

Inspecting Docks, Seawalls & Davits to the FABI Standards of Practice Presented by: Mark Hall

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Mark Hall started working in construction in Sarasota, FL in 1978. After working as a concrete form and framing carpenter for many years he eventually moved into construction management and became a Certified General Contractor in 1989. After a few years with Taylor Woodrow Homes in Sarasota he transferred to Jacksonville to build upper-end homes and subdivisions in the Jacksonville area for Taylor Woodrow. In 1992 he started his own home building business in Ponte Vedra Beach, FL before moving to the Florida Keys in 1998 and opening HomePro Inspections. Mark has conducted over 6,500 home inspections and has also performed over 2,000 dock & seawall inspections. In addition to home inspections Mark is also an active General Contractor offering Construction Management services building one or two upper-end custom homes per year.

Course Overview

COURSE DESCRIPTION:

This 2-hour continuing education course is designed for licensed home inspectors to comply with Florida State CEU requirements and is intended to teach the basic elements of inspecting and reporting on seawalls, docks and boat lifts.

COURSE OUTLINE

- ▶ Quick review of FABI Standard of Practice for docks. 5-Minutes
 - ▶ General overview of different types of docks. 10-Minutes
 - ▶ General overview of different types of seawalls. 10-Minutes
- ▶ Inspecting above water dock and seawall components. 35-Minutes
- ▶ General overview of different types of boat lifts, davits etc. 10-Minutes
 - ▶ Inspecting boat lifts and davits. 35-Minutes
 - ▶ Report writing. 15-Minutes

FABI Standard of Practice for Docks & Seawalls.

Docks and Seawalls: (Optional) The inspector and the client may agree to the inspection of optional items. When this agreement is made the following standards shall apply.

I. The inspector shall:

Inspect:

- ▶ The seawall components, including but not limited to, the seawall cap, bulkhead, panels, footings, and any other component which is visible from the land side of the structure. (In-water inspection by walking on the bottom or diving is optional and is not considered a mandatory part of a seawall inspection).
- ▶ The land side components of the wall system for signs of settlement or soil loss by either visual means or probing.
- ▶ The soil behind the seawall, or a combination of both.
- ▶ The dock structure, including but not limited to pilings, collars, stringers, joists, and decking.
- ▶ Boat house walls and roof, if present. (Standards of Practice for Roof Systems apply)
- ▶ Operation of mechanical boat lifts and davits.
- ▶ Visible components of water and electric service, if present. (Standards of Practice for Electrical Systems and Plumbing Systems apply).
- ▶ Describe: The method of marine construction and the materials used, to include type of seawall, bulkhead or panel material, visible reinforcements pilings, decks, etc.

Report:

- ▶ The evidence of structural deterioration, failure, or inadequacy in the seawall and dock components.
- ▶ Settlement or soil loss behind the seawall.
- ▶ Fastener failures in dock and deck components.
- ▶ Mechanical failures of boat lifts and davits.

II. The inspector is NOT required to:

- ▶ Dig or otherwise unearth tiebacks, anchors, retaining walls or other seawall or dock components below land side or waterside grade.
- ▶ Determine the load capacity of boat lifts.
- ▶ Offer an opinion as to the structural adequacy, life expectancy, or expansion potential of any seawall or dock.
- ▶ Inspect adjoining or contiguous seawall systems or storm sewers projecting through the bulkhead.

Types of Docks to be Discussed

- ▶ WOOD DOCKS
- ▶ CONCRETE DOCKS
- ▶ FLOATING CONCRETE DOCKS
- ▶ FLOATING “JET-DOCKS”

WOOD DOCKS



CONCRETE DOCKS



FLOATING DOCKS

Concrete & Jet-Docks



Types of Seawalls

- ▶ Precast seawall panels with pilings.
- ▶ Masonry & laid stone seawalls.
- ▶ Sheet piled seawalls.
- ▶ Natural cut rock/ limestone seawalls.
- ▶ Rip-rap seawalls.
- ▶ Natural repose soil seawalls.

Precast Seawalls



Masonry & Laid Stone Seawalls



Sheet Piled Seawalls



Natural Cut Rock Seawalls



Rip-rap Seawalls



Natural Soil/ Repose Seawalls



Inspecting Above Water Dock & Seawall Components

The most critical aspect of inspecting docks and seawalls is to not complicate the issue. Inspecting a dock or seawall is exactly the same as inspecting any other similar structure. A seawall is basically a wall, and a dock is just a floor or deck. Just use the same common sense criteria that you would use for any other structural inspection.

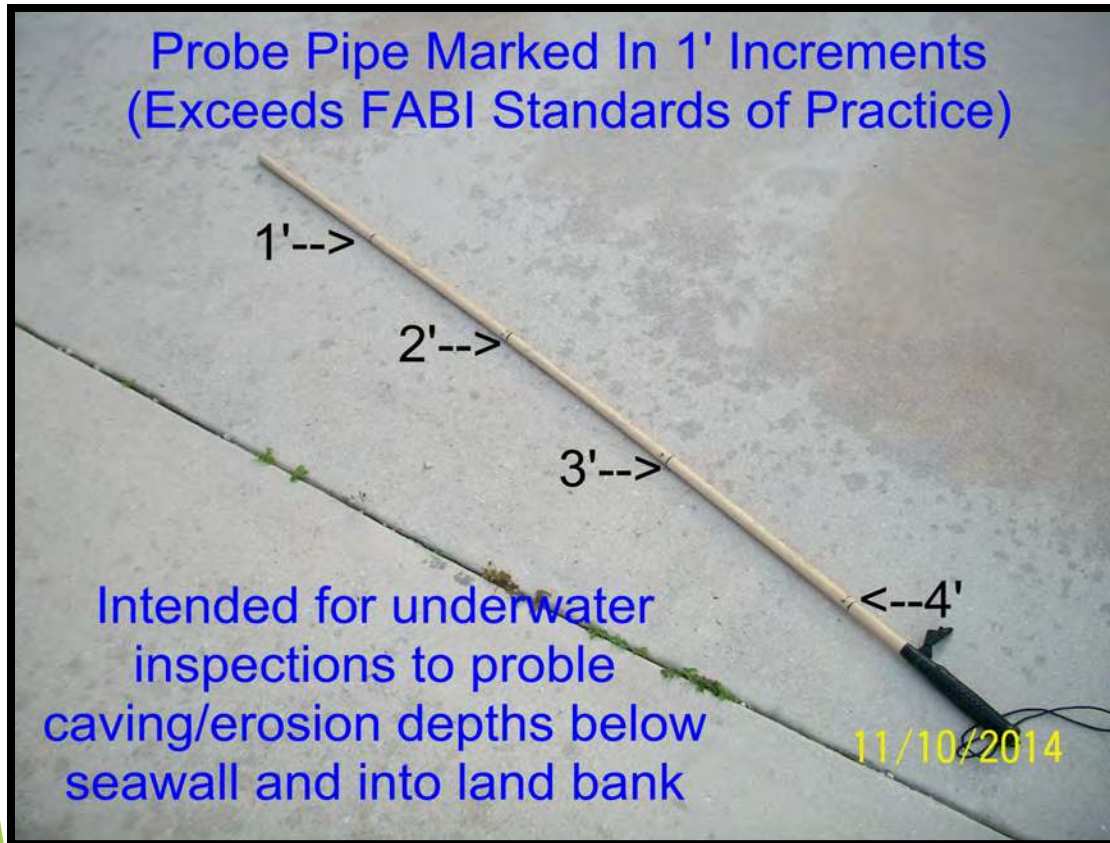
Recommended Dock Inspection Tools

- ▶ Flashlight.
- ▶ Camera with zoom & flash and a lanyard too!!
(Waterproof camera is optional, but recommended)
- ▶ Large inspection mirror.
- ▶ Volt meter.
- ▶ Outlet/ GFCI tester & 30-amp marine outlet plug adapter.
- ▶ Long tape measure or wheel.
- ▶ Probe pipe. (Exceeds FABI Standards of Practice)
- ▶ Underwater dive equipment. (Exceeds FABI Standards of Practice)

Basic Dock Inspection Tools



Tools That Exceed FABI Standards of Practice



Underwater dock and seawall inspections EXCEED the FABI Standards of Practice. Underwater inspections are optional. Do not attempt to perform underwater inspections without proper training since severe injury or DEATH could occur.

