



# Bulkhead Observation Report

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**Morgan Creek Harbor  
Isle of Palms, South Carolina**

March 3, 2022

Terracon Project No. 73055027

**Prepared for:**

Morgan Creek Harbor Association  
1340-G Ben Sawyer Blvd.  
Mt. Pleasant, South Carolina

**Prepared by:**

Terracon Consultants, Inc.  
Columbia, South Carolina



March 3, 2022



Morgan Creek Harbor Association  
c/o Property Management Services  
1340-G Ben Sawyer Boulevard  
Mt. Pleasant, South Carolina 29464

Attn: Ms. Laurie Schueler  
Ph: (843) 881-5459  
[laurie@charlestonpms.com](mailto:laurie@charlestonpms.com)

Re: Bulkhead Observation Report  
Morgan Creek Harbor  
Isle of Palms, South Carolina  
Terracon Project No.: 73055027

Dear Ms. Schueler:

Terracon has completed the Bulkhead Observation services for the above referenced project. This work was performed in general accordance with the scope of work outlined in our Master Proposal No. 12090301-G.R1, dated August 13, 2004. Included in this report are a summary of data collected, our field observations, and our general assessment of the overall condition of the bulkhead. Additional data are included in the Appendix of this report.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,  
**Terracon Consultants, Inc.**

Kevin Sohrabnia, P.E.  
Senior Principal  
SC Registration No. 16603

Phillip A. Morrison, P.E.  
Senior Associate  
SC Registration No. 17275



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Geotechnical



Environmental



Construction Materials



Facilities

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Exhibit A-3	Bulkhead Wall Measurements
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# Bulkhead Observation Report

## Morgan Creek Harbor

### Isle of Palms, South Carolina

Terracon Project No. 73055027

March 3, 2022

## 1.0 INTRODUCTION

This report provides a summary of our field observations and assessments of the bulkhead located at Morgan Creek Harbor in Isle of Palms, SC. The bulkhead consists of an interlocking sheet metal piles with concrete filled I-beam cap. The sheet piles are supported on the top (above mud line) by a tieback system installed on alternating 4- and 8-foot centers. The total length of the bulkhead is approximately 6,000 linear feet with exposed height on the order of 8 to 10 feet above mud line. Also included is a timber sheet bulkhead in 2, 3, and 32 Waterway Island Drive.

The inspection was made on February 3, 2022 by Kevin Sohrabnia, P.E, assisted by David Jeffcoat during the mid to low tide period with clear and mild weather. While on site, we also met with Laurie Schueler and Larry Schneider (MCHA board member) to briefly discuss the initial results of inspection and obtain information about the upcoming repair work on the bulkhead.

Observations of the wall conditions were made from the easement behind the wall and from floating docks on the front side. Wall measurements were made to the reference plate locations, which were originally established in 2005 or to new markings, established at later. In some cases, the reference marks were obscured/missing due to landscaping, paint work by residents, renovation, landscaping, etc. In these cases, no readings could be made. In all, approximately 25% of the markings (20 locations) were measured during this site visit. Field measurement data and a photographic log documenting current conditions are shown on Exhibits A-3 and A-4 in Appendix A.

## 2.0 PROJECT INFORMATION

ITEM	DESCRIPTION
<b>Site Location and Layout</b>	Morgan Creek Harbor, Isle of Palms, South Carolina. See Appendix A, Exhibits A-1 and A-2, Overall Site Location Plans.
<b>General Structure Description</b>	A steel bulkhead wall totaling approximately 6,000 linear feet with the North Harbor Wall from Stations 0+00 to 27+80 and South Harbor Wall from Stations 27+00 to 60+13. The total length of the sheet piles is about 45 to 50 feet, with an exposed height above mud line of about 8 to 10 feet. The exposed section of wall is supported by series of tie-back screw anchors installed on alternating 4 and 8-foot centers.

ITEM	DESCRIPTION
	Timber sheet bulkhead with wooden soldier piles and steel tie rods located in Lots 2, 3, and 32 Waterway Island Drive. The wall height above mud line varies from few feet to about 6 feet, based on a visual estimation. A tie rod is located about 4 feet below the top of the bulkhead at 2 and 3 WWI. Rip-rap was observed in front of the wall. No other design or construction information is available regarding the timber bulkhead. Reference Terracon 2020 inspection report for additional details regarding timber bulkhead.
<b>General Work Scope</b>	Visual observation of bulkhead, checking for the overall wall conditions, evidence of backfill subsidence, the condition of concrete cap, evidence of abnormal wall movement, and overall condition of tie-back assembly and flapper valves.

### 3.0 SUMMARY OF FIELD OBSERVATIONS

The field observation was performed on February 3, 2022. The following tasks were performed:

- Visual observations of bulkhead and its anchorage system from floating docks where possible and from the cap, otherwise.
- Measurements of movement of the bulkhead at reference plate locations. Approximately 25 percent of the locations (20) was measured during this inspection.
- Photo documentation of the wall condition, anchorage system, and backfill subsidence.
- On site meeting with Ms. Laurie Schuler of Property Management Services (PMS) and Larry Schneider of the MCHA Board.
- Preparation of this report.

The following provides a summary of our observations and assessments for each item inspected during this inspection. The assessment considers the current condition of the wall, wall measurements, previous inspection reports and general maintenance program.

It should be noted that a key element impacting the life expectancy and performance of the bulkhead is related to the on-going corrosion issues. We understand that MCHA’s corrosion consultant has designed a cathodic protection system which is planned to be installed later this spring. In addition, the bulkhead will be coated as part of the repair program.

