MidAtlantic
Engineering Partners

May 17, 2022 Project #: GES-2201

Via Email (ppeterson@appliedtm.com**)**
Applied Technology and Management
305 Sixth Avenue
Melbourne Beach, FL 32951

Attention: Mr. Pete Peterson, PE

Reference: Holden Beach Fishing Pier – 2022 Due Diligence Inspection
Holden Beach, North Carolina

Dear Mr. Peterson:

At the request of Geosyntec Consultants Inc., **MidAtlantic Engineering Partners** (MidAtlantic), performed a follow-up due diligence inspection of the timber piles at the Holden Beach Fishing Pier located at 441 Ocean Blvd W, Holden Beach, NC. The initial inspection was performed on September 21st, 2021, however at that time due to significant storm surge, diving on the offshore piles was not feasible. On April 29th, 2022 MidAtlantic performed a follow-up inspection of the pier and performed a dive inspection of the offshore piles.

The primary objectives included assessing the general condition of the timber piles, assign a Condition Assessment Rating (CAR) to the timber piles and performing a dive inspection of the offshore/in-water piles.

The inspection was performed in accordance with standards of the American Society of Civil Engineers Waterfront Facilities Inspection and Assessment Manual (No. 130). The inspection was performed by a three-person dive team composed of a professional engineer diver, engineer-diver, and an engineer-dive supervisor. At the time of the inspection the sea state was low tide, calm with less then 1-ft waves. MidAtlantic performed an inspection of all the piles not previously inspection during the September 21st initial inspection. The timber piles inspected during the April 29th 2022 inspection effort included bent 15 to bent 52.

This information presented in this letter report includes a description of the site, observed conditions, and recommendations. The appendices contain Photographs (Appendix A), Inspection Notes (Appendix B), and ASCE Condition Assessment Rating (CAR) Table and Damage Grading Figures (Appendix C).

Please do not hesitate to contact me with any questions at 646-852-0473 or slewis@midatlanticeng.com.

Respectfully Submitted,

MidAtlantic Engineering Partners, LLC

W. Stuart Lewis, P.E.
Sr. Project Manager

Attachments` Letter Report
Appendix A – Photographs
Appendix B – Inspection Notes
Appendix C – ASCE Condition Assessment Rating (CAR)

INTRODUCTION

MidAtlantic Engineering Partners was retained by Geosyntec, to perform an underwater inspection of the timber piles at the Fishing Pier located at 441 Ocean Blvd W, Holden Beach, NC (Photograph 1). The initial inspection was performed on September 21st, 2021, due to the sea state at the time of inspection (~3 to 5ft breaking waves) it was not feasible or safe to perform diving operations.

MidAtlantic remobilized to Holden Beach, N.C. on April 29th and performed an underwater and above water inspection of the timber piles not previously inspected. The sea state was calm with less than 1-foot waves.

The primary objectives of the inspection were to assess the general condition of the timber piles, assign an overall Condition Assessment Rating (CAR), and provide high-level recommended repairs.

Methodology

The inspection of the timber piles was conducted by a three-person engineer dive team. All work was performed in accordance with the ASCE Underwater Investigations Standard Practice Manual, No. 130.

The inspection included a Level I general inspection effort of 100 percent of all accessible elements. The Level I inspection effort included a visual and tactile evaluation to confirm the facility layout and identify structural elements with obvious major damage or deterioration. Measurements of the main structural components were taken so that quantified repair recommendations could be developed.

Condition Assessment Criteria

The Condition Assessment Rating can be interpreted as the "health" of the systems comprising the structure. The Condition Assessment Rating (CAR) is driven by the information gathered during the investigation process. Defect severity, quantity, frequency, and impact to the facility operations are processed to derive the defined Condition Assessment Ratings. Standardized Condition Assessment Ratings are required to categorize the results of the inspection and provide a basis for comparison of the defect effects against the deficiencies and known results in other facilities. The ability to generate an accurate comparison across large amounts of data, historic or current, is required for a successful waterfront management plan. The Condition Assessment criteria, as per the ASCE inspection manual, can be found in Appendix C.

A damage rating is assigned to each element inspected during the investigation. The rating reflects the condition of the individual element only and is independent of the element's structural importance or type of inspection being conducted. The elemental damage ratings are standardized to provide a qualitative description of an element's condition based on a quantified level of damage. The damage rating characteristics as per the ASCE inspection manual can be found Appendix C.

DESCRIPTION

The Holden Beach Fishing Pier is a timber constructed ocean pier that extends approximately 725-feet into the Atlantic Ocean. The pier is exposed to direct ocean waves without any wave break screen. The pier consists of 58 timber pile supported bents. Each bent is approximately 10ft on center and consist of two opposing battered timber piles. The bents are framed together via timber bracing providing lateral support. Bents -1 and 1 are constructed of three timber plumb piles.

