Easton's Beach Pavilions, Newport, RI

Planning Study Final Report

November 1, 2022

Submitted To:

Joseph J. Nicholson Jr.
City Manager

William Riccio, Jr., P.E.
Director of Public Services

City of Newport
Newport, RI 02840

WOODS HOLE GROUP
A CLS COMPANY

FUSS & O'NEILL
317 Iron Horse Way #204,
Providence, RI 02908
401.861.3070

DBVW ARCHITECTS
111 Chestnut Street
Providence, RI 02903
401.831.1240

1. Historic Postcard of Easton's Beach circa 1904 (from Salve Regina University postcard collection.

TABLE OF CONTENTS

1. PROJECT TEAM

Architect

DBVW Architects
111 Chestnut Street, Providence, RI 02903

Martha L. Werenfels, FAIA, LEED AP, Principal in Charge
Katie van Hamel, Project Manager
Matthew Valero, Architectural Illustrator

Structural Engineer

Yoder + Tidwell, Ltd.
56 Amaral Street, Riverside, RI 02915

Loren Yoder, PE

Civil Engineer

Fuss & O'Neill
317 Iron Horse Way #204, Providence, RI 02908

Elizabeth Kirmmse, RLA, ASLA, WEDG, Project Manager
Lara Sup, PE, Climate and Flood Resilience Engineer
Sara Morrison, Business Line Manager - Climate Adaptation

Environmental Impact Consultant

Woods Hole Group
107 Waterhouse Rd, Bourne, MA 02532

2. Undated image of Easton's Beach (probably around the turn of the century).

3. Aerial view of Easton's Beach.

4. Existing buildings at Easton's Beach.

2. INTRODUCTION & BACKGROUND

DBVW Architects was hired by the City of Newport in early 2021 to evaluate the structural integrity of the Carousel Building, Snack Bar Building, and Rotunda Building at Easton's Beach. During this investigation, DBVW and our structural engineering consultant, Yoder + Tidwell, determined that the Carousel and Snack Bar buildings were in need of extensive structural repairs. Immediate, emergency repairs were undertaken in 2021, however, the question of whether or not to substantially upgrade these buildings became part of a larger discussion about climate resiliency at Easton's Beach. Executing the required repairs at the Carousel and Snack Bar buildings would be extremely costly and invasive, therefore, the City of Newport accepted DBVW's recommendation to evaluate the feasibility of replacing these two buildings with new construction.

5. Historic image of Easton's Beach following 1938 hurricane

The Carousel and Snack Bar buildings were constructed in the 1980s. The carousel horses appear to date from the 1950s.

The Rotunda Building, which is believed to have been constructed following the 1938 Hurricane, is structurally sound and in better condition than the other two buildings, therefore, DBVW recommends that it be preserved.

DBVW's 2021 report on the three buildings described above can be found in the Appendix to this report.

Following the completion of the structural report, DBVW Architects was engaged by the City of Newport to complete a planning study that focuses on preserving the Rotunda and replacing the Carousel and Snack Bar Buildings with a new structure that can accommodate the same functions that currently exist within the buildings. The existing carousel would be preserved and located within the new building.

6. Rotunda

Easton's Beach is a very sensitive and vulnerable site from a climate perspective. For this reason, DBVW teamed with Fuss & O'Neill, civil engineers, to evaluate the climate impacts on the site and to develop recommendations for future improvements in a way that addresses climate resiliency.

2. HISTORY OF SITE & DESIGN PRECEDENTS

Easton's Beach, a property that is owned and operated by the City of Newport, has been a public recreational area for many, many years. The site has experienced a considerable amount of development throughout its history, and has also experienced great loss of buildings over the last two centuries. As the historic photos in the Appendix show, there have been a number of different building campaigns on the site, as well as many recreational amenities. Some of the historic buildings that occupied the site, prior to the existing buildings, were monumental and architecturally distinctive. Additionally, there was once a large roller coaster at the eastern portion of the site. Unfortunately, following the 1938 Hurricane, it appears that very little, if any, of the earlier buildings and structures survived.

7. Historic postcard showing monumental "gateway" buildings on Memorial Boulevard.

8. Aerial view of Easton's Beach circa 1934 by Robert Yarnall Richie (from SRU postcard collection)

9. Post 1938 hurricane image of east end of beach (from SRU post-card collection)

The Rotunda appears to have been constructed following the 1938 Hurricane. Its design seems to have considered the impacts of flooding, given the devastation that the site had just experienced. The Rotunda is octagonal in shape, which helps to deflect wave action, and the overhead doors on the first floor can be opened to allow water to flow through and around the inner core of the building, which is clad with glazed tile.

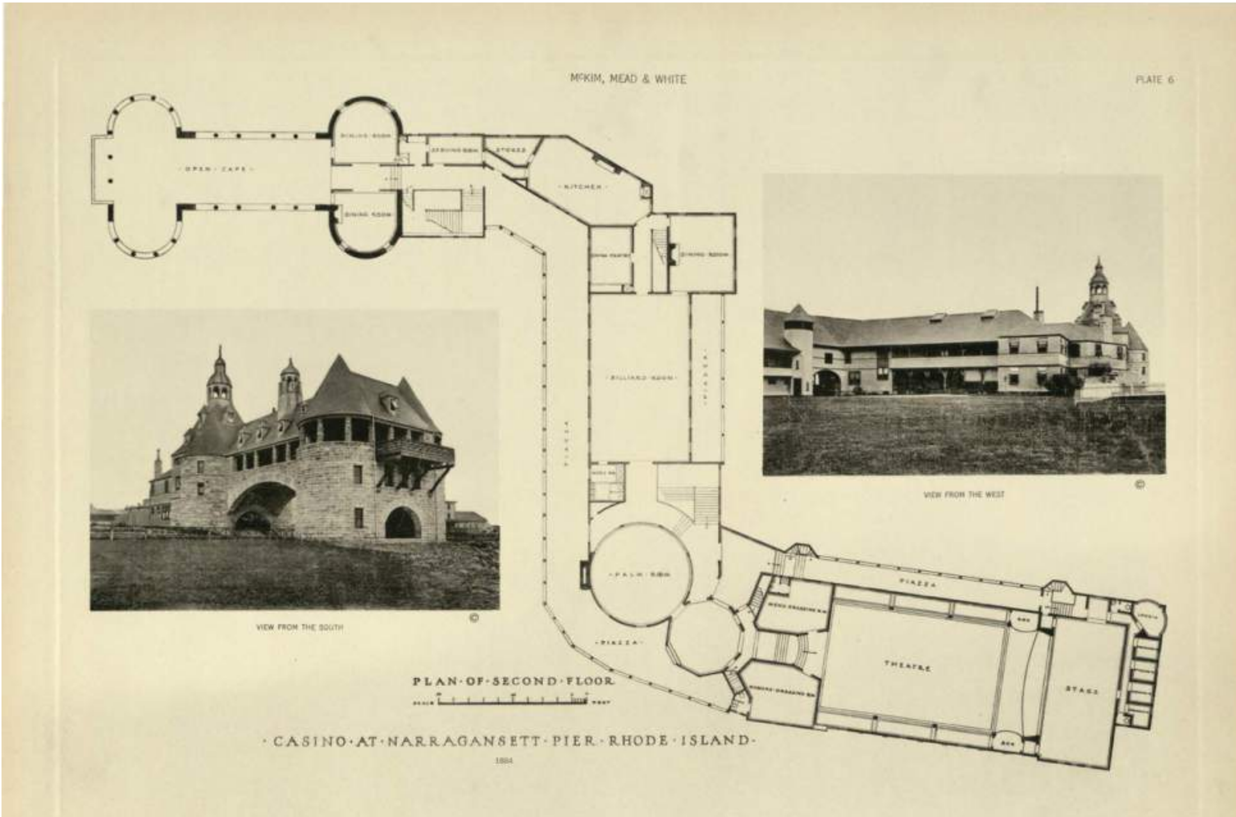
DBVW studied historic precedents as a starting point for designing new buildings for the site. Because there is a desire for the Rotunda to be preserved, the new buildings should be compatible with and complementary of the architecture of the Rotunda. The Rotunda is not listed on the National Register of Historic Places and is not considered eligible for the National Register according to the RI Historical Preservation and Heritage Commission. However, since it dates to circa 1940 and is in relatively good condition, it should be preserved, if possible.

10. Historic postcard, early 20th century (from SRU postcard collection)

11. Historic image of Easton's Beach (undated).

One photograph of Easton's Beach from the late nineteenth century depicts a linear, shingle style building with a long porch facing the beach. The building in this photograph is reminiscent of many buildings in Newport that exhibit similar architectural styles. Newport, after all, was where the shingle style was first introduced by McKim, Mead, and White Architects. This photo provided DBVW with a precedent for designing a new, historically appropriate building.

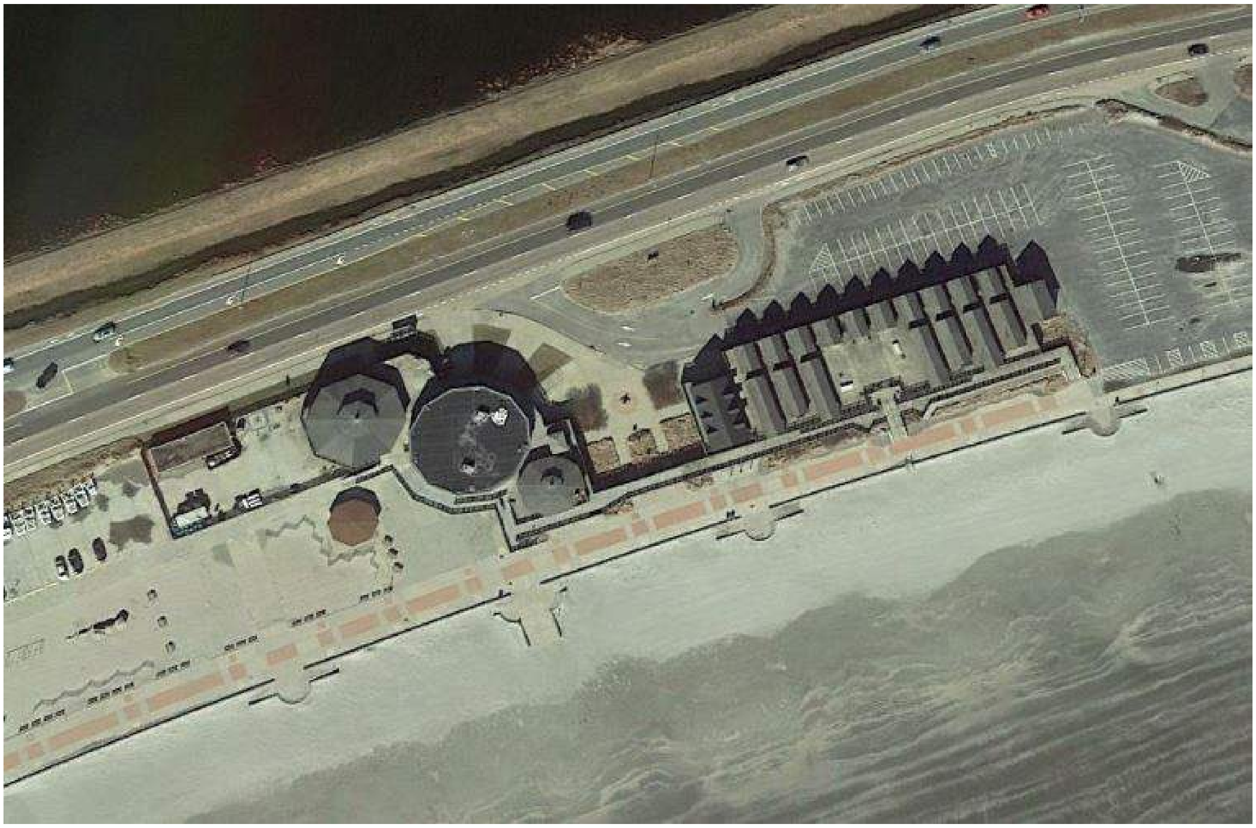
12. Historic image of the Newport Casino, constructed in 1880.



13. Narragansett Casino, designed by McKim, Meade, & White Architects in the late 19th century.

Another precedent that was considered by DBVW is the original Narragansett Casino, much of which has been lost to fire. The original Narragansett Casino was a very long building that culminated in "anchor" pavilions at each end of a linear configuration. The anchors were the most prominent and distinctive portions of the complex from an architectural perspective. They served as bookends to the linear building in between.

14. Historic image of Easton's Beach circa 1904 (from Library of Congress)



15. Aerial view of Easton's Beach

4. PROPOSED BUILDING DESIGN

Because the Rotunda will be preserved, it provides a good opportunity to serve as one anchor at the east end, with a new Carousel building as a second anchor at the west end. In DBVW's proposed design, a linear building connecting these two features accommodates a snack bar, beach store, lifeguard spaces, and restrooms.

As noted previously, the proposed building will be located in a significant flood zone (VE zone). Current codes require that new construction at this location be elevated above the flood zone. Refer to site analysis by Fuss & O'Neill in the Appendix. Accordingly, the occupiable floor elevation was designed to be at approximately elevation 20 (using NAVD88). Elevating the main floor affords an opportunity to provide much-needed storage and covered seating at the ground floor level. The upper floor of the Rotunda currently houses an event space, which shall remain. The lower

16. Rotunda as seen from the beach

17. Proposed building as seen from the beach.

level of the Rotunda can be used for storage, not as occupiable space, per applicable flood zone requirements.

To assist with resiliency, the new building will be sited slightly farther from the water than the existing buildings, while still engaging with the site in a manner that is similar to what currently exists. Much of the improved resiliency of the site will be achieved by adding dunes between the buildings and the water, and by introducing beach nourishment. See Fuss & O'Neill's technical memorandum in the appendix for a more detailed discussion of resiliency strategies.

Enclosed areas on the first floor of the new building must be constructed as "flow through" construction to address flood zone requirements. Similarly, no mechanical or electrical equipment will be permitted on the lower level.

The materials that will be used in the new construction will include architectural roof shingles that are designed to withstand 120 mph winds; windows that meet similar wind requirements and that are impact resistant; and siding, trim, and deck materials that are durable and as weather resistant as possible while still being historically appropriate.

The structural foundation system will consist of driven piles with concrete pile caps, which are then connected by concrete grade beams. This system will be designed to resist the scouring action that is caused by waves and migrating sand during significant storm events. See appendix for a more detailed description of the proposed structural system as provided by Yoder + Tidwell, Ltd., structural engineers.

5. REGULATORY JURISDICTION

The following regulatory agencies will have jurisdiction over this project:

RI Coastal Resources Management Council (CRMC)

RI Department of Transportation (if roadways are impacted)

RI Department of Environmental Management

City of Newport Zoning: Because the proposed building is in an R-20 zone, zoning relief will be required for building height, possibly building use, and front yard setback. The following are stipulations of the R-20 zone:

R-20 Zone

Uses permitted by right: parks, playgrounds and playing fields

Uses requiring a special use permit: federal, state, and municipal buildings

Front setback: 30 feet

Side setback: 15 feet

Rear setback: 20 feet

Building Height: shall not exceed 30'

Easton's Beach is not within the historic zoning district

18. Proposed building as seen from Memorial Boulevard looking southeast.

6. ARCHITECTURAL SUMMARY

It is very important that the buildings and site at Easton's Beach be redesigned in a way that improves resiliency to climate change, including flooding, higher tides, and more severe storms. We need to design in a manner that is much more resilient than what has existed on this site in the past, because, as the climate changes, the facilities at the beach that enable public access are increasingly vulnerable during ordinary storm events. By designing and constructing facilities in a manner that mitgates the risk to these buidings during typical tidal and storm events, the city will be better protected against loss of investment in the public amenity.

While it will not be possible to develop the site in a way that is completely resistant to the effects of rising tides and stronger winds, we need to design in a manner that is much more resilient than what has existed on this site in the past.

Using the historic Rotunda as a starting point, DBVW has designed a new building in an architectural style that is reminiscent of the Newport shingle style of architecture. We have used this style to create a linear connection to a large, new Carousel enclosure at the west end.

The Carousel portion of the building is made more prominent than the connector with a steeper roof form, a cupola, and large overhead doors that can be opened during pleasant weather.

The overall building form allows for a series of porches along the north and south sides. These porches afford views of Easton Bay to the south and Easton Pond to the north. The porches along the south elevation are varied in width to accommodate multiple programmatic elements.

All of the functions that currently exist at Easton's Beach have been accommodated in the new construction. It is our hope that they have been accommodated in a more pleasing, functional, and durable way so these building can serve the City of Newport and the many visitors who enjoy Easton's Beach for many years to come; even in the face of ever-increasing environmental threats.

The design of site improvements is extremely important to the success of this project. As noted earlier in this report, designing for resiliency is absolutely critical to reduce the vulnerability of the site and increase its adaptive capacity for the future. Fuss & O'Neill and the Woods Hole Group have addressed these resiliency issues in a very thorough manner, included in the appendix at the end of this report.

19. Proposed building, beach side.

8. ORDER OF MAGNITUDE COST ESTIMATE

The order of magnitude cost estimate below is intended to be used for planning purposes only. This is not a detailed cost estimate developed by a professional cost estimator. Instead, it is based on overall, anticipated square footage costs. If this project progresses beyond the planning stages, obtaining a detailed, professional cost estimate is strongly recommended.

Easton's Beach Study
Order of Magnitude - Cost Estimate
Date: 10/19/2022

	Description	Building Area (square footage)	Cost per Square Foot	Construction Budget	Design Contingency (15%)	Construction Contingency (15%)	Escalation (5% per year for one year)	Total Feasibility Budget
Site	Site Preparation, Demolition, Amenity Improvements, Dune Construction & Beach Nourishment, Landscaping & Furnishings	See Appendix		$11,034,966	$1,655,245	$1,655,245	$551,748	$14,897,204
Building	Rotunda Restoration (Interior & Exterior) (5,499sf/floor)	10,998	$225	$2,474,550	$371,183	$371,183	$123,728	$3,340,643
	New Building (upper level finish program, including MEP)	10,022	$500	$5,011,000	$751,650	$751,650	$250,550	$6,764,850
	New Building (upper level exterior elements - decking, stairs, pergola, porch roof structure, railings)	10,927	$200	$2,185,400	$327,810	$327,810	$109,270	$2,950,290
	New Building (lower level - structure/storage)	19,963	$250	$4,990,750	$748,613	$748,613	$249,538	$6,737,513
	Sub-Total	51,910		$14,661,700	$2,199,255	$2,199,255	$733,085	$19,793,295
	Total Project Cost							**$34,690,499**

20. Proposed building from Memorial Boulevard looking west.

9. NEXT STEPS

This report is intended to serve as a planning tool for moving forward with replacing severely deteriorated buildings at Easton's Beach with new buildings, and making the overall site more resilient to climate change. The next steps would include a series of meetings with regulatory agencies and stakeholders to obtain their feedback on the proposed buildings and site improvements. While preliminary discussions have occurred with various agencies, those conversations should now occur at a more detailed level so appropriate feedback can be incorporated into the design.

Once the team is satisfied that regulatory agency and stakeholder input has been addressed, the architectural and engineering team should proceed with developing the design documents needed for bidding and construction. The following minimum timeframe is anticipated.

