

North Yorkshire County Council
Scarborough & Whitby Constituency Committee – 3 December 2021
Whitby Swing Bridge - update

1.0 Purpose of the Report

- 1.1 To update members on maintenance issues regarding Whitby Swing Bridge.

2.0 History of the Bridge Maintenance

- 2.1 The Swing Bridge was built in 1909 mechanised in 1983 and from that time the revenue costs of maintenance and operation were shared between Scarborough Borough Council (SBC) and North Yorkshire County Council (NYCC) until the 1 February 2012.
- 2.2 An agreement between NYCC and SBC in 2012 placed the responsibility for the bridge maintenance with NYCC and responsibility for the staffing and operating of the bridge was with SBC. It was agreed that the daily maintenance of oiling, greasing and cleaning would be the responsibility of SBC.
- 2.3 NYCC at the time of signing the agreement invested £82,752 bringing the bridge operating system to a maintainable state and contracted with Fairfield Engineering to manage the maintenance and repair of the Bridge Systems and Hydraulics on an annual basis. Within the first three years of the new agreement the County Council had invested a total of £515,230 on improvements to the bridge.

3.0 Our Long Term Plan for the Bridge

- 3.1 Since NYCC became responsible for the maintenance of the bridge we have up rated the systems that operate the bridge and introduced remote monitoring of the systems that drive the bridge. Regular training has been provided for the SBC operators of the bridge to ensure the correct operation of the bridge and we have introduced regular servicing of the drive systems on the bridge, an annual service and an interim six monthly service which checks the various important service items.
- 3.2 We have improved the location of the sensors which operate the bridge over the past ten years and lifted those we could above the normal flood levels which has improved resilience and has coped with everything but an extreme tide which needed several sensors changing. In order to minimise delays for parts replacement we have a stock of items stored on the quay side so that spares are available for the engineers to fit. The bridge is still affected by extremely hot weather which we are currently investigating with a possible solution which avoids cutting off the ends of the bridge it give greater room of expansion of the two bridge leafs (the deck) which in extreme heat conditions bear on the road on to the bridge and prevent it operating.
- 3.3 Failures of the bridge operation have been reduced from twenty plus per year to approximately four per year since the arrangements set out in section 2.2 came into effect in 2012. However, it is likely that some of these closures have involved extremely high temperatures which prevented the bridge opening as described earlier.

- 3.4 The County Council is responsible for four mechanical bridges, including the bridge at Whitby. The Whitby Swing Bridge operates every day on two tides which is significantly more than any of the other three mechanical bridges we also maintain. In July the Bridge Manager attended a breakdown which was due to the failure of a limit switch on the East leaf of the bridge which indicated falsely that the leaf was closed and when the West leaf was closed it jammed at the centre of the bridge which left an open gap. After consulting the contractor, Fairfield we unjammed the bridge and manually closed the East leaf and that allowed the West leaf to close then the engineer arrived on site and replaced the faulty limit switch and bridge was tested and put back into use. The bridge was operational and checked within an hour of the arrival of the engineer. There was unfortunately disruption for the users for three hours while we unblocked the bridge leaves which had jammed. Fairfield's are currently looking into additional measures to ensure there is a secondary sensor or another way to ensure the bridge cannot be operated in this circumstance. There are numerous options and they are being evaluated before being implemented.
- 3.5 Failures of this type cannot be predicted as the limit switches are checked during the services which are carried out twice a year. The electronic sensors that we have introduced on the bridge can be remotely checked and if they are not operating correctly they can be swapped easily for a new one.
- 3.6 It should be remembered that this bridge operates in a very harsh environment and is open to the elements and the tidal river which is why we instigated the new maintenance regime of the annual service which covers the whole of the bridge and the six monthly service which checks the operating systems and fluid levels.

4.0 longer term issues

- 4.1 The bridge will need painting in ten years' time and the motors that drive the bridge leaves and the hydraulics will need overhauling in the next twenty years. Various sensors will have to be upgraded as they will become obsolete and unavailable but the market will have moved on and suitable replacements will be available.
- 4.2 The bridge structure with the current weight restriction will need work in the future to repair areas of corrosion in non-structural locations on the bridge but the main structure should be good for another 75 years. The current bridge is positioned in the best location for the shortest span across the river and it was built on the site of a fixed span footbridge on the downstream side of the current bridge. A new bridge in the current location would require a footbridge to be provided which was capable of opening to river traffic otherwise the removal of the existing bridge would lock the port and marina upstream of the swing bridge for a number of months. A new bridge for traffic in another location would be of a longer span and be more expensive.
- 4.3 On the morning of the 1 October 2021 an inspection by Fairfield's engineers and the Bridge Manager from NYCC into the operation of the East Leaf was carried out and it was found to be working properly in all respects and no repairs were necessary. Since carrying out this inspection we have called Fairfield's Engineers back to the site and they have checked the bridge staying in Whitby over night to carry out more test swings the next morning and the bridge performed correctly.
- 4.4 Appendix A details the call outs for issues which prevented the bridge operating for the last two years.

