Mallory Square Wharf Assessment

Final Report

Key West, Florida

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Introduction

From April 28, 2025 to May 2, 2025, WGI performed a structural condition assessment of the Mallory Square Wharf located at 400 Wall Street, Key West, Florida. The City of Key West also requested an assessment of the T-dock section, seawall, and the breasting dolphins. The wharf consists of prestressed concrete piles and precast concrete pile caps supporting precast deck slabs with mooring dolphins located on the northwest and southwest ends. There is a total of 92 square 18” piles, 3 pile caps, and two spans with 190 deck slabs making up the wharf. The wharf was most recently renovated in 2008, replacing the topping slab, deck panels, and the pile caps. In 2018 the breasting dolphin to the far south was damaged by a cruise ship and replaced.

The scope of the assessment is to evaluate the structural integrity of the seawall, pile caps, piles, and wharf decking. A cursory swim was done to observe the condition of the T-dock, walkway, and breasting dolphins. A previous inspection was done in 2024 by Tetra Tech, and its findings can be found in Appendix 1. A new assessment was required to identify additional deterioration or damage to the existing structures. Visual observation and non-destructive testing on the wharf were performed by Tetra Tech divers with the coordination of WGI personnel on site. The objective of this assessment is to review the current condition of the wharf and to recommend any necessary replacements or rehabilitation. This report serves as documentation of the findings for our assessment.

WGI was provided the drawings from the 2008 renovations, but no drawings for the seawall or the T-dock section were available to WGI during the site visit. Cross sections of the wharf and the overall plan view are shown in Appendix A.

Figure 1- Scope of Mallory Square observations

Site Observations

Wharf Superstructure

The superstructure of the wharf consists of ten-inch thick precast concrete deck slabs with a six-inch thick composite concrete topping slab overlaid with concrete pavers on bedding sand. There are 101 concrete deck slabs in Span 1, which is between Bent B and Bent C, and 89 concrete deck slabs in Span 2, located between Bent A and Bent B. Due to the paver stones, the top of the cast-in-place concrete topping slab and the closure pours were not accessible for inspection. Because of the limited access, only the underside of the cast-in-place concrete slabs was examined.

Precast Concrete Slabs

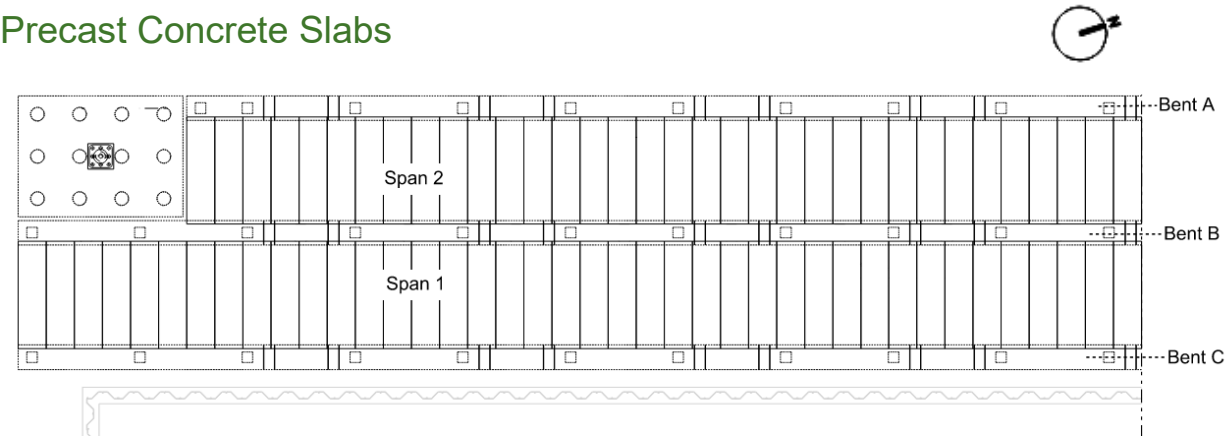


Figure 2 – Design Drawings: Partial Concrete Slab Layout

The deck slabs consist of a single layer of reinforcement. Spalled concrete was readily observed on the deck slabs, with most of the spalling occurring in Span 2. Spalling occurs when delaminated surface layers of concrete have broken off and exposed the underlying materials, resulting in section loss. The spalling of the deck slabs exposed the primary reinforcing and was observed to have rust staining. The traverse reinforcing (spanning north/south) was observed to have 100% section loss in some areas resulting in hanging reinforcing steel. The longitudinal reinforcing steel (spanning east/west) was observed to have about 35% section loss.

Figure 3 – Exposed reinforcing steel on underside of deck slab

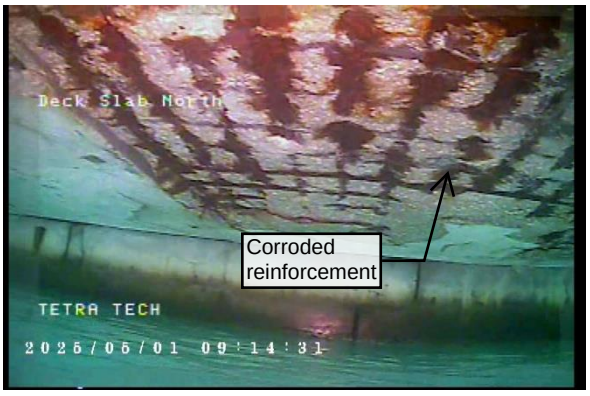


Figure 4 – Corrosion of exposed reinforcing steel

While observing the deck units a plastic material between the deck joints was noted, as seen in Figure 5. It was unclear what the plastic was, but it was present in several locations along both spans of the wharf.

Figure 5 – Hanging plastic on underside decking

Figure 6 – Delamination on underside decking

Towards the middle of Span 1, delamination was observed across the entire span. Delamination was also observed near the south end of the wharf. Delamination is the mode of failure where the concrete fractures and creates an unbonded layer, which reduces the strength of the concrete member. This is often caused by the corrosion of the reinforcing steel. Longitudinal cracking was found in several concrete slabs in Span 2, which is located between Bent A and Bent B. About 95% of the concrete slabs in Span 2 and 70% in Span 1 were observed to have large spalling, delaminations, and are considered to be in poor condition. The remaining concrete slabs exhibited minor cracking and were observed to be in fair condition. Note, that though the remaining slabs were observed in fair condition, based on the performance of adjacent slab units it is likely that they have experienced similar levels of corrosion on the internal reinforcement but have not yet begun to visibly show signs of this deterioration.

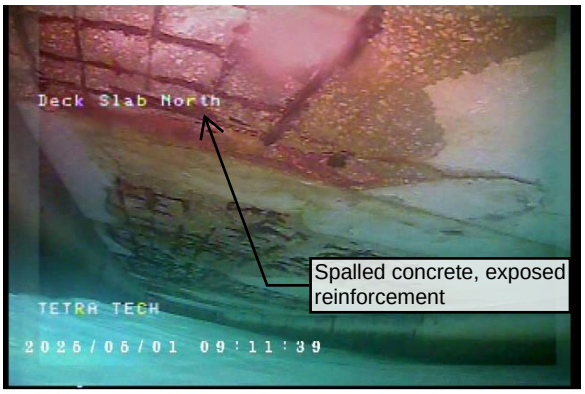


Figure 7 – Exposed reinforcing steel

Figure 8 – Delamination on underside

Wharf Substructure

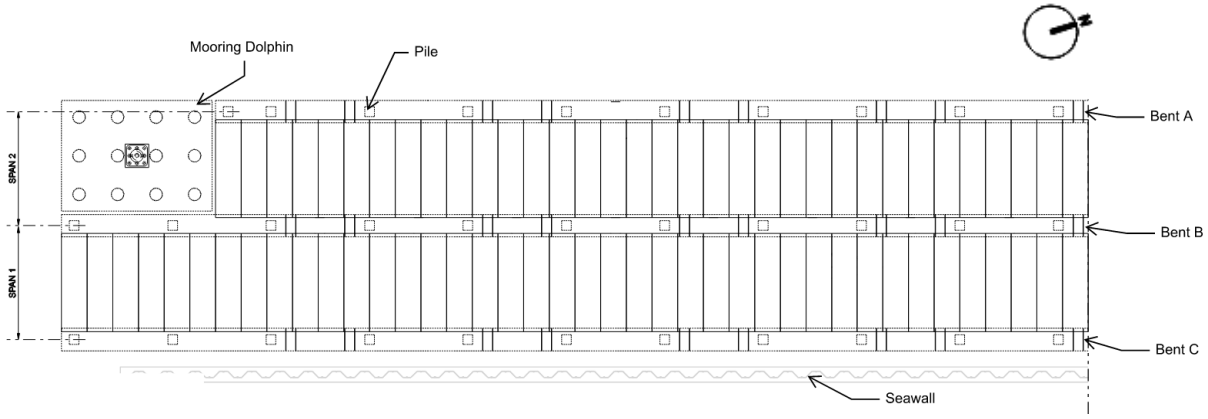


Figure 9 – Design Drawings: Partial Pile Cap Layout

The substructure of the wharf consists of precast concrete pile caps, square concrete piles, and steel pipe piles of the mooring dolphins. There are three bents in the wharf substructure that extend north-south along the direction of the seawall. The bents are labeled Bent A, B, and C, in which Bent A is located on the west side of the wharf with Bent C located on the east, adjacent to and parallel with the seawall. Each bent is made up of several different interlocking precast pile caps, which vary in length depending on their location. The bents have an overall length of approximately 464'-0" long, width of 3'-6", and depth of 3'-6".