Regulatory input:	2 months
Schematic design:	3 months
Design development:	3 months
Construction documents:	6 months
Permitting:	8 months
Bidding and negotiation:	2 months
Construction:	18 months
Total Time Frame:	42 months

10. APPENDIX CONTENTS

- Woods Hole Group Vulnerability Report (10-28-22)
- Fuss & O'Neill Technical Memorandum (10-14-22)
- Fuss & O'Neill Site Work Order of Magnitude Cost Estimate (10-19-22)
- Yoder + Tidwell, Ltd., Structural Narrative for New Construction (October 2022)
- Historic Photos
- DBVW Architects and Yoder + Tidwell Evaluation of Existing Conditions Report (4-15-21)
- DBVW Architects Drawings of Proposed Building

Woods Hole Group Vulnerability Report (10-28-22)

October 28, 2022 Job No. 2022-0010

DBVW NOTE: The observations in this memorandum are based on the existing conditions at Easton's Beach. These observations and evaluations do not include the recommendations that are put forth in this Master Plan Report by Fuss & O'Neill. The Fuss & O'Neill recommendations for beach hardening and beach nourishment contained in this Master Plan Report are a direct result of the following evaluation by the Woods Hole Group.

Beth Kirmmse
Project Manager
Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908

Sent via Email to Beth Kirmmse, EKirmmse@fando.com
Lara Sup, LSup@fando.com

Easton's Beach Vulnerability Assessment and Preliminary Adaptation Concepts

This brief memorandum summarizes the potential vulnerability of infrastructure and valuable assets at Easton's Beach. The assessment was completed in support of Fuss & O'Neill's overall design work for the City of Newport. This technical memorandum also includes general approaches and strategies that enhance the resiliency of the overall barrier beach system and valuable assets (including existing and proposed infrastructure) to changing climate conditions.

Vulnerability Assessment

Easton's Beach, located in Newport, Rhode Island, is part of a barrier beach system, susceptible to present day storm surge, flooding, and coastal erosion. This vulnerability and risk is also expected to increase under changing climate conditions and sea level rise. Existing available data were used to provide a preliminary assessment of potential flooding, storm surge and erosional impacts to the iconic Easton's Beach area, which includes culturally valuable assets and infrastructure. Data used for the vulnerability assessment included the USACE's North Atlantic Coast Comprehensive Study (NACCS), the Massachusetts Coast Flood Risk Model (MC-FRM) and coastal erosion results from the Rhode Island Coastal Resources Management Council.

Potential coastal flood risks and vulnerabilities at Easton's Beach were assessed using data developed and compiled for a previous study completed by Woods Hole Group (Easton's Pond Vulnerability Assessment, 2016). This study identified the potential impacts of sea level rise (SLR) and storm surge to Easton's Pond using the USACE'S North Atlantic Coast Comprehensive Study (NACCS) model (USACE, 2015). Woods Hole Group selected a NACCS model node, representative of conditions in Easton Bay adjacent to Easton Pond, and applied the National Climate Assessment (NOAA, 2012) high rate SLR scenarios (for 2030 and 2070) to the present-day joint probability inundation profile. Further adjustments were made to the Newport Station data based on local tide range and land subsidence. The present day and SLR-adjusted (future) joint probability inundation profiles were applied to the most recent LiDAR data (2014 USGS CMGP Sandy or 2011 Rhode Island Statewide, as available) for the Easton Pond vicinity using a modified bathtub approach to account for connectivity in a GIS environment.`

The NACCS joint probability inundation profiles created for present day, 2030, and 2070 encompass Easton Beach and were used to determine the vulnerability of assets and infrastructure from Mean Higher High Water (MHHW), and projected storm events.

Review of the inundation extents from MHHW show no direct encroachment on the infrastructure at Easton Beach under present day, 2030 and 2070 conditions. Although no direct effect on Easton Beach's infrastructure is exhibited, the inundation extents for 2070 MHHW conditions show inundation further inland along the beach reducing the overall width of the dry beach, and thus limiting recreational ability during high tides. Inundation extents for MHHW in relation to Easton Beach and the proposed building footprints are displayed in Figure 1.

Figure 1: MHHW extent relative to Easton Beach and proposed building footprint (displayed in white)

The probability of inundation for present and future planning horizons is shown in Figures 2-4. In present day (Figure 2), Easton's Beach is expected to experience flooding from a 2-5% annual chance storm event. The risks to Easton's Beach assets include the potential flooding of the western parking lot during a 2% storm event. The eastern parking lot and building footprints at grade of the proposed building is expected to flood in present day conditions from a 5% storm event.

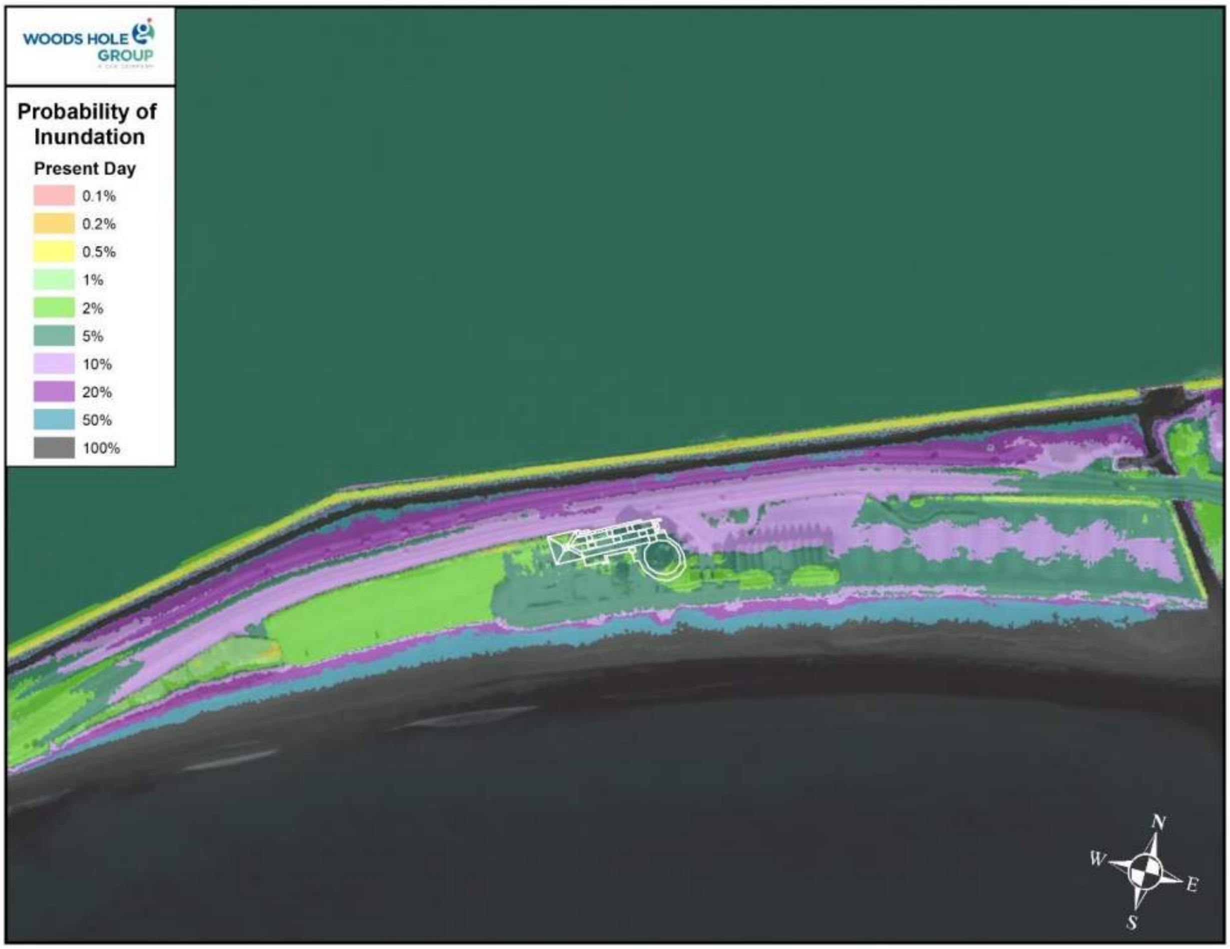


Figure 2: Probability of inundation for Easton's Beach for present day climate conditions.

Flooding of the Easton's Beach (Figure 3) area in the projected 2030 climate horizon shows an increasing probability. Overall, the Easton's Beach area is expected to experience flooding from a 2-10% annual chance (10 to 50-year return period) storm event. The western parking and at grade, proposed building footprints remain at lower risk, with an annual chance of 2% of becoming flooded in the 2030 timeframe. However, the area in front of the buildings and the eastern parking lot are expected to experience flooding by the 10% (1 in 10 year) chance storm event in 2030.

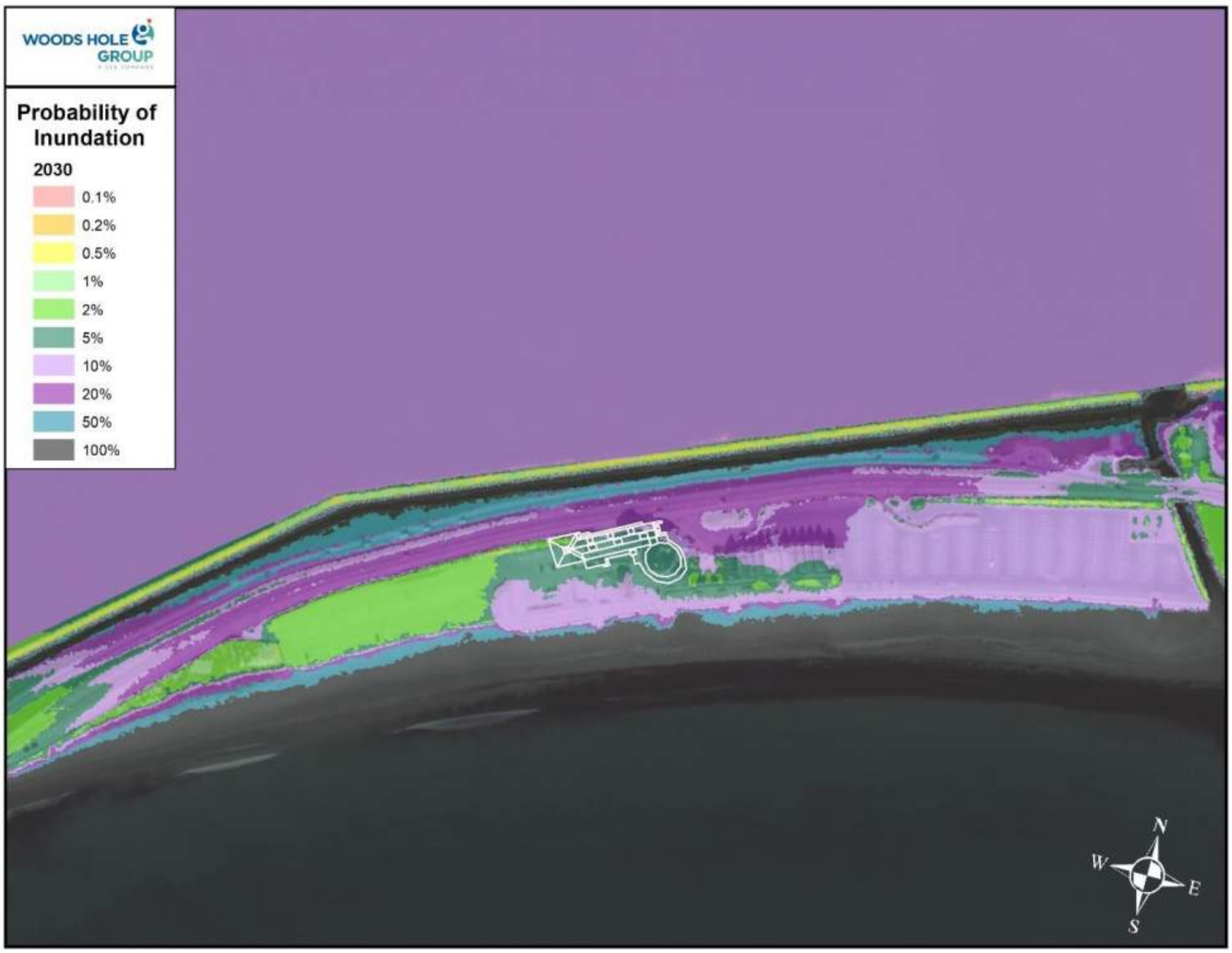


Figure 3: Probability of inundation for Easton's Beach for 2030 climate conditions.

By 2070 (Figure 4), the risks of flooding to Easton's Beach and valuable assets significantly increases. Overall, the area is expected to experience flooding from a 20-100% chance (1 to 5 year return period) storm event. The western parking lot is expected to experience flooding from a 20% (5-year return period) storm event while the at-grade, proposed building footprint is expected to see flooding from a 50% chance

(2-year return period) storm event or one that could occur every other year. The east parking is like to see flooding occur approximately once a year (100% chance storm event).

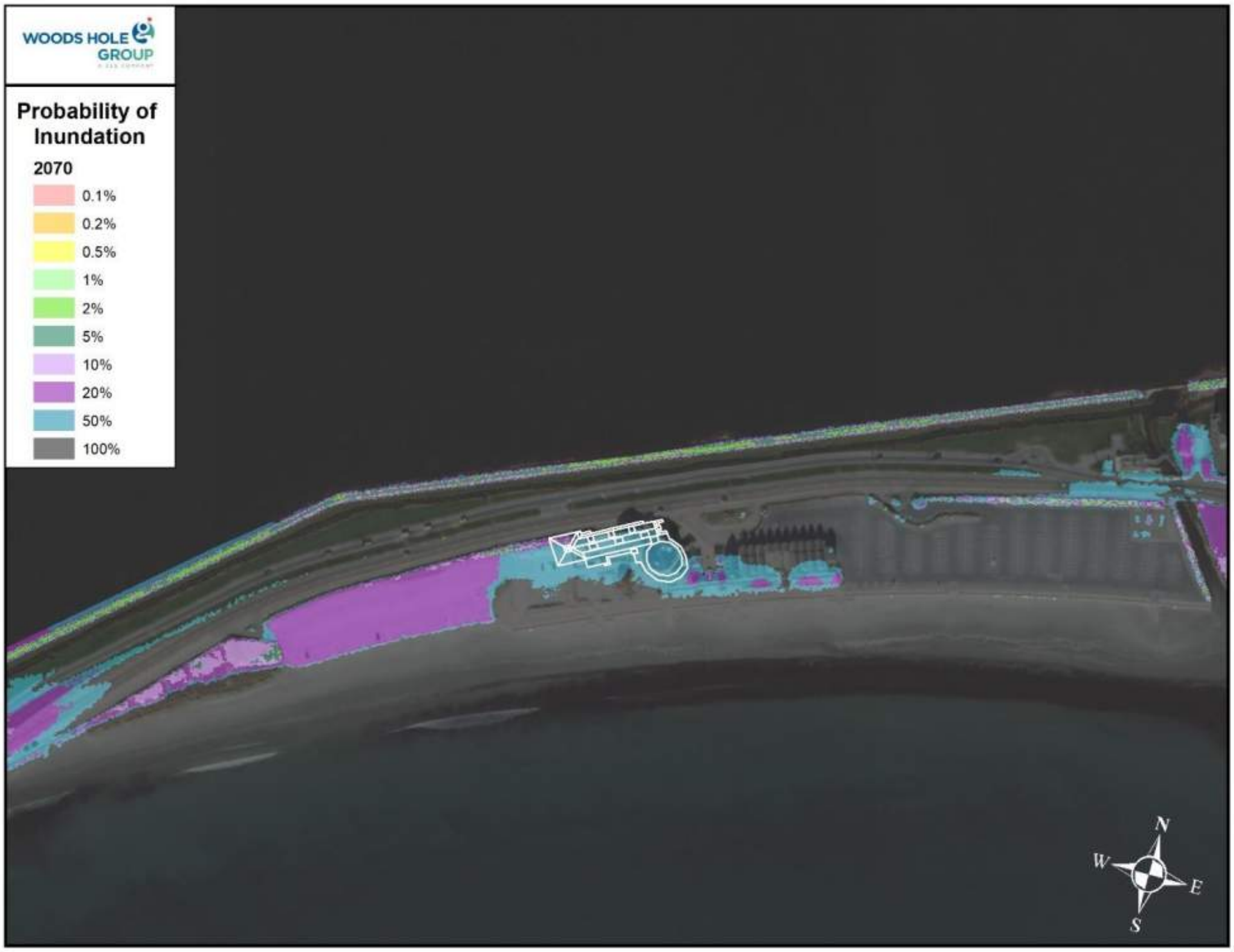


Figure 4: Probability of inundation of Easton's Beach in 2070 climate conditions.

In addition to evaluating water elevation levels over time, Woods Hole Group also evaluated potential changes to the shoreline location that may occur over time. Using historical information, the Rhode Island Coastal Resources Management Council evaluated shoreline change for the coastlines of Rhode Island. The shoreline change analysis for Easton Beach in Newport considered data from 1939 to 2003. Overall, shoreline change along Easton's Beach is variable, but a general erosion trend is observed in front of the existing buildings and parking lots. The area immediately in front of the existing buildings (Transect 3388) has an erosion rate of 1.2 ft/year. Transect 3386 in front of the western parking lot an erosion rate of -0.6 ft/yr. However, transect 3384 and 3383 have experienced shoreline accretion rates of 0.2ft/yr and 0.6 ft/yr respectively. Figure 5 shows the total shoreline retreat distances and shoreline change rates for the length of Easton's Beach developed by the Rhode Island Coastal Resources Management Council.

(http://www.crmc.ri.gov/maps/maps_shorechange.html). Using the erosion rate of the area in front of the Promenade (1.2 ft/yr), it is possible the shoreline has already retreated an additional 22 feet over the last 19 years (2003-present). The continuous erosional trend along Easton's Beach could pose threats of continued erosion, damage, and undercutting of the existing bulkhead, and access points to the beach.

In summary, flooding issues resulting from long-term shifts in normal tidal conditions and increasing risk of coastal storm surge under increasing sea level rise conditions may significantly impact the parking lots, access roads, and other amenities at Easton's Beach. Overall, the risk of daily tidal flooding of Easton's Beach is low in the near to mid-term; however, coupled with ongoing shoreline retreat, the available recreational beach area continues to dwindle, especially during daily high tides. By 2070, MHHW approaches the bulkhead fronting the existing buildings significantly decreasing the width of the beach during high tide. Additionally, erosion rates along Easton's Beach are relatively low compared to other areas in Rhode Island that have experience significant historical shoreline loss.

However, Easton's Beach is currently vulnerable to storm surge in present day, and that risk grows under future climate conditions. While storms are episodic in nature, frequent and more intense coastal storms will likely present a significant threat to the Easton's Beach area. For this reason, it is crucial to develop adaptation strategies which create a more resilient Easton's Beach that fit the needs of the City of Newport and the Community as a whole. This includes fostering resiliency for both recreational usage and infrastructure stability.

Figure 5: Shoreline Change between 1939 and 2003 for Easton's Beach provided by the Rhode Island Coastal Resources Management Council

Resiliency Adaptation Strategies

Easton's Beach strategies should aim to build beach, community, and regional resilience promoting the continued operation and function of the iconic Eaton's Beach for as long as feasible.

Woods Hole Group recommends the following strategies to increase the short- and long-term resiliency of Easton's Beach:

1. **Increase building resiliency by minimizing damage and flooding of buildings.**
   Increasing building resiliency includes the use of flood proofing and building design techniques that will reduce the damage to buildings in the event of a storm event. Potential strategies may consist of the use of flood barrier panels at water intrusion access points, implementation of deployable flood barriers under impending storm situations, and/or elevation of critical building spaces and equipment to reduce flood risk.

   Woods Hole Group understands the design team is currently considering a new proposed building to house the iconic carousel, and include space for changing rooms/bathrooms, a new snack bar and a life saving station. It is our understanding that first habitable floor of the proposed building is likely to tie into the existing rotunda building, which has a lower level that allows for storm surge pass through. As such, the resiliency approach applied here is elevation of the used space and critical infrastructure/equipment. According to the topographic survey provided by DBVW Architects, the top of deck elevation for the rotunda is currently at ~20 ft relative to the NAVD88 vertical datum (see Figure 6 below).

