

**MACKINAC ISLAND FERRY COMPANY  
MAIN DOCK EVALUATION**

**FOR**

**CITY OF MACKINAC ISLAND  
MACKINAC ISLAND, MICHIGAN**

**Prepared by:**

**U.P. Engineers & Architects, Inc.  
1701 Dunlap Avenue, Suite B  
Marinette, Wisconsin 54143**

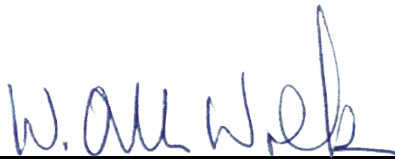
**January 2024**

**MACKINAC ISLAND FAIRY COMPANY  
MAIN DOCK EVALUATION**

**FOR**

**CITY OF MACKINAC ISLAND  
MACKINAC ISLAND, MICHIGAN**

I hereby certify that the structural inspection, conditions study and feasibility report for the above referenced location were prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Michigan.



\_\_\_\_\_  
W. Allen Walker, P.E.

\_\_\_\_\_  
40408

Registration No.

\_\_\_\_\_  
1/31/2024

Date

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1701 Dunlap Avenue, Suite B  
Marinette, Wisconsin 54143

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## **INTRODUCTION**

The following Structural Conditions Study and Feasibility Report is for the seawall and Starline dock located between the City Dock and Marina in the Mackinac Island Harbor in Mackinac Island, Michigan. The dock and seawall are part of the passenger and freight terminal dock, which is owned by Starline Company.

The dock has been in operation since the mid-1800s, the concrete deck was added to the dock in the 1930s. More recently the dock has shown significant deterioration due to higher-than-normal lake levels. At the same time cruise ship mooring has been introduced to the Starline dock which significantly adds to the transverse wind loads while the larger cruise ship is moored along the dock.

The City of Mackinac Island has requested an evaluation of the dock from U.P. Engineers & Architects, Inc. UPEA performed an evaluation of 10/18/2023 and 10/19/2023 with a report that follows.

## **EXECUTIVE SUMMARY**

This dock is not designed to moor the larger cruise vessels listed on page 7 with their large mooring force of 50 to 200 tons. Therefore, we cannot approve or recommend the use of this dock for such a purpose. In order for this dock to support these loads, it would need to go through an extensive and expensive retrofit.

## **SCOPE OF WORK**

U.P. Engineers & Architects, Inc. was retained by Evashevski Law Office for the City of Mackinac Island to perform this structural condition study of the Starline dock at Mackinac Island. The study and feasibility report are being done in preparation of possible repair recommendations or replacement of the existing dock.

This scope of work includes some of the necessary tasks to make proper repair or replacement recommendations to the City of Mackinac Island to assure a safe harbor environment for ferry and large vessel docking at the Starline dock.

Some of the tasks performed for this study include:

1. Landward survey
2. Waterward survey
3. Review of some historic information to determine the age and construction of the dock components.
4. Interview with some local contractors who worked on the dock over the past 20-30 years.
5. Review building inspections on the dock, the terminal building, store and warehouse.
6. Review standard dock design requirements by the unified facilities criteria for piers, wharfs and mooring by the US Department of Defense.
7. Timber pile design and construction manual (Timber Piling Council and American Wood Preservers Institute.)

## **BACKGROUND INFORMATION AND EXISTING DATA**

The historic name of this structure is the Union Terminal Passenger Dock. The estimated date the dock was built is about 1850. The wooden dock was built for passenger service composed of cedar posts, wooded beams and cross bracing. A reinforced concrete deck was added in 1930. This main dock was used for large steamships and smaller ferries.

The Starline Company dock at Mackinac Island is located to the north of the City Dock and to the south of the Mackinac Island Harbor and Marina. The Starline Company Dock extends from the shoreline on the west to the dock end on the east. The dock is approximately 650 feet long. The dock width is about 100 feet wide at the shoreline and about 65 feet wide on the east end. The dock deck is currently about 5 feet above the Lake Huron water level. The Lake Huron water level at the time of the inspection was 579 feet above sea level.

The Mackinac Island Harbor is located on the southern end of the island. The harbor is protected by a manmade break water on the East side made of large boulders and fill that runs Southwardly from Mission point about 1,000 feet. The West side of the harbor is protected by a breakwater that runs South-East from Biddle point approximately 1,000 feet. Round island and Bois Blanc Island offer wave protection to the Harbor from the South. The harbor opening is a little over 1,000 feet across. The Ferry services enter the and leave the harbor through the Southern opening, emanating from the West whether out of Mackinaw City or St Ignace.

The overall depth of the harbor ranges from 40 feet near the harbor entry to 10-15 feet near the ends of the City and Starline docks. The depth of water along the Starline dock range in depth from 17 feet out near the end to about 5 feet near the shoreline. The mean water level has fluctuated over the past 3-4 years to a point of almost 2.5 feet above the normal mean. An overall map of the harbor is shown in Figure 1.

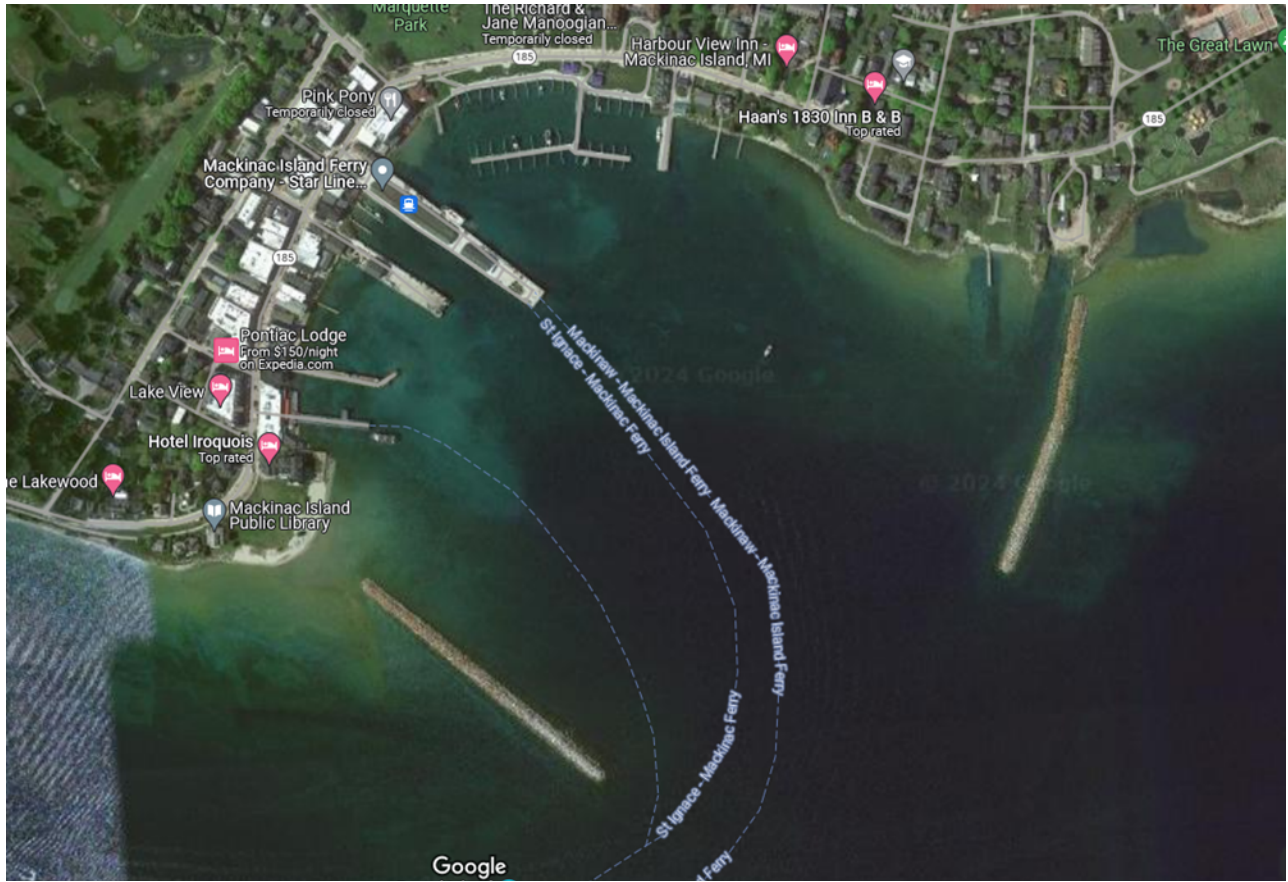


Figure 1.

The Starline Company dock is constructed with the following materials and structural supporting elements:

**Dock:** Concrete slab approximately 4"-5" thick with No. 4 rebar at 2'-0" on center along the edge and presumed wire mesh throughout. The edge of the slab is steel angle 4"x4"x3/8" thick.

**Deck Support:** The concrete deck is supported by 12"x6" timber beams at approximately 6' on center. The 12" strong axis dimension is positioned to support the vertical gravity load. The timber beams run parallel to the overall dock length.

**Beam Framing Support:** The 12"x6" beams are supported by 12"x12" timber girders or pile caps spaced at approximately 8' on center. The girders run perpendicular to the overall dock length.