5.0 In Conclusion

- 5.1 The strategic importance of the swing bridge to Whitby is clear and this paper sets out the work that has been done to improve the resilience of the structure and to minimise the number of breakdowns and the length of time that there is disruption when it does unfortunately breakdown. However, like any complex mechanical system this bridge can fail in service and we have put arrangements in place that allows us to identify the failure quickly and resolve the matter as efficiently as possible. The bridge has many years of life left in it and the maintenance regime we have put in place ensures that the performance of the bridge is in our opinion good for a bridge operating in a difficult location open to a highly corrosive atmosphere and flooding and is in fact better than that of some of our other mechanical bridges which do not operate with the same intensity as this bridge does because of its importance to the economy of Whitby and the Port.


6.0 Recommendation

- 6.1 The contents of the report are noted.

Author: John Smith
Highways and Transportation
Business and Environmental Services
North Yorkshire County Council
05 November 2021

Schedule of maintenance as below since August last year.

Completion Date	Title
20/10/2021	Investigation into bridge getting stuck
18/10/2021	Investigation
26/08/2021	3 month service
10/08/2021	Steel walkway repairs
16/07/2021	Breakdown
07/05/2021	6 month service
08/03/2021	Redecking due to hanger failure
26/02/2021	3 month service
24/12/2020	West side - handrail repair
26/11/2020	6 month maintenance
28/08/2020	3 month service

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**Electrical & Mechanical Service
for
Whitby Swing Bridge Service Visit**

Customer:	North Yorkshire County Council		
Contact Details:	Phillip Richardson	Position:	Bridge Team Tel No. 07812 088745

Location of Works:	Whitby Swing Bridge, Bridge Street Whitby, YO22 4BG
Start Date:	
Duration:	Service Visits (Quarterly, 6 Monthly, Annually)


Revision	Date	Commercial Ref	Description of Amendment
A01	16/11/2021	NYCC4403	First Issue

Description of Works:
Fairfield Control Systems Ltd (FCS) will: <ul style="list-style-type: none"> • Routine Service Visits as per contract • Francis Corner to carry out Mechanical service works. • Harker Hydraulics to carry out Hydraulic service works.

The works carried out in accordance with the service contract schedule. (electrical)	
Signed:	<i>S.M.Hornsey</i>
Position Held	Service Engineer
For and On Behalf Of:	Fairfield Control Systems Ltd
Date:	

The works carried out in accordance with the service contract schedule. (mechanical)	
Signed:	
Position Held	
For and On Behalf Of:	Corner Engineering
Date:	

The works carried out in accordance with the service contract schedule. (hydraulic)	
Signed:	
Position Held	
For and On Behalf Of:	Harker Hydraulics
Date:	

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1. Electrical Inspection


Inspect the East & West Control Panels as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS	
West Leaf - Panel Inspection	Control Panel (exterior)	Push Buttons	Secure	Ok		
			Functional	Ok		
		Pilot Lights	Secure	Ok		
			Functional	Ok		
			Lamp Test	Ok		
		Key Switches	Secure	Ok		
			Functional	Ok		
		Enclosure	Secure	Ok		
			Clean	Ok		
		Control Panel (interior)	MCBs	Condition	Ok	
	Secure			Ok		
	Functional			Ok		
	Fuses		Condition	Ok		
			Secure	Ok		
			Functional	Ok		
	Relays		Condition	Ok		
			Secure	Ok		
			Functional	Ok		
	Terminations		Secure	Ok		
	Panel Heater		Secure	Ok		
			Functional	Ok		
	PLC		Healthy	Ok		
			Secure	Ok		
			Backed Up	Ok		
			Backup Battery	Ok		
	HMI		Healthy	Ok		
			Secure	Ok		
Backed Up			Ok			
Remote Dial in	Functional					