Wharf Piles

The piles at the wharf consist of 18" prestressed precast concrete square piles and 24" X 5/8" steel pipe piles. The steel pipe piles are found at the northwest and southwest ends of the wharf within the mooring dolphins. There are 30 concrete piles in Bent A, 31 concrete piles in Bent B, and 31 concrete piles in Bent C. The piles were numbered from south to north using the same nomenclature used in the design drawings, as shown in Figure 10. The pile caps are connected to the piles using grout fill, and the nomenclature used for identifying the pile caps is shown in Figure 9.

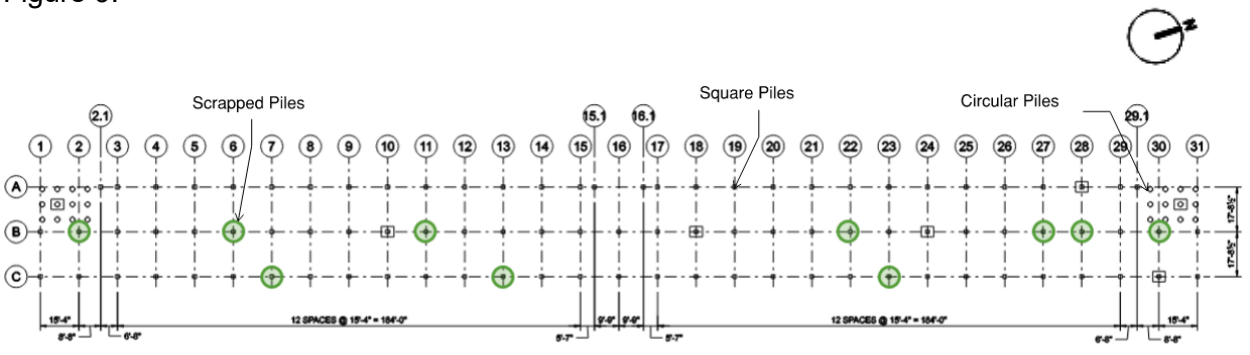


Figure 10 – Design Drawing: Wharf foundation plan

Due to marine growth, limited visual observation of the piles was possible. About 10% of the piles were scraped to be examined at random locations, as shown in Figure 10. The piles were scraped on the shoreside face at isolated locations near the splash zone of the pile. Of the exposed concrete piles, there was no major spalling or exposed reinforcement present. Based on the findings, the concrete piles were found to be in fair condition.

Figure 11 – Growth on pile cap

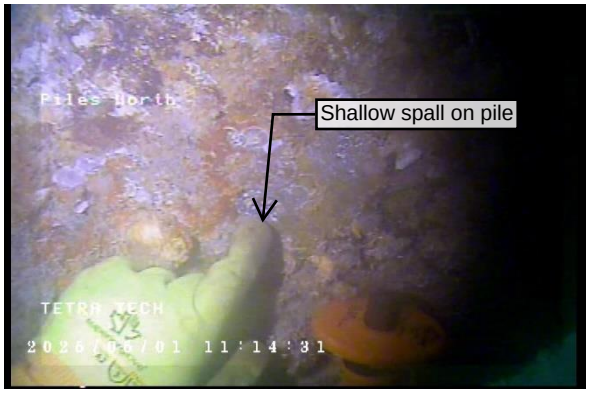


Figure 12 – Minor spall on pile cap

Minor shallow spalls were found on the surface of the concrete piles, and a couple of piles had minor spalling on the edges, but no major spalling was observed on the surface of the piles. Debris was found at the bottom of most piles, which mainly consisted of fallen concrete leaning against the pile surface.

Wharf Pile Caps

The bents are made up of five different precast pile caps. Pile cap C is the longest with a total length of 36’-6”, while pile cap B has the shortest length of 10’-8”. The varying configurations of the precast pile caps can be seen in Appendix A. In the wharf, there are 40 total joints connecting the precast pile caps. During the assessment, the divers examined each exposed face of all the pile caps.

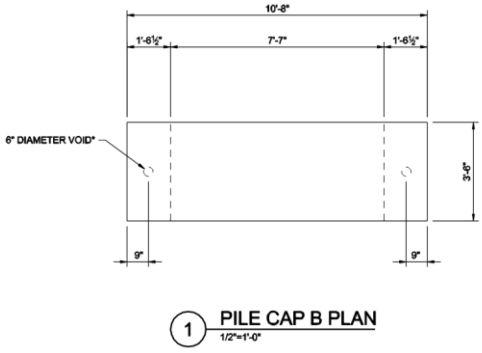


Figure 12 – Design Drawings Pile Cap B Plan

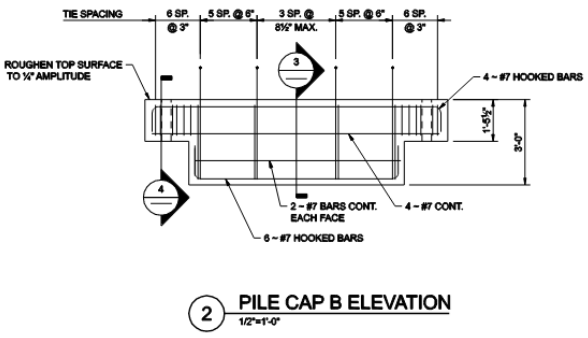


Figure 14 – Design Drawings Pile Cap B Plan Elevation

Pile caps A, C, D, and E were precast with a two-foot by two-foot pocket that were grouted solid around the piles. Pile cap B has a 6” diameter void, as seen in Figure 13, that is used for grouting the #10 dowels used to connect to the adjacent pile caps. The grout fill between the joints and pile cap connection was pumped in with a circular tube, ensuring a secure bond. As the grout solidified, there were multiple faces of bonding for each connection, ensuring strong interlocking between the different components of the wharf.

A majority of the precast pile caps were found to have grout failures around the pile connection. The plans show the piles were to be grouted in a 2ft x 2ft pile pocket. The extent of the grout failures above the piles and within the pile cap connection could not be determined without destructive testing.

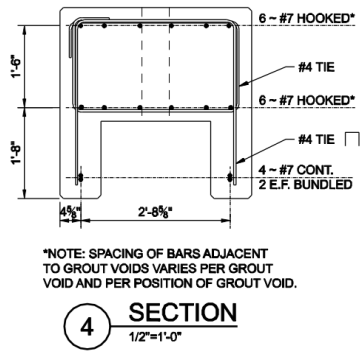


Figure 15 – Design Drawings: Pile Pocket Section

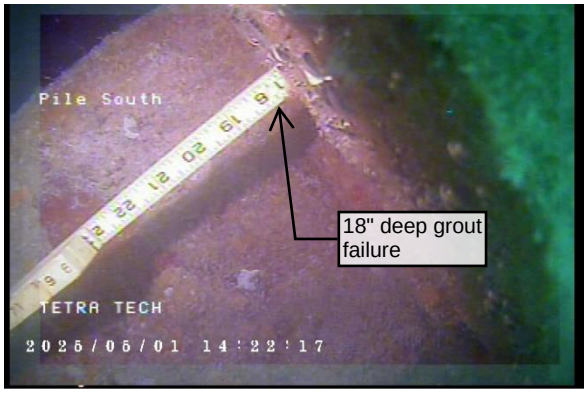


Figure 16 – Spall depth of grout

17% of the piles exhibited grout failures at the pile cap connection on the north end of the wharf. Grout failure was more prevalent on the South end of the wharf. About 50% of the piles inspected on the south end had signs of grout failure around the pile cap connection. The gaps found in the pile pockets due to deteriorated grout extended up to 18-inches deep, typically.

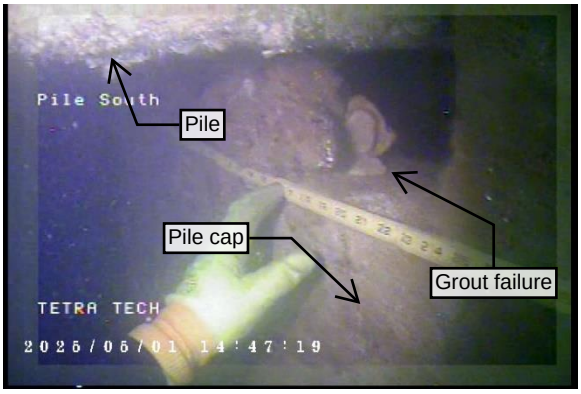


Figure 17 – Spall on underside of pile cap

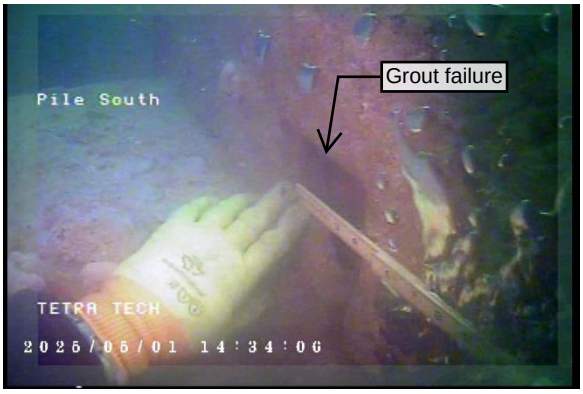


Figure 18 – Spall on underside of pile cap

Rust stains were most present near the top of the joints between the pile caps. Rust staining is a discoloration on the concrete surface, caused by the corrosion of the reinforcing steel inside the concrete. There were instances of cracking with rust staining on the faces of the pile cap. Large spalling was also found along the pile caps most frequently at the joints between the pile caps. The cracking that occurred on the joints of the pile caps were often diagonal showing early signs of spalling with an instance of spalling occurring on the north joint between piles 5 and 6 on the west side face of Bent A as in Figure 17. The west face of Bent A pile cap exposed to the sun, was found to have larger spalls and cracking. The top face of the pile cap for Bent A was observed from the top side of the wharf and was found to have cracking along the span of the wharf indicating early signs of spalling similar to the joints.

