

Appendix C – Technical reports on the condition of existing Windsor Bridge



U/W Bridge Inspection

Contract 10.2535.0889

**B 415 Windsor Bridge
Follow-up Inspection
15.6.2011**

COMPANY DIRECTORS

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Commercial Diving Solutions Pty Ltd
ABN 60 091 624 805

RTA Contract No. 10.2535.0889
B 415 Windsor Bridge

Date: 20.6.2011

RTA Parramatta
Attn: Peter Ton

B 415 Windsor Bridge over Hawkesbury River, Follow-up inspection

In accordance with your requirements and email from 10.6.2011, Commercial Diving Solutions Pty Ltd (CDS P/L) carried out the required follow-up inspection, re-documentation (photos) and fixing of glass slides in 12 locations on the 15.6.2011.

When comparing data and photos from the original inspection (9.4. to 20.4.2011) to this data set which was obtained after the Load Testing of the Bridge, carried out by RTA on the night from 8.6. to 9.6.2011, no evidence appears to be present that the horizontal cracks in piles P5p1, P5p2 and P6p2 have changed, widened or shifted. The same appears to be the case for the small vertical crack in P5p1.

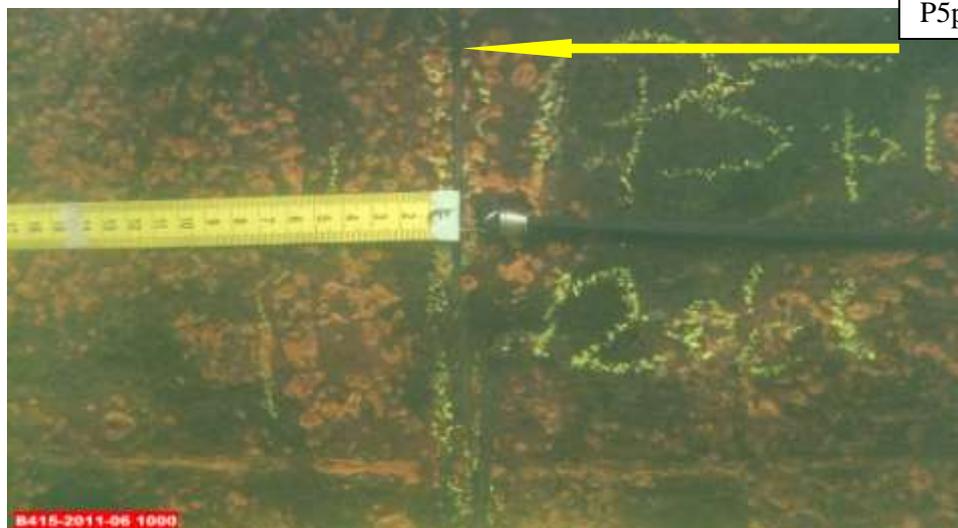
CDS was also engaged to fix a series of 12 glass plates to 4 locations over the cracks on these 3 piles. The 12x glass plates/slides (75mmx20mmx1mm) were attached over the cracks with 2part epoxy in the documented locations.

Graphite for the required areas was removed to a depth of about 10 to 15mm and epoxy balls that embedded the slides above and below the cracks were used to fix the glass plates.

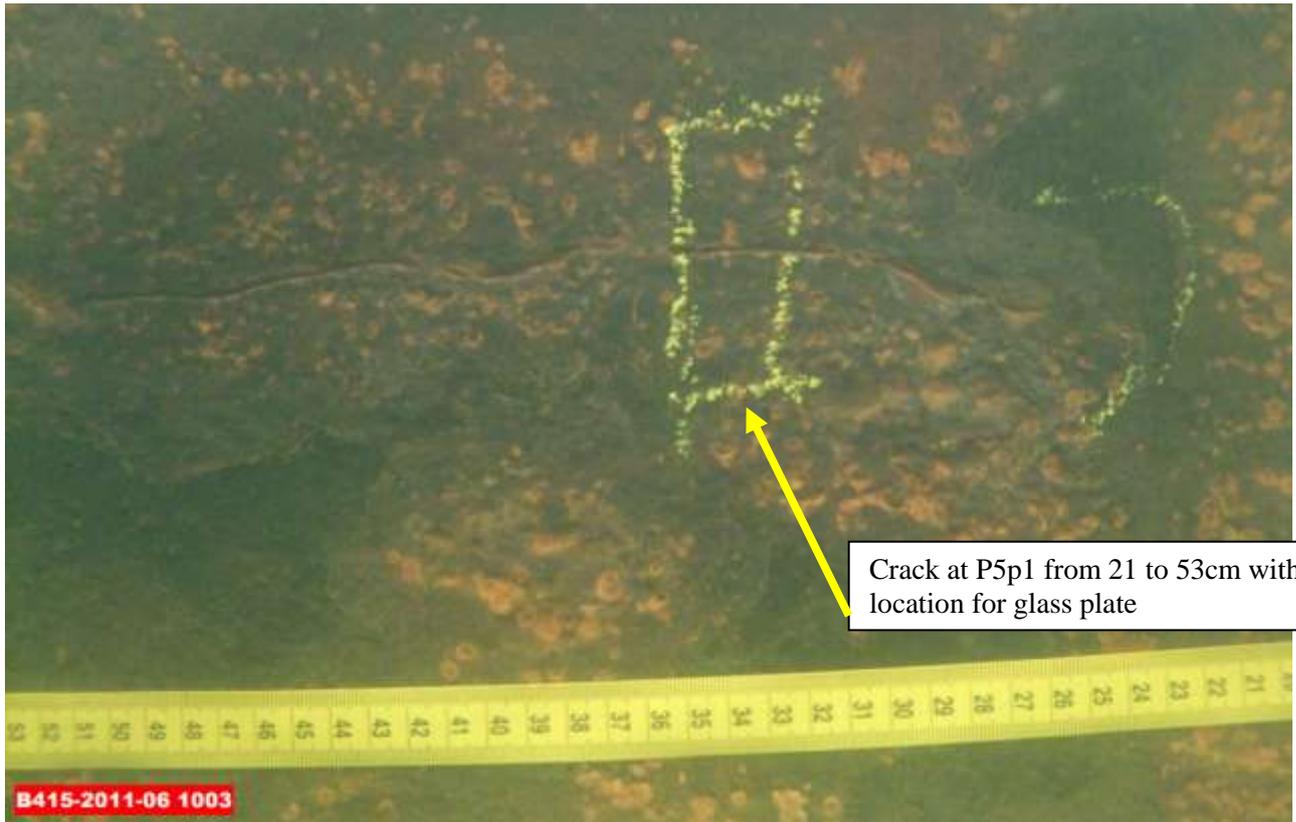
For ease of reference, a continuous yellow tape measure was fixed near each of the cracks in clockwise direction with reference 0.00m starting at the upstream, 12o'clock mark at each of the 3 locations. To aid in reproducibility, a vertical grind mark approximately 1mm wide and 200mm long was ground into each of the 3x 12o'clock locations at P5p1, P5p2 and P6p2. These marks can be clearly seen in the photos and should be relocatable in future.

All Photos, in sequential order for each crack location, are contained in the folder "B415 Windsor Bridge Follow-up Inspection 15.6.2011" in the Subfolders "P5p1 insp2"(photos 1000 to 1035), "P5p2 insp2"(photos 1036 to 1074) and "P6p2 insp2"(photos 1075 to 1101).

