The Board of Selectmen will hold a Meeting on Wednesday, November 14, 2018 at the Chebeague Island Hall at 6:00 PM

I. Call Public Meeting to Order

II. Public Comment for items not on the agenda

III. Regular Business

18-152 To hear a presentation of the Draft Concept Study for Sunset Wharf

Engineers from Collins Engineering will present a draft Concept Study for Sunset Landing to the Board of Selectmen. The Board will have until November 21st to provide Collins with their comments. The subcommittee (Mark, Marjorie and Herb) will conference with Collins as needed to finalize the document. The Board has a regular meeting scheduled on November 28th. The Final document will be presented to the Board at their regular meeting on December 12th.

IV. Communications

V. Town Reports
   Town Administrator
   Town Treasurer

VI. Review and approve prior meeting minutes of November 7, 2018

VII. Approval of Expense Warrant(s)

VIII. Other Business

IX. Adjourn Meeting
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EXECUTIVE SUMMARY

The Town of Chebeague Island (Town) is systematically evaluating the island’s coastal access needs and potential improvements on Great Chebeague Island. Currently, the Stone Wharf facility provides for the majority of the island’s passenger ferry and rescue transport services. The facility also includes infrastructure to support barging, commercial fishermen, annual slip rentals, and transient boating slips. Given the 200+ year age of the facility and estimated costs for improvements to serve the multi-uses, the Town identified the Sunset Landing property as a potential option for a new water transportation facility.

Based on archive records, stakeholder and community input, review of the varied uses served by the facility, and with the direction of the Town’s Board of Selectmen, this plan presents two alternatives for a conceptual harbor at Sunset Landing. Option 1 provides a full-service facility meeting the needs of commercial users (CTC ferry and water taxi), fisherman, recreational users, and boat/freight movement with an all tides barge/boat ramp separate from the pier facility. Option 2 provides a limited commercial-use facility meeting the needs of commercial users and boat/freight movement with an all tides barge/boat ramp separate from the pier facility. The plan provides an evaluation of each alternative and order of magnitude costs (Table A1) for the Town’s consideration and comparison to proposed improvements at the Stone Wharf.

| TABLE A1 | SUNSET LANDING CONCEPT HARBOR PLAN ORDER OF MAGNITUDE COST ESTIMATES SUMMARY |
|-------------------|-------------------|-------------------|
| Item               | Option 1          | Option 2          |
| Pier Construction  | $4,400,000        | $2,775,000        |
| Barge/Boat Ramp Construction | $2,400,000        | $2,400,000        |
| Upland Construction | $800,000          | $1,300,000        |
| Dredging           | $50,000           | $50,000           |
| Design, Permitting, and Consulting Services | $450,000          | $375,000          |
| **Estimated Construction & Engineering** | **$8,100,000**    | **$6,900,000**    |
INTRODUCTION

The Town of Chebeague Island (Town) is systematically evaluating the island’s coastal access needs and potential improvements on Great Chebeague Island. Currently, the Stone Wharf facility provides for the majority of the island’s passenger ferry and rescue transport services. The facility also includes infrastructure to support barging, commercial fishermen, annual slip rentals, and transient boating slips. Given the 200+ year age of the facility and estimated costs for improvements to serve the multi-uses, the Town identified the Sunset Landing property as a potential option for a new water transportation facility1.

The Sunset Landing property is approximately 8.5 acres located along the southwesterly shore of the island (Figures 1, 2) and was acquired by the Town in the early 1990s. Between 2014 and 2016, various site investigations were completed, and determined that the property could be developed.

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1 Town of Chebeague Island, Maine Comprehensive Plan, Adopted at Town Meeting on June 4, 2011
The Town was awarded a Shore and Harbor Grant through the Maine Coastal Program to develop a conceptual harbor plan for Sunset Landing using the previously attained site data with supplemental site investigations. The harbor plan is to develop a conceptual water transportation facility that includes a pier, barging facility, parking, coastal access, preservation of the identified archaeological sites, and possibly open space. The findings of the harbor plan will be used by the Town to determine infrastructure investments between rehabilitating Stone Wharf and constructing a new facility at Sunset Landing.
SUNSET LANDING DESCRIPTION

Sunset Landing is located on the southwestern portion of Chebeague Island, north of Indian Point and south of Seal Ledge. It is bounded on the north by privately-owned residential property; on the east by Great Cove Road; and on the south by privately-owned residential property. The parcel consists of gentle to moderate sloping topography and is generally wooded with limited open/grassy areas. There is some exposed bedrock, particularly along the shoreline with increasing bedrock exposure to the north. A small beach area is in the southwestern corner and central section of the parcel. There is archeological evidence of previous structures and habitation within the central portion of the parcel, and the remains of a pier from the Maquoit Ferry (Photograph 1).

Photograph 1 – Maquoit Ferry at Sunset Landing, 1915

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3 Maine Memory Network Website.
SUNSET LANDING SITE SUMMARY

The following site and environmental investigations were completed as part of an initial site evaluation started in 2014, and are summarized as follows, with important considerations for the planning process highlighted.

- **Chebeague Island Eelgrass Survey**, Normandeau Associates, October 2014. The report indicated that eelgrass is located approximately ~100’ to 350’ offshore for the length of the property and, **Eelgrass is highly protected** as a “Special Aquatic Site” in US Army Corps of Engineers regulations and as a Coastal Wetland under Maine Department of Environmental Protection’s Natural Resource Protection Act.

- **Archaeological Survey Report – Sunset Landing Project**, Tetra Tech, Inc. October 2015. The report identified a number of archeological features including a historic cellar hole located within the northeast portion of the site; a cellar hole depression within the central portion of the site; a historic well located in the south portion of the site; a prehistoric midden located in the southwest portion of the site (along the shoreline); and a former pier located in the west portion of the site (along the shoreline).

- **Sunset Landing Property Wind and Wave Analysis**, Roberge Associates Coastal Engineers, LLC, November 2015. The analysis indicated that wind directions are predominantly from the south to the northwest with seasonal variations. **South to northwest winds can develop waves from 1’ to 3’ in the spring/summer, and southwest to northwest winds can develop waves from 5’ to 7’ in the fall/winter.**

  - Survey
    - Completed in October 2014 by Nadeau Land Surveys, Inc., does not include bathymetric contours.
  - Wetlands
    - The southwest wetlands are not considered Wetlands of Special Significance as defined by the Maine Department of Environmental Protection. **The northeast wetlands are close to the 250’ shoreland zone and will likely be classified as Wetlands of Special Significance.**
  - Paper Streets
    - The paper street identified as “Elizabeth Road” is the only one depicted as there was “insufficient evidence” to show others.
  - Historic Preservation Commission
    - MMI directed Tetra Tech to coordinate with Maine Historic Preservation Commission (MHPC). The MHPC identified two sites, a cellar hole and a prehistoric shell midden. Results from the Tetra Tech work include recommendations to **maintain a 50’ buffer around the cellar hole sites.**
Bathymetric Survey

Originally completed by the State of Maine as part of the Coastal Communities Program, however the quality of the data received was questionable and the area covered by the survey was inadequate.

Eelgrass Beds

Per the MMI report,

*It will be important that any proposed activity that will impact an eelgrass bed be designed so that the impacts are the least amount that is practical. This includes crossing at the shortest distance and locating any floating dock components beyond the extent of the eelgrass beds, rather than over them.*

Zoning

There are three separate zoning districts within the property.

