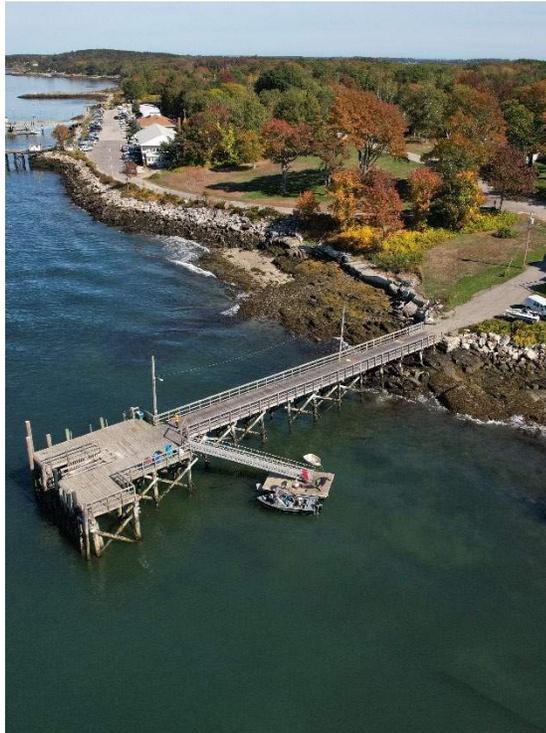




Consulting  
Engineers and  
Scientists



## Ponce's Landing Inspection

Long Island, Maine

**Submitted to:**

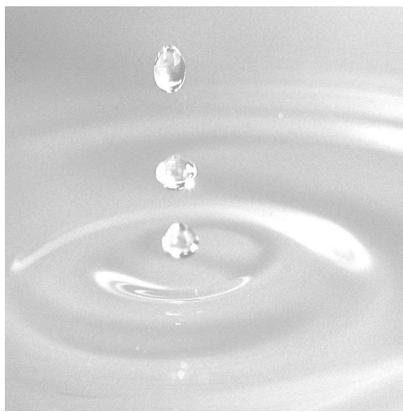
Town of Long Island  
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**Submitted by:**

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November 29, 2022

Project 2203222



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## Appendices

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- A. Inspection Tables
- B. Inspection Plans
- C. Inspection Photo Log

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## Executive Summary

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A Routine Waterfront Facility Inspection was performed at Ponce's Landing in Long Island, Maine on October 5 and 6, 2022. The inspection included above water and below water investigations of the substructure, superstructure, and deck components to assess the general condition of these elements.

The structure rating, remaining service life, and operational restrictions recommended from this inspection are summarized in the table below:

Structure	Rating	Estimated Service Life	Operational Restrictions		
			Vehicular Deck Loading	Pedestrian Deck Loading	Vessel Mooring and Berthing
Entire Pier	Poor	5 to 10 years	No vehicular use	Limited pedestrian use	Small craft in calm conditions only

The pier is in overall poor condition with signs of significant deterioration observed. The pier has an estimated remaining service life of 5 to 10 years, with repairs needed to achieve this. Full replacement of pier should be programmed in the near term.

This report provides a summary of inspection findings and recommendations. The timber deck has approximately 40 planks that are broken or badly deteriorated and require repair. The pier is missing handrail at isolated locations and has no vehicular curb installed. The loading ramp at the pier head is severely deteriorated and should be removed from service and access restricted. There are 12 piles in poor, severe, or critical condition that should be replaced in-kind. Multiple sections of diagonal bracing have failed or are in poor condition and require replacement. The timber pier framing has multiple instances of cracked/split members and section loss. The pier superstructure has insufficient deck live load capacity to support unrestricted pedestrian or vehicular loading. Due to the condition and capacity of substructure and superstructure members, operational restrictions are recommended.

Given the substantial defects and limitations on load capacity of the pier, it is recommended that the following operational restrictions be put in place and enforced immediately:

1. No use of the loading ramp on the pier head should be allowed. It is recommended that the top and bottom of the ramp be secured to prevent access.
2. No vehicular loading of the pier deck should be allowed. It is recommended that a locked gate or barriers be installed at the shore end of the pier to prevent vehicular use.

3. Pedestrian loading should be restricted to no more than 10 people per span at any given time and light equipment such as wheelbarrows or hand carts. Signage should be installed to indicate these restrictions.
  
4. Berthing at the pier head should be limited to only small vessels consisting of recreational and fishing boats of approximately 40 feet and smaller, and in calm conditions where no significant wind or wave conditions exist to limit loading imposed on the pier.

The following table outlines recommended repairs for the pier that should be completed in the short-term to extend the life of the pier 5 to 10 years until a full replacement of the pier is constructed:

Location / Work Item	Unit Cost	Quantity	Unit	Cost
Replace piles rated poor (D) or worse	\$5,000	12	EA	\$60,000
Replace (7) sections diagonal bracing	\$4,000	7	EA	\$28,000
Replace damaged deck boards on pier	\$250	40	EA	\$10,000
Refasten loose deck boards	\$1,000	1	LS	\$1,000
Replace missing handrail on pier	\$200	40	LF	\$8,000
Secure loose handrail on pier	\$5,000	1	LS	\$5,000
Replace decking at gangway landing on pier	\$500	1	LS	\$500
Gangway Repairs	\$2,000	1	LS	\$2,000
Contractor mobilization and demobilization	\$30,000	1	LS	\$30,000
<b>Total</b>	---	---	---	<b>\$144,500</b>
<b>30% Contingency</b>	---	---	---	<b>\$43,400</b>
<b>Total Budgetary Estimate</b>	---	---	---	<b>\$187,900</b>

Based on ASCE Manuals and Reports on Engineering Practice No. 130, Waterfront Facilities Inspections and Assessments (2015) and given the significant deterioration observed, it is recommended that routine inspections be scheduled annually for the remaining service life of the structure, as well as after significant storm events.

For detailed inspection findings refer to Appendix A – Inspection Tables, Appendix B – Inspection Figures, and Appendix C – Inspection Photo Log.

# 1. Introduction

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In August 2022, the Town of Long Island (Town) retained GEI Consultants, Inc. to perform a routine above and underwater inspection of the Ponce's Landing Pier which includes the timber pile-supported pier, timber floats, fender piles, and gangway. The Pier is estimated to be 50 to 60 years old and has significant deterioration/defects. As a result, the Town intends to replace the structure in the next 5 to 10 years. The objectives of this inspection were to:

- Identify and document existing conditions and level of deterioration.
- Identify repairs necessary to maintain structure safety for the limited remaining lifespan prior to replacement.
- Identify usage restrictions necessary to maintain user safety.

GEI completed the above and underwater inspection over two days on October 5 and 6, 2022. This report documents the work completed, inspection observations, and recommendations.

## 1.1 Description of Site and Structures

Ponce's Landing (Fig. 1) is a Town-owned pier facility located on the southwest side of Long Island, Maine. The existing structure is not well documented but is believed to date back to the 1960's. Until 1996, Ponce's Landing served as the primary landing for Casco Bay Lines ferry service to Long Island. After 1996, Casco Bay Lines continued to use the pier intermittently until stopping use in the last several years. The pier also provides short-term mooring and berthing for recreational and commercial vessels. The pier is located at Lat/Long coordinates 43°41'22.85"N, 70°10'6.64"W, and is depicted on NOAA Chart 13290 – Casco Bay.

Existing features at the facility include:

- A fixed pier with a timber superstructure supported on timber piles.
- A timber loading ramp at the pier head.
- Timber handrails.
- Fendering on pier head consisting of timber and composite piles with timber wales and chocks.

- A floating dock and gangway on the south side of the pier that provides access for recreational and commercial vessels and other users.