Bents -6 to Bent 11 are original vintage piles and from Bents 11 to Bent 52 (end of pier) are newer vintage timber piles of unknown origin with varying diameter from 8-inches to 13-inches.

To aid in the description and location of each waterfront system, MidAtlantic labeled each timber bent from -6 to 52. The northern piles are the Alpha "A" row, and the southern piles are the Bravo "B" rows.

Water depths located offshore at MLW are approximately 12-feet. The water depths become less deep gradually along the length of the pier inshore.

OBSERVED CONDITIONS

The timber piles associated with the Fishing Pier structure are in overall **Fair** condition. The ASCE Waterfront Facilities Inspection Manual describes a CAR of fair as, "All primary structural elements are sound but minor to moderate defects or deterioration observed. Localized area of moderate to advanced deterioration may be present but do not significantly reduce the load-bearing capacity of the structure. Repairs are recommended, but the priority of the recommended repairs is low." Table 1 summarizes the pile conditions observed during the inspection.

Table 1: Timber Pile Rating Summary

RATING	QTY OF PILES	PERCENT OF PILES
Minor	91	76.4
Moderate	12	10
Major	2	1.7
Severe	14	11
TOTAL:	119	100

The inshore section of the pier from Bent -6 to Bent 10 are predominantly original vintage 10 - 12-inch diameter timber piles. The piles typically exhibited localized light checking/weathering (Photograph 2 and Photograph 3). The piles located between Bents 11 thru 52 are newer vintage timber piles 8 to 13-inch diameter. The piles located in between Bents 23 thru 52 have light marine growth consisting of light barnacles below mean low water (MLW) (Photograph 4) and typical have no defects above MLW. Isolate major to severe defects were identified at the top of some of the piles which are summarized in Table 2.

Table 2: Major to Severe Timber Pile Summary

PILE LOCATION	ELEMENT RATING	REASON FOR RATING
15B	Severe	Pile is fractured at the cross-brace bolt (Photograph 5).
17A	Severe	100% Non-Bearing pile, timber cap is supported by steel fish plates (Photograph 6).
24A	Major	Pile is 50% bearing, due to displacement of pile shims (Photograph 7).
25B	Severe	Top 18-inch of the pile is broke/overstressed (Photograph 8).
40A	Severe	Top 18-inch of the pile is broke/overstressed (Photograph 9).
40B	Severe	Top 18-inch of the pile is broke/overstressed
41B	Severe	Top 18-inch of the pile is broke/overstressed
44B	Severe	Top 18-inch of the pile is broke/overstressed
46B	Severe	Top 18-inch of the pile is broke/overstressed
47B	Severe	5ft from top, pile has a fracture crack (Photograph 10)
48B	Severe	Top 18-inch of the pile is broke/overstressed
49B	Severe	Top 18-inch of the pile is broke/overstressed (Photograph 11)

PILE LOCATION	ELEMENT RATING	REASON FOR RATING
50B	Severe	Top 18-inch of the pile is broke/overstressed (Photograph 12)
52A	Severe	Top 18-inch of the pile is broke/overstressed (Photograph 13).

Additionally, between Bents 26 to 28 deflection and rotation was noted in the walking surface. The cause of this deflection appears to be overstressing in the pile cap of Bent 27 and the timber stringer from Bent 27 to 26 (Photograph 14). During the time of the inspection, the pier appears to be shutdown.

RECOMMENDATIONS

MidAtlantic has developed recommendations for the timber piles for the Fishing Pier based on observed conditions. The following recommendations should be compared with current and future use parameters to determine the most practical and economical allocation of funds. Recommendations have been identified as Priority and Routine level repair items.

Priority repair items should be executed within the next one to three years to minimize facility limitations or load restrictions. Priority level actions are recommendations for which no immediate measures are required. Priority actions should take precedence over any other scheduled maintenance or repair work on the structure. This level of recommended action reflects conditions that if left unaddressed, could result in further significant deterioration of a structural elements, associated loss of load carrying capacity, and more robust, expensive repairs.

Routine repair items are maintenance items, which should be executed within the next three to five years. Routine maintenance items help extend the service life of the facilities and minimize the need for structural repairs and rehabilitation, which are often costly and can involve temporary facility shutdowns. Routine level actions should be undertaken as part of a scheduled maintenance program. Postponing these actions will not affect the structural integrity of the facility or significantly increase the cost to repair the structure.

The nature of the due diligence inspection is it serves to provide a high-level condition assessment of the facility, with a limited number of elements inspected only visually and tactilely. Prior to making repairs, future functionality of the facility needs to be determined and a feasibility study performed. Once facility functionality is determined, a design level inspection of the facility should be performed to confirm suitability for future operations.

Priority Recommendations (1-3 years)

Priority level actions are recommendations for which no immediate measures are required. However, priority actions should take precedence over any other scheduled maintenance or repair work on the structure. This level of recommended action reflects conditions that if left unaddressed, could result in further significant deterioration of a structural elements, associated loss of load carrying capacity, and more robust, expensive repairs. Table 3 summarizes the priority recommendations.