- Area within 125’ of the Highest Annual Tide (HAT) elevation is zoned Commercial Fishers/Maritime Activities (CFMA), allows for a range of water-dependent use;
- Area within 250’ of the HAT and not within the CFMA is zoned as Limited Residential, does not allow for commercial or industrial uses; and
- The remaining property is located within the Island Residential district, which allows a broad range of residential, agricultural and commercial fishing uses.

Existing Conditions Plan – Sunset Landing Property, Milone & MacBroom, Inc. March 2016. This is an update of the 2014 survey and includes the State’s bathymetric survey, notes regarding plan references, locus deed references, and study references (discussed above).

Town of Chebeague Island Sea Level Rise Vulnerability Assessment, Greater Portland Council of Governments, April 2016. Report indicates that the probable sea level rise will be 2’ in 50 years.

The following is summarized from the 15 August 2018 stakeholder meeting and stakeholder discussions.

Existing Site Conditions

Collins confirmed that the Sunset Landing Committee’s documents have been shared by the Town and are part of the existing site conditions information.

Stakeholder requested review of the CFMA applicability to the site and suitability of the upland for the CFMA overlay.

Stakeholder commented that the Existing Conditions plan provided for the meeting was not the same as the March 7th reference survey from Milone & McBroom under the previous Sunset Landing Committee because Milone & MacBroom modified the survey after the surveyor provided the electronic file to Milone & MacBroom.

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4 Electronic surveys were updated by Collins to include a bathymetric survey completed in early spring, 2018 by their subconsultant, Nadeau Land Surveys, Inc.
5 *Chebeague Island Eelgrass Survey, Normandeau Associates, October 2014*
Wind-Wave Conditions

W, NW, and N winds are similar at Sunset as at Stone Pier, but Sunset does not benefit from protection afforded by Littlejohn Island and Cousins Island. (W winds at Stone Pier are broken up by Cactus Point and the Great Bar, at least at low tide.)

WNW wind at Sunset is not protected by Basket Island. The previous wave study was incorrect in assuming protection from Basket (anecdotally the author agreed but would not re-issue the study). True fetch for analysis should extend to the mainland shore.

Although the fetch distance as noted above may not be accurate, the attendees felt that the maximum wave heights identified in the previous report are appropriate, just not necessarily for the specific wind directions indicated in the report. Applying the indicated maximum wave heights from a westerly wind is likely more representative of the site conditions.

Ice Conditions

- Ice can pack in and out similar to Stone Pier.
- CTC does their own ice breaking at Stone Pier. USCG icebreaker was used during the 2014-2015 winter at Stone Pier, before that it is believed that USCG icebreaking was in the 1990s.
- At Sunset, the exposed bedrock to the north collects ice at low tide then releases it to flow south to the site. Then ice collects in the ‘hook’ to the south and eventually flows north again past the site.
- Dynamic aspects of accumulated ice are higher at Sunset versus Stone Pier. Accumulated ice is a concern.
- Bennett’s Cove is less susceptible to ice.
- Prior to the meeting, photographs of ice condition in March 2015 were forwarded to Collins.

Navigation Approach

- Ferry would approach form the north directly from Cousins Island ferry landing. The travel distance would not substantially increase over the current route.
- Barge would likely approach more from the south to southwesterly direction. It was unclear if the route would increase for barges that historically land at Bennett’s Cove.
- Recreational boats and fishermen would approach from all directions.
- Designating an area for barge operations that is separate from the ferry operations would be easier.
- Ferry, barge and commercial fishing access is higher priority than small boats.
- Consider potential offshore transfer bridge similar to other islands, if the shoreline does not lend itself to a barge ramp solution.
- Consider a facility similar to the recently renovated facility on Long Island that dealt with many of the same issues as Chebeague.
- Solicit more input from the commercial fishermen.
- Collins confirmed that the barge accommodations are based on the CTC barge with consideration of the Lionel Plante barge.
➢ Upland Layout Considerations

- Shallow/exposed bedrock along the top of bank and beyond.
- The Stone Pier plan projected parking needs of approximately 100 for year-round conditions for the 50-yr plan, plus additional for seasonal conditions.
- CTC emphasized that Milone & MacBroom indicated that Sunset could support 200-250 parking spaces. The alternatives for the concept harbor plan should include discussion for parking capacity of 250.
- Alternatives for the pier should consider drive-on access.
- The specific location of the access road is not part of the concept harbor plan, however estimated construction costs for an access road is part of the concept harbor plan. The concept plan will not discuss necessary easements or other issues centered around the access road location.
DIRECTIVES

The Chebeague Board of Selectmen (BoS) identified parameters and design directives for upland parking (upland), the pier and the barge/boat ramp (ramp) in a 22 August 2018 Memorandum that identified up to three options; the third option was at the discretion of the Collins Team.

- Option 1 – Full Service Facility

  Configure to enable cost comparisons between similar designs at the Stone Wharf and Sunset, based on the “EAST COVE & WEST BUILD-OUT®. The estimated cost for planning purposes of 6.5 million dollars will be used to compare the cost of the same services at Sunset. Estimated capacities based on report and GoogleEarth™ measurements and components may be refined or altered as provided in Table 1.

For the purposes of this study, “commercial floats” are those that service the water taxi(s) and the commercial fishing vessels.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Option 1 Benchmark Capacities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility</td>
<td>Facility Component</td>
</tr>
<tr>
<td>Upland</td>
<td>Total Parking Spaces</td>
</tr>
<tr>
<td>Pier</td>
<td>Transportation Service Float</td>
</tr>
<tr>
<td></td>
<td>Small Craft / off-loading (seasonal)</td>
</tr>
<tr>
<td></td>
<td>Commercial Floats</td>
</tr>
<tr>
<td></td>
<td>Commercial Fishing Gear Loading (seasonal)</td>
</tr>
<tr>
<td></td>
<td>Adjacent Gear Temporary Storage</td>
</tr>
<tr>
<td></td>
<td>Covered Passenger area</td>
</tr>
<tr>
<td></td>
<td>Pedestrian walkways</td>
</tr>
<tr>
<td></td>
<td>Bicycle Rack</td>
</tr>
<tr>
<td>Ramp</td>
<td>Barge/Boat Ramp of Similar size</td>
</tr>
</tbody>
</table>

- Option 2 – Limited Commercial Facility

  Configure to prioritize commercial operations and to accommodate all island barge traffic. Provide a dedicated staging area and optimized grading for the heaviest of barged vehicles such as concrete trucks.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Option 2 Benchmark Capacities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility</td>
<td>Facility Component</td>
</tr>
<tr>
<td>Pier</td>
<td>Transportation Service Float</td>
</tr>
<tr>
<td></td>
<td>Covered Passenger area</td>
</tr>
<tr>
<td></td>
<td>Pedestrian walkways</td>
</tr>
<tr>
<td>Ramp</td>
<td>Barge/Boat Ramp of Similar size</td>
</tr>
</tbody>
</table>

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6 *Stone Wharf Master Plan, 31 December 2017.*
**SUNSET LANDING CONCEPT HARBOR RECOMMENDATIONS**

**Overall Objectives**

Metrics used to guide planning in addition to meeting the benchmark goals include:

- Minimize eelgrass bed disturbance
- Minimize disturbance to archeological features
- Minimize disturbance to designated wetlands
- Accommodate wind/waves
- Accommodate ice
- Accommodate sea level rise
- Provide separate barge/boat ramp facilities
- Prioritize commercial use
- Consider 250 parking spaces
- Consider drive-on pier access
- Improve public safety
- Improve traffic flow

**Facility Layout – Options 1 and 2**

The pier, barge/boat ramp (ramp) and parking facility are located in the southern portion of the property for both options, as governed by offshore bedrock outcrop locations, shoreline contours, and eelgrass beds (see Figures G01 and G02).