INSPECTION NOTES & RECOMMENDATIONS

PSU1 Voltages:
In - 236.1VAC
Out - 24.80VDC


PSU2 Voltages:
In - 236.8VAC
Out - 24.70VDC

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ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
East Leaf - Panel Inspection	Control Panel (exterior)	Push Buttons	Secure	Ok	
			Functional	Ok	
		Pilot Lights	Secure	Ok	
			Functional	Ok	
			Lamp Test	Ok	
		Key Switches	Secure	Ok	
			Functional	Ok	
		Enclosure	Secure	Ok	
			Clean	Ok	
		Control Panel (interior)	MCBs	Condition	Ok
	Secure			Ok	
	Functional			Ok	
	Fuses		Condition	Ok	
			Secure	Ok	
			Functional	Ok	
	Relays		Condition	Ok	
			Secure	Ok	
			Functional	Ok	
	Terminations		Secure	Ok	
	Panel Heater		Secure	Ok	
			Functional	Ok	
	PLC		Healthy	Ok	
			Secure	Ok	
			Backed Up	Ok	
			Backup Battery	Ok	
	HMI		Healthy	Ok	
			Secure	Ok	
			Backed Up	Ok	
	Remote Dial in		Functional		

INSPECTION NOTES & RECOMMENDATIONS


PSU Voltages:
 In – 238.8VAC
 Out – 24.14VDC

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2. Support & Locking Systems


Inspect the East & West Support & Locking Systems as per checks below:

ITEM	LOCATION		DETAIL	WKG	FTY	COMMENTS	
West Leaf - Support & Locking System	Tail End Junction Box	Enclosure	Secure	Ok			
			Clean	Ok			
		Terminations	Secure	Ok			
	North West Jack/Wedge Assembly (seaside)	Jack Down Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		Jack Up Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		Wedge in Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		Wedge Out Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		South West Jack/Wedge Assembly (land side)	Jack Down Proximity Switch	Secure	Ok		
				Adjustment	Ok		
				Clean	Ok		
				Functional	Ok		
			Jack Up Proximity Switch	Secure	Ok		
				Adjustment	Ok		
				Clean	Ok		
				Functional	Ok		
	Wedge in Proximity Switch		Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
	Wedge Out Proximity Switch		Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
	Tail Pin Assembly	Tail Pin-in Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		Tail Pin-Out Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
				Secure	Ok		


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	Nose Bolt Assembly	North West Nose Pin Assembly (seaside)	Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		South West Nose Pin Assembly (land side)	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		


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ITEM	LOCATION		DETAIL	WKG	FTY	COMMENTS
East Leaf - Support & Locking System	Tail End Junction Box	Enclosure	Secure	Ok		
			Clean	Ok		
		Terminations	Secure	Ok		
	North East Jack/Wedge Assembly (seaside)	Jack Down Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Jack Up Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Wedge in Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Wedge Out Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
	Functional		Ok			
	North West Jack/Wedge Assembly (land side)	Jack Down Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Jack Up Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Wedge in Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
	Wedge Out Proximity Switch	Secure	Ok			
Adjustment		Ok				
Clean		Ok				
Functional		Ok				
Tail Pin Assembly	Tail Pin-in Proximity Switch	Secure	Ok			
		Adjustment	Ok			
		Clean	Ok			
		Functional	Ok			
	Tail Pin-Out Proximity Switch	Secure	Ok			
		Adjustment	Ok			
		Clean	Ok			
		Functional	Ok			

 Fairfield control systems	Electrical & Mechanical Service	Revision: A01
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3. Positional Sensors

Inspect the East & West Position Sensors Systems as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
West Leaf – Positional Sensors	Centre Pier	Enclosure	Secure	Ok	
			Clean	Ok	
		Terminations	Secure	Ok	
		Bridge Close Slow Down Proximity Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
		Bridge Closed Limit Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
		Bridge Open Slow Down Proximity Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
		Bridge Closed Limit Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
		Bridge Overtravel Limit Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
		Slew Count Proximity Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	

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ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
East Leaf – Positional Sensors	Centre Pier	Enclosure	Secure	Ok	
			Clean	Ok	
		Terminations	Secure	Ok	
			Secure	Ok	
		Bridge Close Slow Down Proximity Switch	Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
			Secure	Ok	
		Bridge Closed Limit Switch	Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
			Secure	Ok	
		Bridge Open Slow Down Proximity Switch	Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
			Secure	Ok	
		Bridge Closed Limit Switch	Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
			Secure	Ok	
		Bridge Overtravel Limit Switch	Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
			Secure	Ok	
		Slew Count Proximity Switch	Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
			Secure	Ok	