Figure 19 – Large spall on pile cap to pile cap joint

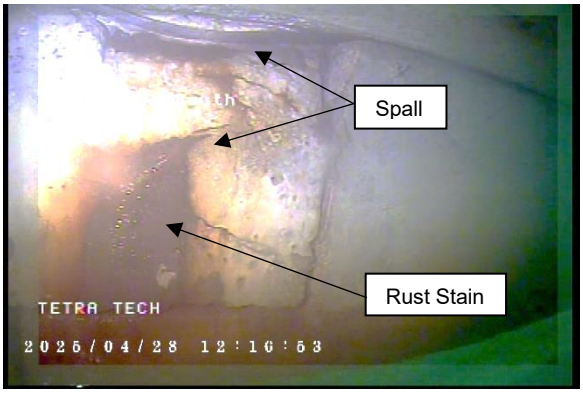


Figure 20 – Spall and rust staining of pile cap

Grouted connections are present on all bents and there are signs of degradation of the grout pads throughout. In many of the joints, the grout pad had failed leading to separation in the north/south direction of the pile caps of up to four-inches in one instance as shown in Figure 21. In other instances, the grout was completely degraded making the other side of the cap visible.

Figure 21 – Rust and separation on joint

Figure 22 – Degradation of ½" grout pad on Bent B

To the north of the wharf there is another seawall supporting a pool of the Ocean Key Resort. On this north side it was observed that there was no connection between the concrete components in the north/south direction of the wharf and the Ocean Key Resort seawall pile cap. On the north mooring dolphin there is a walkway that leads from the wharf to the hotel. There was a metal plate spanning from the walkway that is in contact with the north pile cap outside the seawall. The metal plate is used to secure the wooden walkway to the wharf. Overall, the metal plate is in poor condition with significant rusting and section loss occurring near the end. On the far north face of Bent C there was a large diagonal crack with rust along the length of the pile cap, indicating a location of potential delamination and future spalling.

Figure 23 – Diagonal crack on Bent C

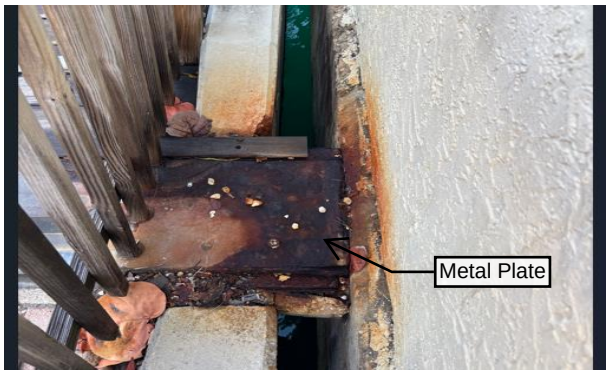


Figure 24 – Metal plate with rust stains.

Mooring Dolphins

There are two mooring dolphins located within the extents of the wharf, each spanning 23’-6” north/south and 17’-3” east/west. One is located at the southwest end with the other on the northwest end. The pile cap of the mooring dolphins was 6’-0” deep, with steel pipe piles embedded 3’-0” into the cap. The mooring dolphins are separated from the main wharf structure with a six-inch expansion joint. The provided plans show twelve 24-inch by 1/2-inch thick round steel pipe piles, though there were only six piles were installed at each end as shown in red below. There were two rows of three piles spanning in the north/south direction.

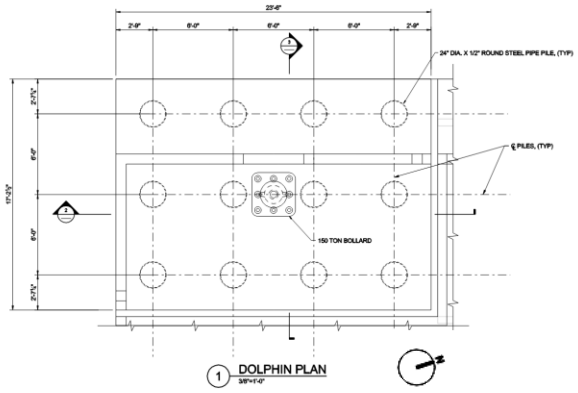


Figure 25 – Design Drawings: Dolphin Plan

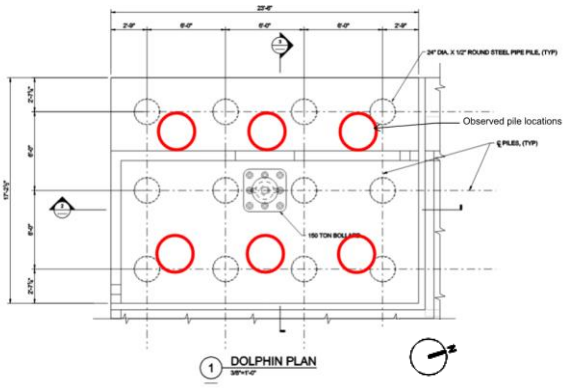


Figure 26 – Design Drawings: Actual Dolphin Layout

Minor rust stains were found on the outside surface of the steel pipe piles. No pitting or metal loss was observed on the surface of the pipe piles. There was a gap in the pile cap ranging from 3 to 4-inches around the perimeter of all the steel piles. This gap between the pile and the pile cap could be spalling due to the corrosion and expansion of the embedded steel. The existing plans do not call out a pile pocket similar to the precast concrete pile caps, but since the actual layout of the piles does not match the set of plans received, it is possible that an alternate precast design was constructed.

The pile cap around all the steel pipe piles was observed to have longitudinal cracking on the sides. Not all sides of the cap could be examined due to access limitations. Minor spalling at the corners was visible on the pile cap, with rust stains present on the sides. On the northwest dolphin there is a large spall with rust stains on the southwest corner above the water line. There is also cracking on this section which could lead to further deterioration.

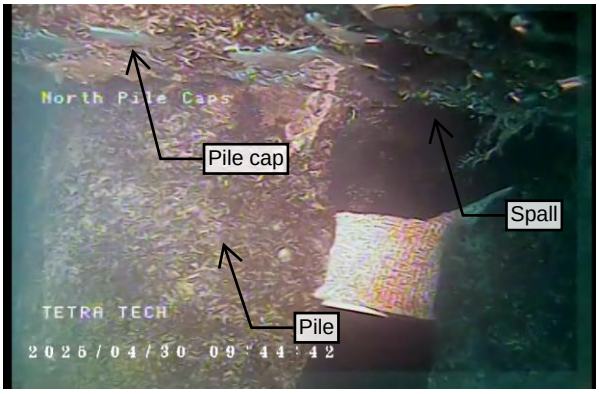


Figure 27 – Pile to pile cap connection with hand in spall

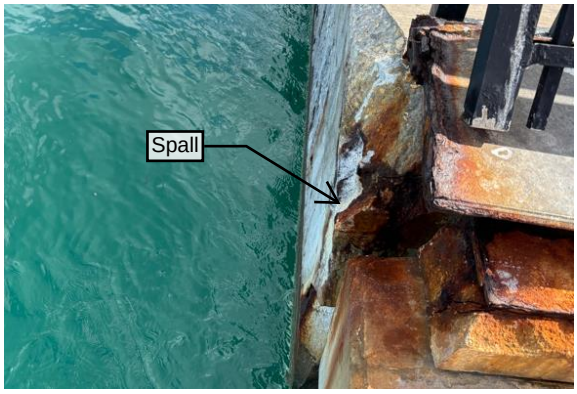


Figure 28 – Spall and rust stain on mooring dolphin

Seawall

The seawall is located on the east side of the wharf, separating the main portion of the square from the wharf. The seawall is approximately 464 feet long with a 20-foot-long return on the south, see Figure 29. No existing plans were given for the seawall, but it was observed to be made of existing steel Z-shaped sheet pile walls embedded in a concrete cap.

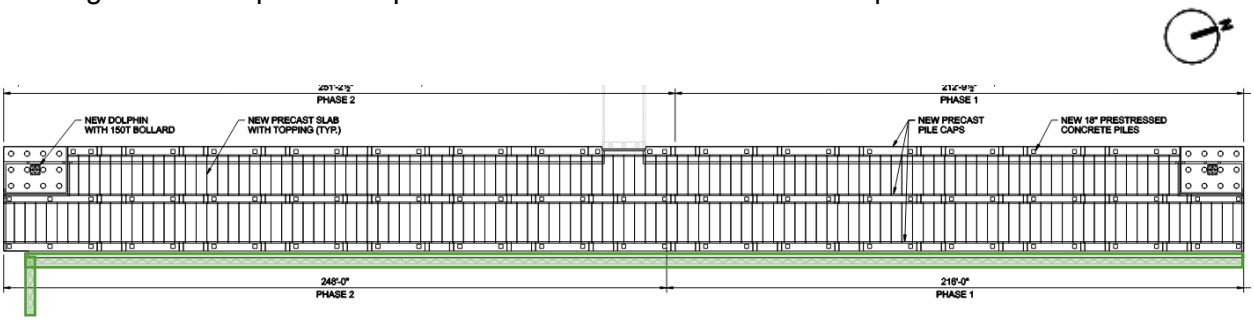


Figure 29 – Design Drawings: Seawall overview

The sheet piles below the waterline showed little signs of degradation with marine growth covering most of the observable face. There were some instances where rust was present through the growth, but no cracking or section loss was observed. Within the splash zone the existing sheet piles exhibited significant corrosion with some instances of the sheet pile beginning to experience visible section loss of around 15%.