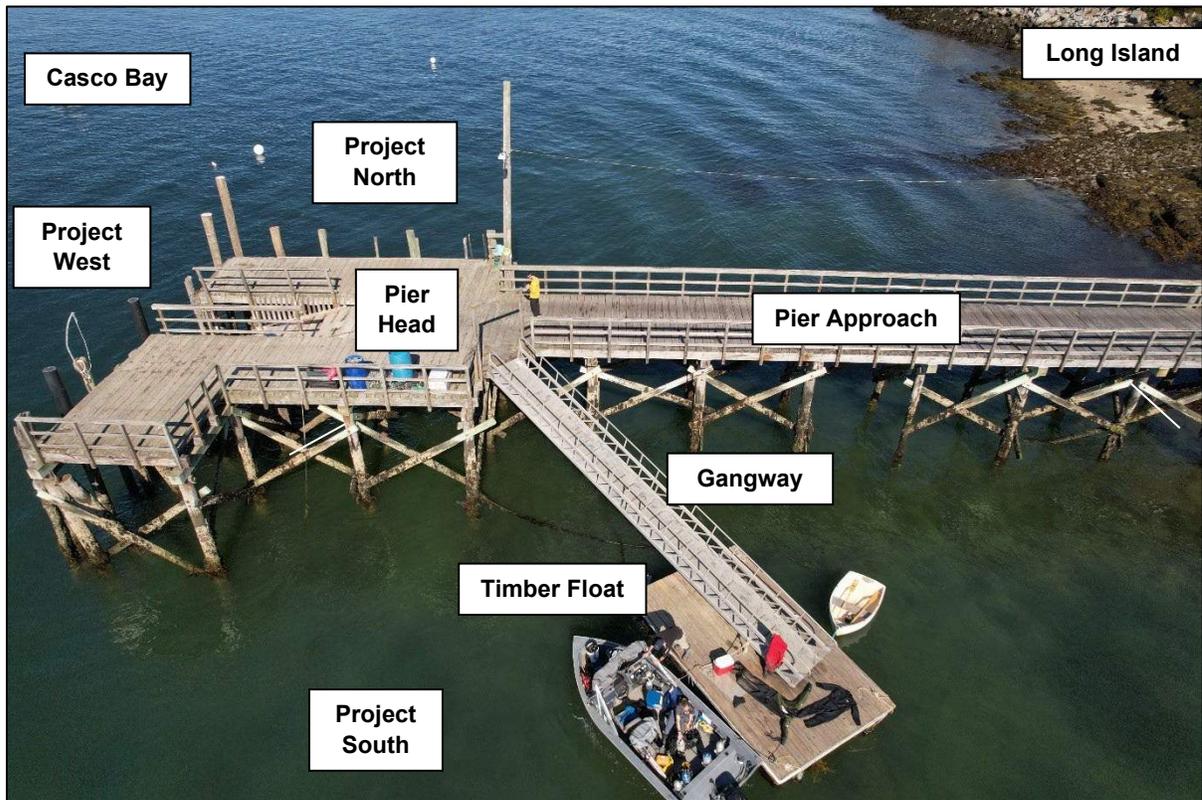


Fig. 1 – Ponce's Landing, October 2022 Drone Imagery

## 1.2 Review of Background Information

There is limited background information available on the pier and no existing plans were available to GEI to support the inspection. Based on a review of historic aerial imagery, the existing pier is believed to have been constructed circa 1960s. A pier existed at the site prior to the current pier being constructed but differed notably in dimensions from what exists today. The Town reported during the kickoff meeting that several rounds of repairs have been completed during the structure's life. Specific details are very limited, however the varied conditions, materials, member sizes, and configurations that exist today are consistent with a history of intermittent repairs. The pier had been used by Casco Bay Lines as a ferry terminal regularly until 1996 when Mariner's Wharf was built, at which time ferry service was transferred to the new facility. Casco Bay Lines continued to operate out of Ponce's Landing intermittently until recent years.

### 1.3 Water Elevations

Tidal and flood elevations for the site are summarized in Table 1 in the following datums: Mean Lower Low Water (MLLW), Mean Low Water (MLW), National Geodetic Vertical Datum of 1929 (NGVD29), and North American Vertical Datum of 1988 (NAVD88). All elevations provided in this report and on the project plans are referenced to NAVD88 datum unless otherwise noted.

Site specific tidal elevations and datum conversions were derived from NOAA Tidal Station 8418150, Portland, ME. The Highest Annual Tide (HAT) elevation was taken from the Maine DEP published HAT table for 2018 for Long Island. Coastal stillwater elevations were taken from the Preliminary FEMA Flood Insurance Study (FIS) for Cumberland County dated August 30, 2019, for Transect 072 which is located nearby to the site. The Base Flood Elevation was taken from FEMA flood map number 23005C0708F which shows the site in a VE zone with Base Flood Elevation of +20 feet NAVD88.

Based on a survey conducted during the October 2022 inspection, the pier deck elevation varies with a range from approximately +9.9 feet to +10.4 feet NAVD88. These elevations place the pier deck 3.4 feet to 3.8 feet above the Highest Annual Tide, and 9.7 feet to 10.1 feet below the preliminary Base Flood Elevation (100-year flood). Note that no adjustment for future sea level rise is projected herein.

**Table 1. Tidal and Flood Elevations**

Elevation Reference (all elevations are in feet)		Vertical Datum			
		MLLW	MLW	NGVD29	NAVD88*
Base Flood Elevation		+25.3	+24.9	+20.7	<b>+20.0</b>
Stillwater Elevation	0.2% Annual Chance	+14.8	+14.4	+10.2	<b>+9.5</b>
	1% Annual Chance	+14.2	+13.8	+9.6	<b>+8.9</b>
	2% Annual Chance	+13.9	+13.5	+9.3	<b>+8.6</b>
	10% Annual Chance	+13.3	+12.9	+8.7	<b>+8.0</b>
Highest Annual Tide (HAT)		+11.8	+11.5	+7.3	<b>+6.5</b>
Mean Higher High Water (MHHW)		+9.9	+9.6	+5.4	<b>+4.7</b>
Mean High Water (MHW)		+9.5	+9.1	+4.9	<b>+4.2</b>
NAVD88		+5.3	+4.9	+0.7	<b>0.0</b>
Mean Sea Level (MSL)		+4.9	+4.6	+0.4	<b>-0.3</b>
NGVD29		+4.6	+4.2	0.0	<b>-0.7</b>
Mean Low Water (MLW)		+0.4	0.0	-4.2	<b>-4.9</b>
Mean Lower Low Water (MLLW)		0.0	-0.4	-4.6	<b>-5.3</b>

\*Project Datum

## 1.4 Scope of Work and Inspection Methodology

The scope of work for this investigation included above and underwater inspection. The inspection methodology was based on the procedures of American Society of Civil Engineers (ASCE) Manuals and Reports on Engineering Practice No. 130 – Waterfront Facilities Inspection and Assessment (MOP 130) for “Routine Inspection”. Level I and Level II inspections were performed as defined below:

- Level I Inspection: Visual and tactile inspection on 100% of structure.
- Level II Inspection: Visual and probing of topside elements as necessary to further evaluate Level I observations. Partial growth removal/cleaning and measurement of remaining diameter on at least 10% of piles/timber elements.

The inspection was performed by GEI’s in-house engineer-dive team on October 5 and 6, 2022. Weather conditions during the October 5, 2022, inspection were rainy with temperatures in the mid 50’s and moderate wind and waves. Due to the weather conditions, only above water inspection was performed on October 5. Weather conditions during the October 6, 2022, inspection were clear, sunny, and calm. The underwater inspection, below deck inspection, remaining topside inspection, elevation survey, and drone inspection were completed on October 6. Personnel included: Daniel Bannon, P.E. (Project Manager), Steve Hennessy, E.I.T. (MA) (Inspection Team Lead), Dan Pelletier, E.I. (Diver), and Emily Jarrett, E.I. (Diver).

Topside and above water inspection consisted of visual, tactile, and auditory inspection. Elements were photographed, probed to investigate soundness, and defects were observed, measured, and documented. Topside structures were accessed by foot from the pier deck, floats, and gangway. Below deck elements in the tidal range were inspected by work boat. Additional topside imagery was captured using a GEI survey drone to take high-resolution images through a series of low-level flights around the structure.

Underwater inspection consisted of visual and non-destructive physical inspection. Inspection was performed by a one-man dive team. Underwater visibility during the inspection was approximately 5 to 6 feet. Water currents were negligible.

Conditions were documented for elements as defined in MOP 130 Element Level Damage Ratings (MOP 130 Tables 2-4 through 2-13) and Condition Assessment Ratings (MOP 130 Table 2-14). Damage Assessment Ratings were applied to components inspected in the field with reference to Table 2. Based on these assessments, a Condition Assessment Rating was established for each individual component with reference to Table 3.

