or with toe protection; and living breakwaters). These profile pages contain design schematics, illustrative case studies, and a key explaining selection characteristics (e.g. "tidal range" and "nearby sensitive resources").

**Living Shorelines Introduction**

A detailed profile page was created for each of the eight (8) living shoreline types listed below. The purpose of these profile pages is to provide a comprehensive overview of the design recommendations, siting criteria and regulatory topics pertinent to a range of living shoreline designs that practitioners and regulators can use as a quick reference in the field or as an informational tool when educating home owners.

Living Shoreline Types
1. Dune - Natural
2. Dune - Engineered Core
3. Beach Nourishment
4. Coastal Bank - Natural
5. Coastal Bank - Engineered Core
6. Natural Marsh Creation/Enhancement
7. Marsh Creation/Enhancement w/Toe Protection
8. Living Breakwater

**Design Schematics**

The following living shoreline profile pages provide an example design schematic for each of the eight living shoreline types. Each schematic shows a generalized cross-section of the installed design. In addition, they illustrate each design's location relative to MHW and MLW, whether plantings are recommended, if fill is required, and any other major components of the design. It is important to note that these are not full engineering designs, and due to each site's unique conditions, a site-specific plan developed by an experienced practitioner is required for all living shoreline projects. Also note that these design schematics are meant to provide a general concept only, and are not drawn to scale.

**Case Study** One example case study with the following information is provided for each living shoreline type:

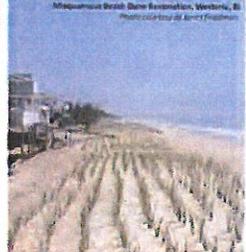
Project Proponent	The party responsible for the project.
Status	The status of the project (i.e. design stage, under construction, or completed) and construction date if applicable.
Permitting/Approvals	This section notes any specific permitting hurdles that occurred, or any regulatory insights that might have facilitated other projects in the future.
Construction Notes	This section identifies major construction methods or techniques, any unique materials that were used, or observations from a field visit design to approximate site specific conditions.
Maintenance Issues <td>If the project is complete and has entered the maintenance phase, this section is to note whether the project was maintained correctly. If a field visit, and/or if any specific maintenance needs have been required since completion.</td>	If the project is complete and has entered the maintenance phase, this section is to note whether the project was maintained correctly. If a field visit, and/or if any specific maintenance needs have been required since completion.
Final Cost	This section provides a cost for the project, broken down into permitting, construction, monitoring, etc. where applicable.
Challenges	Four sections highlight any unique challenges associated with a particular project and how they were handled.

**Explanation of Design Overview Tables**

<b>Materials</b>	A description of materials most commonly used to complete a living shoreline project of this type.
<b>Habitat Components</b>	A list of what types of coastal habitats are created or impacted by a living shoreline project of this type.
<b>Durability and Maintenance</b>	Although specific, sometimes it is impossible to provide in this context, general guidelines and schedules for probable maintenance needs, and design durability are detailed here.
<b>Design Life</b>	Although specific design life estimates will vary by site for each living shoreline type, this section provides some insight into factors that could influence design life.
<b>Ecological Services Provided</b>	This section provides an overview of the ecological services that could be provided or improved through the installation of that particular type of living shoreline project.
<b>Unique Adaptations to NE Challenges (e.g. ice, winter storms, cold temps)</b>	This section provides any unique practices or design improvements that could be made to improve the performance of the design given New England climatic and tidal challenges.

**Acronyms and Definitions**

<b>CV</b>	Cubic yards; one cubic yard equal 27 cubic feet. Project materials are often measured in cubic yards.
<b>MHW</b>	Mean High Water: The average of all the high water (i.e. high tide) heights observed over a period of time.
<b>MTE</b>	Mean Tide Level: The average of mean high water and mean low water.
<b>MLW</b>	Mean Low Water: The average of all the low water (i.e. low tide) heights observed over a period of time.
<b>SAV</b>	Submerged aquatic vegetation, which includes seagrasses such as eelgrass ( <i>Zostera marina</i> ) and widgeon grass ( <i>Ruppia maritima</i> ).
<b>Sediment</b>	Naturally occurring materials that have been broken down by weathering and erosion. Fine, small-grained sediments are silts or clays. Slightly coarser sediments are sands. Even larger materials are gravels or cobbles.