The corrosion of the sheet piles resulted in chloride buildup occurring at the connection between the sheet piles and the concrete cap, as shown in Figure 32 by the white discoloration. Efflorescence was also observed on the concrete cap along the 20-foot return on the south. Efflorescence is a deposit of chloride, usually white, formed on a concrete surface. The majority of the sheet piles were obstructed by riprap and other debris. Soil conditions behind the sheet piles and evidence of wall rotation or deformation could not be observed in areas of limited access and visibility. The areas with no obstructions showed no signs of wall rotation, deformation, or soil loss through the sheet wall.

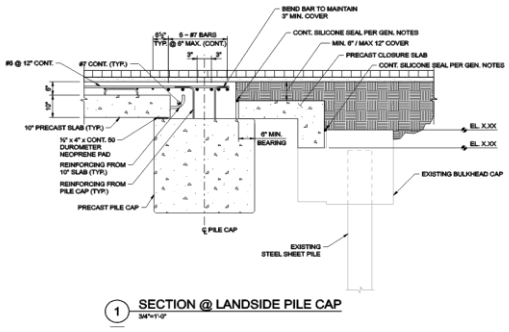


Figure 30 – Seawall and Bent C section view

Figure 31 – Typical photo of sheet pile under water line

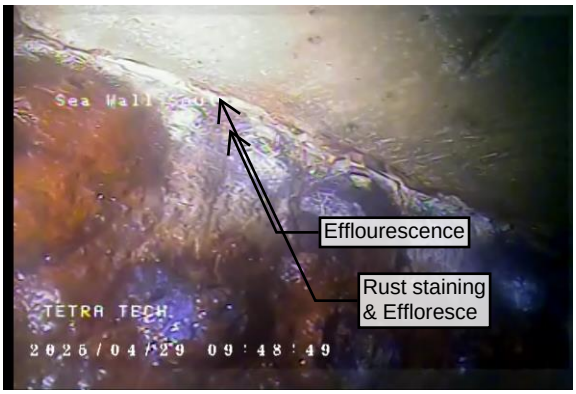


Figure 32 – Sheet pile corrosion and efflorescence

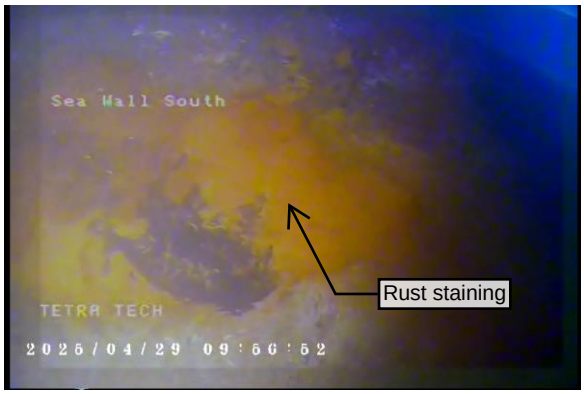


Figure 33 – Rust staining under water line

Only the west and bottom faces of the seawall pile cap were observable. The underside of the concrete cap outside the span of the wharf was in good condition, with only degradation due to corrosion from the sheet piles. Under the wharf, the bottom of the cap exhibited significant scaling and spalling. Scaling occurs when the surface of concrete begins to flake or peel away. As seen in Figures 34 and 35, large spalls occur on the underside face. Also, when looking at Figure 34, there is a metal sheet which was likely a stay in place form. This form on the top of the cap connects the sheet pile cap to Bent C. This galvanized corrugated metal sheet showed signs of corrosion leading to degradation of the cap. There was also spalling that occurred at the top edge of the concrete cap and the metal sheet.

Figure 34 – Spalling on bottom face of sheet pile cap

Figure 35 – Scaling on bottom face of sheet pile cap

On the west side of the cap face there are instances of additional spalling. There was a section of major spalling located between Piles 8 and 9, measuring 56-inch long by 10-inch deep extending the full height of the cap. The reinforcing steel on the side of the pile cap was exposed and showed 100% surface corrosion on the horizontal and vertical reinforced steel. This resulted in a section loss of about 10% on both the vertical and horizontal reinforced steel. There were two more instances of exposed reinforcing steel on the pile cap, one instance on the bottom face and another along the west face. Both instances exhibited small spalling areas with corrosion on the exposed reinforcing steel.

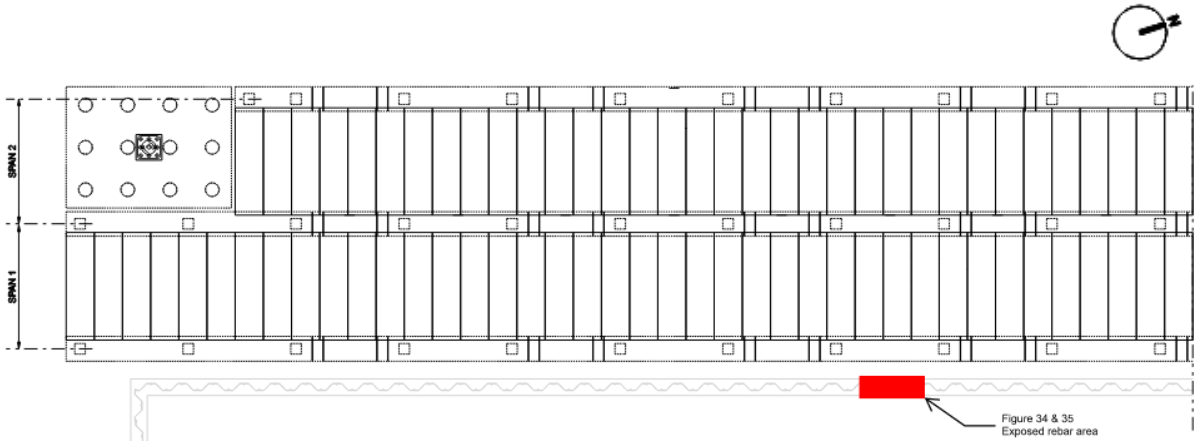


Figure 36 –Design Drawings: Exposed reinforcing steel on sheet pile cap

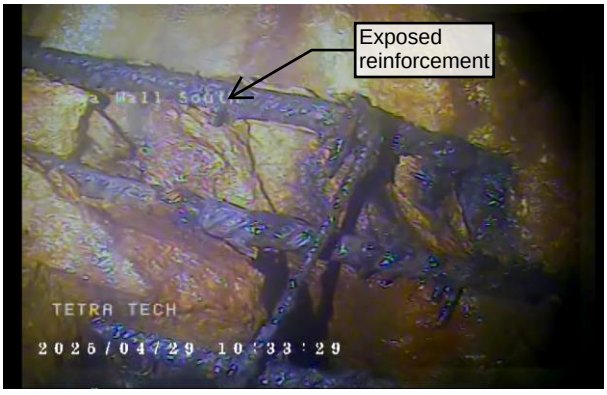


Figure 37 –Exposed reinforcing steel on sheet pile cap.

Figure 38 – Exposed reinforcing steel on sheet pile cap

There is a pipe penetration through the northern end that runs about 70 feet to the middle of the Mallory Square parking lot. The penetration consisted of a metal casing housing a PVC pipe. The pipe looked to be in good condition. The connection between the conduit and the existing sheet piles was in good condition with no cracking or separation between the components present.

Figure 39 – Top of conduit connection

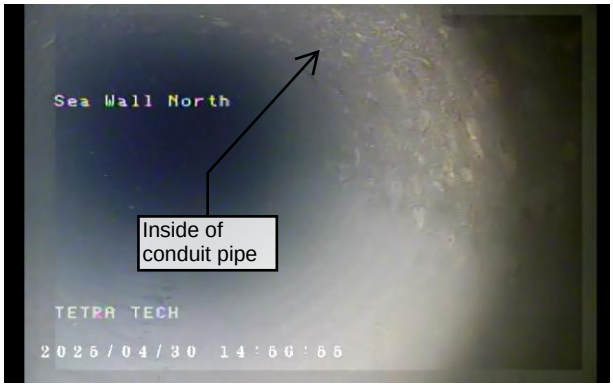


Figure 40 – Inside view of conduit pipe

T-Dock Section

Existing plans for the T-dock section were provided to WGI after the site visit. During the site visit the T-dock was observed to consist of a connected south breasting dolphin, a connected north breasting dolphin, two walkways, and a docking platform. The substructure of the T-dock consisted of 20 square concrete piles connected to concrete pile caps. The superstructure of the T-dock was made up of concrete slabs, pavers, and a metal railing along the sides. The superstructure was seen to have vegetation growing out of the top layer of bricks and was closed off by a locked gate from the wharf. No access was provided to observe the top side of the T-dock and connected dolphin.

