Survey Report

Rochester Pier, Medway Towns

2019

Condition of jetty structure, pontoon and Brows

Contents

Disc copies of digital report and all photographs included at back of printed report, hard copy.

Introduction

WPH Marine was commissioned to undertake a condition survey of the Jetty structure and brows at Rochester Pier, Medway Towns. The Jetty is an old T head cast structure constructed of cast iron piles, with a beam frame and concrete slab, the majority of the beams are riveted with some rolled steel beams inserted after. In front of the old jetty are two timber dolphins which at one time retained a pontoon for all tide berthing. More recently installed are steel tube piles which carry a double brow and hold pontoons further out into the river due to silting up of foreshore.

The current use is for day visitor moorings and public access.

The Inspection was carried out on 16th/18th April 2019.

The survey was undertaken at mid/ rising water from a boat.

Survey methods and restraints

Access to the underside was from boat at mid tide.

Main inspection was visual with photographic evidence. No deconstruction or

destructive tests were carried out. Rust was cleaned off in bad areas and ultrasonic thickness testing done.

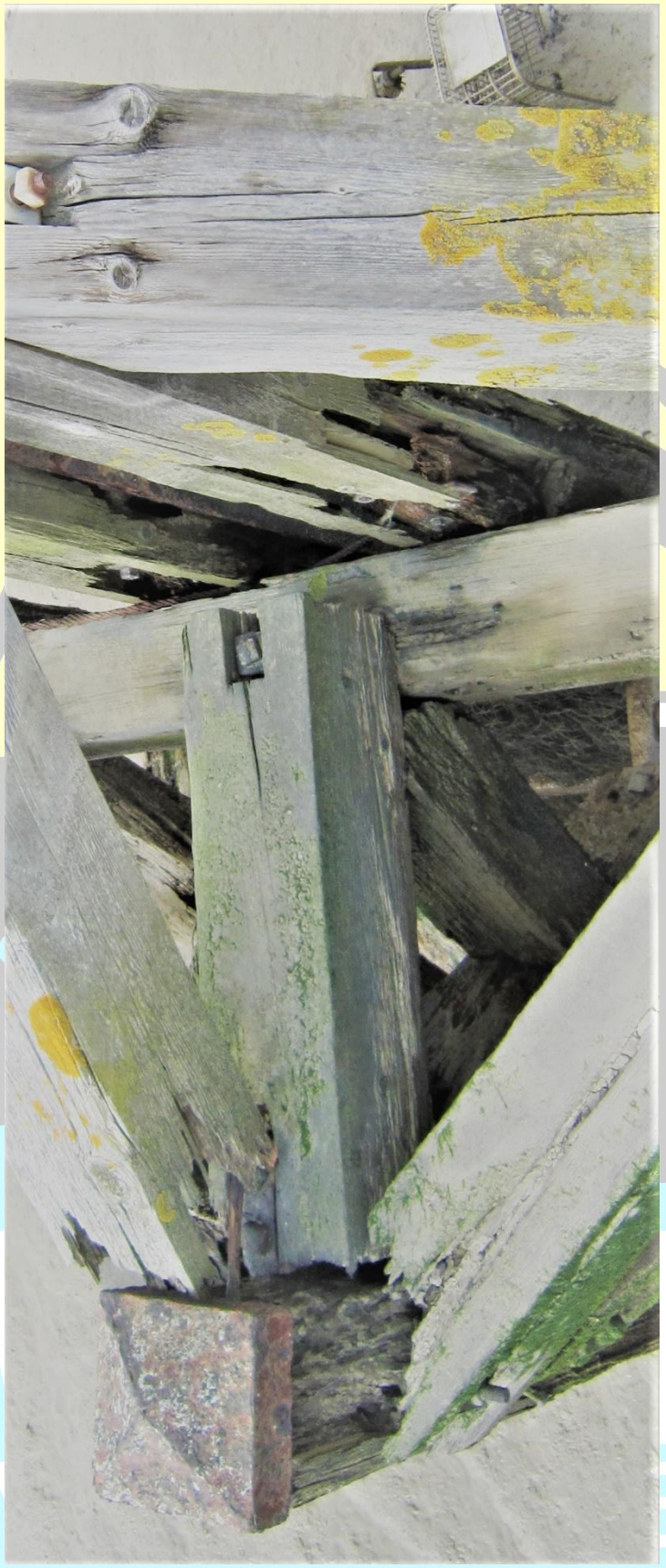
Description of construction material and structural form Condition, Observations and comments

"T" Head Jetty

The "T" head jetty is constructed of cast iron piles, with a beam frame and concrete slab, the majority of the beams are riveted with some rolled steel beams inserted after. There is also round bar cross bracing between piles. In front of the old jetty are two timber dolphins which at one time retained a pontoon for all tide berthing.