The state of practice of natural and nature-based adaptation measures is rapidly changing, and so property owners using this 2017 guide are advised to seek out the most up-to-date information on the technique of interest to them. For further information please see <https://www.conservationgateway.org/ConservationPractices/Marine/Pages/new-england-living-shorelines.aspx>.

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### 7.2.6 Natural and Nature-Based Adaptation Measures

1. Natural or nature-based adaptation measures, sometimes described as “non-structural,” “living shorelines,” “natural” or “green infrastructure,” “soft armoring,” or similar terms, refers to the use of natural features and systems to reduce the exposure of residential and other coastal properties and infrastructure while enhancing habitat and ecosystem services. Common examples include protection or restoration of beaches sand dunes; vegetated buffers; and protection or restoration of coastal wetland systems (California Coastal Commission 2015). Natural and nature-based adaptation measures include a broad suite of strategies that can be implemented at either the **site** or the **structural** scale, and for either **existing** or **new construction**, as a means of either **protection** or **accommodation**. Natural or nature-based strategies can be used by themselves or in combination with traditional (“hard” or “grey infrastructure” strategies) to create hybrid adaptation approaches. Such hybrid approaches are under consideration by CRMC, but some may not be permitted under the current regulations. Please refer to the RICRMP for the most current CRMC regulations.
2. The CRMC prohibits new structural shoreline protection measures on barriers classified as undeveloped, moderately developed, and developed, and on all shorelines adjacent to Type I waters (see the RICRMP §1.3.1(G)(3)). Additionally, the CRMC favors non-structural methods of shoreline protection (see the RICRMP §1.3.1(G)(1)).
3. Natural or nature-based adaptation strategies are frequently advocated over “hard” adaptation strategies because they can provide other ecological, economic, social and cultural benefits. These can include recreational areas, positive visual impacts, water quality improvements, and habitat for a broad range of species (California Coastal Commission 2015; NRC 2014).
4. When considering natural or nature-based adaptation strategies, property owners and decision-makers should consider a few important caveats. First, the use of natural or nature-based approaches in coastal adaptation is relatively new, many such approaches are still being tested and refined, and more research is needed on these topics; the property owner should evaluate what is known about the effectiveness of a given approach when considering its use on her or his property. Additionally, natural or nature-based approaches can be costly and can require large amounts of space, though are potentially less costly than structural shoreline protection measures. Finally, not all

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such approaches may be ecologically beneficial in all such places. Property owners should consider natural or nature-based approaches that are appropriate to the amount of space available and the ecological characteristics of their site and the surrounding area (California Coastal Commission 2015; NRC 2014).

5. **Coastal bank protection** encompasses a suite of methods used to stabilize the sediment in coastal banks. These methods can involve a variety of “hard” and “soft” materials and differing degrees of engineering in their design. Coastal bank protection strategies are designed to absorb storm surge, reduce wave energy and protect against coastal erosion, and are implemented as a natural alternative to bulkheads and revetments. Coastal bank **protection** projects can be applied at the **site** scale adjacent to **existing** or **new construction** (Woods Hole Group 2017).
6. **Natural** coastal bank protection projects include use of coir (natural fiber) rolls or logs, root wads, natural fiber blankets, and planted native vegetation such as marine grasses. Combining these materials with re-grading of the bank to reduce steepness and create a more dissipative slope can help to minimize erosion. **Engineered** coastal bank protection projects involve similar techniques such as regrading or terracing banks and planting native vegetation, but also incorporate the use of engineered cores, such as coir envelopes or sand-filled tubes (Woods Hole Group 2017). Engineered coastal bank designs might also incorporate the limited use of hard materials such as stone to stabilize the toe of the slope. For detailed guidance on these techniques, including local examples and siting criteria, please see Woods Hole Group 2017, particularly profile pages 4 and 5 (“Coastal Bank – Natural” and “Coastal Bank – Engineered Core”).
7. **Living breakwaters** are structures constructed in the nearshore environment as a means of breaking waves before they reach the shoreline. They are designed as a means of wave attenuation and coastal erosion control and a means of promoting sediment retention. Living breakwaters are typically oyster or mussel reefs. Their structure is often constructed out of shell bags, stone, or cast concrete structures such as reef balls (Woods Hole Group 2017). For detailed guidance on these techniques please see Woods Hole Group 2017, particularly profile page 8 (“Living Breakwater”).
8. **Dune restoration** is the practice of constructing new or restoring existing dunes as a means of dissipating wave energy and addressing storm surge and coastal erosion. Dune restoration can involve both natural and engineered techniques. For natural projects,

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sediments are either placed on an existing dune, or a mound of sediments are built up in an appropriate site in order to create an artificial dune. Engineered projects involve use of an engineered core, constructed using coir envelopes or similar structures, in order to stabilize the dune (Woods Hole Group 2017). For detailed guidance on these techniques please see Woods Hole Group 2017, particularly profile pages 1 and 2 (“Dune – Natural” and “Dune – Engineered Core”).