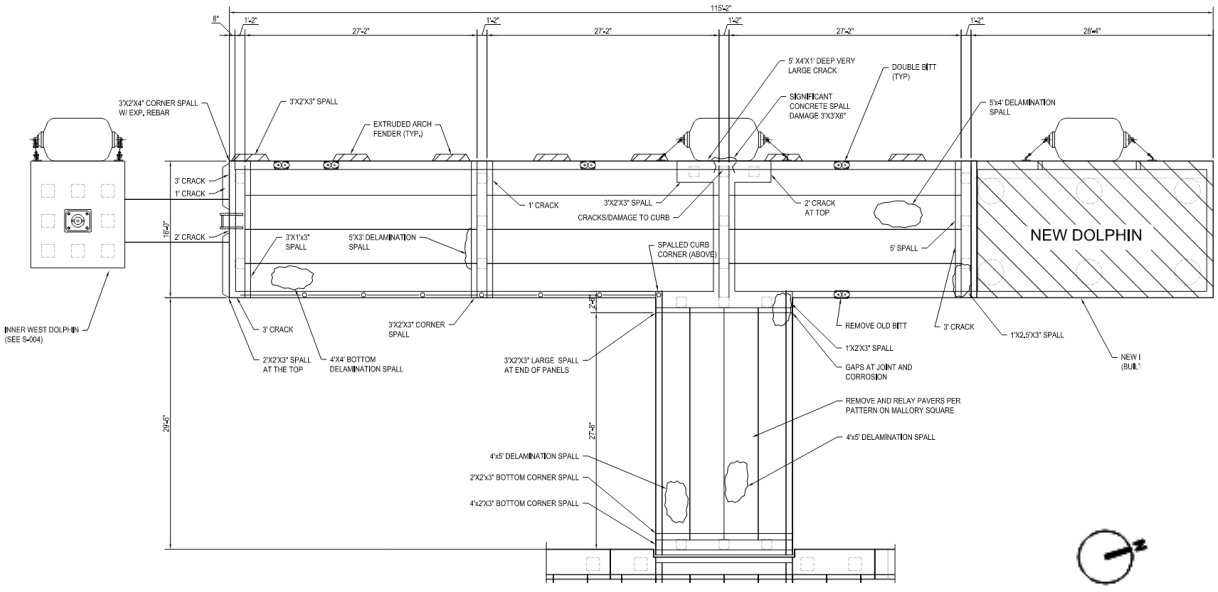


Figure 41 – T dock overall layout

Overall, the components of the T-dock were in fair condition. The underside of the walkway had utilities running along the bottom of the concrete slabs. The bottom of the concrete slabs had large spalls and showed signs of delamination. On the existing walkway there was a spalled area which had exposed reinforcing steel along the north/south direction. The concrete piles appeared to have minor spalling along the corners. Rust staining were present along the concrete pile caps and longitudinal cracking. On the corners of the T-dock where the large cruise fenders are located, there were large cracks and spalling. Overall, the components of the T-dock were in fair condition.

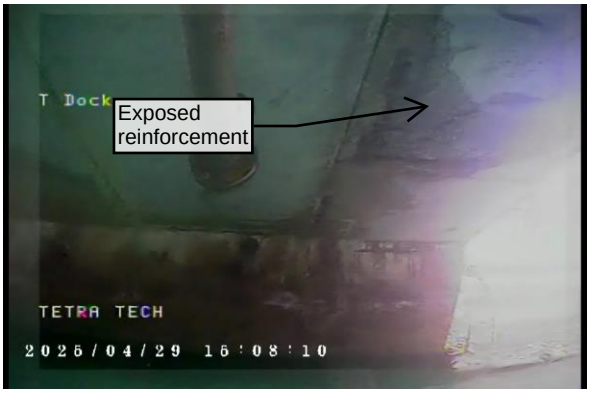


Figure 42 – Exposed reinforced steel on decking

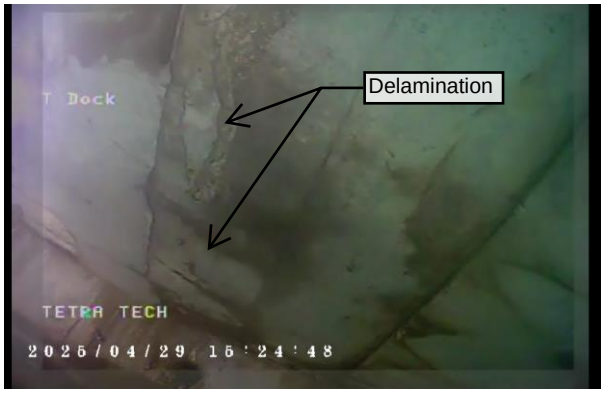


Figure 43 – Delamination on underside decking

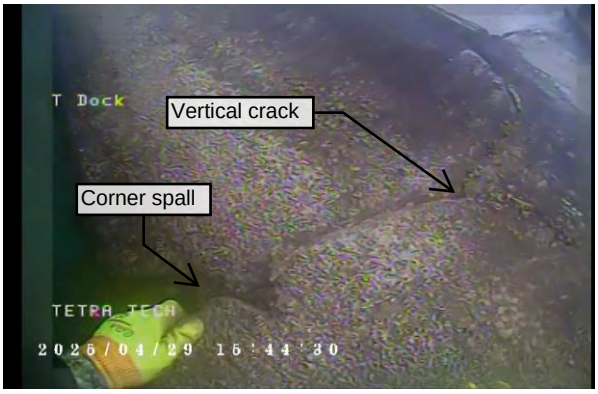


Figure 44 – Corner crack and spalling on T-Dock

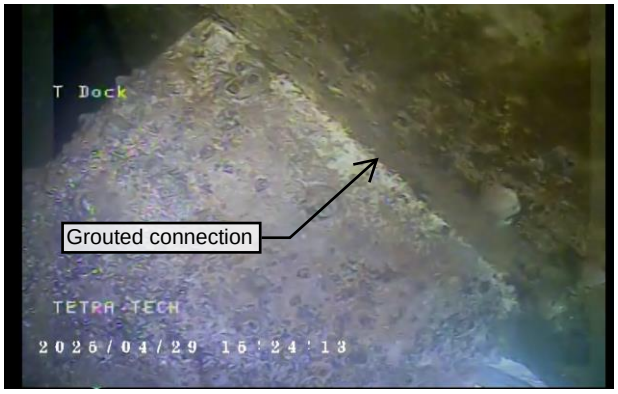


Figure 45 – Pile to pile cap connection

Breasting Dolphins

Four total breasting dolphins were observed. There is one breasting dolphin connected to the south end of the T-dock with a gangway and one on the north end of the wharf. These two breasting dolphins each have 8 square concrete piles connected to a pile cap. The third breasting dolphin is located to the south of the wharf and consists of four circular steel pipe piles connected to a pile cap. The fourth breasting dolphin is connected to the north end of the T-dock and consists of 6 circular steel pipe piles. No plans for the north T-dock dolphin were provided, but plans for the remaining breasting dolphins were provided after the site visit. It should be noted that the south breasting dolphin was replaced in 2018 after taking damage from a docking cruise ship and the north T-dock dolphin was built in 2016.

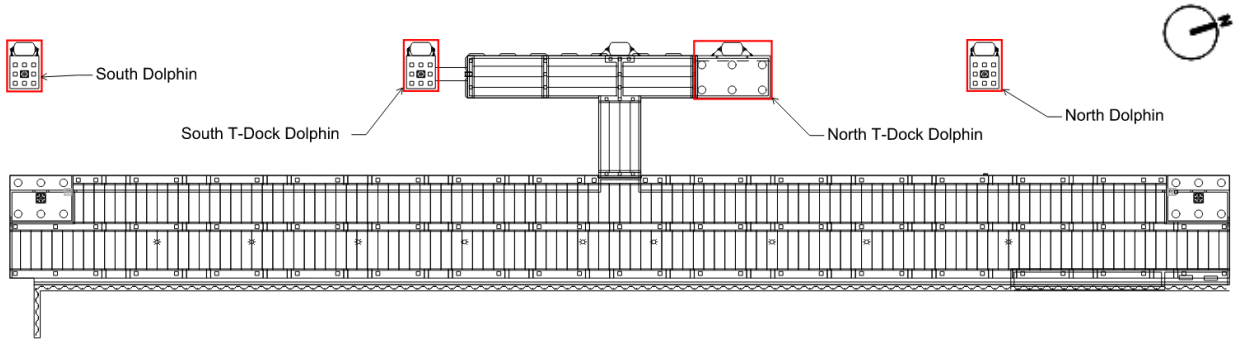


Figure 46 –Design Drawings: Breasting Dolphin Locations

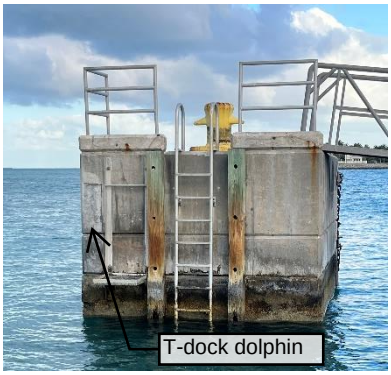


Figure 47 – South T-dock dolphin

Figure 48 – South dolphin

On the North dolphin, there was a large spall on the concrete pile located on the northwest corner. The spall on the pile spanned across the pile and had a depth of about eight-inches into the pile. There was no exposed rebar observed in the spall, but there was large marine growth impeding the view of the pile condition. The underside of the dolphin was found to have spalling and general erosion. The sides of the dolphin exhibited cracking above the water line, which could lead to spalling in the future.