Some sample photos are set out below:



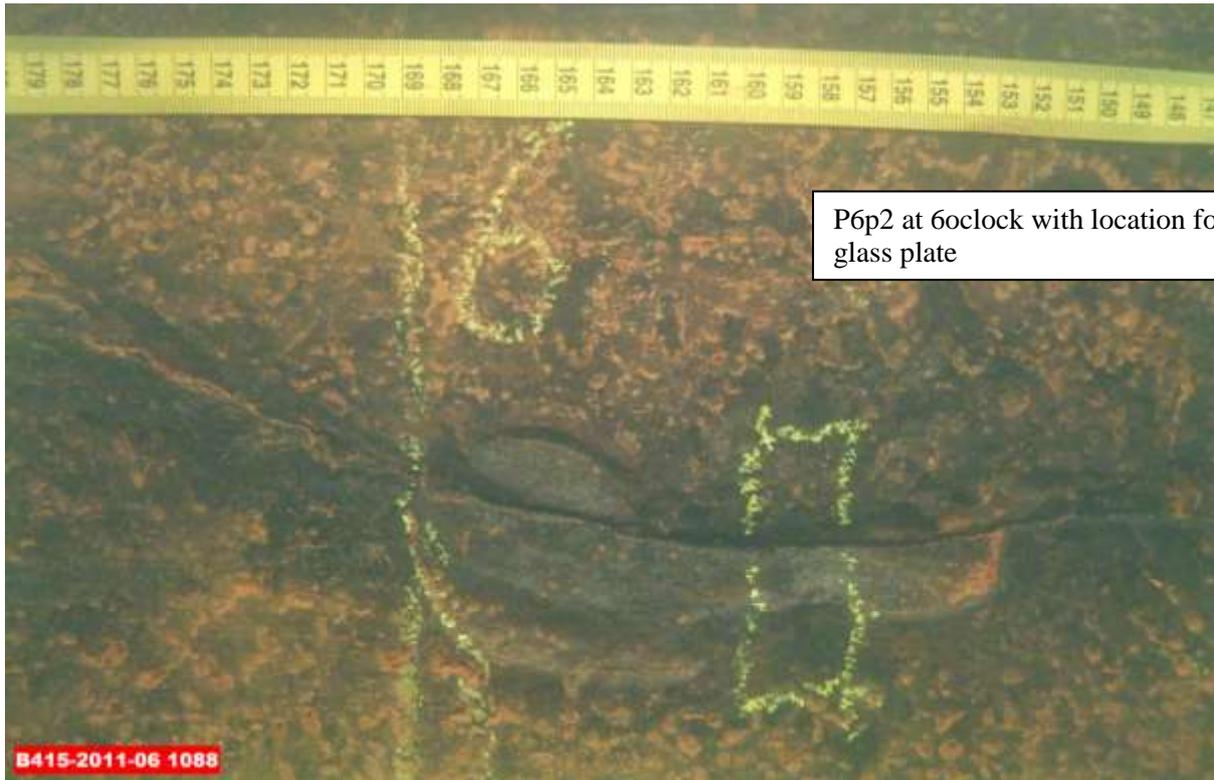
Start of reference tape measure, here P5p2, 12o'clock with reference grind



Crack at P5p1 from 21 to 53cm with location for glass plate



Glass plate on P5p1 at above location



P6p2 at 6oclock with location for glass plate



P6p2 with glass plate installed near 6o'clock



We trust the inspection has been completed to your requirements.
Please contact us if you require further clarification.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Martin Woschitzka'.

Martin Woschitzka
Director
COMMERCIAL DIVING SOLUTIONS PTY LTD

ATT:

- 2x DVDs with electronic reports and Photo file "B415 Windsor Bridge Follow-up Inspection 15.6.2011"



Commercial Diving Solutions Pty Ltd

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U/W Bridge Inspection

Contract 10.2535.0889

B 415 Windsor Bridge

9.5.2011 to 20.5.2011

COMPANY DIRECTORS

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Commercial Diving Solutions Pty Ltd
ABN 60 091 624 805

RTA Contract No. 10.2535.0889
B 415 Windsor Bridge

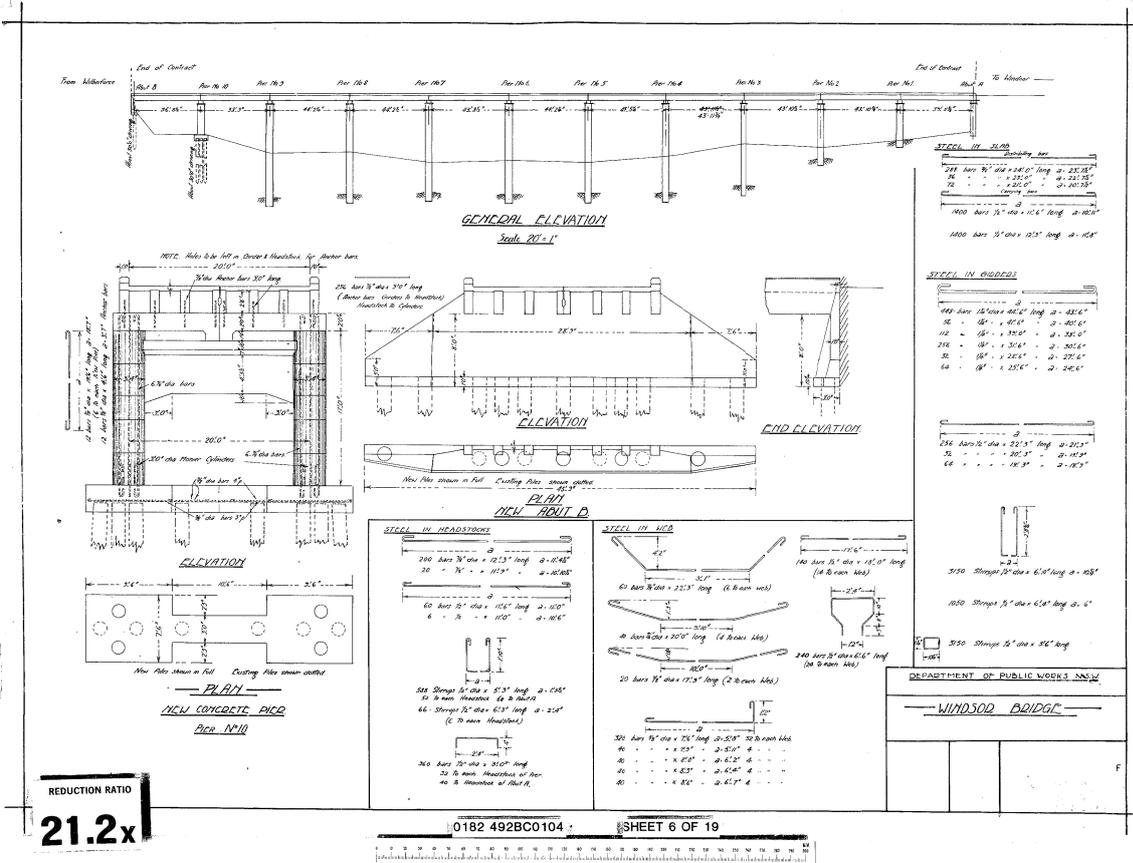
Date: 2.6.2011

RTA Parramatta
Attn: Peter Ton

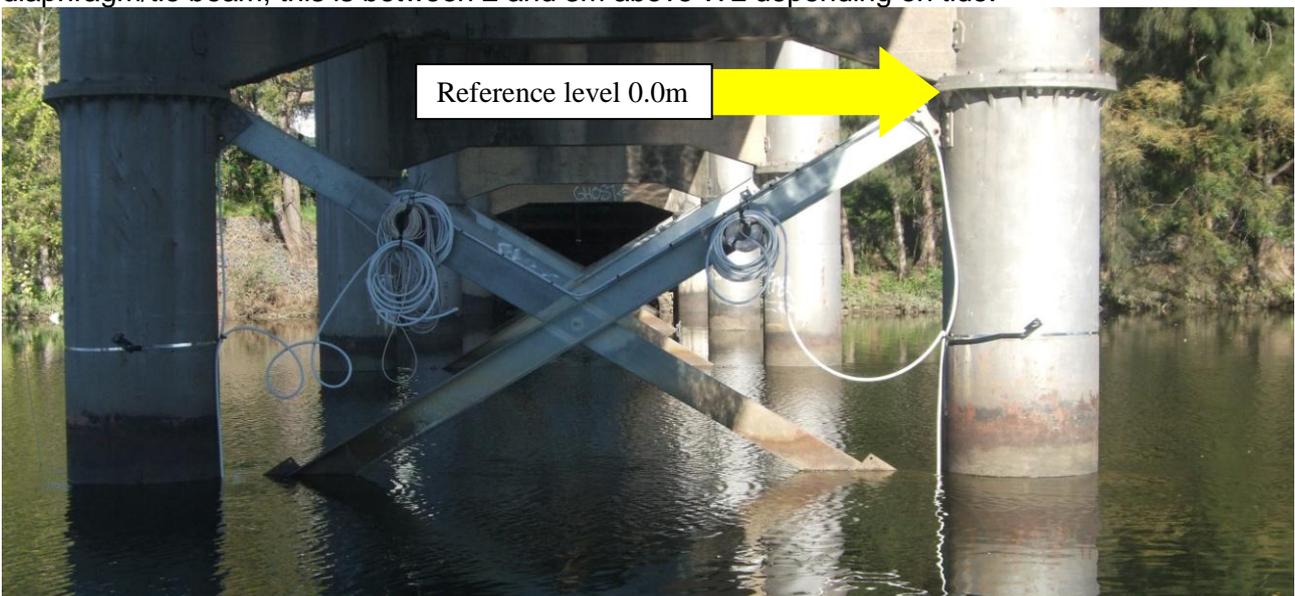
B 415 Windsor Bridge over Hawkesbury River

In accordance with the requirements of contract 10.2535.0889, Underwater Bridge Inspections within Hunter region, Commercial Diving Solutions Pty Ltd (CDS P/L) carried out the required underwater element cleaning and inspection works including condition rating for the underwater portions of elements on Piers 2 to 9. (Piers 1 and 10 were not immersed or in water too shallow for diving inspection at time of inspection). Works commenced 9.5.2011 and were completed 20.5.2011. A total of 89 working hours (11 days) with a 4MDT were spent to complete the required inspection works on this bridge which included also Principal ordered additional work of drilling and recovery of 17 cores and fitting of 4 underwater sets of metal braces with attached monitoring sensors and wiring.