Table 3: Priority Repair Recommendations Summary

ELEMENT	RECOMMENDATION	ESTIMATED COST
Timber Piles	Install timber pile shim (17A).	$ 3,000
	Replace inkind timber pile shims (24A).	$ 3,000
	Post/Structural pile repair to the top 2 feet of the ten (10) overstressed piles .	$ 50,000
	Structural repair two(2) fractures piles (Bent 15B & 47B)	$12,000
Timber Pile Cap	Replace inkind timber pile cap (Bent 27).	$ 9,000
Timber Stringer	Replace inkind timber stringer (Bent 27 to 26).	$ 7,000
Pier Wide	Perform structural analysis of piles, caps, stringers. Check slinderness ratio and strength against environmetal loads	$32,000
	Priority Recommendation Subtotal:	$ 116,000

Routine Recommendations (3-5 years)

Routine level actions should be undertaken as part of a scheduled maintenance program. Postponing these actions will not affect the structural integrity of the facility or significantly

increase the cost to repair the structure. These actions should be undertaken within a three to five-year time frame or longer depending on the future use of the site. Table 4 provides a summary of Routine and Maintenance Recommendations for the site.

Table 4: Routine Recommendations Summary

ELEMENT	RECOMMENDATION	ESTIMATED COST
Entire Facility	Perform a routine inspection of the pier, piles, hardware, decking, stringers and bracing every 5-years.	$ 20,000
	Routine Recommendation Subtotal:	$ 20,000

FUTURE INSPECTION

At the time of inspection, the pier was not operational. Based on the current conditions of the Holden Beach Fishing Pier structural element, MidAtlantic recommends a Routine Inspection be performed at minimum every 5- years or following a major storm event. The American Society of Civil Engineers (ASCE) Underwater Investigations Standard Practice Manual suggests that structures rated Satisfactory, which are exposed to an aggressive environment (brackish waters and or with current), shall receive Routine Inspection every five years or following a major storm event.

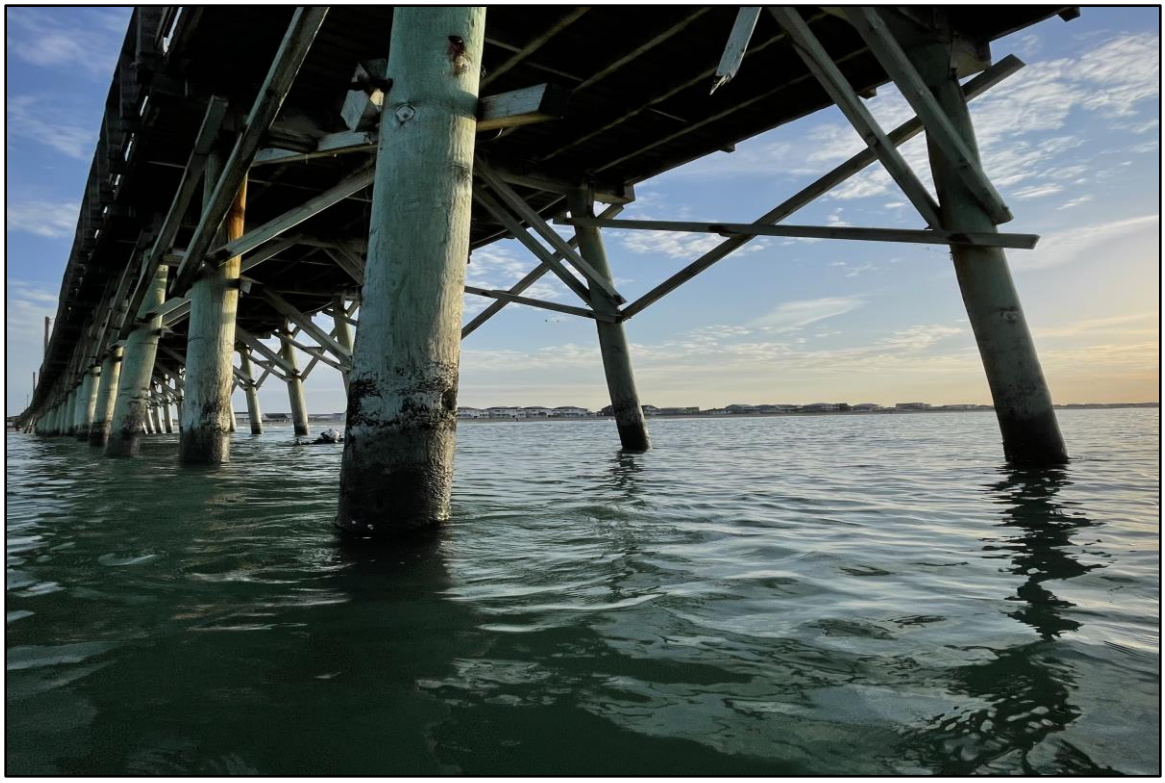
APPENDIX A

PHOTOGRAPHS

Photograph 1: Overall of Holden Beach Pier

Photograph 2: Pile 25B – Typical shell peeling found on newer vintage piles

Photograph 3: Pile 7A – Typical checking and weathering found on original vintage piles