Wood Dock Structures: Joist, Decking & Pilings

The joist/beam component of a wood dock is critical to the stability of the entire dock structure. The most common problems with dock joists/beams is splitting wood and deterioration of the anchor bolts/fasteners and tie-down straps.



SPLIT OR DETERIORATED JOISTS & CROSS BEAMS



DETERIORATED/MISSING ANCHOR BOLTS, FASTENERS & STRAPS



Anchors, bolts and straps make up the ties that hold the dock structure together.

Bolts and joist hangers must be in good condition to prevent collapse of the dock structure while tie-down straps help to keep the dock framing in place during times of flooding or increased wave action.

DETERIORATED, SPLINTERED OR MISSING WOOD DECKING



Always be sure to inspect for uneven, deteriorated and especially splintered decking. Splintered decking is a significant liability due to the high potential for injuries to peoples feet. And obviously, uneven or loose decking is a trip & fall hazard.

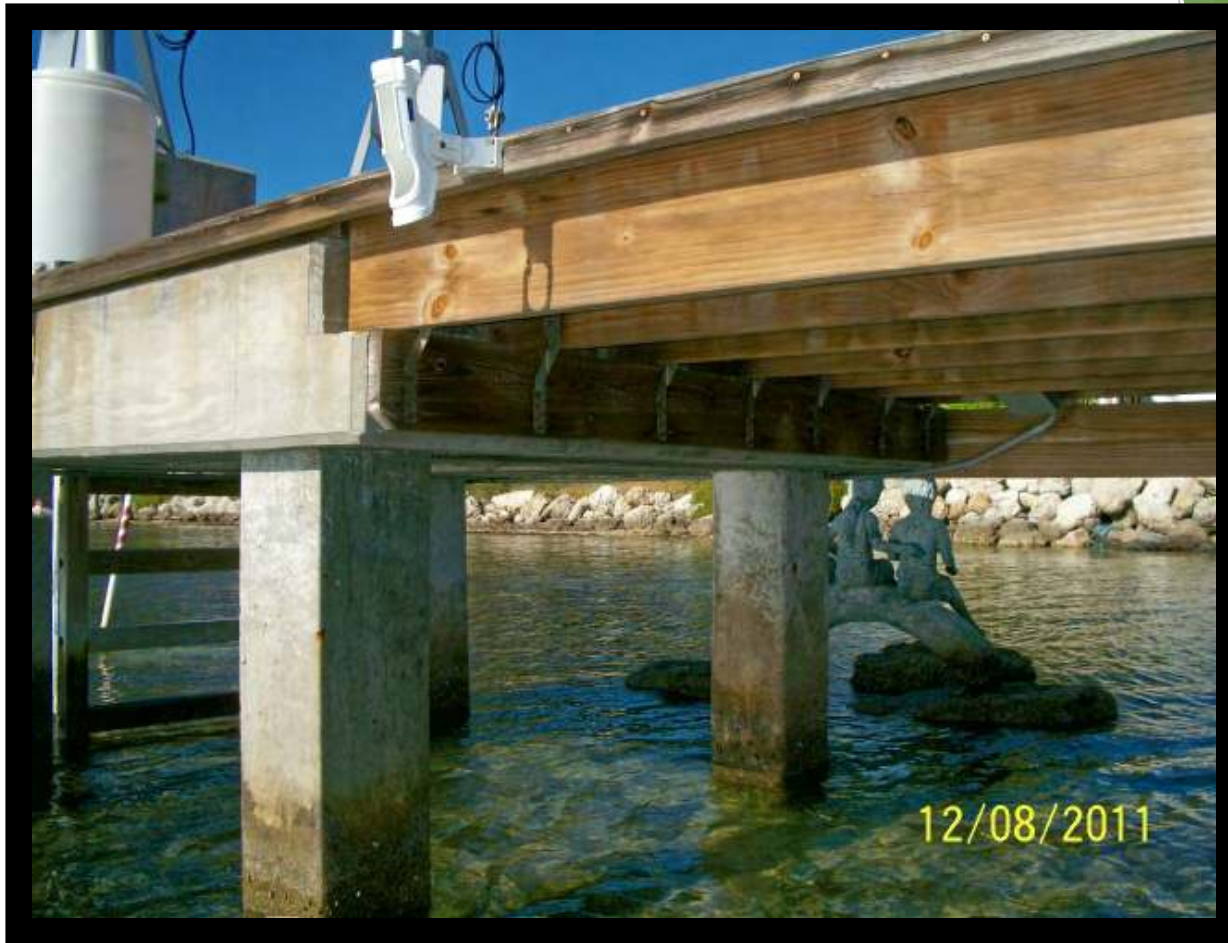
DETERIORATED PILINGS



Pilings are “legs of the table” that hold the entire wood dock structure up. Pilings can be damaged from vessel impacts, rot/fungus or deterioration below the water line. If possible try to look down into the water to check for “thinning” of the pilings.



WOOD DOCK ATTACHMENT TO SEAWALL OR CONCRETE DOCK



Just as you would inspect any deck on a home, the connection of the wood dock to the landside structure or concrete dock is critical. The dock/joist structure **MUST** be supported with sufficient lag or anchor bolts, or as in the case of this photo, a ledger as well as bolts. Docks can collapse just like a residential deck can. Be diligent on checking for proper structural support and bolting below.

IMPROPER CONNECTION AT DOCK TO SEAWALL STRUCTURE

At first glance this finger pier dock seems perfect. However, once you look below....



you will see that the dock is supported, but it is not **CONNECTED** to the concrete dock! Only 3" of outward movement and this dock will collapse!

Inspecting Concrete Docks, Caps & Seawalls



CONCRETE DOCK SURFACE AND UNDERSIDE STRUCTURES



Concrete docks are susceptible to cracking due to settlement or shrinkage just like any other concrete slab. Be sure to use good judgment to determine the cause of cracking. In the case of this photo, the cracking is normal shrinkage cracking since no control cuts were made to control the shrinkage. In this case the cracking is a minor cosmetic concern with very limited chance of being an ongoing concern.

However, spall cracking due to rusted steel within the concrete can be a major concern with significant costs associated with repairs or replacement!



SPALLING AS SEEN BELOW DOCK SLABS



The reinforcing steel within this dock slab has rusted and spalled the concrete off below the dock. Obviously, this dock needs MAJOR repairs.

The steel within this dock has rusted so badly that the only logical action is total replacement of the dock structure. You will notice that the support beams are spalled as well!