**Timber Girder Supports:** The timber girders are supported on 12" diameter piles spaced at about 6'-8' on center.

**Connections:** The connections between the various structures were not readily available to view during the inspection. Typically, the dock, beam, girder and piles are connected with 1/2" to 1" diameter lag bolts and/or screws to prevent uplift from wave action.

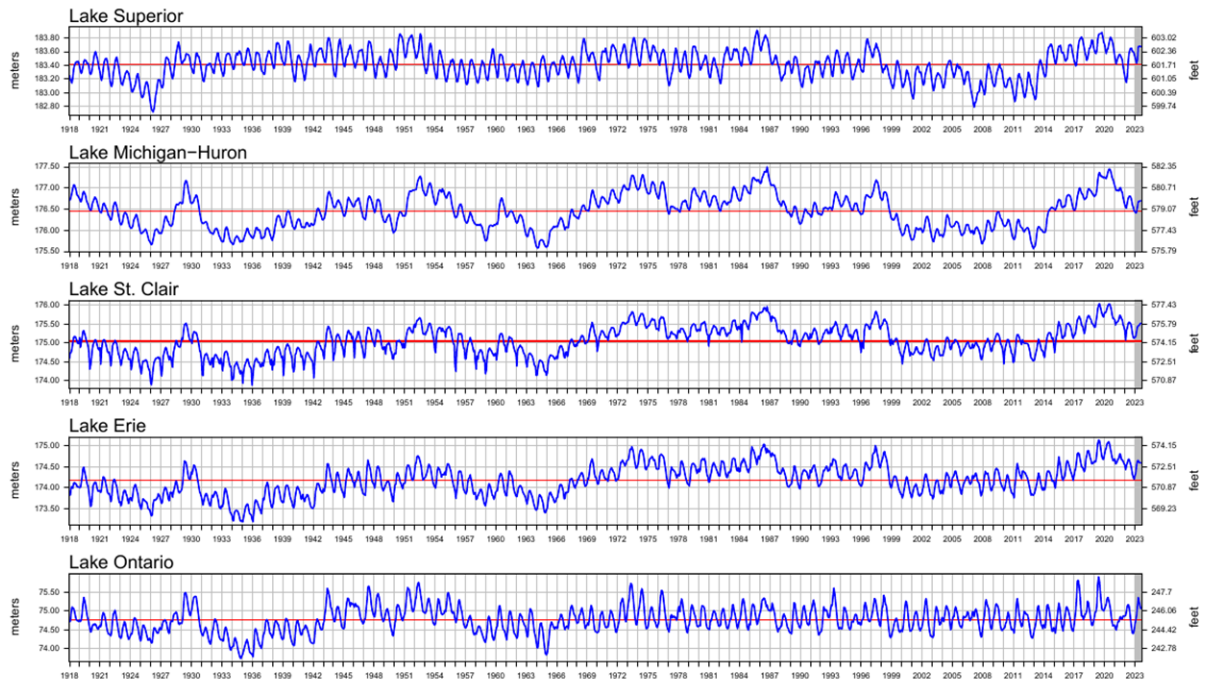
**Recent High Water:** The Lake Huron water level has risen significantly over the past 3 years, an elevation of 582.35 feet above sea level, about 3.28 feet or 39 inches above the monthly mean level of 579.07 feet above sea level. Figure 2 shows the lake level from 1918 to 2023.





### Great Lakes Water Levels (1918–2023)

— Monthly Mean Level    — Long Term Average Annual



The monthly average levels are based on a network of water level gages located around the lakes. Elevations are referenced to the International Great Lakes Datum (1985).

Water levels have been coordinated through 2022. Values highlighted in gray are provisional.

Figure 2.

Over the past few years, the Starline dock has allowed larger cruise ships to dock and moor at the Starline dock. An example of the three larger vessels that have docked are shown in Figure 3. An estimated horizontal mooring force from these larger vessels ranges from 50 to 200 tons.

Three passenger cruise ships that dock Mackinac Island:

**Ocean Navigator**

Length 299 ft

Width 49 ft

Gross Tonnage 4954 gt



**Ocean Voyage**

Length 285 ft

Width 49 ft

Gross Tonnage 4954 gt



**Ocean Explorer**

Length 341 ft

Width 59 ft

Gross Tonnage 8228 gt



Figure 3.

## **GENERAL STRUCTURAL CONDITIONS OF EXISTING SEAWALL, DOCK AND BUILDING**

There were three (3) major items reviewed during this structural inspection:

1. Seawall
2. Dock Structure
3. Terminal and Warehouse Buildings

### 1. Seawall and Dock

#### a. Observations

- 1) The dock is approximately 650 ft long; and varies in width from 100 ft (west end) to 65 ft (east end).
- 2) The condition of the concrete slab is poor.
- 3) The condition of the concrete and timber facing on the dock is poor with several piles that are missing, rotted edge timbers, rotted girders and loose edge angle.
- 4) The dock on the elements north side, west end, appears to be in fair condition with signs of recent reinforcing.
- 5) The seawall on the west end of the dock appears to be in fair condition.

## **DEFICIENCY LIST**

More specifically, the remainder of the dock has several deficiencies that should be repaired for safety reasons. Below is a more detailed list of items that should be addressed:

- 1) East dock end battered piles removed or cut off below deck elevation. No signs of cross bracing under the deck to resist horizontal movement in the dock due to wind loads on large vessel or dock buildings.
- 2) Several areas along the south edge of the dock from west shoreline out to the east end have missing piles, this would apply to a few areas on the north end and the east end too. The missing piles in some cases have been replaced with shortened piles down to plank benching which is deflecting to the point that support and resistance is not available.
- 3) Pile deterioration appears in several areas at or near the water line. The Lake Huron water level has fluctuated significantly over the past few years which has caused additional deterioration from air/water exposure, ice damage and wave height changes.
- 4) Several bumper piles on the north side of the dock appeared cracked and damaged to the point that these will be safety concerns and may not work as intended.
- 5) The main girder or cap beam that sits on the piles to help support the framing and deck above are deteriorated as shown in several photos. The supporting capability of these members is significantly compromised and is a safety concern.
- 6) The secondary edge beams show excessive deterioration along the edge of the dock that supports the concrete deck above.

- 7) This deteriorated condition of the dock framing system will continue to be a safety issue as the concrete deck and edge angle fall apart and create further safety issues.
- 8) Organic growth in certain areas, appear to be causing further deterioration of the dock framing system. These areas need to be cleaned up or the impacted members removed.
- 9) There are several areas along the dock where the edge angle adjacent to the concrete has been bent and are now no longer performing as intended. The angles sticking out away from the dock are a safety issue.
- 10) There is approximately a loss of 1 inch concrete deck along the terminal building on the south side of the dock. This appears to be due to excessive wear and tear from carriage traffic. Loss of 20% of the concrete surface would be considered excessive and should be addressed.
- 11) There is excessive deck deterioration especially near the east end of the dock. The deterioration is in the form of cracking at line bollards, spall on the surface and separation of the concrete deck into individual pieces. In addition, the deterioration has caused uneven walking surfaces, which is a tripping hazard and safety concern.
- 12) Overall, the northwest section of the dock appears to be maintained better than the remainder of the dock. Several of the areas of concern are safety related not only for large vessels mooring but for the safety of the public and employees using the dock.

## **STRUCTURAL RECOMMENDATIONS**

1. **Battered Piles:** There are several battered piles that have seen significant damage and have been disconnected from the concrete dock. For better horizontal resistance of the cruise ship loads, these piles should be repaired, extended and reconnected to the concrete deck.
2. **Missing piles:** there are several areas where piles are missing and extension benching has been installed. The benching in these areas should be removed and new piles driven along with new framing and decking.
3. **PILE deterioration:** Several piles are completely deteriorated. These piles should be removed down to the lake bottom and new piles installed as needed.
4. **Damaged bumper piles:** Several bumper piles have been damaged. The top of these piles should be removed and replaced with new.
5. **Main girder or cap beam:** Several cap beams have deteriorated beyond repair. These beams should be removed and replaced with new cap beams.
6. **Secondary edge beams:** Several edge beams have deteriorated. These beams should be removed and replaced with new edge beams.

7. **Organic growth:** There are areas of organic growth from the existing timbers. The organic material should be removed and maintained so further growth is reduced or eliminated.
8. **Edge angle:** There are several areas where the edge angle on the deck is loose or is no longer in place. The edge angle should be replaced.
9. **Approximately a loss of 1 inch concrete deck:** The concrete surface along the south edge of the dock from the west to east end of the terminal building has over 20% of deck lose. It is anticipated that the loss will be over 50% by 2030. This concrete surface should be removed and replaced.
10. **Excessive deck deterioration:** There are areas of excessive cracking, spall and loose concrete deck. These areas should be removed and replaced.

**Note:**

Items highlighted in **red** are short-term repair and should be completed prior to the 2025 tourism season.

Items highlighted in **yellow** are long-term repair and should be completed prior to the 2027 tourism season.

## **FEASIBILITY DISCUSSION**

1. It is our opinion that short term repair program should be completed prior to the 2025 tourism season followed by a long-term repair program that should be completed prior to the 2027 tourism season.
  