**Table 2. Damage Assessment Rating**

<b>Damage Rating</b>	<b>Damage Description</b>
Not Inspected (NI)	Not inspected, inaccessible, or passed by.
No Defects (ND)	Sound surface material.
Minor (MN)	Checks, splits, & gouging < 0.5 in wide, light abrasion less than 0.5 in deep, light fungal decay, minimal marine borer activity.
Moderate (MD)	Remaining diameter loss up to 15%, checks and splits wider than 0.5 in, cross-section area loss up to 25%, corroded hardware, evidence of marine borer or fungal decay along with loss of section, abrasion up to 2 in deep.
Major (MJ)	Remaining diameter loss 15 to 30%, checks and splits through full depth of cross-section, cross-section area loss 25 to 50%, heavily corroded hardware, displacement and misalignments at connections, abrasion damage greater than 2 in deep, fungal decay up to 3 in deep.
Severe (SV)	Remaining diameter loss more than 30%, cross-section area loss more than 50%, loss of connections and/or fully nonbearing condition, partial or complete breakage, fungal decay greater than 3 in deep.

\*Damage Assessment Rating table shown is only meant to provide an understanding of the overall issues with the elements rated. For an in-depth understanding of the damage ratings refer to ASCE Manual 130, Chapter 2, Tables 2-4 through 2-13.

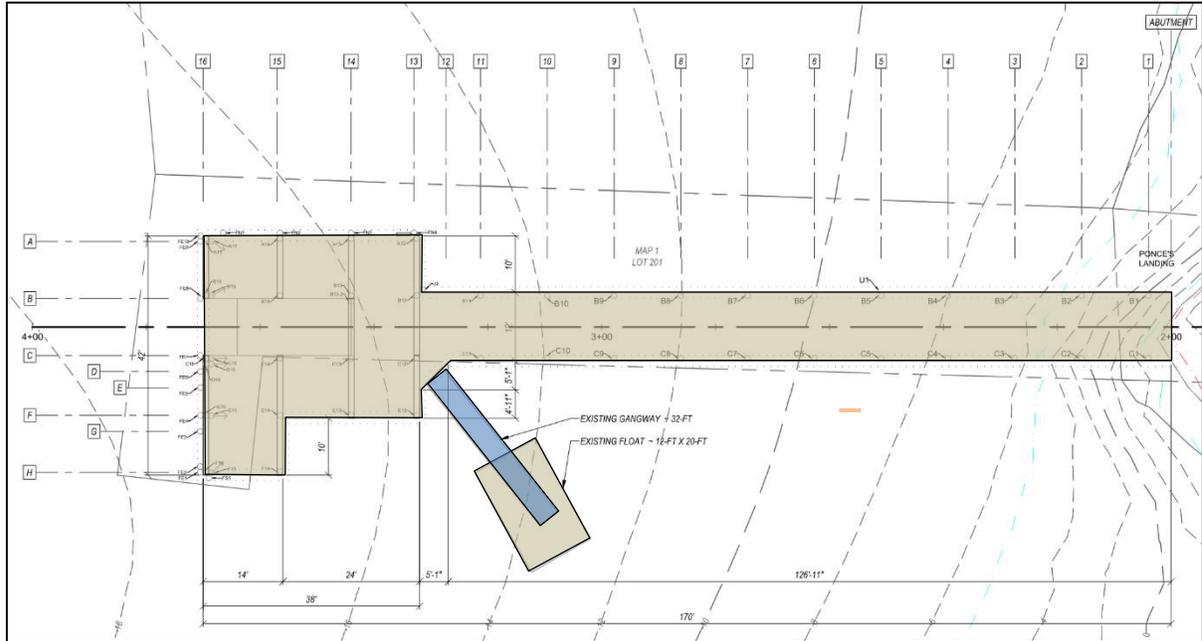
**Table 3. Condition Assessment Ratings**

<b>Member Rating*</b>	<b>Member Rating Description</b>
6 (A) Good	No visible damage or only minor damage is noted. Structural elements may show very minor deterioration, but no overstressing observed. No repairs required.
5 (B) Satisfactory	Limited minor to moderate defects or deterioration observed but no overstressing observed. No repairs are required
4 (C) Fair	All primary structural elements are sound but minor to moderate defects or deterioration observed. Localized areas of moderate to advanced deterioration may be present but do not significantly reduce the loading capacity of the structure. Repairs are recommended, but the priority of the recommended repairs are low.
3 (D) Poor	Advanced deterioration or overstressing observed on widespread portions of the structure but does not significantly reduce the load-bearing capacity of the structure. Repairs may need to be carried out with moderate urgency.
2 (E) Severe	Advanced deterioration, overstressing, or breakage may have significantly affected the load-bearing capacity of the primary structural components. Local failures are possible and loading restrictions may be necessary. Repairs may need to be carried out on a high-priority basis with urgency.
1 (F) Critical	Very advanced deterioration, overstressing, or breakage has resulted in localized failures(s) of primary structural components. More widespread failures are possible or likely to occur, and load restrictions should be implemented as necessary. Repairs may need to be carried out on a very high-priority basis with strong urgency.

\*The letter assigned to the rating was added to the MOP 130 table to assist with field operations.

## 2. Existing Conditions

A schematic plan of the existing structure is provided in Fig. 2.

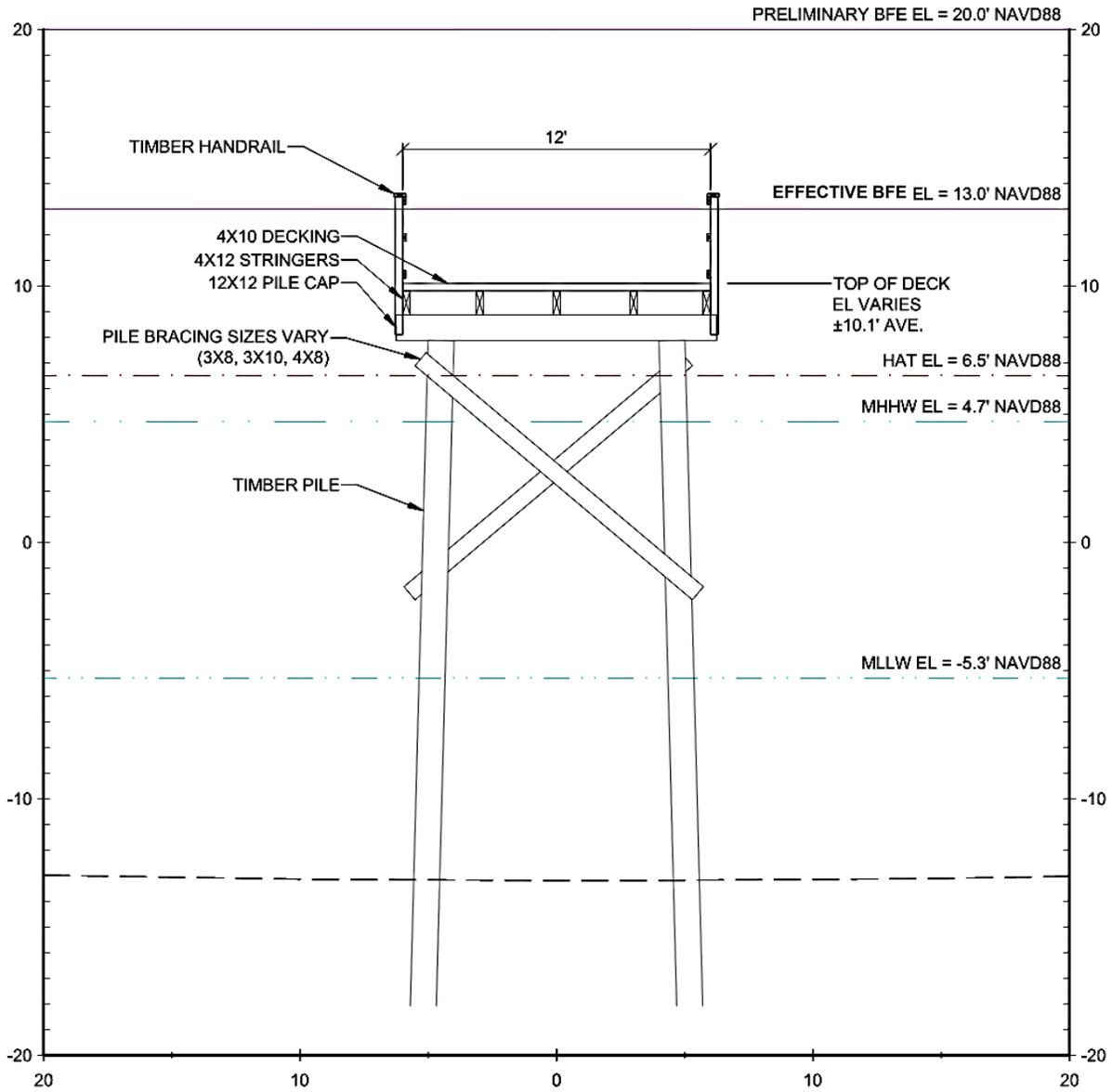


**Fig. 2 – Schematic Plan of Pier**

Elements included in this inspection include:

- Forty-eight (48) timber piles that support the pier structure.
- Fourteen (14) fender piles on the pier head consisting of twelve (12) timber piles and two (2) reinforced plastic composite piles.
- Diagonal timber pile bracing in the tidal range.
- A timber superstructure consisting of pile caps, stringers, and decking.
- A timber ramp in the middle section of the pier head that ramps down in elevation.
- Timber curbs and handrails.
- One timber floating dock on the south side of the pier.
- A 32-foot aluminum gangway to access the south floating dock.

A typical cross section view for the approach pier is provided in Fig. 3.



**Fig. 3 – Pier Head Section**

Conditions observed during the field inspection are summarized in this section. Inspection Tables with a full listing of Condition Ratings based on Table 3 are provided in Appendix A. Inspection Plans are provided in Appendix B. A photo log is provided in Appendix C

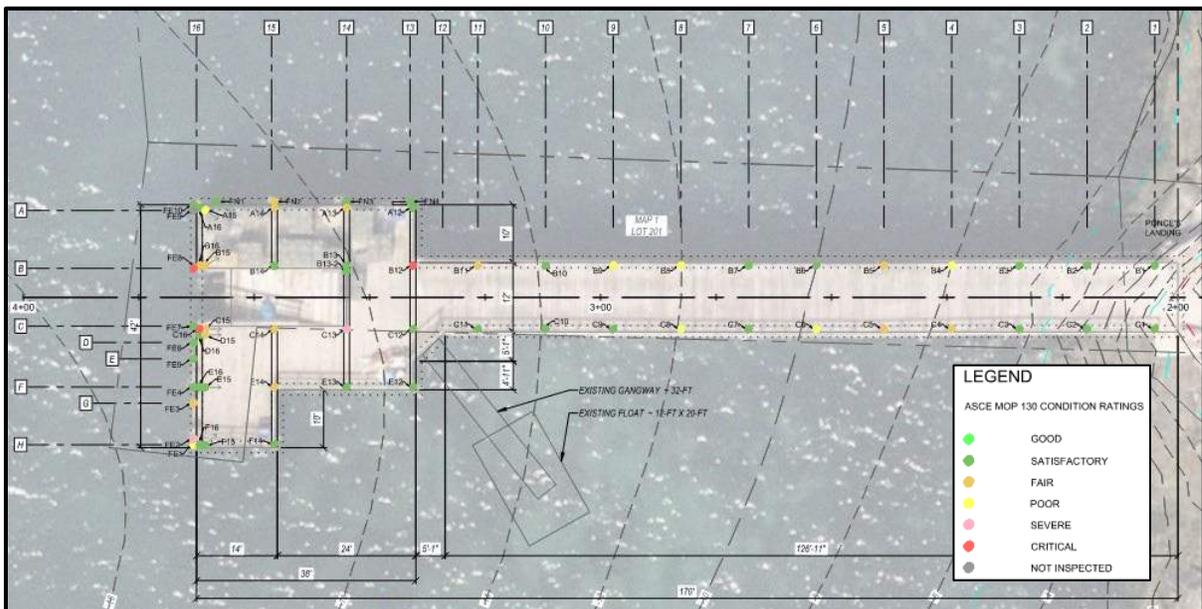
## 2.1 Inspection Observations

### 2.1.1 Piles

There are a total of 62 existing piles which include 48 timber support piles beneath the pier and 14 fender piles around the pier head. The piles vary in age, condition, and material indicative of a history of intermittent repairs. Piles are in Poor condition with conditions ranging from *satisfactory* (B) to *critical* (F). A summary of pile condition ratings is provided in Table 4 below. Full ratings for all piles are provided in Appendix A. Pile Conditions are depicted in Fig. 4 which is also included in Appendix B. In total twelve (12) piles were given condition ratings of *poor* (D) or worse and are recommended to be replaced.

**Table 4. Condition Assessment Ratings for Piles**

MOP 130 Condition Rating	A Good	B Satisfactory	C Fair	D Poor	E Severe	F Critical	NI Not Inspected	Total
Quantity of Piles	0	35	14	7	2	3	1	62



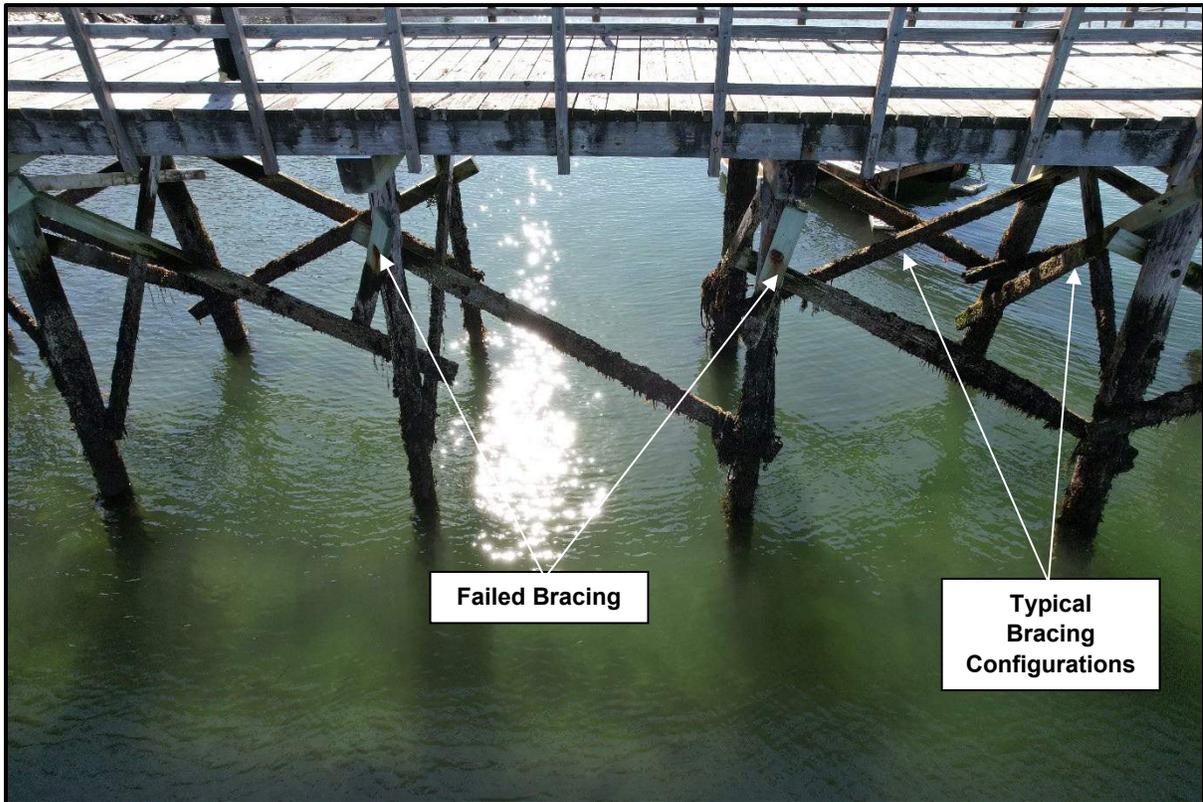
**Fig. 4 – Pile Condition Plan**

### 2.1.2 Bracing

Diagonal bracing is installed between piles and bents in both longitudinal and transverse directions. The bracing varies in size including 3x8, 3x10, and 4x10 timber sections. The bracing is generally in *fair* (C) condition, except as noted below.