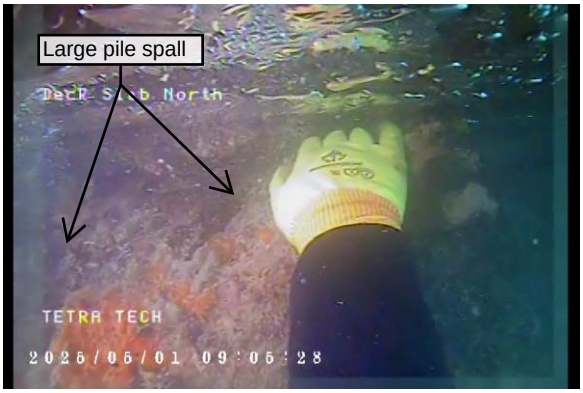


Figure 49 – Large spall on pile of north dolphin

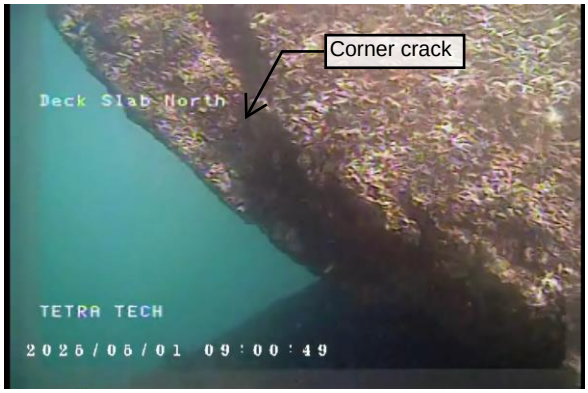


Figure 50 – Large crack on corner of dolphin pile cap

The dolphin adjacent to the T-dock on the south end has spalling and cracking on the corners of the pile cap. A protective fender is located on the west side of the dolphin and is attached to the pile cap with several anchor bolts. Cracking was observed at the location of these bolts. The concrete piles were observed to have minor rust staining, with most of the piles covered by marine growth.

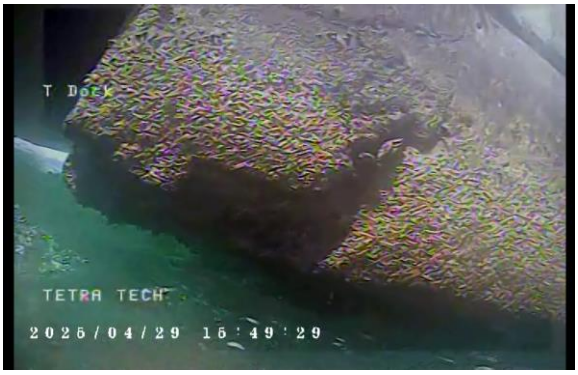


Figure 51 – Spall on pile cap of south T-dock dolphin

Figure 52 –Crack on corner of south T-dock dolphin

The north T-dock dolphin was found to be in good condition. There was minor spalling on the outside corner of the pile cap. The piles were observed to have minor rust staining through marine growth. No section loss of the steel pipe piles was observed. The pile caps were observed to have scaling in the splash zone.

Figure 53 – Overall north T-dock dolphin

Figure 54 – Minor spall and scaling on pile cap

The south dolphin was observed to have delamination and spalling at the underside of the pile cap. There was no exposed reinforcement present. Large cracks and rust stains were visible on three sides of the pile cap. The steel piles were found to have rust staining along the outside surface through the marine growth. No section loss of the steel pipe piles was observed.

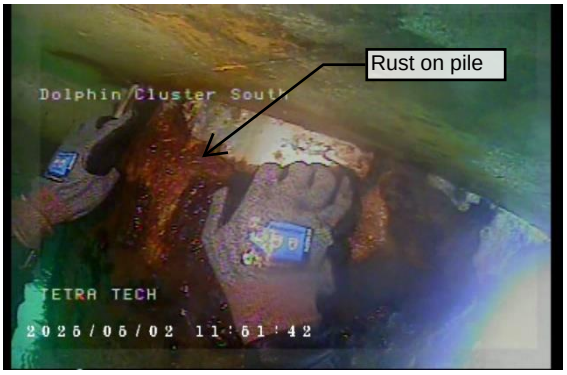


Figure 55 – Rust on pile of south dolphin

Figure 56 – Cracking on face of south dolphin

Load Analysis

Based on the plans provided to WGI an analysis to determine the remaining capacity of the existing precast deck slabs was performed. The original design loads for the deck were a uniformly distributed live load of 400 pounds per square foot and a vehicle load represented by an HS-20 truck with impact loading. The plans did not specify that the loads were to act concurrently. The 10-inch deck unit were specified to have six number 8 bars (1-inch diameter) with a 6-inch reinforced concrete topping slab to provide composite deck action. These composite decks have a clear span of 15-feet. Based on both the observed reinforcement section loss and approximated deterioration of the reinforcement in deck units not yet exposed a maximum recommended live load was calculated based upon the remaining moment and shear capacities of the deck. Due to the varying condition of each deck unit an overall live load was determined using engineering judgement. Based on this analysis, it is WGI's recommendation that trucks and vehicles not be allowed on the wharf until replacement or repairs are completed. The observed reinforcement and deck units in their current condition should be capable of carrying a live load of 100 pounds per square foot. It is WGI's understanding that cruise ships will continue docking and unloading people onto the wharf. Be sure when unloading that the 100 pounds per square foot live load is not exceeded on the wharf or T-dock.

The observed deck condition and section loss of the reinforcement was used to provide the recommended maximum live load that the deck should be able to withstand under its current condition over the next 1 to 2 years. Due to the continued exposure of reinforcement and its ongoing deterioration any recommendation beyond that timeline will necessitate further review. One factor that results in the deterioration of the deck slabs is the wave action occurring under the wharf. The continuous impact of waves on the bottom of the deck units is a key factor in the spalls and corrosion that are currently present. During storms the impact of the waves increases in force and frequency which can result in additional damage. It is WGI's recommendation that the wharf be reassessed after all storms that result in significant wave action. Conditions that would produce this wave action arise during storms with wind speeds greater than 35 miles per hour.

Conclusions & Recommendations

The wharf superstructure consists of precast deck units, which are in poor condition. About 80% of the deck slabs had exposed reinforcing steel with section loss or showed early indications of delamination and spalling. There are methods to repair the deck slabs, though it should be noted that these approaches typically will not result in a permanent fix and will only provide a temporary extension of the wharf's service life of between one to five years until further repairs would be recommended. One approach that WGI was asked to consider would be the installation of an additional topping slab over the existing slab. This additional topping slab would result in an increase in the deck dead load that will need to be offset against a future live load that the new deck could carry. If this approach were to be used, the continual deterioration of the existing deck reinforcement would also need to be considered in the topping slab design and while determining the life span of the raised deck. WGI would not consider this approach to be a part of a temporary deck modification in order to reopen the deck but not a long term deck repair option. This raised deck portion would also require a reduced allowable load based on limitations from the existing wharf substructure.

WGI's recommendation based on the observed condition, is for the deck to be replaced with prestressed or post-tensioned deck slab units designed and detailed for the highly corrosive environment.

The substructure of the wharf consists of piles, pile caps, and seawall. The piles of the substructure were observed to be in good condition with only minor spalling observed on some piles. The piles caps were observed to be in fair condition with spalling, rust stains, and loss or deterioration of grout noticeable on the joints and pile connection of each cap.

The mooring dolphins to the wharf were observed to be in fair condition. The steel pipe piles observed had minor rust. The pile cap connection with the piles was observed to be spalled up to a maximum depth of 18". The T-dock was observed to be in fair condition with some spalling on the underside of the deck unit and general wear from the conditions. The dolphins were found to be in fair condition. The north dolphin had a large spall on the northwest corner pile and there was spalling on the corners of the pile caps. The south dolphin had spalls on the corners and had rust staining on the piles.

The seawall consisted of two components: the existing steel sheet piles and pile cap. The sheet piles were observed to be in fair condition with corrosion occurring primarily in the splash zone and above the water line. The reinforced concrete cap was found to be in poor condition along the entire length. There were areas of structural concern with large spalls and areas of exposed reinforcement. The areas where reinforcing steel was not exposed showed signs of scaling and spalling. Based on the condition of the sheet piles and cap, it is recommended that the cap be replaced and extended to increase the embedment depth of the sheet piles. With a repair completed in this manner the life of the seawall could be extended to match the life of a replaced wharf deck.

Based on our assessment, WGI recommends the following:

- Limit load capacity on the wharf until the above repairs or replacement are complete
- Remove and replace all the existing concrete slabs and toppings of both spans.
- Using concrete restoration techniques, repair the spalls on the pile caps
- Using concrete restoration techniques, repair cracks on pile caps
- Using concrete restoration techniques, repair grouted connections between the joints of the pile caps
- Using concrete restoration techniques, repair grouted connections between the piles and the pile caps
- Remove and replace the seawall sheet pile cap
- Clean and repair corrosion on existing sheet piles:
- It is the understanding of WGI that the breasting dolphins and T-dock are to be replaced within the next couple years. If that is the case, there is no recommendation for repair at this time.

The following appendices are enclosed with the report. Appendix A contains exhibits related to the site. Appendix B is an Engineer's Opinion of Probable Construction Costs for completing the recommended repairs and replacements.