2. The short-term repair program by 2025 to include the following items:
  - Battered piles
  - Missing piles
  - Main girder or cap beam
  - Pile deterioration
  - Organic growth
  - Approximately a loss of 1 inch concrete deck
  - Excessive deck deterioration
  
3. The long-term repair program by 2027 to include the following items:
  - Damaged bumper piles
  - Secondary edge beams



**APPENDIX I**  
**HISTORIC RESEARCH SURVEY**

## City of Mackinac Island

### Downtown Intensive Level Historic Resource Survey



#### Address

**Street:** 7271 Huron

**City:** Mackinac Island      **County:** Mackinac

**Zip:** 49757

**Parcel ID Number:** 051-550-047-00

**NHL ID Number:** 738

**GPS Number:** 45.8498961, -84.6177455

**Current Name:** Arnold Terminal Passenger Dock

**Historic Name:** Union Terminal Passenger Dock

#### Evaluation

**District:** Market/Main

**Contributing/Non-Contributing to Potential Local Historic District:** Contributing

**Individually Eligible for National Register:** Yes

#### Description

**Description:** Wooden dock for passenger service comprised of cedar posts and wooden beams and cross bracing, some elements may date from 1850s. Reinforced concrete deck first installed in 1930s.

**Decorative Features:**

**Other Buildings/Features:**

**Landscape Features:**

**History:** Main dock in use for large steamships and smaller ferries. Park and Harbor Commission established funds for concrete paving of passenger dock in late 1930s.

**Area of Significance:** Criteria A, C, D

**Period of Significance:** Island Resort and Park (1870-1930)

**Statement of Significance:** Parts of the dock may date from as early as 1855 based on survey map of that year which shows three docks in the current location. Oral history accounts describe the Arnold transit company's enterprises starting on Mackinac Island in 1877 or 1878, at which time Arnold had purchased the present passenger dock from the Hoban family. During the early 1880's Arnold purchased the neighboring coal dock, originally part of the dock used by the American Fur Company as appears from examination of the 1828 Mullett Survey map of the island. Arnold enlarged the dock, as he also did several times with the passenger dock.

Given the heavy use and adverse conditions on Lake Huron, the high integrity of the structures is remarkable. The 1 ½ story terminal building on the passenger dock is raised on wooden pilings over the water and supported by heavy

#### Property Information

**Date Built:** c. 1850

**Source of Date:** NHL Survey--D / Ximour personal communication 7/99

**Architect/Builder:**

**Style:**

**Historic Use:** Passenger dock

**Current Use:** Passenger dock

#### Materials

**Foundation:** Wooden pilings

**Walls:**

**Roof:**

hewn beams and log posts, some said to come from salvaged docks from Escanaba. The venerable age of the building is conveyed not just through the sagging beams of creeping timbers, but also from the graffiti of travelers and workers painted on the interior walls inside of the baggage area, some dating to 1900.

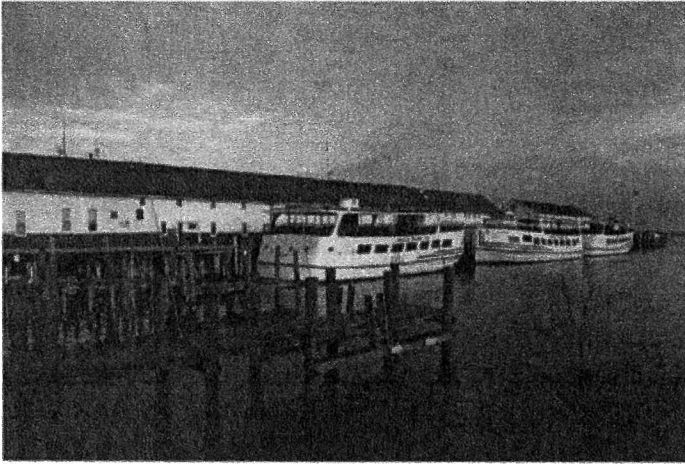
The two docks together served passengers and supported the machinery of steam travel and transit. The freight terminal on the southern end of the passenger dock replaced an earlier building sometime before 1923 based on Sanborn maps. The construction matches that of the terminal as well as that of the warehouse buildings on the coal dock (taking its name from its role as a tendering station for the cord wood, and later, mountains of coal consumed by Great Lakes steamers.) The outer building with its sloped rammed walls supported the fueling operations. Further north on the coal dock is the ice house, an insulated and cavernous space constructed to store ice cut during the winter months from the waters of the bay and used in the packing of fish and as well as refrigeration on ships as well as on the island. Themes: Architecture; Maritime History—Passenger Travel

**Statement of Integrity:** Good integrity to period c. 1880s in location, materials, scale, design, feeling, association.

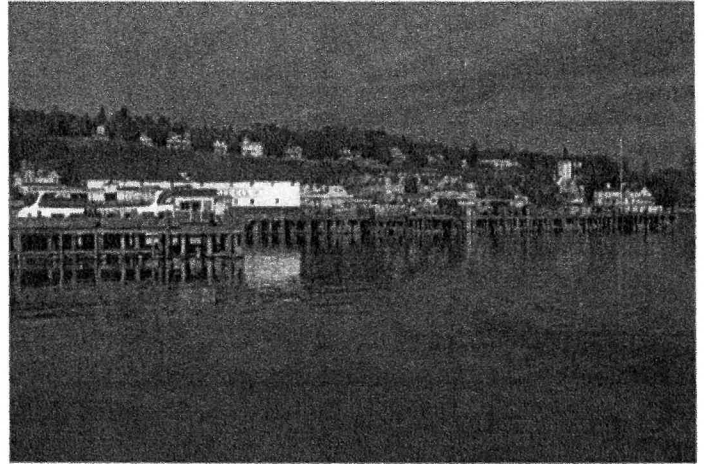
**References:** Otto Lang oral history, MSHP, Petersen Center; Porter, Mackinac: An Island Famous in These Regions (1998); Dunnigan, A Picturesque Situation (2008); Study Committee comments (2/11); Frank Straus email correspondence (2/11)

**Surveyor:** Eric Gollanek **36 CFR61:** yes **Survey Date:** 11/22/2010

**Credit:** Eric Gollanek



7271 Huron Mackinac Island 1.tif



Dockside from Sheplers Mackinac Island 1 .TIF



Dockside from water Mackinac Island 1.tif

# **APPENDIX II DRAWINGS**



# Mackinac Island Ferry Company

| INDEX OF SHEETS |                            |
|-----------------|----------------------------|
| NUMBER          | SHEET NAME                 |
| S001            | SITE PLAN                  |
| S002            | DEFICIENCY MAP             |
| S003            | PROPOSED SHORT TERM REPAIR |
| S004            | PROPOSED LONG TERM REPAIR  |
| P001            | PHOTO MAP 1                |
| P002            | PHOTO MAP 2                |
| W001            | WATER DEPTHS               |
| W002            | WATER DEPTHS ENLARGED      |



## SCOPE OF WORK

### SITE EVALUATION

- LANDWARD OBSERVATION
- SEAWALL
- INTERFACE
- WING WALL
- LOADS
  - DEAD LOADS
  - LIVE LOADS
  - WIND LOADS
- WATERWARD
- DECK
- DECK FRAMING
- PILES
- BRACING
  - HORIZONTAL
  - LONGITUDINAL
- LOADS
  - DEAD LOADS
  - LINE LOADS
  - WIND LOADS
  - FERRY CRUISE/SHIP LOADS
- NEED BACKGROUND INFORMATION
  - YEAR BUILT
  - YEARS MODIFIED
  - HISTORICAL USE

### REPORT

- INTRODUCTION/EXECUTIVE SUMMARY
- SCOPE OF WORK
- BACKGROUND INFORMATION AND DATA
- GENERAL STRUCTURAL CONDITIONS OF EXISTING SEAWALL AND DOCK
- STRUCTURAL RECOMMENDATIONS
- FEASIBILITY DISCUSSION
- APPENDIX I HISTORIC RESOURCE SURVEY
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- APPENDIX III PHOTOS
- APPENDIX IV PROPOSED REPAIRS AND DETAILS
- APPENDIX V OPINION OF COSTS