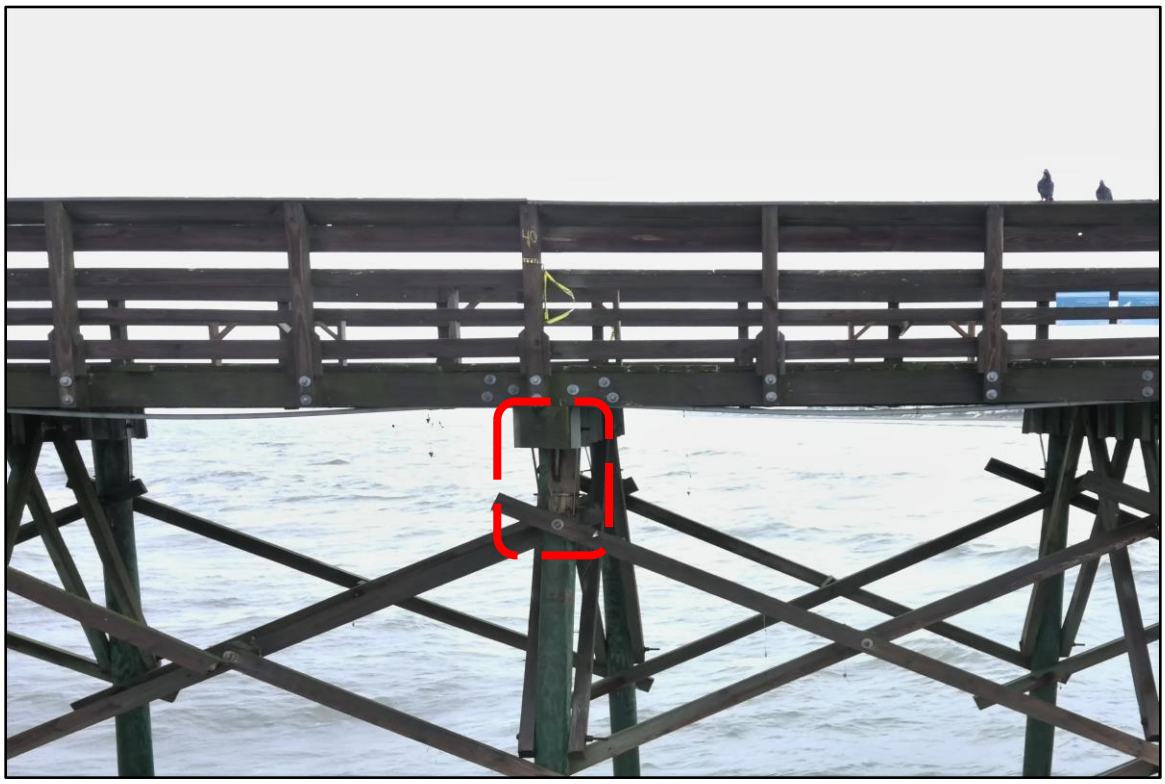
Photograph 4: Pile 52B – Typical marine growth found down length of pile

Photograph 5: Pile 15B – Pile fractured

Photograph 6: Pile 17A - 100% Non-Bearing pile, timber cap supported by steel fish plates