The two redundant timber dolphins at the front of the "T" head are rotten and of no use. In the near future these will start to fall apart and large chunks of timber will float off down river, with the possibility of damage to river craft and structures.

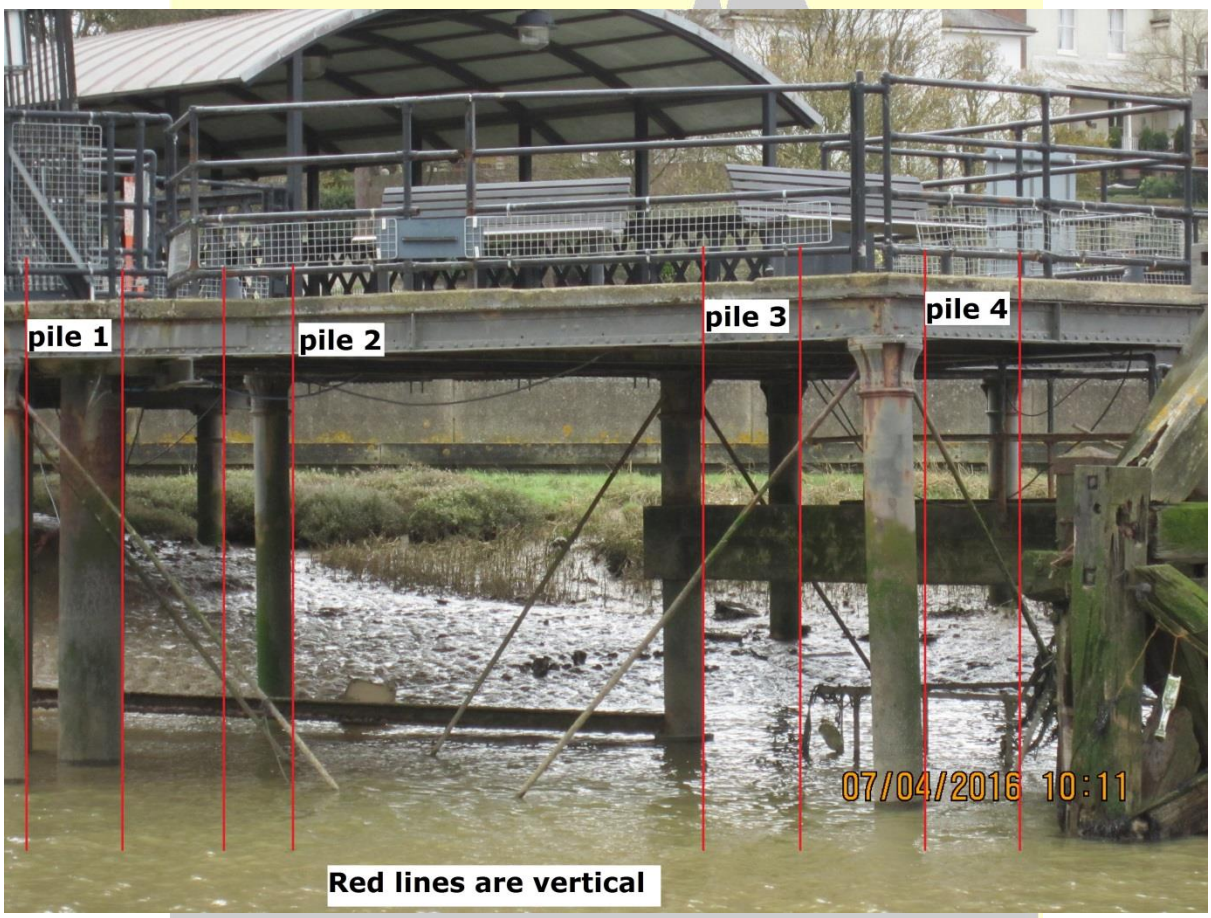
There, is very little holding the top section together.