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4. Backup Generators

Inspect the East & West Generators as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
West Leaf – Generator	Enclosure	Secure	Ok		
		Clean	Ok		
	Terminations	Secure	Ok		
	Generator	Leaks	Ok		
		Overheating	Ok		
		Filters	Ok		
		Fuel Level	Ok		
		Functional	Ok		
	Batteries	Ok			

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
East Leaf – Generator	Enclosure	Secure	Ok		
		Clean	Ok		
	Terminations	Secure	Ok		
	Generator	Leaks	Ok		
		Overheating	Ok		
		Filters	Ok		
		Fuel Level	Ok		
		Functional	Ok		
	Batteries	Ok			

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5. Hydraulic Power Packs

Inspect the East & West Hydraulic Power Packs as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
West Leaf – HPU	West Plant Room	Enclosure	Secure	Ok	
			Clean	Ok	
		Terminations	Secure	Ok	
		Solenoid Valves	Secure	Ok	
			Connections	Ok	
		Level Switches	Secure	Ok	
			Connections	Ok	
		Thermostat & Oil Heater	Secure	Ok	
			Operational	Ok	

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
East Leaf – HPU	East Plant Room	Enclosure	Secure	Ok	
			Clean	Ok	
		Terminations	Secure	Ok	
		Solenoid Valves	Secure	Ok	
			Connections	Ok	
		Level Switches	Secure	Ok	
			Connections	Ok	
		Thermostat & Oil Heater	Secure	Ok	
			Operational	Ok	


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<p>East Leaf oil leak, filter loose. Tightened and retested. Ok.</p> <p>Mechanical inspections conducted by Francis Corner Engineering and Harker Hydraulic</p>

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6. Mechanical Inspections

Mechanically inspect East & West as per checks below:


ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
West Leaf – Mechanical Inspections	Under Bridge	Tail Pin	Secure	Ok	
			Clean	Ok	
			Greased	Ok	
			Functional	Ok	
			Leaks	Ok	
		North West Jack	Secure	Ok	
			Clean	Ok	
			Greased	Ok	
			Functional	Ok	
			Leaks	Ok	
		North West Wedge	Secure	Ok	
			Clean	Ok	
			Greased	Ok	
			Functional	Ok	
			Leaks	Ok	
		South West Jack	Secure	Ok	
			Clean	Ok	
			Greased	Ok	
			Functional	Ok	
			Leaks	Ok	
	South West Wedge	Secure	Ok		
		Clean	Ok		
		Greased	Ok		
		Functional	Ok		
		Leaks	Ok		
	West Pier	Rotation Gearbox	Secure	Ok	
			Oil Level	Ok	
		Ring Gear	Tight	Ok	
			Clean	Ok	
			Free of Debris	Ok	
			Greased	Ok	
		Rotation Wheels (inner & outer)	Secure	Ok	
			Rotate Freely	Ok	
			Greased	Ok	
			Free of Debris	Ok	
			Drain Channels	Ok	
		Fixings	Secure	Ok	
		Buffer	Secure	Ok	
			Functional	Ok	
			Free of Debris	Ok	
Pintle Bearings		Secure	Ok		
		Clean	Ok		
		Greased	Ok		
		Condition	Ok		

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	Bridge Structure	Fixings	Condition	Ok			
			Cracks	Ok			
			Lose Bolts	Ok			
	Bridge Deck	Stonework	Clamping Bands Secure	Ok			
				North West Nose Bolts	Secure	Ok	
		Clean	Ok				
		Greased	Ok				
		Functional	Ok				
		Leaks	Ok				
		North West Nose Bolts	Secure	Ok			
			Clean	Ok			
			Greased	Ok			
			Functional	Ok			
			Leaks	Ok			
		Access Gates	Secure	Ok			
			Functional	Ok			