Figure 6: Critical elevations along the Deck surrounding the first habitable floor of the existing Rotunda.

The rotunda and proposed building could be severely damaged if this elevation is exceeded during a storm event. To determine the approximate level of resiliency associated with an elevation of 20 feet NAVD88 and applying a 50-year service life, still water flood elevations and maximum wave crests associated with a 1% (1 in 100-year occurrence) storm event under a projected 2070 climate horizon was utilized. The projected still water storm levels projected in a 2070 1% storm event are shown in Table 1 for both NACCS and the Massachusetts Coast Flood Risk Model (MC-FRM) storm surge models. The MC-FRM is the state standard for climate change planning and resiliency physics-based model that has been utilized for design guidance throughout the Commonwealth of Massachusetts and for the northeast. Although the MC-FRM does not include overland areas in Rhode Island, all water bodies, including Easton's Bay, are included for all of the northeast, and therefore, water surface elevations and wave heights along the shoreline of Rhode Island are included in the model. MC-FRM includes projected sea level rise dynamically in the model simulations, while NACCS only simulates present day conditions and simply adds a static value for the sea level rise projections.

Critical elevation of Rotunda and Proposed Building: ~20 ft NAVD88			
Storm Surge Model	2070 1% Still Water Elevation (ft, NAVD88)	Maximum Wave Crest (ft)	Maximum Wave Crest Elevation (ft, NAVD88)
NACCS	13.81	3.7	17.51
MC-FRM	15.1	4.4	19.5

Based on this comparison to both NACCS and MC-FRM, the critical elevation of ~20 ft NAVD88 will provide adequate resilience from flooding damage to the first habitable floor of the Rotunda and proposed new building. This elevation could support the continuation of vital functions and operations of the Rotunda, Carousel, and other amenities after the passage of storm events in conjunction, the proposed building should include an open ground floor allowing for potential flood water flow through, and the elevating and/or relocating mechanical equipment to the first habitable floor to further reduce damage to the proposed building. Lastly, the use of other flood proofing measures like flood barrier panels or perimeter barriers (if applicable) could further increase building resiliency for other buildings located on the property. Examples of flood barrier panels or perimeter barriers can be found on floodproofing.com's product website (www.floodproofing.com).

2. **Develop regional strategies to maintain function, recreational use, and layered resilience of Easton's Beach.**
   While the existing Rotunda and proposed building elevations are being proposed at an elevation that is high enough to minimize damage in the event of a storm, the overall Easton's Beach area (parking lots, roads other structures, natural resources, etc.) is still extremely vulnerable to storm surge flooding now and in the future. For example, the two parking lots along Easton's beach and Memorial Blvd, which provide critical access to Easton's Beach, are vulnerable to storm surge-based flooding. This highlights the need to integrate regional strategies in concert with the proposed building-based resiliency measures to create an overall more resilient system. The use of regional strategies can help maintain beach function, recreational use, and critical access (i.e., Emergency access) to Easton's Beach in the short- and long-term. These strategies can also provide added resilience to the existing and proposed structures through reduction of wave energy and other physical processes. For

example, a proposed beach nourishment fronting the Easton's Beach infrastructure can add recreational space and attenuate storm energy to reduce potential erosion and damage impacts to the beach infrastructure.

Woods Hole Group recommends designing regional resiliency at Easton's beach by exploring flexible nature-based solution options that can help reduce the impacts of storm surge and wave action. Nature based solutions help mitigate impacts from coastal hazards and increase long term resiliency by incorporating natural systems and mimicking natural processes all while avoiding repetitive high infrastructure repair costs. For Easton's Beach this could mean the development of a beach nourishment and dune enhancement program along the length of Easton's Beach that ties into the natural coastal dune system on the western edge of Easton's Beach.

Preliminary conceptual designs of a beach nourishment and dune enhancement along Easton's Beach are shown in Figure 7. Undetsanding that the preservation of the existing parking lot configuration is a high priority, both concepts presented below include a designed beach/dune nourishment system starting southward of the existing bulkhead to avoid modification of the exiting parking lot configuration and quantity of parking spaces. Concept 1 includes a dune that merges into the natural dune feature at the western edge of the property and runs along the seaward side of the existing bulkhead to the eastern edge of the area.

Concept 2 includes two individual proposed dunes fronting each parking lot with only a beach berm in front of the Promenade area to preserve access ease and interaction with the beach. Along the area in front of the buildings (with no added dune), an additional option would be the reinforcement of the existing bulkhead to increase potential resiliency efforts.

An engineered beach and dune system requires a coastal processes evaluation of the beach system prior to developing a beach and dune design template to ensure adequate performance and evaluate overall potential impacts. However, a possible system template is presented herein to provide some idea on what this regional solution may potentially include. A potential dune template may include a dune crest at 11 feet NAVD88 at a width of 40-50 feet with slopes at approximately 5H:1V to 7H:1V. A possible beach nourishment template may include a beach berm at an elevation of 6.5 feet NAVD88 with a width of up to 100 feet and slopes at approximately 20H:1V to 10H:1V.

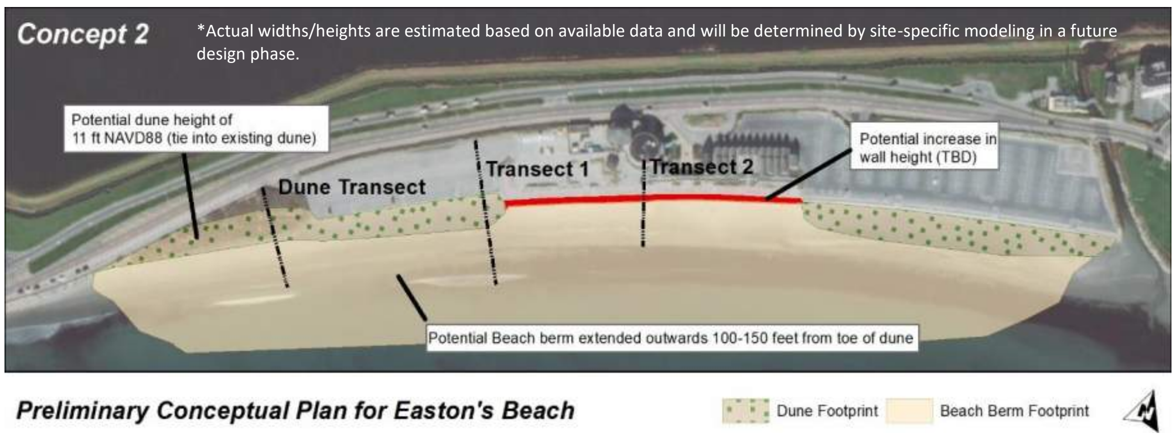


Figure 7: Potential conceptual plans for Beach Nourishment and Dune Enhancement at Easton's Beach.

These representative cross-sections are shown in Figures 8-11. Figures 8-10 are cross sections representing Transects 1 and 2, and the Dune for Concept 1. Figure 11 shows the cross section for Transect 2 for Concept 2 that only consists of a beach berm in front of the promenade.

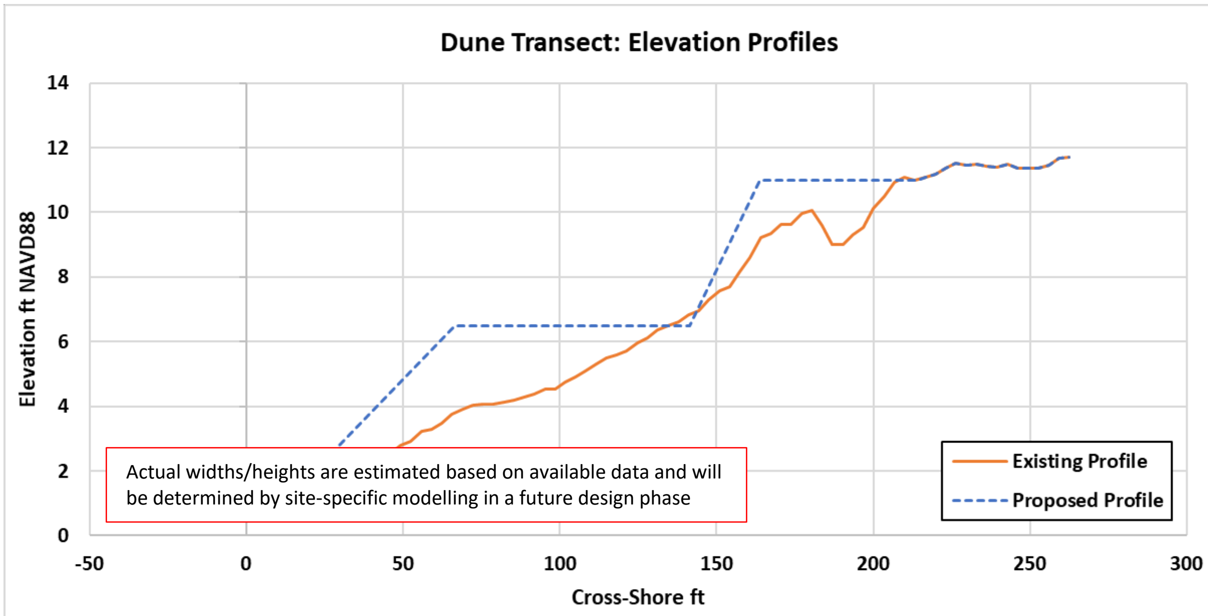


Figure 8. Existing elevation and proposed profile along the Dune Transect for Concepts 1 and 2.

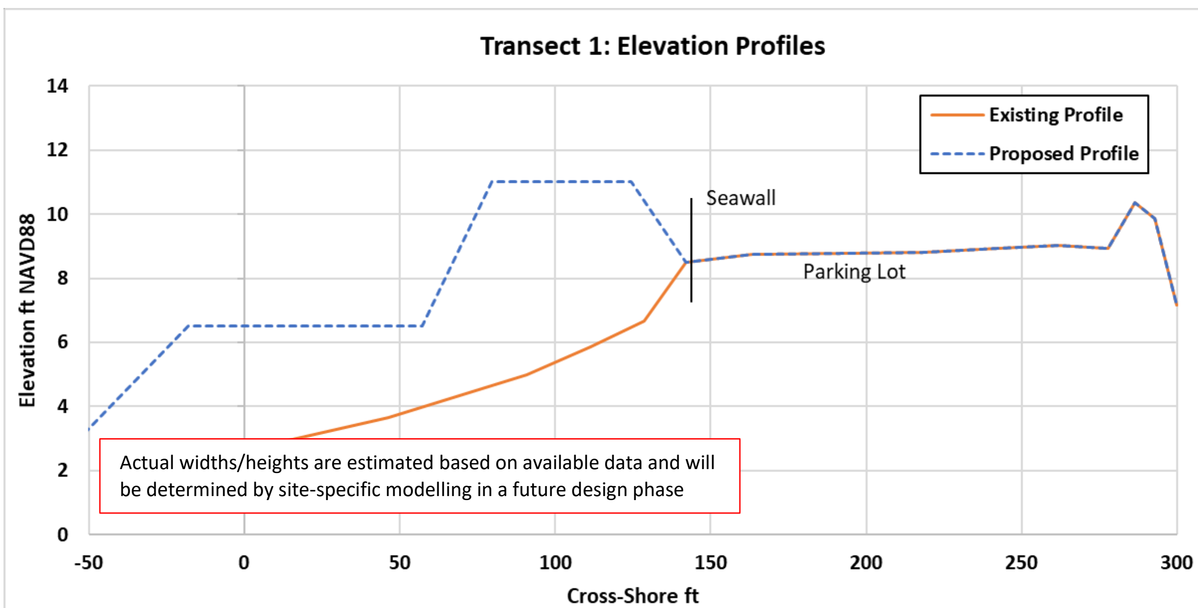


Figure 9. Existing elevation and proposed profile along Transect 1 for Concepts 1 and 2. Proposed dune would start seaward of existing seawall.

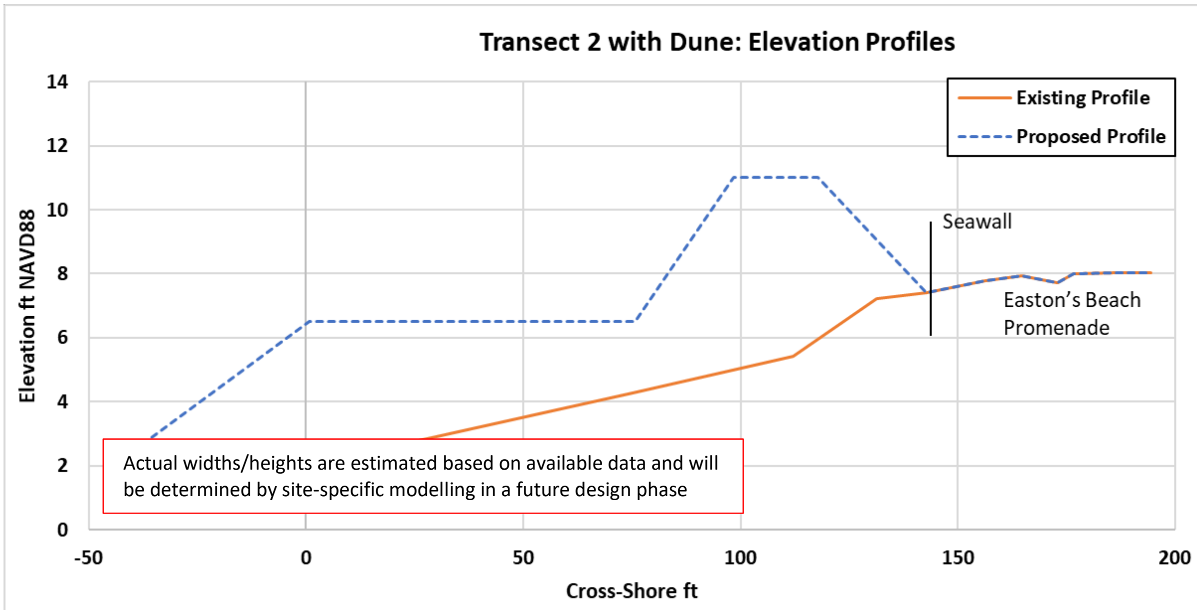


Figure 10. Existing elevation and proposed profile along Transect 2 for Concept 1. Dune could start at grade seaward of existing seawall.

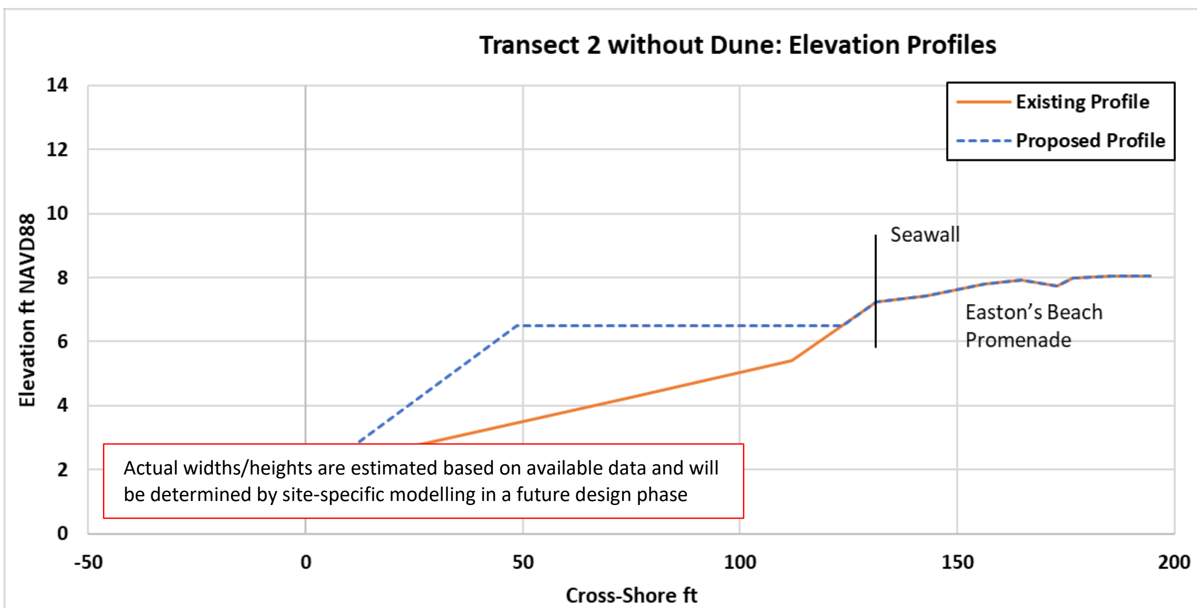


Figure 11. Existing elevation and proposed profile along Transect 2 for Concepts 2. Berm would start at grade elevation of 6.5 ft NAVD88 seaward of existing seawall.

A more continuous dune and barrier beach system at Easton's Beach will likely improve the overall resiliency of the natural system to protect the upland areas from coastal storm flooding conditions. However, keep in mind this conceptual design is preliminary and representative of an estimated beach/dune restoration cross-section and template. A more detailed coastal processes study and engineered beach template would be required prior to permitting and final design.

3. **Use creative alternatives to maintain connectivity and critical access.**
Employing a resiliency strategy including a full beach/dune enhancement program will be beneficial in reducing impacts from storm surge and waves but it may also restrict access to the beach for both beachgoers and emergency responders. With any beach/dune program considerations of on-foot and vehicular access is important, thus maintaining critical access to Easton's Beach especially for emergency response and services is a high priority.

Many times, when enhancing a dune/beach enhancement program break, cut throughs, and crossovers in the dune system are included to provide pedestrian, vehicular and emergency access. However, these areas tend to be lower in elevation and more prone to erosion creating vulnerable areas and flood pathways during coastal storm events. This highlights the need to design a continuous dune and finding alternative ways to include vehicle access.

For pedestrian access, the use of Mobi-Mats can be an option. Mobi-Mats can ensure access to the beach and simultaneously be used to help stabilize a dune pathway, prevent erosion, and limit inundation through a potential pathway. Additionally, Mobi-Mats, and other products available (www.mobi-mat-chair-beach-access-dms.com), could allow for more equitable access for people who require the use of wheelchairs to enjoy Easton's Beach.

If vehicle access is a concern for Easton's Beach, Woods Hole Groups recommends that the City of Newport consider various alternatives for vehicular access, which also may include acquisition of beach specific vehicles.

If building a continuous dune is not possible, considering the angle in which the access ramp connects to the beach could be used to build resiliency. Designing an access route at an angle across the dune template rather than shore perpendicular means the ramp is not directly exposed to the harshest wave action and the angled approach allows for a longer distance than a perpendicular ramp, giving a higher crest elevation and improved protection.

Fuss & O'Neill Technical Memorandum (10/14/22)

FUSS & O'NEILL

MEMORANDUM

TO: Martha Werenfels, FAIA, LEED AP, DBVW Architects

FROM: Lara Sup, PE, Fuss & O'Neill, Inc.
Beth Kirmmse, RLA, ASLA, WEDG, Fuss & O'Neill, Inc.

DATE: October 14, 2022

RE: **Easton's Beach Existing Conditions Technical Memorandum**

Fuss & O'Neill has prepared this existing conditions technical memorandum to support the design of Easton's Beach in Newport, RI. The purpose of this memorandum is to summarize the materials we have reviewed to inform the study and base map, summarize the Vulnerability Analysis completed by Woods Hole Group, September 19, 2022, and provide local, state, and federal guidelines and requirements for the project area.