As directed, the piles for cleaning and inspection on piers 2 to 9 were numbered 1(US) and 2(DS) for each pier, ie Pier 5 pile 2 would be "P5p2". Reference for all measurements is from bottom edge of Caisson Flange directly below concrete diaphragm/tie beam, this is between 2 and 3m above WL depending on tide.



The piles of this bridge are approx. 1.08m diameter cast iron caissons (measured circumference of 3.37m) that are mass(concrete?) filled. Each pile consists of several approx. 1.84m high segments which are bolted together by internal caisson flanges(as per core recovered from segment join) and has a height adjusted last segment at it's top that is finished with an external flange, just below the concrete diaphragm.

Note that bottom edge of this flange forms the RL of depth and other location measurements in this report

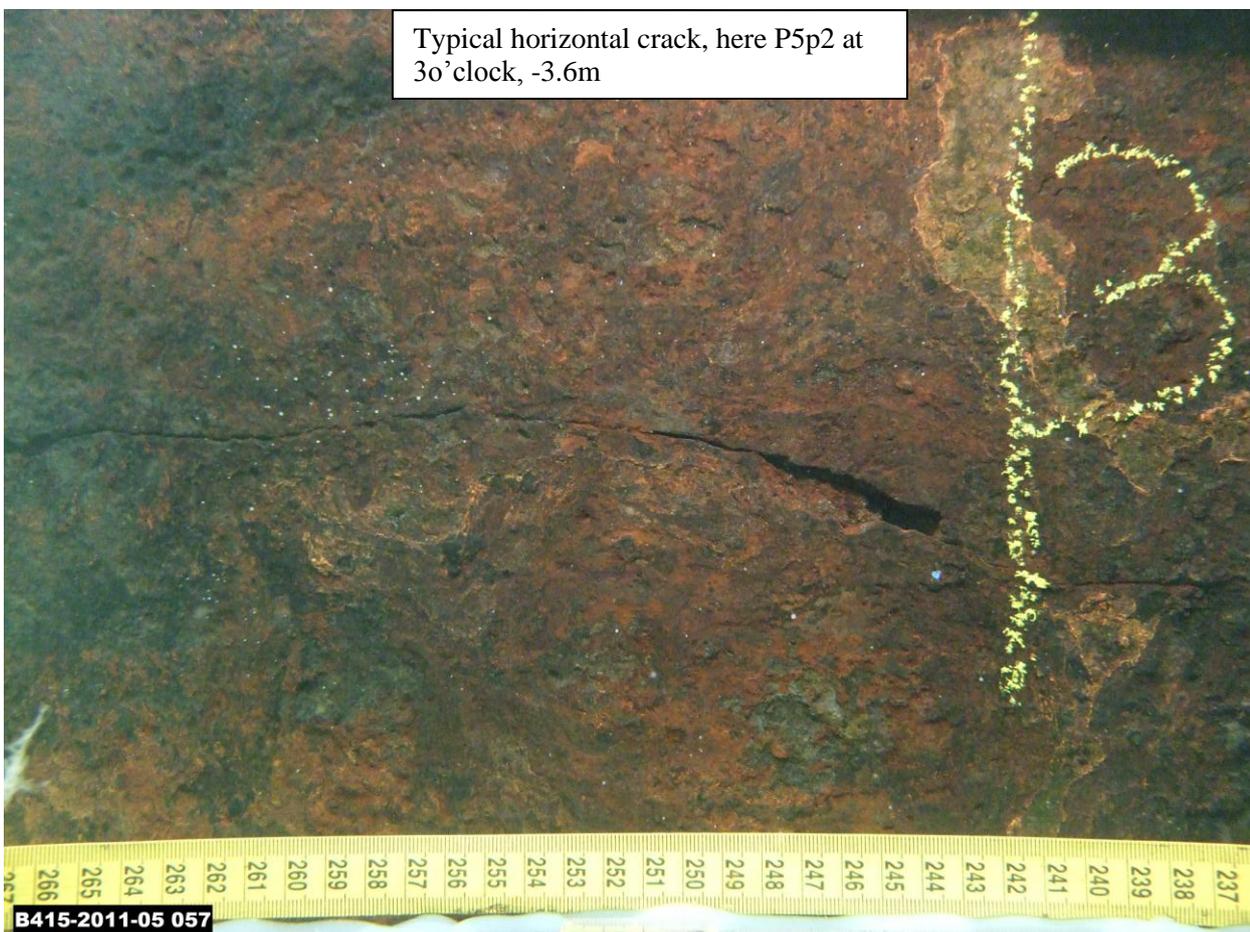
Water conditions at time of inspection:

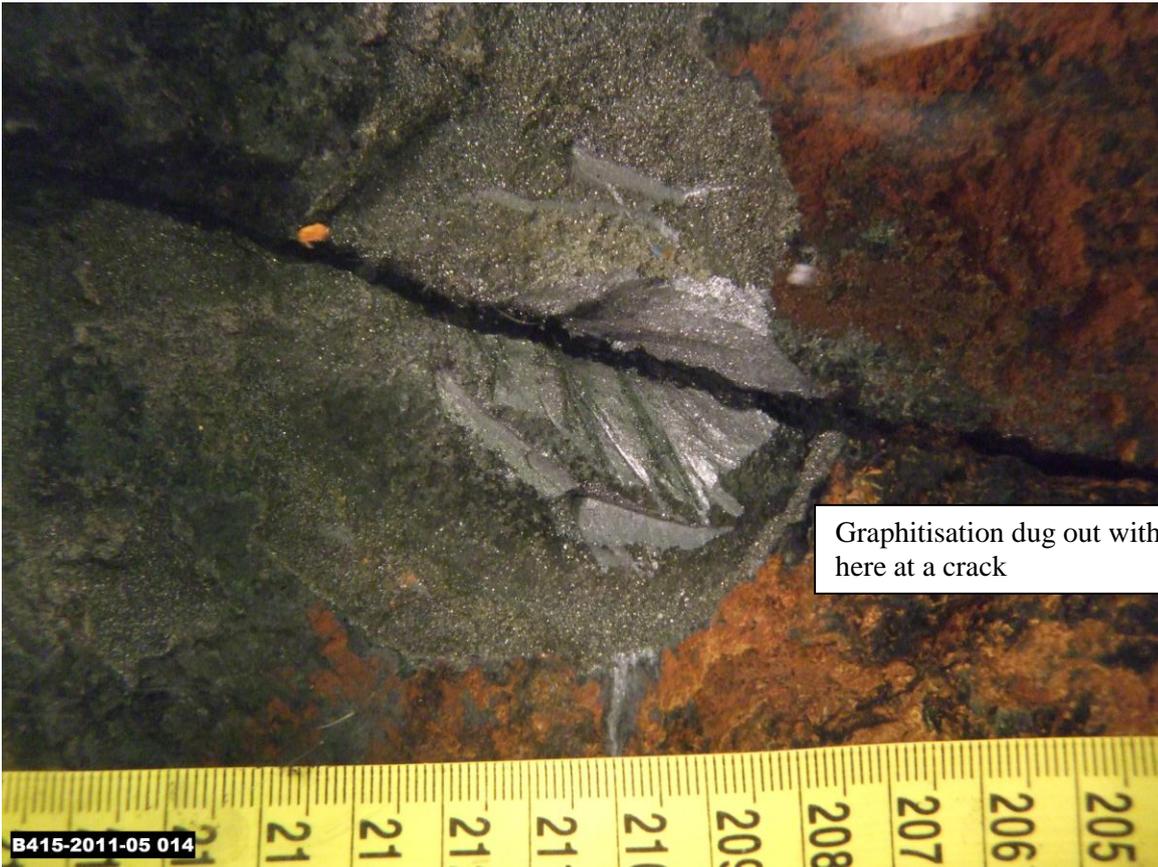
Fresh water, with water visibility of approx.0.3 to 0.5m with sandy riverbed at the piles and no obvious scouring. There was a daily tidal range of up to 1m noticeable during diving work. The current ran out at up to 2kn and in at up to 1kn.