The pier and ramp are oriented perpendicular to the existing contours to limit regrading and earthwork. As shown in Figure 3, the extents of the eelgrass beds increase from the south to the north, with the narrowest strip occurring near the proposed layout. The ACOE\(^7\) has indicated that it assesses additional permitting fees due to eelgrass shadowing - construction of structures over eelgrass beds - ranging from $4 to $9 per square foot, which is evaluated on a case-by-case basis. As previously discussed, limiting disturbance to existing eelgrass beds is a high priority for the environmental permitting agencies. The ACOE has also indicated that dredging within eelgrass beds is highly discouraged.

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\(^7\) Email from Clement, Jay L. to Wally Mosher, 22 October 2018 - Subject: Sunset Harbor Landing Concept Study - questions for ACOE.
Figure 3 – Eelgrass Bed Limits

The parking location provides approximately 3.5 acres of contiguous open space running from the pier north to the property line and wrapping northeast around the parking. 71% of the shore is preserved for contiguous passive recreation, including the small cove and beach area. Total site open space also protects all mapped freshwater wetlands. The open space also serves as a storm water buffer for the proposed impervious surfaces of the parking and circulation.
Pier and Ramp Geometry

A comparison of the benchmark values provided by the Board of Selectmen and the conceptual values are provided in Table 3.

<table>
<thead>
<tr>
<th>Facility</th>
<th>Facility Component</th>
<th>Benchmark</th>
<th>Option 1 Full Service</th>
<th>Option 2 Limited Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pier</td>
<td>Transportation service float (square feet)</td>
<td>1,250</td>
<td>1,440 (north)</td>
<td>1,260 (south)</td>
</tr>
<tr>
<td></td>
<td>Small Craft / off-loading (seasonal, sf)</td>
<td>2,320</td>
<td>2,130</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commercial floats (sf)</td>
<td>1,000</td>
<td>600^8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commercial fishing gear loading (seasonal, ft)</td>
<td>125</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adjacent gear temporary storage (sf)</td>
<td>1,500</td>
<td>1,800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Covered passenger area (sf)</td>
<td>150</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pedestrian walkways</td>
<td></td>
<td>6’ x 225’</td>
<td>6’ x 185’</td>
</tr>
<tr>
<td></td>
<td>Bicycle rack (#)</td>
<td>2-3</td>
<td>Can be incorporated as needed</td>
<td></td>
</tr>
<tr>
<td>Ramp</td>
<td>Barge/Boat ramp width (ft)</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

➢ Pier Geometry – Options 1 and 2

Detailed pier options are provided in Figures G03 and G04.

The pier is 18’ wide to provide a dedicated 6’ pedestrian walkway and a 12’ access lane for vehicles (drive on/back off, and vice versa). The pier width does not accommodate traffic turning, which requires a minimum width of ~36’. As this effectively doubles the width of the pier it was not considered to be a cost-effective consideration.

Top of pier elevation is +18’, and was develop based on the following:

- 2-ft sea level rise (SLR) over the next 50 years^9
- +9.3-ft 50% probability of annual exceedance of tides with respect to mean sea level (MSL)^10
- 7-ft predicted maximum extreme waves (Roberge Associates)
- 2-ft + superstructure depth (assumed)
- 15-ft Base Flood Elevation w/2-ft wave above Still Water Level^11

Option 1 - The pier is 310’ long to avoid dredging within the eelgrass bed. Required water depths were set at -17’ in consideration of the annual expected exceedance of tides with respect to the Mean Sea

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^8 Option 1 includes the provision for fishing vessel access to the transportation service floats (floating breakwaters), which is not included in the value provided.


^10 Elevations of Mean Lower Low Water Station 8418150, Portland, ME, NOAA Tides and Currents.

Level, a maximum expected wave height of 3’, a 7’ draft as controlled by the CTC ferry\(^{12}\), and a 1’ keel clearance (assumed). It is understood that the 3’ wave height is not the maximum expected; however, it is unlikely that an emergency event or scheduled CTC service would occur at the same time as the maximum wave corresponding to an extreme low tide, and was therefore considered to be a reasonable design value.

Option 2 - The pier is 185’ long due to the elimination the small craft and commercial floating docks.

Construction considerations for both options include:
- Battered steel pipe piles to resist gravity and lateral loads including ice.
- Rock-socketing the piles due to either shallow bedrock or limited overburden above bedrock.
- Concrete deck to extend the useful service life and to facilitate snow and ice removal, which may be a maintenance issue as the snow will need to be transported off the pier and deposited upland.
- Limited dredging outboard of the eelgrass bed is required to develop minimum water depths.

Transportation Service Floats – Options 1 and 2

The transportation service floats were designed to meet the benchmark area and to provide protection for the berthing vessels from an extreme wave environment. It is understood that the Stone Wharf concepts included two wave screens constructed outboard of the facility, however wave screen construction at the Sunset Landing would likely occur in deeper water, would be located a significant distance offshore, and would ideally need to be oriented to manage waves generated by winds from the south (3’ waves) to the northwest (up to 7’ waves)\(^ {13}\), which is a fairly significant swing (see Figure 4). Additionally, the wave screen(s) would need to resist the north/south movement and potential aggregation of winter ice floes generated by the tides\(^ {14}\). These combined variables reduce wave screen serviceability and durability, such that it is an impractical approach for this site and for the proposed layout.

Alternative wave attenuation systems include floating breakwaters, which are like concrete docks but with depths up to 6’ or more, and effectively attenuate waves\(^ {15}\). For this site we assumed two floating breakwaters would be required to protect the transportation vessels from virtually all wave directions, and provide berthing options accordingly.

Construction considerations include:
- Large diameter steel pipe piles to resist lateral loads including waves and ice.
- Rock-socketing the piles due to either shallow bedrock or limited overburden above bedrock.

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\(^ {12}\) Commercial Boats List 1 page.xlsx, provided by the Town of Chebeague.

\(^ {13}\) Sunset Landing Property Wind and Wave Analysis, Roberge Associates Coastal Engineers, LLC, November 2015.

\(^ {14}\) Stakeholder Meeting Summary Notes, 08 August 2015.

\(^ {15}\) Breakwater and floating dock information, SF Marina Systems.
Small Craft Floats – Option 1 Only

The small craft seasonal floats provide the design benchmark area, and are oriented to facility vessel movement within and between the floats, and to facilitate commercial vessel movement adjacent to the pier. The fingers are 35’ long and the double berths are 25’ wide (based on an assumed 8’ beam width).

Commercial Floats – Option 1 Only

The commercial float is considered seasonal and was design primarily to support the fishing vessels, however they can optionally berth at the floating breakwaters if there is availability. It is assumed that the transportation vessels have berthing priority, which should be an issue given the relatively short window the fishing vessels will be using the pier. A davit crane can be installed at the end of the pier to accommodate loading/unloading, and the floating dock is serviced by a 4’ wide gangway located at the in-shore end.

Commercial Fishing Gear and Temporary Storage – Option 1 Only

The area and length identified in Figure G03 for storage meets the design benchmark criteria. It is assumed that this location is reasonably accessible from the west end of the pier, the commercial floating dock, and from the vehicle access lane. Increasing these accommodations by widening the pier or constructing additional dedicated build-outs are not considered to be cost-effective nor practical for the limited use expected.