With the deterioration in the last three years, we are surprised that there are not more timbers missing.

We would recommend the removal of the top sections (above higher horizontal bracing) as very urgent and the remainder within ten years. The top section is made up of Douglas fir and will float. As the river is very densely leisure craft, impact with this could be catastrophic.

As noted in the last report 2016.
There are four of the cast piles on the down river end that have at some time in the past moved and are not vertical. Pile 1 and 4 are worst.



We would support historic movement theory, as no further movement was noted.

There is a steel frame on top of the cast piles which consists of mainly riveted construction beams, but some have been replaced with rolled steel beams.

The riveted beams have had welded plate repairs done to the ends as they go on to piles and the top flanges coved in concrete to protect and strengthen corrosion in the past. The repairs have seen better times and are covering up continuing corrosion. The concrete coving and plate repairs are wide spread. Corrosion continues at normal rates.

Note corrosion under coving where corrosion has blown coving. This is likely to be similar under majority of coving.

Extract from previous report.

There are also areas of the beams completely boxed in concrete as original corrosion would have been through web as well as flanges.

See list below for comments

	Comment to photo above
1	Concrete coving that has blown due to water ingress, original corrosion, continues and rust is pushing concrete away. Staining running down web of beams shows rust, alkali leaching and water ingress.
2	Welded plates to strengthen corroded flanges, showing rust marks and staining.
2a	Welded plate strengthening has split welds and is corroding between flange and plate, this undermines strength.
3	Beam boxed in with concrete, welded plate repair to flange was carried out first and boxed in. the corrosion has blown the concrete see picture below.

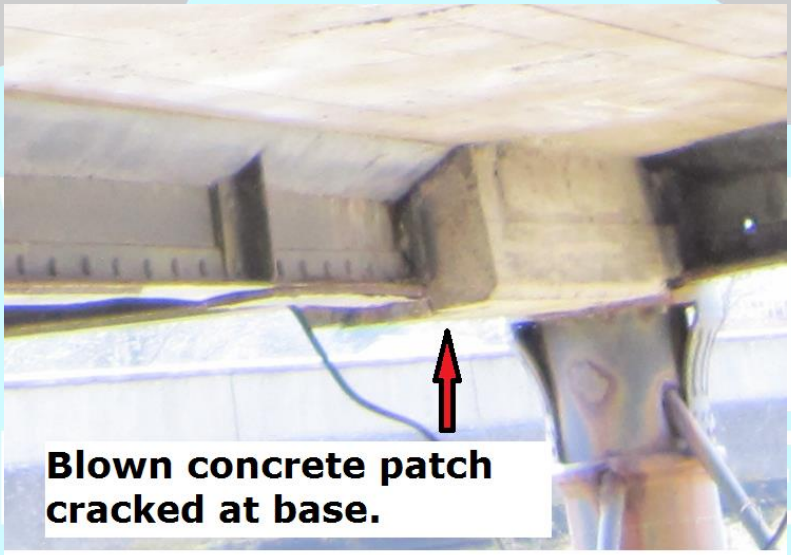


Photo from 2019 of same area. Corrosion continuing and repairs are becoming redundant.

2019 photo blown concrete patch crack has expanded and will eventually fall away.

The following photograph shows all forms of the above corrosion and a hole in the web.

The cross-bracing ties between piles are approx. 38mm diameter, 35/45% are between 35/50% wasted and require maintenance. 20% would normally be the safety factor.

This one is nearer 70% wasted.

These two are 25% and 60% wasted.

The approach handrails are generally in good condition. However, they require protective coating maintenance.

However, more attention and further investigation of areas where bridge is supported is required. These areas are crevice traps and accelerate corrosion, as they hold dirt and moisture with good supply of oxygen. They are also the prime load bearing points. Remedial repairs to steel in these areas is expected.