Topic	Overview Statement
<b>Overall conditions</b>	Based on visual observation of exposed wall sections and limited field measurements of reference plates, the bulkhead appears to be performing generally satisfactorily considering its age and environmental factors. Some exceptions apply and are noted in this report. The inspection of wall was

**Bulkhead Monitoring Report**

Morgan Creek Harbor ■ Isle of Palms, South Carolina

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Topic	Overview Statement
	performed on February 3, 2022 during mid to low tide periods. The wall measurements were made during the low tide.
<b>Subsidence</b>	Isolated areas of backfill subsidence were noted during our inspections. Most appear to be due to irrigation and/or yard inlets present in the area. Subsidence impacts the overall stability and drainage behind the wall. We recommend that the backfill be periodically checked and any observed subsidence repaired.
<b>Field Measurements</b>	<p>The wall movement (inward/outward) was randomly checked at several of the reference plates established in 2005 or thereafter. Approximately 25%, or 20 locations, were measured during this inspection. All locations were measured during the 2017 inspection. The results of both measurements and the 2019 measurements are included in the attached tabulation. The running average of last 3 readings (where available) were compared to the 2008 or 2015 readings to check the net (+/-) movement:</p> <ul style="list-style-type: none"> <li>■ The outward (top moving toward water) movements generally ranged from 0 (no change) to 1.0 inch. At 5 locations, the readings indicated outward movements of greater than 1 inch.</li> <li>■ Similarly, the inward (top moving toward land) movements generally ranged from 0 (no change) to about 1 inch. At 2 locations, the readings indicated inward movements were 1.6 and 2.3 inches. The highest inward movement of 2.3 inches was at Marker 41A, The reading was unchanged compared to 2019 measurement.</li> </ul> <p>Movement (deflections) of 1 inch or less is generally considered to be within the acceptable range and accuracy of measuring devices. In some cases, the readings are impacted by access to the marker and other environmental factors (tide, temperature, etc.) at the time of readings.</p> <p>At locations indicating movements of greater than 1-inch, we did not notice any apparent signs of distress or movement of the wall and wall cap. Nevertheless, these locations should be observed and/or measured during next scheduled inspection program.</p>
<b>Concrete Cap</b>	The concrete filled cap for most part appears to be in fair condition with several areas of surface damage, irregular cracks and joint spalling, exposed aggregate and age-related deterioration. The cap should be repaired as part of upcoming maintenance program.
<b>Flapper Valves</b>	<p>The flapper valves appeared to be in good condition and functioning as intended at the time of our inspection. We did not notice any missing valves or clogged outlet gates.</p> <p>The inspection was performed during mid to low tide. During this time, the valves were noted to be opening and closing as intended.</p>
<b>Tieback system</b>	The tieback heads at the +4-level including the bearing plates, patch plates, rods and nuts show a great deal of rust and surface corrosion. Marine growth is more abundant than in previous years and, in some cases, obscures the

**Bulkhead Monitoring Report**

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Topic	Overview Statement
	<p>heads of the tiebacks at the zero level. This prevents a closer inspection of some of the zero level tiebacks and head assemblies. We did not notice any slippage of head assemblies or bearing plates. Some minor leakage around bearing plates was noticed at several locations due to likely excessive corrosion. The corrosion has gotten worse since last inspection, as expected. Also, some pin holes have developed around several of the bearing plates that will require patching/repair.</p>
<b>Corrosion</b>	<p>As has been stated in our previous monitoring reports, corrosion is an on-going issue that requires constant maintenance and attention. Corrosion appears to be more severe on the south side (A to J and Med Docks) as compared to the north side. The corrosion has gotten worse in last several years with development of new pin holes and enlargement of existing holes. We understand that MCHA has been working with a corrosion consultant to address the corrosion issues. Southern Cathodic Protection Company has been retained by MCHA to design and install a cathodic protection system. The work is anticipated to begin sometime later in Spring of 2022. In addition, the bulkhead will be recoated, and pin holes patched.</p>
<b>Timber Bulkhead, 2, 3 and 32 WWI</b>	<p>At the time of our site visit, pool construction and landscaping work at 3 WWI were in progress but the subsidence repair behind the bulkhead had not started yet. The landscaping work on 32 WWI noted during 2021 inspection had been completed.</p> <p>We visually checked the timber bulkhead at these locations and did not notice any evidence of wall distress at any of the locations. The overall condition of the walls appeared unchanged from the 2021 inspection.</p>
<b>House Keeping</b>	<p>As has been mentioned in previous inspection reports, shrubs, trees, and heavy privacy landscaping have been planted very close to the wall in Morgan Place between Station Markers 30+50 to 33+00. The wall has a granular drainage system which allows relief of hydrostatic pressure behind the wall. Heavy roots growing into the drainage media behind the wall impedes drainage which may result in excessive hydrostatic pressure on the wall, impacting its stability. Also, vegetation near the wall prevents closer inspection and makes it difficult to conduct wall movement measurements. Considerations should be given to limit the vegetation within 10 feet of wall to grass only, if possible.</p> <p>Also, construction materials, stockpiles, etc. should not be stored within 10 feet of wall to limit the impact of surcharge loads on the wall.</p>
<b>General Assessments and Recommendations</b>	<p>We recommend that inspections of the bulkhead, backfill conditions, flapper gates, etc. continue to be made as these inspections are important to the long-term performance of the bulkhead.</p> <p>The summary of backfill subsidence observed during this inspection are provided in Tables 1 and 2, below. Photographs documenting the subsidence are included in the appendices. These areas should be periodically inspected</p>

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Topic	Overview Statement
	<p>and filled as necessary. Considerations should be given to locating future irrigation heads away from the bulkhead to minimize backfill subsidence.</p> <p>Construction materials (stacked plywood) are stored near the wall at approximately Station 36+00. Although we did not observe any abnormal wall performance in this area, we recommend avoiding storing materials near the wall for an extended period of time to prevent additional surcharge loads being imposed on the wall.</p> <p>The wall measurements and other observations were made for the 5<sup>th</sup> time since the 2012/2013 dredging. It appears that the dredging has not negatively impacted the wall. The pre-post dredging measurements as compared to recent readings do not indicate any abnormal wall performance.</p> <p>As noted previously, several locations indicated wall movements of greater than 1 inch (inward or outward) when compared to earlier readings. The movements however had not changed or had only changed slightly (&lt; 0.50 inch) when compared to the last three readings. Regardless, we recommend that wall measurements be continued annually to check for abnormal movements.</p> <p>Corrosion continues to be major issue and should be addressed to improve life expectancy of the bulkhead.</p> <p>Trees and shrubs should not be planted near the wall to maintain drainage for the wall and to allow for proper inspection and measurements.</p> <p>The Association has a sizeable investment in the bulkhead, and in order to maintain it, periodic observations are necessary. It is recommended that continued maintenance along with periodic inspections continue to be conducted as it will help to extend the life of the bulkhead. Any unusual conditions should be reported to Terracon immediately.</p> <p>We understand that a Cathodic Protection System will be installed along the wall in coming months. The system includes drilling a deep well (8 inch diameter hole ) to depths of 130 feet behind wall to install sacrificial anodes. The installation will require a heavy drill rig and other construction equipment operating near the bulkhead. We recommend that the bulkhead be monitored periodically during the system installation to check for any signs of instability or excessive deflection. Additional temporary monitoring monuments may need to be established to check for signs excessive wall movement/deflection. Also, extreme precautions should be made not to damage the tie back and drainage system behind the wall.</p>