Photograph 7: Pile 24A - 50% Bearing due to displaced pile shims

Photograph 8: Pile 25B - Top 18-inch pile is broke/overstressed

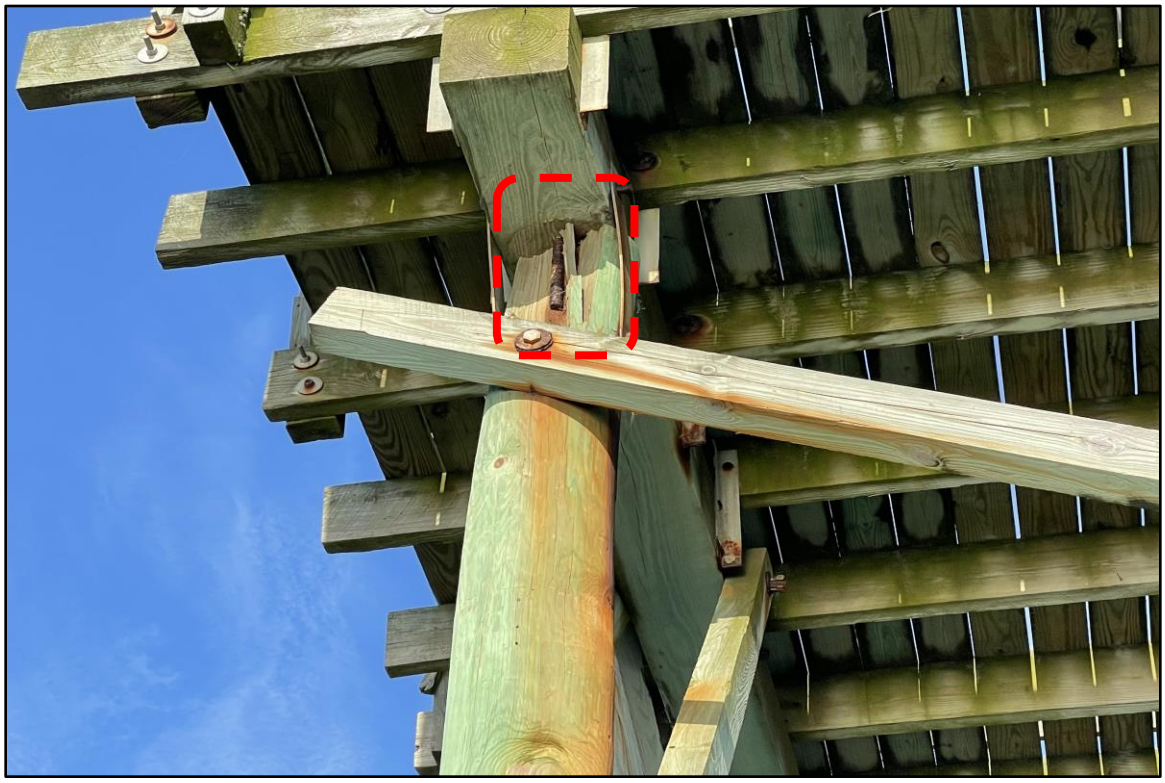


Photograph 9: Pile 40A - Top 18-inch pile is broke/overstressed

Photograph 10: Pile 47B - Pile is fractured 5feet down from top.

Photograph 11: Bent 49B - Overstressed pile cap & stringer

Photograph 12: Pile 50B - Top 18-inch pile is broke/overstressed



Photograph 13: Pile 52A - Top 18-inch pile is broke/overstressed

Photograph 14: Bent 27 - Overstressed pile cap & stringer

APPENDIX B

INSPECTION NOTES

Structure	Bent	Row	Element	Shape	Material	Rating	Deterioration	Severity	Section Loss %	Dimensions (L x W x D)	Comments	Level II/III	Photo?	Photo Comments	Date (MM/DD/YYYY)
FISHING PIER	-6	A	Pile	Round	Timber	MD	Checking	LT	< 10	-	18" exposed pile	No	No	-	9/21/2021
FISHING PIER	-6	B	Pile	Round	Timber	MD	Checking	LT	< 10	-	18" exposed pile	No	No	-	9/21/2021
FISHING PIER	-5	A	Pile	Round	Timber	MJ	Rot	HVY	50-75	-	Base of pile with 50% section loss; Original pile diameter 11", pile diameter at base 6".	No	No	-	9/21/2021
FISHING PIER	-5	B	Pile	Round	Timber	MD	Checking	LT	< 10	-	Shim located on top; 24" exposed pile length	No	No	-	9/21/2021
FISHING PIER	-4	A	Pile	Round	Timber	MD	Checking	LT	< 10	-	36" exposed pile length, 8-inch diameter pile	No	No	-	9/21/2021
FISHING PIER	-4	B	Pile	Round	Timber	MD	Checking	LT	< 10	-	36" exposed pile length, 8-inch diameter pile	No	No	-	9/21/2021
FISHING PIER	-3	A	Pile	Round	Timber	MN	None	-	-	-	New Pile 13" diameter; 48" exposed pile length	No	No	-	9/21/2021
FISHING PIER	-3	B	Pile	Round	Timber	MN	None	LT	-	-	New Pile 13" diameter; 48" exposed pile length	No	No	-	9/21/2021
FISHING PIER	-2	A	Pile	Round	Timber	MD	Checking	MD	15-25	-	Section loss at base of pile 20%, due to checking	No	No	-	9/21/2021
FISHING PIER	-2	B	Pile	Round	Timber	MN	None	-	-	-	-	No	No	-	9/21/2021
FISHING PIER	-1	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	-1	A.5	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	-1	B	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	1	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	1	A.5	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	1	B	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	2	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	2	B	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	3	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	3	B	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	4	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	4	B	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	5	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	5	B	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	6	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	6	B	Pile	Round	Timber	MD	Checking	MD	15-25	-	-	No	No	-	9/21/2021
FISHING PIER	7	A	Pile	Round	Timber	MD	Checking	MD	15-25	-	-	No	No	-	9/21/2021
FISHING PIER	7	B	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	8	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	8	B	Pile	Round	Timber	MN	Checking	LT	< 10	-	Localized abrassion damage southeast face (4-inch long x 1-inch deep)	No	No	-	9/21/2021
FISHING PIER	9	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	9	B	Pile	Round	Timber	MD	Checking	MD	15-25	-	Southface with moderate checking	No	No	-	9/21/2021
FISHING PIER	10	A	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	10	B	Pile	Round	Timber	MN	Checking	LT	< 10	-	-	No	No	-	9/21/2021
FISHING PIER	11	A.1	Pile	Round	Timber	MN	None	-	-	-	-	No	No	-	9/21/2021
FISHING PIER	11	A	Pile	Round	Timber	SV	Rot	-	-	-	Rot @ mudline. Pile has been abandoned with new pile 11 A.1 installed adjacent	No	No	-	9/21/2021
FISHING PIER	11	B	Pile	Round	Timber	MD	Checking	MD	10-15	-	-	No	No	-	9/21/2021
FISHING PIER	12	A	Pile	Round	Timber	MD	Checking	MD	10-15	-	-	No	No	-	9/21/2021
FISHING PIER	12	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	9/21/2021
FISHING PIER	13	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 8" Diameter pile	No	No	-	9/21/2021
FISHING PIER	13	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	9/21/2021
FISHING PIER	14	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 8" Diameter pile	No	No	-	9/21/2021
FISHING PIER	14	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	9/21/2021
FISHING PIER	15	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	15	B	Pile	Round	Timber	SV	Split	HVY	-	-	Pile split 3ft above the ground	No	Yes	-	4/29/2022
FISHING PIER	16	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	16	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	17	A	Pile	Round	Timber	SV	None	-	-	-	100% Non-Bearing, cap supported by fish plates.	No	Yes	100% Non-Bearing, cap supported by fish plates.	4/29/2022
FISHING PIER	17	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022