9. **Beach replenishment** (also sometimes called “beach fill” or “beach nourishment”) is the practice of replacing sediment along eroding beaches, often elevating or widening a beach. This activity is often thought of as a means of managing a recreational resource, but beach replenishment increases beaches’ ability to protect upland structures against wave energy and storm surge. This activity is often paired with dune restoration (above) (Woods Hole Group 2017). For detailed guidance on these techniques please see Woods Hole Group 2017, particularly profile page 3 (“Beach Nourishment”).
  
10. **Coastal wetland creation or enhancement** involves a range of methods to stabilize or enhance coastal wetlands, which can help stabilize shorelines and dissipate wave energy. Natural coastal wetland creation or enhancement involves planting marsh vegetation such as cordgrass, which provides a minimally intrusive means of enhancing marsh. Coastal wetland enhancement may also include installing toe protection materials in order to assist with coastal wetland stabilization. These techniques may include natural fiber rolls, shell bags, or stone (Woods Hole Group 2017). In some cases, fill material can be used to create elevations suitable for marsh vegetation, though it should be noted that additional state and regulatory restrictions apply to projects that involve placement of material below Mean High Water. For detailed guidance on these techniques please see Woods Hole Group 2017, particularly profile pages 6 and 7 (“Natural Marsh Creation/Enhancement” and “Marsh Creation/Enhancement w/ Toe Protection.”). See Shoreline Change SAMP Chapter 4 for further discussion of Rhode Island’s coastal wetlands’ exposure to sources of coastal hazard risk and of ongoing marsh restoration efforts.

### 7.2.7 Flood Barriers

1. Flood barriers provide one means of **protection** from exposure to flooding. Although commonly used, flood barriers must be considered with extreme caution. CRMC staff have found that flood barriers are often either undersized or under-designed for the sources of coastal hazard risk they are intended to address. Further, flood barriers may

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simply not be feasible means of protecting a site from storm surge and sea level rise given the latest sea level rise estimates (discussed in Chapters 2 and 3 of the Shoreline Change SAMP). CRMC staff have also found that flood barriers may be particularly ineffective in a FEMA mapped V-Zone or Coastal A-Zone as they do not effectively protect against wave energy, and may simply contribute to the amount of debris generated during a storm event. Designing flood barriers to address these sources of risk can therefore be very costly and may also lead to legal issues given the permitting and construction of such large structures.

2. Flood barriers can be applied to **existing** or **new construction**, and can protect a **site** or in some cases be built into a **structure**. Flood barriers are typically constructed along the perimeter of a site and may include a mix of different types of flood barriers. Choice of flood barrier adaptation measure(s) must be guided by the best available information on the exposure of the site to flooding associated with storm surge and sea level rise. Flood barriers should be specifically engineered and designed for their purpose; this includes certification to a national standard. FM Global (2016) advises that flood barrier design must address site-specific characteristics including the adjacent structures, site hydrology, hydraulics, drainage, and soils. Further, FM Global advises consideration of the property owner's ability to operate and maintain the system. Any flood barrier must be designed by an engineering professional who will evaluate all of these considerations and design a barrier appropriate for the site. Again, CRMC staff have found that flood barriers may be particularly ineffective in a FEMA mapped V-Zone or Coastal A-Zone as they do not adequately protect against wave energy.
3. Flood barriers include **permanent** and semi-permanent barriers as well as **temporary** structures. Permanent barriers are those which are permanently installed, even though they may not always be in use, and include but are not limited to **floodwalls, flood gates, berms, and tide gates**. Semi-permanent flood barriers have permanent foundations with removable columns and barrier panels that can be installed in advance of flood conditions, and taken down after flood waters recede (see e.g. EKO Flood USA n.d. or Flood Control America 2016). Temporary flood barriers include those which are not permanently installed but can be deployed in anticipation of a flood, and include inflatable plastic barriers (see e.g. A Better City n.d.).
4. **Floodwalls** are vertical engineered structures, typically built out of concrete or similar materials, that can be scaled as a means of **protection** for one or multiple structures on