UNDERSIDE SPALLING

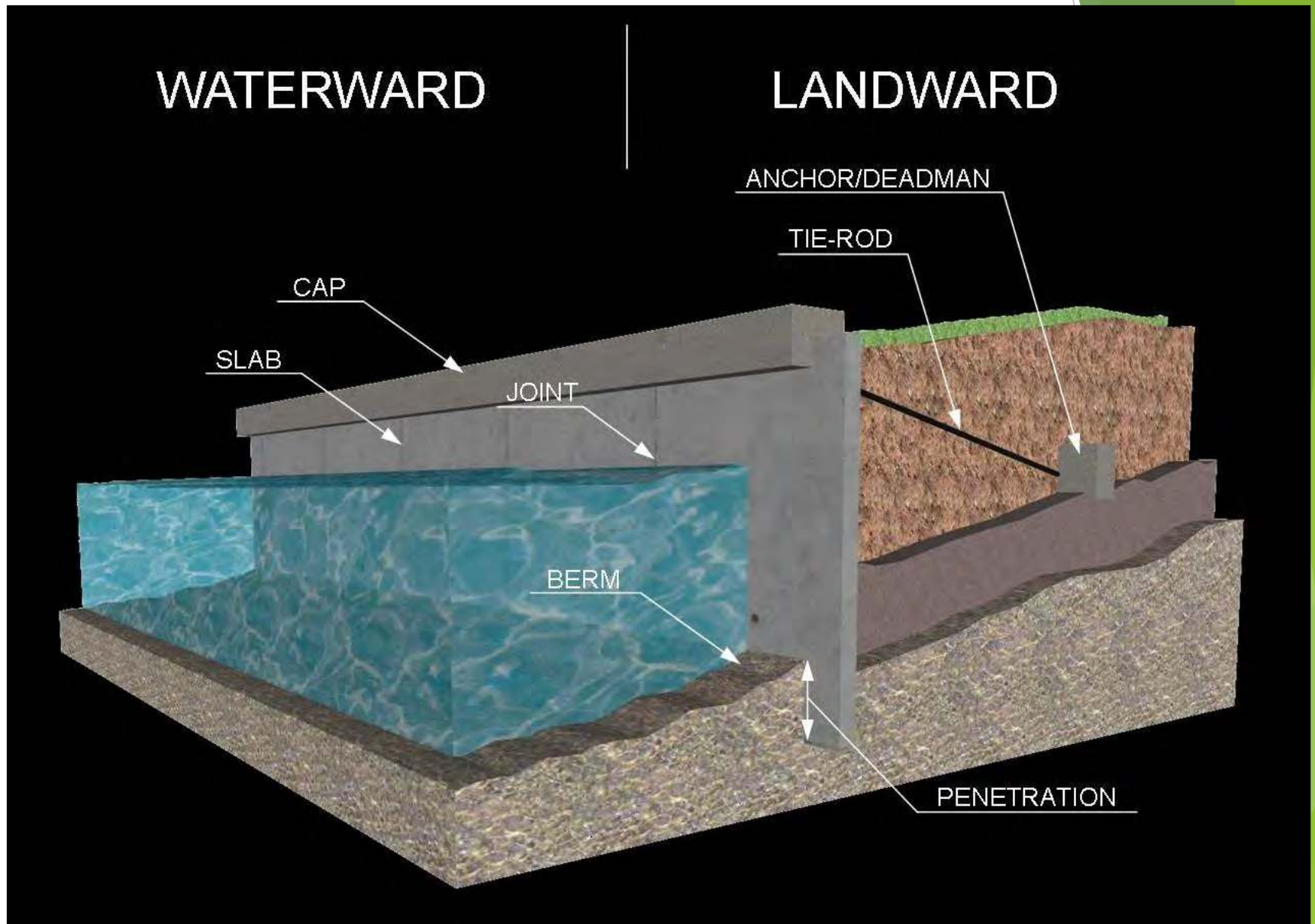


Some spalling below dock slabs can be more difficult to see. Both of these docks looked perfect on the top sides.

Be sure to look as far under the dock as safely possible. It is recommended to shoot a photo-mosaic of multiple angles to let your camera be an extension of your vision for better results.



TYPICAL SEAWALL STRUCTURE



TIE BACK ANCHORS/DEADMAN CONSTRUCTION



Tie back or “deadman” anchors are steel rods that connect either through the seawall cap, seawall pilings, or in rare occasions, through the seawall panels and anchor into the ground.

These tie back anchors help to prevent outward movement caused by the pressures of the landside fill against them. Tie backs are critical to the stability of seawall structures. However, some seawalls do not have tie backs, usually shorter or inside curved seawalls do not need them.

Tie back anchors are a component of seawall construction that you would rarely see during an inspection. The only time you might be able to see tie backs is during a major repair or new construction. The other possibility is if there is major erosion at the land side of the seawall. For these reasons tie back anchors are **EXCLUDED** from a seawall inspection because they are concealed. There are ways to determine the “possibility” of tie back problems which are covered later in this presentation.

SEAWALL CAP CONSTRUCTION



A seawall cap is basically a tie beam as you would see in any masonry CMU constructed home. The seawall cap “ties” the seawall panels and pilings together and provides a rigid diaphragm to help keep the seawall straight.

SEAWALL CAP CONSTRUCTION



These photos show a cap replacement in progress. The seawall panels and pilings were in good condition, but the cap was badly spalled and needed to be replaced. The outer cap form boards are in place and you can see the tops of the seawall panels and “T-pilings”. Notice how there is rebar protruding from the top of the seawall panels and pilings. When the cap is poured it will connect all of the seawall components together into a solid homogenous structure.

SEAWALL CAP CONSTRUCTION



Looking closely you will be able to see the top of the “T” piling and the rebar protruding from the top of the piling. After all of the steel is installed it will tie all of the seawall components together.

Here you can see the steel rebar cages ready to be dropped into the form. As stated previously, just think of a seawall cap as a tie beam just like you would see in a home under construction.

