Footbridge Reconstruction Workshop #1

Town of Boothbay Harbor, ME

November 20, 2017

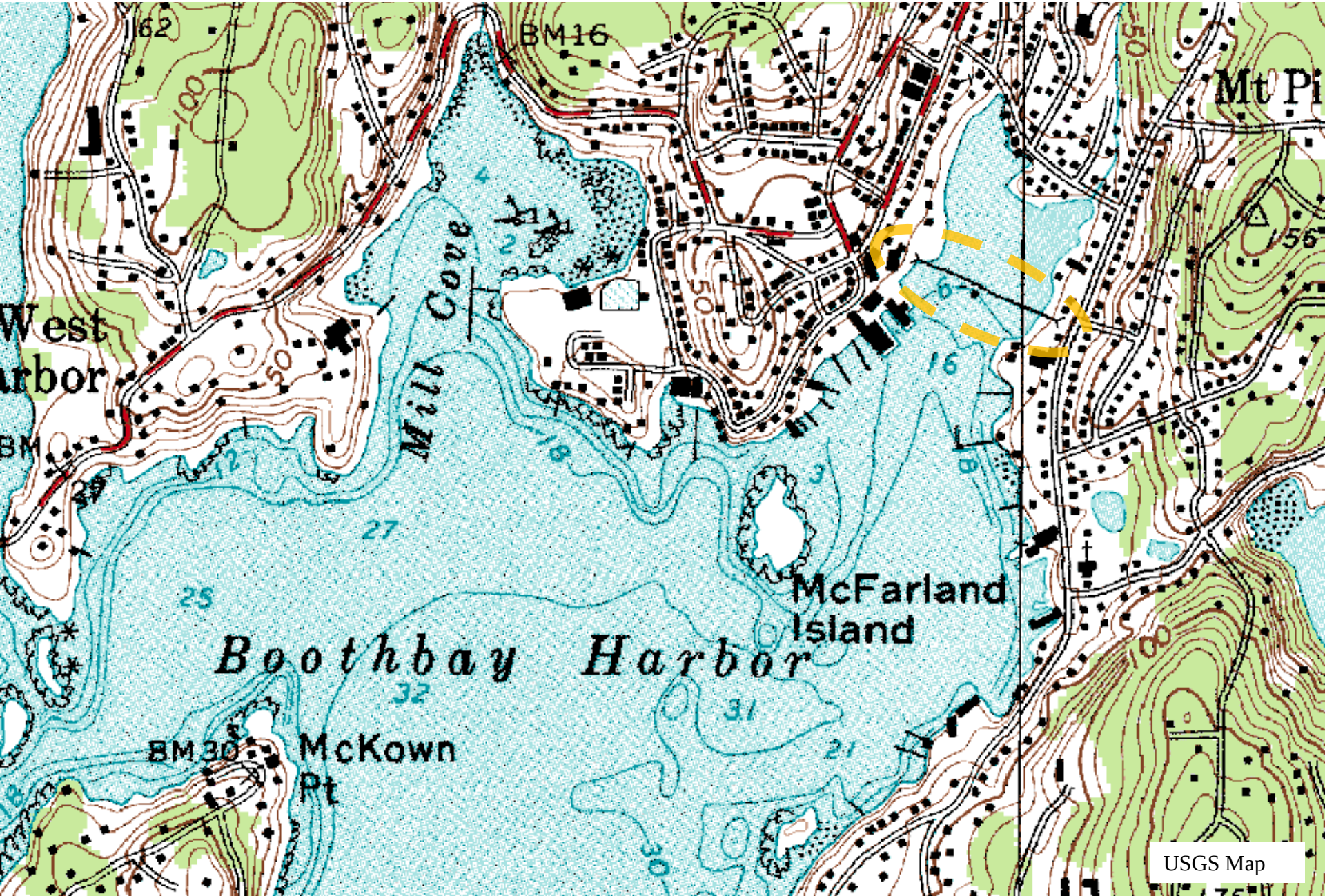
BAKER DESIGN CONSULTANTS
Civil, Marine, & Structural Engineering

tjd&a

Presentation Outline

1. Project Location and Overview
2. Footbridge History
3. Existing Conditions
4. Project Purpose and Need
5. Reconstruction Options
   A. Overview of key design parameters
   B. Project goals and preferences
   C. Review design opportunities
6. Timeline and Next Steps
7. Feedback