**Horizontal ring cracks were found on 3 caissons of this bridge (P5p1, P5p2 and P6p2).
One small vertical crack was found on P5p1.**

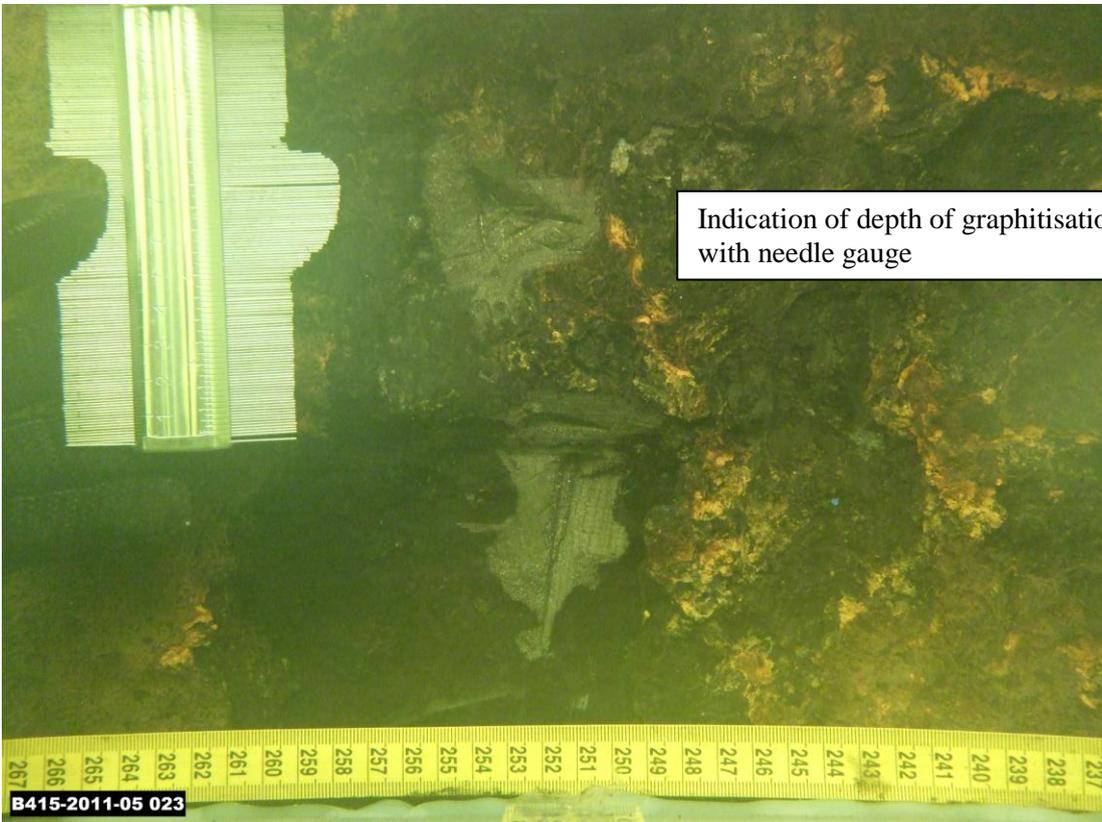
All inspected below water surfaces of the cast iron caissons of this bridge appeared heavily built up with nodules of about 30 to 50mm diameter, up to 50mm high and all covered with a thin layer (up to 20mm) of marine growth. After removing/cleaning the surface layer (some marine growth and a carbonised, black and rusty layer up to 30mm thick), an even graphitised layer about 5-15mm thickness (and up to 20mm in isolated areas) is covering most areas of the underwater surfaces that were investigated and inspected. Near Bed Level the noduling is less pronounced and graphitisation appears to be much thinner. (less than 3 mm)

The 17 Core samples that were taken appear to confirm this "global" graphitisation pattern. Core samples were handed to Fred Salome (CTI Consultants) for analysis.

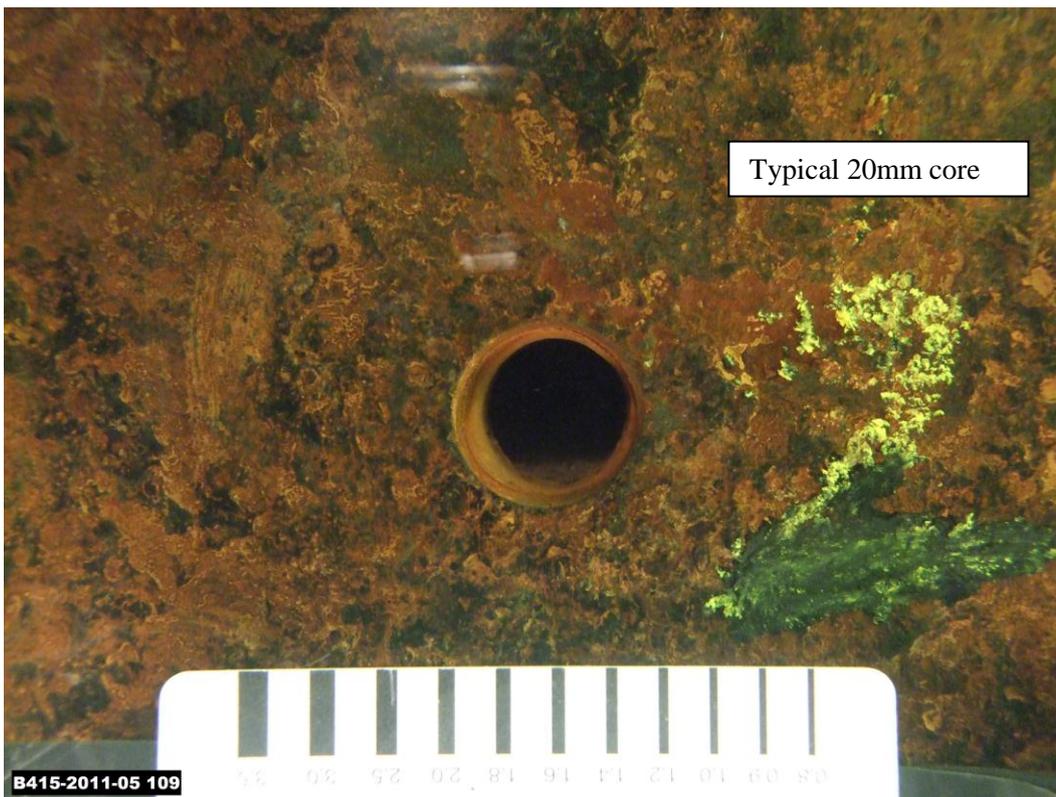




Graphitisation dug out with sharp edge, here at a crack



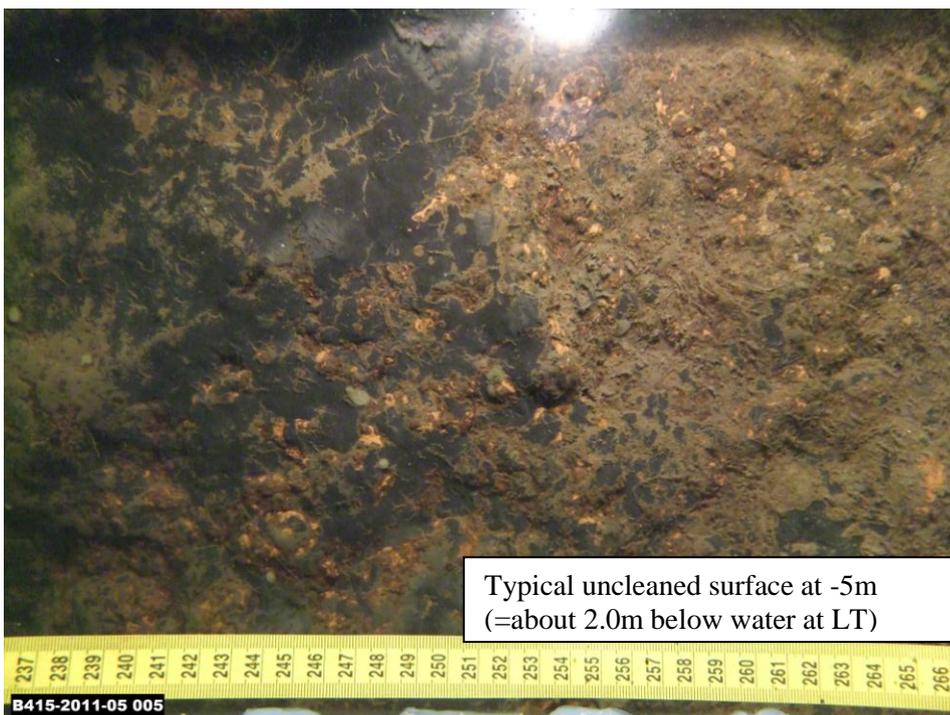
Indication of depth of graphitisation with needle gauge

