Reuben Clarson CONSULTING

September 10, 2020

Ed Chesney, P.E.
Marine & Aviation Director
City of Clearwater
25 Causeway Blvd.
Clearwater, FL 33767
Email: ed.chesney@myclearwater.com

Re: Seawall Inspection Report for City of Clearwater Beach Marina
25 Causeway Blvd, Clearwater, FL 33767

Dear Mr. Chesney,

This letter provides a summary of the field inspection performed on September 4, 2020 of the residential seawall and dock located at the above referenced address. The following is a summary of findings and recommendations.

Existing Seawall Conditions/Construction

- 1,543 LF +/- of seawall
- Cast-In-Place concrete cap (24" x 16")
- Pre-cast Concrete Panels
- Seawall exposed height = 69± inches

Approximately 1,543 linear feet (LF) of reinforced concrete slab seawall consists of 4 ft to 6 ft wide x 10± ft long slabs with a 24" high x 16" wide concrete cap. The exposed height from the top of the cap to the berm (mudline) is approximately 5.75 ft.

The seawall inspection starts at Station 0+00 at the northeast side of the property (by Causeway Blvd overpass) around to the southwest side of the property at Station 15+43. The seawall is an original concrete slab seawall with a replaced concrete cap. Structural defects (longitudinal cracking/spalling) were observed in the top and front face of the seawall cap indicating rebars in the concrete are rusting from salt intrusion. The rusting causes the rebars to expand and thus crack the concrete. Rusting in the cap in areas without cracking was most likely caused by lack of concrete coverage in rebar and/or rebar ties. Transverse cracking was observed in the seawall cap, however not structurally defective.

Structural defects (horizontal/diagonal cracking) were observed in the vertical slabs. No wellpoint drains were observed; however, slab joints were open to aid in relieving hydrostatic pressure or water from behind the seawall. Open slab joints may be causing subsurface sediment loss behind the wall. Some sections of the vertical wall could not be inspected due to obstacles in front of the wall.

See the table below for cap size, seawall observations, and recommendations at each station starting from the northeast side of the property:

From Sta.	To Sta.	Cap Size (H x W)	Vertical Wall	Observations/Recommendations
0+00	0+63	24”x16”	Concrete	• (10) slabs with horizontal cracking/Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid in the structural support of the wall immediately + construction of new seawall in 5± years • (5) areas of longitudinal cracking in face of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy • Exposed height=69” • 6’ wide slabs
0+63	1+00	24”x16”	Concrete	• (5) slabs with horizontal cracking/Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid in the structural support of the wall immediately + construction of new seawall in 5± years • (3) areas of longitudinal cracking in face + (1) on top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy
1+00	1+63	24”x16”	Concrete	• (1) area of longitudinal cracking in face + (2) areas on top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy • 4’ wide slabs
1+63	2+07	24”x16”	Concrete	• (1) disjointed slab/Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of slab joint to aid in the structural support of the wall. • (1) area of longitudinal cracking in face + (1) area on top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy.
2+07	2+48	24”x16”	Concrete	• (7) slabs with horizontal cracking/Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid in the structural

				support of the wall immediately + plan on construction of new seawall in 5± years • (1) area of longitudinal cracking in face of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy • Disjointed expansion joints at 2+07
2+48	2+79	24”x16”	Concrete	• Rusting on top of seawall cap @ 2+54, 2+63 and 2+68 /Clean and seal with hydraulic cement or a trowelable epoxy or leave as is (going to continue) • (6) slabs with horizontal cracking/Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid in the structural support of the wall immediately + plan on construction of new seawall in 5± years
2+79	3+31	24”x16”	Concrete	• (13) slabs with horizontal cracking/install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid in the structural support of the wall immediately + construction of new seawall in 5± years • (1) area of longitudinal cracking in face of seawall cap/clean and seal with hydraulic cement or a trowelable epoxy
3+31	3+72	24”x16”	Concrete	• (2) slabs with horizontal cracking + wall kicking out at toe/install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid in the structural support of the wall immediately + construction of new seawall in 5± years • Spalling in face of seawall cap from 3+44 to 3+55/clean and seal with hydraulic cement or a trowelable epoxy
3+72	4+35	24”x16”	Concrete	• (1) area of longitudinal cracking in face of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy • (2) slabs with horizontal cracking + wall kicking out at toe/Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid

				in the structural support of the wall immediately + plan on construction of new seawall in 5± years
4+35	5+22	24”x16”	Concrete	• (6) slabs with horizontal cracking /Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid in the structural support of the wall immediately + plan on construction of new seawall in 5± years • (4) areas of longitudinal cracking in face + (1) area in top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy • Spalling in face of seawall cap at 4+59/Clean and epoxy rebuild
5+22	5+85	24”x16”	Concrete	• Extensive diagonal cracking in vertical slab @ 5+22/Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of the slab with structural defects to aid in the structural support of the wall immediately+ plan on construction of new seawall in 5± years • Spalling of Seawall Cap/Clean and epoxy rebuild
5+85	6+28	24”x16”	Concrete	• (1) area of longitudinal cracking in top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy
6+28	7+14	24”x16”	Concrete	• (3) areas of longitudinal cracking in top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy • (1) slab with diagonal cracking in vertical slab @ 5+22/Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid in the structural support of the wall • Spalling of seawall cap @ 7+14/clean epoxy rebuild
7+14	7+46	24”x16”	Concrete	• Shear cracking/spalling of seawall cap @ 7+46/Clean epoxy rebuild
7+46	8+40	24”x16”	Concrete	• Shear cracking/spalling of seawall cap @ 7+75/Clean and epoxy rebuild
8+40	8+84	24”x16”	Concrete	• (6) slabs with horizontal cracking /Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab

				with structural defects to aid in the structural support of the wall immediately + plan on construction of new seawall in 5± years
8+84	9+04	24”x16”	Concrete	• (1) area of longitudinal cracking in top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy • (1) slab with horizontal cracking /Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of the slab with structural defects to aid in the structural support of the wall
9+04	9+68	24”x16”	Concrete	• Spalling of seawall cap/exposed rebar @ 9+48/Clean and epoxy rebuild
9+68	10+09	24”x16”	Concrete	• (1) area of longitudinal cracking in face + (1) area in top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy
10+09	12+28	24”x16”	Concrete	• Spalling of seawall cap/exposed rebar @ 11+14/Clean and epoxy rebuild
12+28	13+45	24”x16”	Concrete	• (4) slabs with horizontal cracking /Install one 1” diameter secondary tieback rod with a 12”x12”x1/2” HDG washer and nut to MR-SR manta ray anchor through the middle of each slab with structural defects to aid in the structural support of the wall immediately + plan on construction of new seawall in 5± years • (2) areas of longitudinal cracking in face + (1) area in top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy
13+45	13+97	24”x16”	Concrete	• (1) area of longitudinal cracking in face + (2) areas in top of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy
13+97	15+43	24”x16”	Concrete	• (1) area of longitudinal cracking in face of seawall cap/Clean and seal with hydraulic cement or a trowelable epoxy • End of wall @ 15+43

Seawall Recommendations

With above observations we recommend the following maintenance and repairs within the next 6± months:

1. Clean and seal all cracking in the seawall cap and vertical slabs with either a trowelable epoxy or hydraulic cement (101 areas).
2. Secondary tieback rods should be installed through the middle of the vertical slabs with structural defects to aid in the structural support of the wall. Tieback rods should be attached to deadmen or MR-SR anchors (65 total).
3. Areas of spalling in seawall cap should be epoxy rebuilt to prolong the useful life of the seawall (6 areas).

Rusting in areas without cracking can be cleaned and sealed however, we believe that rusting may continue. It should be noted that the typical useful life of a seawall on saltwater is approximately 50± years. Based on the structural defects observed and the age of the seawall, we recommend planning for replacement of approximately 639 linear feet of the existing seawall system in approximately 5± years (see table above for recommended sections). We recommend planning for replacement of the remaining sections within the next 10± years. We also recommend continued monitoring for additional structural defects at least every 3 years to determine when a replacement seawall may be necessary.

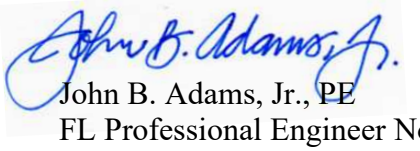
Recommended specifications for a new seawall would include construction of a new corrugated vinyl seawall system with a new concrete cap and 1" diameter HDG PVC encased tieback rods to MR-SR Manta Ray anchors or deadmen. Well point drains should be installed through both walls at 6' on center and 5" above the barnacle line to relieve the hydrostatic pressure or aid in removing water from behind the wall. The existing wall would remain. Concrete filler would be applied between the two walls.

Finally, we recommend meeting with the City to discuss future plans for any modifications to the marina development. Upon understanding the future plans, we can better assist the City with repair and replacement plans, phasing as needed and estimated construction costs.

If you should have any questions or comments, please do not hesitate to contact me. We appreciate the opportunity to provide this report.

Sincerely,

REUBEN CLARSON CONSULTING, INC.