- a small **site** scale (FEMA 2007). Floodwalls are generally not designed to resist high-energy waves, unlike seawalls and other similar shoreline protection structures (see section 7.2.8 below). As such they are often located in areas inland of coastal wetlands or other features that reduce wave energy (NRC 2014). Floodwalls are often used in areas where there is insufficient space for levees, which have a larger footprint (FEMA 2007).
5. Floodwalls sometimes incorporate **flood gates**, which provide a means of controlling water flow in such systems. Flood gates are typically designed as passive devices, automatically opening and closing in response to the hydrostatic pressure of floodwaters (FEMA 2015). Flood gates are not limited to installation in flood walls, but can be installed as stand-alone devices protecting **sites** or individual **structures**. They can also be installed on roadways or walkways (A Better City 2015).
  6. While floodwalls can protect adjacent structures on a site from inundation, they have many limitations as a coastal adaptation measure, including cost and effort of construction and maintenance (FEMA 2007). Further, floodwalls are not immune from failure, as demonstrated in some cases in New Orleans during Hurricane Katrina (NRC 2014). Floodwalls may also have impacts including exacerbated flooding of adjacent areas and environmental impacts such as construction in or adjacent to coastal wetlands and changes to flood conditions (NRC 2014). For detailed guidance on constructing floodwalls, see FEMA 2007.
  7. **Berms**, sometimes also described as embankments, raised ground, or dikes, are structures typically constructed of soil, clay or other earthen materials and used as means of flood **protection** on a small **site** scale (e.g. one residential structure). Berms differ from levees in scale (FEMA 2007). Levees may be constructed of similar materials but may protect an entire neighborhood or part of a city, such as New Orleans (NRC 2014). A berm can be constructed along one side of a building or can completely encircle a building (FEMA 2007). Even a small berm can require a large amount of space and a lot of earthen material; as such, berms are often incorporated into site terrain management (section 7.2.5 above) through site layout and grading.
  8. **Tide gates** are another form of flood barrier used in low-lying areas. They are a means of flood **protection** typically applied on a **site** scale, and are designed specifically to close during incoming tides, preventing downstream waters from coming further inland,

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and open during outgoing tides, allowing upstream waters to drain. It is important to note that tide gates are of limited effectiveness given rising sea levels. A study by Walsh and Miskewitz (2012) found that sea level rise limits the effectiveness of tide gates because it impacts the hydraulic systems used to control tide gates, resulting in longer and deeper flooding events.

### 7.2.8 Structural Shoreline Protection Measures

1. The CRMC prohibits new structural shoreline protection measures on barriers classified as undeveloped, moderately developed, and developed, as well as on all shorelines adjacent to Type I waters (see the RICRMP §1.3.1(G)(3)). Additionally, the CRMC favors non-structural methods of shoreline protection (see the RICRMP §1.3.1(G)(1)).
2. Structural shoreline protection measures designed to protect adjacent structures are among the most well-known adaptation measures. Although commonly used, structural shoreline protection measures must be considered with extreme caution. Like flood barriers, CRMC staff have found that structural shoreline protection measures are often either undersized or under-designed for the sources of coastal hazard risk they are intended to address. Further, they may not be feasible means of protecting a site from storm surge and sea level rise given the latest sea level rise estimates (discussed in Chapters 2 and 3 of the Shoreline Change SAMP). Structural shoreline protection measures can thus be a very costly adaptation measure with little return on investment.
3. Such structures are designed as **protection** strategies for adjacent structures and are typically constructed at the **site** scale, parallel to the shore. In some cases, structural shoreline protection measures are built in to individual **structures**. Conceptually, such structures can be applied to **existing or new construction**. Examples of such “hard” shore-parallel shoreline protection structures include **seawalls, revetments, and bulkheads**. Such structures are designed to address flooding and coastal erosion as well as to reduce wave attack (NRC 2014).
4. The terms seawall, revetment, and bulkhead are frequently used interchangeably. A **seawall** is a hard, static, shore-parallel structure typically built out of concrete or stone. Seawalls vary widely in length; some protect one residential parcel while others may run the length of a beach or road. Seawalls are typically vertical structures. A **revetment** is also a hard shore-parallel structure, but is typically sloped rather than vertical, and is

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typically composed of materials like rock or rip rap. A **bulkhead** is a vertical structure, like a seawall, but in general is applied in commercial or industrial settings (e.g. a marina) solely to retain upland soils from sliding into the water.