1. Project Location and Overview



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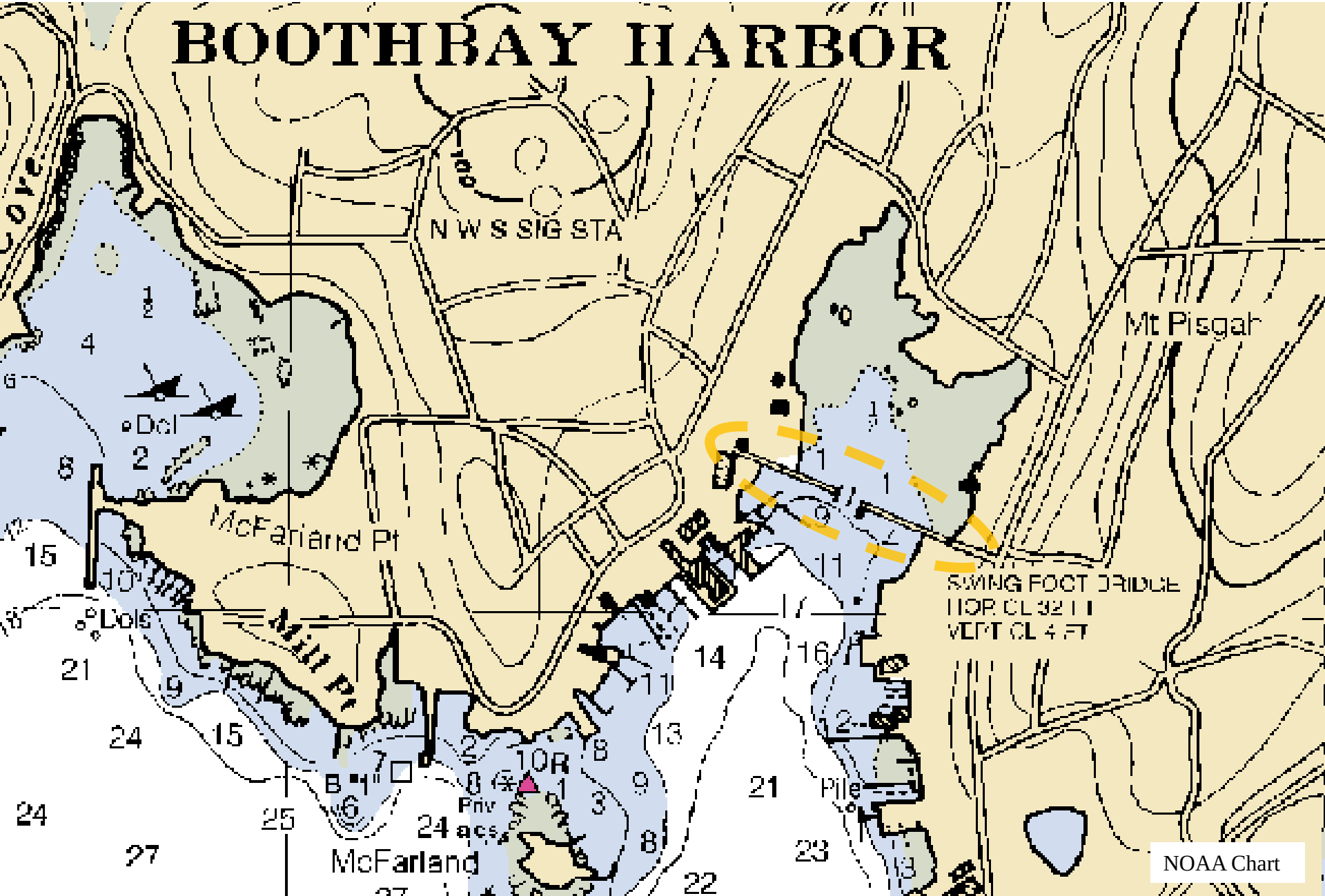