**Table 1 – Backfill Subsidence Summary (South Harbor Wall)**

Station Number	Description
59+00/60+00	Multiple locations, 4+ inches deep, about 10' long
57+00/58+00	Multiple locations, 3+ inches deep, about 10' long
57+30	6+/- inch deep, about 15' long
47+55	6+/- inch deep, about 5' long
43+00/45+00/41+50	Multiple locations, 3 to 4 inches deep, about 10' long

**Table 2 – Backfill Subsidence Summary (North Harbor Wall)**

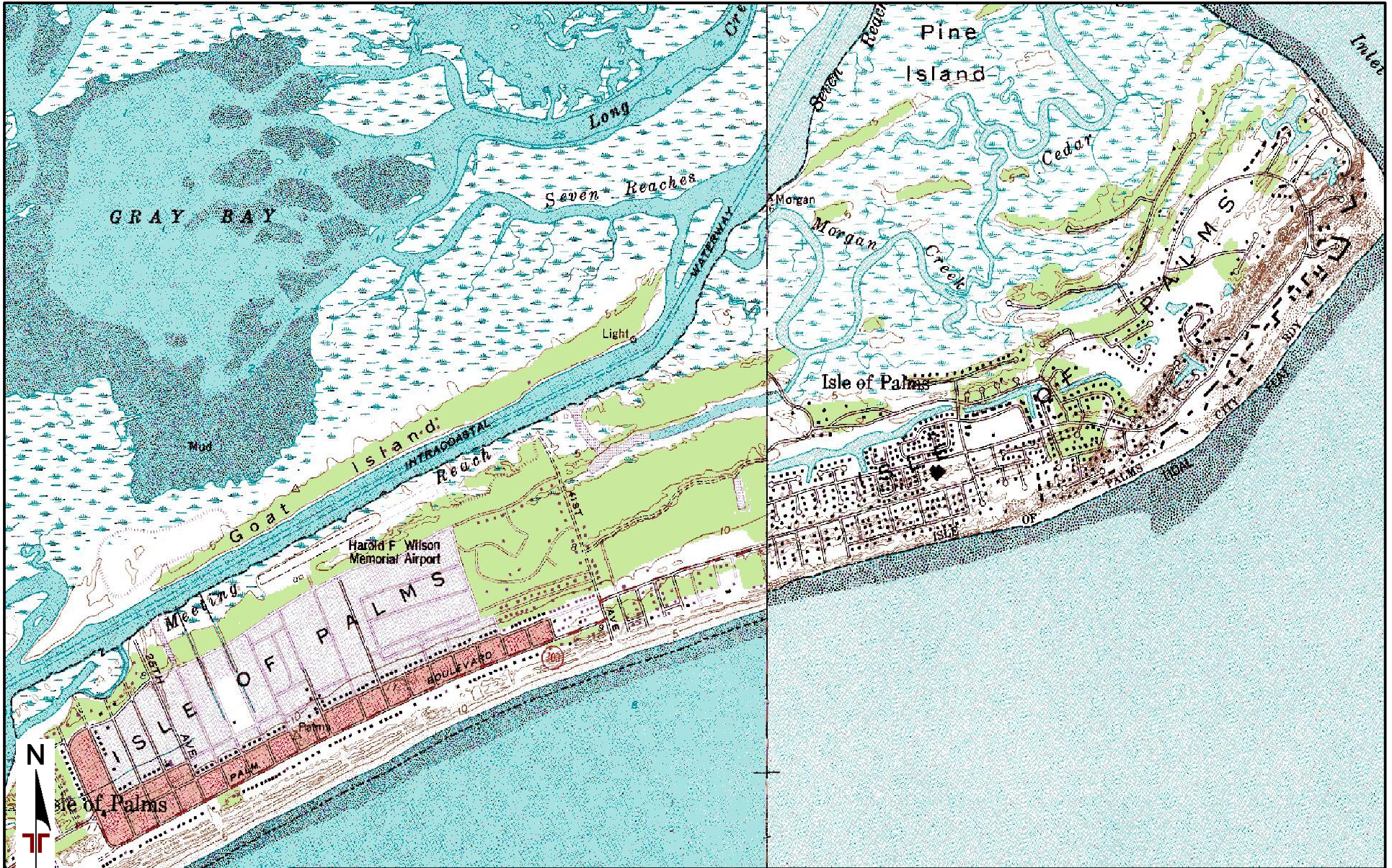
Station Number	Description
15+20	Multiple locations, 4+ inches deep, about 10' long
16+20/16+25	10+ inches deep, about 15' long
17+20	6+ inch deep, about 10' long
22+25	Multiple locations, 10+ inch deep, 10 to 15 feet long

## 4.0 GENERAL COMMENTS

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon Consultants, Inc. reviews the changes and either verifies or modifies the conclusions of this report in writing.

## **APPENDIX A**

Exhibit A-1 and A-2	Overall Site Location Plans
Exhibit A-3	Bulkhead Wall Measurements
Exhibit A-4	Photographic Log



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY  
 QUADRANGLES INCLUDE: FORT MOULTRIE, SC (1/1/1979) and CAPERS INLET, SC (1/1/1992).