There are six locations where bracing was missing or broken which were rated *critical (F)* and require replacement. These locations (referenced to pile location) are: B12-C12, B11-B21, FN2-FN3, F14-F15, E13-E14, and C8-C9.

There are several locations where the bracing has been recently replaced as can be observed by the color of the newer timbers and relative lack of marine growth. These are in *satisfactory (B)* condition. Refer to Fig. 5 for typical bracing conditions.



**Fig. 5 – Bracing Conditions**

### **2.1.3 Pile Caps / Stringers**

The pile caps consist of 12x12 nominal timber sections. The pile caps are in *fair (C)* condition. Some pile caps have been replaced recently. There are several locations where the pile caps have significant splitting including above pile B5, B11, B14-C14, and C9. See Photo 11 for example.

The stringers are in *satisfactory (B)* condition with minor isolated defects not observed to require repair. See Photos 15 through 18. Within the pier approach there are five 4x12 stringers that are typically spaced at 36 inches on center. The stringers in the pier head are 4x12 and 6x12 at varied spacing up to 36 inches on center.

### 2.1.4 Decking

The decking consists of 4x10 timber boards installed transversely across the width of the pier. The decking is generally in *fair (C)* condition. Localized areas of decking were observed where decking has broken or severely rotted and is in *poor (D)* to *severe (E)* condition. Some of these areas have been covered with plywood as an attempted repair. Forty sections of the timber decking are recommended for replacement. Deck boards were also observed with loose fasteners in many locations that are recommended to be refastened.

### 2.1.5 Pier Head Loading Ramp

A loading ramp is located at the pier head. The loading ramp transitions the pier deck to a lower elevation (See Fig. 6 below). The entire ramp is severely deteriorated including the stringers – some of which have 100% section loss, decking – some of which is missing entirely, and connection to support piles – which is compromised by the severe section loss of timber framing. This entire area is rated in *critical (F)* condition. It is recommended that use of this area be prohibited and access restricted.



Fig. 6 – Pier Head Loading Ramp Condition

### **2.1.6 Railings**

The railings consist of 4x4 posts at approximately 4-foot spacing, with a 2x6 top rail, 2x4 top rail support, 2x4 midrail, and 2x4 low rail. The railings are generally in *fair (C)* condition. Occasional loose connection points were observed. There is no railing present along the west or north face of the pier head.

There are no vehicular curbs installed along the edges, which is a safety concern and potential code-compliance issue for a pier that supports vehicular use.

### **2.1.7 Wales and Chocks**

The west face fendering includes wales and chocks near the high water elevation. Where present, the wales and chocks are in *fair (C)* condition. There is evidence of timber splitting in several locations. The high-water wale and chocks were missing along the west face in the area north of the loading ramp (piles FE8 to FE10).

### **2.1.8 Fasteners / Connections**

The fasteners/connections are in *poor (D)* condition. There are many instances of rusted bracing hardware that has failed and should be replaced.

### **2.1.9 Gangway and Floating Dock**

The aluminum gangway is 32-feet-long by 4-feet-wide and connects the floating dock to the pier. In general, the gangway and floating dock are in *fair (C)* condition. Defects noted on the gangway include:

- The lower gangway transition plate is missing. This presents a trip hazard and is not compliant with an ADA accessible route.
- There is no wearing plate installed on the float. This is a durability issue and will reduce the lifespan of the timber floating dock decking.
- There are several locations on the gangway where there are failed welds, most noticeably between the vertical plate and surface plate.
- There are several missing strips of traction wood.
- The decking where the gangway meets the pier is in *poor (D)* condition.

The floating dock is approximately 12-feet-wide by 20-feet-long. The floating dock is *fair (C)* condition. Defects noted on the floating docks include:

- The face boards of the floating dock have sustained some damage due to boat impact.
- The fendering system on the dock face is in *poor (D)* condition.
- The decking of the floating dock is worn but is in *fair (C)* condition.

### 3. Evaluation and Assessment

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An evaluation of the pier was undertaken to assess the structural capacity in existing conditions. This information was used to inform the recommended repairs and operational restrictions. An analysis was initially performed of the structure based on its original member sizes and conditions. Reductions were then incorporated to account for observations of the October 2022 inspection to analyze the load capacity of the structure in its current condition. The analysis is summarized below. Additionally, consideration was given to the risks of flood damage due to the low elevation of the structure. Evaluation findings are reported in the following sections.

#### 3.1 Loading Criteria

The pier is used for pedestrian and vehicular access, applicable vertical dead, live, and snow load criteria are summarized below based on International Building Code 2015, which is adopted by reference as part of the Maine Uniform Building and Energy Code. Additional live load criteria are provided from ASCE 50 – Planning and Design Guidelines for Small Craft Harbors which provides design criteria for marine piers.

**Table 5. Pier Deck Loading Criteria**

Load	Value
Dead Load	Based on weight of components
Live Load (per IBC 2015)	Pedestrian: <ul style="list-style-type: none"> <li>• 100 psf uniform for public spaces</li> </ul> Vehicular: <ul style="list-style-type: none"> <li>• 250 psf uniform, 8000 lb concentrated load</li> </ul>
Live Load (per ASCE 50)	Restricted Access (limited pedestrian use only) <ul style="list-style-type: none"> <li>• 50 psf</li> </ul> Unrestricted Access (golf cart and car/pickup) <ul style="list-style-type: none"> <li>• 100 psf</li> </ul> Tractor-trailer/Fire truck <ul style="list-style-type: none"> <li>• 250 psf uniform</li> </ul>
Snow Load	50 psf ground snow load

#### 3.2 Analysis Findings

The pier was first analyzed for total live load capacity in the original design conditions based on existing member sizes and layout. Reductions were then applied to the capacity to account for observed deterioration and defects existing condition and with reductions taken to the pier capacity to account for the level of deterioration that has been observed.

In the current condition, the pier superstructure is estimated to have a live load capacity of **45 psf**. The limiting factor in this capacity is the flexural strength of the 4x12 timber stringers that support the pier spans. **This capacity is insufficient to meet code requirements for unrestricted pedestrian or vehicular use.**

During the inspection, twelve (12) piles were identified in poor, severe, or critical condition. At these locations support for the superstructure is compromised resulting in further reduction to the capacity of the pier. This is of particular concern in areas where there is little redundancy in the pier layout, and locations where support there are multiple adjacent piles in poor condition. Bents 4/5 and Bents 8/9 are two areas where these issues exist. **As a result of the pile conditions, sections of the pier beyond Bent 3 have limited remaining capacity to support safe vehicular and pedestrian use and operational restrictions must be implemented.**

In addition to structural deficiencies and maintenance requirements, the structure is at-risk of damage during flooding and severe storm events due to its low elevation. Based on a survey conducted during GEI's inspection, the pier deck elevation varies between +9.9 feet and +10.4 feet NAVD88. These elevations place the pier deck 3.4 feet to 3.8 feet above the Highest Annual Tide, 1.0 feet to 1.5 feet above the 1% annual chance Stillwater, and 9.7 feet to 10.1 feet below the preliminary Base Flood Elevation (100-year flood). These elevations place the pier superstructure at risk of exposure to uplift and lateral forces from high water elevations and wave action. The pier does not utilize hold-down brackets for pile-to-pile cap or pile cap-to-stringer connections so there is limited resistance to uplift loading. The condition of the pile bracing with many deteriorated or broken sections also reduces the lateral capacity of the pier and increases risk of damage from wave action. Note that analysis for the existing pier does not include consideration for sea level rise, given that the remaining life span is understood to only be 5 to 10 years. There is potential for flood risks to worsen significantly beyond this time, which must be considered in the design for the replacement structure.

In the present condition, the pier has significant issues that impact the ability to maintain safe use of the structure. GEI understands that the Town intends to completely replace the pier in the next 5 to 10 years. If the facility is to remain in operation until this occurs, substantial repairs will be needed to address deficiencies in the pier condition and structural capacity. Recommendations for immediate usage restrictions, short-term repairs, and long-term replacement are provided in the following section.