16 Email from Jeff Putnam to Herb Maine (cc Dan O’Connor), 24 October 2018 - Subject: Re: Sunset Landing update.
Additional Pier Considerations

- Minimum 150-sf covered shelter provided for both options.
- Electrical/lighting provided for both options.
- Access ramps
  - ADA requirements include a maximum 1:12 slope for all public gangways less than 80’ long. With a ~10’ tide swing, the minimum ramp length would need to be 120’, and the ramp itself will likely require custom design and fabrication. It is also a long distance for emergency personnel to transport patients within the confines of a gangway, and an ADA gangway is not provided at Cousins. Given these considerations, we have provided a minimum 80’ long gangway for CTC/Taxi use and a 70’ long gangway for the commercial fishing/recreational use (meeting the industry-recommended 1:3 slope).

Barge/Boat Ramp

The proposed ramp is an all tides construction 20’ wide and 240’ long. The ramp length is dictated by slope and water depths. The ramp was designed with a 13.8% slope and terminates within a 16’ minimum water depth, based on a 6’ barge draft (Town of Chebeague) and other criteria as discussed in the Pier Geometry section.

Construction considerations include:
- Concrete deck supported on concrete pile caps, founded on steel pipe piles. Bottom contours and likely soft composition do not facilitate constructing directly on existing ground.
- Rock-socketing the piles due to either shallow bedrock or limited overburden above bedrock.
- Requires a temporary cofferdam to enable constructing the ramp in the dry.
- Limited dredging outboard of the eelgrass bed is required to develop minimum water depth.

Upland Summary – Options 1 and 2

The upland site concept improvements for Sunset Landing are designed to support and interface with shore infrastructure in an efficient, site sensitive and optimum manner.

Options 1 and 2 are not unlike the function of the Cousins Island Facilities. The parking is located on the flat upland away from the pier, and loading and turnaround is located at the head of the pier. The pier is not intended for daily user vehicular circulation, but is reserved for commercial fisherman, emergency vehicles, maintenance, and loading and unloading of cargo from the ferry when required. There is no turnaround for vehicles on the pier. Overall geometry is as follows.

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- On Cousins Island there is an approximately 800’ walk from the parking lot to the pier, which has been reduced in both options to approximately 250’ from the primary parking and passenger drop-off/pick up area to the pier.
- Both options include ADA parking and a loading area at the head of the pier. Option 2 includes a one-way loop serving the head of pier for loading and passenger drop-off/pick-up. However, it is envisioned that the typical daily user will park in the parking lot or get dropped off at the passenger zone near the parking lot and then walk down the hill to the pier.
- Option 1 includes parking for 124 cars and Option 2 includes parking for 204 cars.
- In both options the parking, passenger zone, sidewalks, and pier and ramp access have paved surfaces. The access road connecting the facilities to North Road is assumed to have a gravel surface.
- In both options, site lighting is assumed at key intersections, mid points in the parking lots, and at the passenger loading zone and the head of pier area.

- Parking

The Stone Wharf Master Plan notes that the facility has 93 year-round spaces (including 35 overflow spaces) with a projected total need of 123 spaces in 50 years (including 35 overflow spaces). The East Cove & West Build-Out accommodates 88 year-round spaces and 36 overflow spaces for a total of 124 spaces. The Sunset Landing parking includes 124 spaces in Option 1 and 204 spaces Option 2. The boat/barge ramp has ten dedicated parking spaces on the approach road.

- Option 1 includes 124 parking spaces in addition to ten dedicated ramp spaces
- Option 2 includes 204 parking spaces in addition to ten dedicated ramp spaces
- ADA parking is located at the head of the pier
- Parking is not located on the pier

- Vehicular and Pedestrian Access

Vehicular pedestrian access and circulation serving the pier and ramp are kept separate to minimize conflict points and address the efficient use of the site, public safety, traffic flow, and parking capacity. As depicted on Options 1 and 2, vehicles enter the site and then either access the ramp at the first left or continue north to the parking lot(s) serving the pier. Vehicles accessing the ramp are kept separate from the parking and access for the pier.

Option 1 parking includes 124 spaces and a two-way traffic flow within the parking lot. Vehicles can access and egress the parking in a two-way movement from the eastern end of the parking lot. At the western end of the parking lot, the circulation pattern becomes one-way counterclockwise serving the drop-off/pick-up zone. Vehicles leaving the drop-off/pick-up zone continue in a one-way counterclockwise circulation pattern, eventually connecting with the two-way ramp access road. Vehicles can use the travel aisle in the parking lot for queuing to pick up passengers in the drop-off/pick-up zone.

Option 2 parking and circulation offers the same flexibility, but clarity of movement as Option 1. Option 2 parking includes 204 cars versus 124 in Option 1.
Pedestrian access to the site is along a sidewalk / multi-use path on the southern side of the ramp access road. By routing pedestrians along the southern side of the road only one potential conflict point is created between North Road and the pier.

It is feasible to build the Option 1 parking and then extend the norther bays of parking to the east to complete the phasing of Option 2 parking in order to meet future demand.

- **Pier Access / Support**
  - Direct access to the pier / head of pier is provided for commercial fisherman, ADA parking, emergency vehicles, and other users. A loading area is also provided at the head of pier.
  - Most users will utilize the parking lot and drop-off / pick-up zone approximately 250’ from the pier. As noted above, the parking on Cousins Island is 800’ from the pier for comparison.
  - The grade of the pier access road is approximately 7%.
  - Pier access and parking is separate from the access, parking, and staging for the ramp.
  - In Option 2, the direct pier access is a one-way counter clockwise loop road connecting with the ramp access to the south. This loop road will make loading and unloading at the head of pier more convenient, but mixes ramp traffic with pier traffic.

- **Ramp Access / Support**
  - Ramp access, parking, and staging is separate from the pier access and the contiguous open space. Access to the ramp is approximately 8%.
  - Ramp location options were reviewed north of the proposed pier and these alternatives were not pursued due to extent of ledge removal required, presence of eel grass, impacts on open space, and the additional cost/inefficiencies of upland site design.

- **Open Space**
  Options 1 and 2 include at a minimum 3.5 acres of contiguous open space running from the pier north to the property line and wrapping northeast around the parking. 71% of the shore is preserved for contiguous passive recreation, including the small cove and beach area. Total site open space also protects all mapped freshwater wetlands. The open space also serves as a storm water buffer for the proposed impervious surfaces of the parking and circulation.

- **Zoning**
  - The approximate 8.5-acre site is in the Commercial Fisheries / Maritime Activities, Limited Residential, and the Island Residential Zones.
  - The Commercial Fisheries/Maritime Activities Zone is located within 125’ of the Highest Annual Tide elevation. The proposed uses for the site are allowed in this Zone.
  - The Limited Residential Zone is located between the Commercial Fisheries / Maritime Activities Zone and 250’ from the Highest Annual Tide Elevation. Parking Facilities as well as Governmental and Institutional Uses are allowed within the Limited Residential Zone.
The remaining portion of the parcel is in the Island Residential Zone. The proposed uses are allowed following approval of the Board of Adjustment and Appeals as a “Municipal building and uses,” which is defined as “…any use or building maintained by the Town of Chebeague Island.”

The proposed improvements are not located within the 55’ front setback or 30’ side setbacks, although with proper buffering parking and circulation can be located as close as 15’ to a property line.

Cultural / Environmental Impacts

None of the mapped wetlands are impacted by the proposed parking and circulation patterns. The cellar hole surveyed in the archeological report is impacted by the expansion of parking in Option 2. The archeological report is not definitive in its findings on the protection of this cellar hole, except any site work should be coordinated with Maine Historic Preservation Commission. The parking as shown on Option 2 is located in the most practical location given site constraints and as a logical and cost-effective extension of the Option 1 parking and circulation patterns.