**MIFC MAIN DOCK EVALUATION**  
**CITY OF MACKINAC ISLAND**  
**MACKINAC ISLAND, MICHIGAN**

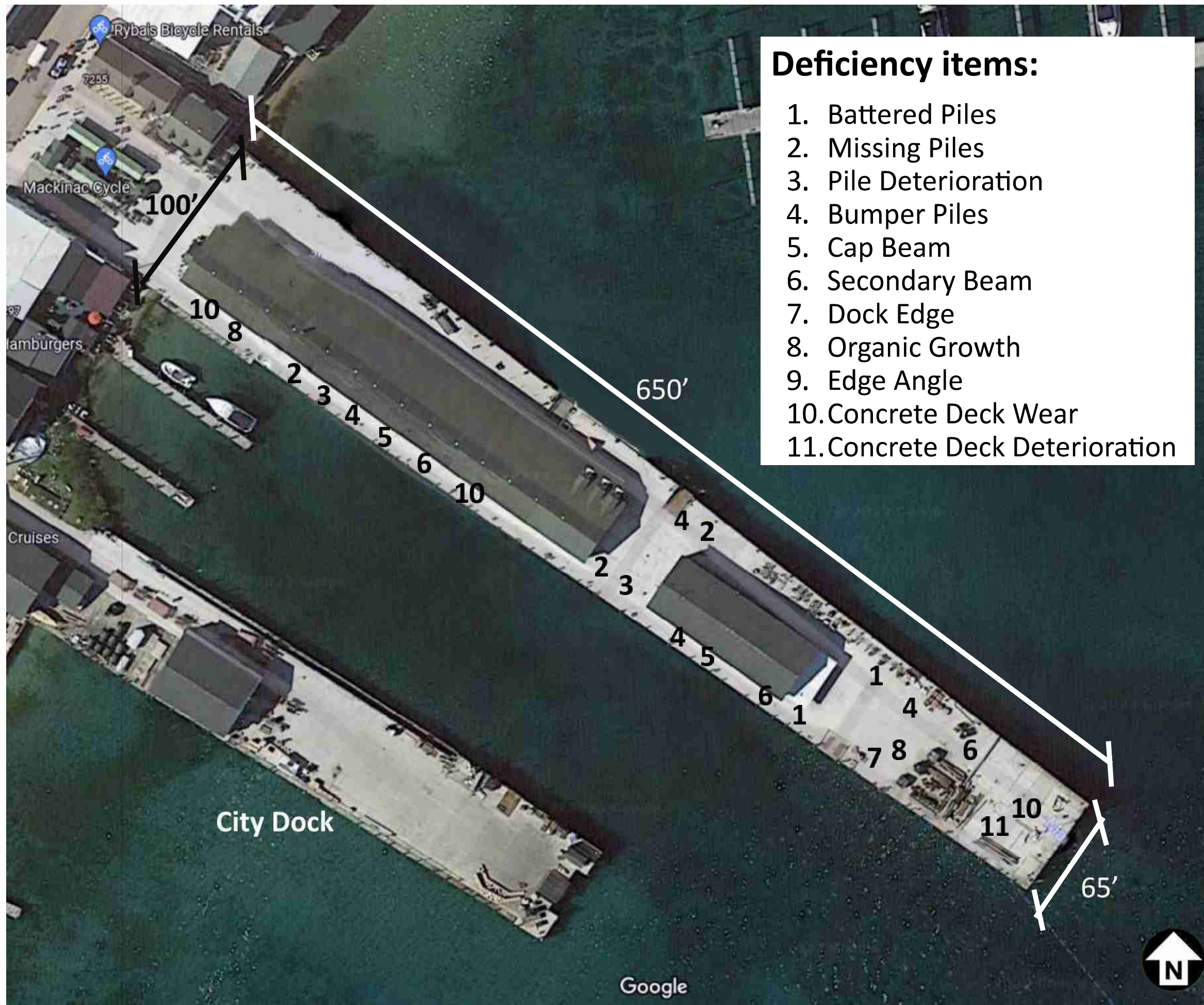
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| PRELIMINARY EVALUATION | 10/17/2023 |
| OWNER REVIEW           | 1/25/2024  |
| EVALUATION REPORT      | 1/31/2024  |

| MIFC MAIN DOCK INSPECTION | DESIGNED BY: |
|---------------------------|--------------|
| CITY OF MACKINAC ISLAND   | AW           |
| PROJECT NO: E115-03495    | DRAWN BY:    |
|                           | NMB          |
|                           | CHECKED:     |
|                           | AW           |
|                           | APPROVED:    |
|                           | AW           |

SITE PLAN

S001





- Deficiency items:**
1. Battered Piles
  2. Missing Piles
  3. Pile Deterioration
  4. Bumper Piles
  5. Cap Beam
  6. Secondary Beam
  7. Dock Edge
  8. Organic Growth
  9. Edge Angle
  10. Concrete Deck Wear
  11. Concrete Deck Deterioration



**MIFC MAIN DOCK EVALUATION**  
**CITY OF MACKINAC ISLAND**  
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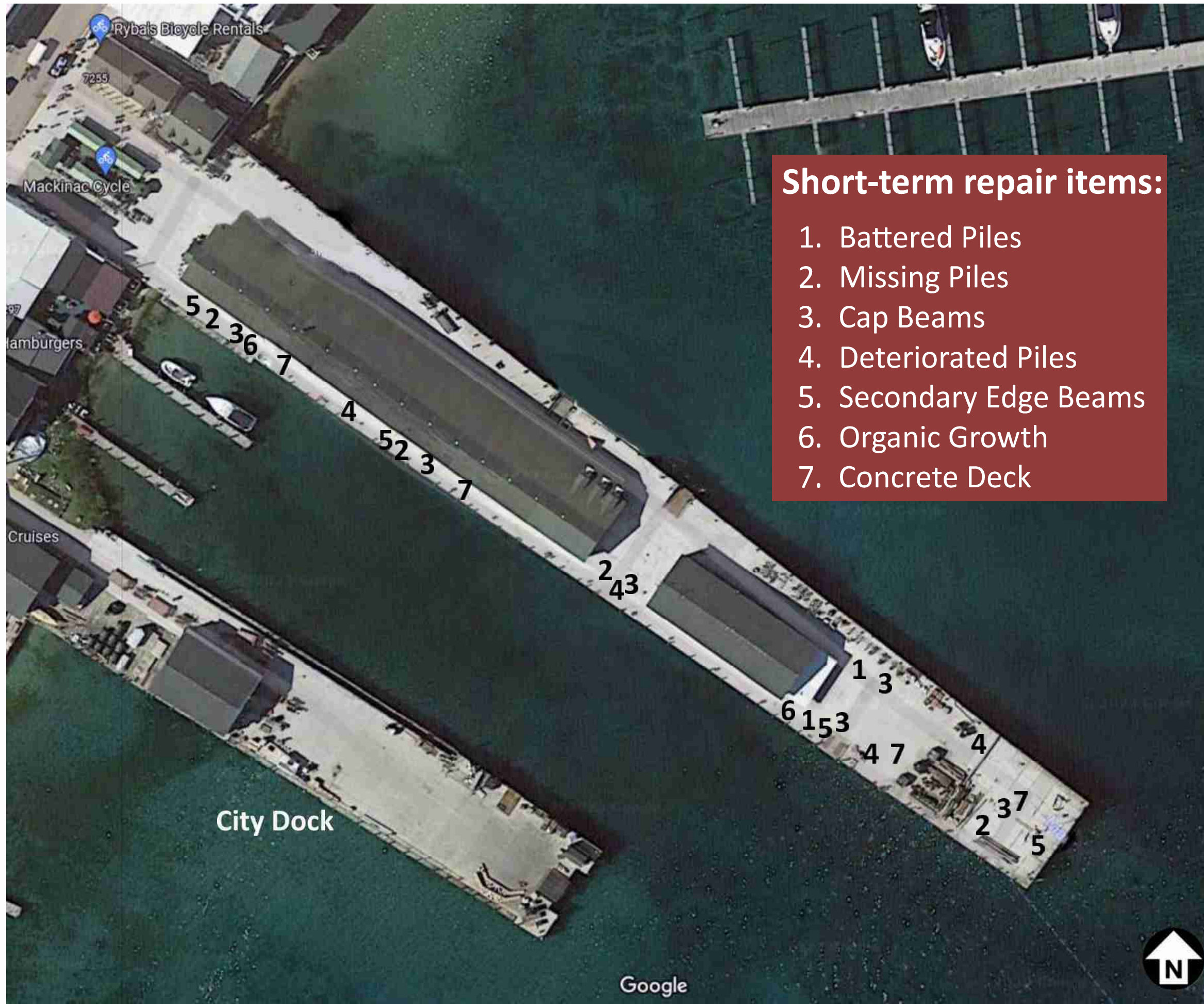
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|                                  | <b>DRAWN BY:</b> NIB          |
|                                  | <b>CHECKED:</b> AW            |
|                                  | <b>APPROVED:</b> AW           |

Deficiency  
MAP

S002





## Short-term repair items:

1. Battered Piles
2. Missing Piles
3. Cap Beams
4. Deteriorated Piles
5. Secondary Edge Beams
6. Organic Growth
7. Concrete Deck



**MIFC MAIN DOCK EVALUATION**  
**CITY OF MACKINAC ISLAND**  
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PROPOSED  
SHORT TERM  
REPAIR