Jetty Brows

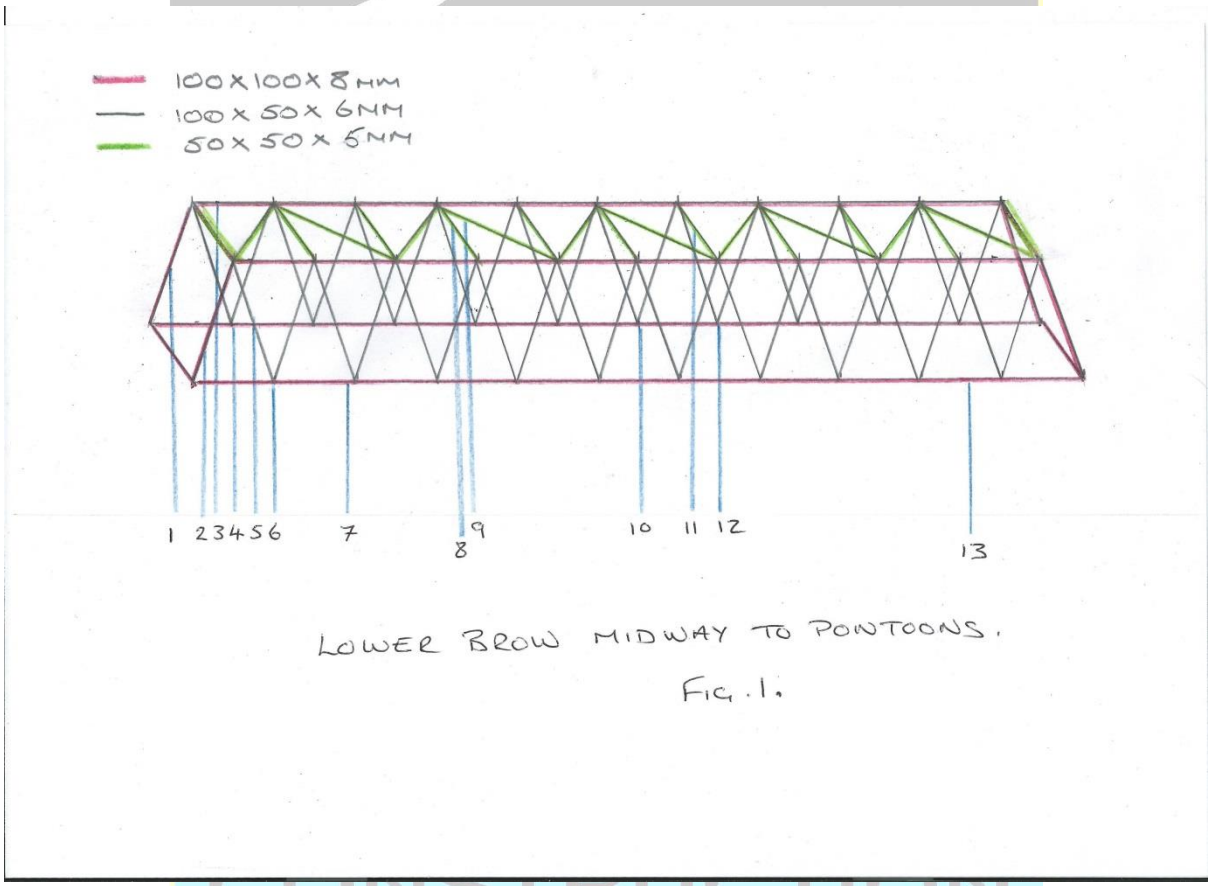
There are two brows of approx. 33 meters. The first connects from the “T” head to a midway flotation pontoon and then the second from there to the mooring pontoons.

The brows are constructed of steel box sections, in a box lattice structure. Main stringers are 100 x100 x 8mm, diagonals to sides are 100 x 50 x 6mm, the bottom perpendicular ties between sides are 100 x 50 x 6mm and the top perpendicular ties and diagonals top and bottom are 50 x 50 x 5mm. the deck is 4.5mm OP chequer plate.
There are numerous areas where the paint has lifted and corrosion taken place.
The majority of the corrosion is surface corrosion but there are 9No. Areas that are between 25/40% wasted.

The chequer plate deck has been fully welded on joints between apexes and stitch welded where they join over perpendicular 100 x 50 x 6mm ties between stringers. The majority of corrosion is on the stitch welded joints and where the plates are stitch welded to stringers along sides. These are the supports for the deck plate, with only one diagonal tie underneath a three meter span.

Lower brow

Thickness readings were taken in the worst areas and are noted on Fig.1. below.