Structure	Bent	Row	Element	Shape	Material	Rating	Deterioration	Severity	Section Loss %	Dimensions (L x W x D)	Comments	Level II/III	Photo?	Photo Comments	Date (MM/DD/YYYY)
FISHING PIER	18	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	18	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	19	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	19	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	20	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	20	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	21	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	21	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	22	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	22	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	23	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	23	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	24	A	Pile	Round	Timber	MJ	None	-	-	-	50% Bearing, Shims failing due to displacment	No	Yes	Failing shims and 50% bearing.	4/29/2022
FISHING PIER	24	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	25	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	25	B	Pile	Round	Timber	SV	Broke	HVY	-	-	Top 18" of pile broke/overstressed	No	Yes	Top 18" of pile broke/overstressed	4/29/2022
FISHING PIER	26	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	26	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	27	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	27	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	28	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	28	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 9-10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	29	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 12" Diameter pile	No	No	-	4/29/2022
FISHING PIER	29	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 13" Diameter pile	No	No	-	4/29/2022
FISHING PIER	30	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 12" Diameter pile	No	No	-	4/29/2022
FISHING PIER	30	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 12" Diameter pile	No	No	-	4/29/2022
FISHING PIER	31	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 12" Diameter pile	No	No	-	4/29/2022
FISHING PIER	31	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 12" Diameter pile	No	No	-	4/29/2022
FISHING PIER	32	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	32	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	33	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	33	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 12" Diameter pile	No	No	-	4/29/2022
FISHING PIER	34	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	34	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	35	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	35	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	36	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	36	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	37	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	37	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	38	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile -	No	No	-	4/29/2022
FISHING PIER	38	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	39	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No	-	4/29/2022
FISHING PIER	39	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 10" Diameter pile	No	No	-	4/29/2022
FISHING PIER	40	A	Pile	Round	Timber	SV	Split	HVY	-	-	Top 18" of pile broke/overstressed	No	Yes		4/29/2022
FISHING PIER	40	B	Pile	Round	Timber	SV	Split	HVY	-	-	Split at top of pile	No	No		4/29/2022
FISHING PIER	41	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No		4/29/2022
FISHING PIER	41	B	Pile	Round	Timber	SV	Split	HVY	-	-	Split at top of pile	No	No		4/29/2022
FISHING PIER	42	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No		4/29/2022
FISHING PIER	42	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No		4/29/2022
FISHING PIER	43	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No		4/29/2022
FISHING PIER	43	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No		4/29/2022
FISHING PIER	44	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile 12" Diameter	No	No		4/29/2022
FISHING PIER	44	B	Pile	Round	Timber	SV	Split	HVY	-	-	Split at top of pile	No	No		4/29/2022
FISHING PIER	45	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No		4/29/2022