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	KS	Project No.	73055027
Drawn by:	-	Scale:	1"=2,000'
Checked by:	-	File Name:	-
Approved by:	-	Date:	-



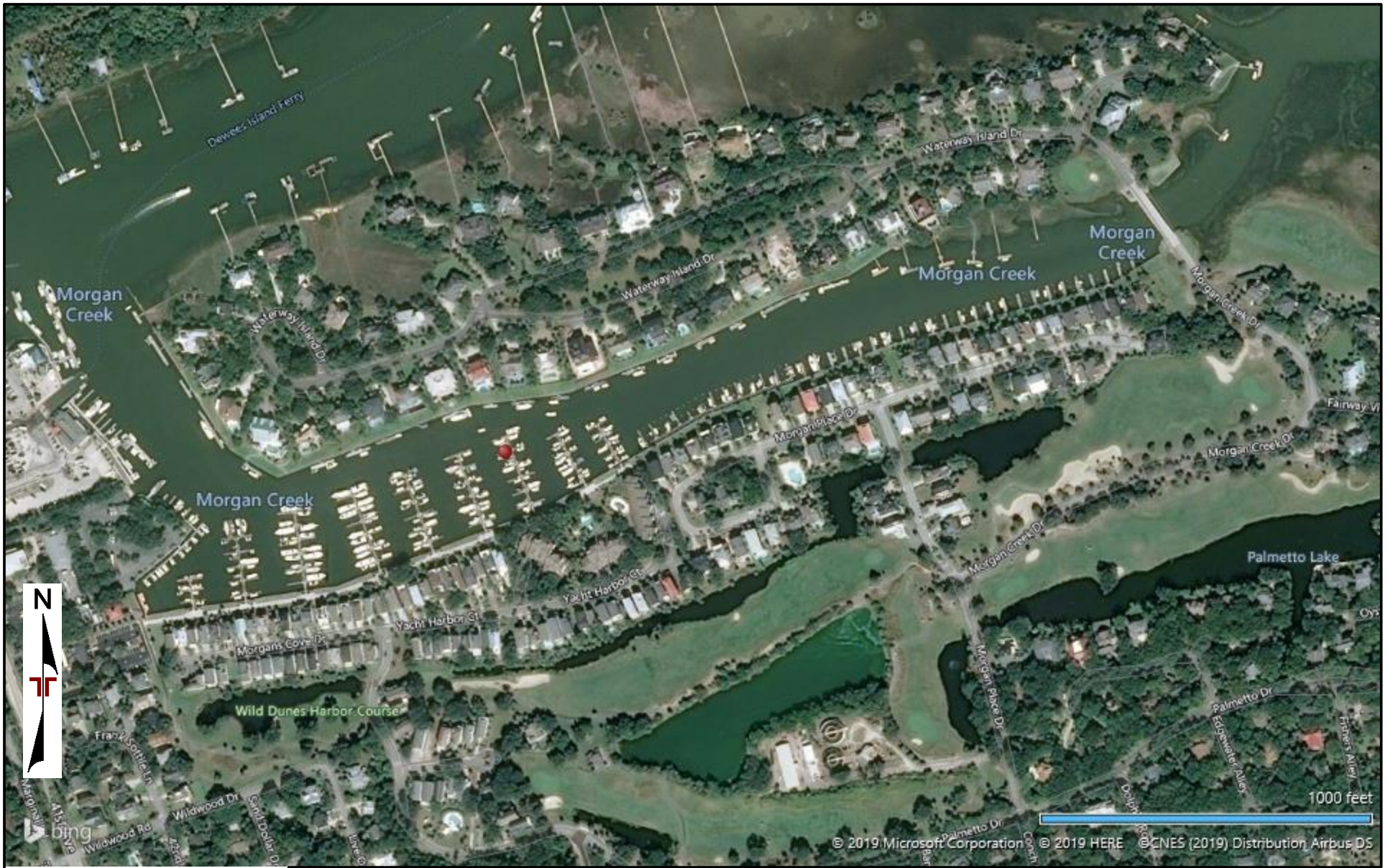
521 Clemson Rd  
 Columbia, SC 29229-4307

**SITE LOCATION**

Morgan Creek Harbor  
 Isle of Palms  
 Isle of Palms, SC

Exhibit

**A-1**



AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: KS  
 Drawn by:  
 Checked by:  
 Approved by:

Project No. 73055027  
 Scale: AS SHOWN  
 File Name: -  
 Date: -

**Terracon**  
 Explore with us

521 Clemson Rd  
 Columbia, SC 29229-4307

EXPLORATION PLAN

Morgan Creek Harbor  
 Isle of Palms  
 Isle of Palms, SC

Exhibit

A-2

Table 1  
**MORGAN CREEK HARBOR - Bulkhead Wall Mesuremnts**  
 February 3, 2022  
 Terracon Project No. 73055027