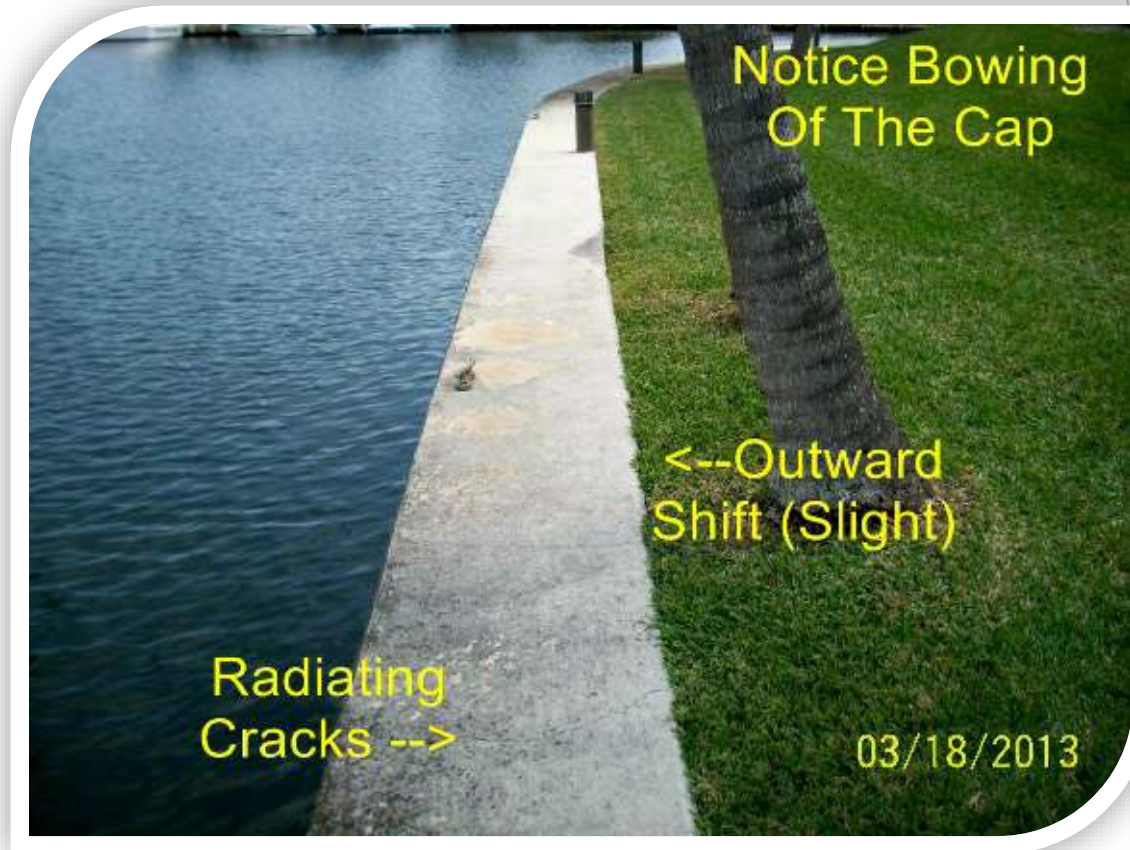


SEAWALL CAP CONSTRUCTION



These photos show the finished repair from the previous slides. Notice the level of the landside fill and grass. It is important that the grade be high enough to not allow too much water to get trapped landside of the seawall. Ideally, water should flow over the top of the seawall cap during heavy rains. Some seawalls will have a French drain to help with drainage. If you notice excessive difference between the land elevation and the top of the cap, expect to find erosion problems.

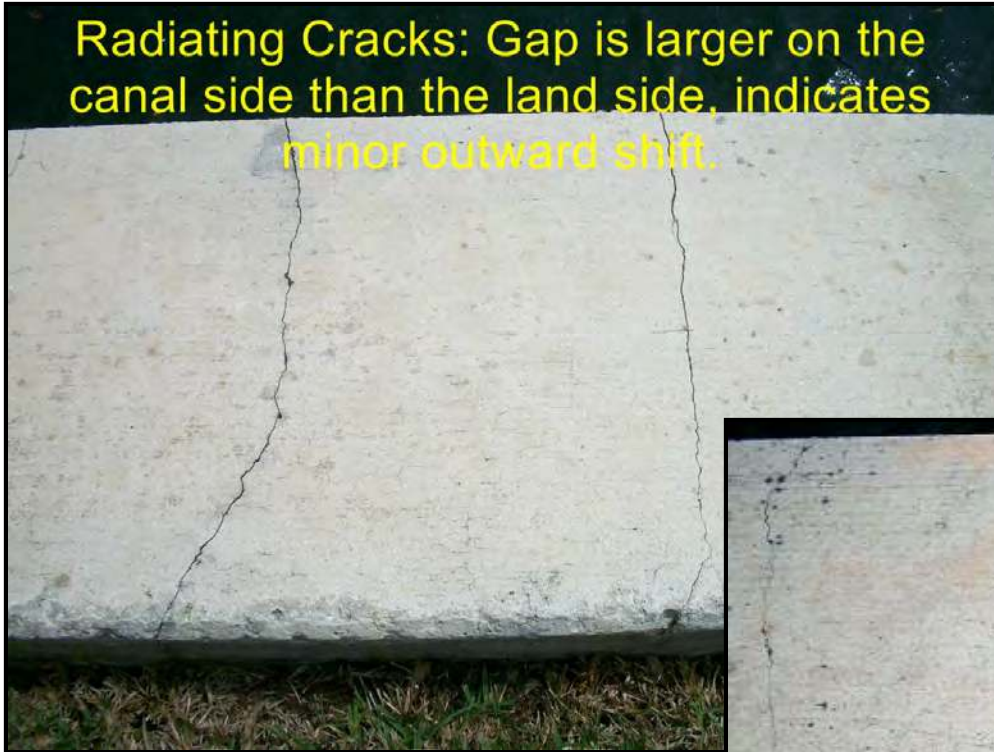
WHAT TO LOOK FOR WHEN INSPECTING SEAWALL CAPS OUTWARD MOVEMENT OR BOWING



Always remember that form carpenters like to build things in straight lines! It is difficult to bend forms to make curves. If you look along what should logically be a straight seawall and it is curved, there is a chance of outward movement. Outward movement could indicate failed tie back anchors.

WHAT TO LOOK FOR WHEN INSPECTING SEAWALL CAPS OUTWARD MOVEMENT OR BOWING SIGNS: RADIATING CRACKS

Radiating Cracks: Gap is larger on the canal side than the land side, indicates minor outward shift.



When a cap has cracks that are larger toward the water and tight at the land side it indicates outward movement of the cap and seawall.

In the case of this inspection it was the house construction that was the problem. After the seawall was built they brought in about 8'-10' of fill above the cap line to elevate the house. Too much lateral pressure.



WHAT TO LOOK FOR WHEN INSPECTING SEAWALL CAPS: OUTWARD MOVEMENT SIGNS/BOWING SEAWALL CAP & HIGH LAND ELEVATION



As mentioned in the previous slide, this seawall was bowing due to excessive land fill which was put in to elevate the home for a better view. The soils created so much pressure that it shifted the entire seawall structure, AND even shifted the tie back anchors.

You must always consider the surrounding environment when inspecting seawalls. It may not be a problem of the original design, but as in this case, it was a problem created by what came after the seawall was built.

In a case such as this, the only thing you can do is state your opinion regarding the reasons for the problem and recommend consultation with a structural engineer.

WHAT TO LOOK FOR WHEN INSPECTING SEAWALL CAPS: OUTWARD MOVEMENT SIGNS/BOWING SEAWALL CAP & HIGH LAND ELEVATION



After realizing that soils pressure was causing the seawall panels to shift I looked in the crawlspace of this home to see if there were any indications of settlement.

In the top picture you can see that the soils have settled nearly 2 feet.

In the photo to the right you can see that the soils are shearing and creating tiers due to the soils falling away toward the canal. The soils were higher the further away from the canal I went.

By the way, the house was stable with pilings & grade beams.



WHAT TO LOOK FOR WHEN INSPECTING SEAWALL CAPS: EROSION



At first glance this minor erosion does not look like much to worry about. But after getting down and looking inside the void...

... it was a large cavern that could have posed a serious injury problem. Anyone walking along the edge of this seawall cap could step into this and break an ankle. Always probe along the inside edge to find erosion.



WHAT TO LOOK FOR WHEN INSPECTING SEAWALL CAPS: SPALLING



As previously discussed, spalling is a major concern for docks & seawalls. Given the exposure to salt water, the chance of rusting rebar is very high. When the rebar rusts it expands and cracks the concrete and sometimes even breaks off the outer layer of concrete. Spalling can be very costly to repair, but it should also be remembered that the deterioration process can take many years. In most cases a spalled dock or seawall structure is NOT in imminent danger of collapse. It is however, something that will need to be addressed at some time in the future. It is important to help our clients understand spalling and its risk/cost potential for the purchaser. If spalling is significant it is always recommended to have the structure looked at by a Marine or Concrete Repair Contractor to determine repair or replacement costs.

WHAT TO LOOK FOR WHEN INSPECTING SEAWALL CAPS: SPALLING



This cap shows significant spall cracking. Notice that the cracks have been “patched” by filling the cracks with grout. This is not a proper repair, repairs will be needed.

RUST BLEEDERS & SPALLING



In many cases rust bleeders are just moisture that wicks into the concrete due to hydrostatic pressure coming into contact with the rebar causing rust stains. This is VERY common when the dock is a slab-on-grade and there is a step-down from the landside with elevated lawn areas etc.. This is considered a cosmetic concern that should be monitored.