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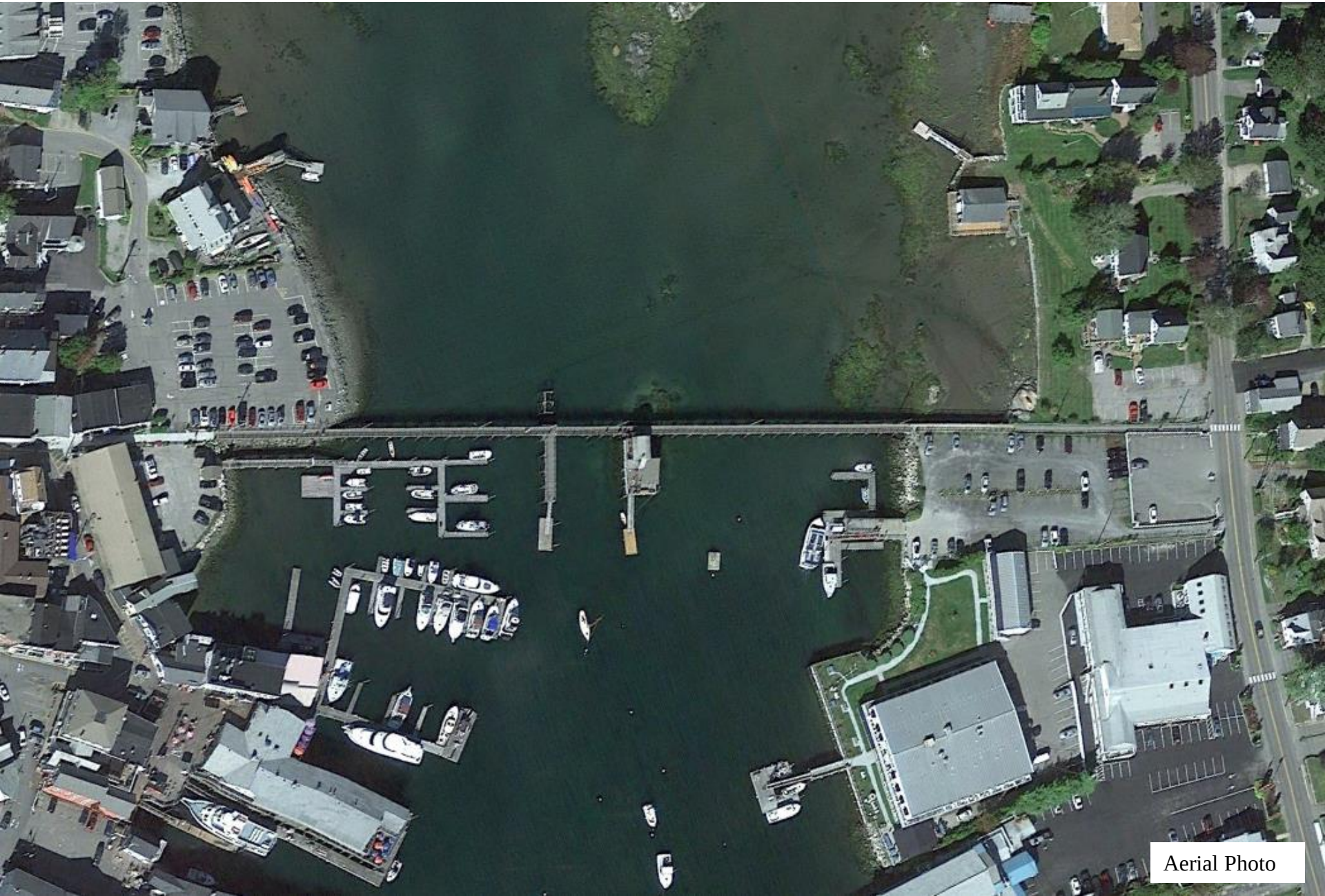
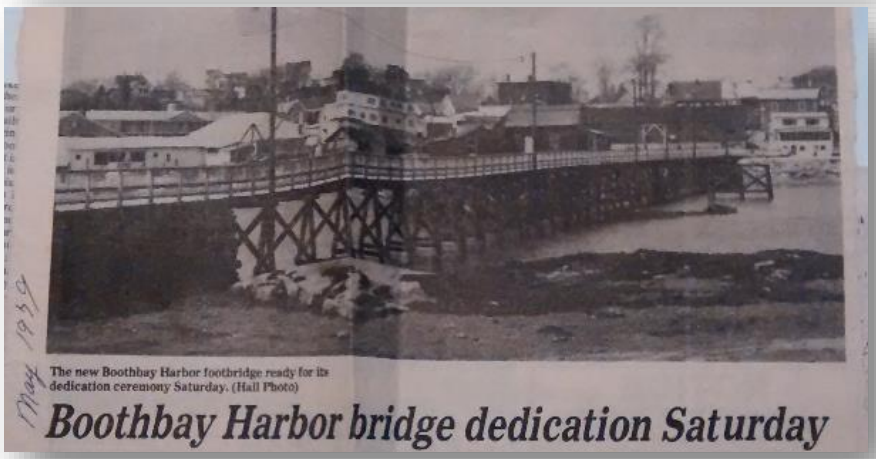