As shown on both Options 1 and 2, storm water rain gardens are located to the north and south of the parking to treat storm water in a decentralized manner before entering Casco Bay. To the north of the Option 1 and 2 parking is 3.5 acres of undisturbed open space that functions as both a park and storm water buffer.

Phasing

As noted above, the Option 2 parking is located in a manner to dovetail with Option 1 parking and site circulation – as well as maximize the contiguous open space. The Option 2 parking and circulation can be phased at later date and completed without interfering with the daily operations of the facilities. The Option 2 additional capacity parking can also be built as demand increases and therefore is flexible to expand with the use of the facilities and the open space.

Access Road

The access road connecting the facilities to north road is 1300 linear feet +/-. This road is envisioned as a 24’ wide full-depth construction gravel road with a sidewalk on one side.
ESTIMATED CONCEPT CONSTRUCTION COSTS

Order of magnitude project cost estimates are provided in Tables 4 and 5. The estimates represent conceptual, budgetary planning costs; actual costs will be influenced by the scope of work progressed for design and permitting and the waterfront marine construction bid environment at the time of construction. Overall, the cost estimates provide the Town with order of magnitude costs for comparison with the Stone Wharf concepts.

Breakdowns for the estimates are presented on the following pages.

<table>
<thead>
<tr>
<th>TABLE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUNSET LANDING CONCEPT HARBOR PLAN ORDER OF MAGNITUDE COST ESTIMATES SUMMARY</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Option 1</th>
<th>Option 2</th>
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<tr>
<td>Pier Construction</td>
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<tr>
<td>Barge/Boat Ramp Construction</td>
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<td>$2,400,000</td>
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<td>Upland Construction</td>
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<tr>
<td>Dredging</td>
<td>$50,000</td>
<td>$50,000</td>
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<tr>
<td>Design, Permitting, and Consulting Services</td>
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<td><strong>Estimated Construction &amp; Engineering</strong></td>
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<td><strong>$6,900,000</strong></td>
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<table>
<thead>
<tr>
<th>TABLE 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUNSET LANDING CONCEPT ACCESS ROAD ORDER OF MAGNITUDE COST ESTIMATES SUMMARY</td>
</tr>
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<table>
<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
<td>Selective Tree Removal</td>
<td>$7.00</td>
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<tr>
<td>Topsoil stripping</td>
<td>$5.00</td>
</tr>
<tr>
<td>Rough grading</td>
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<tr>
<td>Finish grading 8&quot; gravel</td>
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<td>8&quot;gravel</td>
<td>$11.00</td>
</tr>
<tr>
<td>Haul</td>
<td>$27.00</td>
</tr>
<tr>
<td>Electrical</td>
<td>$56.00</td>
</tr>
<tr>
<td><strong>Estimated Construction &amp; Engineering</strong></td>
<td><strong>$140.00</strong></td>
</tr>
</tbody>
</table>
# Order of Magnitude Costs

**Client:** Town of Chebeague Island, ME  
**Project:** Sunset Landing Harbor Plan  
**Description:** Order of Magnitude Costs  
**Job No.:** 15-10944.00  
**Prep. By:** WMM/MRLD  
**Checked By:** DOC  
**Date:** 11/6/2018

## Option 1 - Structures

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Total Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pile Supported Concrete Pier (18'x310')</td>
<td>5600</td>
<td>SF</td>
<td>$350</td>
<td>$1,960,000</td>
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<td>Recreational Floats (8 @ 4'x35', 1 @ 4'x165', 1 @ 4'x90')</td>
<td>2140</td>
<td>SF</td>
<td>$100</td>
<td>$214,000</td>
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<tr>
<td>Commercial Float (6'x100')</td>
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<td>$100</td>
<td>$60,000</td>
</tr>
<tr>
<td>Floating Breakwaters (24'x60', 18'x70')</td>
<td>2700</td>
<td>SF</td>
<td>$250</td>
<td>$675,000</td>
</tr>
<tr>
<td>Timber Wave Screen</td>
<td>25</td>
<td>LF</td>
<td>$500</td>
<td>$12,500</td>
</tr>
<tr>
<td>Commercial Gangways (1 @ 4'x70', 2 @ 4'x80')</td>
<td>3</td>
<td>EA</td>
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<td>$150,000</td>
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<tr>
<td>Gangway Supports (1 @ 100SF, 1 @ 140SF)</td>
<td>240</td>
<td>SF</td>
<td>$200</td>
<td>$48,000</td>
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<tr>
<td>Covered Shelter</td>
<td>1</td>
<td>LS</td>
<td>$15,000</td>
<td>$15,000</td>
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<tr>
<td>Pier Electrical/Lighting</td>
<td>1</td>
<td>LS</td>
<td>$15,000</td>
<td>$15,000</td>
</tr>
<tr>
<td>Barge Ramp (20'x240')</td>
<td>4800</td>
<td>SF</td>
<td>$365</td>
<td>$1,752,000</td>
</tr>
<tr>
<td>Dredging</td>
<td>1400</td>
<td>CY</td>
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<td>$35,000</td>
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## Option 1 - Civil

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<th>Total Cost</th>
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</thead>
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<tr>
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<td>LS</td>
<td>$385,000</td>
<td>$385,000</td>
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<tr>
<td>Pavement</td>
<td>1</td>
<td>LS</td>
<td>$35,000</td>
<td>$35,000</td>
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<tr>
<td>Stormwater/Landscaping</td>
<td>1</td>
<td>LS</td>
<td>$85,000</td>
<td>$85,000</td>
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<tr>
<td>Lighting</td>
<td>1</td>
<td>LS</td>
<td>$60,000</td>
<td>$60,000</td>
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</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor Mobilization/Demobilization (10%)</td>
<td></td>
<td></td>
<td></td>
<td>$550,000</td>
</tr>
<tr>
<td>Contractor Overhead &amp; Profit (15%)</td>
<td></td>
<td></td>
<td></td>
<td>$907,000</td>
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<tr>
<td>Contingency (10%)</td>
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<td>$696,000</td>
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**Construction Cost Subtotal:** $7,647,000  
**Collins Engineers Design, Permitting and Consulting Services:** $440,000  
**Total:** $8,087,000  
**SAY:** $8,100,000

## Additional Items

<table>
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<tr>
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<th>Unit Price</th>
<th>Total Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly haulout/install of Recreational/Commercial Floats</td>
<td>1</td>
<td>LS</td>
<td>$10,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Eelgrass fee</td>
<td>4500</td>
<td>SF</td>
<td>$27,000</td>
<td></td>
</tr>
</tbody>
</table>

**Total:** $37,000

* This cost estimate is for general planning purposes associated with the Sunset Landing Concept Harbor plan. Actual cost may vary depending on when the work is completed, labor and material costs and the waterfront marine construction bid environment. Individual line item cost estimates are order of magnitude estimates with respect to the total project cost estimate. Actual costs may vary and could be significantly more, or less, than shown.
# Sunset Landing Concept Harbor Plan