When you see lines indicative of the rebar mat within the concrete, this indicates a major spalling concern. If the dock is a slab-on-grade and supported by soils, it is not as severe as it would be if the dock is self-supported. In slab-on-grade cases this dock could be capped. However, if the dock slab is self-supporting, major structural repairs would be required.



SPALLED SEAWALL PILINGS



The minor spall cracks on this piling are considered typical for the age of the seawall. The above water portions are very susceptible to cracking and this is something that your client should monitor over the years.

SPALLED SEAWALL PILINGS



In these photos the seawall structure is still stable, but repairs will need to be done at some point in the future.

More severe spalling will require the attention of a Marine Contractor to evaluate repair costs, if the client desires.



INSPECTING CONCRETE SEAWALL FACES/PANELS



This seawall, cap and pilings are in good condition.

This seawall is in good condition, but notice the sand bags that have been deposited at the toe of the seawall.



INSPECTING CONCRETE SEAWALL FACES/PANELS



Sand bags placed at the toe of the seawall indicate that the shoulder of the canal has deteriorated exposing the bottom of the seawall panels. This may or may not indicate a problem. If the soils of the land side are very stable, or as in the Keys possibly limestone, the risk is low. However, if the soils are soft and will erode easily, this could create erosion problems. Exposure below the toe of the seawall is not usually a **STRUCTURAL** problem though, the seawall panels are tied into the cap and unless you see signs that the panels are falling away, it is usually not a structural concern.

INSPECTING CONCRETE SEAWALL FACES/PANELS



As discussed in the previous slide, erosion below the seawall toe can allow seawall panels to settle away from the cap, or in this case, break off of the cap structure. Ironically, this dock looked pretty good on the top side, but looking below was a real shock! Don't ever assume, always look. This seawall was a deal breaker.

INSPECTING CONCRETE SEAWALL FACES/PANELS



Inspect seawall panels for any displacement, voids and cracking.

Both of these seawalls show signs of cracking and spalling. The rust bleeders are superficial and cosmetic but do indicate moisture seepage.



Inspecting Sheet Piled Seawalls



Sheet pilings are interlocking corrugated steel or plastic sheets that are driven into the canal bottom vertically creating a seawall face. Usually the sheet piles are capped with a traditional seawall cap to keep the wall straight and even.

STEEL SHEET PILINGS



Know the difference between minor rusting of sheet piles...

...versus MAJOR rusting!



Steel sheet pilings should be inspected for EXCESSIVE rust as well as bulging seams or interlocking seam connections that have come apart. Also look to make sure that the piling connection to the cap is not shifted or settled. Settlement could indicate a sheet pile that is not properly embedded into the substrate below.

PLASTIC SHEET PILINGS



Although not as common as steel sheet pilings, plastic sheet pilings do make a very clean looking, low maintenance seawall. The reason they are not as common in South Florida is because of the limestone substrates in our area. Plastic sheet panels may be more common in areas where the ground is not so hard.

WARNING: Don't be fooled by thin non-structural vinyl "piling-panels" which look like sheet piles, but are not a structural sheet pile. They are typically used to "dress-up" a bad seawall. Be sure to look to see what they might be covering up!

Inspecting Masonry & Laid Stone Seawalls



Masonry CMU seawalls are basically a block wall on either a footer or natural rock.

Laid stone seawalls are a rock veneer that is adhered with mortar sitting upon a footer or natural rock. Laid stone seawalls are more susceptible to damage because they are not as strong as block.



INSPECTING MASONRY CMU SEAWALLS



When inspecting masonry CMU seawalls look at the mortar joints and connection to the dock slab or cap for signs of settlement.

Be sure to note any voids or damaged masonry. Also, if possible, check the footer to make sure it is stable. Erosion below the toe of a masonry seawall can have major consequences.

This seawall has fallen away from the dock structure because the canal bottom eroded and no longer supported the seawall.

The worst news is what was discovered below the dock slab...



INSPECTING MASONRY SEAWALLS



Looking below the dock it is apparent that there is no longer any support for the dock structure. This is a MAJOR concern because not only does the seawall need to be replaced, but the dock structure needs to be stabilized as well.

INSPECTING LAID STONE SEAWALLS



Laid stone seawalls require a lot more attention than masonry CMU walls due to the non-linear structure. This section of seawall is in pretty good condition with no signs of settlement or cracking. Look very closely for voids, past repairs and especially settlement. Settlement indicates failure or erosion of the foundation.

INSPECTING LAID STONE SEAWALLS



Look at the seawall from a distance if possible to see any irregularities. In this instance you can see the line below the dock slab dropping off toward the corner.

The stone seawall has settled 3" due to underwater erosion below the seawall. Many times the erosion is caused by rain water running behind the seawall as well as tidal flow. At some point in the future this seawall is going to require major repairs.



INSPECTING LAID STONE SEAWALLS



Past repairs are clear indicator of potential problems. This wall was patched with concrete sand bags because the soils behind washed out taking the seawall with it. Be sure to list previous repairs on your report.

Cracks in a dock slab over any type of seawall can indicate erosion below the seawall. This crack is a result of a major cave that eroded from the natural ground below the seawall. At some point this corner will collapse if not stabilized.



Natural Cut Rock Seawalls



Cut-out natural rock seawalls and docks are quite rare. In the Florida Keys this sort of structure is only found in high elevation neighborhoods that have cut-out canals. In most areas of Florida seeing this type of construction is very unlikely. The chances of major concerns with a cut-out seawall or dock is **EXTREMELY** low. Just use common sense to look for major cracking or voids that might need repair. This is a preferred type of dock/seawall because the life expectancy is almost unlimited.

Rip Rap Seawalls



Rip rap seawalls are usually used on properties that are exposed to open ocean or areas where large waves are possible. Rip rap walls absorb the impact of large waves to prevent erosion to the land.

Inspecting rip rap is very straightforward. Inspect for and report missing stones/boulders and report any indications of erosion.

The top edge where the stones meet the land is the place where most erosion occurs due to washouts. Higher quality rip rap installations have a poured concrete “cap” poured along the top edge of the stones to lock the stones together and reduce erosion.

Natural Repose “Seawalls”



A natural repose seawall is basically any shoreline that has not been improved that supports or is below another dock structure. This photo shows a concrete dock support beam that appears to be resting upon the natural ground. Our concern for this discussion is not the beam, but the condition of the natural soils. In many cases the “natural repose” is actually just a beach as you would see with a finger pier that extends out into the ocean or a lake.

INSPECTING NATURAL REPOSE SEAWALLS



As stated in the previous slide, a “natural repose seawall” is not actually a seawall, but land that is unimproved which, in some cases, MAY support the structure of a dock.