Reference Plate No.	Station No.	Distance to Reference Plate March 10-11, 2005	Distance to Reference Plate February 12, 2008	Distance to Reference Plate July 17, 2015	Distance to Reference Plate May 11, 2017	Distance to Reference Plate May 15, 2019	Distance to Reference Plate Feb 3, 2022	Running Average	Difference (inch)	General Notes
1	60+75.00	52.42	52.45	52.44	52.44	-	52.43	52.44	(0.18)	
2	60+ 53.85	46.95	46.98	46.98	46.98	46.99	-	46.99	0.06	
3	59+53.93	56.90	56.90	56.92	56.92	56.92	56.93	56.92	0.28	
4	58+15.55	53.70	54.04	-	-	-	53.97	53.97	(0.84)	Rt Col
4A	58+15.55	-	28.50	28.46	28.46	28.46	-	28.46	(0.48)	back of sidewalk
5	57+32.40	56.22	56.49	56.50	56.50	-	-	56.50	0.12	new marker, '14
5A	57+32.40	-	26.21	26.21	26.21	-	-	26.21	0.00	plate missing
6	55+02.48	54.10	54.15	54.13	54.12	-	-	54.12	(0.36)	plate missing
7	53+79.00	62.00	61.95	62.45	62.45	62.46	62.38	62.43	(0.24)	shrubs, new marker 2015
8	52+54.00	63.90	63.90	-	-	-	-	NA	-	marker missing, abandon
8A	52+54.00	-	-	-	-	-	-	NA	-	marker missing, abandon
8B	52+50.00	-	-	27.23	27.21	-	-	27.21	(0.24)	note 1
9	51+45.00	69.10	69.10	-	-	-	-	NA	-	marker missing, abandon
9A	51+45.00	-	25.70	25.71	25.71	25.72	25.72	25.72	0.20	back of sidewalk
10	50+08.42	63.80	63.81	63.84	63.84	-	-	63.84	0.36	
11	48+13.10	50.50	50.47	-	-	-	-	NA	-	marker missing, abandon
11A	48+13.10	-	-	27.59	27.59	27.60	27.59	27.59	-	Note 2
12	46+45.00	28.40	28.40	28.41	28.41	28.41	28.41	28.41	0.12	Note 3
13	44+50.00	62.40	62.42	62.42	62.41	62.41	62.42	62.41	(0.08)	corner of house
14	43+50.00	47.50	47.42	43.63	43.63	-	-	-	-	marker missing, abandon
15	42+14.93	42.60	42.53	42.55	42.54	-	42.61	42.58	0.54	
16	41+25.11	43.60	43.60	43.63	43.61	-	-	43.61	0.12	
17	40+50.00	55.50	55.53	-	-	-	-	NA	-	diff. to access, abandon
17A	40+50.00	-	44.51	44.49	44.49	44.48	-	44.49	(0.30)	To step column
18	40+00.00	137.50	137.50	-	-	-	-	NA	-	marker missing, abandon
18A(new)	39+78.00	-	44.55	-	-	-	-	NA	-	marker missing, abandon
19	39+27.26	46.10	46.11	46.12	46.12	-	-	46.12	0.12	missing plate
20	38+34.69	44.90	44.90	-	-	-	-	NA	-	marker missing, abandon
20A	38+34.69	-	-	44.65	44.65	-	-	44.65	-	marker on house trim
21	37+43.83	49.60	49.60	49.61	49.61	-	-	49.61	0.12	
22	37+00.00	51.60	51.58	-	-	-	-	NA	-	marker missing, abandon
23	36+50.00	48.10	48.10	48.16	48.16	-	48.11	48.14	0.42	2nd Col from RT
24	35+50.00	42.40	42.42	53.71	49.33	-	-	49.33	-	marker missing, abandon
25	35+17.57	49.30	49.30	49.32	-	-	-	NA	-	
26	34+44.28	47.00	46.97	47.00	47.15	47.01	47.02	47.06	1.08	left column, deck
27	33+82.47	49.00	49.01	49.01	49.06	-	-	49.06	0.60	
28	33+37.63	46.20	46.20	46.20	46.25	-	-	46.25	0.60	
29	32+68.00	46.00	45.99	46.01	46.01	-	-	46.01	0.24	marker missing, abandon
30	31+91.55	47.00	47.10	46.92	46.92	-	47.01	46.97	(1.62)	above spigot on column
31	31+00.00	137.90	137.90	-	-	-	-	NA	-	marker missing, abandon
32	30+39.00	45.40	45.38	-	-	-	-	NA	-	marker missing, abandon
33	29+68.68	46.50	46.51	46.51	46.51	-	-	46.51	0.00	shrubs
34	28+63.00	45.80	45.77	45.78	45.78	-	-	45.78	0.12	shrubs, no reading
35	28+07.82	46.30	46.57	46.68	46.68	-	-	46.68	1.32	porch column, new marker 08
36	0+57.38	34.00	33.99	34.09	34.09	-	34.09	34.09	1.20	porch column
37	1+58.75	45.60	45.57	42.96	42.96	-	-	42.96	-	new marker
38	2+89.23	44.00	43.95	43.97	43.97	-	-	43.97	0.24	
39	3+90.89	35.10	35.09	35.09	35.09	-	-	35.09	0.00	middle column

Table 1  
**MORGAN CREEK HARBOR - Bulkhead Wall Measurements**  
 February 3, 2022  
 Terracon Project No. 73055027

Reference Plate No.	Station No.	Distance to Reference Plate March 10-11, 2005	Distance to Reference Plate February 12, 2008	Distance to Reference Plate July 17, 2015	Distance to Reference Plate May 11, 2017	Distance to Reference Plate May 15, 2019	Distance to Reference Plate Feb 3, 2022	Running Average	Difference (inch)	General Notes
40	5+17.00	41.00	41.09	41.10	41.11	-	41.11	41.11	0.24	outside corner
41	7+94.37	71.00	-	-	-	-	-	NA	-	marker missing, abandon
41A	-	-	37.06	36.88	36.88	36.88	36.84	36.87	(2.32)	shrubs, tree, reading impacted
42	9+20.00	60.30	60.30	60.31	60.32	-	-	60.32	0.24	
43	10+20.00	31.00	30.96	34.21	34.23	34.28	34.20	34.24	0.32	silt fence, no reading, RT post
44	12+00.00	45.00	45.03	45.01	-	45.01	-	45.01	(0.24)	
45A	13+10.00	-	36.77	36.77	36.77	-	-	36.77	0.00	5th post from RT
46	14+30.00	34.00	33.93	-	-	-	-	NA	-	marker missing, abandon
47	15+10.00	63.70	63.67	-	-	-	-	NA	-	marker missing, abandon
47A	15+10.00	-	-	35.70	35.69	35.69	35.70	35.69	(0.08)	corner, Note 4
48	16+86.00	35.00	34.95	-	-	-	-	NA	-	shrubs, no reading, abandon
49	17+71.90	52.10	52.10	52.08	52.08	-	-	52.08	(0.24)	left post steps
50	18+30.00	72.30	72.31	72.31	72.31	-	-	72.31	0.00	left corner
51	19+00.00	34.10	34.14	34.16	34.16	34.16	-	34.16	0.24	corner post
52	19+62.55	45.30	45.23	45.24	45.21	-	45.29	45.25	0.24	corner
53	20+00.00	54.00	53.82	53.86	53.86	-	54.11	53.99	1.98	4 <sup>th</sup> column from north corner
54	20+50.00	43.90	43.90	44.87	44.01	-	-	44.01	1.32	new marker
55	21+00.00	45.30	45.20	44.17	46.14	-	44.28	45.21	0.12	New Marker, left column, cinder block
56	21+50.00	54.80	54.87	-	-	-	-	NA	-	marker missing, abandon
57	22+25.00	32.50	33.42	33.44	33.44	-	-	33.44	0.24	
58	23+00.00	39.90	39.87	39.93	39.93	-	-	39.93	0.72	By door
59	23+50.00	34.10	34.09	34.10	34.10	-	-	34.10	0.12	
60	24+25.00	34.20	34.20	34.20	34.20	-	-	34.20	0.00	