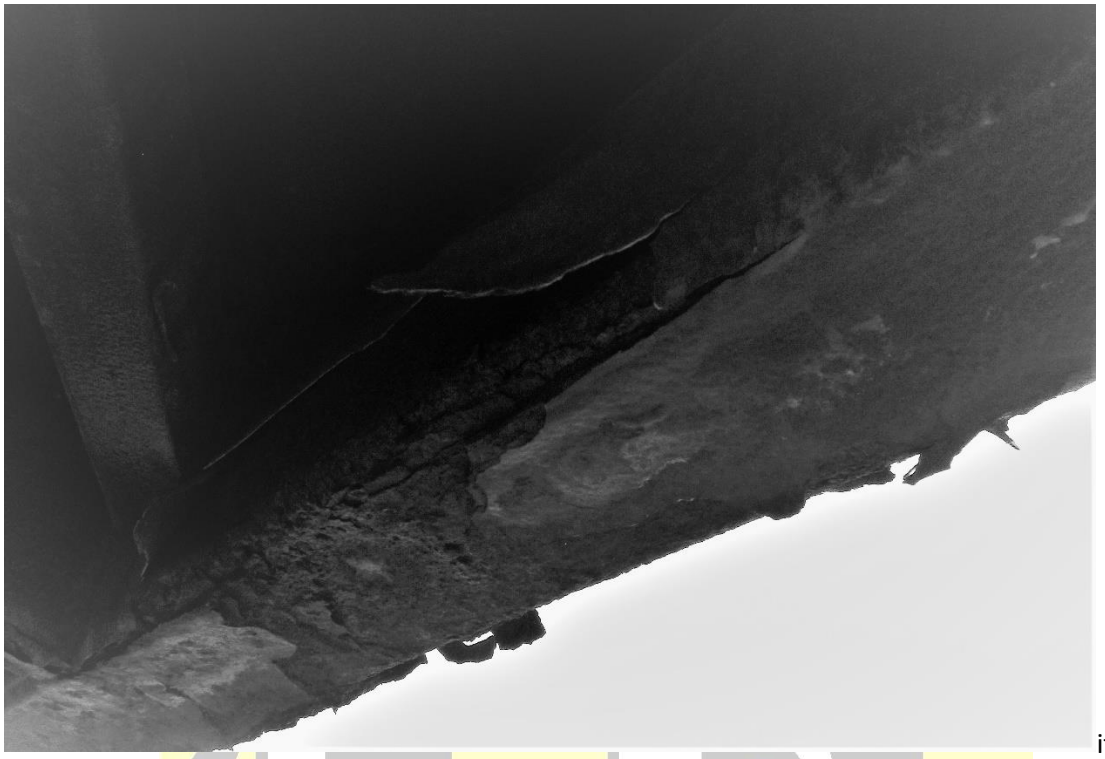
Item 1. Thickness taken through paint 8.3mm 100 x 100 x 8mm RHS
Item 2. Paint lifted and thickness taken 7.5mm 100 x 100 x 8mm RHS
Item 3. Top stringer outside radius of box 6.4mm 100 x 100 x 8mm RHS
Item 4. Bottom stringer thickness 5.6mm 100 x 100 x 8mm RHS

item 4.

Item 5. Thickness through paint 6.7mm 100 x 50 x 6mm
Item 6. Bottom stringer thickness 6.1mm 100 x 100 x 8mm RHS

item 7.

Item 7. Bottom stringer thickness 5.6mm 100 x 100 x 8mm RHS
Item 8. Perpendicular tie thickness through paint 5.6mm
Item 9. Diagonal tie thickness 4.0mm



item 10

Item 10. Bottom stringer thickness 5.4mm

Item 11. Perpendicular tie thickness 3.6mm

Item 12. Bottom apex thickness 4.7mm

item 12

Item 13. Bottom stringer thickness not retaken

The damaged paint is extensive see photos below;

Corrosion at this first apex from pontoon is being influenced by stress loads, splash zone and impact with pontoon in rough weather. Thickness items

These are all water traps between deck and bottom stringer, where deck is stitch welded.

Channel joint, in middle of brow where brow was joined after fabrication and road haulage.

Upper brow

Generally in a much better condition with regard corrosion, the paint is similar, see photos below.

Steel piles and connections to brows

At the “T” head end there are 2No. Steel tube piles that create a banks seat and the brow connected by pins.

The piles are in good condition generally but have lost paint protection in the tide splash zone, thus corrosion is evident.

The pins are locked in place and the safety chains are in good condition. Due to construction type of pin and housing there is no way to inspect pin its self for wear. They need to be removed for inspection.