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ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
East Leaf – Mechanical Inspections	Under Bridge	Tail Pin	Secure	Ok	
			Clean	Ok	
			Greased	Ok	
			Functional	Ok	
			Leaks	Ok	
		North East Jack	Secure	Ok	
			Clean	Ok	
			Greased	Ok	
			Functional	Ok	
			Leaks	Ok	
		North East Wedge	Secure	Ok	
			Clean	Ok	
			Greased	Ok	
			Functional	Ok	
			Leaks	Ok	
		South East Jack	Secure	Ok	
			Clean	Ok	
			Greased	Ok	
			Functional	Ok	
			Leaks	Ok	
	South East Wedge	Secure	Ok		
		Clean	Ok		
		Greased	Ok		
		Functional	Ok		
		Leaks	Ok		
	East Pier	Rotation Gearbox	Secure	Ok	
			Oil Level	Ok	
		Ring Gear	Tight	Ok	
			Clean	Ok	
			Free of Debris	Ok	
			Greased	Ok	
		Rotation Wheels (inner & outer)	Secure	Ok	
			Rotate Freely	Ok	
			Greased	Ok	
			Free of Debris	Ok	
			Drain Channels	Ok	
		Fixings	Secure	Ok	
		Buffer	Secure	Ok	
			Functional	Ok	
			Free of Debris	Ok	
Pintle Bearings		Secure	Ok		
		Clean	Ok		
		Greased	Ok		
		Condition	Ok		
Bridge Structure		Fixings	Condition	Ok	
	Cracks		Ok		
	Lose Bolts		Ok		
	Stonework	Clamping Bands Secure	Ok		

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		Access Gates	Secure	Ok		
			Functional	Ok		

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Mechanical inspections conducted by Francis Corner Engineering and Harker Hydraulic

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7. Hydraulic Inspections

Hydraulically inspect East & West as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS	
West Leaf – Hydraulic Inspections	Under Bridge	HPU	Oil Level (top up if required)	Ok		
			Oil Temp (min 10DegC)	Ok		
		Pressure Line Filters	Secure	Ok		
			Clean (change if necessary)	Ok		
			Pressure Level	Ok		
			Replace Filter (12m only)	N/A		
		Return Line Filters	Secure	Ok		
			Clean (change if necessary)	Ok		
			Pressure Level	Ok		
			Replace Filters (12m only)	N/A		
		Vibrations	Non excessive	Ok		
		Noise Levels	Non excessive	Ok		
		Solid Pipe Works	Secure	Ok		
			Tight	Ok		
			No Leaks	Ok		
		Flexible Hoses	Secure	Ok		
			Tight	Ok		
			No Leaks	Ok		
			Functional	Ok		
		Oil Sample	Oil Sample Required (12m only)	N/A		Max Dirt ISO DIS 4406 18/14 Water Content: -0.01%max

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ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS		
East Leaf – Hydraulic Inspections	Under Bridge	HPU	Oil Level (top up if required)	Ok			
			Oil Temp (min 10DegC)	Ok			
		Pressure Line Filters	Secure	Ok			
			Clean (change if necessary)	Ok			
			Pressure Level	Ok			
			Replace Filter (12m only)	N/A			
		Return Line Filters	Secure	Ok			
			Clean (change if necessary)	Ok			
			Pressure Level	Ok			
			Replace Filters (12m only)	N/A			
		Vibrations	Non excessive	Ok			
		Noise Levels	Non excessive	Ok			
		Solid Pipe Works	Secure	Ok			
			Tight	Ok			
			No Leaks	Ok			
		Flexible Hoses	Secure	Ok			
			Tight	Ok			
			No Leaks	Ok			
			Functional	Ok			
		Oil Sample	Oil Sample Required (12m only)	N/A			Max Dirt ISO DIS 4406 18/14 Water Content: -0.01%max

INSPECTION NOTES & RECOMMENDATIONS

Mechanical inspections conducted by Francis Corner Engineering and Harker Hydraulic

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Electrical & Mechanical Service for Whitby Swing Bridge Service Visit

Customer:	North Yorkshire County Council		
Contact Details:	Phillip Richardson	Position:	Bridge Team Tel No. 07812 088745

Location of Works:	Whitby Swing Bridge, Bridge Street Whitby, YO22 4BG
Start Date:	
Duration:	Service Visits (Quarterly, 6 Monthly, Annually)


Revision	Date	Commercial Ref	Description of Amendment
A01	16/11/2021	NYCC4403	First Issue

Description of Works:
Fairfield Control Systems Ltd (FCS) will: <ul style="list-style-type: none"> • Routine Service Visits as per contract • Francis Corner to carry out Mechanical service works. • Harker Hydraulics to carry out Hydraulic service works.