**Table Notes:**

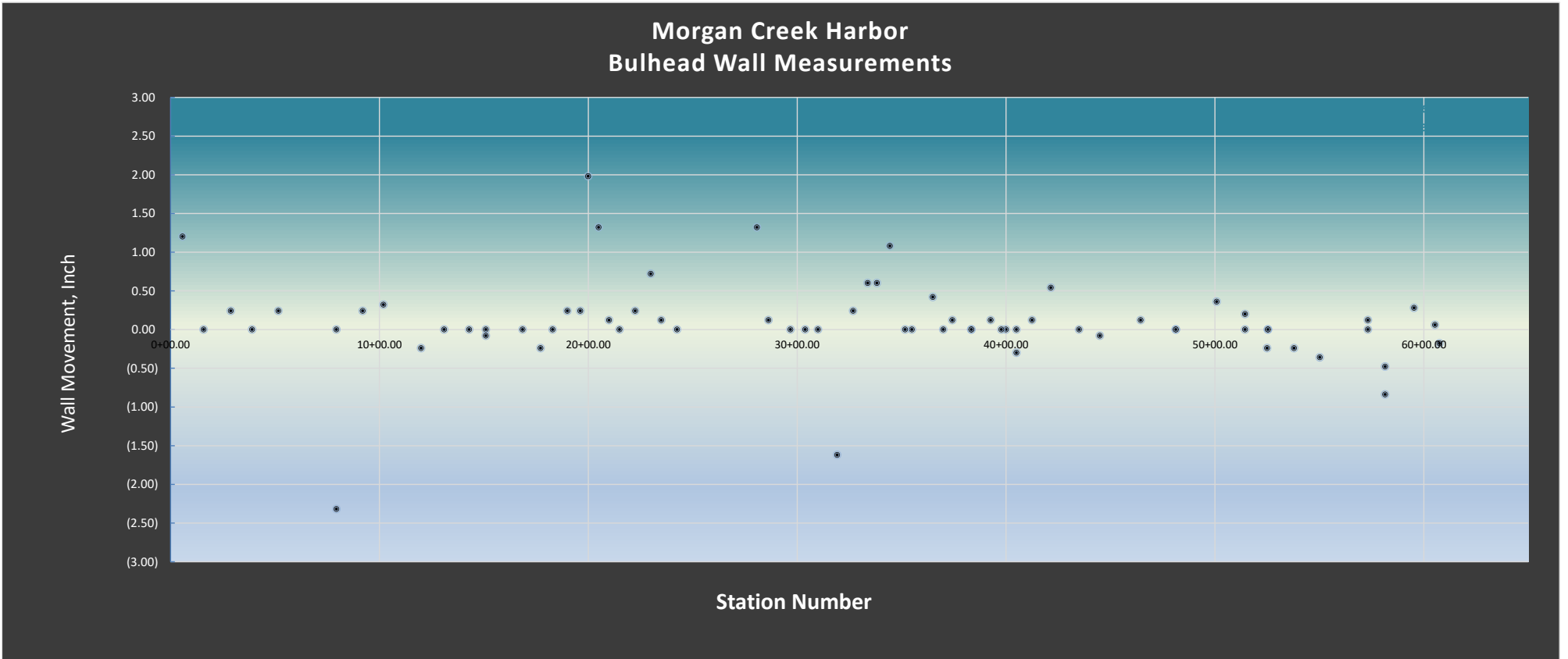
- 1) Measurement from back of the sidewalk at joint to station marker 52+50. Marker was established in 2013.
- 2) Measurement to the back of sidewalk, tangent to east side of fence post.
- 3) Measurements to the back of sidewalk at the construction joint.
- 4) New marker to RT column of pool deck.

**General Notes**

- a) Positive numbers indicate outward (toward the water) and negative numbers (<>) indicate inward (toward land) movement.
- b) Measurements were taken at low to mid tide, temperature in low seventies, light wind.
- c) Measurements taken to bottom left corner of reference plate, unless noted otherwise.
- d) Measurements were taken using a 100' long woven metallic tape.
- e) Dashes " - " in the table indicates no measurements were made during this inspection
- f) running average denotes average of last three readings, if available.

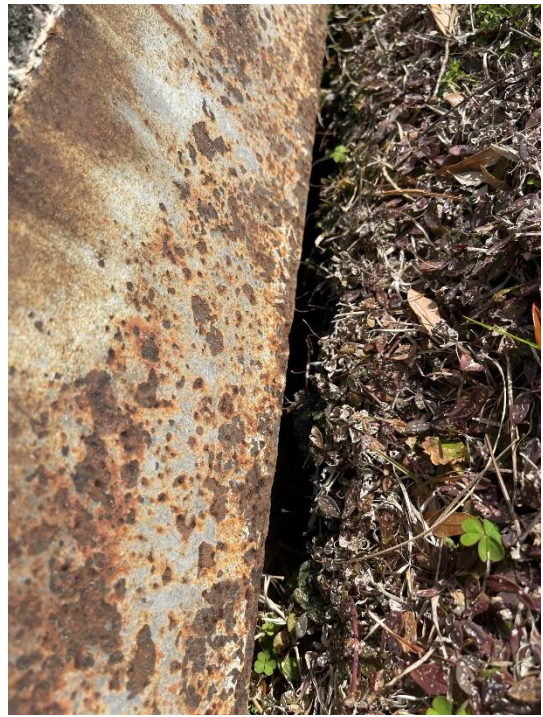
Table 1  
**MORGAN CREEK HARBOR - Bulkhead Wall Measurements**  
 February 3, 2022  
 Terracon Project No. 73055027