5. Structural shoreline protection measures can have a broad range of negative impacts on adjacent beaches and properties, on the natural environment, and on shoreline public access. Further, they are insufficient adaptation measures to respond to the latest sea level rise projections. For an in-depth discussion of these issues please see Chapter 4, Section 4.3.1.5, "Shoreline Protection Structures."

### 7.2.9 Modifying or Retrofitting Structures: Wet and Dry Flood Proofing

1. In cases where flooding is anticipated under present or future conditions, property owners may choose to modify or retrofit residential, commercial, or industrial **structures** as a means of either **accommodation** or **protection**. This form of adaptation includes a series of floodproofing techniques which can be applied to **new construction** as well as to **existing construction** through a retrofit process. As with all adaptation measures discussed in this chapter, options discussed here are not necessarily limited to those that would be permissible by all relevant regulatory agencies, including but not limited to the Rhode Island Building Code.
2. Some floodproofing techniques are designed to **accommodate** floodwaters in portions of a building that are most likely to flood (sometimes called "wet floodproofing"). The modifications are not designed to keep water out, but to minimize damage and facilitate easy cleanup. Techniques may include using **building materials** on lower, uninhabited building levels to ensure that walls and floors can be easily cleaned and dried (e.g. tile floors over wood floors; concrete walls rather than drywall) (FM Global 2016). They also include installing **wall openings, vents, and other mechanisms** to allow water to flow in and out, minimizing the potentially damaging effects of hydrostatic pressure on the building (NRC 2013; FEMA 2014), protecting the **underside of elevated buildings** (FEMA 2014), or the installation of **breakaway walls** that can be carried away during a storm without compromising the structural integrity of a building (NRC 2013). Last, techniques include **elevating primary living quarters and utilities** to the second floor, minimizing the exposure of first-floor infrastructure to flooding (Snow and Presad 2011).
3. Other floodproofing techniques are designed to **protect** structures and infrastructure

from flooding by keeping the water out (“dry floodproofing”). These modifications are designed to seal the exterior of a building by using **impermeable building material or sealants** on lower-level infrastructure and installing **water-tight doors and windows or enclosures** over such openings (FM Global 2016; FEMA 2014). Use of flood barrier products certified to meet ANSI/FM 2510 standards is recommended, and a listing of certified products can be found in the National Flood Barrier Testing and Certification Program (Association of State Floodplain Managers 2018).

4. Other techniques may include installing **pumps** on all dry floodproofing to remove any water that does seep in (FEMA 2014). Pumps should be designed and installed with backup power in the event of a power outage (FM Global 2016). Another technique includes installing **backflow valves** to prevent potential backflow from sewer systems (FM Global 2016).

**Box 3. FORTIFIED™:**

**The Insurance Institute for Business and Home Safety’s Program  
for Resilient Home Construction**

The Insurance Institute for Business and Home Safety (IBHS) offers the FORTIFIED™ program as a possible “code plus” adaptation measure for coastal property owners seeking to make their homes resilient to hazards. IBHS offers FORTIFIED™ programs for both homeowners and businesses. The FORTIFIED™ Home program encompasses a suite of engineering and building standards that can be applied to individual **structures** as either **existing** or **new construction**. Participating homeowners work with certified FORTIFIED™ evaluators and professionals (e.g. contractors or engineers). FORTIFIED™ addresses the hazards of hail, high winds, and hurricanes, and utilizes an incremental approach, outlining three levels of **protection** (Bronze, Silver, and Gold) that homeowners can choose in order to reduce their exposure to these hazards. Through the FORTIFIED™ program, coastal property owners can begin by redesigning their roof system (Bronze), but can improve their resilience by addressing windows, doors, and attached structures (Silver), and, further, by connecting their roof to their walls and their floors to their foundation (Gold).

Importantly, the FORTIFIED™ program does NOT address the primary sources of coastal hazard risk addressed in the Shoreline Change SAMP (storm surge, coastal erosion and sea level rise). Nonetheless, it represents the types of adaptation measures available to Rhode Island coastal property owners and decision-makers. It is important to note that CRMC offers an incentive for expedited permit review for applicants seeking FORTIFIED™ program designation. For further information, please see <https://disastersafety.org/fortified/>.