The works carried out in accordance with the service contract schedule. (electrical)	
Signed:	<i>S.M.Hornsey</i>
Position Held	Service Engineer
For and On Behalf Of:	Fairfield Control Systems Ltd
Date:	26/08/2021

The works carried out in accordance with the service contract schedule. (mechanical)	
Signed:	<i>F Corner</i>
Position Held	Mechanical Engineer
For and On Behalf Of:	Corner Engineering
Date:	26/08/2021

The works carried out in accordance with the service contract schedule. (hydraulic)	
Signed:	<i>J Harker</i>
Position Held	Hydraulic Engineer
For and On Behalf Of:	Harker Hydraulics
Date:	26/08/2021

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1. Electrical Inspection


Inspect the East & West Control Panels as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS	
West Leaf - Panel Inspection	Control Panel (exterior)	Push Buttons	Secure	Ok		
			Functional	Ok		
		Pilot Lights	Secure	Ok		
			Functional	Ok		
			Lamp Test	Ok		
		Key Switches	Secure	Ok		
			Functional	Ok		
		Enclosure	Secure	Ok		
			Clean	Ok		
		Control Panel (interior)	MCBs	Condition	Ok	
	Secure			Ok		
	Functional			Ok		
	Fuses		Condition	Ok		
			Secure	Ok		
			Functional	Ok		
	Relays		Condition	Ok		
			Secure	Ok		
			Functional	Ok		
	Terminations		Secure	Ok		
	Panel Heater		Secure	Ok		
			Functional	Ok		
	PLC		Healthy	Ok		
			Secure	Ok		
			Backed Up	Ok		
Backup Battery			Ok			
HMI	Healthy		Ok			
	Secure		Ok			
	Backed Up	Ok				
Remote Dial in	Functional	OK				

INSPECTION NOTES & RECOMMENDATIONS

PSU1 Voltages:
In - 236.1VAC
Out - 24.80VDC


PSU2 Voltages:
In - 236.8VAC
Out - 24.70VDC

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ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
East Leaf - Panel Inspection	Control Panel (exterior)	Push Buttons	Secure	Ok	
			Functional	Ok	
		Pilot Lights	Secure	Ok	
			Functional	Ok	
			Lamp Test	Ok	
		Key Switches	Secure	Ok	
			Functional	Ok	
		Enclosure	Secure	Ok	
			Clean	Ok	
		Control Panel (interior)	MCBs	Condition	Ok
	Secure			Ok	
	Functional			Ok	
	Fuses		Condition	Ok	
			Secure	Ok	
			Functional	Ok	
	Relays		Condition	Ok	
			Secure	Ok	
			Functional	Ok	
	Terminations		Secure	Ok	
	Panel Heater		Secure	Ok	
			Functional	Ok	
	PLC		Healthy	Ok	
			Secure	Ok	
			Backed Up	Ok	
			Backup Battery	Ok	
	HMI		Healthy	Ok	
			Secure	Ok	
			Backed Up	Ok	
	Remote Dial in		Functional		

INSPECTION NOTES & RECOMMENDATIONS


PSU Voltages:
 In – 238.8VAC
 Out – 24.14VDC

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2. Support & Locking Systems


Inspect the East & West Support & Locking Systems as per checks below:

ITEM	LOCATION		DETAIL	WKG	FTY	COMMENTS	
West Leaf - Support & Locking System	Tail End Junction Box	Enclosure	Secure	Ok			
			Clean	Ok			
		Terminations	Secure	Ok			
	North West Jack/Wedge Assembly (seaside)	Jack Down Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		Jack Up Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		Wedge in Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		Wedge Out Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		South West Jack/Wedge Assembly (land side)	Jack Down Proximity Switch	Secure	Ok		
				Adjustment	Ok		
				Clean	Ok		
				Functional	Ok		
			Jack Up Proximity Switch	Secure	Ok		
				Adjustment	Ok		
				Clean	Ok		
				Functional	Ok		
	Wedge in Proximity Switch		Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
	Wedge Out Proximity Switch		Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
	Tail Pin Assembly	Tail Pin-in Proximity Switch	Secure	Ok			
			Adjustment	Ok			
			Clean	Ok			
			Functional	Ok			
		Tail Pin-Out Proximity Switch	Secure	Ok			
Adjustment			Ok				
Clean			Ok				
Functional			Ok				
			Secure	Ok			


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	Nose Bolt Assembly	North West Nose Pin Assembly (seaside)	Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		South West Nose Pin Assembly (land side)	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		


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ITEM	LOCATION		DETAIL	WKG	FTY	COMMENTS
East Leaf - Support & Locking System	Tail End Junction Box	Enclosure	Secure	Ok		
			Clean	Ok		
		Terminations	Secure	Ok		
	North East Jack/Wedge Assembly (seaside)	Jack Down Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Jack Up Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Wedge in Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Wedge Out Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
	North West Jack/Wedge Assembly (land side)	Jack Down Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Jack Up Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Wedge in Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Wedge Out Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
	Tail Pin Assembly	Tail Pin-in Proximity Switch	Secure	Ok		
Adjustment			Ok			
Clean			Ok			
Functional			Ok			
Tail Pin-Out Proximity Switch		Secure	Ok			
		Adjustment	Ok			
		Clean	Ok			
		Functional	Ok			