Reference Plate No.	Station No.	Distance to Reference Plate March 10-11, 2005	Distance to Reference Plate February 12, 2008	Distance to Reference Plate July 17, 2015	Distance to Reference Plate May 11, 2017	Distance to Reference Plate May 15, 2019	Distance to Reference Plate Feb 3, 2022	Running Average	Difference (inch)	General Notes
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001-backfill subsidence, multiple locations (typ), Stations 59+00/60+00




002-backfill subsidence, note the soil loss near the back of the wall, Station 59+75



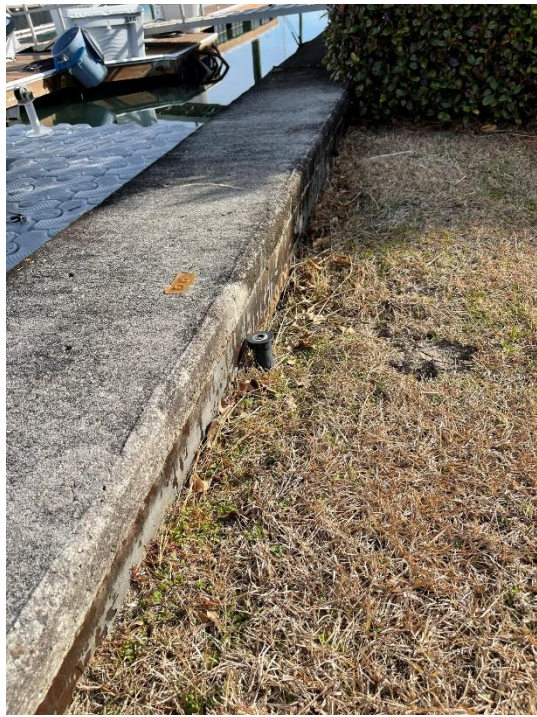
003-deterioration concrete cap, aggregate exposed Station 59+00



004-backfill subsidence, some soil loss near the wall. Note sprinkle head near the wall Station 57+50

Bulkhead Observation Report Isle of Palms, South Carolina	Project Number: 73055027	
	Report Number: NA	
March 2, 2022	Engineer: Kevin Sohrabnia	521 Clemson Road
	Date: 2/3/2022	Columbia, SC 29229
	Scale: Not to Scale	





005-backfill subsidence, near sprinkler head  
Station 57+30




006-backfill subsidence and some soil loss near the back of the wall  
Station 47+50



007-backfill subsidence  
Station 43+00



008-stockpile of construction material near the wall  
Station 36+00

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009-heavy vegetation behind the wall  
Station 36+00




010-heavy vegetation behind the wall  
Station 33+00



011-timber bulkhead, 2 WWI, conditions unchanged from 2021  
inspection



012-timber bulkhead, 3 WWI, landscaping and repair of backfill  
subsidence in progress

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	Scale: Not to Scale	



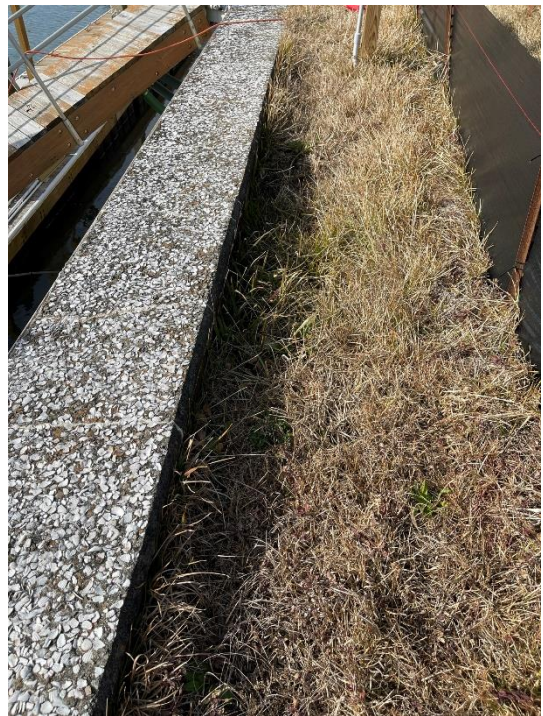
013-timber bulkhead, 3 WWI, construction work underway




014-timber bulkhead, 4 WWI, conditions unchanged since 2021 inspection



015-1 WWI, the shoreline is covered with well-established vegetation. No evidence of erosion along shoreline



016-backfill subsidence and concrete pile cap deterioration Station 20+50

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	Scale: Not to Scale	



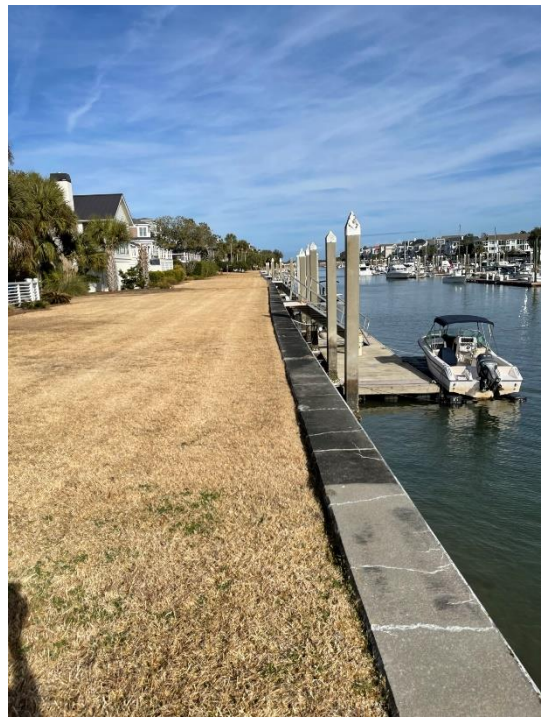
017-view of bulkhead at low tide, note marine growth and corrosion  
Station 22+00