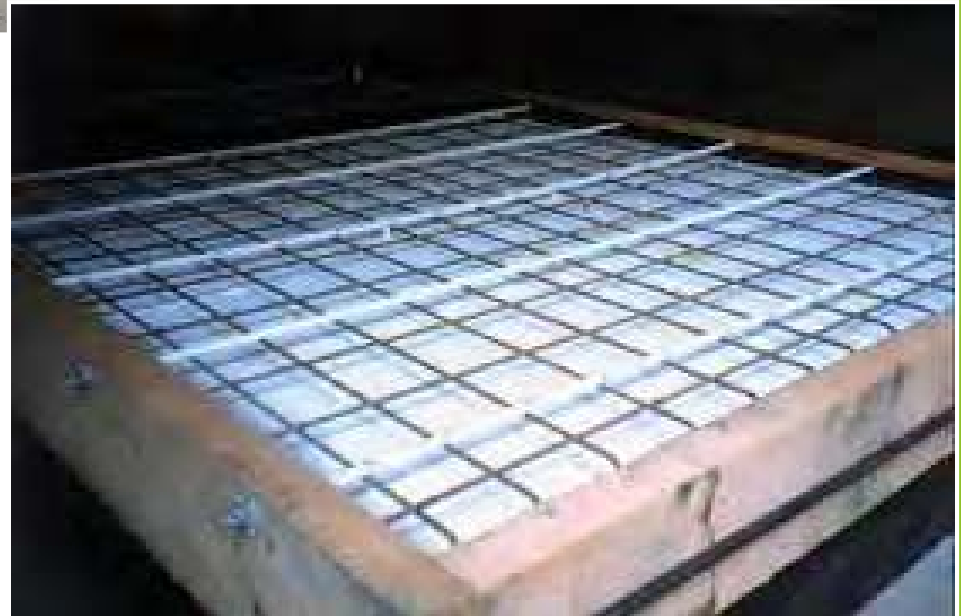
This photo is a great example of what can happen when a dock is supported on natural soils. This photo was actually taken in a level position. The dock has settled 1' on the land side due to the settlement & erosion of the natural land bank over the years. This is a significant repair which will require the rebuilding of the wood dock. Hopefully, when this dock is rebuilt, the contractor will provide a solid foundation to support the dock. So, the long & short of this type of inspection is to evaluate erosion and support for the dock structure above. Report all deficiencies.

Concrete Floating Docks



Although it seems illogical that concrete can float, it does. Floating concrete docks are made from huge Styrofoam blocks that are encased in concrete on all sides except the bottom. These floating docks can be massive structures.

This picture shows a concrete floating dock cell being made. The foam block is wrapped with rebar matting and then the forms are filled with concrete making the cell a solid structure. This type of dock system is mostly used in marinas, but you will see floating docks in residential settings as well.



INSPECTING CONCRETE FLOATING DOCKS

Floating dock cells are held together with banding boards that are bolted to the cells for stability. Sometimes you will see 2 or even 3 banding boards.

The banding boards are a vital component in keeping the dock structure cells tied together as an integral unit. If the banding boards become deteriorated, the dock cells can come apart.



Inspect the condition of the banding board bolts, nuts & washers as well as the condition of the wood bands.



INSPECTING CONCRETE FLOATING DOCKS



All types of floating docks are held in position with wood, concrete or metal pilings. The connection is controlled with collars and roller wheels that protect the piling from damage. As the tide goes in and out, the dock is able to float freely while being held in place. The condition of ALL of these components must be checked. Bad rollers can cause damage to the piles. Broken or rusted collars could allow the dock to move out of position or come loose. And, damaged, rusted or loose pilings could also allow the dock to shift out of position. Steel pilings are very susceptible to rust, so try to check the pile condition as deep into the water as possible, preferably at low tide.

A free floating dock can cause a lot of damage!

Plastic Floating Docks



Plastic floating docks have some similarities to the concrete version, they float, and they are held in position with piles of some sort. The construction is typically durable plastic cells that are joined together, or sometimes in the cases of smaller Jet Ski docks, of one single cell. You will still need to check the connection points and anything that is attached to the dock such as rollers or winches, but the MOST important thing is to make sure that the dock is floating evenly. If the dock is not even (except if there is a vessel on the dock) it could indicate flooded cells. If the dock has flooded cells the cells will need to be repaired or replaced.

INSPECTING PLASTIC FLOATING DOCKS



If there is a vessel on the floating dock, it may limit your ability to see all of the cells, so be sure to notate the “restricted access” in your report to protect yourself from any possible issues. When you encounter a float-on dock like this one, in addition to your normal protocol, be sure to inspect the condition of the winch components and rollers or PVC slides, if any.

PLASTIC FLOATING DOCKS



In cases where the plastic dock is just an accessory, like this Jet Ski dock, I do not include it in my report. In my opinion, anything that is not permanently secured to the dock or pilings should be considered an accessory.

Types of Boat Lifts



Davits are basically small cranes mounted on concrete bases or pilings that lift and support boats with cables. Davits can be belt-driven, direct chain driven or hand winched. Davits can be rated from 500 lbs to a maximum of 5,500 lbs per davit.

SIDE ELEVATOR BOAT LIFTS



Side elevator lifts are like a forklift that have lift cables or hydraulic pistons. Side elevator lifts are very stable and can be designed for boats of all sizes up to 25,000 lbs. Side elevator lifts typically mount on the canal bottom and are stabilized with anchor plates to the dock surface.

OVERHEAD BEAM LIFTS



Overhead beam lifts have lift bunks that are suspended by cables at all four corners which are connected to a rotating winder bar. Overhead beam lifts are installed across pilings on each side. Maximum capacities for these lifts typically range between 4,000 lbs and 16,000 lbs.

PERSONAL WATERCRAFT LIFTS



The most common type of personal watercraft lifts are the “Up & Over” type which lift the vessel UP and then rotate the watercraft OVER onto the land or dock surface to allow access and servicing.

A basic PWC lift may not allow turning the PWC over the land or dock, obviously this would restrict access for repairs or service.

PWC lifts can come in single or double lifts with ratings from 1,500 to 3,000 lbs.

SUBMERSIBLE BOAT LIFTS



Submersible boat lifts are designed to float with the vessel out of the water, then submerge when launching the boat. These lifts can be VERY difficult to inspect and test. They do not want to submerge when there is not a boat on the lift. I do not inspect these lifts, I make note of it and recommend consultation with a specialist.

BOTTOM MOUNTED HYDRAULIC BOAT LIFTS



Canal bottom mounted hydraulic lifts are hydraulic scissor jacks with bunks to support the vessel. These lifts can be operated with either water supplied by hoses, or with oil pressurized by pumps. These lifts are very difficult to inspect because the majority of the lift is underwater all the time. I do not inspect these lifts, I make note of it and recommend consultation with a specialist.

Inspecting Common Davit & Boat Lift Components



Davits and boat lifts have many components that are common to both. With the exception of hydraulic side elevator lifts, all davits and lifts have cables and typically winder spools or winder bars. Davits and lifts also have motors that drive either a belt/pulley or a housed direct drive gear. And obviously, davits and boat lifts have similar switching and wiring. In the next few slides we will discuss inspecting these common components.

INSPECTING DAVIT & LIFT CABLES: CABLE RUST



Galvanized lift cables are very susceptible to rusting. The cable on the left is still in good condition at the winder spool.

Cables rust from the inside-out, so when you see rust like the picture to the right, they **MUST** be replaced. The cost for a new set of cables runs between \$200.00 and \$250.00, stainless steel cables run about \$300.00



INSPECTING DAVIT & LIFT CABLES: CABLE WIND-ON



Always check to make sure that the lift cables are wound-on to the winder bar or spool as evenly as possible.

If the cable becomes a rats-nest it will damage the cables. When an uneven cable wind gets trapped below a cable with the weight of a boat on it there is a huge amount of pressure applied to the cable wraps below. This pressure is enough to damage the cable by crushing it.



INSPECTING DAVIT & LIFT CABLES: CABLE CRUSH & FRAYING

You can clearly see the damage caused to the cables due to not being wound-on evenly. Even the stainless steel cable at the right is damaged.