## **4. Recommendations**

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A list of recommendations has been developed based on the defects identified during the inspection and evaluation that has been completed. The recommendations are presented in the following categories:

1. Immediate Usage Restrictions
2. Short-term repairs (recommended in the next year and prior to resuming use of pier)
3. Continued routine inspections
4. Structure replacement

### **4.1 Immediate Usage Restrictions**

Given the substantial defects and limitations on load capacity of the pier, it is recommended that the following restrictions be put in place and enforced immediately:

1. No use of the loading ramp on the pier head should be allowed. It is recommended that the top and bottom of the ramp be boarded off to prevent access.
2. No vehicular loading of the pier deck should be allowed. It is recommended that a locked gate or barriers be installed at the shore end of the pier to prevent vehicular use.
3. Pedestrian loading should be restricted to no more than 10 people per span at any given time and light equipment such as wheelbarrows or hand carts. Signage should be installed to indicate these restrictions.
4. Berthing at the pier head should be limited to only small vessels in calm conditions to limit loading imposed on the pier.

### **4.2 Short-Term Repairs**

The following short-term repairs should be addressed within the next year and prior to resuming any increased use. Note that these repairs are intended to be the minimal repairs to keep the pier operational for the next 5 to 10 years with operational/access restrictions in place while full replacement of the pier is programmed. Additional short-term repairs would be recommended if a longer service life or increased operational conditions are needed.

1. Piles:
  - a. Any piles that rated *poor (D)* or worse should be replaced in-kind. In total, twelve piles have been identified for replacement.
2. Bracing:
  - a. Replace all broken/missing sections of diagonal bracing with new 4x10 timber sections. There are at least 7 locations with broken/missing diagonal bracing.
3. Pier:
  - a. Replace broken/severely deteriorated deck boards, approximately 40 locations.
  - b. During the deck replacement, it is recommended that the contractor walk the entire pier and identify any loose boards and securely fasten them.
  - c. Secure loose handrail and replace missing handrail
  - d. If vehicular use is to be resumed on the pier, install code-compliant edge protection including vehicular curbs.
  - e. If use of the pier head loading ramp is to be resumed, this area of the pier will require full replacement.
4. Gangway:
  - a. Replace decking at gangway landing location on pier.
  - b. Replace gangway wear plate on floating dock.
  - c. Replace lower gangway transition plate.
  - d. Replace missing pieces of traction wood.

Proposed repairs are summarized, and budgetary/rough order of magnitude cost estimates are provided in Table 6.

**Table 6. Summary of Short-Term Repairs**

<b>Location / Work Item</b>	<b>Unit Cost</b>	<b>Quantity</b>	<b>Unit</b>	<b>Cost</b>
Replace piles rated poor (D) or worse	\$5,000	12	EA	\$60,000
Replace (7) sections diagonal bracing	\$4,000	7	EA	\$28,000
Replace damaged deck boards on pier	\$250	40	EA	\$10,000
Refasten loose deck boards	\$1,000	1	LS	\$1,000
Replace missing handrail on pier	\$200	40	LF	\$8,000
Secure loose handrail on pier	\$5,000	1	LS	\$5,000
Replace decking at gangway landing on pier	\$500	1	LS	\$500
Gangway Repairs	\$2,000	1	LS	\$2,000
Contractor mobilization and demobilization	\$30,000	1	LS	\$30,000
<b>Total</b>	---	---	---	<b>\$144,500</b>
<b>30% Contingency</b>	---	---	---	<b>\$43,400</b>
<b>Total Budgetary Estimate</b>	---	---	---	<b>\$187,900</b>

### 4.3 Future Inspections

Marine structures are subject to severe exposure and will experience ongoing deterioration over time. Regular inspection is important to identify deterioration and repair needs.

Based on the age, condition, and exposure of the structure, the maximum interval between routine inspections that is recommended by ASCE MOP 130 is 1 to 3 years. Given the significant number of defects and limited remaining life, GEI recommends that the Town plan for annual inspections going forward. Complete above and underwater inspection may not be required for all routine inspections. For frequent inspections a topside walkthrough and boat drive by may be sufficient and can be conducted more efficiently, however full inspections are recommended every 2 years. Additionally, the Town should plan for inspections after significant storm events to identify any damage that may have occurred.

### 4.4 Long-Term Replacement

GEI understands that the Town wishes to proceed with a full replacement in 5 to 10 years. As part of the current project, GEI will be preparing concept level designs and budgets for the long-term replacement, so this work is not included in the current report. For the full replacement, key improvements to the design will need to include sufficient live load capacity for vehicular and public pedestrian access, pier elevation and construction to resist flood exposure including the effects of sea level rise, and improvements to the pier layout and features to meet the Town's current requirements for capacity and features. These will be addressed during the concept design process for the pier replacement.

## 5. Conclusion and Limitations

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This report has been prepared to document the observations made by GEI Consultants, Inc. during the field inspection of Ponce's Landing in October 2022. Existing conditions have been documented, defects have been identified, and recommendations have been made for repair and operation restrictions. GEI understands that the aim of this inspection is to make recommendations that will be incorporated into an upcoming repair project that the Town intends to undertake within the coming 5 to 10 years.

Conditions reported herein represent the observations of GEI's inspection team at the specific time of the inspection and under the conditions encountered. Changes to conditions and/or availability of additional data may require re-evaluation of the recommendations of this report during later stages of implementation.

The investigation was limited to visual and tactile non-destructive evaluation. No destructive evaluation was completed, and no elements of the structure were removed to inspect concealed conditions. Consequently, there is potential that additional defects may be identified upon disassembly or further inspection. Repair recommendations contained herein are preliminary and intended for general budgeting purposes. The actual method of repair must be left to subsequent design effort and the discretion of the Engineer of Record and may require modification as detailed design is undertaken. The recommendations include rough order of magnitude cost estimates associated with the recommended repairs. The cost of individual line items is based on the context of the overall project. It should be anticipated that costs for individual items taken separately would be greater.

This report has been prepared for the exclusive use of the Town of Long Island for the sole purposes stated herein. Any use other than intended may invalidate findings or recommendations.

Please contact GEI Consultants, Inc. should any questions arise with the contents of this report.

# Appendix A

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## Inspection Tables



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<b>By</b>	EEJ	<b>Chk.</b>	
<b>Date</b>	11/17/2022	<b>Date</b>	

<b>Project No.</b>	2203222	<b>Document No.</b>	--
<b>Subject</b>	Pile Condition Rating Table		

BENT	PILE	CONDITION ASSESSMENT RATING
1	B	B
1	C	B
2	B	B
2	C	B
3	B	B
3	C	B
4	B	D
4	C	C
5	B	C
5	C	C
6	B	B
6	C	D
7	B	B
7	C	B
8	B	D
8	C	D
9	B	D
9	C	B
10	B	B
10	C	B
11	B	C
11	C	B
12	A	B
12	B	F
12	C	B
12	E	B
13	A	C
13	B	B
13	B2	B
13	C	E
13	E	B

BENT	PILE	CONDITION ASSESSMENT RATING
14	A	C
14	B	B
14	C	C
14	E	C
14	F	B
15	A	D
15	B	C
15	C	C
15	D	C
15	E	B
15	F	B
16	A	B
16	B	C
16	C	F
16	D	B
16	E	B
16	F	B
FE	1	D
FE	2	E
FE	3	C
FE	4	B
FE	5	B
FE	6	B
FE	7	B
FE	8	F
FE	9	NI
FE	10	B
FN	1	B
FN	2	C
FN	3	B
FN	4	B