The following sources were compiled to create the base map for Easton's Beach:

- Topographic survey completed by Waterman Engineering Company, dated May 6, 2022. Utilities on the plan were located from field survey information and existing plans.
- LiDAR data was taken from the NOAA clearinghouse
- Aerial photography was taken from Rhode Island GIS database

The base map is provided under a separate cover.

Woods Hole Group, Inc completed a Vulnerability Assessment of Easton's Beach on September 19, 2022. The purpose of the study was to summarize the potential vulnerability of infrastructure and valuable assets at Easton's Beach and provide preliminary general approaches and strategies to enhance the resiliency of the overall barrier beach system regarding changing climate conditions. The assessment is provided under separate cover. A review of the Mean Higher High Water for the present, 2030, and 2070 conditions show no direct encroachment on the infrastructure at Easton's Beach, however, the levels show the width of the dry beach will greatly recede, thus limiting the recreational usability of the beach. The study also demonstrated that the beach and infrastructure will be at risk of inundation for increasingly frequent and smaller storm events as the years pass. Finally, the Assessment looked at erosion rates for the beach and found the shoreline may have already retreated 22 feet over the last 19 years. The continuous erosional trend along Easton's Beach could pose threats of continued erosion, damage, and undercutting of the existing seawall, sidewalk, and access points to the beach. The assessment recommends the following strategies to increase resiliency at Easton's Beach:

- Increase building resiliency by having first-floor habitable space at elevation 20 NAVD88 or higher and building floodproofing measures into the ground floor such as flow-through design
- .

- Develop regional strategies to maintain function, recreational use, and layered resilience of Easton's Beach. A longitudinal natural dune enhanced by structural components at the building site and beach nourishment would be considered.

Permitting

The proposed design for Easton's Beach must adhere to local, state, and federal regulations. Summaries of applicable regulations are provided in the following sections.

Local

The Easton's Beach project must adhere to local regulations as prescribed in the City of Newport Code of Ordinances. Title 15 provides regulations relating to buildings and construction. Chapter 15.24 provides specific guidance for development in flood hazard areas. Any proposed construction or other development within a special flood hazard area requires a building or development permit. Chapter 15.25 provides guidance for soil erosion and sediment control for construction sites. Title 17 of the Code of Ordinances provides zoning regulations for the City of Newport. The proposed site improvements must adhere to all zoning regulations or request the necessary variances.

State

This new coastal zone development must meet specific criteria regarding flood-resistant and load-bearing construction as per the Rhode Island Building Code, specifically Appendix G Flood-Resistant Construction. The natural coastal dune system must follow guidelines outlined by the Rhode Island Coastal Resource Management Council and the Rhode Island Department of Environmental Management.

Rhode Island Building Code

In recognition that structures located within Flood Hazard Zones must be designed to meet more severe conditions than those not, the Rhode Island State Building Code, (RISBC) contains specific requirements for flood zone construction. The RISBC informs elevation regulations, sitting practices, and the use of flood-resistant materials in flood-prone areas. Section 1612 of the RISBC establishes flood hazard areas and design flood elevations as identified by the Federal Emergency Management Agency and sets requirements for flood hazard documentation. Appendix G provides minimum requirements for development located in flood-hazard areas.

Rhode Island Department of Environmental Management

The Rhode Island Department of Environmental Management (RIDEM) Office of Water Resources (OWR) regulates construction projects through Freshwater Wetlands Permitting, Water Quality Certification, Groundwater Discharge/Underground Injection Control, and the Rhode Island Pollutant Discharge Elimination System (RIPDES) Construction General Permit. Stormwater construction projects subject to RIDEM OWR permitting are required to file a stormwater construction permit application to receive all pertinent authorizations. RIDEM regulates activities impacting freshwater wetlands in the state of Rhode Island, however, freshwater wetlands in the vicinity of the coast are regulated by the Coastal Resources Management Council (CRMC). The Easton's Beach project falls under CRMC jurisdiction and would therefore not require a freshwater wetlands permit. Projects that require an Army Corps of Engineers permit or that are located below the high tide line require a RIDEM water quality certification. If the stormwater management design for the Easton's Beach project includes an infiltration system, the project will be subject to the Groundwater Discharge/Underground Injection Control Program. The Rhode Island Pollutant Discharge Elimination System (RIPDES) Construction General Permit regulates stormwater discharges associated with construction activity.

Soil erosion, runoff, sediment, and pollution prevention control measures included in the project must be designed, implemented, and maintained in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook. The Soil Erosion and Sediment Control Handbook offers guidance and minimum recommendations for soil erosion and sediment control. The stormwater management components of the project must adhere to the Rhode Island Stormwater Management, Design, and Installation Rules (stormwater rules). The stormwater rules provide standards for planning, designing, and installing effective stormwater best management practices (BMPs) to effectively manage the impacts of stormwater and prevent adverse impacts on water quality, habitat, and flood storage capacity.

Rhode Island Coastal Resources Management Council

RI Coastal Resources Management Council (CRMC) provides regulations to govern building, permitting, and policy in coastal areas. The CRMC Red Book contains the regulatory components of the Coastal Resources Management Program. This section summarizes regulations from the Red Book that may be applicable to the Easton's Beach project.

Developments occurring on coastal features or within 200 feet of a shoreline require a CRMC assent. As shown on the Newport Water Type Classification Map, Easton's Beach is classified as a moderately developed barrier, and the waters immediately surrounding the beach are assigned the CRMC Water Type Classification of conservation areas.

See http://www.crmc.ri.gov/maps/maps_wateruse/watertypemaps_newport.pdf

Waters are designated as conservation areas (Type 1) if they are within or adjacent to the boundaries of designated wildlife refuges and conservation areas, they have retained natural habitat or maintain scenic values of unique or unusual significance, or they are particularly unsuitable for structures due to their exposure to severe wave action, flooding, and erosion. The CRMC aims to protect these waters from activities or uses that have the potential to degrade scenic, wildlife, and plant habitat values, or which may adversely impact water quality or natural shoreline types. The rest of Easton Bay is classified as multi-purpose waters (Type 4 Waters). Type 4 waters are open waters used for fishing, recreational boating, and commercial traffic.

Easton's is classified as a moderately developed barrier, which is defined as an area that is essentially free of houses, commercial/industrial buildings, (excluding public utility lines) that contain surfaced roads, recreational structures, and/or structural shoreline protection facilities.

Beach Pavilion

Construction of new recreational structures in a moderately developed barrier beach is prohibited. Non-water dependent structures must be set back a distance of 30 times the annual erosion rate, of 1.2' per year at Easton's, for less than four dwelling units, which would result in a 36-foot setback, and 60 times the annual erosion rate for commercial structures, which would result in a 72-foot setback. At a minimum, setbacks shall extend either fifty (50) feet from the inland boundary of the coastal feature or twenty-five (25) feet inland of the edge of a Coastal Buffer Zone, whichever is further landward. Where the applicant demolishes a structure, any contemporary or subsequent application to rebuild shall meet applicable setback requirements. Applicants for alterations and activities who cannot meet the minimum setback standards may apply to the Council for a variance.

Existing recreational structures on moderately developed barriers may be altered, rehabilitated, expanded, or developed according to the following standards:

- Any expansion of or development activities associated with existing recreational structures shall not occur within or extend into any flood zone designated as V on the most current FEMA Flood Insurance Rate Maps, or as established by the Federal Emergency Management Agency. F:\P2006\0901\B10\FEMA\VE zone map.JPG
- All activity shall be confined to the existing footprint of disturbance; for the purposes of this section, the footprint of disturbance shall be defined as that area encompassed by the perimeter of the structural foundation and/or areas determined by the CRMC to be substantially altered due to associated structures, excluding dunes, wetlands and areas encompassed within pertinent setback and buffer zone requirements of this program.
- Any proposed expansion of existing recreational structures shall be limited to an area equal to twenty-five percent (25%) of the square footage of the ground floor area encompassed by the structural foundation of the existing building as of June 23, 1983; associated structures shall not be used in calculating existing area.
- The activity shall meet or exceed all relevant standards for the appropriate flood zone designation.
- All activities shall be subject to relevant setback and buffer zone requirements of this program, including accessory structures such as decks, porches, walls, boardwalks, swimming pools, roads, driveways, parking lots and other structures integral to or ancillary to the existing recreational structure.

Construction in flood hazard zones. In addition to the requirements of the RISBC, the CRMC suggests that applicants incorporate the following items into their proposed designs:

A. For construction in wave velocity (V) zones as defined by FEMA Flood Insurance Rate Maps:
   1) (1)If timber pilings are used, they should meet the American Society for Testing and Materials (ASTM) standards for Class B piles and shall have a minimum tip diameter of 8 inches. Wooden pilings should be treated with a wood preservative. Bracing between piles is recommended.
   2) (2)Pilings in ocean fronting areas should penetrate no less than ten (10) feet below mean sea level.
   3) (3)Floor joists should be secured with hurricane clips where each joist encounters a floor beam. These metal fasteners or straps should be nailed on the joist as well as on the beam.
   4) (4)To secure the exterior wall to the floor joists, galvanized metal strap connections should be used connecting the exterior wall studs to the joists.
   5) (5)Roof trusses or rafters should be connected to the exterior wall with galvanized metal straps.

Large-scale public infrastructure improvements are inappropriate on barriers due to their highly dynamic nature and ability to be significantly impacted by storms. Existing recreational structures, such as beach pavilions, located on moderately developed barriers that enhance the public's access to the water and generate tourism revenue for the State of Rhode Island may be permitted to be re-established in the event that they are physically destroyed fifty percent (50%) or more as a result of storm-induced flooding, wave, or wind damage. The prohibition for new infrastructure or expansion of existing infrastructure on all barriers does not apply to infrastructure which is intended to service the needs of the state such as transportation-related projects, including stormwater drainage improvement projects, or transmission corridors or other infrastructure intended to meet a demonstrated state need that provides public benefit.

On Moderately Developed Barriers, only in-kind maintenance is allowed. If a lot can support it, the structure may be moved back and elevated in accordance with RI State Building Code requirements. However, in-kind rebuild is still the only allowance. If a structure is within the 50-foot setback area, and cannot relocate beyond the 50-foot setback area, the application will be determined to be a maintenance activity and the structure will be allowed to be rebuilt in-kind provided it meets current RI State Building Code and all other applicable CRMC requirements.

Every effort should be made to safeguard from obstruction significant views to and across the water from highways, scenic overlooks, public parks, and other vantage points enjoyed by the public. Adjacent to Type 1 waters, structures along the water's edge should be screened by vegetation, and disruptions of natural landform and vegetation should be minimized.

Parking Lot and Other Site Amenities

Construction of new public parking lots in a moderately developed barrier beach is prohibited. On moderately developed barriers, existing roads, bridges, utilities, and shoreline protection facilities may be maintained only. Permeable materials shall be utilized, where practicable, to surface roadways and parking lots on shoreline features adjacent to Type 1, 2, and 3 waters.

Stormwater Management

The Council requires the use of low-impact development (LID) strategies as the primary method of stormwater management to reduce the volume of stormwater runoff to surface waters, recharge groundwater supplies, and improve overall water quality. CRMC requires the proper management and treatment of stormwater through the preparation and implementation of a stormwater management plan in accordance with the most recent version of the RIDEM Rhode Island Stormwater Design and Installation Standards Manual, which satisfies the requirements of the RICRMP and any applicable Special Area Management Plan. All projects shall be planned, designed, and developed in order to: Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss; Limit increases of impervious surface areas, except where absolutely necessary; Limit land disturbance activities such as clearing and grading and cut and fill to reduce erosion and sediment loss, and Limit disturbance of natural drainage features and vegetation.

For stormwater management the Council requires, in accordance with the "Smart Development for a Cleaner Bay Act of 2007" (see R.I. Gen. Laws Chapter 45-61.2), that all applicable projects meet the following requirements:

- Maintain pre-development groundwater recharge and infiltration on-site to the maximum extent practicable;
- Demonstrate that post-construction stormwater runoff is controlled, and that post-development peak discharge rates do not exceed pre-development peak discharge rates; and
- Use low impact-design techniques as the primary method of stormwater control to the maximum extent practicable.
- Residential, commercial, industrial or public recreational structures shall provide treatment and management of stormwater runoff for all new structural footprint expansions, including building rooftops, greater than six (600) hundred square feet in size and any new impervious pavement, driveways, sidewalks, or parking areas, regardless of size.

Dune Restoration

Construction of non-structural shoreline protection in a moderately developed barrier beach requires a category A assent. Filling and grading of shoreline features in a moderately developed barrier beach requires a category A assent. Alterations to beaches adjacent to Type 1 waters are prohibited except where the primary purpose of the project is to preserve or enhance the area as a natural habitat for native plants and wildlife.

Activities that disturb more than 5,000 square feet of land shall prepare an erosion and sediment control plan and adhere to standards in the Rhode Island Soil Erosion and Sediment Control Handbook. Filling, removing, or grading activities shall be reviewed at the Category B level when they involve more than ten thousand (10,000) cubic yards of material or affect more than 2 acres. Filling, removing, or grading is prohibited on beaches and dunes adjacent to Type 1 waters unless the primary purpose of the alteration is to preserve or enhance the feature as a conservation area or natural buffer against storms. Section 1.3.1.B.3. provides design standards for filling, removal, or grading projects.

Structural Shoreline Protection

Construction of structural shoreline protection is prohibited in a moderately developed barrier beach. Structural shoreline protection facilities shall not be permitted to preserve or enhance Type 1 waters as a natural habitat or to protect the shoreline feature. The Council prefers nonstructural shoreline protection methods over all other shoreline protection methods for controlling erosion such as stabilization with vegetation and beach nourishment due to their effectiveness in preserving beaches, natural shoreline habitats, and sediment dynamics. In most cases, the Council prefers hybrid shoreline protection methods over structural shoreline protection methods due to their effectiveness in preserving beaches, natural shoreline habitats, and sediment dynamics as compared to structural shoreline protection. For a practice to be considered hybrid shoreline protection, stone may only be used for toe-of-slope protection or to create an intertidal sill for salt marsh creation. When structural shoreline protection is proposed, the Council shall require that the owner exhaust all reasonable and practical alternatives including, but not limited to, the relocation of the structure(s) intended to be protected, landward re-contouring of the shoreline to create a more dissipative profile, and nonstructural and hybrid shoreline protection methods. For a practice to be considered hybrid shoreline protection, only stone may be used for toe-of-slope protection or to create an intertidal sill for salt marsh creation.

The Council shall prohibit new hybrid and structural shoreline protection on barriers classified by the CRMC as moderately developed as well as shorelines abutting Type 1 waters. The construction of new seawalls and bulkheads is prohibited, except where an applicant demonstrates to the satisfaction of the CRMC that there is no technically feasible alternative. Applicants for structural shoreline protection measures to control erosion shall, on the basis of sound professional information, demonstrate in writing all of the following:

- An erosion hazard exists due to natural erosion processes and the proposed structural shoreline protection has a reasonable probability of controlling this erosion problem;
- Nonstructural and hybrid shoreline protection has not worked in the past or will not work in the future because these methods are not suitable for the present site conditions;
- There are no practical or reasonable alternatives to the proposed activity such as the relocation of existing structures that mitigate the need for structural shoreline protection;
- The proposed structure is not likely to increase erosion or disrupt shoreline sediment dynamics that sustain adjacent natural shoreline features, or adversely affect the stability of the shoreline on either side of the project;

- Describe the long-term maintenance program for the structure including storm damage, the ability to rebuild the structure following storm damage, and financial commitments to pay for said maintenance;
- New structural shoreline protection shall be designed and certified by a registered professional engineer; and
- Describe all likely impacts that the structural shoreline protection may have on the continued public lateral beach access. If lateral public access will be impacted at any time, a lateral public access plan shall be provided, except where preempted by federal law (e.g., U.S. Coast Guard Maritime Security (MARSEC)).

All previously required coastal buffer zones or existing areas of natural vegetation landward of the shoreline protection structure must be preserved or replaced where disturbed and retained in an undisturbed condition. A twenty-five (25) foot setback shall be maintained between the buffer zone or natural vegetation and nearby structures.

The maintenance or repair of shoreline protection shall not extend beyond one (1) foot seaward of the existing toe of the structure. In most cases, expansion of the shoreline protection structure beyond one (1) foot seaward of the existing toe and one (1) foot vertical above the existing or shoreline protection elevation will be considered new construction. It is required that seawalls eligible for maintenance and that require replacement, be replaced with a riprap revetment, hybrid shoreline protection, or nonstructural shoreline protection. Approved replacement shoreline protection shall begin at the existing toe of the seawall (no farther seaward) and extend landward.

Beach Nourishment

Beach nourishment in a moderately developed barrier beach requires a category B assent. In Type 1 waters, activities and alterations including grading and excavation on abutting shoreline features are prohibited unless the primary purpose of the alteration or activity is to preserve or enhance the area as a natural habitat for native plants and wildlife or a beach renourishment/replenishment project. It is the Council's policy to protect, maintain and, where possible, enhance public access to and along the shore for the benefit of all Rhode Islanders. Publicly funded beach nourishment projects shall contain a public access component.

Category B Assent Requirements

The following requirements must be addressed in writing for a Category B Assent:

- Demonstrate the need for the proposed activity or alteration.
- 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.
- Describe the boundaries of the coastal waters and land area that is anticipated to be affected.

- 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.
- Demonstrate that the alteration or activity will not result in significant impacts on the abundance and diversity of plant and animal life.
- 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.
- Demonstrate that the alteration will not result in significant impacts on water circulation, flushing, turbidity, and sedimentation.
- Demonstrate that there will be no significant deterioration in the quality of the water in the immediate vicinity as defined by DEM.
- Demonstrate that the alteration or activity will not result in significant impacts on areas of historic and archaeological significance.
- 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.
- Demonstrate that measures have been taken to minimize any adverse scenic impact

Federal

The natural coastal dune system must follow guidelines outlined by the Federal Emergency Management Agency and the US Army Corps of Engineers.

Army Corps of Engineers

Permits for hybrid or structural shoreline protection projects with any portion of the project located below the high tide line must be obtained concurrently from the Army Corps of Engineers and the CRMC.

The US Army Corps for Engineers (USACE) 's Institute for Water Resources provides regulations to prevent unauthorized obstruction or alteration of any navigable waterway in the United States. The Agency regulates activities impacting navigable waters of the United States under different laws including section 10 of the Rivers and Harbors Act of 1899. Special permits from USACE must be obtained to complete such work.

The Easton's beach project will involve beach nourishment and dune enhancement, The project will therefore require USACE permits under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899, which control the placement of dredged or fill material into the waters of the United State.

The USACE has articulated a commitment to Building Resilience. (https://www.usace.army.mil/Media/Fact-Sheets/Fact-Sheets-View/Article/609942/building-resilience/) This project will need to comply with the USACE's approach to building resilience.

FEMA

FEMA building code resources provide information about retrofitting, rebuilding, and constructing in the coastal zone. The Federal Emergency Management Agency has provided a coastal construction manual as a guide for construction activities in coastal areas. Easton's Beach is located within special flood hazard areas zone VE and therefore shall follow the requirements below.