**Chebeague Island, Maine**

**November 2018 | Collins Engineers | MRLD**

---

### Client: Town of Chebeague Island, ME

**Project:** Sunset Landing Harbor Plan

**Description:** Order of Magnitude Costs

**Job No.: 15-10944.00**

**Prep. By: WMM/MRLD**

**Date: 11/6/2018**

**Checked By: DOC**

**Date: 11/7/2018**

---

## Option 2 - Structures

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
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<th>Unit Price</th>
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</tr>
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<tr>
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<td>Recreational Floats</td>
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<td>SF</td>
<td>$100</td>
<td>$0</td>
</tr>
<tr>
<td>Commercial Float</td>
<td>0</td>
<td>SF</td>
<td>$100</td>
<td>$0</td>
</tr>
<tr>
<td>Floating Breakwaters (24’x60’, 18’x70’)</td>
<td>2700</td>
<td>SF</td>
<td>$250</td>
<td>$675,000</td>
</tr>
<tr>
<td>Timber Wave Screen</td>
<td>0</td>
<td>LF</td>
<td>$500</td>
<td>$0</td>
</tr>
<tr>
<td>Commercial Gangways (2 @ 4’x80’)</td>
<td>2</td>
<td>EA</td>
<td>$50,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>Gangway Supports</td>
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<td>SF</td>
<td>$200</td>
<td>$0</td>
</tr>
<tr>
<td>Covered Shelter</td>
<td>1</td>
<td>LS</td>
<td>$7,500</td>
<td>$7,500</td>
</tr>
<tr>
<td>Pier Electrical/Lighting</td>
<td>1</td>
<td>LS</td>
<td>$10,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Barge Ramp (20’x240’)</td>
<td>4800</td>
<td>SF</td>
<td>$365</td>
<td>$1,752,000</td>
</tr>
<tr>
<td>Dredging</td>
<td>1400</td>
<td>CY</td>
<td>$25</td>
<td>$35,000</td>
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## Option 2 - Civil

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</thead>
<tbody>
<tr>
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<td>$610,000</td>
<td>$610,000</td>
</tr>
<tr>
<td>Pavement</td>
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<td>LS</td>
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<td>$55,000</td>
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<tr>
<td>Stormwater/Landscaping</td>
<td>1</td>
<td>LS</td>
<td>$165,000</td>
<td>$165,000</td>
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<tr>
<td>Lighting</td>
<td>1</td>
<td>LS</td>
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**Contractor Mobilization/Demobilization (10%)** $467,000  
**Contractor Overhead & Profit (15%)** $771,000  
**Contingency (10%)** $591,000

**Construction Cost Subtotal** $6,499,000

**Collins Engineers Design, Permitting and Consulting Services** $374,000

**Total** $6,873,000

**SAY** $6,900,000

## Additional Items

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<th>Unit</th>
<th>Unit Price</th>
<th>Total Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly haulout/install of Recreational/Commercial Floats</td>
<td>0</td>
<td>LS</td>
<td>$10,000</td>
<td>$0</td>
</tr>
<tr>
<td>Eelgrass fee</td>
<td>2500</td>
<td>SF</td>
<td>$6</td>
<td>$15,000</td>
</tr>
</tbody>
</table>

**Total** $15,000

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## Roadway and Electrical

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Total Cost*</th>
</tr>
</thead>
<tbody>
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<td>AC</td>
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<td>$5,969</td>
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<td>Topsoil stripping</td>
<td>2,900</td>
<td>CY</td>
<td>$1.50</td>
<td>$4,350</td>
</tr>
<tr>
<td>Rough grading</td>
<td>1</td>
<td>LS</td>
<td>$4,000</td>
<td>$4,000</td>
</tr>
<tr>
<td>Finish grading subgrade</td>
<td>5,800</td>
<td>SY</td>
<td>$1.00</td>
<td>$5,800</td>
</tr>
<tr>
<td>Finish grading 8&quot; gravel</td>
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<td>$4.00</td>
<td>$14,000</td>
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<td>8&quot; gravel</td>
<td>770</td>
<td>SY</td>
<td>$13</td>
<td>$9,630</td>
</tr>
<tr>
<td>Haul</td>
<td>3,900</td>
<td>CY</td>
<td>$6.25</td>
<td>$24,375</td>
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<tr>
<td>Electrical</td>
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<td>$50,700</td>
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Contractor Mobilization/Demobilization (10%) $12,000  
Contractor Overhead & Profit (15%) $20,000  
Contingency (10%) $16,000

**Construction Cost Subtotal** $166,823

Collins Engineers Design, Permitting and Consulting Services $10,000

**Total** $176,823  
**SAY** $180,000

## Cost Per Foot

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<tr>
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<th>Unit Price</th>
<th>Total Cost*</th>
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</thead>
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<td>LF</td>
<td>$138</td>
<td>$180,000</td>
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</tbody>
</table>

**Say** $140 per LF

*This cost estimate is for general planning purposes associated with the Sunset Landing Concept Harbor plan. Actual cost may vary depending on when the work is completed, labor and material costs and the waterfront marine construction bid environment. Individual line item cost estimates are order of magnitude estimates with respect to the total project cost estimate. Actual costs may vary and could be significantly more, or less, than shown.*
LIST OF AVAILABLE ARCHIVE INFORMATION

5. *Existing Conditions Plan – Sunset Landing Property*, Milone & MacBroom, Inc. March 2016; and

LIST OF ADDITIONAL AVAILABLE INFORMATION

1. *Commercial Boats List 1 page.xlsx*, provided by the Town of Chebeague;
2. *Elevations of Mean Lower Low Water Station 8418150, Portland, ME*, NOAA Tides and Currents;
4. *Design: Small Craft Berthing Facilities*, Unified Facilities Criteria UFC 4-152-07, September 2012 (UFC);
5. *Flood Insurance Study Volume 2 of 4*, FEMA, 28 March 2018;
7. Email from Nichols, Robert F BOSN3 to Wally Mosher, 16 October 2018 - Subject: *Chebeague Island planning & ice breaking*;
8. Email from Clement, Jay L. to Wally Mosher, 22 October 2018 - Subject: *Sunset Harbor Landing Concept Study - questions for ACOE*;
9. Email from Brewer, Angela D. to Wally Mosher, 25 October 2018 – Subject: Sunset Harbor Landing Concept Study - questions for DEP regarding eelgrass disturbance;
10. Email from Jeff Putnam to Herb Maine (cc Dan O’Connor), 24 October 2018 - Subject: Re: Sunset Landing update;
11. Sunset Landing Concept Harbor Plan Stakeholder Meeting Summary Notes, 15 August 2018;
12. Breakwater and floating dock information, SF Marina Systems; and
13. Ice flows at residential pier (photos), courtesy of Paul Belesca, 10 August 2018.
DESIGN CRITERIA

DESIGN VESSELS

Reference: *Commercial Boats List 1 page.xlsx*, provided by the Town of Chebeague

<table>
<thead>
<tr>
<th>Company</th>
<th>Owner</th>
<th>Boat Name</th>
<th>Length</th>
<th>Beam</th>
<th>Draft</th>
<th>Type</th>
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<tbody>
<tr>
<td>Chebeague Transportation Co.</td>
<td>Islander</td>
<td></td>
<td>52.0</td>
<td>18.3</td>
<td>7.0</td>
<td>passenger ferry</td>
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<td>Chebeague Transportation Co.</td>
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<td></td>
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<td>24.0</td>
<td>5.0</td>
<td>flat barge</td>
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<td>25.2</td>
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<td>18.9</td>
<td>7.6</td>
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<td>harbor master</td>
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<td>Dropping Springs Bait Co.</td>
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<td>27.0</td>
<td>13.0</td>
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<td>3.0</td>
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<td></td>
<td>87.0</td>
<td>28.0</td>
<td>6.0</td>
<td>barge</td>
</tr>
</tbody>
</table>

Recreational: 20.0 8.0 2.5 sailboat

Controls

**Figure 1** - Lionel Plante Barge  
**Figure 2** - CTC Barge and Push Boat

Reference: Sunset Landing Concept Harbor Plan Stakeholder Meeting Summary Notes, 15 August 2018 - Navigation Approach

- Ferry would approach from the north directly from Cousins Island ferry landing. The travel distance would not substantially increase over the current route.
- Barge would likely approach more from the south to southwesterly direction. It was unclear if the route would increase for barges that historically land at Bennetts Cove.
- Recreational boats and fishermen would approach from all directions.
- Designating an area for barge operations that is separate from the ferry operations would be easier.
- Ferry, barge and commercial fishing access is higher priority than small boats.
- Consider potential offshore transfer bridge similar to other islands, if the shoreline does not lend itself to a barge ramp solution.
**BOAT RAMP CRITERIA**


2. There is a narrow range of launch ramp slope (12%-15%) that has been nationally accepted as a standard. Boaters across the country have successfully manipulated launch ramps within this slope range for many years (see Figure 3-2).