# Appendix B

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## Inspection Plans









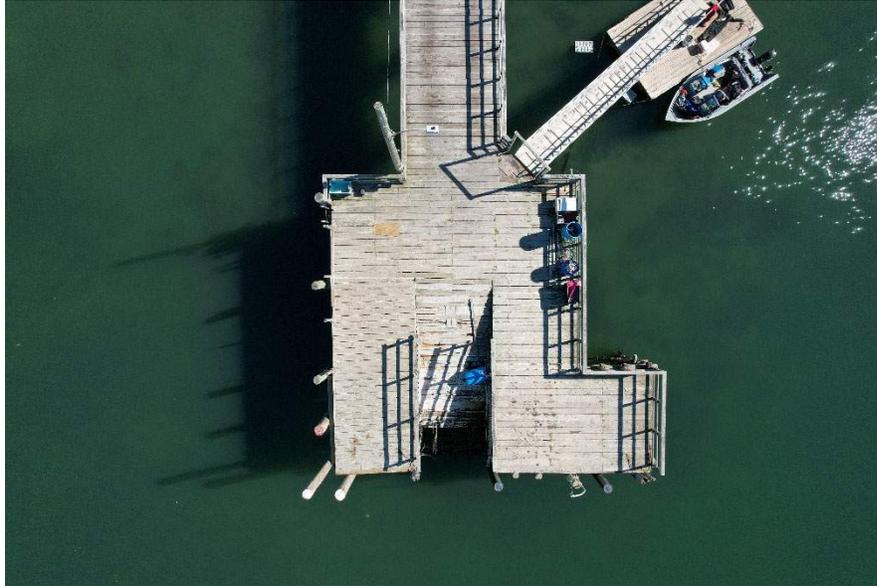
# Appendix C

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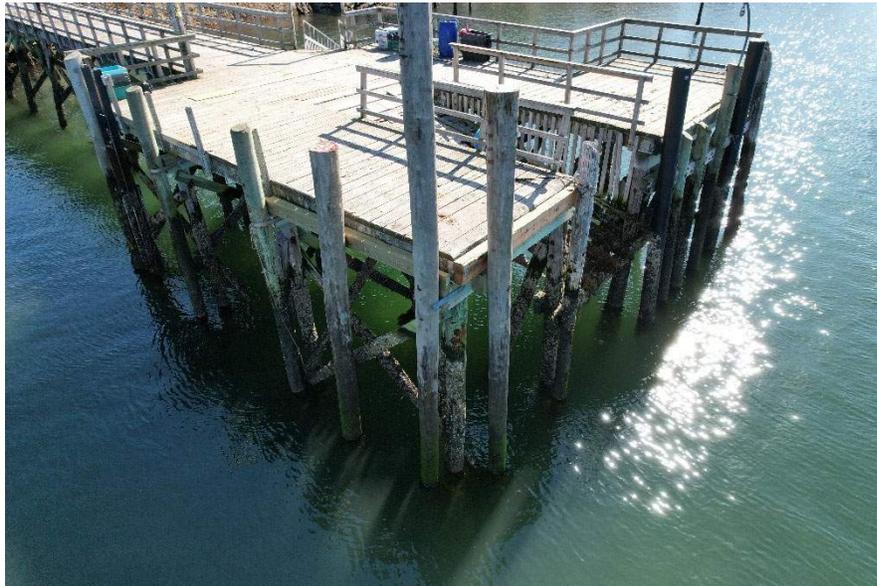
## Inspection Photo Log



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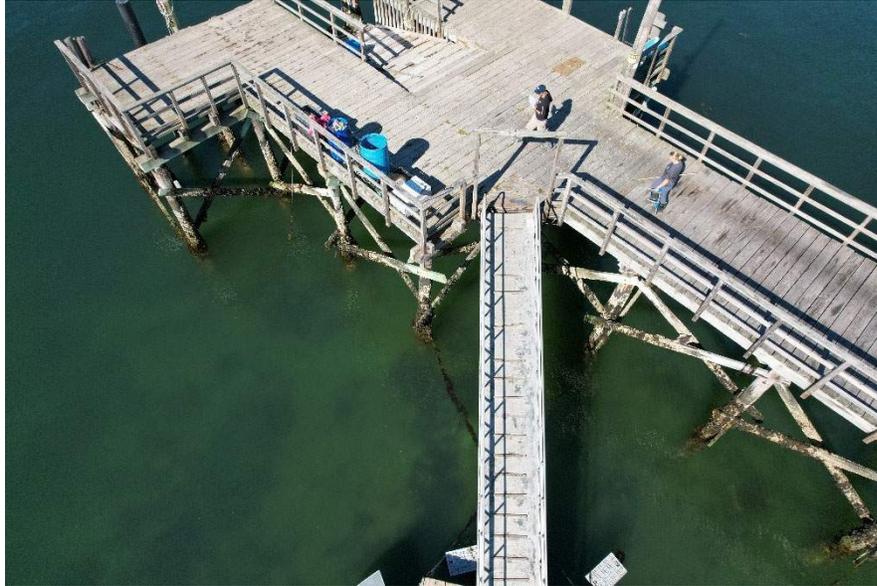
**Photo No. 1:** Overview aerial photo of Ponce's Landing.



**Photo No. 2:** Aerial view of Northern and Western faces of the pier.



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**Photo No. 3:** Aerial view of the Southern face of the pier.



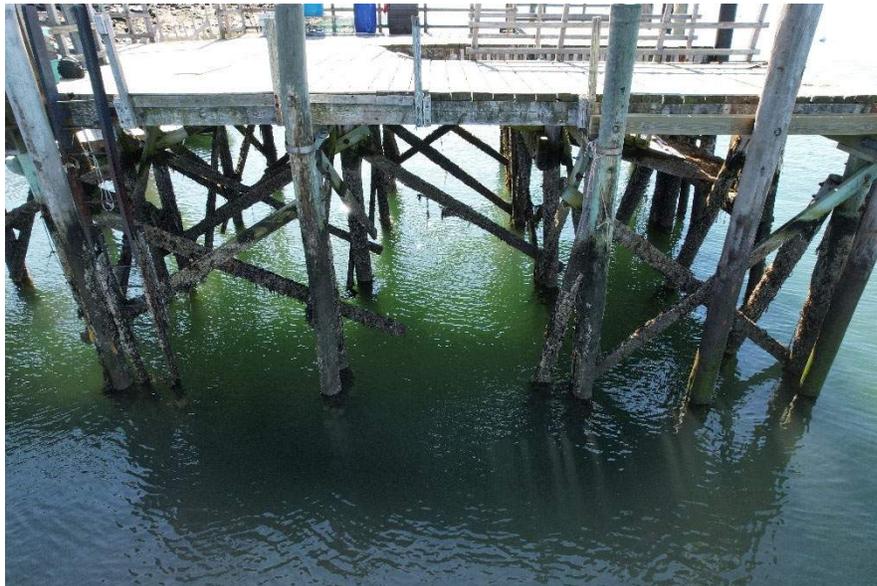
**Photo No. 4:** Aerial view of pier connection to land.



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**Photo No. 5:** Aerial view of Western face.



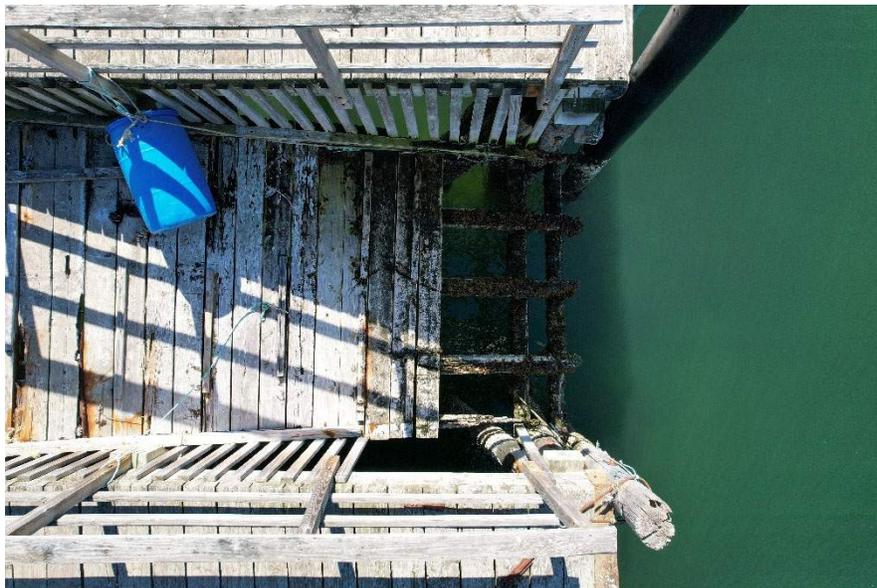
**Photo No. 6:** Northern face of pier head.