The following construction requirements are highlighted in the manual:

- New construction in coastal flood hazard areas (V Zone and A Zone) should be designed using the engineering standards (ASCE 24 and ASCE 7) or the International Residential Code (IRC), as applicable. Best practices must exceed the minimum NFIP requirements and must meet, or exceed, all community zoning and building code requirements. Repairs, remodeling, and additions must always meet NFIP and building code requirements for the part of the structure impacted. Should these costs exceed 50 percent of the fair market value of the structure, the entire building must be brought to local floodplain management and building code compliance.
- All new buildings in the VE zone must be elevated above the base flood elevation (BFE) on open foundations consisting of piles, posts, piers, or columns designed to allow waves and water moving at high velocity to flow beneath the buildings. Areas below the lowest occupiable floor of a building must be constructed of non-supporting breakaway walls that are intended to collapse under wave loads without causing collapse, displacement, or other structural damage to the elevated building or supporting foundation system. (Specific design requirements for breakaway walls can be found in the NFIP regulations Title 44 of the Code of Federal Regulations, Section 60.3(e)(4).[i])
- Engineering standards ASCE 24-05 and ASCE 7-10 are more stringent in V Zones than in A Zones, to protect against the increased flood, wave, flood-borne debris, and erosion hazards typical of V Zones.
- For added protection, it is strongly recommended that buildings in flood zones that are subject to breaking waves between 1.5 and 3 feet as well as erosion and scour be designed and constructed to V Zone standards.

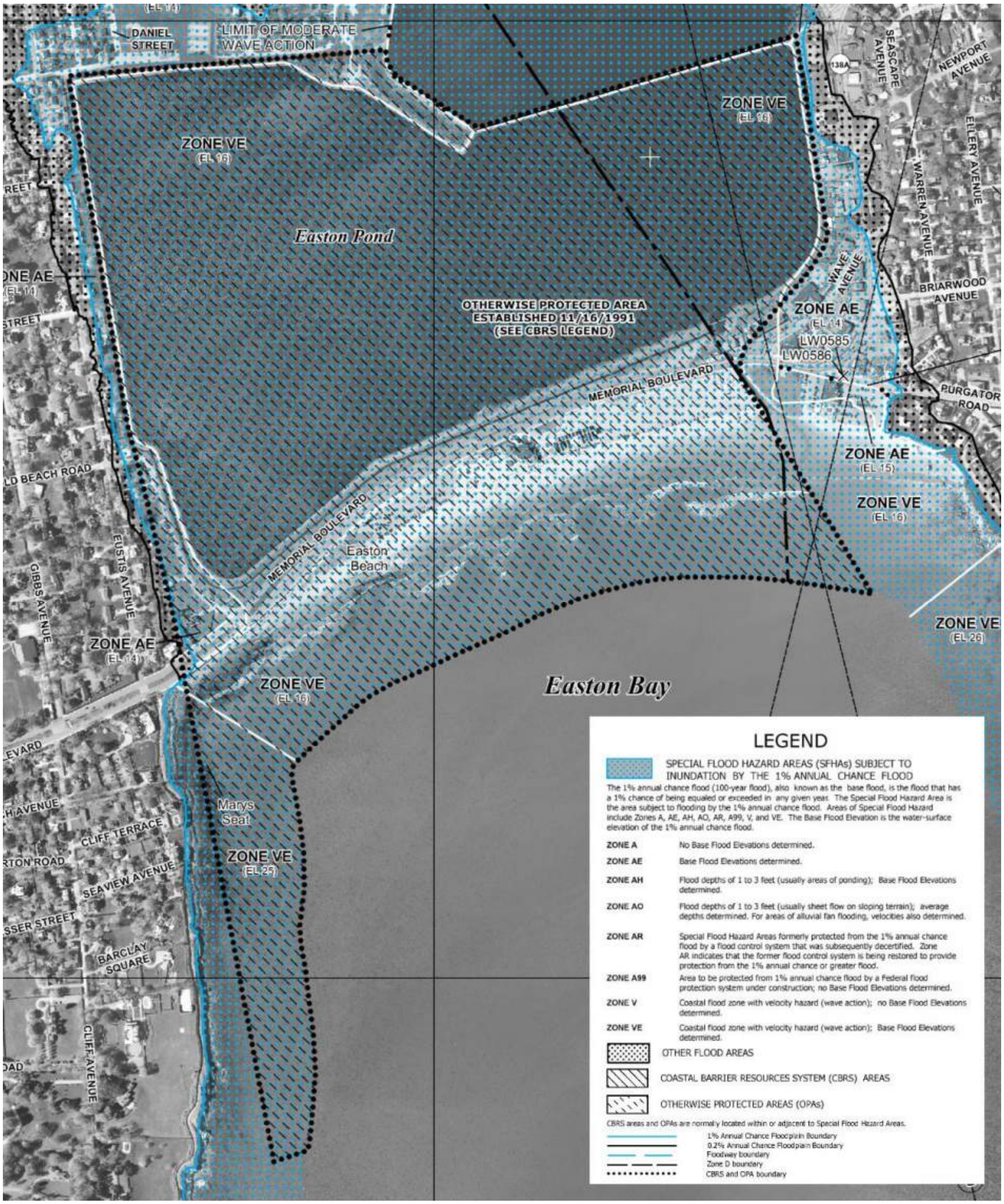


Figure 1: FEMA Flood Insurance Rate Map (4405C0181J)

---

[i] Title 44 of the Code of Federal Regulations, in Section 60.3(e)(4), which states that a community shall: "Provide that all new construction and substantial improvements in Zones V1-V30 and VE, and also Zone V if base food elevation data is available on the community's FIRM, are elevated on pilings and columns so that (i) the bottom of the lowest horizontal structural member of the lowest foor (excluding the pilings or columns) is elevated to or above the base food level; and (ii) the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values shall be those associated with the base food. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of paragraphs (e)(4)(i) and (ii) of this section."

Fuss & O'Neill Site Work
Order of Magnitude Cost Estimate (10-19-22)

Easton's Beach Study
Site Work Order of Magnitude - Cost Estimate
Date: 10/19/2022

		Description	Unit Measurement	Number of Units	Cost Per Unit	Construction Budget	Design Contingency (10%)	Construction Contingency (10%)	Escalation (5%/ 1year)	Total Feasibility Budget
Site	Site Preparation and Demolition	Erosion and Sediment Controls	LS	1	$10,000	$10,000	$1,000	$1,000	$500	$12,500
		Site Controls (Temporary Fence)	LF	3,000	$16	$48,000	$4,800	$4,800	$2,400	$60,000
		Construction Signs	LS	1	$5,000	$5,000	$500	$500	$250	$6,250
		Remove and Dispose Pavement	SY	13,867	$15	$208,000	$20,800	$20,800	$10,400	$260,000
		Remove and Dispose Concrete	SY	9,683	$10	$96,833	$9,683	$9,683	$4,842	$121,042
		Remove and Dispose Concrete Wall	LS	1	$30,000	$30,000	$3,000	$3,000	$1,500	$37,500
		Remove and Dispose Concrete Deck Over Entrance	LS	1	$15,000	$15,000	$1,500	$1,500	$750	$18,750
		Stockpile and Relocate Flag Pole	EA	1	$500	$500	$50	$50	$25	$625
	Site Improvements	Bituminous Concrete Pavement	TON	1,527	$100	$152,710	$15,271	$15,271	$7,635	$190,887
		Common Borrow	CY	2,000	$35	$70,000	$7,000	$7,000	$3,500	$87,500
		Gravel Borrow	CY	1,417	$30	$42,517	$4,252	$4,252	$2,126	$53,146
		Concrete Pavement	CY	251	$200	$50,222	$5,022	$5,022	$2,511	$62,778
		Concrete Ramps	CY	273	$200	$54,593	$5,459	$5,459	$2,730	$68,241
		Concrete Benches, Stadium Seating, & Stairs	CY	337	$200	$67,407	$6,741	$6,741	$3,370	$84,259
		Artificial Wood Ramps/Deck	SF	7,705	$30	$231,150	$23,115	$23,115	$11,558	$288,938
		Railings	LF	1,800	$40	$72,000	$7,200	$7,200	$3,600	$90,000
		Concrete Walls	CY	130	$440	$57,037	$5,704	$5,704	$2,852	$71,296
		Closing Off Entrances in Existing Concrete Wall	CY	9	$440	$4,074	$407	$407	$204	$5,093
		Boulders	EA	122	$400	$48,800	$4,880	$4,880	$2,440	$61,000
		Wooden Guiderail	LF	800	$50	$40,000	$4,000	$4,000	$2,000	$50,000
		Bollards	EA	22	$2,000	$44,000	$4,400	$4,400	$2,200	$55,000
		Mobi Mat Beach Access Mat (5' Wide)	LF	1,060	$50	$53,000	$5,300	$5,300	$2,650	$66,250
		Mobi Mat Vehicle Access Mat (10' Wide)	LF	125	$100	$12,500	$1,250	$1,250	$625	$15,625
		Concrete Curb Stop	EA	7	$200	$1,400	$140	$140	$70	$1,750
		Pavement Markings	LF	10,000	$0.6	$6,000	$600	$600	$300	$7,500
		Pavement Marking Arrows	EA	9	$88	$792	$79	$79	$40	$990
		Pavement Marking Accessible Parking Symbol	EA	4	$75	$300	$30	$30	$15	$375
		Footwash	EA	1	$4,500	$4,500	$450	$450	$225	$5,625
		Footwash Water Service	LS	1	$2,000	$2,000	$200	$200	$100	$2,500
		Flagpole Lighting	LS	1	$4,000	$4,000	$400	$400	$200	$5,000
		Sand Fence	LF	5,270	$2	$10,540	$1,054	$1,054	$527	$13,175
		Dune Construction and Beach Nourishment	LS	1	$7,500,000	$7,500,000	$750,000	$750,000	$375,000	$9,375,000
		Bioswale	LS	1	$113,000	$113,000	$11,300	$11,300	$5,650	$141,250
	Landscaping	Back Dune Plantings	LS	1	$200,000	$200,000	$20,000	$20,000	$10,000	$250,000
		Beachgrass Plantings	LS	1	$200,000	$200,000	$20,000	$20,000	$10,000	$250,000
	Site Furnishings	Playground Equipment: Explorer Ship	EA	1	$113,810	$113,810	$11,381	$11,381	$5,691	$142,263
		Playground Equipment: Stilts	EA	1	$6,080	$6,080	$608	$608	$304	$7,600
		Playground Equipment: Crawling Pyramid	EA	1	$4,020	$4,020	$402	$402	$201	$5,025
		Playground Equipment: Cocowave Swing	EA	1	$13,880	$13,880	$1,388	$1,388	$694	$17,350
		Playground Equipment: Oasis Sandworks	EA	1	$13,690	$13,690	$1,369	$1,369	$685	$17,113
		Playground Equipment: Forest Lake Boat	EA	1	$11,660	$11,660	$1,166	$1,166	$583	$14,575
		Playground Equipment: Shipping and Installation	LS	1	$80,000	$80,000	$8,000	$8,000	$4,000	$100,000
		Sunshades	EA	6	$48,037	$288,222	$28,822	$28,822	$14,411	$360,278
		Seasonal Chain Link Fence	LF	170	$25	$4,250	$425	$425	$213	$5,313
		Benches	EA	3	$2,500	$7,500	$750	$750	$375	$9,375
		Bicycle Racks	EA	6	$1,300	$7,800	$780	$780	$390	$9,750
		Bus Shelter	EA	1	$25,000	$25,000	$2,500	$2,500	$1,250	$31,250
	Miscellaneous	Mobilization & Demobilization	% of Cost	6.5%						$815,083
		Insurance and Bonds	% of Cost	1.5%						$188,096
		Total								**$13,542,913**

Yoder +Tidwell, Ltd.,
Structural Narrative for New Construction
(8-18-22)

YODER + TIDWELL, Ltd.

Easton's Beach Planning Study
Proposed New Recreational and Pavilion Building **August 18, 2022**
Newport, RI

Structural Narrative

Foundation

1. Due to the location and potential for wave action, a deep foundation system consisting of driven pile(s) at each building pier location will be required. The type of driven pile will need to be based on a geotechnical evaluation of the site, and consider the existing subsurface soil conditions, corrosiveness and longevity, and cost of the pile. Options may include galvanized steel, concrete, or composite piles.
2. The top of each driven pile would be capped below grade with a concrete pile cap that would be anchored to the pile and reinforced to act as a base for the cast in place concrete grade beams and concrete piers that extend up to the upper level floor deck.
3. All pile caps would be tied together with a grid of reinforced concrete grade beams. The size of the grade beam would be dependent on the layout of the concrete piers, but would generally be in the 12" wide by 18" deep range.
4. The upper floor deck level would be supported on cast in place reinforced concrete piers. The concrete piers would be approximately 16"x16", similar to what currently exists.

Upper Floor Deck Structure

1. The portion of the upper floor deck structure that is not enclosed would consist of a composite decking on pressure treated wood beams and joists, similar to the existing exterior deck construction. Reinforced concrete beams could also be used to span between the concrete piers, and then wood framing infilled between the main beams. Or treated timber beams could be used to span between the concrete piers in lieu of the concrete beams. The advantage of using concrete beams to span between the concrete piers is they provide more rigidity to the structure and would therefore reduce the required size and reinforcing of the piers. The reinforced concrete beams would also likely provide more longevity to the structure than would pressure treated beams.
2. The portion of the upper floor deck structure that is enclosed could consist of a two way reinforced concrete slab spanning between the concrete piers. Based on the current pier grid of about 13'x13', the slab would need to be about 6" thick. We would have concrete beams along all edges of the building to support the exterior walls above.
3. An alternative to the two way concrete slab would be to frame the entire upper level floor deck using pressure treated timber beams spanning between the concrete piers and then infilled with pressure treated wood joists. Similar to my comment in item #1 above, the concrete slab and beam system would likely provide more longevity to the enclosed structures compared to the wood framed option.

Pavilion Framing

1. The typical frame for the upper level pavilions would likely consist of a structural steel frame that is supported on top of the concrete piers and perimeter concrete beams. All steel would be hot dipped galvanized with all connections bolted.
2. For the areas where the exterior walls are mostly open, such as at the carousel building, the steel frames would be bolted moment resisting connections. For the areas where there are solid exterior walls, the steel frames could have bolted diagonal braces that are concealed inside of the wall framing.
3. The roof of the pavilions would consist of structural wood decking on top of heavy timber beams, purlins, rafters, and clear span trusses. The roof framing would be supported on the perimeter steel beams that are part of the structural steel frame.

Typical Exterior Wall Framing

1. All exterior wall framing would be non-load bearing and could consist of pressure treated wood stud walls infilled between the concrete and steel building frame.

Rotunda

1. The structure for the existing building is in generally good condition. The issues of the deteriorated steel in the basement would need to be addressed. Because it is subject to constant flooding, it would be ideal to eliminate the basement and infill the entire area.
2. In addition to the repairs identified in the assessment report, it may be desirable to make some reinforcements to the lower level to improve the buildings ability to withstand wave forces. Currently the exterior walls consist of unreinforced masonry. The large garage door openings can be opened to reduce the impact of waves, and the geometry is also helpful in that regard. But large wave forces could still cause significant damage to the existing unreinforced masonry piers. One potential improvement that could be made would be to add a reinforced concrete or steel frame on the inside face of the lower level walls to help buttress the existing masonry walls in the event of large wave forces. The columns for the new framework would need to be supported on new concrete footings adjacent to the existing foundation walls.

Historic Photos

HISTORIC IMAGES

Several of the following images came from an online postcard collection at Salve Regina University. This Newport Collection can be found at https://digitalcommons.salve.edu/postcards/index.20.html

Historic 1. Late 19th or early 20th century

Historic 2. 1906 (from SRU postcard collection)

Historic 3. Late 19th century

Historic 4. 1900-1906 (from Library of Congress)

Historic 5. Early 20th Century

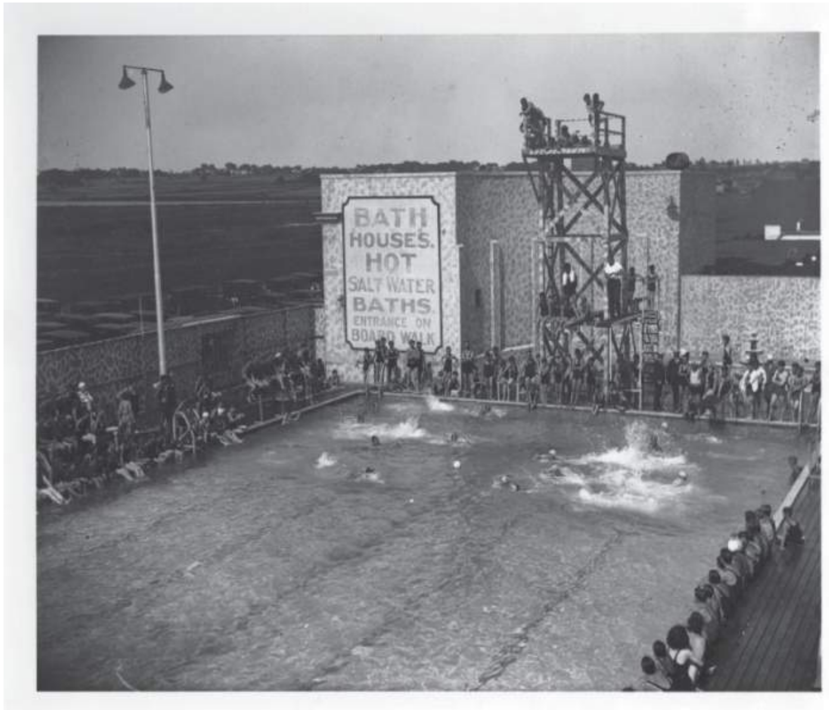
Historic 6. Early 20th Century

Historic 7. Early 20th Century

Historic 8. Circa 1920s

Historic 9. Colored postcard circa 1920s

Historic 10. Colored postcard circa 1930s



Historic 11. Circa 1930s

Historic 12. Photo by Robert Yarnall Richie 1932-1934 (from SMU Libraries)

Historic 13. 1938, following hurricane (from SRU postcard collection)

Historic 14. 1938 following hurricane

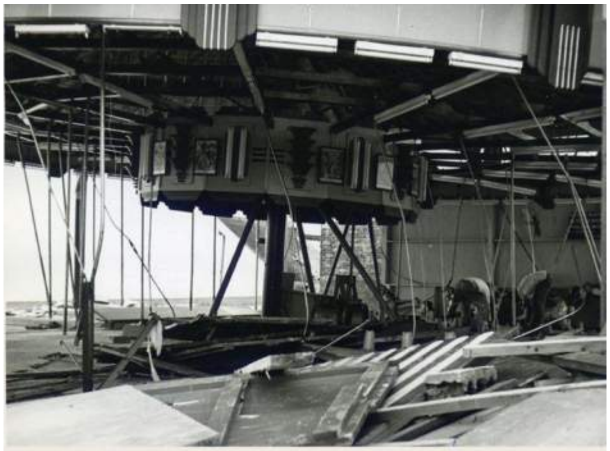
Historic 15. 1938 following hurricane

Historic 16. Circa 1930s?

Historic 17. Circa 1930s?

Historic 18. Between 1938 and 1954

Historic 19. Undated (from Providence Public Library)



The Merry-Go-Round at Easton's Beach, destroyed by Carol,
Newport Historical Society Collection

Historic 20. 1954 following hurricane

Historic 21. Circa 1960s

Historic 22. Circa 1960s

DBVW Architects and Yoder + Tidwell Evaluation of Existing Conditions Report (4-15-21)

Easton's Beach Pavilions, Newport, RI

Evaluation of Existing Conditions with Recommendations

April 15, 2021 (final report)

Submitted To:

William Riccio, Jr., P.E.
Dirctor of Public Services
CIty of Newport
280 Spring Street
Newport, RI 02840

YODER + TIDWELL, Ltd.
architects and engineers
333 Smith Street
Providence, RI 02908
401.751.2460

DBVW ARCHITECTS
111 Chestnut Street
Providence, RI 02903
401.831.1240

TABLE OF CONTENTS

PROJECT TEAM

Architect

DBVW Architects
111 Chestnut Street, Providence, RI 02903

Martha Werenfels, FAIA - Senior Principal

Michael Swanson - Project Manager

Structural Engineer

Yoder + Tidwell, Ltd.
333 Smith Street, Providence, RI 02908

Loren Yoder, P.E. - Principal

1. Undated image of Easton's Beach (probably around the turn of the century).

2. Contemporary aerial view of Easton's Beach.

I. EXECUTIVE SUMMARY

DBVW Architects and Yoder + Tidwell, structural engineers, conducted inspections of the Rotunda, Carousel Building, and Snack Bar and Surf Shop Building on three separate occasions and observed a fairly broad range of conditions at each building. While the Carousel Building and the Snack Bar and Surf Shop Building were constructed in the 1990s, they are in significantly worse condition than the Rotunda, which was constructed circa 1940.