2. Footbridge History

- **1901** Original bridge constructed by Luther Maddocks at a cost of $1,500. Bridge originally had a hand-operated swing span to allow large vessels to reach head of harbor.
- **Winter 1917-1918** bridge damaged by icing and repaired
- **1928** bridge damaged by icing and repaired
- Originally 1,000-ft long, the bridge was at some point shortened by 300-ft by filling at ends. Parking Lots created at each end (currently Town Lot and Squirrel Island Lot)
- **1978-1979** Complete reconstruction of bridge complete by Mace Carter at a cost of $135,000.
- **2017** Pile bracing and swing span repair


Region Scenes Of The Past

EXACT DATE this photo was taken is not known, but it is believed to have been 1917, one of the years the harbor froze over. This picture was submitted for use in the Register by Mrs. Ethel Fowler of the Bridge House Studio in Boothbay Harbor.


The new Boothbay Harbor footbridge ready for its dedication ceremony Saturday. (Hall Photo)

Boothbay Harbor bridge dedication Saturday

3. Existing Conditions

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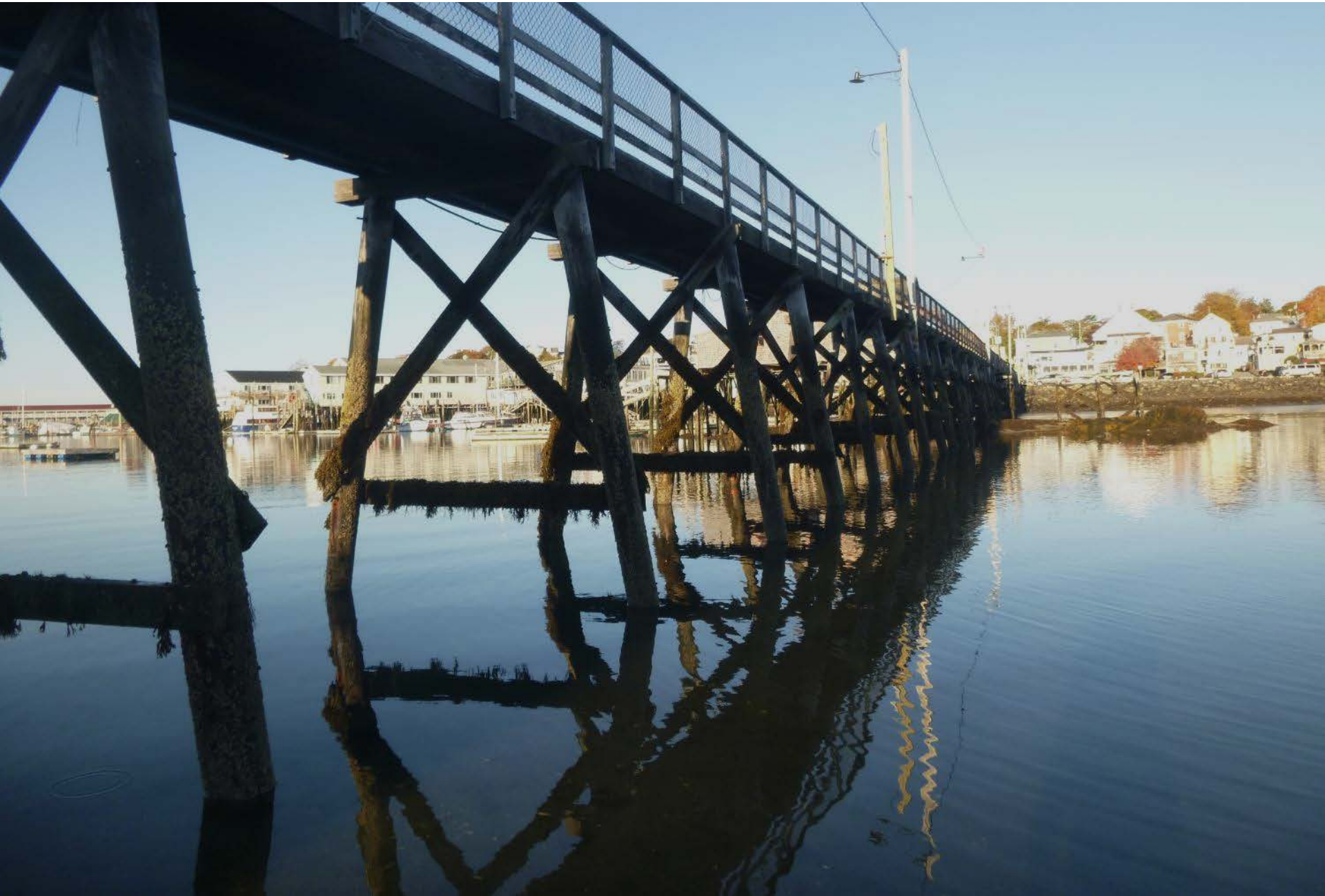