018-view of bulkhead at low tide, note marine growth and corrosion  
Station 22+00



019-closeup view of corrosion and some pin holes  
Station 22+00

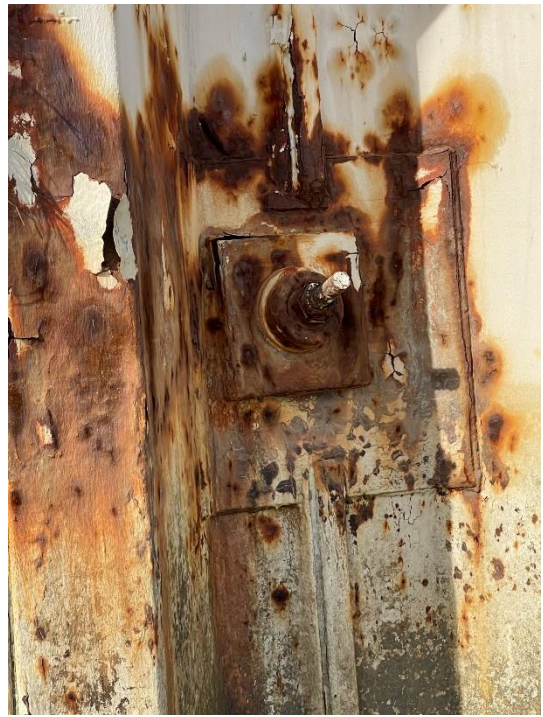


020-view of backfill and bulkhead, Water Way Island

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	Scale: Not to Scale	



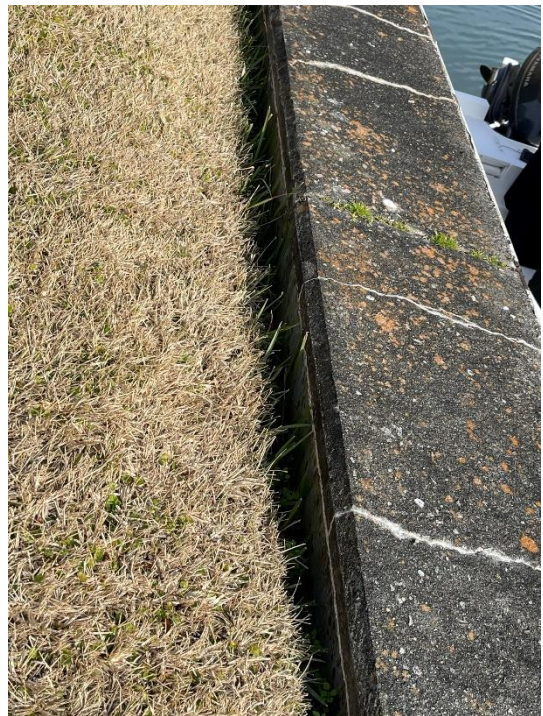
021-marine growth and corrosion, WWI, typical  
Station 18+00




022-corrosion of bulkhead and bearing plate, WWI  
typical

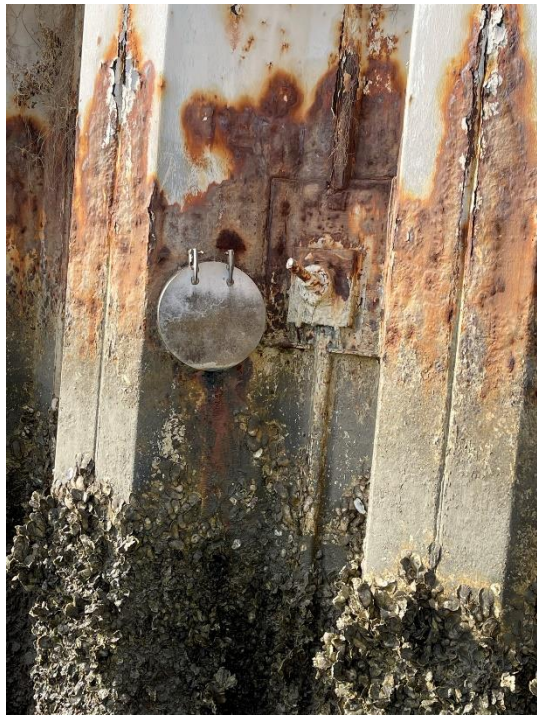


023-closeup, penetrations and corrosion  
Station 18+00



024-backfill subsidence, WWI  
Station 16+25

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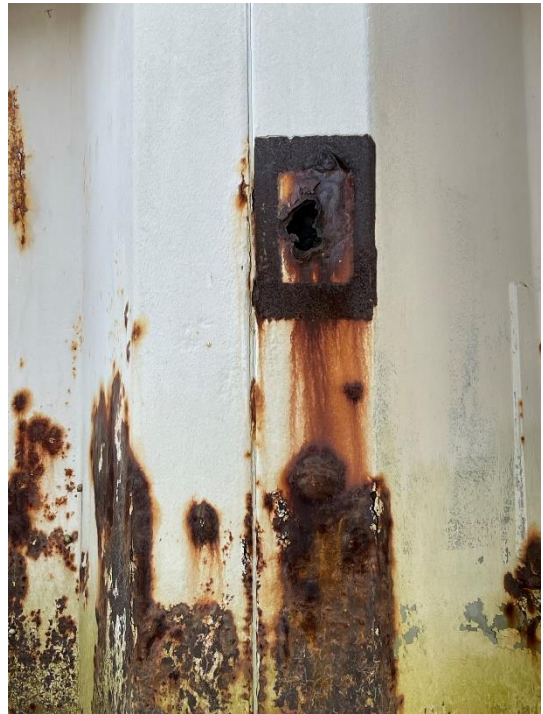
025-flapper valve (Typical). Note corrosion of bulkhead and bearing plate  
Station 15+25




026-corrosion and marine growth, WWI (typical)  
Station 15+25



027-cap joint deterioration (typ)  
Station 44+00



028-hole in the patch plate  
Station 49+50

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	Scale: Not to Scale	