The Carousel Building, as well as adjacent elevated walkways and stairs, exhibits serious structural conditions that prompted this team to write a preliminary report on February 24, 2012 that recommended closing specific areas to public access. Those recommendations remain in effect as of the writing of this report. Drawings indicating the areas of recommended closure can be found in the appendix.

The conditions observed and discussed in this report generally fall into three broad categories. In the section titled "Structural Evaluation" (page 32) the recommended work is categorized as follows as a means to prioritizing the work:

1. Structurally Unsound and Unsafe: Areas where the structural elements are severely deteriorated and/or have failed. This occurs primarily at the west side of the Carousel Building and at elevated walkways (see drawing). These areas should not be open to the public.
2. Very Deteriorated: Areas that exhibit significant deterioration, but are not structurally unsound. These areas should be repaired in the next year to avoid more serious damage.
3. Deteriorated: These areas should be repaired within the next three years to avoid additional deterioration.

3. Historic image of Easton's Beach, probably following the 1938 hurricane.

Addressing all of the conditions that fall within the above categories constitutes a significant amount of work, particularly with respect to the two buildings that flank the Rotunda. Deferred maintenance, which is not specifically addressed in this report, should also be included in any major renovations, thereby increasing the cost of repairs.

The effects of climate change on these three buildings cannot be ignored. Stronger and more frequent storms regularly batter these buildings, as do storm surges that flood the lower levels. One has to consider how prudent it is to spend large amounts of money to save the two buildings (Carousel Building and Snack Bar Building) that were constructed in the 1990s. These two buildings were not constructed well and they will continue to be adversely impacted by storms and sea level rise. While these buildings contain portions of the earlier buildings that were substantially destroyed by hurricanes within their lower levels, they are not historically significant buildings as they stand today.

The Rotunda building, which was constructed following the Hurricane of 1938, is historically significant and is in somewhat better condition than the two buildings that flank it. It is our recommendation that the Rotunda be preserved and that opportunities for making it more resilient to storms than it currently is be explored.

If the decision is made not to save the newer buildings, it may be possible to locate the retail functions of the Snack Bar and Surf Shop in the Rotunda building.

The Carousel horses, which date to the 1950s, should probably be located in a different building that is out of harm's way.

In summary, the condition of the Carousel Building and the Snack Bar and Surf Shop Building is extremely poor. As noted, there are significant structurally deficiencies and structural failure is occuring at some locations. Difficult decisions will need to be made with respect to renovating these buildings at considerable cost or removing them.

II. OVERVIEW

DBVW Architects and Yoder + Tidwell, Ltd., structural engineers, were asked by the City of Newport to evaluate existing conditions at the Easton's Beach Pavilions on Memorial Boulevard in Newport, RI.

This report represents our findings based on site visits conducted on 11/16/20, 1/21/21, and 3/18/21. The buildings that were evaluated include the Rotunda, the Carousel Building, and the Snack Bar and Surf Shop Building (Image 2).

Easton's Beach was the home of a nineteenth century amusement park that was damaged over the years by fire, hurricanes and flooding. The existing brick Rotunda Building appears to have been constructed following the 1938 hurricane that devasted the Rhode Island coastline. The Carousel Building and Snack Bar Building were largely reconstructed in the 1990s, however, the first floors of both buildings contain some original material. The carousel horses appear to date to the 1950s, with the original carousel having been lost in the hurricane of 1954.

DBVW Architects and Yoder + Tidwell reviewed the following documents as background for our evaluation of the buildings:

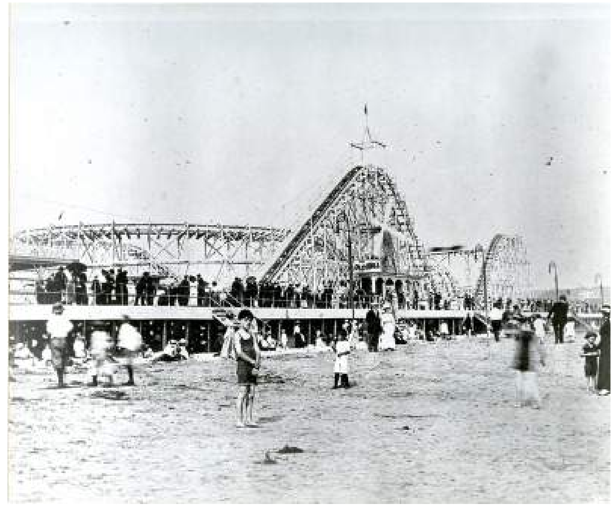
- Easton's Beach Building Complex Survey Report by Tecton Architects, May 17, 2018
- Renovations to Easton's Beaach Drawings by William L. Burgin Architects February 23, 1993
- Letter from Aquidneck Consulting Engineers to William Riccio, January 12, 2021

4. Aerial view of Easton's Beach prior to 1938. Note roller coaster at top of image.

The goal of this assessment was to record and evaluate the existing conditions of the Carousel Building, the Rotunda, and the Snack Bar and Surf Shop Building relative to the building envelopes, their structural systems, and active infiltration.

The assessment included but was not limited to:

a. Roofs and roof drainage
b. Walls (wood framed and masonry)
c. Windows and doors
d. Structural systems
e. Concrete slabs, sidewalks, stairs and wood decks adjacent to the building identified above.



6. Historic image of Easton's Beach roller coaster, no longer extant.

5. Historic image of Easton's Beach.
Most of the buildings in this image were subsequently destroyed.

II. Building Background and Construction Types

The buildings reviewed as part of this assessment include the Rotunda, the Carousel Building, and the building containing the Snack Bar and Surf Shop. The elevated decks and walkways adjacent to and connecting these buildings were also evaluated. The buildings occupy space near the center of the Easton's Beach complex, with a parking lot to the west and cabanas and more parking to the east. The buildings are separated from the beach by a hardscaped pedestrian boardwalk. (Image 2)

The Rotunda building is the central building of this three-building complex. It links to the Carousel building to the northeast via a basement space and is joined to both the Carousel Building and the Snack Bar by an elevated boardwalk at the second floor level. The Rotunda building was built sometime after the 1938 hurricane devastated the site and demolished the structures that previously occupied this location (see historic images). Lower portions of the Carousel building and the Surf Shop are most likely from the same era, however, these buildings were largely reconstructed in the early 1990's.

The Rotunda houses aquarium exhibits on the first floor and salinization and water treatment tanks in the basement directly beneath the Inner Hall. The second floor of the building contains a large multi-function space and is accessed by two interior stairways and an exterior boardwalk. This building also contains a hydraulic passenger elevator.

The Rotunda building is a dodecagon (12 sided) in plan and has a hybrid steel and wood framed structure with concrete floor slabs and brick masonry exterior bearing walls. The building has a partial basement of approximately 1,000 square feet under the northern portion of the building. The structure in this area consists of steel beams encased in concrete with a concrete floor slab.

7. Historic image of Easton's Beach (undated).

The remainder of the first floor is constructed as a concrete slab on grade.

The first floor, occupying roughly 5,000 square feet, has a circulation corridor ringing the perimeter and is separated from the Inner Hall by masonry walls. These walls are clad on both sides with glazed blocks and there are large, overhead doors located on each face of the building.
The second floor is constructed of heavy wood framing visible from the first floor corridor space. Within the Inner Hall, the second floor structure is covered by a finished ceiling but it appears to be reinforced concrete construction.

The exterior walls are of brick masonry with painted plaster walls on the interior and large, non-original, aluminum windows on each face.

The Carousel Building lies to the northwest of the Rotunda and shares a common wall with the Rotunda at the ground floor level. This Carousel Building houses facilities' offices and maintenance areas on the ground floor and a carousel dating from 1958 on the second floor. The ground floor is mostly concrete slab on grade with a partial basement under the east portion of the building. The floor area over the basement is constructed with reinforced concrete beams and a concrete floor slab.

Only the easternmost portion of the first floor is enclosed. The western portion of the first floor is open to the elements and the second floor framing is exposed. The second floor framing consists of steel bar joists spanning between masonry bearing walls and steel columns that rise up through the second floor to support a timber-framed roof. The carousel, itself, is supported by a central steel column.

The exterior walls of the Carousel Building are a combination of brick masonry and exposed concrete masonry units at the ground floor and wood framed exterior wall panels with shingles and wood trim at the second floor.

The Surf Shop and Snack Bar building lies to the southeast of the Rotunda building and, like the Carousel building, shares a common wall at the ground floor. The ground floor spaces include the Surf Shop, lifeguard station, administration offices, rest room, showers and storage. The construction of this building is similar to the Carousel building but without a basement. The ground floor is concrete slab on grade. The second floor and roof are supported by steel bar joists bearing on masonry walls with concrete slabs. Similar to the Carousel enclosure, the Snack Bar is octagonal and covers most but not all of the ground floor. The remainder is an outdoor concrete deck. The exterior walls and roof of the Snack Bar are constructed similarly to the Carousel building.

Based on historic photographs taken in the post WWII era, the Carousel and Snack Bar buildings were built as one-story structures and the second stories were added in the 1990's. (Image 2 & 3)

8. Historic photograph of Snack Bar building.

9. Historic photograph with original Carousel behind gateway to beach. None of these buildings has survived.

III. Architectural Assessment

The three buildings in this report range in condition from very poor for the Carousel and Snack Bar Buildings to fair condition for the Rotunda. The Carousel building has severe degradation of the exposed second floor framing system, as well as the first floor structure over the basement. The basement is suffering from underground water infiltration. The Surf Shop and Snack Bar building is experiencing exterior wall failures due to water infiltration, which is leading to corrosion of steel elements within the wall and degradation of the exterior wall veneers.

10. Rotunda (left) and Carousel Building (right) from the north.

Despite being the oldest of the three buildings, the Rotunda is in the best overall condition. There is, however, significant infiltration in the basement as well as deterioration of the windows and doors, the masonry and the boardwalk construction.

The specific deficiencies in each building are noted below, along with general observations. A focused structural evaluation of each building is included in Section IV.

11. Carousel Building (left), Rotunda (center), and Snack Bar (righ) from the southwest.

ROTUNDA BUILDING:

A. Exterior Envelope

1. There are several areas of the brick masonry that require repointing, most notably above the cornice over the windows on the second floor. The mortar at these locations shows loss of contact with the brick along the horizontal joints. This appears to be the area where the roof meets the exterior wall. (Image 13) The joints at the corner of the building are cracking and might best be repointed with a sealant, as movement is likely to continue to occur at this location. (Image 14) There are many areas at the first floor level, particularly on the south facing elevations that require repointing. (Image 15)

2. There are areas on the brick masonry walls on the first floor under the boardwalk with heavy biologic growth. This growth is also evident throughout the underside of the wood framed boardwalk. (Image 16) It is important to note that biologic growth only occurs in the presence of relatively high moisture content, therefore, the sources of moisture should be identified and addressed.

12. Rotunda from the south.


13. Masonry above cornice on second floor requires repointing .


14. Joints cracking at the corner of the building.


15. Areas on south facing elevations require repointing.

3. The painted steel ledgers under the boardwalk all show moderate to serious rusting. Please refer to the Structural section of this report for additional information. (Image 17)

4. There are areas of masonry below the windows on the south sides of the building where the brick has been replaced. This work was done with little attempt at matching the original brick, mortar mix, mortar color and joint sizes. In many instances the mortar joints are failing.

5. There have been repairs to the masonry above the window heads. The brick was removed and new lintels were installed, a rubber-type flexible flashing was installed over the lintels, and plastic weeps were inserted in the head joints. The flexible flashing is exposed to the air and is drying and curling. These types of flashings are typically not meant to be exposed and a metal drip edge flashing should have been used at the exposed edges. The current efficacy of this flashing is difficult to determine, but it may be the cause of the leaks around the window heads. (Image 18 & 19)

6. According to the City, there are leaks in the windows that ring the large multi-function space. The leaks apparently emanate from the window heads. There was some residue between the head receptors and the window heads that appears to be the result of water infiltration. The non-original, aluminum windows are approximately thirty years old and may be reaching the end of their useful life. (Image 18)

16. Heavy biologic growth on brick masonry walls.

17. Rusting on painted steel ledgers under boardwalk.

7. There are numerous spalls, cracks and signs of rusted reinforcing in the precast concrete elements surrounding the windows. Several of the spalled sections have seen prior repair attempts. (Image 20) There are also areas of recent applications of clear sealant at pre-cast joints in lieu of mortar.

8. There is a drain pipe on the exterior wall above the precast band over the window heads that spills onto the brick masonry. The water from this pipe is staining the brick and mortar below and will eventually cause further erosion of the brick and mortar. There is also biologic growth at this location at the first floor level.

9. The finish on the aluminum windows is chalky and faded. It is also discolored due to the copper cornice flashing above the windows, which is patinating and staining the surfaces beneath.
(Image 20)

10. It is important to note that biologic growth only occurs in the presence of relatively high moisture content, therefore, the sources of moisture should be identified and addressed.

18. Window from exterior.

19. Rubber, flexible-type flashing at window head.

20. Spalling at window area.

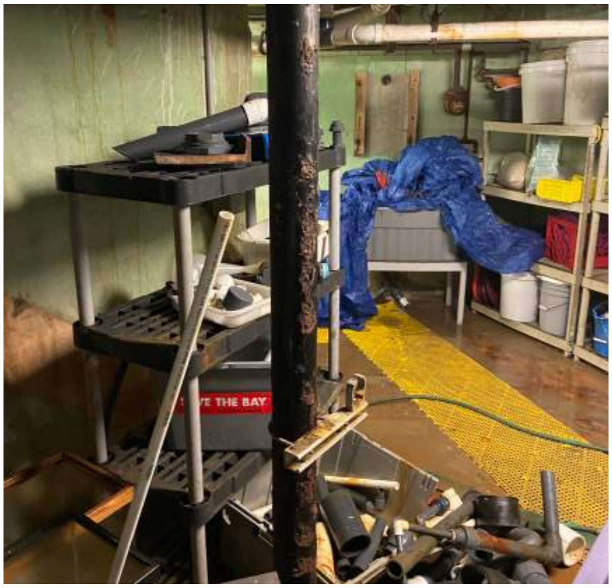
B. Basement

1. At the time of our visits, there was approximately 1" of standing water in much of the basement. The water appears to be coming in through the joints between the two basement spaces and through cracks in the foundation walls. (Image 21)

2. All of the exposed steel structure showed excessive amounts of corrosion, including steel components installed during a 1993 renovation.
(Image 22)

3. This space contains the salinization and water treatment tanks for the aquarium on the first floor level of this building. (Image 23)


21. Water infiltration in basement


22. Corrosion on steel structure.


23. Salinization and water treatment tanks.

C. First Floor

1. There are areas in the glazed block veneer that require repointing, particularly on the exterior walls from the floor up to a height of three feet. There are also some cracked glazed blocks. (Image 24)

2. There are several cracks in the slab-on-grade portion of the first floor slab. At least one location is showing signs of differential movement and attempts have been made to build up and grind down the edges to lessen the potential tripping hazard of the uneven slab edges. (Image 25)

3. According to the City, water comes in under the overhead doors that ring the first floor circulation space during rainstorms. This could not be verified during our visits although there are clear water stains leading from the doors to the floor drains. This infiltration may be partly due to improper sloping of the exterior sidewalks towards the building.
(Image 26)

4) Wood deterioration was noted at the second floor wood framing along the perimeter of the exterior wall. Some areas had been previously repaired. See also, Second Floor Note C.3.


24. Cracked areas on blocking.


25. Cracking in slab-on-grade at first floor level.


26. Water stains leading into floor drains.

D. Second Floor

1. The floor has settled approximately 1" at the east exit door and the entrance to the east interior stairway. The steel beam framing the stair has settled where it meets the masonry bearing wall below. There is missing masonry around the bearing plate at this location. There are several deteriorated wood joists in this area where the joists intersect with the masonry wall. (Image 25 & 26) This represents a potential trip hazard at a point of egress as well as a non-compliant handicapped accessibility issue.

2. Cracks are visible in the plaster wall finish above the windows and some separation between the finished ceiling and the crown molding in the multi-purpose space.

25. Potential trip hazard.

26. Photos of deteriorated wood joists at the intersection of the masonry wall.

27. Result of water infiltration at window head.

CAROUSEL BUILDING

A. Exterior Envelope

1. The north-facing exterior walls are showing signs of biologic growth on the masonry walls and wooden components of the deck and stairs. The stains are typically green, however, there are also black stains on the masonry walls as a result of water draining off the concrete decks above. The top seven courses of masonry on these walls have been rebuilt. Neither the brick nor the mortar match the original. Of the remaining masonry, approximately 50% should be repointed. (Image 20, 30 & 31)

2. There are areas of efflorescence on the brick masonry, most notably on the south wall near the overhead door from the courtyard. The amount of efflorescence combined with heavy biologic growth and rusting of the steel lintel over the door indicates significant amounts of water infiltrating into this wall. The water appears to be entering near the top of the wall where it meets the exterior concrete deck. There are also water stains visible on the interior surface of this wall. The masonry veneer of this wall is close to failure and will require dismantling and reconstruction. (Image 33 & 34)

3. The round windows on the north side of the building require new sealant. (Image 31)

28. Carousel Building from the southwest.

29. Black stains on masonry as a result of water drainage.

30. Black and green stains on masonry as a result of water drainage and biologic growth.

31. Black stains on masonry as a result of water drainage.

4. The roof of the Carousel enclosure is covered by three-tab asphalt shingles. While the roof does not appear to be failing and there were no reported leaks inside, the roof shingles are approaching or at the end of their useful life.

5. There are several areas of painted wood exterior trim at the Carousel level that are soft, punky or showing signs of deterioration. Replacement of this trim is necessary as well as any deteriorated sheathing behind it. (Image 32)

6. There are no gutters on the building, which is exacerbating the problems of deterioration in the wood trim and water infiltration under the overhead doors.

33. Efflorescence on brick masonry near overhead door.

32. Deteriorated trim and sheathing behind it.

34. Visible water stains on interior surface.

B. Basement

1. There is rust-stained water seeping into the building at the joint between the Carousel building and the Rotunda building at the basement. This water is draining towards a floor drain in the hall. The concrete floor slab at this joint is heaving. Attempts at patching are evident, but have clearly been unsuccessful. (Image 35)

2. There is a minor amount of water on the floor of the former boiler room adjacent to and two steps below the hallway. This water appears to be finding its way to a sump pit and pump. The functionality of the pump is unknown to us.

3. There are several locations of exposed reinforcing steel in the slab and concrete beams of the floor framing above the basement, as well as in the concrete wall between the hallway and boiler room. The reinforcing is severely corroded and is exposed due to concrete loss. There is additional cracking in these structures due to rust jacking of the reinforcing steel within. (Image 36) See the Structural portion of this report for additional information.