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4. Project Purpose and Need

- The Footbridge is an important piece of the Town of Boothbay Harbor's Infrastructure
  - Transportation
    - Access across harbor
    - Access to Town dock
    - Access to private property
  - Destination
    - Access to the harbor
  - Part of the character of Boothbay Harbor
- ***Why reconstruct the footbridge?***

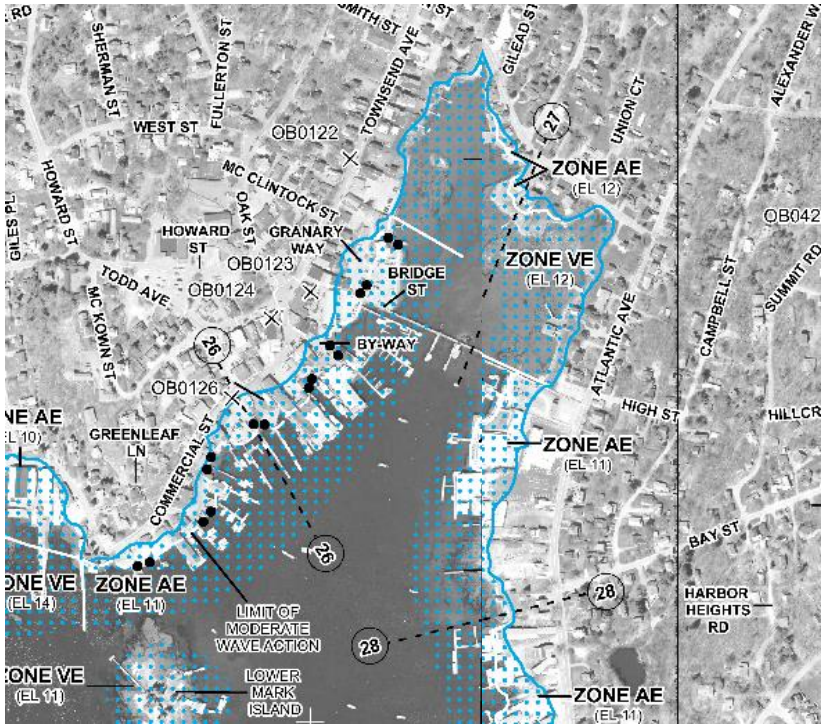
4. Project Purpose and Need

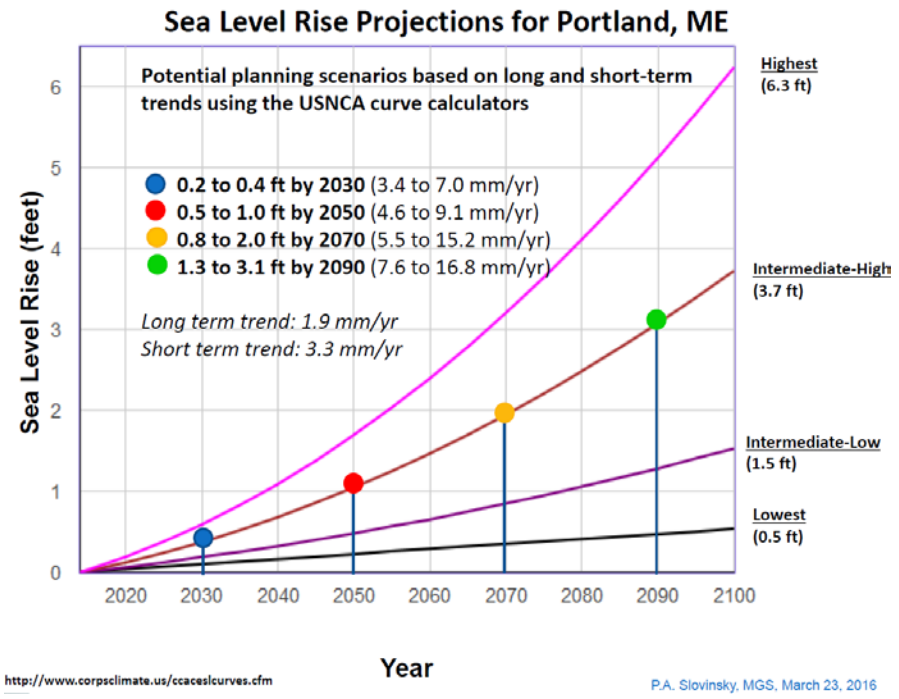
1. **Existing Structure built in 1978-1979**
   - Currently over 38 years old
   - This represents a significant portion of the expected service life of a timber structure in a coastal environment
   - *Investments should consider long-term economics and feasibility*
2. **Swing Span**
   - USCG classifies the Footbridge as a movable bridge
   - Not functional in recent history
   - Per USCG, Town is responsible for opening the bridge if need arises
   - *Operation of movable bridge should be restored or the Town should work with USCG to change the bridge classification*
3. **Structural Capacity**
   - Code requirement for pedestrian live load is 90-100 psf