Structure	Bent	Row	Element	Shape	Material	Rating	Deterioration	Severity	Section Loss %	Dimensions (L x W x D)	Comments	Level II/III	Photo?	Photo Comments	Date (MM/DD/YYYY)
FISHING PIER	45	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile	No	No		4/29/2022
FISHING PIER	46	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 13" Diameter pile	No	No		4/29/2022
FISHING PIER	46	B	Pile	Round	Timber	SV	Split	HVY	-	-	Split at top of pile	No	No		4/29/2022
FISHING PIER	47	A	Pile	Round	Timber	MD	Hole	LT	-	2" Diameter	7ft up from mudline 2" hole 6-inch deep	No	No		4/29/2022
FISHING PIER	47	B	Pile	Round	Timber	SV	Broke	HVY	-	-	5ft from top, pile has a fracture crack	No	Yes		4/29/2022
FISHING PIER	48	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 13" Diameter pile	No	No		4/29/2022
FISHING PIER	48	B	Pile	Round	Timber	SV	Split	HVY	-	-	Split at top of pile	No	Yes		4/29/2022
FISHING PIER	49	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 12" Diameter pile	No	No		4/29/2022
FISHING PIER	49	B	Pile	Round	Timber	SV	Split	HVY	-	-	Split at top of pile	No	Yes		4/29/2022
FISHING PIER	50	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 11" Diameter pile	No	No		4/29/2022
FISHING PIER	50	B	Pile	Round	Timber	SV	Split	HVY	-	-	Split at top of pile	II	Yes		4/29/2022
FISHING PIER	51	A	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 12" Diameter pile	No	No	-	4/29/2022
FISHING PIER	51	B	Pile	Round	Timber	MN	None	-	-	-	Newer vintage pile - 11" Diameter pile	No	No	-	4/29/2022
FISHING PIER	52	A	Pile	Round	Timber	SV	Broke	HVY	-	-	Top 18" of pile broke/overstressed	No	Yes	Top 18" of pile broke/overstressed	4/29/2022
FISHING PIER	52	B	Pile	Round	Timber	MN	None	-	-	-	12" diameter pile	No	No	-	4/29/2022

Structure	Bent	Row	Item	Units	Location	Elev. 1 (ft)	Time (HHMM)	Readings	Elev. 2 (ft)	Time (HHMM)	Readings	Elev. 3 (ft)	Readings	Time (HHMM)	Date (MM/DD/YYYY)
FISHING PIER	5	A	Cleaning	-	Circum.										
FISHING PIER	5	A	Measurement	Inch	Circum.										
FISHING PIER	10	B	Cleaning	-	Circum.										
FISHING PIER	10	B	Measurement	Inch	Circum.										
FISHING PIER	15	A	Cleaning	-	Circum.	0	930	10							
FISHING PIER	15	A	Measurement	Inch	Circum.										
FISHING PIER	20	B	Cleaning	-	Circum.	0	930								
FISHING PIER	20	B	Measurement	Inch	Circum.			11							
FISHING PIER	29	A	Cleaning	-	Circum.	3	900	LT marine growth				0	No marine growth	900	4/29/2022
FISHING PIER	29	A	Measurement	Inch	Circum.	3		13							
FISHING PIER	33	B	Cleaning	-	Circum.	4	845	LT marine growth				0	No marine growth	845	4/29/2022
FISHING PIER	33	B	Measurement	Inch	Circum.	4		12							
FISHING PIER	40	A	Cleaning	-	Circum.	7	830	LT marine growth					No marine growth	830	4/29/2022
FISHING PIER	40	A	Measurement	Inch	Circum.	7		10					10		
FISHING PIER	44	B	Cleaning	-	Circum.	11	820	LT marine growth				0	No marine growth	820	4/29/2022
FISHING PIER	44	B	Measurement	Inch	Circum.	11		12				0	12		
FISHING PIER	48	A	Cleaning	-	Circum.	13	800	LT marine growth				0	No marine growth	800	4/29/2022
FISHING PIER	48	A	Measurement	Inch	Circum.	13		11				0	11		
FISHING PIER	50	B	Cleaning	-	Circum.	11	734	LT marine growth				0	No marine growth	735	4/29/2022
FISHING PIER	50	B	Measurement	Inch	Circum.	11		11				0	11		
FISHING PIER	52	A	Cleaning	Inch	Circum.	12		LT marine growth				0	No marine growth		
FISHING PIER	52	A	Measurement	Inch	Circum.	12	700	12				0	12	705	4/29/2022

APPENDIX C

ASCE CONDITION ASSESSMENT RATING (CAR)

Table 2-14. Condition Assessment Ratings

Rating		Description
6	Good	No visible damage or only minor damage noted. Structural elements may show very minor deterioration, but no overstressing observed. No repairs are required.
5	Satisfactory	Limited minor to moderate defects or deterioration observed but no overstressing observed. No repairs are required.
4	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 load-bearing capacity of the structure. Repairs are recommended, but the priority of the recommended repairs is low.
3	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	Serious	Advanced deterioration, overstressing, or breakage may have significantly affected the load-bearing capacity of 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	Critical	Very advanced deterioration, overstressing, or breakage has resulted in localized failure(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.

