Project Approach
Boardwalk Restoration

- Dimensions
  - Alignment
  - Width
  - Slope

- Deck Elevation: Sea Level Rise
  - FEMA (BFE)
  - NOAA/USACE

Foundation Options
- Timber Piles
- Helical Anchors

Railing Options
- Vertical
- Sloped
- Infills
Key Issues

- Address structural deficiencies
- Improve accessibility to all
- Minimize impacts to the salt marsh
- Maintain historical character

- Salt Marsh Environment
  - Access for equipment
  - Foundation depth requirements
  - Wave/Flood/Ice

- Resiliency Design
  - Sea level rise
  - Storm surges

- Loading Scenarios
  - Emergency access

- Maintenance
Historic Storm Photos (2018)
Post Storm Photos
Dimensions

• **Alignment**
  - Follow existing footprint from Boardwalk Rd & Wood Ave towards Town Neck Beach

• **Width**
  - Existing (5ft)
  - Increased (6ft)
    - Improved pedestrian access
    - Potential for Vehicle Access (Polaris)
    - Option of 25 ft diameter “turnaround” observatory located mid-span
    - Approx. $150,000 cost premium

• **Slope**
  - MAAB/ADA (≤1:20) Typical for no grabrails
  - Meets current and proposed deck profiles
Deck Elevations
(Storms & Sea Level Rise)

- **Alignment/Width**: **6 ft Wide Deck**
  - Maintain existing alignment
  - Comfortable feel for pedestrians in passing
  - Increase deck width to 6ft – will allow access for emergency vehicle (Polaris)
- **Deck Elevation**: **NAVD (+12)**
  - Existing Boardwalk NAVD (+7 to +8)
  - Increase of 4 to 5 feet from existing deck, 7 to 8 feet from existing marsh elevation
- **Foundation Option**: **Helical Anchors**
  - Ease of installation
  - Uplift Capacity
- **Future Storm Condition**
  - 10% Annual chance water elevation
  - NAVD (+10.4) to include wave crest
  - Sea Level Rise consideration of (0.5 to 2 ft), NAVD (+10.9 to +12.4)
- **Regulatory Pre-Application Meetings**
Proposed Foundation
Helical Piles

- Lighter equipment
- Uplift (pull-out) capacity
- Better foundation in poor quality soils – thick peat layer is present
Railing Options

- **Vertical Railing**
  - Traditional railing
  - Infills TBD
  - ($200/LF)

- **Sloped Railing**
  - 9” – 12” wider at top of railing
  - Infills TBD
  - ($250/LF)
Proposed Reconstruction

- 6’ Wide Boardwalk
- Sloped Wooden Railings
- Raise Deck Elevation 4’ to 5’
- Mill Creek Platform and ladder to remain
- Beach access from boardwalk to be maintained
**Costs**

- **Estimated Construction costs**

<table>
<thead>
<tr>
<th>Option</th>
<th>Vertical Railing</th>
<th>Sloped Railing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A - Existing Elevation &amp; Existing Deck Width</td>
<td>$1,932,000</td>
<td>$2,019,000</td>
</tr>
<tr>
<td>Option B - Existing Elevation &amp; Widened Deck Width</td>
<td>$2,072,000</td>
<td>$2,158,000</td>
</tr>
<tr>
<td>Option C - Increased Elevation &amp; Existing Deck Width</td>
<td>$2,005,000</td>
<td>$2,091,000</td>
</tr>
<tr>
<td>Option D - Increased Elevation &amp; Widened Deck Width</td>
<td>$2,144,000</td>
<td>$2,232,000</td>
</tr>
</tbody>
</table>

  - Costs do not include mobilization and demobilization approx. $150,000

- **Estimated annual maintenance costs**
  - Current elevation - $40,000 to $50,000 as an average
  - Recommended deck elevation - $10,000 to $15,000 as an average
• Estimated Project Schedule
  • Design 3-4 months
  • Permitting 6-9 months
  • Bid Phase 2-3 months
    • May increase depending on Town & Contract Award
  • Construction 8 – 10 months
  • Total Estimated Project Duration – 26 Months from authorization of approved alternative
Questions?

We welcome your input!!

Questions and comments may be emailed to: Engineering@sandwichmass.org