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3. Positional Sensors

Inspect the East & West Position Sensors Systems as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS	
West Leaf – Positional Sensors	Centre Pier	Enclosure	Secure	Ok		
			Clean	Ok		
		Terminations	Secure	Ok		
		Bridge Close Slow Down Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
			Functional	Ok		
		Bridge Closed Limit Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
		Bridge Open Slow Down Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
		Bridge Closed Limit Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
		Bridge Overtravel Limit Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
		Slew Count Proximity Switch	Secure	Ok		
			Adjustment	Ok		
			Clean	Ok		
				Functional	Ok	

INSPECTION NOTES & RECOMMENDATIONS


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ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
East Leaf – Positional Sensors	Centre Pier	Enclosure	Secure	Ok	
			Clean	Ok	
		Terminations	Secure	Ok	
		Bridge Close Slow Down Proximity Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
		Bridge Closed Limit Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
		Bridge Open Slow Down Proximity Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
		Bridge Closed Limit Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
		Bridge Overtravel Limit Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	
		Slew Count Proximity Switch	Secure	Ok	
			Adjustment	Ok	
			Clean	Ok	
			Functional	Ok	

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4. Backup Generators

Inspect the East & West Generators as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
West Leaf – Generator	Enclosure	Secure	Ok		
		Clean	Ok		
	Terminations	Secure	Ok		
	Generator	Leaks	Ok		
		Overheating	Ok		
		Filters	Ok		
		Fuel Level	Ok		
		Functional	Ok		
	Batteries	Ok			

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
East Leaf – Generator	Enclosure	Secure	Ok		
		Clean	Ok		
	Terminations	Secure	Ok		
	Generator	Leaks	Ok		
		Overheating	Ok		
		Filters	Ok		
		Fuel Level	Ok		
		Functional	Ok		
	Batteries	Ok			

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5. Hydraulic Power Packs

Inspect the East & West Hydraulic Power Packs as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
West Leaf – HPU	West Plant Room	Enclosure	Secure	Ok	
			Clean	Ok	
		Terminations	Secure	Ok	
		Solenoid Valves	Secure	Ok	
			Connections	Ok	
		Level Switches	Secure	Ok	
			Connections	Ok	
		Thermostat & Oil Heater	Secure	Ok	
			Operational	Ok	

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
East Leaf – HPU	East Plant Room	Enclosure	Secure	Ok	
			Clean	Ok	
		Terminations	Secure	Ok	
		Solenoid Valves	Secure	Ok	
			Connections	Ok	
		Level Switches	Secure	Ok	
			Connections	Ok	
		Thermostat & Oil Heater	Secure	Ok	
			Operational	Ok	


INSPECTION NOTES & RECOMMENDATIONS
<p>East Leaf oil leak, filter loose. Tightened and retested. Ok.</p> <p>Mechanical inspections conducted by Francis Corner Engineering and Harker Hydraulic</p>

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6. Mechanical Inspections

Mechanically inspect East & West as per checks below:


ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS
West Leaf – Mechanical Inspections	Under Bridge	Tail Pin	Secure	OK	
			Clean	OK	
			Greased	OK	
			Functional	OK	
			Leaks	OK	
		North West Jack	Secure	OK	
			Clean	OK	
			Greased	OK	
			Functional	OK	
			Leaks	OK	
		North West Wedge	Secure	OK	
			Clean	OK	
			Greased	OK	
			Functional	OK	
			Leaks	OK	
		South West Jack	Secure	OK	
			Clean	OK	
			Greased	OK	
			Functional	OK	
			Leaks	OK	
	South West Wedge	Secure	OK		
		Clean	OK		
		Greased	OK		
		Functional	OK		
		Leaks	OK		
	West Pier	Rotation Gearbox	Secure	OK	
			Oil Level	OK	
		Ring Gear	Tight	OK	
			Clean	OK	
			Free of Debris	OK	
			Greased	OK	
		Rotation Wheels (inner & outer)	Secure	OK	
			Rotate Freely	OK	
			Greased	OK	
			Free of Debris	OK	
			Drain Channels	OK	
		Fixings	Secure	OK	
		Buffer	Secure	OK	
			Functional	OK	
			Free of Debris	OK	
Pintle Bearings		Secure	OK		
		Clean	OK		
		Greased	OK		
		Condition	OK		