   - Superstructure rated at 50 psf live load capacity
   - *The superstructure must be capable of supporting code-required live loading*

4. Project Purpose and Need

4. Flood Hazard Issues

- Structure is very low in relation to tidal and flood elevations
- Top of Deck ranges from **8.2**' NAVD88 to **9.5**' NAVD88
- Base Flood Elevation (BFE) = **12.0**' NAVD88
- Highest Annual Tide (HAT) = **6.5**' NAVD88 (LCPRC 2013 Study)
- <u>These values do not account for Sea Level Rise</u>





Sea Level Rise Projections from USACE per MGS 2016 Study

Explanation of Datums

- Chart Datum
  - MLLW = 0’
  - Used for navigation charts/tide charts
  - Varies by location on earth
- NAVD88 Datum
  - Established datum used across United States
  - Used by FEMA for published flood elevations
  - Close, but not equivalent to Mean Sea Level

February 11, 2016 High Tide
(Photo: LCPRC)

February 11, 2016 High Tide
(Photo: LCPRC)

November 16, 2016 High Tide (Photo: LCPRC)

November 16, 2016 High Tide (Photo: LCPRC)


Top of Deck @ Swing Span
EL 9.47' (NAVD88)


Top of Deck @ Swing Span
EL 9.47' (NAVD88)
BFE = 12.0'
HAT = 6.8'
MHHW = 4.4'