S003



Google





**Long-term repair items:**

1. Bumper Piles
2. Edge Angle



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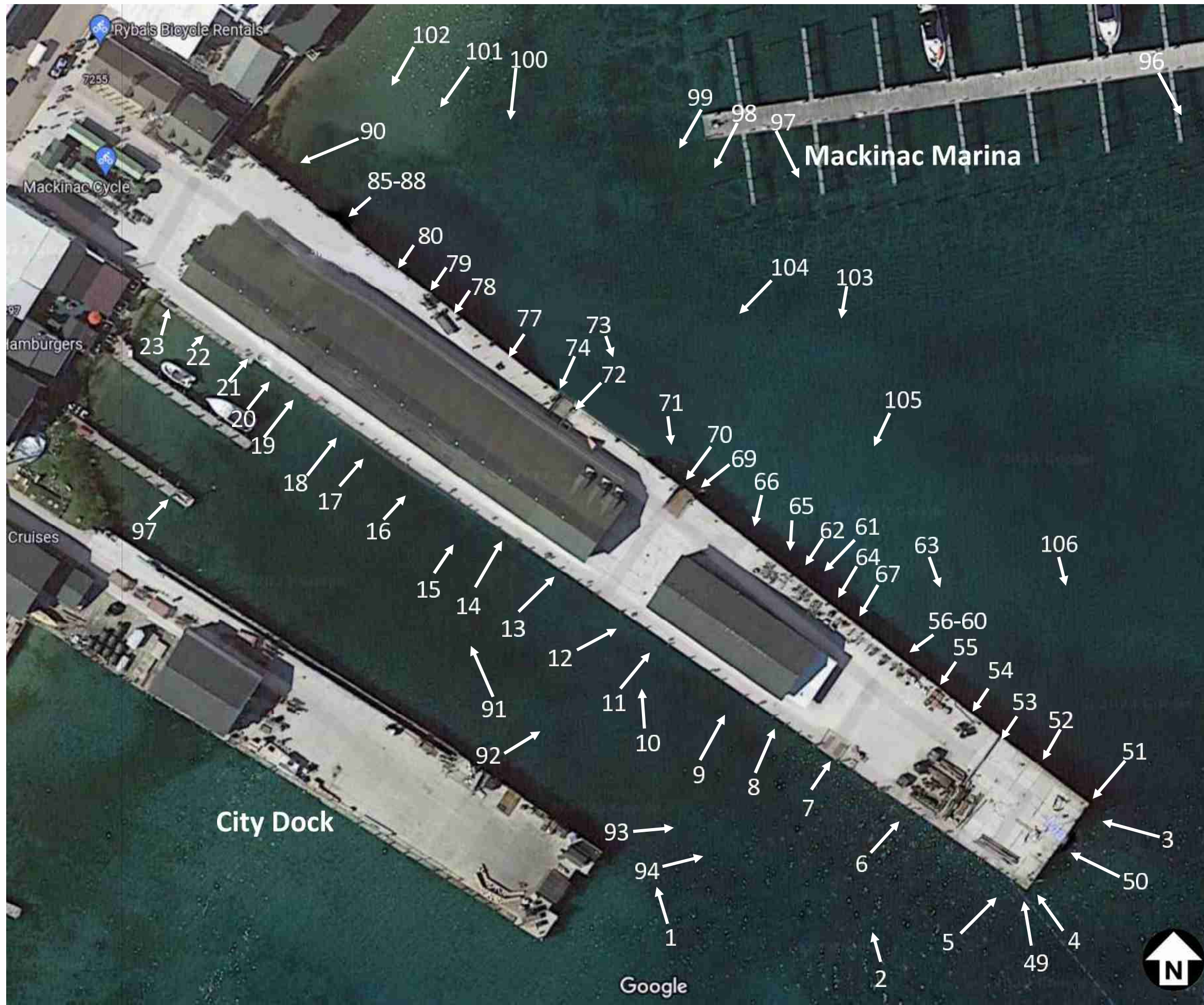
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**PROPOSED  
LONG TERM  
REPAIR**

S004





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CITY OF MACKINAC ISLAND  
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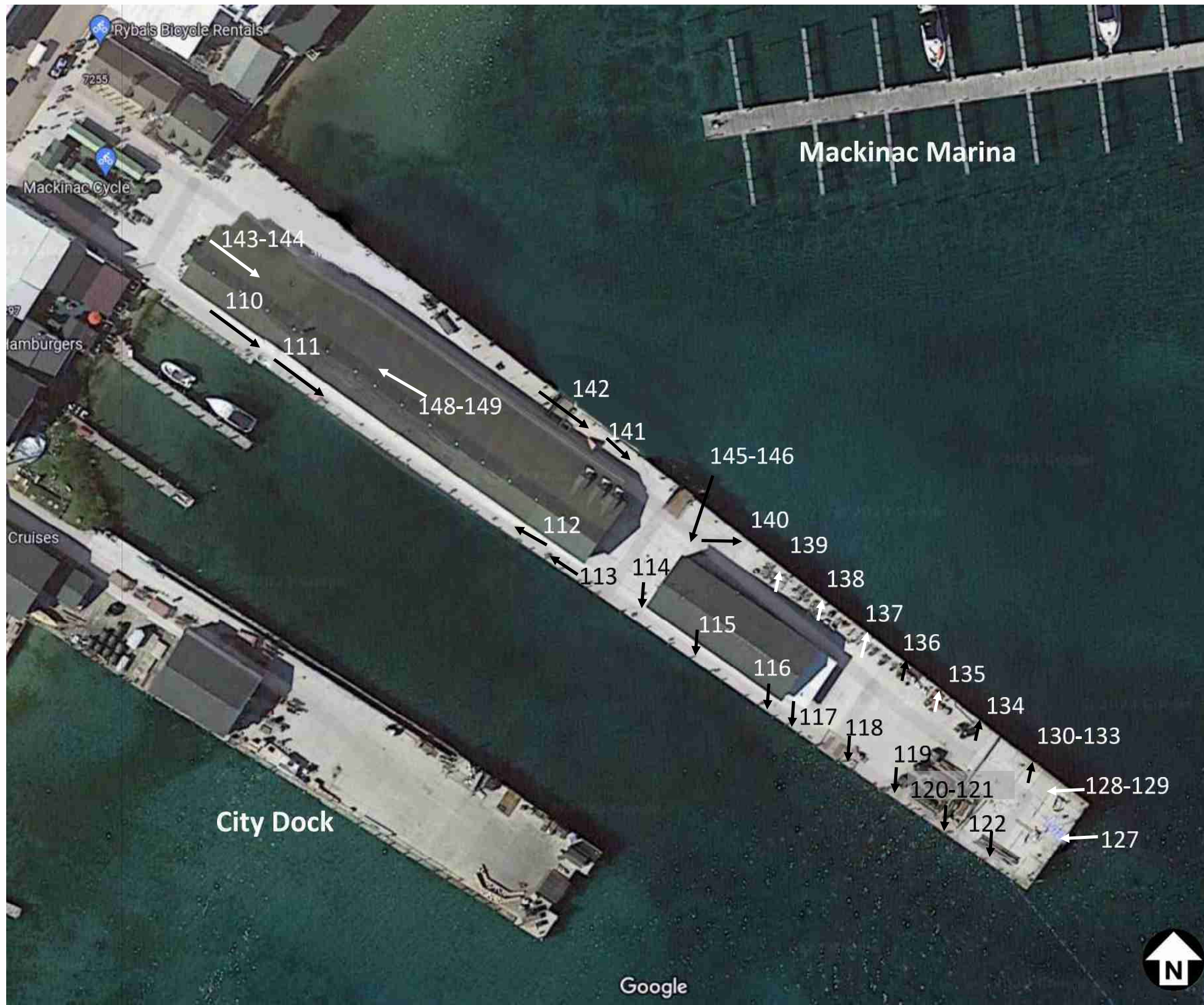
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|             | OWNER REVIEW<br>EVALUATION REPORT | 1/31/2024  |

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PHOTO  
MAP 1

P001





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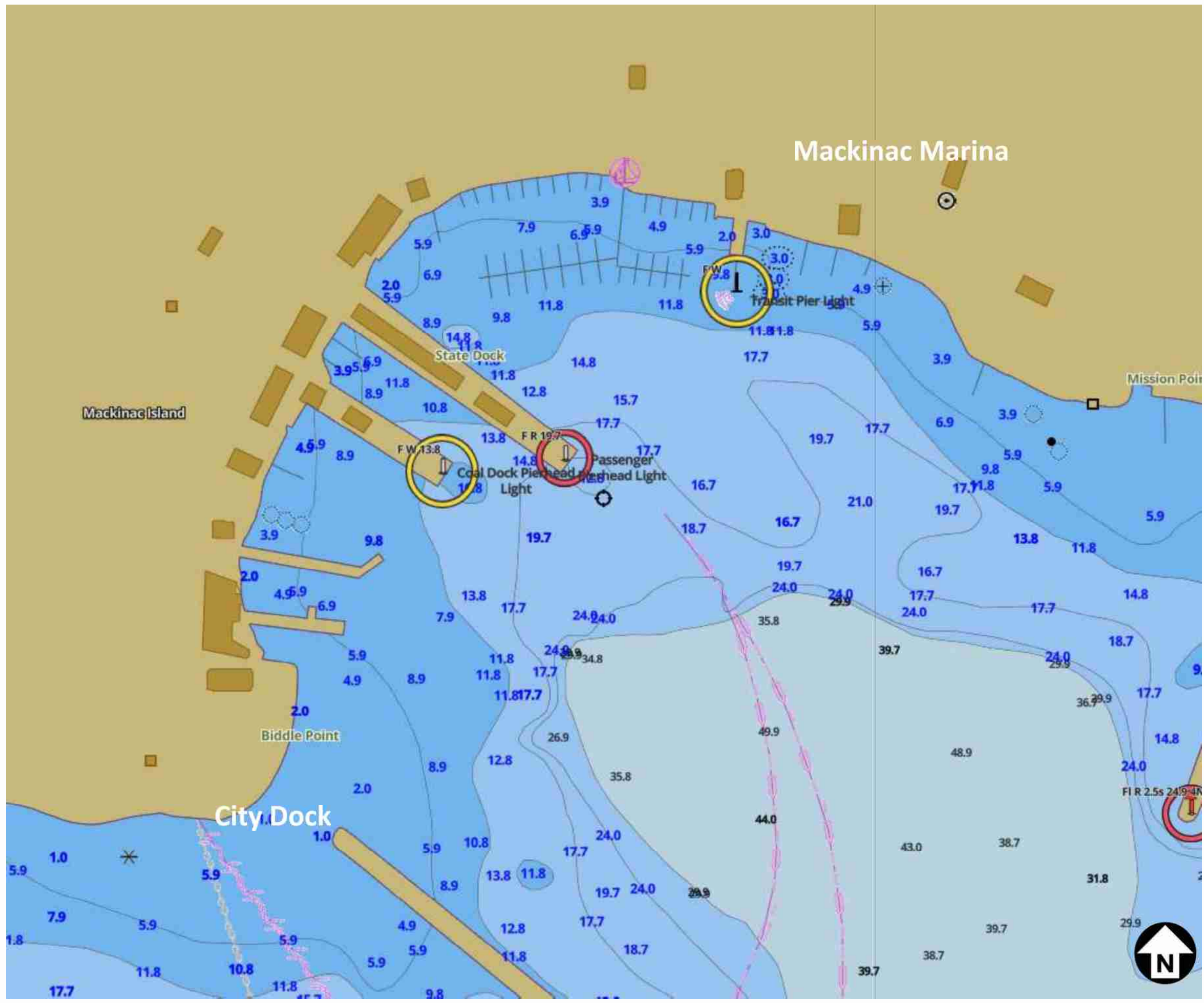
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| APPROVED: AW              |