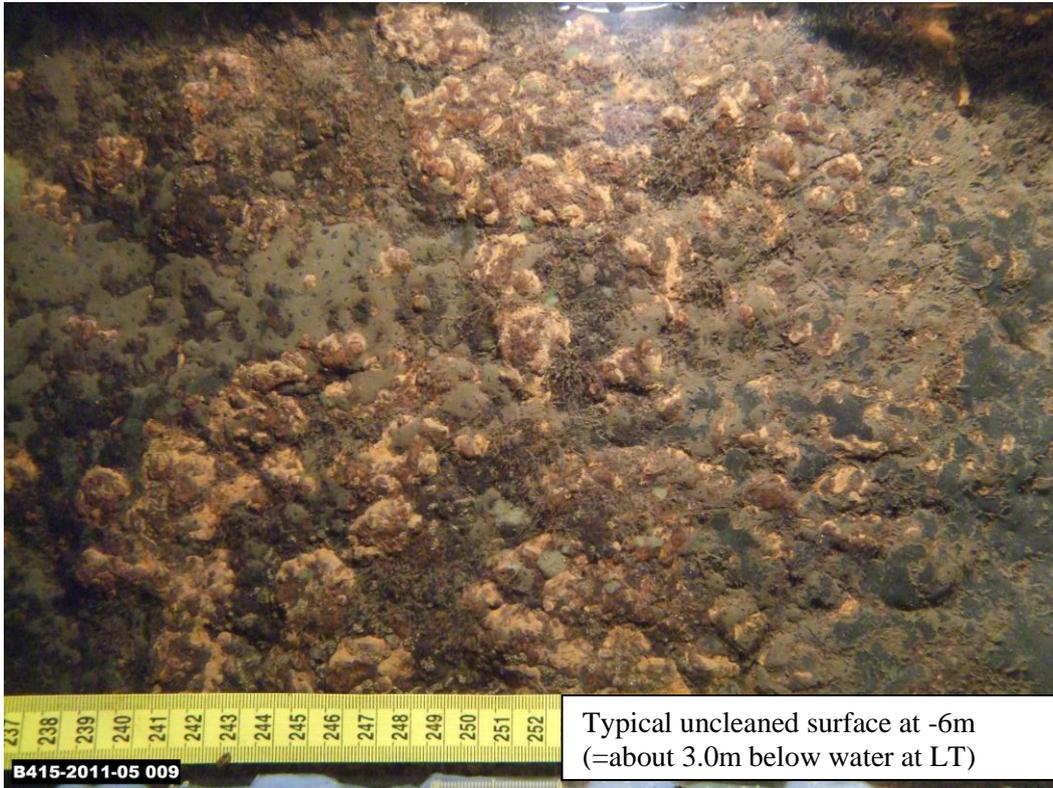


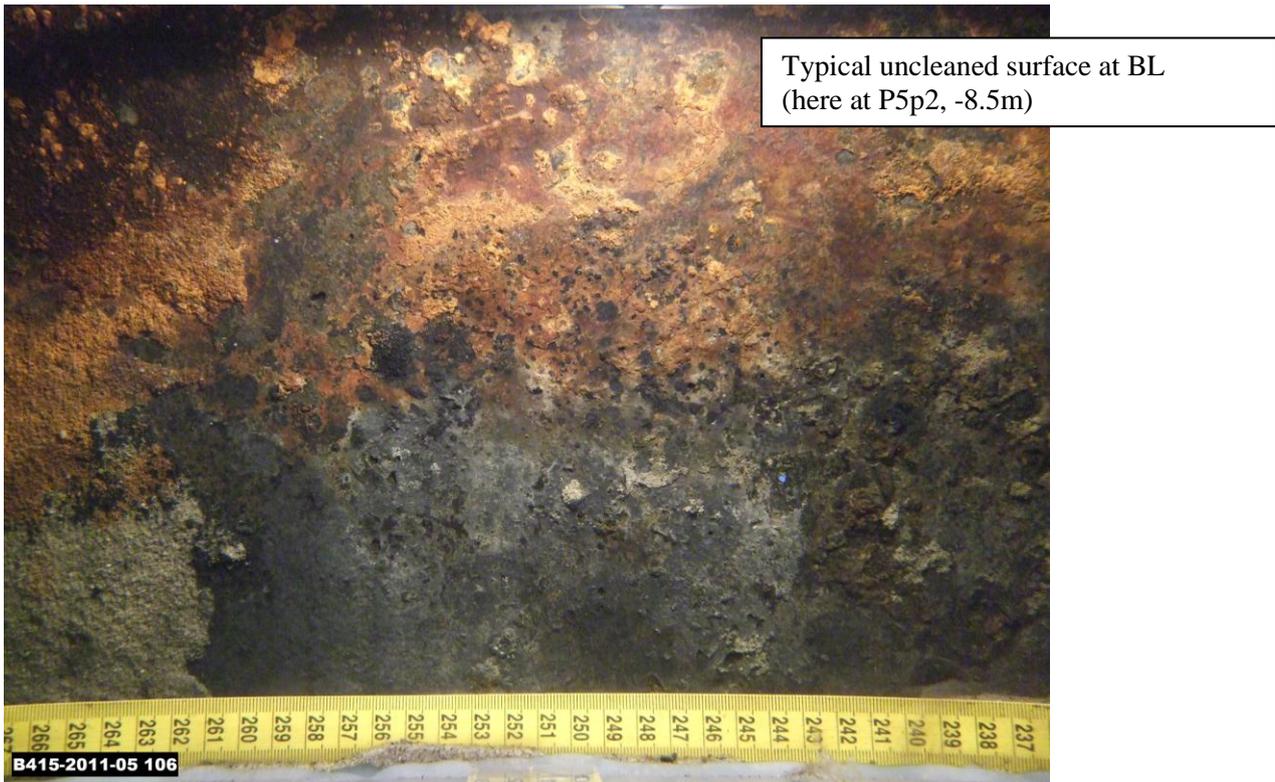
Pile Cleaning – (B350 / clause 4.5.1)

Full HP water cleaning on 14 piles of Piers 2 to 8 was carried out. A High-Pressure Water Unit with on site water extraction and adjusted, moderate nozzle pressure of approximately 200 bar, EWP at turbo nozzle approx 280-300 bar with angle of attack of approx. 35-45 degrees was used for better efficiency than hand tools. The cleaning system delivers a clean surface with all marine growth and most carbonisation removed for ease of caisson inspection. Please note that minimal graphitised material only is removed in this process.

Typical uncleaned surface, note the different growth/noduling at various depths:







Once the pile surface was pressure cleaned, a black, clean graphitised surface presented. This surface only stayed black for a couple of hours before oxydising and appearing completely rusty 24 hours later:







All photos used in this report and more sample pictures are in the file "B 415 Windsor Bridge photos" in relevant labelled subfolders on the attached DVD together with electronic copy of this report.

Following is the detailed inspection report on elements as per the amended cleaning schedule for this bridge which asked for all piles of piers 2 to 8 to be fully cleaned and inspected.

Please note that we have numbered piles as directed and also show river bed levels measured from the depth reference (Bottom edge of Caisson flange below concrete tie beam) at the element.

Individual element depths are up to 2.5m deeper (average:1.5m) than natural bed levels approx. 15m up- and 15m downstream from the piers indicating ongoing scouring and changing river bed levels. The attached sketch summarises the measured depths from RL (bottom of Caisson flange) as at 19.5.2011. At time of measurements RL was 2.5m above water level.