Mid support dolphin and pontoon support.

The construction is of 4No. Steel piles with horizontal tube welded between each of the outside 2No. piles. This creates a platform for the frame of the pontoon support to sit on mid tide and low tide.

Piles are generally in good condition with protective paint coating in need of maintenance in the high tide splash zone.

The frame of the pontoon has had repairs carried out in the past, the horizontal main beam has broken at the point of cantilever for the overhanging pontoons up and down river.

down river out-shore low tide.

Down river out-shore mid/high tide.

Note. Gap opens and closes in split with tide change. The bolts above split can be turned with your fingers. The pontoon is moving the bolted joint every change of tide. All bolted connections require bolts tightening and/or replacing.

Also note the condition of the angle iron frame work that holds the pontoons in place. There is only currently one area of damage as photo below, but remainder are at the end of life stage.

Bottom edge angle iron frame detached.

Protective paint coating on the lower frame requires maintenance.

The slide pads on the upper brow are in good condition.

The pin to the lower brow in shore is in and locked. However, but the out-river side pin is free of its locking plate and only partially in working its way out. Only got 50% strength left and may come out at any time.

The locking plate to pin is missing a bolt. Wear on the pins can't be checked due to construction type need to be removed to check.

Brow decking

The chequer plate deck has been fully welded on joints between apexes and stitch welded where they join over perpendicular 100 x 50 x 6mm ties between stringers at apexes. The majority of corrosion is on the stitch welded joints and where the plates are stitch welded to stringers along sides. These are the supports for the deck plate, with only one diagonal tie underneath a three meter span.

Every stitch welded area is corroding to a greater or lesser extent and the fully welded joints on lower brow in particular are also starting to corrode.

There are repairs of areas, areas with deck cut out and plate welded over cut out and patches welded over holes and holes. 2No. visible holes as of survey.

view of patch and hole.

Cut out and plated over.

View from underneath

Underside of plate not corrosion protected (painted), area where old plate cut out (box section or plate edges) not cleaned and painted. The over lap of plate to box is a water trap and will corrode rapidly. This area requires very regular monitoring as structural member of bridge. These types of repair patching and cutting in require good corrosion prevention practises or they will cause corrosion to accelerate. This is a sticky plaster to hide the problems.

Pontoons.

The pontoon construction is of a 150mm steel channel frame with a 50mm polystyrene and 100mm concrete deck, in sections approx. 2500 x 10000 mm. 11No. and a rear pontoon to land brow. Front face has D rubber fendering and rear has 150 x 50 timber fendering.

The frames are supported on 2500 x 1200 x 900 mm polystyrene enclosed in plastic effectively a tank and lid, bolted to frame.

Sections of pontoon are bolted together through rubber blocks and a safety sling.

These are all in good condition. D section rubber fenders to front face good.

There is corrosion to galvanising on the frames below deck, predominately to front face but also to areas where rain water or river water drain through deck. Due to vessel wash/splash and environmental exposure from open water.

View through front to back. Note corrosion heaviest at front and non-existent at rear.