![Diagram of launch ramp slopes](image)

**Figure 3-2** Typical range of launch ramp slopes

Proposed Ramp slope = 240-ft long @ 13.8% slope
**ELEVATIONS (NAVD88)**

Top of Pier:
- Set at elevation +18
- Controlled by the following:
  - 2-ft sea level rise (SLR) over the next 50 years
  - +9.3-ft 50% probability of annual exceedance of tides with respect to mean sea level (MSL)
  - 7-ft predicted maximum extreme waves
  - 2-ft + superstructure depth
  - 15-ft Base Flood Elevation w/2-ft wave above Still Water Level (SWL)

Water Depth for Commercial Use of Floating Docks:
- Minimum depth = 17-ft
- Controlled by the following:
  - -7.5-ft 50% probability of annual exceedance of tides with respect to mean sea level (MSL)
  - 3-ft predicted maximum expected waves (assumes vessel pitch of 1-ft)
  - 7-ft draft (controlled by ferry)
  - 1-ft keel clearance (assumed)

Water Depth for Recreational Use of Floating Docks:
- Minimum depth = 12-ft
- Controlled by the following:
  - -7.5-ft 50% probability of annual exceedance of tides with respect to mean sea level (MSL)
  - 2-ft average predicted maximum expected waves (assumes vessel pitch of 1-ft)
  - 2.5-ft draft (assumed)
  - 1-ft keel clearance (assumed)

Top of Boat Ramp:
- Set at elevation +18
- Controlled by the existing ground elevation at proposed location

Water Depth for Commercial Use of Boat Ramp:
- Minimum depth = 16-ft
- Controlled by the following:
  - -7.5-ft 50% probability of annual exceedance of tides with respect to mean sea level (MSL)
  - 3-ft predicted maximum expected waves (assumes vessel pitch of 1-ft)
  - 6-ft draft (controlled by Lionel Plante Barge)
  - 1-ft keel clearance (assumed)
## PROJECT DATUMS

Reference: [https://tidesandcurrents.noaa.gov/datums.html?id=8418150](https://tidesandcurrents.noaa.gov/datums.html?id=8418150)

### Elevations on Mean Lower Low Water

<table>
<thead>
<tr>
<th>Datum</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHHW</td>
<td>9.91</td>
<td>Mean Higher-High Water</td>
</tr>
<tr>
<td>MHW</td>
<td>9.47</td>
<td>Mean High Water</td>
</tr>
<tr>
<td>MTL</td>
<td>4.91</td>
<td>Mean Tide Level</td>
</tr>
<tr>
<td>MSL</td>
<td>4.94</td>
<td>Mean Sea Level</td>
</tr>
<tr>
<td>DTL</td>
<td>4.96</td>
<td>Mean Diurnal Tide Level</td>
</tr>
<tr>
<td>MLW</td>
<td>0.35</td>
<td>Mean Low Water</td>
</tr>
<tr>
<td>MLLW</td>
<td>0.00</td>
<td>Mean Lower-Low Water</td>
</tr>
<tr>
<td>NAVD88</td>
<td>5.26</td>
<td>North American Vertical Datum of 1988</td>
</tr>
<tr>
<td>STND</td>
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<td>Station Datum</td>
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<tr>
<td>GT</td>
<td>9.90</td>
<td>Great Diurnal Range</td>
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<tr>
<td>MN</td>
<td>9.12</td>
<td>Mean Range of Tide</td>
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<tr>
<td>DHQ</td>
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<td>Mean Diurnal High Water Inequality</td>
</tr>
<tr>
<td>DIO</td>
<td>0.34</td>
<td>Mean Diurnal Low Water Inequality</td>
</tr>
<tr>
<td>HWI</td>
<td>3.59</td>
<td>Greenwich High Water Interval (in hours)</td>
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<tr>
<td>LWI</td>
<td>9.75</td>
<td>Greenwich Low Water Interval (in hours)</td>
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<td>Lowest Observed Tide</td>
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BASE FLOOD ELEVATION

Reference:  
Flood Insurance Study Volume 2 of 4, FEMA, 28 March 2018
Preliminary Firm, FEMA, 14 April 2017

Table 26: Summary of Coastal Transect Mapping Considerations - continued

<table>
<thead>
<tr>
<th>Coastal Transect</th>
<th>Primary Frontal Dune (FMD) Identified</th>
<th>Wave Runup Analysis</th>
<th>Wave Height Analysis</th>
<th>Zone VE Limit</th>
<th>SFHA Boundary</th>
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<td>Runup</td>
<td>Runup</td>
<td></td>
</tr>
</tbody>
</table>
**SEA LEVEL RISE**


Assume 2-ft rise for 50-year design life (2070)
EXCEEDANCE PROBABILITY LEVELS AND TIDAL DATUMS


High and low annual exceedance probability levels are shown relative to the tidal datums and the geodetic North American Vertical Datum (NAVD88), if available. The levels are in meters relative to the National Tidal Datum Epoch (1983-2001) Mean Sea Level datum at most stations or a recent 5-year modified epoch MSL datum at stations with rapid sea level rates in Louisiana, Texas, and Alaska. On the left are the exceedance probability levels for the mid-year of the tidal epoch currently in effect for the station. On the right are projected exceedance probability levels and tidal datums assuming continuation of the linear historic trend.

Assume 2018 data with SLR for maximum above (+)
Assume 1983-2001 data for maximum below (-)
**WIND/WAVE DATA**

Reference: Sunset Landing Concept Harbor Plan Stakeholder Meeting Summary Notes, 15 August 2018 - Wind-Wave Conditions

- W, NW, and N winds are similar at Sunset as at Stone Pier, but Sunset does not benefit from protection afforded by Littlejohn Island and Cousins Island. (W winds at Stone Pier are broken up by Cactus Point and the Great Bar, at least at low tide.)
- WNW wind at Sunset is not protected by Basket Island. The previous wave study was incorrect in assuming protection from Basket (anecdotally the author agreed but would not re-issue the study). True fetch for analysis should extend to the mainland shore.
- Although the fetch distance as noted above may not be accurate, the attendees felt that the maximum wave heights identified in the previous report are appropriate, just not necessarily for the specific wind directions indicated in the report. Applying the indicated maximum wave heights from a westerly wind is likely more representative of the site conditions.

Table 8: Wind Rose Station 44097 – Fall

The analyzed wind data shows that the majority of the wind is out of the South to Northwest, or from a bearing of 180° to 315°, with typical speeds ranging between 1 to 22 knots. Waves generated during typical conditions will be on the order of 1’ to 3’. A 3’ wave has a high potential to cause operational problems for landing and launching boats. Such problems can be mitigated with proper design. A wave attenuator structure may be added to the ferry landing to reduce wave heights and render landing and launching less troublesome.