John B. Adams, Jr., PE
FL Professional Engineer No. 53963

Photo #1- Start of Seawall at Northeast End of Property.

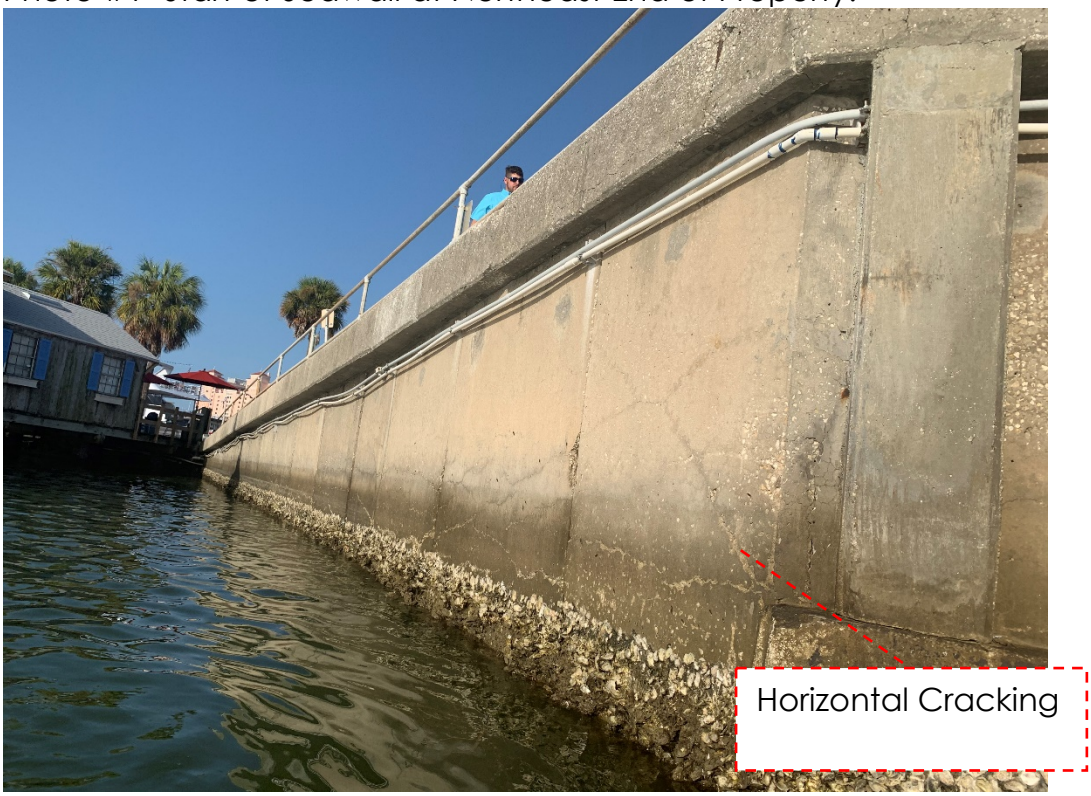


Photo #2 – View of Longitudinal Cracking in the Face of Seawall Cap at Northeast End.

Photo #3- View of Spalling of the Seawall Cap.