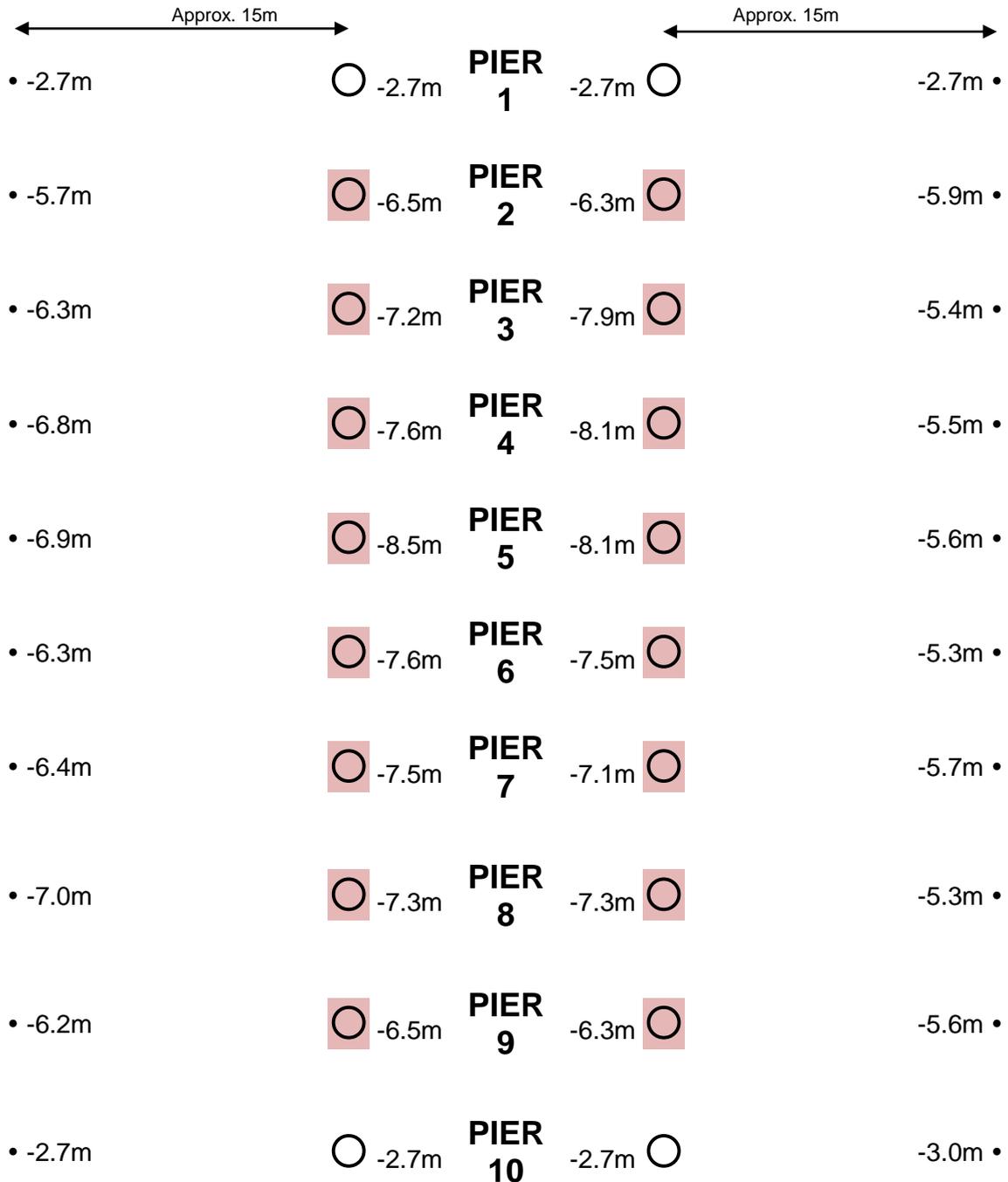
Bed Level Depths from RL (Bottom Edge of caisson flange below concrete tie beam) at piles and approx. 15m US and DS

 Indicates cleaned and inspected piles

WINDSOR ↑

← Downstream

Upstream →



TO WILBERFORCE ↓



UNDERWATER BRIDGE INSPECTION - FORM A

SUMMARY REPORT FOR BRIDGE / WATERWAY

Bridge No.:	B 415
Bridge Name / Description:	Windsor Bridge
Date(s) of Inspection:	9.5.2011 to 20.5.2011
Inspection Conditions:	Est. Water Temp. 12°C Weather: fine River Flow: tidal, up to 2kn run-out current .
Water Quality:	Fresh
Water Visibility:	Cloudy, visibility up to 0.5m
Waterway Bed Material:	Sandy
Waterway Bed Scour: (show bed depths in General Inspection Report for Individual Elements)	Up to 2.5m, 1.5m average
Waterway Bed Debris:	Old car U/S of P5p1, some driftwood on all U/s areas of U/S piles
General Comments: (Underwater Bridge Condition Summary)	Graphitisation found in all underwater areas inspected Coring recovered 17 cast iron plugs, 24mm max thickness, these show 0-20mm of graphitisation, variation appears to depend on cored area, worst in the first 2-3m below LWL.

LIST OF ATTACHMENTS

1. Water Test Report: N/A
2. General Inspection Report For Individual Elements
3. Detailed Inspection Reports (see General Inspection Report for summary)
4. Video Camera Logs (number of logs attached) .0, not required

Total normal hours worked (team)	Total overtime hours worked (team)	Total hours of travelling to bridge (team)	Diving Team Size (persons)
80	9	17	4

Dive Team:

Diving Supervisor: Martin Woschitzka

Lead Diver (underwater): C. Connell, G May

Other(s): K Welling, J Webster

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UNDERWATER BRIDGE INSPECTION – FORM B

GENERAL INSPECTION REPORT FOR INDIVIDUAL ELEMENTS

Bridge Name: Windsor Bridge..... **Bridge No:** 415.....

Depth reference for all elements: Bottom edge of caisson flange below concrete tie beam

Abutment or Pier No.	Element or Pile No.	Element Code (refer Annexure B350/E)	Bed Depth below nominated reference (refer Clause 5)	Nominated for Detailed Inspection? (Yes/No)	Detailed Inspection Reports (No. Pages attached)	Video Camera Log of Cleaned Surfaces? (Yes/No)	Comments on Element Condition <i>(Mandatory for Individual Elements not nominated for detailed inspection. All Individual Elements on the bridge must be accounted for as line entries on this form, and more than one page may be required)</i>
1	1	SPIL	-2.7m	N		N	Too shallow for diving inspection
1	2	SPIL	-2.7m	N		N	Too shallow for diving inspection
2	1	SPIL	-6.3m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
2	2	SPIL	-6.5m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
3	1	SPIL	-7.9m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
3	2	SPIL	-7.2m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
4	1	SPIL	-8.1m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
4	2	SPIL	-7.6m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
5	1	SPIL	-8.1m	Y ,full clean	2	N	All inspected U/W areas inspected show graphitisation, horizontal and vert. cracks
5	2	SPIL	-8.5m	Y ,full clean	2	N	All inspected U/W areas inspected show graphitisation, horizontal crack

Bridge Name: Windsor Bridge..... **Bridge No:** 415.....



Depth reference for all elements: Bottom edge of caisson flange below concrete tie beam

Abutment or Pier No.	Element or Pile No.	Element Code (refer Annexure B350/E)	Bed Depth below nominated reference (refer Clause 5)	Nominated for Detailed Inspection? (Yes/No)	Detailed Inspection Reports (No. Pages attached)	Video Camera Log of Cleaned Surfaces? (Yes/No)	Comments on Element Condition <i>(Mandatory for Individual Elements not nominated for detailed inspection. All Individual Elements on the bridge must be accounted for as line entries on this form, and more than one page may be required)</i>
6	1	SPIL	-7.5m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
6	2	SPIL	-7.6m	Y ,full clean	2	N	All inspected U/W areas inspected show graphitisation, horizontal crack
7	1	SPIL	-7.1m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
7	2	SPIL	-7.5m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
8	1	SPIL	-7.3m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
8	2	SPIL	-7.3m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
9	1	SPIL	-6.3m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
9	2	SPIL	-6.5m	Y ,full clean	1	N	All inspected U/W areas inspected show graphitisation
10	1	SPIL	-2.7m	N		N	Too shallow for diving inspection
10	2	SPIL	-2.7m	N		N	Too shallow for diving inspection



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 2 Element No. 1 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 11m² total surface area

A. CONDITION RATING

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	11m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.12m, -2.96m, -4.80m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5	Bed level at pile: -6.3m	
7.0		
7.5		
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 2 Element No. 2 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 11m² total surface area

A. CONDITION RATING

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	11m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.52m, -3.535m, -5.19m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5	Bed level at pile: -6.5m	
7.0		
7.5		
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 3 Element No. 1 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 17m² total surface area