PHOTO  
MAP 2

P002





**MIFC MAIN DOCK EVALUATION  
CITY OF MACKINAC ISLAND  
MACKINAC ISLAND, MICHIGAN**

|                        |            |
|------------------------|------------|
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| OWNER REVIEW           | 12/26/2024 |
| EVALUATION REPORT      | 1/31/2024  |

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|                           | APPROVED: AW    |

WATER DEPTHS

W001



**MIFC MAIN DOCK EVALUATION  
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MACKINAC ISLAND, MICHIGAN**

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|                           | APPROVED: AW  |

WATER DEPTHS ENLARGED

W002

**APPENDIX III  
PHOTOS**





**1) South side of dock**



**2) South side of dock at east end**



**3) Dock east end (north)**



**4) Dock east end (south)**



**5) Dock east end (south)**



**6) Dock east end (south)**



**7) Dock (south)**



**8) Dock (south)**





9) Dock (south)

Tops of battered pile removed



10) Dock (south)



11) Dock (south)



12) Dock (south)

Pile deterioration



13) Dock (south)



14) Dock (south)

Bowed pile benching

Missing piles



15) Dock (south)



6) Dock (south)

Secondary edge beam deterioration





Dock (south)

Main girder deteriorated

Missing piles



Dock (south)

Edge beam deterioration

Pile benching deformation

Missing Piles



Dock (south)

Excessive benching

Pile deterioration



Dock (south)

Edge beam deterioration and organic growth



**21) Dock (south) (west end)**



**22) Dock (south) (west end)**



**23) Dock (south) (west end)**

Excessive piles and missing benches



**24) Dock (south) (west end)**





**25) Dock (south) (west end)**  
Main girder deterioration



**26) Dock (south) (west end)**



**27) Dock (south) (west end)**



**28) Dock (south) (west end)**



**29) Dock (south)**



**30) Dock (south) (west end)**



**31) Dock (south) (west end)**



**32) Dock (south) (west end)**



33)



34)



35)



36)





37)



38)



39)



40)





41)



42)



43)



44)



45)



46)



47)



48)

Missing piles



44) Dock east end



50) Dock east end



51) North dock east end



52) North dock east end

Pile missing



**53) North side east end**  
Excessive benching



**54) North side east end**  
Bumper piles damaged



Horizontal bracing removed **55) North side east end**



**56) North side east end**





**57) Dock (north)**



**58) Dock (north)**



**59) Dock (north)**

Excessive piles missing



**60) Dock (north)**



**61)** North dock at warehouse



**62)** Dock (north)  
Deteriorated beam    Deteriorated piles



**63)** North dock at warehouse looking east



**64)** Dock (north)



65) Dock (north)



66) Dock (north)

Missing piles



67) Dock (north)



68) Dock (north)

Deteriorated beam



**69) North ramp**



**70) Dock (north)**



**71) Dock (north)**



**72) Dock (north)**





**73) Dock (north) looking east**



**74) Dock (north) ramp (west end)**



**75) Dock (north) with bumper**



**76) Dock (north)**



**77) Dock (north)**



**78) Dock (north)**



**79) Dock (north)**  
Deteriorated beam



**80) Dock (north)**



**81) Dock (north)**



**82) Dock (north)**



**83) Dock (north)**



**84) Dock (north)**





**85) Dock (north)**



**86) Dock (north)**



**87) Dock (north)**



**88) Dock (north)**





**90) Dock (north) (west end)**



**91)** South side (west end)



**92)** South side (middle)



**93)** South side (middle)



**94)** South side (east end)



**96)** North side (east)



**97)** North side (middle)



**98)** North side (west end)



**99)** North side (middle)



**100) North (middle)**



**101) North (west end)**



**102) North (west end)**





**103) North (west end)**



**104) North (middle)**



**105) North (middle)**



**106) North (east end)**



Excessive benching/missing or deteriorated piles



Excessive benching/missing or deteriorated piles





**110) South deck area**



**111) South deck area**



**112) South deck area**



**113) South deck area**  
Apron metal 1 1/2' deck ware



**114) Deck**



**115) Horizontal support**



**116) Horizontal support**



**117) Horizontal Support**





118) Deck angle



119) Deck angle

Damaged deck angle



120) Deck angle



121) Horizontal support



**122) Horizontal support**



**123) Angle separation**



**124) Broken deck, angle separation**



**125) Deteriorated deck**





126) Deck deterioration



127) Deck deterioration



128) Bit/deck deterioration



129) Bit/deck deterioration



**130) Deck (east end)**



**131) Deck (east end)**



**132) Horizontal support**



**133) Horizontal support**





**134)** Horizontal support



**135)** Horizontal support



**136)** Bumper pile (north side)



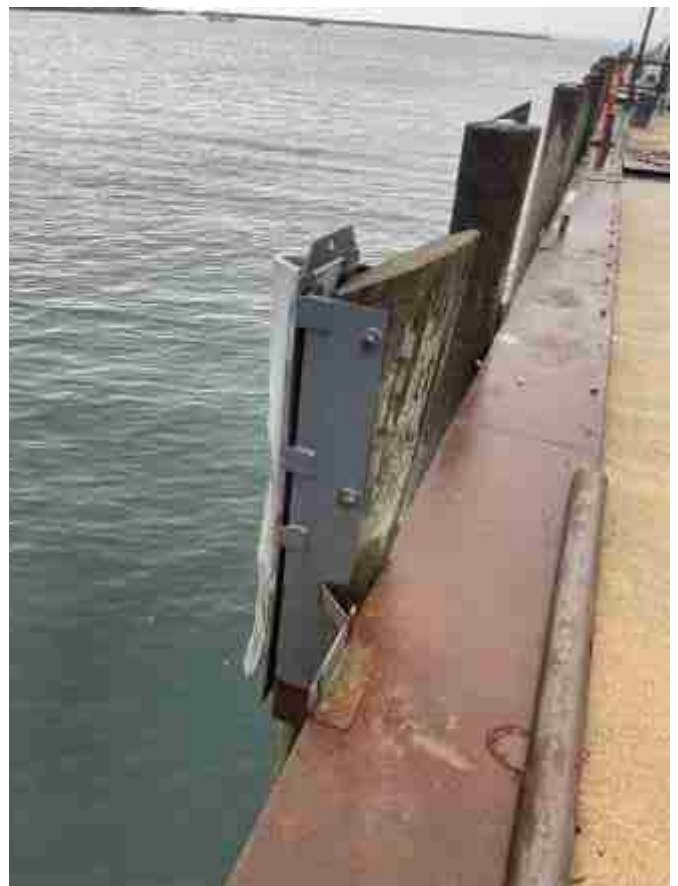
**137)** Bumper pile (north side)