4. Project Purpose and Need

4. Flood Hazard Issues

- Structure is at significant risk of damage during flood events
- Opportunities: Elevate, Resist (Wet Floodproof), Combination
- Regulatory Requirements

Town of Boothbay Harbor
Flood plain Management Ordinance

§170-92 Development Standards

M. Bridges. New construction or substantial improvement of any bridge in Zones A, AE and VE shall be designed such that:

(1) When possible, the lowest horizontal member (excluding the pilings, or columns) is elevated to at least one foot above the base flood elevation; and

(2) A registered professional engineer shall certify that:

(a) The structural design and methods of construction shall meet the elevation requirements of this section and the floodway standards of § **170-92K**; and

(b) The foundation and superstructure attached thereto are designed to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all structural components. Water loading values used shall be those associated with the base flood.

O. Wharves, piers and docks. New construction or substantial improvement of wharves, piers, and docks are permitted in Zones A, AE, and VE, in and over water and seaward of the mean high tide, if the following requirements are met:

(1) Wharves, piers, and docks shall comply with all applicable local, state, and federal regulations; and

(2) For commercial wharves, piers, and docks, a registered professional engineer shall develop or review the structural design, specifications, and plans for the construction.

Full compliance with the Floodplain Management Ordinance would require the Top of Deck Elevation to be increased by **4.6'** at the Swing Span, and **5.9'** at the ends.

4. Project Purpose and Need

5. **Code Compliance Issues**
   - ADA (stairs to wharf, deck surface irregularities)
   - Handrails (insufficient structural capacity)
6. **Utilities**
   - Water, sewer, electric
   - Swing span mechanism subject to flooding

4. Project Purpose and Need

Conclusion:

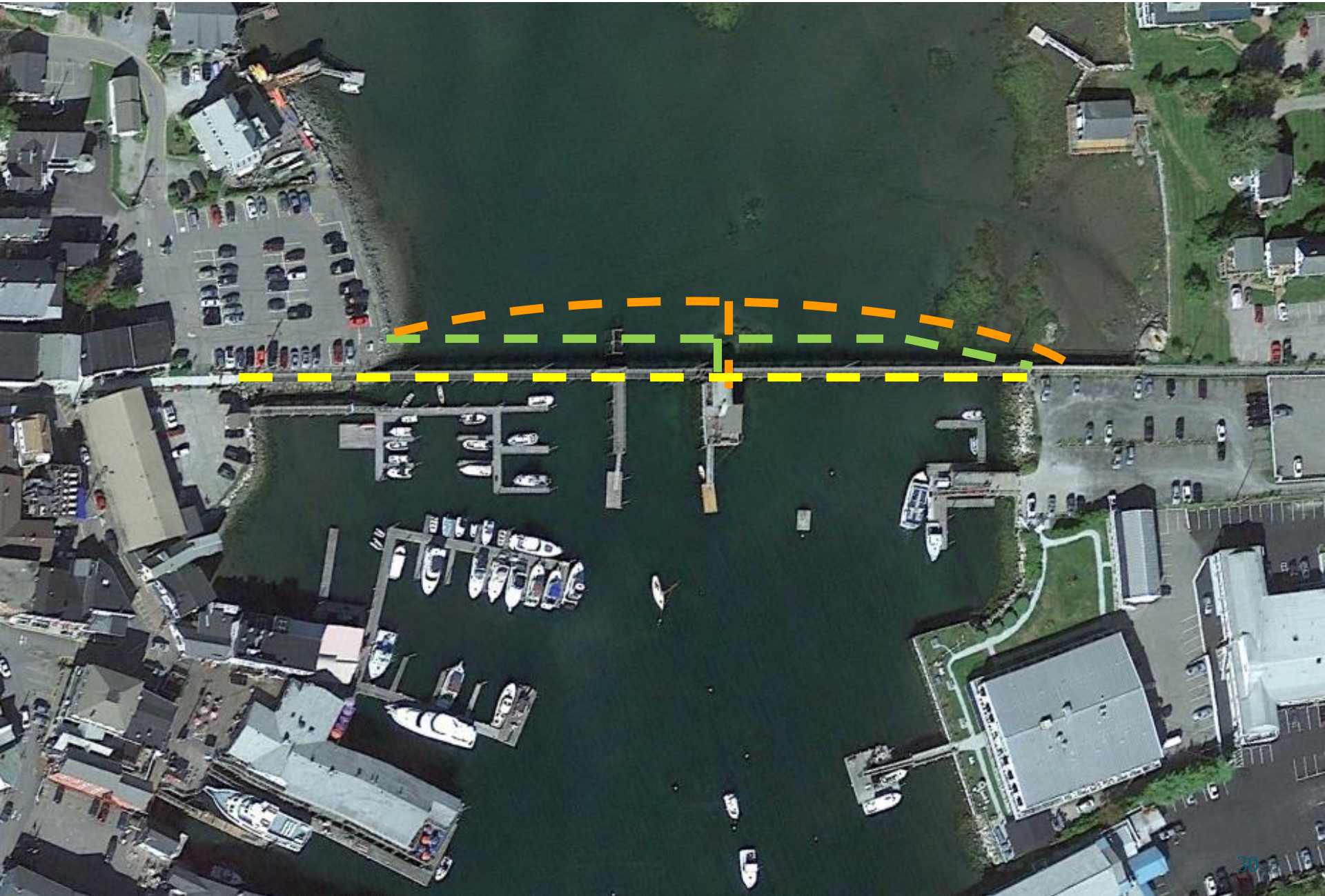
The most feasible solution is a
<u>Replacement</u> of the existing footbridge