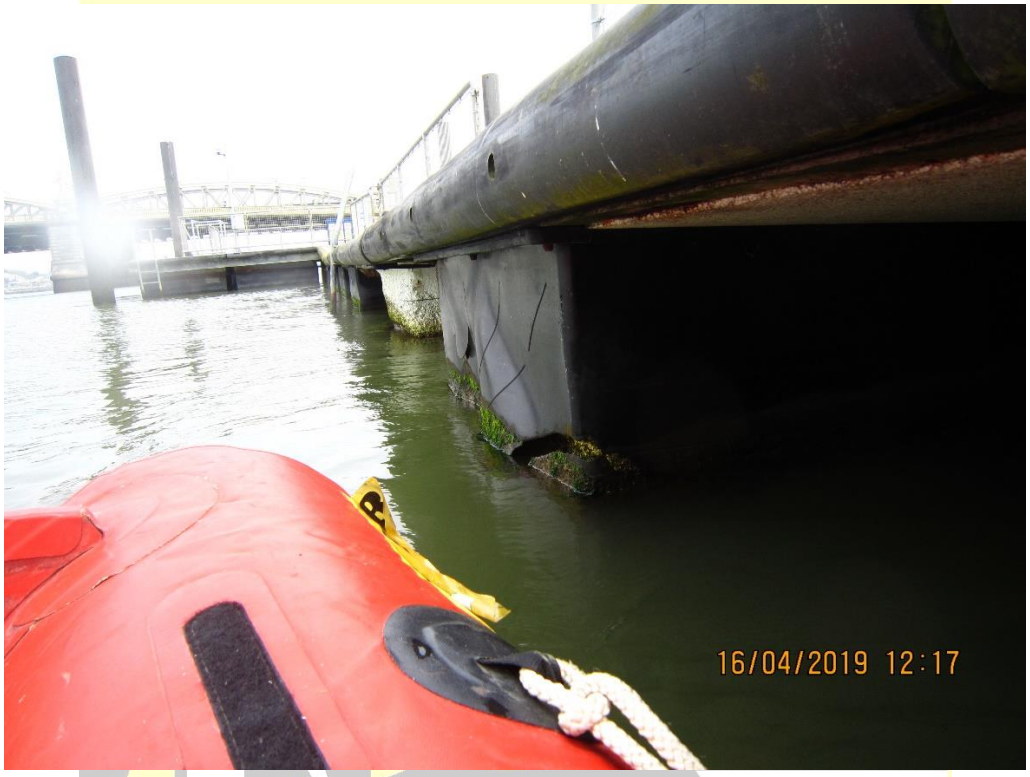
View to rear, shows less corrosion.

Comments.

There are 2No. floats with missing plastic tanks one to face of lower pontoon and one to face of raised area. There is no evidence that these have been ripped out and the washers and bolts are tight to frame no gap where plastic has been removed. Would suggest that these where never fitted.

Generally, pontoons are structurally sound. Protective coatings have reach end of life and require attention.

There are also 4No. tanks that are split.



We would recommend monitoring these with no action at present, as they are functioning correctly.

There are 7No. escape ladders around pontoon all of which need replacing, as rungs are missing. Individual unbolt bolt on.

Pontoons are held in place by piles with guide frames bolted to pontoons. The piles require paint refurbishment in the splash zone, other than that good. Guide brackets are all good.

Recommendations and priority

Priority scale is based on structural damage prevention. Min 10year life expectancy

Priority scale: 1 Structural Immediate 2 Recommended 3 Decorative

	Recommendation	**Priority**
"T" Head Jetty		
Dolphins	removal	1
Piles	No action on level	
Beams	remove concrete coving and boxing where blown and further inspect.	
	Repair as necessary. Repair/replace steel	
	strengthening to riveted beams.	1
Cross bracing	Replace corroded bracing	1
Approach handrails		
Lattice handrail support points	clean and further inspect. Repair as necessary.	1
Protective coating	clean and repaint	2
Jetty Brows		
Lower brow	Strengthen 9No. areas of corrosion	1
	Remove brows and shot-blast and repaint	1
Upper brow	Remove brows and shot-blast and repaint	1
Piles and connections	piles and frame to mid pontoon clean	
	and repaint.	2
	Float support frame work replace	1
	remove pins and check, refit moved pin	1
Decking	replace all decking	1
Pontoon		
Corrosion to underside of frame work,	clean and re-paint.	2

Ladders	replace safety issue	1
Floats	monitor	2
Paint to piles	clean and repaint	2

Summary

The structure under the jetty is in reasonable condition but we can't safely confirm condition of beams under concrete coving and boxes. Therefore, safe life expectancy is less than 7 years without strengthening work. The brows need a lot of work, strengthening, decking replaced and protective coating repaired, this would make sense to remove them and do shore side. Life expectancy for safe operation of decking, is less than 3years. Whilst the brows are out, the pins can be checked and replaced/repaired as necessary.

Generally.

To maintain the life expectancy the protective coatings do require maintenance, the cross bracings take impact damage from debris in the water i.e. timber logs etc. and will require monitoring because the impact removes corrosion, covering/protecting steel beneath and exposing fresh steel to corrosion. Do to continual tidal/swell movement, use by craft and the environmental conditions, stresses through loads change, bolts stretch and undo, environmental conditions including salt and pollution accelerate corrosion. To this degree we would recommend yearly structure surveys or max 2 yearly and ongoing maintenance checking, 6 monthly, particularly after winter and before. i.e. During out of service times.

We note that a lot of the works and just general maintenance has not been carried out and we would point out that the longer you leave it the more cost will be incurred as the corrosion escalates.