Photo #4- View of Spalling of Seawall Cap

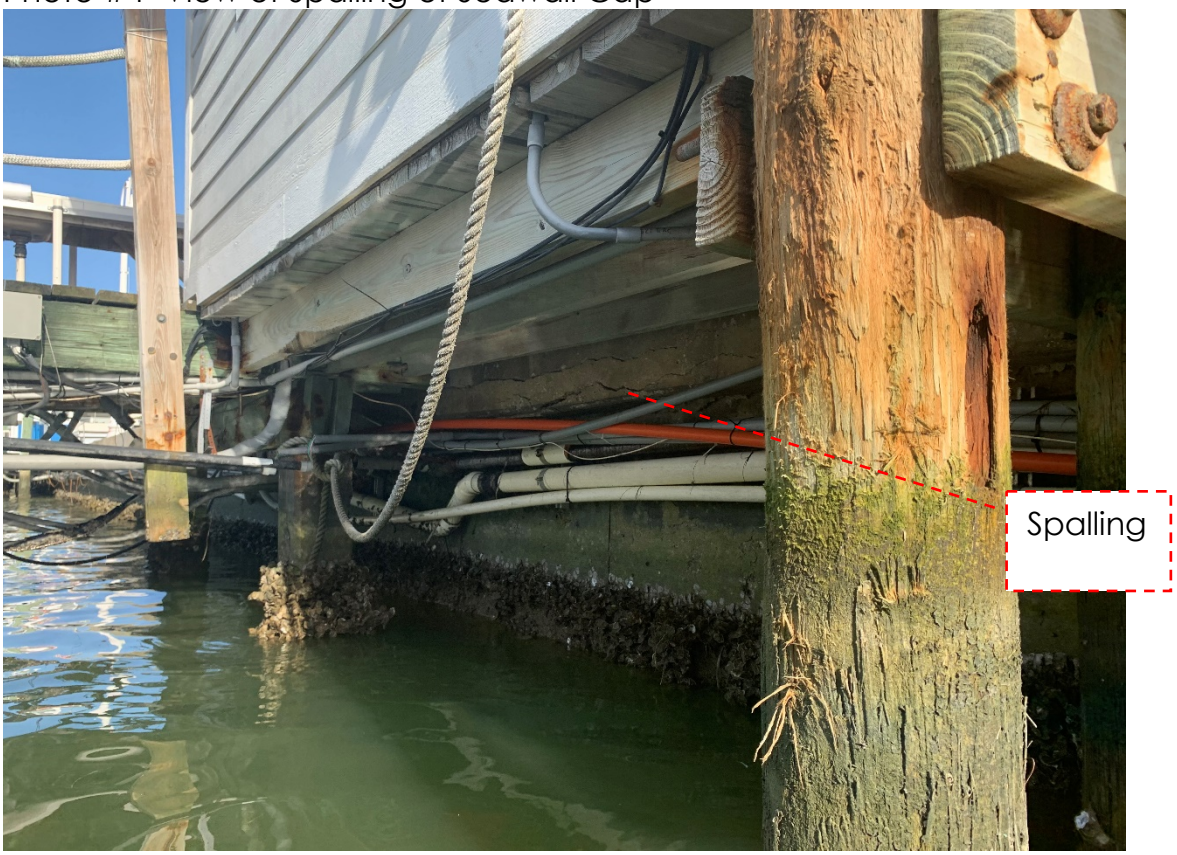


Photo #5 – View of Extensive Diagonal Cracking in Slab and Spalling of Cap

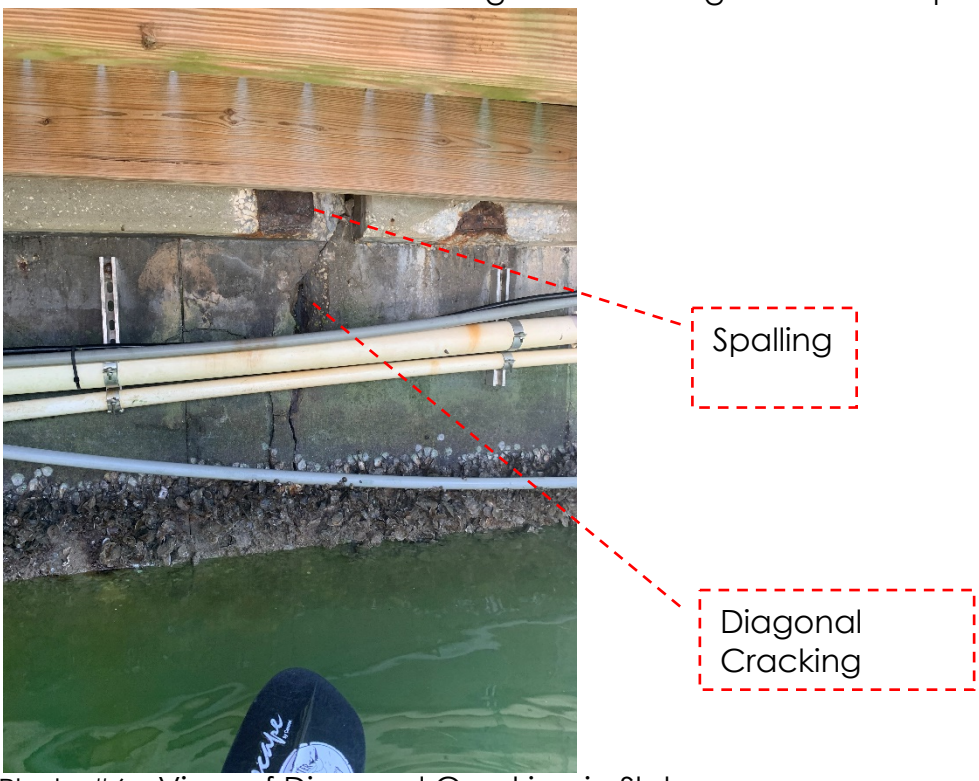


Photo #6 – View of Diagonal Cracking in Slab

Photo #7 – View of Longitudinal Cracking in Face of Cap.