Questions?

5. Reconstruction Options

- Design Parameters
  - Geometric
    - Structure Location/Horizontal Alignment
    - Vertical Alignment/Elevation/Gradients
    - Width
  - Bridge type
    - Uses
    - Movable span type and opening requirements
    - Materials
  - Features
    - Lighting
    - Railings
    - Aesthetics
    - Utilities
    - Site improvements/overlooks/landings
- Project Goals/Preferences
  - Structural and Code Requirements
  - Use Requirements
  - Navigational Needs
  - Functional/Movable Bridge
  - Cost (up front and lifecycle)
  - Aesthetics
  - Historic Preservation
  - Lighting
  - Incorporation with Town dock and other adjacent facilities/improvements

Bridge Location/Alignment



Bridge Location/Alignment

straight

curved

Vertical Alignment

Bridge Type

traditional

modern


railing material
surface treatment


improvements at landings
integrated lighting
proper width

railing transparency

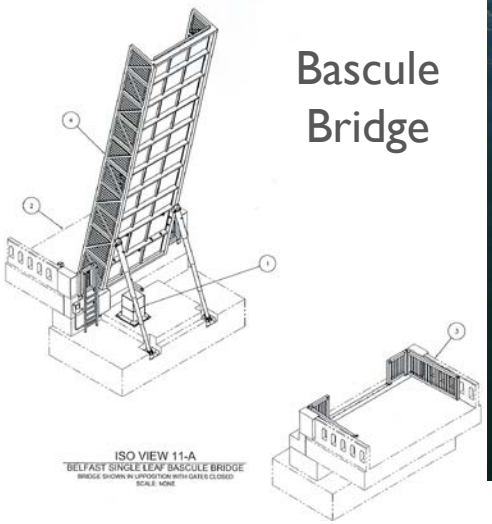
curved alignment


destination along the way
multiple lanes/levels
PROVIDENCE RIVER PEDESTRIAN BRIDGE

Movable Span Type

Opening sized for navigation requirements

Bascule Bridge



Landings


Widened approach
with overlook areas
Landscape feature at
entrance landing

Landings


Access to water
Curved alignment
Improved
Landscape
feature

7. Feedback

- Comments on goals, preferences
- Anything we have missed?
- Anything else we should be thinking about?

6. Timeline and Next Steps

- Gather feedback from Workshop #1
- Preliminary design development
- Workshop #2 to be scheduled in coming months
  - Present preliminary design concepts
  - Gather input on design details
- Permitting and Final Design pending acceptance of Preliminary Design
- Maine DOT funding for a portion of the project is programmed for 2020
- Additional funding pending

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Town of Boothbay Harbor, Maine

November 20, 2017

Questions, contact:

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