A. CONDITION RATING

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	17m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -0.97m, -2.81m, -4.65m, -6.49m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5		
8.0	Bed level at pile: -7.9m	



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 3 Element No. 2 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 15m² total surface area

A. **CONDITION RATING**

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	15m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. **DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP**

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.04m, -2.88m, -4.72m, -6.56m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5	Bed level at pile: -7.2m	
7.0		
7.5		
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 4 Element No. 1 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 17m² total surface area

A. **CONDITION RATING**

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	17m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. **DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP**

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.67m, -3.51m, -5.37m, -7.20m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5		
8.0	Bed level at pile: -8.1m	



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 4 Element No. 2 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 16m² total surface area

A. **CONDITION RATING**

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	16m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. **DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP**

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.72m, -3.56m, -5.40m,-7.26m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5	Bed level at pile: -7.6m	
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 5 Element No. 1 Cleaning Method: High-pressure water

Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled

Total quantity & unit for element: HP cleaned and inspected, approx. 17m² total surface area

A. CONDITION RATING

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	14m ²	Graphitisation over entire pile surface underwater, up to 20mm thick,
4	3m ²	Horizontal crack all round at about -3.35m
Total		

B. DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

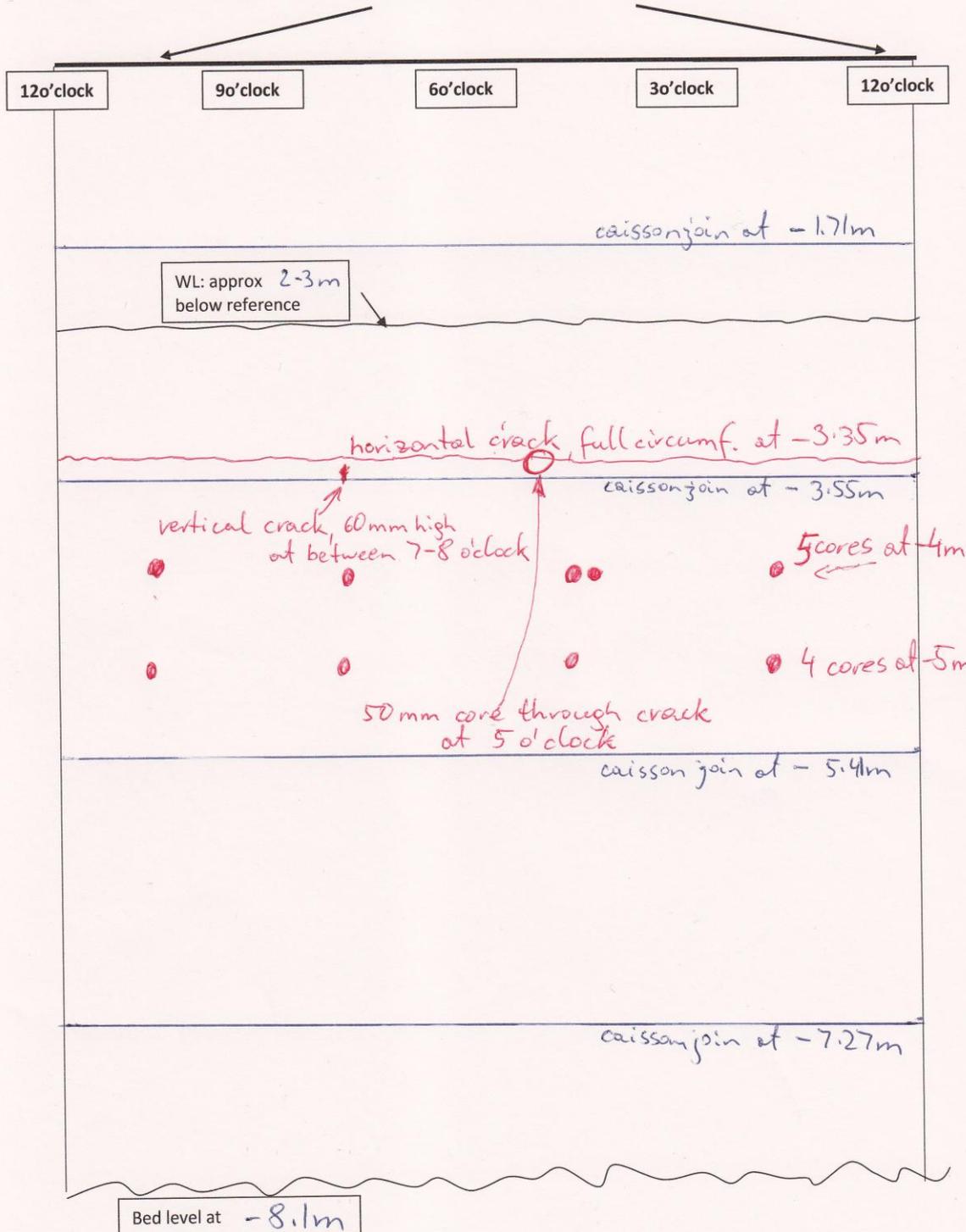
Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.71m, -3.55m, -5.41m, -7.25m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 20mm	3
	10 core samples taken at locations shown next page	
2.0		
2.5		
3.0		
3.5	Horizontal crack all round about 200-250mm above caisson join	4
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5		
8.0	Bed level at pile: -8.1m	

Bridge: **B 415 Windsor Bridge**

PIER: 5

PILE: 1 (US)

REFERENCE: Bottom edge of Caisson flange, 12o'clock=U/S













UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 5 Element No. 2 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, approx 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 18m² total surface area

A. **CONDITION RATING**

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	15m ²	Graphitisation over entire pile surface underwater, up to 20mm thick,
4	3m ²	Horizontal crack all round at about -3.6m
Total		

B. **DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP**

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

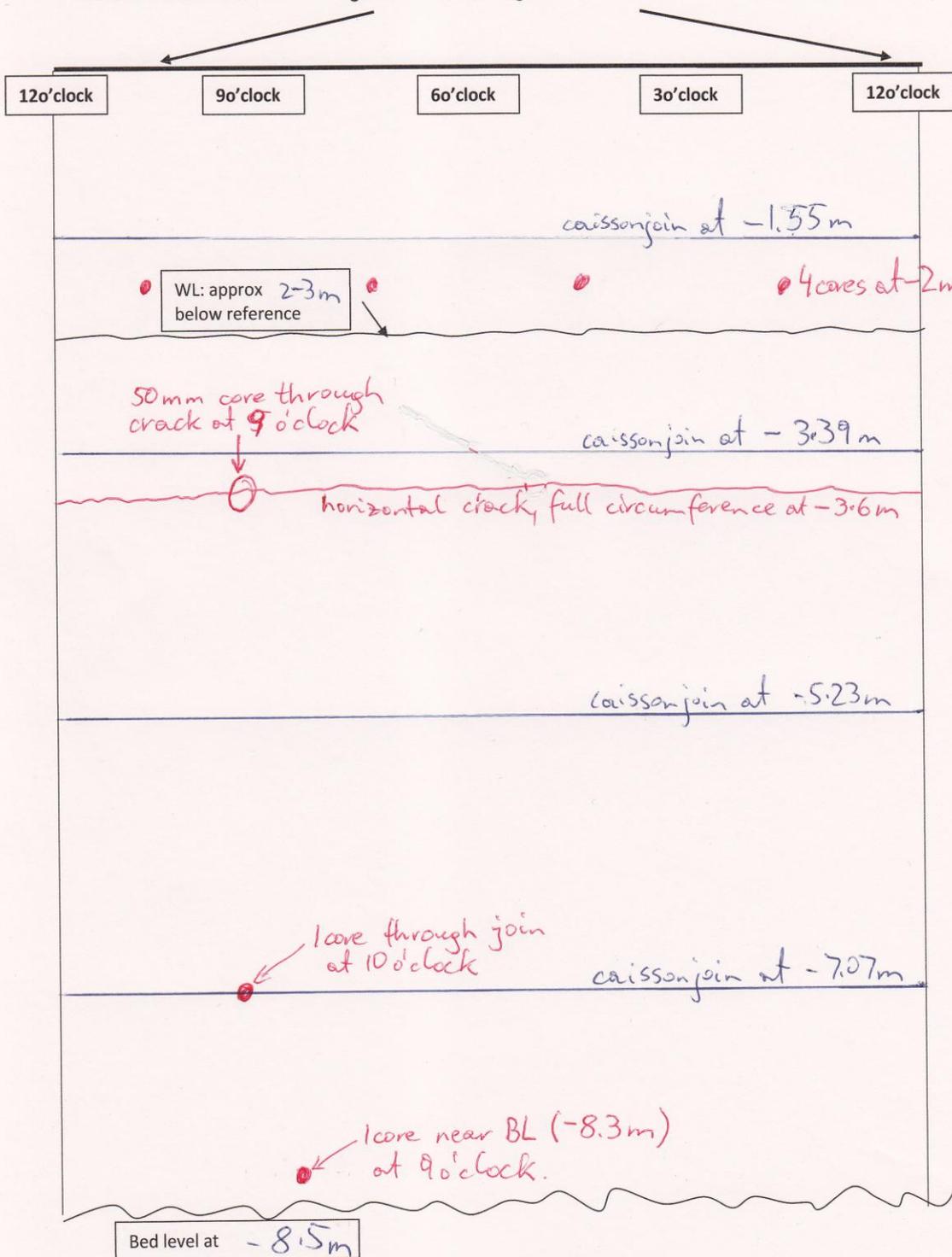
Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.55m, -3.39m, -5.23m, -7.07m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 20mm	3
1.5	7 core samples taken at locations shown next page	
2.0		
2.5		
3.0		
3.5	Horizontal crack all round about 200-250mm below caisson join at about -3.6m	4
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5		
8.0	Bed level at pile: -8.5m	