More extreme events may generate larger waves on the order of 5’ to 7’, with the largest waves again being generated from a bearing of 225°, 247.5°, and 292.5°. Waves of this size have the potential to create large loads on structures and cause significant damage structures that have not been engineered to withstand their impacts. Conservative design would mandate that the design utilize the 7.02/5.08 second deepwater wave to develop structural load conditions.
Figure 3 - Wave Summary

1'-3' waves
spring / summer

5'-7' waves
fall / winter
EELGRASS

Reference: Email from Clement, Jay L. to Wally Mosher, 22 October 2018
Subject: Sunset Harbor Landing Concept Study - questions for ACOE

Wally:

Any of your concepts will require Corps and Maine DEP permitting. For structures over eelgrass it is pretty common for at least the Corps to require compensatory mitigation in the form of an in-lieu fee payment. This may be at a diminished rate if the impacts are indirect (e.g. shading) vs. direct (e.g. filling or dredging). The permitting for just structures in navigable waters is pretty straightforward; most applications of that nature qualify for our Maine General Permit.

Dredging complicates the process but not unduly so. For any project involving dredging, the key questions are typically how much, where will the material be disposed of, and what level of testing (and at what cost) will be required to ascertain the level of contaminants in the sediment if any. That is leg work that the Corps and DEP work with you on in advance of any permit application and the back and forth can take some time. Depending on the amount and intensity of sediment testing, it can also be an added cost. And if you end up dredging eelgrass, something we try to discourage, that'll definitely cost you in terms of compensatory mitigation.

Neither the Corps nor the DEP dictate which of your preliminary designs is more or less likely to receive permits, we generally leave the initial proposal up to you. You're already working with Prock evidently, so they can probably break down the relative costs of your various options. But we would encourage a pre-application meeting as soon as you believe you've settled on a preferred design. This would likely be held at the DEP's Portland office and we'd join in. We'd then be able to better outline the various steps in the process and discuss any potential red flags. I'm copying Colin Greenan from my office as he'd likely be the one to process any future application. Alison from the DEP is copied as well - when necessary, she'll determine who from her team will be the project analyst.

Jay

Reference: Second Email from Clement, Jay L. to Wally Mosher, 22 October 2018
Subject: Sunset Harbor Landing Concept Study - questions for ACOE

Direct impacts to eelgrass would generally be $4.30 per square foot of impact multiplied by a factor of two. This would represent the high end of the cost. Indirect impacts would be more of a case by case determination and would generally be less than that.

Dredging per se wouldn't require compensatory mitigation unless you're going to dredge eelgrass.

Jay
Reference: Email from Brewer, Angela D. to Wally Mosher, 25 October 2018 – Subject: Sunset Harbor Landing Concept Study - questions for DEP regarding eelgrass disturbance

Wally, I appreciate you asking for feedback. As you know, eelgrass has been mapped since the 1990s pretty much around the perimeter of Chebeague. I have no reason to think there isn’t an eelgrass resource at those three locations now, but I am awaiting delineation of all beds around Chebeague as part of a Casco Bay-wide survey I coordinated this year. I should know distribution and percent cover of the eelgrass at your proposed study locations by the end of the year. Hopefully this new information can help avoid as much eelgrass impact as possible. Regarding impact minimization, my preference a marine biologist that values the ecosystem services of eelgrass would be to place structures over the narrowest fringe of lowest percent cover eelgrass possible, and as high over the water surface as possible. Indirect impacts of shading, from docks/floats, piers or vessels, fragment functional beds and reduce available habitat for marine species, not to mention other nearshore benefits. I am happy to speak to more detailed pros and cons at a pre-app.
COMMERCIAL FISHING

Reference: Email from Jeff Putnam to Herb Maine (cc Dan O’Connor), October 2018
Subject: Re: Sunset Landing Update

Hi Herb,
Thank you for keeping me involved in the planning discussions. I would be happy to talk with the folks from Collins, I can be reached at 650-3327.
In short, I feel that the Stone Pier is an adequate facility for the 3 weeks in early June and late November that fishermen set of take up traps there. I hope that younger generations are involved in aquaculture and commercial fishing from Chebeague but so far the numbers do not show increased activity. From a cost/benefit standpoint I have a hard time seeing that public investment into a facility to support marine use by a dwindling number of fishermen makes sense.
I have a couple of fishermen in mind that may have different perspectives on sunset, I will ask them if they would speak with Collins and follow up with Dan and Herb on that.
thanks,
-Jeff

19 Collins contacted Mr. Putnam 25 October 2018 via phone and left a message. There has been no further communication.
ICE

Reference: Sunset Landing Concept Harbor Plan Stakeholder Meeting Summary Notes, 15 August 2018 – Ice Conditions

- Ice can pack in and out similar to Stone Pier.
- CTC does their own ice breaking at Stone Pier. USCG icebreaker was used during the 2014-2015 winter at Stone Pier, before that it is believed that USCG icebreaking was in the 1990s.
- At Sunset, the exposed bedrock to the north collects ice at low tide then releases it to flow south to the site. Then ice collects in the ‘hook’ to the south and eventually flows north again past the site.
- Dynamic aspects of accumulated ice are higher at Sunset versus Stone Pier. Accumulated ice is a concern.
- Bennett’s Cove is less susceptible to ice.
- Prior to the meeting, photographs of ice condition in March 2015 were forwarded to Collins.

Reference: Email from Nichols, Robert F BOSN3 to Wally Mosher, 16 October 2018
Subject: Chebeague Island planning & ice breaking

Good Morning Mr. Mosher

As per Cheryl’s request, the following are answers to specific questions she had and a brief overview of our procedure for managing domestic ice breaking.

**Question 1. What is your local knowledge of the ice conditions around the area we will be working?**
**Answer:** The ice conditions in this area very greatly from year to year, some years we see no accumulative ice and other years (as in 2015) that area had significant ice. Sorry for such an ambiguous answer but it is virtually impossible to predict, so that is why we prepare for the worst-case scenario.

**Question 2. General overview of the ice breaking services?**
**Answer:** In general, the Coast Guard performs ice-breaking for 3 purposes. Search and rescue; flood relief; and to support the reasonable demands of commerce. At Sector Northern New England, we monitor environmental conditions and ice formation in all ports, harbors and federally marked rivers from the U.S./Canadian border to the NH/MA border. We support this mission with a small fleet of Coast Guard Cutters that remain dedicated to ice breaking throughout the winter months.

**Question 3. Procedures for requesting ice breaking assistance?**
**Answer:** All requests should be directed to the Sector Northern New England Command Center at (207) 767-0303. We will prioritize these requests on a case-by-case basis. Vessels and facilities should be ready to provide additional information on the criticality of the request and the timeframe in which ice breaking resources are needed.

**Question 4. What priority may be given to an island’s water transportation connection to the mainland?**
**Answer:** Our priorities are as follows:
   a. Help facilitate Search and Rescue
   b. Urgent response to vessels that have a high probability of becoming hazardous (vessel beset in ice).
c. Exigent Community services, this is where we support communities that have a need for fuel, food, medical supplies, etc. (most likely any assistance you would be requesting would fall under this category).

**Question 5. Potential alternatives if USCG does not have the resources to aid?**

*Answer:* There are tug operators that will conduct commercial ice breaking upon request. I suggest you contact your local harbor master for specific recommendations.

![Figure 1 - Ice flows at residential pier, courtesy of Paul Belesca, 10 August 2018](Image)