WGI's professional services have been performed in accordance with the standard of skill and care generally exercised by other professional consultants acting under similar circumstances and conditions at the time the services were performed. WGI's findings, conclusions, and opinions are based on WGI's visual observations, professional experience, and evaluation of reviewed documentation. WGI's visual observations include no specific knowledge of concealed construction or subsurface conditions at locations not visible. Comments pertaining to concealed construction or subsurface conditions are the professional opinion of WGI based on relevant experience, judgement, and current industry standard of practice.

WGI's findings are summarized as of the date of issuance. Should new information or additional documentation become available, WGI reserves the right to amend or revise its opinion and recommendations accordingly.

No warranty, expressed or implied, is made as to findings presented in this report.

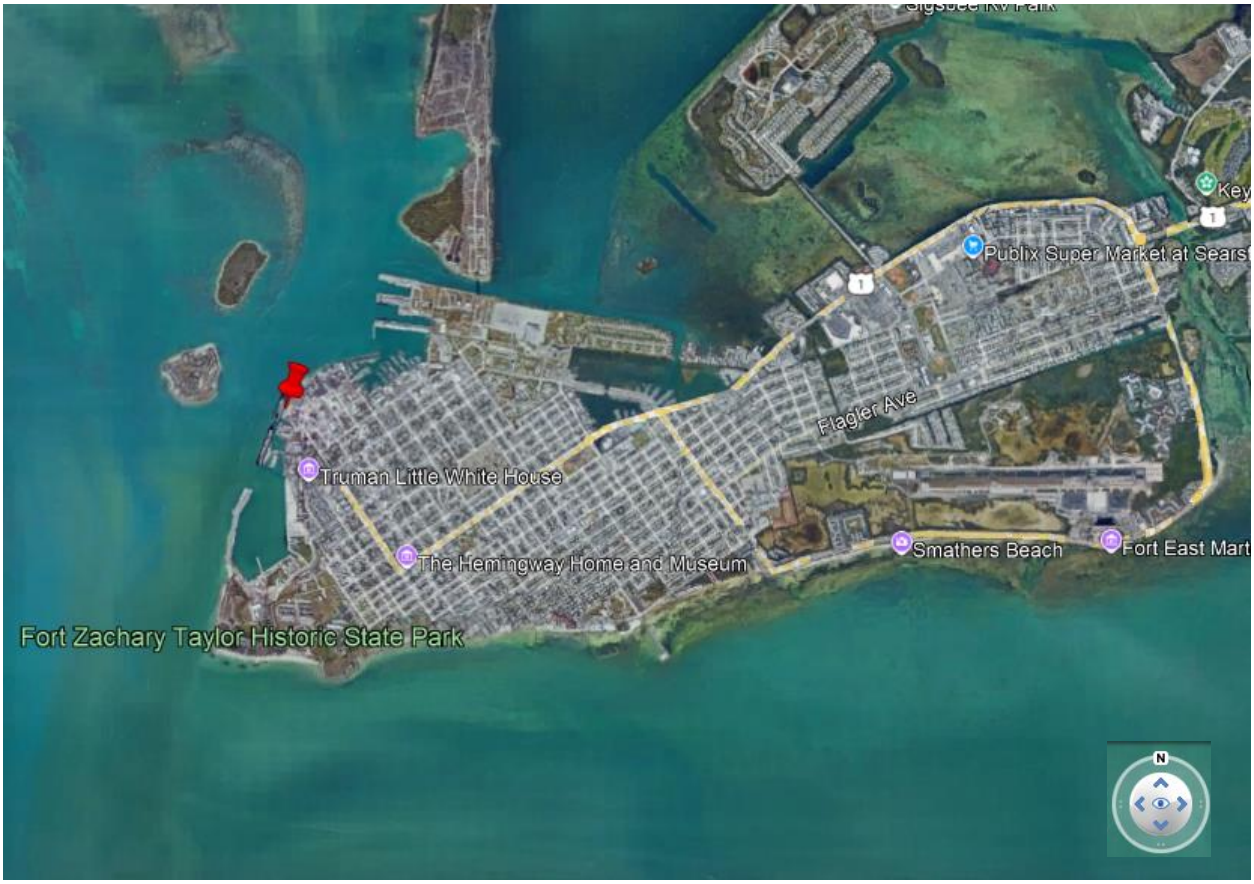
CHRISTOPHER B LAFORTE, STATE OF FLORIDA, PROFESSIONAL ENGINEER, LICENSE NO. 76797

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY CHRISTOPHER B LAFORTE ON THE DATE INDICATED HERE.

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

Digitally signed by Christopher B LaForte
Date: 2025.06.17 16:32:04-04'00'

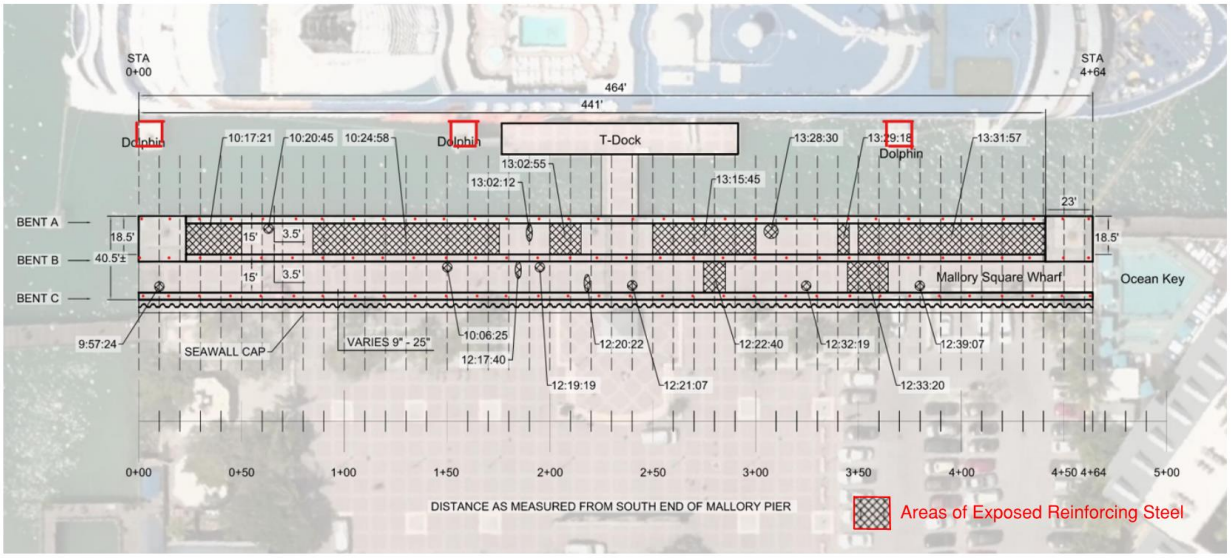
Appendix A: Facility Location and Provided Drawings



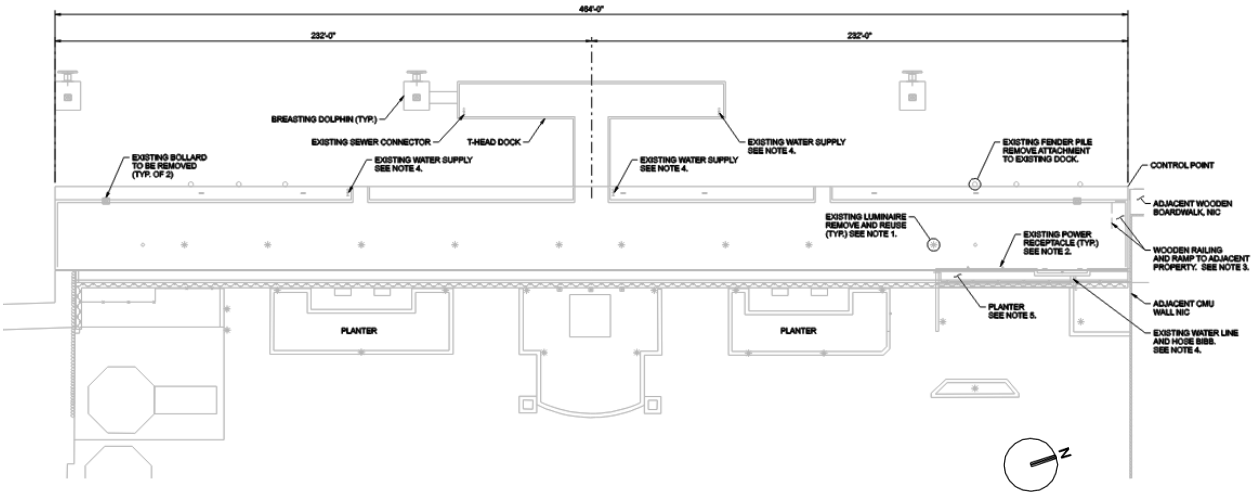
Site location


N
The Ocean Terrace
Pier House Resort & Spa
Sunset Pier
Front St
Two Friends Patio Resta
Wall St
Mallory Square
Duval St
Front St
Key West Aquarium
Image © 2025 Airbus
Greene St