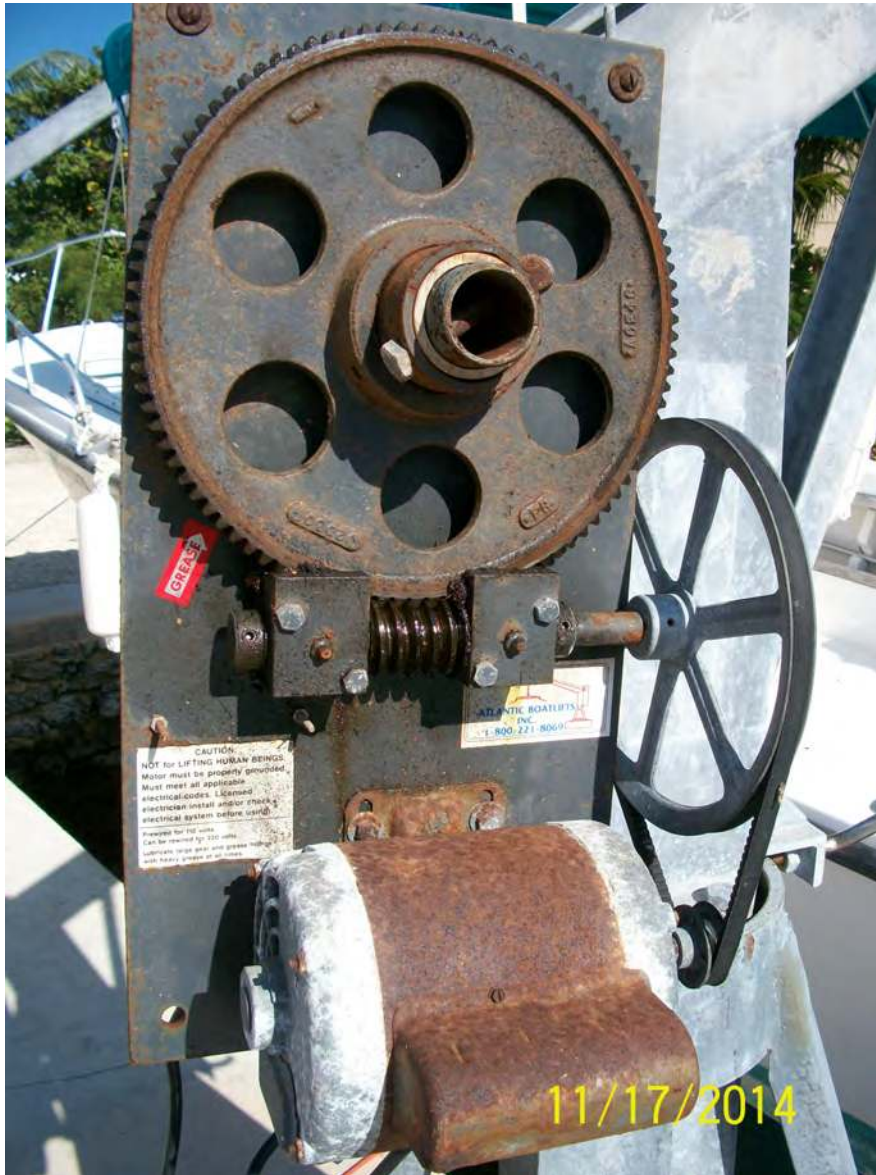
In both of these cases you would report that the damaged cables need to be replaced.

INSPECTING DAVIT & LIFT CABLES: CABLE CONNECTIONS



Cables are only as strong as the connections that hold them together. Look at the condition of the compression or bolted cable clamps for excessive corrosion or signs of cable damage at the connector. A lift cable may look perfect until you see how it is connected. Watch for amateur clamps, I have seen automotive bull-dog clamps used!

INSPECTING DAVIT & LIFT MOTORS, PULLEYS, BELTS & GEAR DRIVES



MOTORS: Obviously, the way to test a lift motor is by running it. If the motor does not run, or makes excessive noise while running, report it. Many times a motor will be frozen-up from lack of use. Sometimes you can free it up by turning the pulley and they will usually run fine after that.

PULLEYS: Pulleys need to be checked for alignment and to make sure they are not damaged or loose.

BELTS: Check belts for fraying and that they are not dried out. Also make sure there is good belt tension.

GEAR DRIVES: Check all gears for condition and lubrication. Most gear assemblies have built-in lubrication zerks, always recommend lubrication.

INSPECTING DAVIT & LIFT DIRECT GEAR DRIVE & CHAIN DRIVE MOTORS



Direct gear drive motors are usually direct drive shaft or drive chain. These motors have a housed gear box that runs in an oil bath.

Inspect for any signs of gear oil leakage. Also, when running the motor if it makes excessive noise or squeals, it is most likely out of oil and will require attention. Check the condition of the solenoid box as well as the condition of the drive shaft, chain & sprocket.



INSPECTING DAVIT & LIFT MOTORS, PULLEYS, BELTS & GEAR DRIVES



This is a great example of a davit that was not very well maintained, to say the least!

If you see rusting this severe, the davits will have to be replaced, or at the very least rebuilt.

The gears on this davit were rusted so bad that the components had fused together.

If you see anything other than surface rust on the motor mounting plate or the gears, report it and recommend maintenance.

In this instance I recommended consultation with a Davit Contractor.

INSPECTING SWITCHES AND WIRING



Any rusted or broken switches or exposed wiring needs to be reported. Just use the same FBI protocols you would use for inspecting the electrical within the home.

These are pretty obvious, the switch is rusted out and the control box wiring is open with exposed connections. In the case of the control box I listed that as a shock hazard.



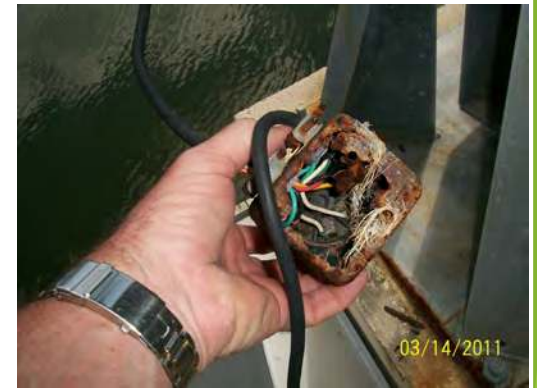
INSPECTING SWITCHES AND WIRING

Be sure to check the condition of electrical cables and wires. Report any spliced or wires in poor condition.

Check switch boxes for rust or damaged wires as well as testing the switch to make sure it works properly.

Look for any broken fixtures on the dock as well, you want to make sure that you look at all electrical components as a part of your dock inspection.

Check for GFCI protection. Some davits & lifts have built-in GFCI protection, but many have been bypassed. If the built-in GFCI is missing, then the outlets **MUST** be GFCI protected.



A QUICK NOTE ABOUT SHORE POWER PYLONS



Inspect a shore power pylon just like you would any panel or sub-panel. Expect to find a 20-amp (120-volt) GFCI outlet, a 30-amp (120-volt) marine outlet, most times a 50-amp (240-volt) marine outlet, and occasionally a 100-amp (240-volt) or larger marine outlet. All of these circuits should have their own breakers at the pylon.

INSPECTING DAVIT & LIFT COMPONENTS

The picture on the right shows normal surface rust at the bolts and edges of the davit base plate. This is not a structural concern. You could recommend rust-proofing measures to extend the life of the davits, but this would also be a good “no call” as well.



However, this rust has migrated into the bolt hole location and you are seeing the rolled steel layers indicating serious rust. This base MAY be repairable, but the entire davit base stanchion will likely need to be replaced. If allowed to worsen, this base plate could fail.

INSPECTING DAVIT & LIFT COMPONENTS



Piling mounted davits are typically intended for very light boats or personal watercraft. They are not intended to lift larger boats because the wood pilings are just not strong enough to support the weight.