4. At the junction of the two basement areas there are two concrete encased steel beams overhead. The underside of the beams is exposed and severely corroded. This corrosion has led to concrete spalling, delamination of the steel beam flanges, and section loss of the exposed portions of the beam. See the Structural portion of this report for additional information. (Image 37)

35. Water penetration at joint between Carousel building and Rotunda building.

36. Concrete loss resulting in corrosion of reinforcing steel members.

37. Corrosion on underside of beam.

C. First Floor

1. The steel framing for the second floor (where the Carousel is located) is exposed to the air on the western half of the building. The steel was painted, but shows varying levels of corrosion where the coatings have failed. In several locations steel components of the framing members have failed completely due to corrosion. The steel members, which consist of bar joists and wide flange shapes are severely compromised by corrosion on the seaward side of the building, but less so on the landward side. The steel wide-flange members exhibit severe deterioration, particularly along the bottom flanges and at the beam to column connections. See the Structural portion of this report for additional information. (Image 38)

2. Surrounding this exposed portion of the second floor framing is an outer ring of concrete spandrel beams and concrete columns. This structure supports the outer edge of a wood framed walkway at the second floor level. Several of these columns exhibit cracking at the top below where the spandrel beams bear on them. (Image 39)

3. There is evidence of a leak in the roof over the maintenance area. It is unclear whether this leak has been addressed or is active. The location of the leak corresponds to a repair to the concrete deck on the outdoor walkway above. (Image 40)

4. There are cracks in the block walls at the exterior walls.

38. Corrosion on steel framing at second floor.

39. Cracking on concrete structure at second floor framing.

40. Roof leak over maintenance area.

D. Second Floor

1. There are numerous cracks in the concrete floor slab at the Carousel level. The cracks do not appear to be structurally concerning, but may be attributable to deflection of the compromised floor joists below. (Image 41)

2. Water is being driven by wind under the overhead doors that enclose this level of the building. The water travels along and into the floor cracks, where it is subsequently captured by floor drains.

41. Cracks in second floor concrete slab.

SNACK BAR AND SURF SHOP BUILDING

A. Exterior Envelope

1. The exterior walls of the first floor show extreme signs of water infiltration. The walls consist of original cinder block (circa 1939) covered with a ¼” thick layer of cementitious parging as an exterior finish on the east and north elevations. The south and west elevations have cinder block with a brick veneer. The parging layer has spalled off in many locations and the cinder block shows signs of spalling and deterioration. (Image 43) There is also biologic growth on the surface of these walls and on the wood framing of the boardwalk above.

2. The north wall of the first floor has a similar parging layer, but appears to be constructed of brick underneath. There is a large crack running horizontally between and beyond two adjacent door heads. (Image 44) The steel lintels over these doors are heavily rusted, delaminating, and showing section loss. The cracking of the masonry is due to rust jacking at these lintels. This area also exhibits heavy biologic growth on the walls and wood framing above. (Image 45 & 46)

42. Snack Bar and Surf Shop Building

43. Spalling, biologic growth and deterioration on first floor exterior wall.

44. Rust, cracking and biologic growth on north wall at the first floor.

3. The brick masonry exterior walls on the south and west side at the first floor exhibit biologic growth, failing masonry joints, and cracking and movement of the brick veneer due to rust jacking of the steel lintels over doors and windows. (Image 45 & 46) The former food service openings on the first floor level have been infilled with brick masonry and the heads of these openings are blocked from view by the wood ledgers for the deck above. Judging by the corrosion seen on the visible lintels, it is likely that any other steel lintels in this wall are also substantially corroded. The original portions of these brick masonry walls are all in need of cleaning and repointing. (Image 47)

4. The exterior envelope of the second story Snack Bar space is wood framed with shingle siding and painted wood trim. There are many areas of wood deterioration visible at the wood trim. Some of the wood trim, particularly the ten inch high wall base trim, has been replaced with PVC – a material better suited to this location. The remainder of the trim requires scraping and painting.

45. Cracking, failing masonry joints and biologic growth on south and west side at the first floor.

46. Rust jacking of steel lintels over doors and windows.

47. Masonry joints need repointing

5. At and above the boardwalk level the exterior walls change from brick masonry to a CMU with a parging layer as seen on the east side at the ground level. Above the top of the wall the edge of the concrete deck is visible. Between the concrete slab and the CMU there is a strip of painted wood trim meant to cover the joint. In several locations this cover strip is missing or has been replaced with a PVC trim board which has also failed. (Image 48) This joint between the wall and concrete deck appears to be the source for much, if not all, of the water infiltration into the wall construction. (Image 49) The CMU mortar joints and the parging are failing at various points along the south side of the building.

6. At the east side of the building there is a long stretch where the trim board is missing. This correlates with the spalling of the wall below.

7. There are cracks in the concrete slab edge at various points, potentially leading to additional water infiltration.

8. At the roof level of the northeast corner of the building there is a particularly bad area of water infiltration. (Image 49) This may be the result of a failed guard rail post connection above. The wooden railing posts are typically anchored to the concrete decks and spandrel beams by a piece of metal pipe which is grouted into the concrete and through-bolted to the wood posts. It appears as though the waterproofing measures used to protect this connection have failed and the water that has penetrated the slab is finding its way out here. The heavy amounts of efflorescence seen in the photo are indicative of water passing through concrete.

9. The roof of the Snack Bar is covered in asphalt shingles, they appear to be at the end of their useful life.

48. PVC trim board breaking apart.

49. Wall damage and spalling from water infiltration

B. First Floor/Surf Shop

1. East wall shows rusty drip lines from through-bolt penetrations in the upper part of the wall suggesting that the bolts are deteriorating. The through-bolts attach a wood ledger to the wall to support the boardwalk above.

2. The head of the window on the east wall shows signs of water infiltration, including blistering paint on the CMU over the window. There is a 2" wood shim between the window head and the CMU which is wet and rotting. (Image 49)

49. Signs of water infiltration on east wall window.

C. Second Floor/Snack Bar

1. The second floor of this structure is octagonal in plan and has a smaller footprint than the first floor. The extra space at the second floor features a concrete deck, which is partially covered by a small wood shed.

2. There is a crack in the concrete floor slab that runs diagonally across the entire floor within the enclosed space of the Snack Bar. (Image 50)

50. Crack in the concrete slab.

4. ELEVATED WALKWAYS AND DECKS

A. Boardwalk

The boardwalk construction is composed of wood framing joists covered with composite deck boards. The framing members are typically supported by wood ledgers on the building side and steel channel ledgers on the outboard side. There is some variation to this composition depending on the adjacent structure.

1. The framing system at the west side of the Carousel building relies on wood ledgers bolted to either the steel framing or the concrete spandrel beams. Overall, this system is in good condition but the integrity of the steel framing in some areas is compromised due to heavy corrosion. (Image 51)

2. The boardwalk at the south side of the Rotunda is wider and the framing system is arranged differently, with the joists running parallel to the edges of the walkway. In this case, the joists span from beams at each column location and the applied ledgers are used to support the edges of the deck boards and the ends of the beams. (Image 52) The steel channel ledgers as well as the steel saddles that carry the beams ends exhibit extensive corrosion. (Image 53) Please refer to the Structural portion of this report for additional information.

3. The underside of all of the boardwalks are covered in biologic growth, including algae and in more limited areas, black mold. As noted previously, the presence of organic growth indicates that the substrate has a high moisture content.

51. Heavy corrosion on steel framing.

52. Ledgers supporting the edges of deck boards.

53. Corrosion on steel channel ledgers and steel saddles.

4. The wood framing and deck boards around the Snack Bar show a heavy amount of biologic growth and many of the through-bolts used to attach the ledger boards to the building are weeping rust-colored water. This could be attributed to the amount of moisture that may be within the wall due to infiltration. A sample of bolts should be removed and inspected for the level of corrosion present. (Image 54)

5. At the point where the boardwalk on the north side of the Rotunda meets the outdoor concrete deck of the Carousel building, the structure has settled along the outer edge of the boardwalk. This has created a differential height situation in the walking surfaces and poses a tripping hazard. (Image 55)

54. Rust colored water weeping through the ledger boards.

55. Structure has settled along outer edge of boardwalk.

B. Outdoor Concrete Decks

1. At the boardwalk landing of the west stair, there is one area of outdoor concrete deck that is in very poor condition. In this location, the supporting structure of painted steel bar joists is suffering from extreme corrosion. The landing has been temporarily supported to try and address this problem, however, a more effective and permanent solution is required. (Image 57) The concrete beam that carries the landing and the top of the stair also require repair. Spalling and exposed reinforcing steel are evident. (Image 58) Please refer to the Structural portion of this report for additional information.

2. The outdoor concrete decks at the Carousel building appear to be in fair condition, without any excessive cracking. No active leaks were reported in the spaces below. There are signs of previous patches and repairs, with one corresponding to observed damage in the ceiling below. According to the City, this location is not actively leaking. There are no roof drains serving this area, therefore, rain water is left to drain over the edge of the deck. This drainage does not always perform satisfactorily, thus allowing water to flow under the overhead doors that abut the deck areas. Moss was seen growing at the sill of one of the overhead doors, indicating moisture is present for long periods of time at these door sills. (Image 59)


57. Extreme corrosion on painted steel bar joists.


58. Spalling and exposed reinforcing steel on concrete beam.


56. Uneven walking surface poses a tripping hazard.

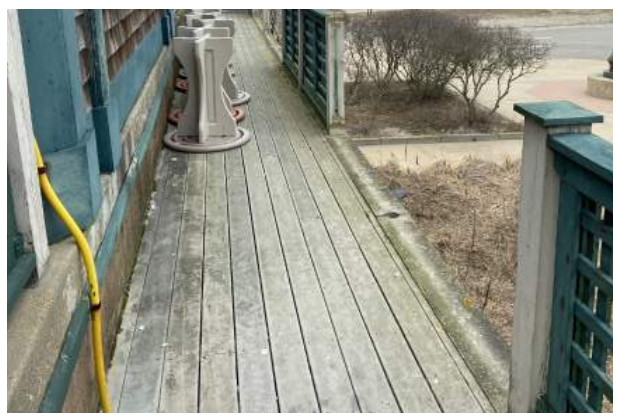

59. Moss growth indicating prolonged periods of moisture.

C. Stairs and Railings

1. The railings at the edge of all the walkways and decks appear to have been installed as part of a renovation in the 1990s. They consist of 6" x 6" solid wood posts, six to seven feet on center with infill panels of lattice. The posts are capped with a wood board that is shaped to drain and in some cases with a decorative round wood sphere. (Image 60) The railing system is in poor condition, with many missing trim pieces, areas of deterioration, inferior materials used for its construction, and missing paint.

2. At the east side of the Snack Bar and leading to the south stair from boardwalk to grade, there are locations where sections of the railing are missing. (Image 61 & 62)

60. Typical railings along the edge of walkways and decks.

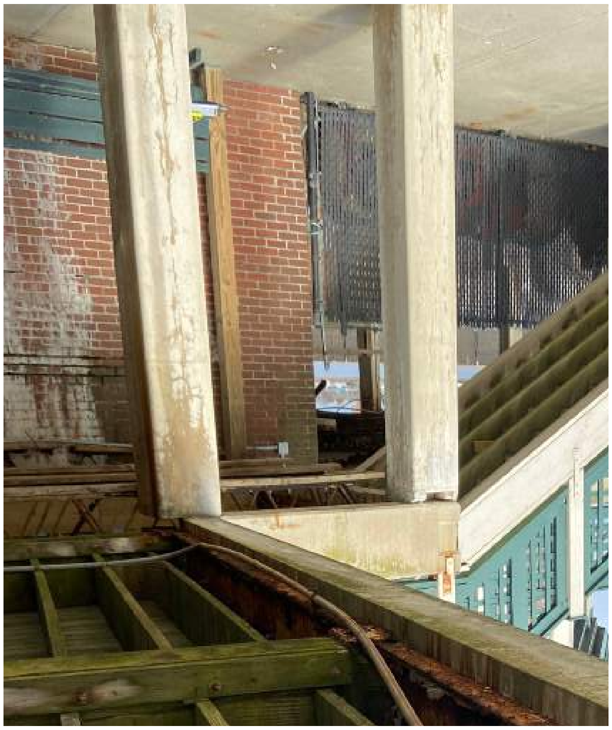


61. Section of missing railing

62. Section of missing railing.

3. Some of the railings at the stairs are loose where the flange connects to the wood posts. These should all be tightened or re-anchored. (Image 63)

4. There are two stairways that provide access from grade level to the boardwalk. One is at the west end of the boardwalk and one is on the south side leading up to the Snack Bar. These stairs are wood framed with composite deck boards for the treads and risers. The west stair has a cast-in-place concrete portion from the grade to the first landing. Both stairs have galvanized steel railings from grade to the first landing and then the wood lattice guardrail system continues to the boardwalk level. The stairs are in fair condition, with minor repairs needed at the metal railings on the west stair. The strap anchors connecting the stair stringers to the wood post supports should be replaced due to corrosion. (Image 64 & 65)



64. stairway providing access from grade level to boardwalk.

63. Loose connection where flange connects to wood post.

65. The strap anchors connectingthe stair stringer to the wood post supports should be replaced due to corrosion.

D. Grade Level Sidewalks

1. There are numerous settlement cracks in the sidewalks surrounding the buildings, but no serious differential settlement was noted.

2. The slope of the sidewalks away from the building should be verified to ensure that they are not contributing to water infiltration under the overhead doors.

3. There is an obsolete cast iron downspout boot outside a door leading into the Carousel building. This pipe is broken with jagged edges and is a safety concern. (Image 66)

66. Broken pipe with jagged edges presents safety concern.

STRUCTURAL EVALUATION
YODER +TIDWELL, Ltd., STRUCTURAL ENGINEERS

This is a summary report of the structural observations made by Yoder + Tidwell on January 21, 2021 and on March 18, 2021 at Easton's Beach in Newport, RI. The three primary structures that were observed during these site visits were the central Rotunda Building, the Carousel Building located on the northwest side, and the Snack Bar/Surf Shop Building located on the southeast side. The connecting elevated decks that attach to the upper level of each of the three buildings were also briefly observed. Our site visits consisted of structural observation of typical exposed conditions, no destructive investigation or testing was performed during these visits. The following is a brief structural description of each of the three primary structures and the connecting decks, followed by a summary of any significant structural deficiencies observed, including a preliminary narrative of recommendations for each deficiency observed.

GENERAL STRUCTURAL

Carousel

The carousel building consists of concrete block bearing walls at the lower level, supporting a concrete deck above. Some of the exterior block walls are faced with brick. The block appears to be an older, lighter weight type of block, commonly called "cinder block", which is darker in color than today's concrete block, is lighter in density, and has less structural strength. The second floor deck consists of a concrete slab poured on top of plywood sheathing over open web steel joists. The open web steel joists are 28" deep and spaced approximately 30" on center. The plywood decking is fastened to the steel joists via a wood nailer that is bolted to the top of the joists. The western portion of the first floor of this building is an open parking area and the structural steel framing for the second floor deck is exposed to the weather. The octagonal enclosure for the carousel on the second floor has a wood framed roof supported on perimeter steel beams and steel columns. The steel columns extend down through the second floor deck and are supported on concrete piers at the lower level. Therefore, the upper carousel building is supported independent of the second floor deck structure. The first floor of the carousel building is slab on grade, except for a small portion that has a basement below the Women's Room, Storage Room, and Corridor that leads to the Rotunda. The first floor structure in this area appears to be a reinforced concrete slab and concrete beam structure. The foundation walls appear to be poured in place concrete.

Rotunda

The Rotunda building is believed to be the original building in the complex. It generally consists of a faceted exterior core of load bearing brick and glazed tile walls, with a smaller faceted interior core of load bearing brick. These outer and inner structural cores support a second floor structure that consists of concrete encased steel beams and a concrete floor slab over the inner core, and wood beams and joists at the outer core. The wood joists are 2x14s spaced at 12" on center. Steel beams were used to frame out the larger openings for the two stairs. The roof structure is not visible but is likely to be clear span steel beams supporting wood rafters to create the large open volume of the Function Room. The first floor of the Rotunda is primarily slab on grade, except for a small basement area that occurs below the northern half of the center core, and a connecting tunnel that leads to the basement of the Carousel building. The first floor structure over the basement areas consists of a reinforced concrete slab, supported by concrete encased steel beams, and steel supporting columns. The foundation walls are poured in place concrete.

Snack Bar and Surf Shop Building

This building is very similar in construction to the Carousel building, consisting of concrete block ("cinder block") bearing walls at the lower level, supporting a concrete deck above. The second floor deck consists of a concrete slab poured on top of plywood sheathing over open web steel joists. Unlike the Carousel building, the second floor open web steel joists are fully enclosed by the building below and are not exposed to the elements. The octagonal enclosed Snack Shop on the second floor has a wood framed roof supported on perimeter steel beams and steel columns. The steel columns extend down and are supported on steel columns that continue through to the lower level. The first floor of this building is all slab on grade, there is no basement. The foundation walls appear to be poured in place concrete.

Elevated Decks

Review of the connecting deck structures was not the primary focus of our report, however since they do connect directly to the three structures that we were observing, a limited review was made of these elevated structures. The existing decks consist of pressure treated wood joists supported by ledgers against the existing buildings, and by precast concrete beams that span between concrete piers at the perimeter. There are a variety of framing conditions, some of the ledgers are wood, and some of the ledgers are steel channels.

OBSERVED STRUCTURAL DEFICIENCIES

The observed structural deficiencies have been grouped into three general categories. This was done based on preliminary observation alone and may need to be modified based upon any future investigation and discovery. The three categories are:

1. Structurally Unsound and Unsafe: Areas where the structural elements are severely deteriorated and/or have failed. These areas should not be open to the public.
2. Very Deteriorated: Areas that exhibit significant deterioration but are not structurally unsound. These areas should be repaired in the next year to avoid more serious damage.
3. Deteriorated: These areas should be repaired within the next three years to avoid additional deterioration.

The items within each of the categories on the following pages are not listed in any particular order of importance.

CATEGORY 1 DEFICIENCIES

1.1 Severe Joist Deterioration - West End of Carousel Building.
(Reference Photos 1.1a and 1.1b)

The western portion of the Carousel building on the lower level is not enclosed and structural members are exposed to the elements. This open air condition has led to severe deterioration of the structural steel and in particular the open web steel joists. The joists closest to the south on the water side are extremely deteriorated and there are missing members on some of the joists due to the severe deterioration. This area presents a dangerous condition and requires immediate attention. Access to the space below as well as the space above this area of severe deterioration should be restricted immediately until permanent repairs can be made. Temporary shoring should be installed immediately in order to provide support for the concrete slab. Shoring could consist of adjustable steel shore posts supporting a continuous PT beam below the slab, or it could be several continuous PT wood stud bearing walls. The temporary shoring would bear directly on wood cribbing placed on top of the existing concrete floor slab.

There are several options for the permanent repairs for this area, and each requires a more detailed study and analysis. One option would be to remove this area of framing entirely and reconstruct with all new structural framing and a new concrete deck. Another option could be to keep the existing concrete deck in place, and remove all existing joists from below and replace with new galvanized steel joists or steel beams.

1.1a Severe Joist Deterioration

1.1b Severe Joist Deterioration

1.2 Severe Joist Deterioration - South End Connector of Carousel Building.
(Reference Photos 1.2a and 1.2b)

There is a similar, but smaller area of severe deterioration of the steel joists that occurs at the top of the exterior stairs on the south side of the Carousel building. This is at the concrete deck connector that joins the top of the stair to the second floor of the Rotunda building. There are four steel joists in this area that are severely deteriorated. The joist adjacent to the Carousel exterior wall has completely failed and some temporary PT shoring has been installed. The bearing of these steel joists at each end consists of a steel angle ledger which is also severely deteriorated.

My recommendation for this area is the same as that described above in item 1.1, which is to immediately restrict access to the space above and below, and install temporary shoring. The permanent repairs could also be similar to above, however this is a smaller area, and the condition of the concrete deck in this area is poor due to all the cracking. Therefore, complete removal and reconstruction is likely the preferred solution.