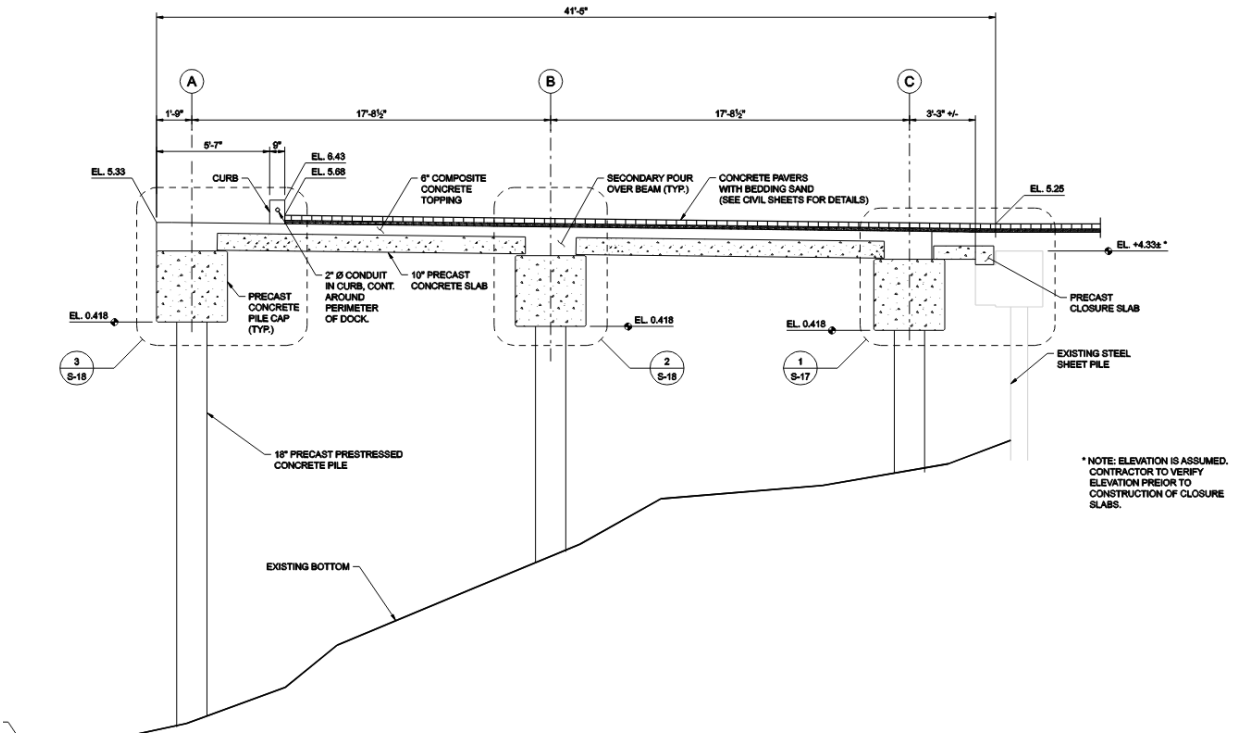
Site Map



Deterioration Diagram from 2024

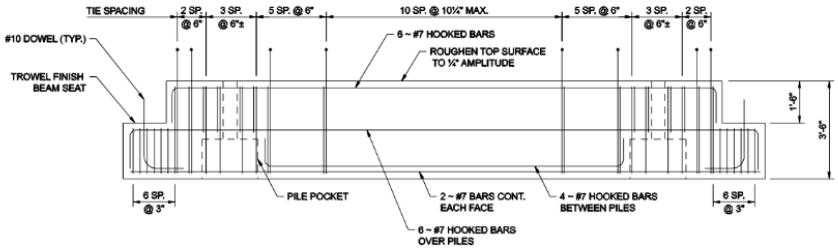


Facility map provided by City of Key West

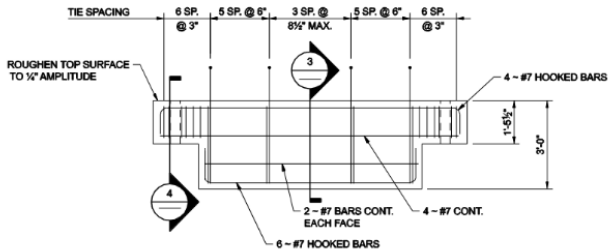


Wharf section provided by City of Key West

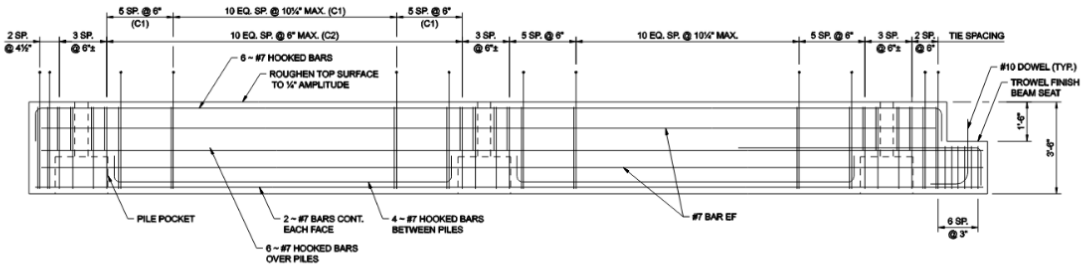
Pile cap sections provided by City of Key West



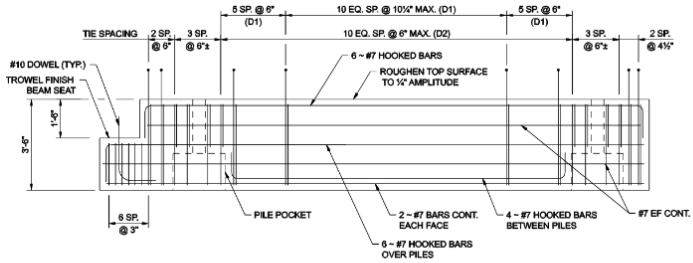
2 PILE CAP A ELEVATION
1/2"=1'-0"



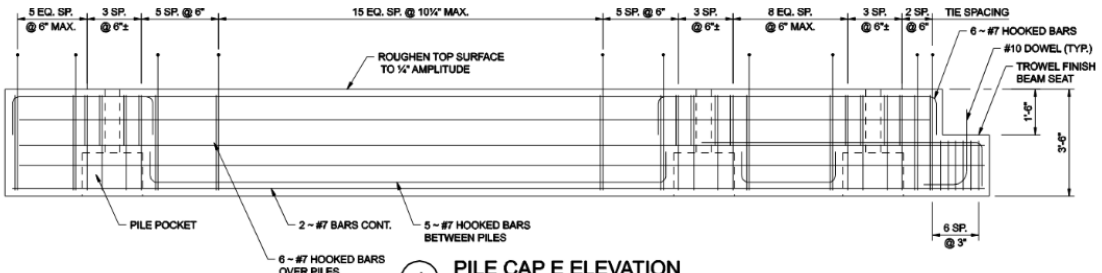
2 PILE CAP B ELEVATION
1/2"=1'-0"



2 PILE CAP C ELEVATION
1/2"=1'-0"



2 PILE CAP D ELEVATION
1/2"=1'-0"



4 PILE CAP E ELEVATION
1/2"=1'-0"

Appendix B: Engineer's Opinion of Probable Construction Costs

2035 Vista Parkway
West Palm Beach, FL 33411
t.561.687.2220 f.561.687.1110

PREPARED BY: RR
CHECKED BY: CL

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COSTS
RECOMMENDED IMPROVEMENTS FOR MALLORY SQUARE WHARF
400 WALL ST, KEY WEST, FL 33040
PROJECT No. 11350.00

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
1	Mobilization	LS	1	$ 250,000.00	$ 250,000.00
2	Demolition	SF	13920	$ 85.00	$ 1,183,200.00
3	Pile cap spall repair	CF	100	$ 575.00	$ 57,500.00
4	Pile cap crack repair	LF	950	$ 345.00	$ 327,750.00
5	Sheet pile cap replacement	LF	500	$ 1,000.00	$ 500,000.00
6	Sheet pile corrosion cleaning	SF	1250	$ 287.00	$ 358,750.00
7	Repair grouted connection between pile caps	EA	76	$ 3,450.00	$ 262,200.00
8	Repair grouted connection between pile cap and pile	EA	50	$ 4,000.00	$ 200,000.00
9	Repair spalls on concrete piles	CF	60	$ 575.00	$ 34,500.00
10	Replace decking units	EA	190	$ 8,625.00	$ 1,638,750.00
11	Repair concrete spalling on mooring dolphins	CF	75	$ 575.00	$ 43,125.00
12	Repair cracking on T Dock	LF	315	$ 345.00	$ 108,675.00
				SUBTOTAL	$ 4,964,450.00
			10% MAT/LABOR ESCALATION		$ 496,445.00
				15% CONTINGENCY	$ 744,700.00
TOTAL PROBABLE CONSTRUCTION COST					**$ 6,205,595.00**
13	Design, permitting, and construction costs	LS	1	$ 744,671.40	$ 744,671.40
14	Benthic Permitting and Mitigation Costs	LS	1	$ 75,000.00	$ 75,000.00
TOTAL COST					**$ 7,025,266.40**

NOTE 1: CONSTRUCTION COSTS HAVE BEEN SUBJECT TO DAILY FLUCTUATIONS. THE UNIT COSTS PROVIDED ARE BASED ON INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THIS DOCUMENT WITH SOME ACCOUNTING FOR FUTURE INCREASES AND MAY VARY FROM THE ACTUAL COST AT THE TIME OF CONSTRUCTION. THERE ARE MULTIPLE OPTIONS FOR THE PAVERS, THEY CAN BE DEMOLISHED OR THEY CAN BE REMOVED THEN STORED TO BE REPLACED AT A LATER DATE.

EA Each
LF Linear Feet
SF Square Feet
CF Cubic Feet