When inspecting this type of davit it is very important to check the pile for signs of splitting or fungal growth. In this inspection it was the piling that was the problem, it was rotted internally and it split.

Be sure to let your client know of the limitations regarding these lifts (and what to watch for in the future) because serious injury could occur when something like this happens.

INSPECTING DAVIT & LIFT COMPONENTS



Inspect welded connections at pulleys or boom structures.

Look for rust in less obvious locations.

Report anything other than surface rust and recommend rust-proofing measures to extend the life of the lift.



INSPECTING DAVIT & LIFT COMPONENTS



Inspect davit locking bolts for condition. If corroded, recommend lubrication. You can try to lock or unlock these bolts, but sometimes if they are locked-down they can be very difficult to turn without a hammer.

Look at the davit turning rollers inside the davit stanchion collar. Many times they become frozen or in rare cases the centering bolt is broken or rusted out. These rollers are critical when turning the davits to bring the vessel over land.



INSPECTING DAVIT & LIFT COMPONENTS



The stern spreader “T-bar” is a very important part of a davit inspection. The spreader bar is used at the stern of the boat to keep the weight of the boat even for stable lifting. Always look for the T-bar... many times they are not on property because they left with the previous owner or they have been stolen. Always document their presence or absence in your report. A new T-bar costs \$300.00

INSPECTING DAVIT & LIFT COMPONENTS



Inspect side elevator lift rollers for condition and lubrication. Watch the rollers while operating the lift to make sure that they are turning. Any frozen rollers should be reported. Always recommend lubrication if questionable.

INSPECTING DAVIT & LIFT COMPONENTS



The condition of lift forks and bunks should be inspected.

Check the condition of all connections as well as the condition of the wood bunks, look for rot and deterioration.



The side elevator lift to the right is rusted out and is not safe for use. This lift will need to be replaced or rebuilt. There are a couple of reasons for the condition of this lift, but the biggest enemy of metal and water is electrolysis.

INSPECTING DAVIT & LIFT COMPONENTS



All side elevator boat lifts have metal components that are **ALWAYS** submerged in the water. When these in-water components deteriorate it can destroy a boat lift in a short period of time, especially if the lift is left plugged in to an electrical source. That is why **ALL** lifts that have in-water metal components **MUST** have sacrificial zinc anodes to protect the lift structure.

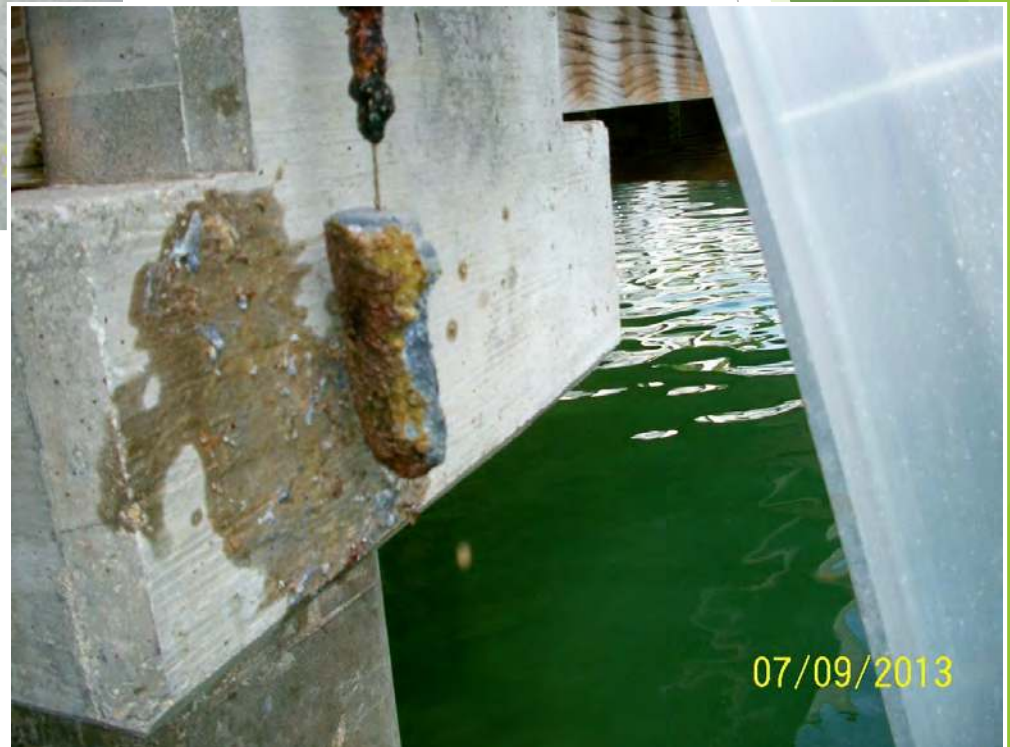
THERE IS NO OTHER MORE IMPORTANT PART OF A IN-WATER LIFT INSPECTION THAN THE CONDITION OF THE ZINCS!

INSPECTING DAVIT & LIFT COMPONENTS



Side elevator lifts should have two zinc anodes, one connected to each side of the lift with stainless steel cables. The intent of the zinc is for it to deteriorate (due to electrolysis) instead of the lift structure.

Pull the zincs from the water and hit them firmly against side of the seawall or dock to break off all encrusted material. Some zincs will look 100% intact but are actually just a “shell” with no zinc left inside.



INSPECTING DAVIT & LIFT COMPONENTS



For best results zincs should be suspended within the water column, not resting on the bottom or in contact with the lift structure. Try to determine that the zincs will not be left high and dry during low tide. You also want to make sure that the zinc cable is connected to the lift structure not the dock.

The rule of thumb for zinc anodes is that once they have deteriorated 75% from original size then they should be replaced. If the zincs are completely deteriorated or missing it should be listed as a MAJOR concern to get the attention of your client. They must understand the importance of the zincs and that they must be monitored monthly. Always recommend that lifts be left unplugged when not in use. Lifts that are left plugged-in go through zincs at a higher rate.

INSPECTING DAVIT & LIFT COMPONENTS

Most components of overhead beam lifts are the same as davits, so inspecting this type of lift is the same protocol. The only real difference is that the condition of the pilings is very important, look for condition & stability.



The greatest difficulty with these lifts is that most times you will not be able to inspect the outer beam components, unless you are brave enough to walk out on the bunks. Also, if there is a vessel on the lift it will restrict your access.

Report Writing

- ▶ Describe the type of construction used to construct the dock, seawall etc..
- ▶ Describe the type of boat lifts and drive types, if any.
- ▶ Describe the availability of electrical power (if needed for lift operation) and the presence or lack of GFCI protection.
- ▶ Describe the availability of water supply, if any.
- ▶ Report any deterioration of the structural components of the dock, seawall or lifts.
- ▶ Report any non-functioning features of the lifts or davits.
- ▶ Report any deteriorated lift cables, switches, belts or other components that would prevent or limit use of the lifts.

REPORT WRITING

THE INSPECTOR IS NOT REQUIRED TO:

- ▶ Dig or otherwise unearth tie-backs, anchors, retaining walls or other seawall or dock components below land side or waterside grade.
- ▶ Determine the load capacity of boat lifts.
- ▶ Offer an opinion as to the structural adequacy, life expectancy, or expansion potential of any seawall or dock.
- ▶ Inspect adjoining or contiguous seawall systems or storm sewers projecting through a seawall bulkhead.

Questions?

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If you are unsure of something you encounter on a dock or seawall inspection please feel free to contact me, I may be able to help. You can even text or email me a picture of what you are looking at and maybe we can figure it out together.

Thank you for your attention!