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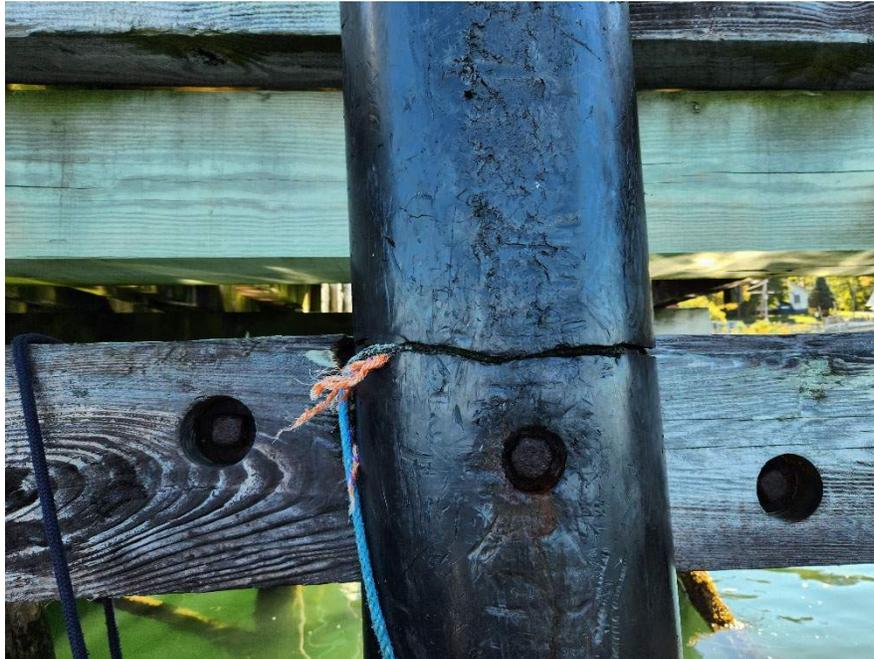


**Photo No. 7:** Northeastern corner of pier head.

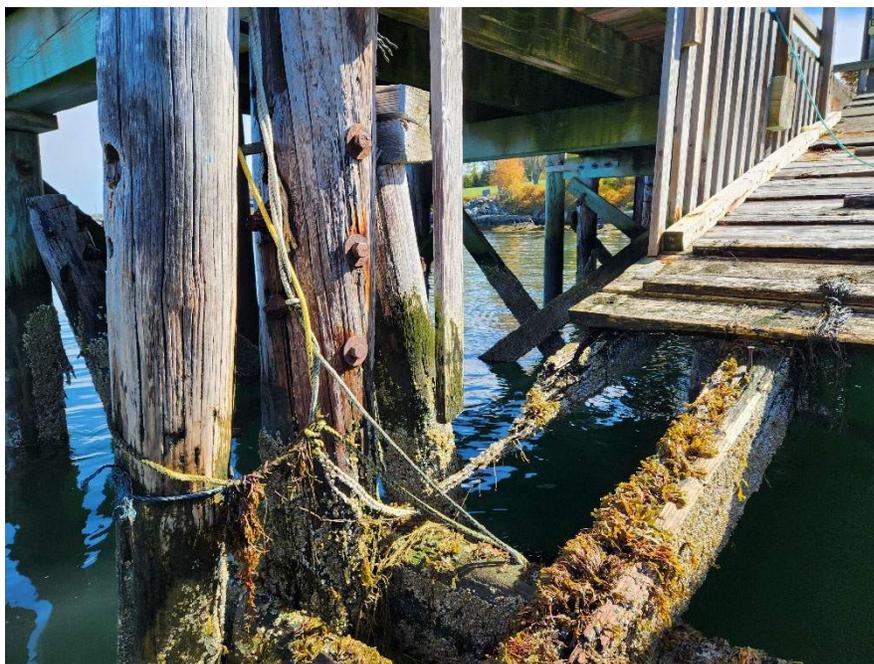


**Photo No. 8:** Aerial view of damaged loading ramp.

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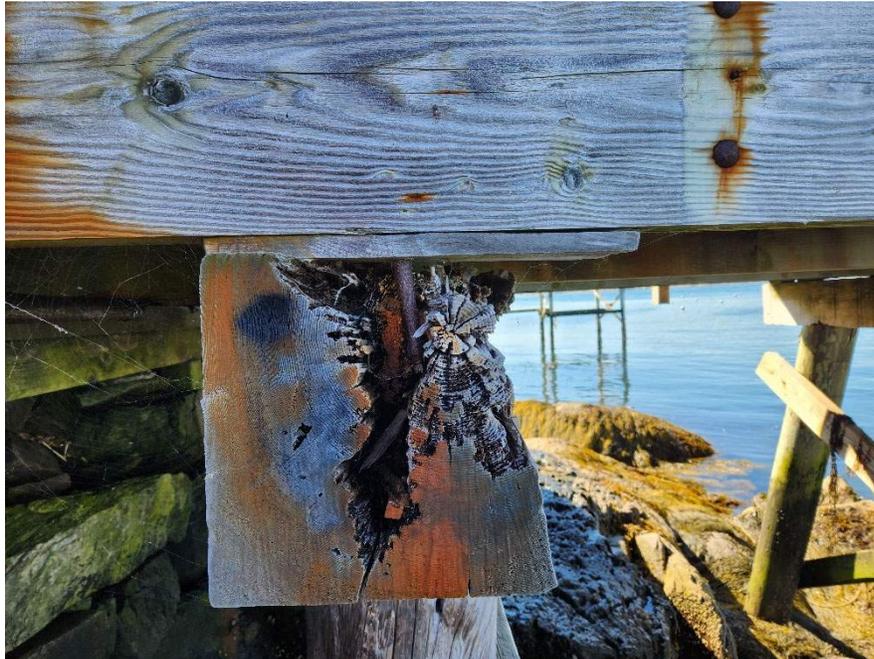


**Photo No. 9:** Composite pile with horizontal splits.



**Photo No. 10:** Deterioration of loading ramp stringers and planking.

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**Photo No. 11:** Pile cap in deteriorated condition. There are several pile caps in this poor condition.



**Photo No. 12:** Pile with severe checking, splitting, and section loss.

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**Photo No. 13:** Cracking on top of composite piles.



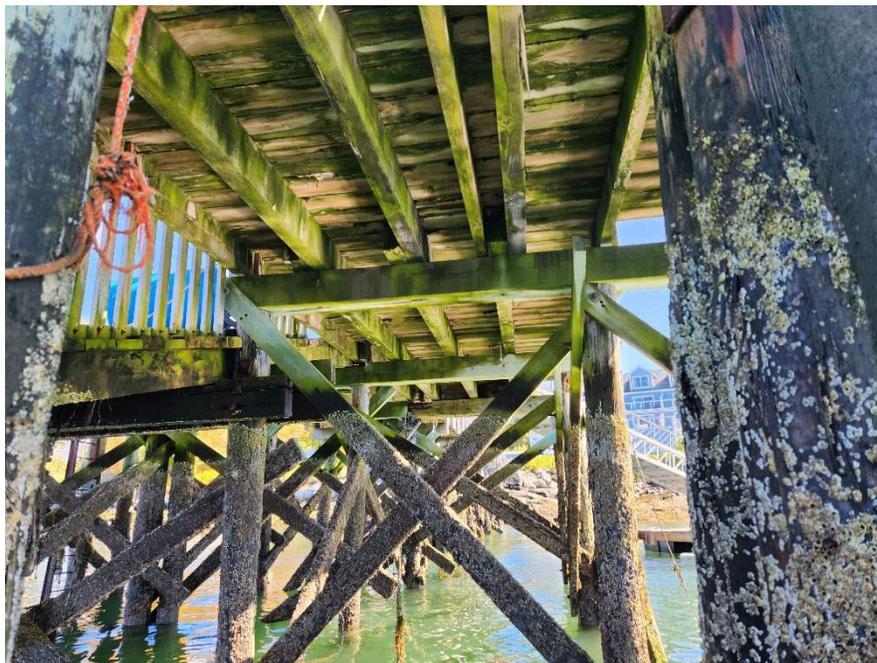
**Photo No. 14:** Significant penetration depth with screwdriver shows major splitting of timber piles.



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**Photo No. 15:** Bracing missing in several locations between bents.



**Photo No. 16:** Underside of Western face of pier.

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**Photo No. 17:** Bracing between pile bents that has broken and is hanging.



**Photo No. 18:** Underside view of decking failure.

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**Photo No. 19:** Splitting in timber pile.



**Photo No. 20:** Typical conditions of decking on pier. Many locations with patches or significant holes.



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**Photo No. 21:** Missing handrail on Northern face of pier head.



**Photo No. 22:** Piles showing significant section loss and breakage.



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**Photo No. 23:** Severe splitting of pile.