2.6.2 Condition Assessment Ratings

The Condition Assessment Rating should be assigned upon completion of the Routine Inspection and remain associated with the structural unit (as defined in Section 3.1.1) until the structure is rerated following a quantitative engineering evaluation and repairs, or upon completion of the next

Table 2-4. Damage Ratings for Timber Elements

Damage Rating		Existing Damage[a]	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	• Not inspected, inaccessible, or passed by[b]	
ND	No Defects	• Sound surface material	
MN	Minor	• Checks, splits, and gouges less than 0.5 in. wide • Evidence of marine borers or fungal decay	Minor damage not appropriate if • Loss of cross section • Marine borer infestation • Displacements, loss of bearing, or connections
MD	Moderate	• 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 borers or fungal decay, with loss of section	Moderate damage not appropriate if • Displacements, loss of bearing or connections

(Continued)

Table 2-4. Damage Ratings for Timber Elements *(Continued)*

Damage Rating		Existing Damage[a]	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
MJ	Major	• 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	Major damage not appropriate if • Partial or complete breakage
SV	Severe	• 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	

[a] Any defect listed is sufficient to identify relevant damage grade.
[b] If not inspected due to inaccessibility or passed by, note as such.

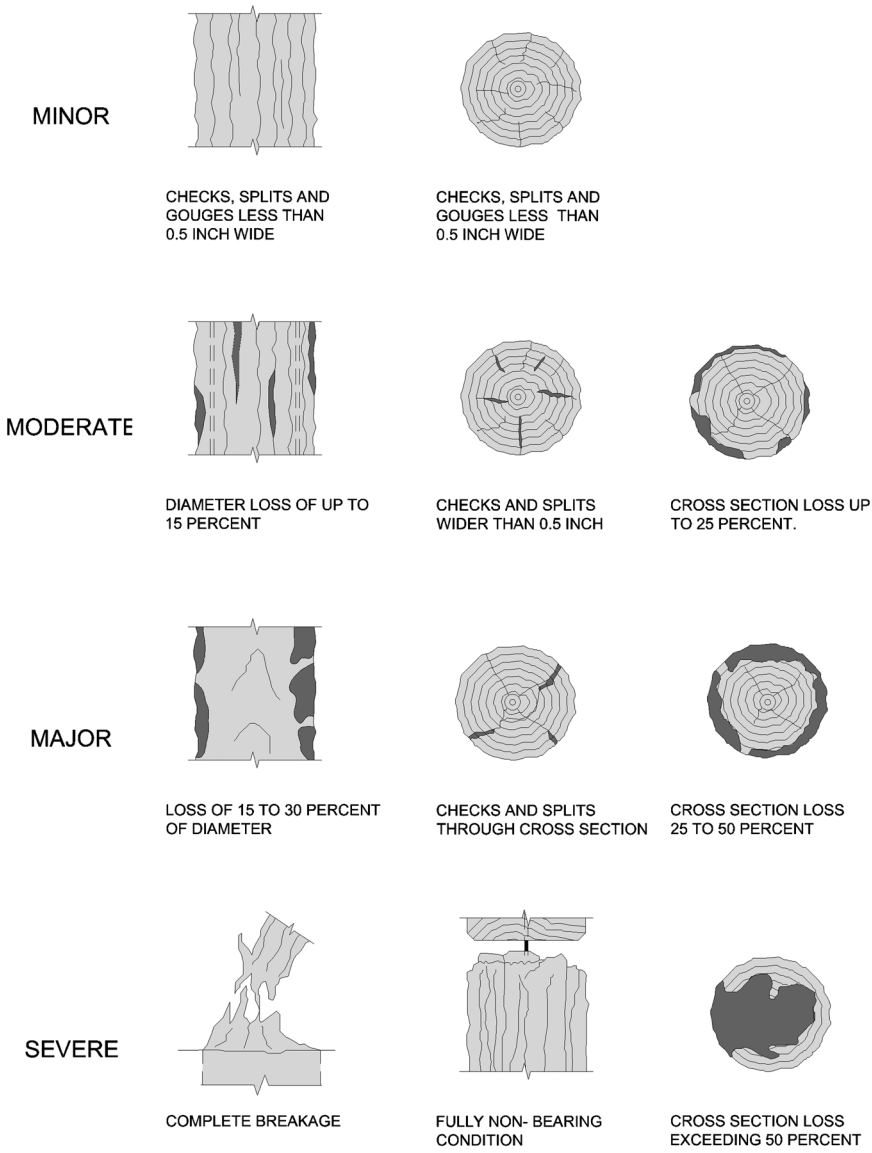


Fig. 2-2. Condition ratings for timber elements
Source: Courtesy of CH2M HILL, Inc. and Ben C. Gerwick, Inc., reproduced with permission.