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	Bridge Structure	Fixings	Condition	OK		
			Cracks	OK		
			Lose Bolts	OK		
	Bridge Deck	Stonework	Clamping Bands Secure	OK		
				North West Nose Bolts	Secure	OK
		Clean	OK			
		Greased	OK			
		Functional	OK			
		Leaks	OK			
		North West Nose Bolts	Secure	OK		
			Clean	OK		
			Greased	OK		
			Functional	OK		
			Leaks	OK		
		Access Gates	Secure	OK		
			Functional	OK		

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ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS		
East Leaf – Mechanical Inspections	Under Bridge	Tail Pin	Secure	OK			
			Clean	OK			
			Greased	OK			
			Functional	OK			
			Leaks	OK			
		North East Jack	Secure	OK			
			Clean	OK			
			Greased		X		Grease Line Damaged – Replacement Required
			Functional	OK			
			Leaks	OK			
		North East Wedge	Secure	OK			
			Clean	OK			
			Greased	OK			
			Functional	OK			
			Leaks	OK			
		South East Jack	Secure	OK			
			Clean	OK			
			Greased	OK			
			Functional	OK			
			Leaks	OK			
	South East Wedge	Secure	OK				
		Clean	OK				
		Greased	OK				
		Functional	OK				
		Leaks	OK				
	East Pier	Rotation Gearbox	Secure	OK			
			Oil Level	OK			
		Ring Gear	Tight	OK			
			Clean	OK			
			Free of Debris	OK			
			Greased	OK			
		Rotation Wheels (inner & outer)	Secure	OK			
			Rotate Freely	OK			
			Greased	OK			
			Free of Debris	OK			
			Drain Channels	OK			
		Fixings	Secure	OK			
		Buffer	Secure	OK			
			Functional	OK			
			Free of Debris	OK			
		Pintle Bearings	Secure	OK			
			Clean	OK			
			Greased	OK			
			Condition	OK			
		Bridge Structure	Fixings	Condition	OK		
	Cracks			OK			
	Lose Bolts			OK			

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		Stonework	Clamping Bands Secure	OK		
		Access Gates	Secure	OK		
			Functional	OK		

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Mechanical inspections conducted by Francis Corner Engineering and Harker Hydraulic

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7. Hydraulic Inspections

Hydraulically inspect East & West as per checks below:

ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS	
West Leaf – Hydraulic Inspections	Under Bridge	HPU	Oil Level (top up if required)	OK		
			Oil Temp (min 10DegC)	OK		
		Pressure Line Filters	Secure	OK		
			Clean (change if necessary)	OK		
			Pressure Level	OK		
			Replace Filter (12m only)	N/A		
		Return Line Filters	Secure	OK		
			Clean (change if necessary)	OK		
			Pressure Level	OK		
			Replace Filters (12m only)	N/A		
		Vibrations	Non excessive	OK		
		Noise Levels	Non excessive	OK		
		Solid Pipe Works	Secure	OK		
			Tight	OK		
			No Leaks	OK		
		Flexible Hoses	Secure	OK		
			Tight	OK		
			No Leaks	OK		
			Functional	OK		
		Oil Sample	Oil Sample Required (12m only)	N/A		

INSPECTION NOTES & RECOMMENDATIONS

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ITEM	LOCATION	DETAIL	WKG	FTY	COMMENTS		
East Leaf – Hydraulic Inspections	Under Bridge	HPU	Oil Level (top up if required)	OK			
			Oil Temp (min 10DegC)	OK			
		Pressure Line Filters	Secure	OK			
			Clean (change if necessary)	OK			
			Pressure Level	OK			
			Replace Filter (12m only)	N/A			
		Return Line Filters	Secure	OK			
			Clean (change if necessary)	OK			
			Pressure Level	OK			
			Replace Filters (12m only)	N/A			
		Vibrations	Non excessive	OK			
		Noise Levels	Non excessive	OK			
		Solid Pipe Works	Secure	OK			
			Tight	OK			
			No Leaks	OK			
		Flexible Hoses	Secure	OK			
			Tight	OK			
			No Leaks	OK			
			Functional	OK			
		Oil Sample	Oil Sample Required (12m only)	N/A			Max Dirt ISO DIS 4406 18/14 Water Content: -0.01%max

INSPECTION NOTES & RECOMMENDATIONS

Mechanical inspections conducted by Francis Corner Engineering and Harker Hydraulic