1.3 Deteriorated First Floor Slab and Beams – Basement of Carousel Building
(Reference Photos 1.3a and 1.3b)

There is a small basement area below the Women's Room, Storage Room, and Corridor that leads to the Rotunda. The first floor framing over the basement area consists of a reinforced concrete slab supported by reinforced concrete beams. The bottom of the concrete slab and beams is severely spalling in some areas. The exposed steel reinforcing bars are severely deteriorated and, in some cases, have rusted all the way through. The steel lintel over the opening into the basement below the Rotunda building is severely rust jacking.

1.2a Severe Joist Deterioration

1.2b Severe Joist Deterioration

1.3a Deteriorated First Floor Slab and Beams

1.3b Deteriorated First Floor Slab and Beams

This area of the basement should be restricted to only necessary personnel, and temporary shoring should be installed as soon as possible. This would consist of adjustable steel shore posts supporting various locations of the underside of the beams and slab. Permanent repairs would be extensive and require further investigation. Designing the repairs is beyond the scope of this report. Due to the extensive repairs that are required, one possible consideration would be to infill and eliminate the basement areas entirely since they are continuously wet due to constant flooding.

CATEGORY 2 DEFICIENCIES

2.1 Deteriorated First Floor Slab and Beams – Basement of Rotunda Building
(Reference Photos 2.1a and 2.1b)

The small basement of the Rotunda, which only exists below the northern half of the center core, is in poor condition. The first floor deck over this basement area appears to be a reinforced concrete slab supported on steel beams encased in concrete. Due to the very high moisture in the environment, the exposed portions of the bottom flanges of the beams are deteriorated to varying levels. There is also localized spalling of the underside of the concrete slab. The deterioration does not appear to be as extreme as the basement of the adjacent Carousel building, but is an area that should be investigated further.

It is my recommendation that when the temporary shoring design is done for the basement of the Carousel building, this area of the Rotunda basement be studied in more detail as well, and temporary adjustable shore posts added as needed to support any beams that have significant deterioration. Similar to the recommendation for Item 1.3, permanent repairs to this type of concrete structure would be extensive and requires further investigation and therefore beyond the scope of this report. Consideration to eliminate the basement would apply to this area of the Rotunda as well.

2.1a Deteriorated First Floor Slab and Beams

2.1b Deteriorated First Floor Slab and Beams

2.2 Deteriorated Column Bases and Beams – West End of Carousel Building
(Reference Photo 2.2a)

The steel column bases for the columns that support the Carousel Building roof are deteriorated where they bear on the concrete piers. The steel spandrel beams that tie the tops of the piers also have varying levels of deterioration.

Based on my limited observation, it appears that the existing beams and column bases could remain and be scraped to remove all loose scale, then cleaned and coated with a high performance coating to protect from future deterioration. Following the scraping and removal of all loose scale and prior to coating, any members with significant loss of steel cross section could be augmented by localized welding of additional steel plates and shapes as needed to maintain the original cross section of the member.

2.2a Deteriorated Column Bases and Beams

2.3 Deteriorated Ledgers and Beam Seats Supporting Wood Deck Framing
(Reference Photos 2.3a and 2.3b)

Many of the steel channel ledgers and steel beam seats that support the main support beams of the wood decks are very deteriorated. These steel elements support the typical wood joists and beams in a variety of ways, some as primary support, and some as secondary support. The level of deterioration also widely varies from minor to severe.

All steel supporting elements for the deck, including all steel channels and beam seats, should have loose scale removed and evaluated on a case by case basis to determine the level of deterioration. Some elements will likely require complete replacement. Other elements may be able to remain in place and augmented by adding additional welded steel plates and shapes. Some elements may only require scraping, cleaning, and coating. Based on my limited observation, it is likely that many of the steel ledgers will fall into the category of needing full replacement.

2.3a Deteriorated Ledgers and Beam Seats Supporting Wood Deck Framing

2.3b Deteriorated Ledgers and Beam Seats Supporting Wood Deck Framing

2.4 Localized Joist and Joist Seat Deterioration – Carousel Building
(Reference Photos 2.4a and 2.4b)

Although much more isolated than the large area described in Item 1.1, there were some observed areas of localized steel deterioration in the enclosed area of the Carousel Building. There was one joist adjacent to a deck penetration that was deteriorated, as well as the bearing seats at the east and west ends of the joists along the south wall where there is an open deck above adjacent to an exterior wall. These are areas where water was able to get through the deck and locally damage the surrounding steel. Even though the damage is severe in some areas, because it is very localized, this is something that would not require immediate shoring or full replacement, but rather localized repairs to the steel. The flashing details in these areas need to be evaluated and corrected as well to prevent ongoing infiltration.


2.4a Localized Joist and Joist Seat Deterioration


2.4b Localized Joist and Joist Seat Deterioration

CATEGORY 3 DEFICIENCIES

3.1 Localized End Deterioration of Wood Joists/ Beam at Rotunda Building
(Reference Photos 3.1a and 3.1b)

Some of the wood beams and joists at the second floor level of the Rotunda building have ends that are deteriorated where they pocket into the exterior wall. This is likely what has led to the localized drop on the second floor above and the gap below the baseboard. In some locations, a steel angle ledger has been added along the inside face of the exterior wall. This was done as part of a past repair to address deteriorated joist ends. There is also a beam that is not properly supported at the top of the east stair. A temporary wood post was installed, but the beam is not supported by the brick wall. There is about a 1" drop on the second floor above this stair landing which creates a tripping hazard.


3.1a Localized End Deterioration of Wood Joists/Beam


3.1b Localized End Deterioration of Wood Joists/Beam

The most direct solution for this issue would be to sister then ends of all deteriorated joists with short joist sections or plywood gussets. Instead of notching these new sections into the brick wall, a steel angle ledger bolted to the inside face of the wall could be installed, similar to the previous repairs. The beam at the top of the east stair should be properly supported by rebuilding the brick around the beam pocket, and/or installing a permanent steel post in lieu of the wood post.

3.2 Deterioration of CMU Walls at Carousel Building and Surf Shop Building
(Reference Photos 3.2a and 3.2b)

Many of the exterior concrete block walls are in very poor condition, particularly on the east wall of the Snack Bar/Surf Shop, and the south wall of the Carousel Building. These walls have been taking in water for a long time due to the open joint where the second floor slab turns over the top of the block wall. There is severe efflorescence, and/or cracking and spalling of the parge coating that was applied over the outside face of the block. The block and mortar have likely been compromised due to the excessive moisture in the wall.

A more detailed investigation is required to determine the extent of the water damage to the block and mortar. At the very least, this would involve removal of several areas of the wall to evaluate and/or test the condition of the block and the bond strength of the mortar. This would allow a determination to be made as to whether the wall could be salvaged and repointed, or if it would require complete reconstruction. In either case, the detail at the top of the wall needs to me modified and flashed properly such that water from the surface of the deck above does not continue to enter the wall cavity of the block.

3.2a Deterioration of CMU Walls

3.2b Deterioration of CMU Walls

3.3 Cracks in Concrete Piers
(Reference Photos 3.3a and 3.3b)

There are numerous hairline cracks in many of the concrete piers that support the elevated concrete and wood decks. These small cracks can quickly grow into larger cracks as water is able to penetrate the pier and cause deterioration of the steel reinforcing. Cycles of freeze/thaw can also lead to localized spalling the concrete. All cracks should be sealed with an appropriate concrete crack repair product. Due to the harsh environment, it is also recommended to coat the piers with a concrete corrosion inhibitor product. Sika makes several products that would be suitable for both types of repairs.

3.4 Rust Jacking of Steel Lintels
(Reference Photos 3.4a and 3.4b)

At various locations in all three buildings, there were observed locations of rust jacking of the steel lintels over door and window openings. Some of the original lintels were replaced with new lintels during a previous renovation, but it appears that some of the original lintels were left in place and are now deteriorated. All deteriorated lintels will need to be replaced with new galvanized steel lintels. Continued deterioration of the lintels will lead to further damage to the brick surrounding the lintels.


3.3b Cracks in Concrete Piers

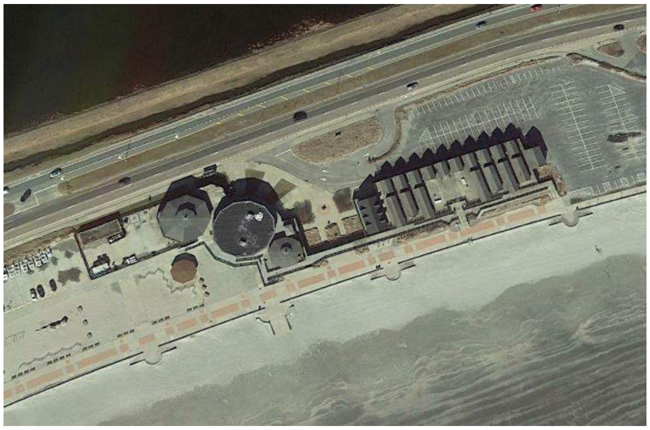

3.4a Rust Jacking of Steel Lintels


3.3a Cracks in Concrete Piers


3.4b Rust Jacking of Steel Lintels

LIMITATIONS OF REPORT

The conclusions and recommendations contained in this report are based on observation of those structural items that were visible and reasonably accessible at the time of my visits. They are also based on conditions that existed at the time of my visit. Other than the general visual observation of typical structural conditions that was done during the walk through, no detailed survey, probing, or structural analysis was made of existing structural elements. Due to finished ceilings and walls in some of the spaces, some structural elements could not be directly observed.



Aerial view of Easton's Beach.

NEXT STEPS

As outlined in detail in this report, there are areas of the three Easton's Beach Buildings that must be closed to the public immediately. These areas are unsafe to occupy and specific locations need to be shored up immediately to prevent structural failure. These areas are graphically identified in the drawings in the Appendix of this report.

Note: DBVW Architects and Yoder + Tidwell, Structural Engineers, did not have access to electronic drawings of the buildings, therefore, we overlaid our recommendations on PDFs of drawings prepared by William L. Burgin Architects in 1993.

The following next steps are recommended to ensure the safety of the public, to prevent further structural failure, and to chart a path forward for the three buildings at Easton's Beach that are the subject of this report.

1. Close off unsafe portions of the buildings (see drawings in Appendix).

2. Develop a shoring plan for temporarily stabilizing the areas that are in the worst condition and in jeapoardy of structural failure. These areas are specifically identified as "Category 1 Deficiencies" beginning on page 34 of this report.

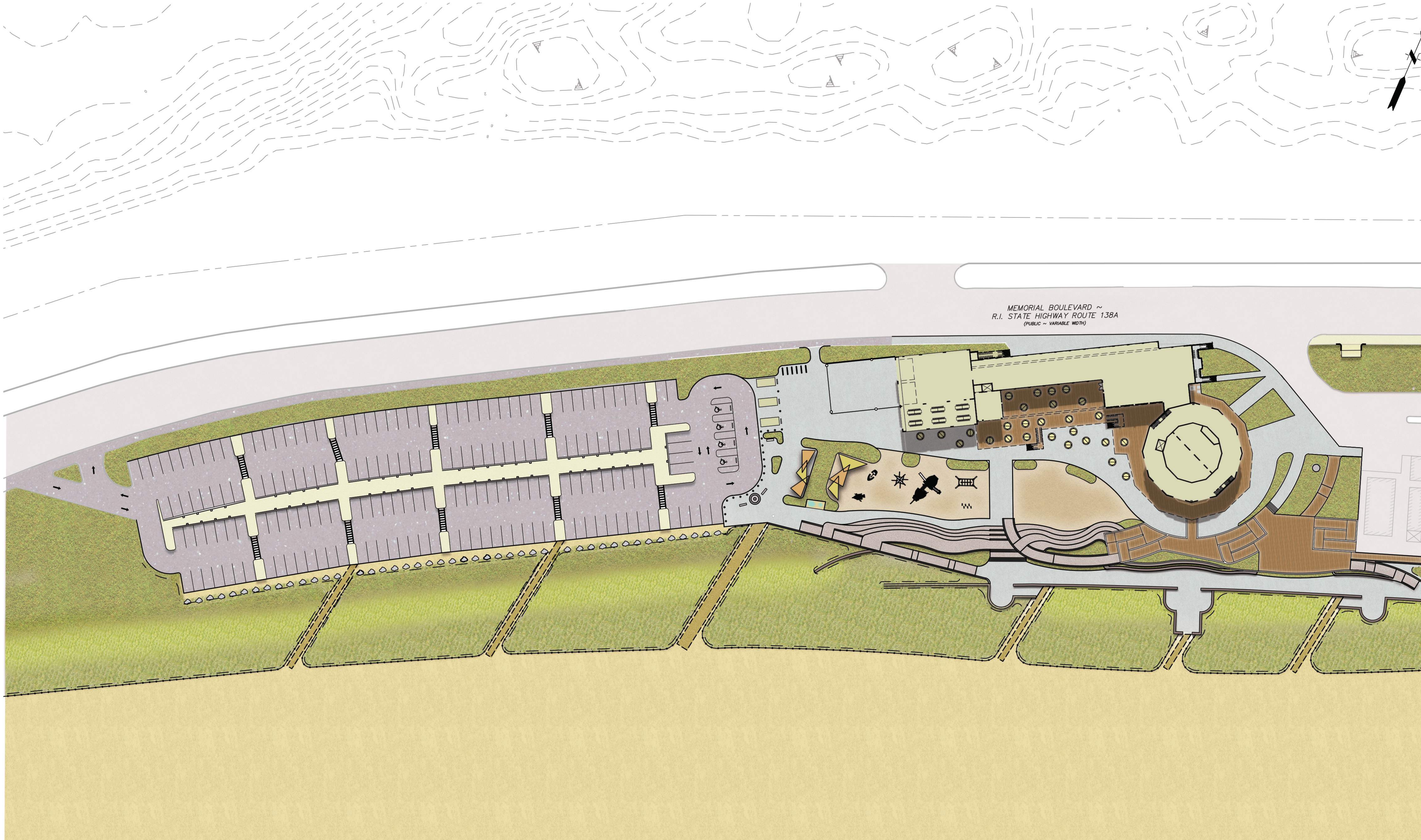
3. Execute the temporary shoring plan, ensuring that all means of egress are kept open and safe.

4. Re-open stabilized areas, <u>except</u> the upper level of the Carousel Building, which will not be safe to occupy, even after the temporary shoring is installed.

5. Develop a strategy for repairing, restoring, or removing specific buildings. As stated in the Executive Summary of this report, some difficult decisions may be required. The strategy must take into account the following factors:

   a. Resiliency - How will these buildings be impacted by sea level rise, storm surges, and more frequent and severe weather events?
   b. Historic Significance - What is the historic significance of the buildings and can they be preserved?
   c. Cost - How much will it cost to repair or restore the buildings and is this cost justified?

DBVW Architects Drawings of Proposed Building



LEGEND

- BUILDING
- CONCRETE PAVEMENT
- BITUMINOUS CONCRETE PAVEMENT
- PERMEABLE PAVERS
- SAND (PLAYGROUND/EVENT)
- ARTIFICIAL WOOD DECK
- MOBI-MATS
- BEACH GRASS
- BACK DUNE PLANTINGS

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: 1"=40'
VERT.:
DATUM:
HORZ.:
VERT.:

40 20 0 40
GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

DBVW ARCHITECTS

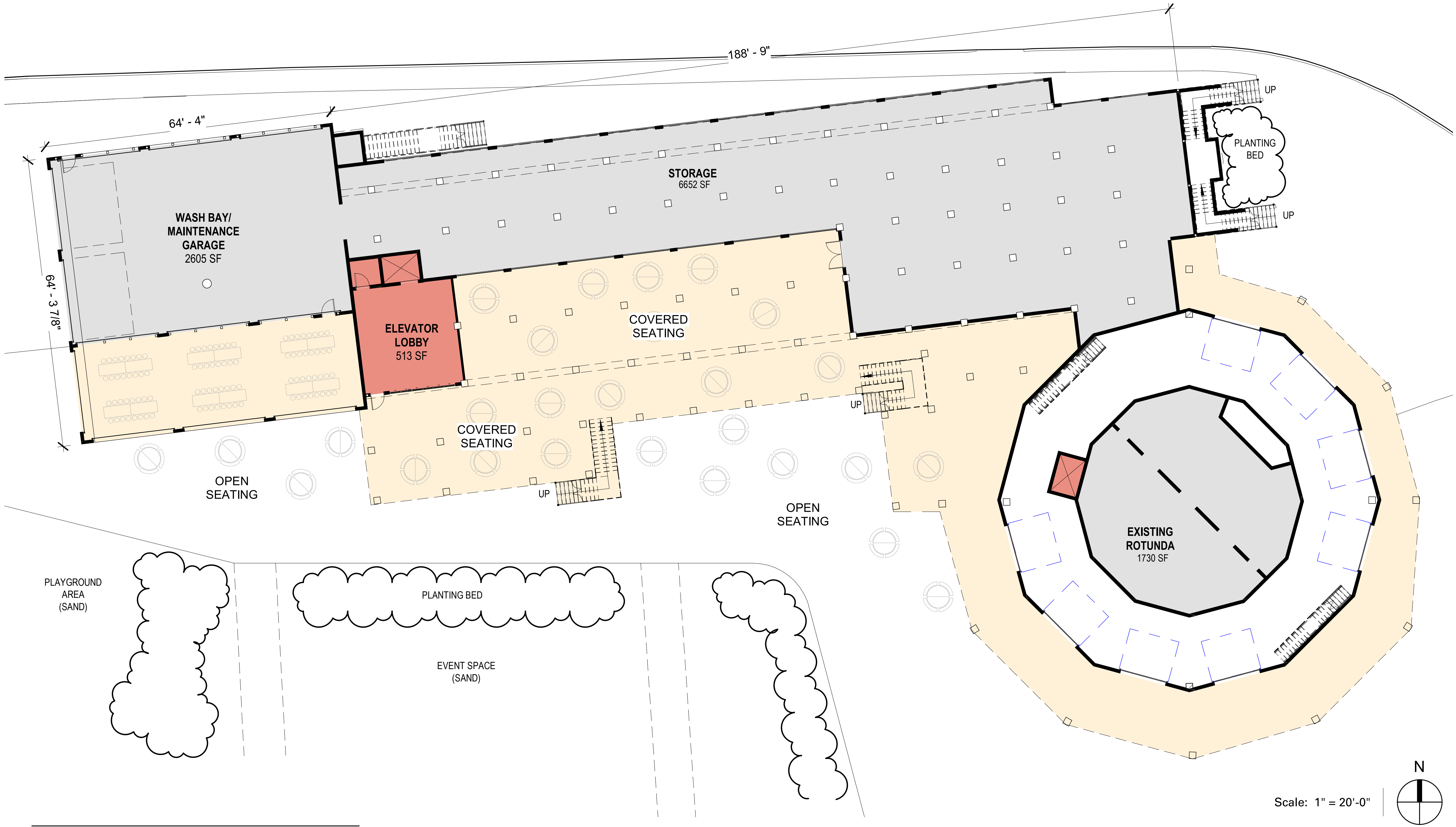
CONCEPTUAL PLAN

EASTON'S BEACH

NEWPORT RHODE ISLAND

PROJ. No.: 20060901.B10
DATE: SEPTEMBER 2022

CS-102



Easton's Beach Planning Study

Newport, RI

Proposed Recreational Building - Lower Level Floor Plan

DBVW ARCHITECTS

A1

Easton's Beach Planning Study

Newport, RI

Proposed Pavilion - Upper Level Floor Plan

DBVW ARCHITECTS

A2