### 7.2.10 Relocation or Managed Retreat

1. **Relocation or managed retreat** refers to a suite of adaptation measures designed to remove people and property from potential exposure to sources of coastal hazard risk. This suite of adaptation measures can be applied to both **existing or new construction** and at the **site or structural scale**. While relocation or managed retreat can sound to some like a dramatic or daunting adaptation measure, there are a number of practical ways that coastal property owners and decision-makers can apply this approach incrementally in order to reduce their exposure to sources of coastal hazard risk.
2. Some of these practical methods of managed retreat were discussed earlier in this chapter within the context of **site selection**. Coastal property owners can select sites that are located sufficiently inland, away from sources of current and potential future coastal hazard risk. This form of managed retreat can take place at the site or parcel level: a new potential coastal property owner can choose a parcel that is sufficiently inland. This can also take place at the structural level: a coastal property owner who already has a coastal parcel can choose to build – or rebuild – a structure at a site on that parcel that is furthest away from sources of coastal hazard risk.
3. When building on a site that is exposed to sources of coastal hazard risk, a coastal property owner can choose to build a structure that would be easy to **relocate** inland at some point in the near future. For example, the California Coastal Commission’s Sea Level Rise Policy Guidance indicated that foundation designs and other aspects of new development should be designed to “not preclude future incremental relocation or managed retreat,” further noting that deepened perimeter foundations, caissons, and basements may be difficult to remove in the future (California Coastal Commission 2015, p. 131).
4. In cases of existing construction, if possible, a property owner may choose to relocate that structure inland to another location on the same parcel, or to a new parcel entirely. For example, one of Matunuck’s historic Browning Cottages was relocated after Superstorm Sandy in 2012. This cottage was the last of three iconic coastal cottages dating back to 1900. In 2013 the owner of the surviving cottage relocated it 35 feet inland on the same lot, and elevated it onto concrete pilings, following a CRMC permitting process (see e.g. Wilson 2013).

5. Last, at its most extreme, relocation or managed retreat may involve abandoning coastal properties or structures completely. A severe storm may even leave a property owner with insufficient land left on which to rebuild. For example, in the case of severe property damage due to a coastal storm, a property owner may choose to abandon the coastal property rather than rebuild on the same parcel.

### 7.3 Future Research Needs

1. This chapter has focused on technical adaptation techniques that can be applied at the individual site or structural level by individual coastal property owners. As has been stated throughout this chapter, the field of adaptation is rapidly changing. Further research is needed on the subject of adaptation in general and on the adaptation tools and techniques described in this chapter in order to refine and improve adaptation practices in the face of changing future conditions.
2. This chapter has not considered planning, policy and legal solutions to adaptation, nor the legal implications of the adaptation measures discussed herein. Topics not discussed herein, but which may be considered in this regard, include buy-out programs and legal options such as rolling easements. Further research is needed on all of these topics, particularly within the context of Rhode Island.

**Box 4. ADAPTATION RESOURCES PROVIDED BY THE UNIVERSITY OF RHODE ISLAND COASTAL RESOURCES CENTER AND RHODE ISLAND SEA GRANT COLLEGE PROGRAM**

**Catalog of Adaptation Techniques for Coastal and Waterfront Businesses: Options to Help Deal with the Impacts of Storms and Sea Level Rise**

[http://www.beachsamp.org/wp-content/uploads/2015/05/adaptation\\_catalogue.pdf](http://www.beachsamp.org/wp-content/uploads/2015/05/adaptation_catalogue.pdf)

**Newport Resilience Assessment Tour: Newport Waterfront Overview Summary**

<http://www.beachsamp.org/wp-content/uploads/2015/06/NRAT.pdf>

**Rhode Island Coastal Property Guide**

<http://www.beachsamp.org/relatedprojects/coastalpropertyguide/>

**Staying Afloat: Adapting Waterfront Businesses to Rising Seas and Extreme Storms (Proceedings of the 2014 Ronald C. Baird Rhode Island Sea Grant Science Symposium)**

[http://www.beachsamp.org/wp-content/uploads/2015/07/2014\\_baird\\_proceedings.pdf](http://www.beachsamp.org/wp-content/uploads/2015/07/2014_baird_proceedings.pdf)

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## 7.4 References

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