**138)** Reinforce deck and horizontal support (north side)



**139)** Reinforced deck (north side)



**140)** Reinforced deck and pumper (north side)



**141)** West end (north side)

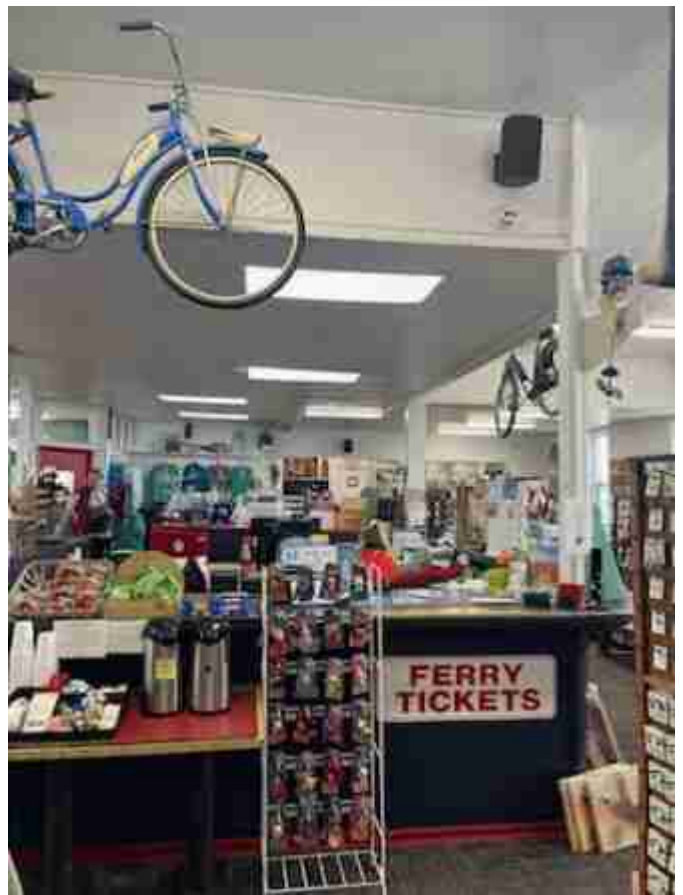


**142)** West end (north side)





143) West end of gift shop



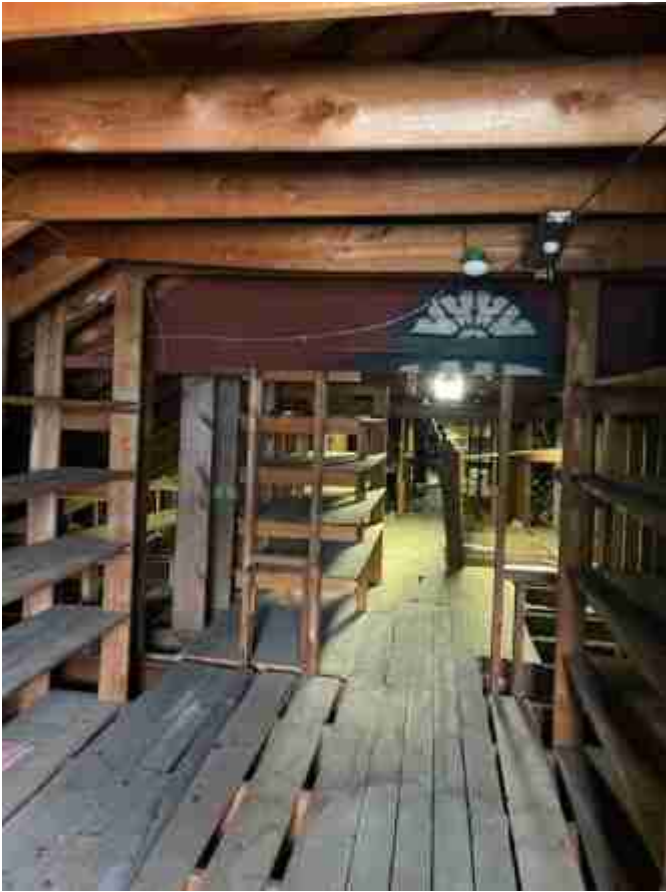
144) West end of gift shop



145) East end of warehouse with bike storage on the second level



146) Lower level of warehouse



**148)** Warehouse upper floor



**149)** Warehouse roof system

**APPENDIX IV  
PROPOSED REPAIRS AND DETAILS**



# CALCULATION SHEET

Computed by:

A. WALKER

Subject:

REPLACE BUTTERED PILE

Checked by:

Job No.:

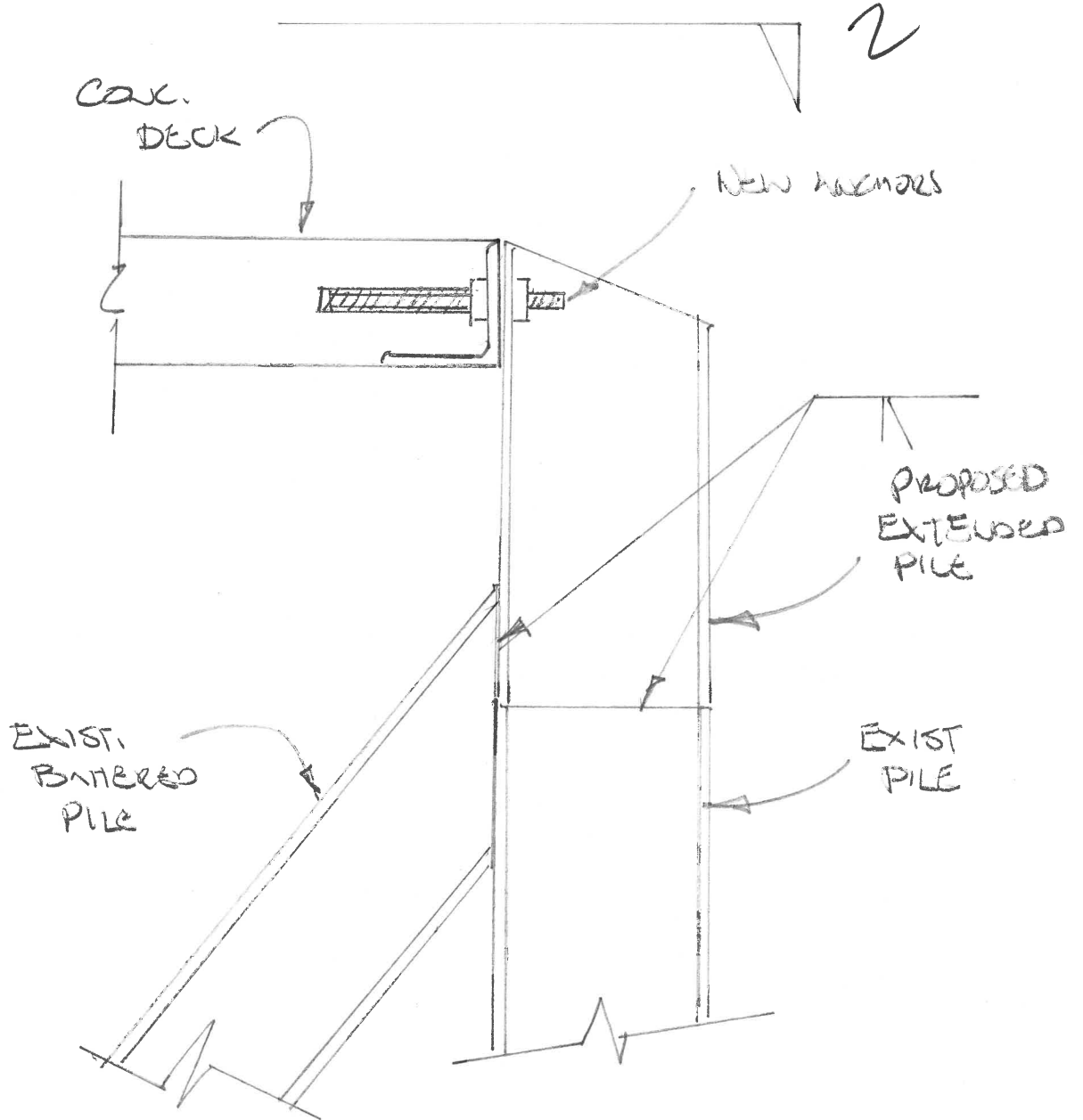
E115-03495

Client:

EVANSKOWSKI LAW OFFICES

Date:

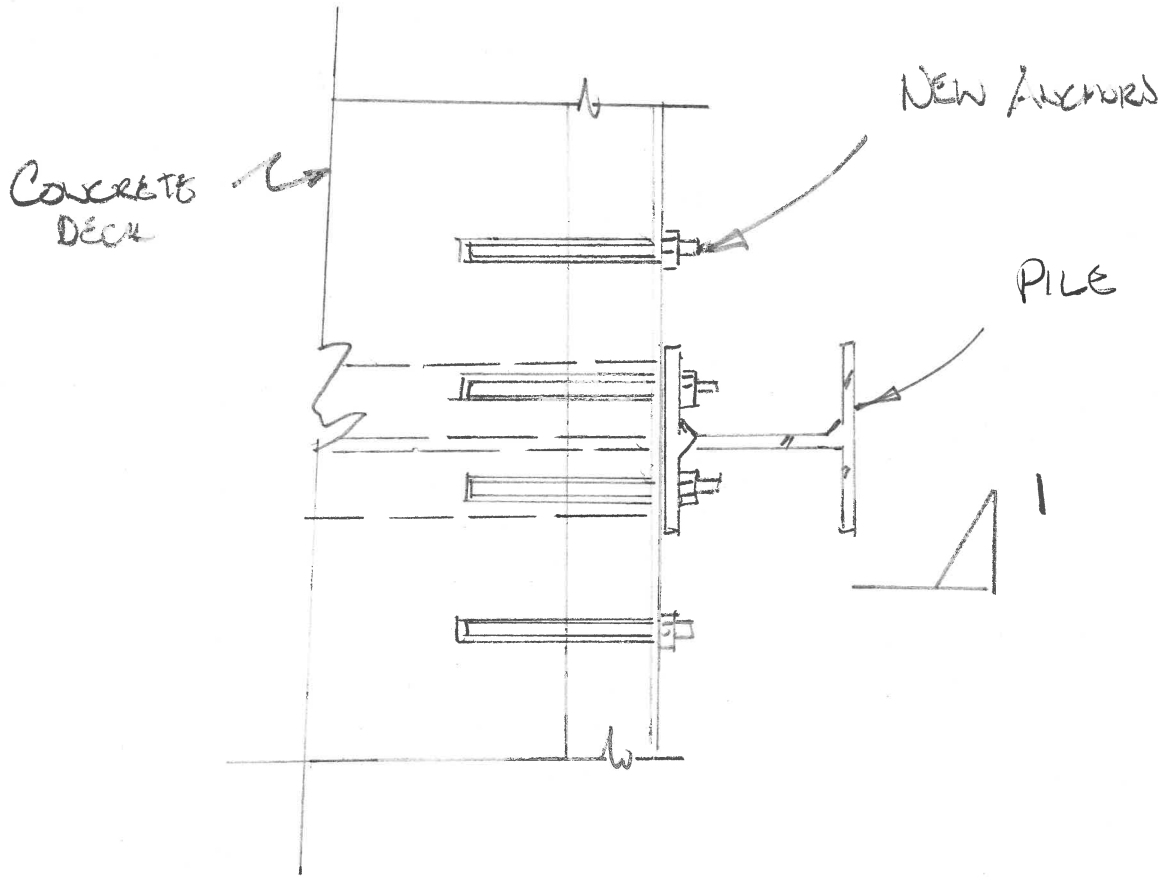
1/23/24



1 ELEVATION (NTS)

# CALCULATION SHEET

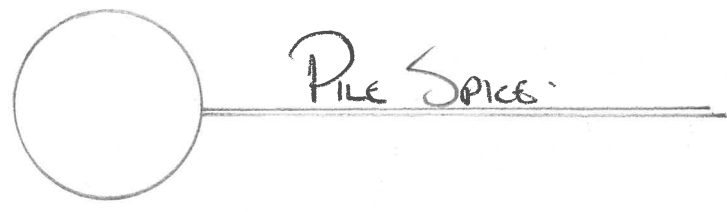
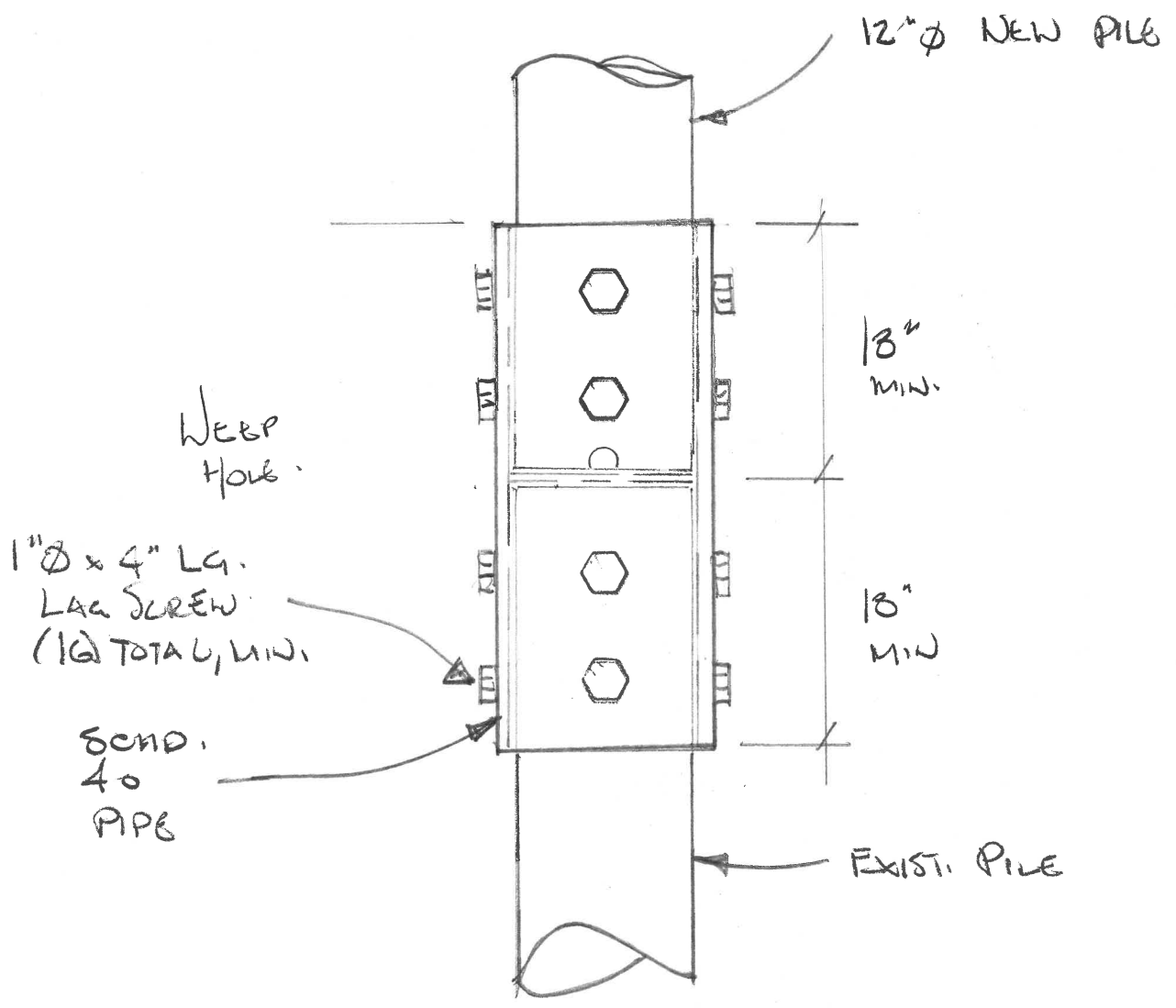
Computed by: A. WALKER Subject: REPAIRS BATTERED PILES  
Checked by: \_\_\_\_\_ Job No.: E115-03495  
Client: EVASHEVSKI LAW OFFICES Date: 1/23/24



② PARTIAL PLAN  
(NTS)

# CALCULATION SHEET

Computed by: A. WALKER Subject: EXTEND. EXIST. PILE  
Checked by: \_\_\_\_\_ Job No.: 115-03495  
Client: EVSEVSKI LAW OFFICE Date: 1/29/24





**APPENDIX V**  
**OPINION OF COSTS**

**MIFC MAIN DOCK EVALUATION****SHORT-TERM DOCK REPAIR**

January 31, 2024

**ENGINEER'S OPINION OF COST**

|                                       | Item                                | Quantity | Unit | Unit Price | Amount                 |
|---------------------------------------|-------------------------------------|----------|------|------------|------------------------|
| 1.                                    | Mobilization and General Conditions | 1        | LSUM | 200,000.00 | 200,000.00             |
| 2                                     | Concrete Deck Demolition            | 400      | CYD  | 100.00     | 40,000.00              |
| 3                                     | Pile Driving Equipment              | 1        | LSUM | 100,000.00 | 100,000.00             |
| 4                                     | 12" Diameter Piles                  | 15000    | LF   | 75.00      | 1,125,000.00           |
| 5                                     | Extend Battered Piles               | 20       | EA   | 10,000.00  | 200,000.00             |
| 6                                     | Replace Cap Beams                   | 2000     | LF   | 200.00     | 400,000.00             |
| 7                                     | Replace Concrete Deck               | 400      | CYD  | 750.00     | 300,000.00             |
| 8                                     | Replace Secondary Beams             | 2000     | LF   | 100.00     | 200,000.00             |
| 9                                     | Remove Organic Growth               | 1        | EA   | 30,000.00  | 30,000.00              |
| Construction Subtotal =               |                                     |          |      |            | \$ 2,595,000.00        |
| Construction Overhead and Profit=     |                                     |          |      |            | 519,000.00             |
| 20% Contingency =                     |                                     |          |      |            | 622,800.00             |
| <b>CONSTRUCTION TOTAL =</b>           |                                     |          |      |            | <b>\$ 3,736,800.00</b> |
| Estimated Engineering Services =      |                                     |          |      |            | 298,944.00             |
| <b>TOTAL ESTIMATED PROJECT COST =</b> |                                     |          |      |            | <b>\$ 4,035,744.00</b> |

**Items Included:**

Battered Piles  
 Missing Piles  
 Cap Beams  
 Deteriorated Piles  
 Secondary Edge Beams  
 Organic Growth  
 Concrete Deck

**MIFC MAIN DOCK EVALUATION**

**LONG-TERM DOCK REPAIR**

January 31, 2024



**ENGINEER'S OPINION OF COST**

|                                       | Item                                | Quantity | Unit | Unit Price | Amount               |
|---------------------------------------|-------------------------------------|----------|------|------------|----------------------|
| 1.                                    | Mobilization and General Conditions | 1        | LSUM | 200,000.00 | 200,000.00           |
| 2                                     | Pile Driving Equipment              | 1        | LSUM | 100,000.00 | 100,000.00           |
| 3                                     | 12" Bumper Diameter Piles           | 1000     | LF   | 75.00      | 75,000.00            |
| 4                                     | Edge Angle Replacement              | 500      | LF   | 200.00     | 100,000.00           |
| Construction Subtotal =               |                                     |          |      |            | \$ 475,000.00        |
| Construction Overhead and Profit=     |                                     |          |      |            | 95,000.00            |
| 20% Contingency =                     |                                     |          |      |            | 114,000.00           |
| <b>CONSTRUCTION TOTAL =</b>           |                                     |          |      |            | <b>\$ 684,000.00</b> |
| Estimated Engineering Services =      |                                     |          |      |            | 54,720.00            |
| <b>TOTAL ESTIMATED PROJECT COST =</b> |                                     |          |      |            | <b>\$ 738,720.00</b> |

**Items Included:**

- Bumper Piles
- Edge Angle