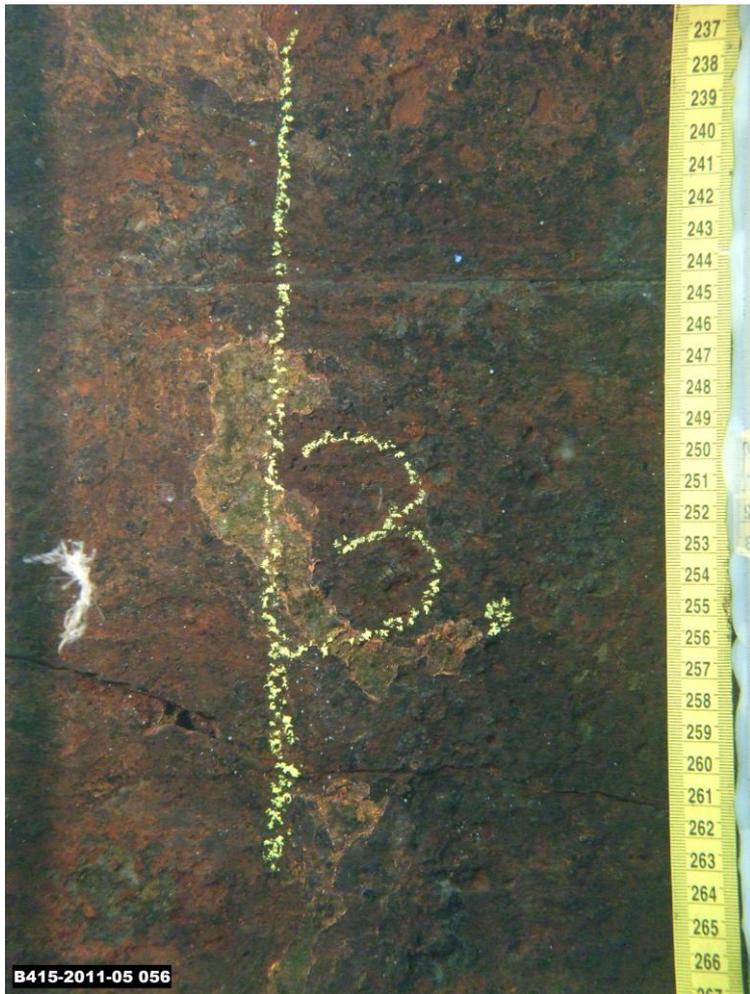
Bridge: **B 415 Windsor Bridge**

PIER: 5

PILE: 2 (DS)

REFERENCE: Bottom edge of Caisson flange, 12o'clock=U/S











UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 6 Element No. 1 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 15m² total surface area

A. CONDITION RATING

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	15m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -0.57m, -2.41m, -4.26m, -6.11m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5	Bed level at pile: -7.5m	
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 6 Element No. 2 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 15m² total surface area

A. CONDITION RATING

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	12m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4	3m ²	Horizontal crack from just after 12 o'clock to 9 o'clock at about -3.4m
Total		

B. DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -0.57m, -2.41m, -4.26m, -6.11m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5	Horizontal crack from just after 12 o'clock to 9 o'clock at about -3.4m	4
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5	Bed level at pile: -7.5m	
8.0		

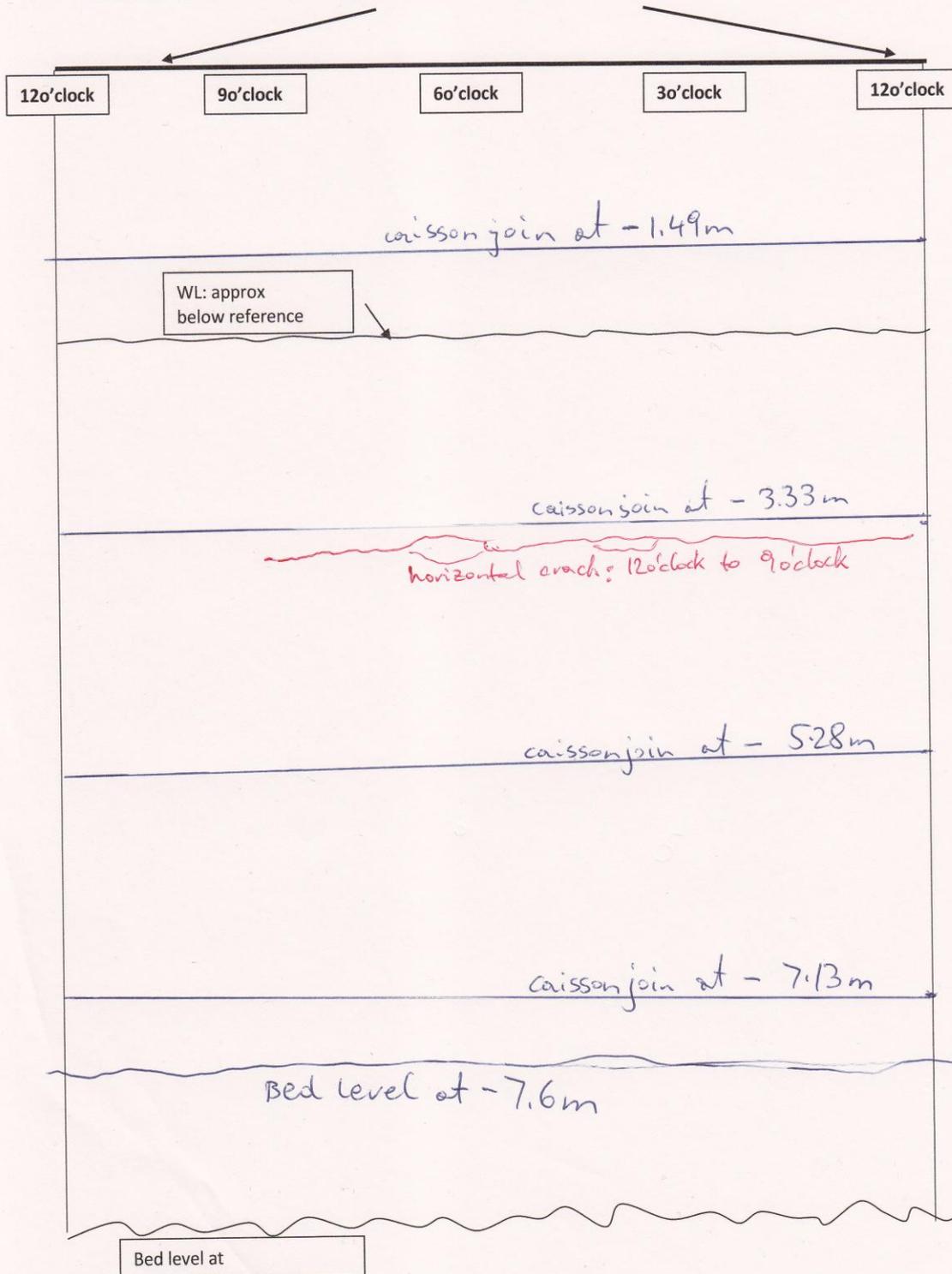


Bridge: **B 415 Windsor Bridge**

PIER: 6

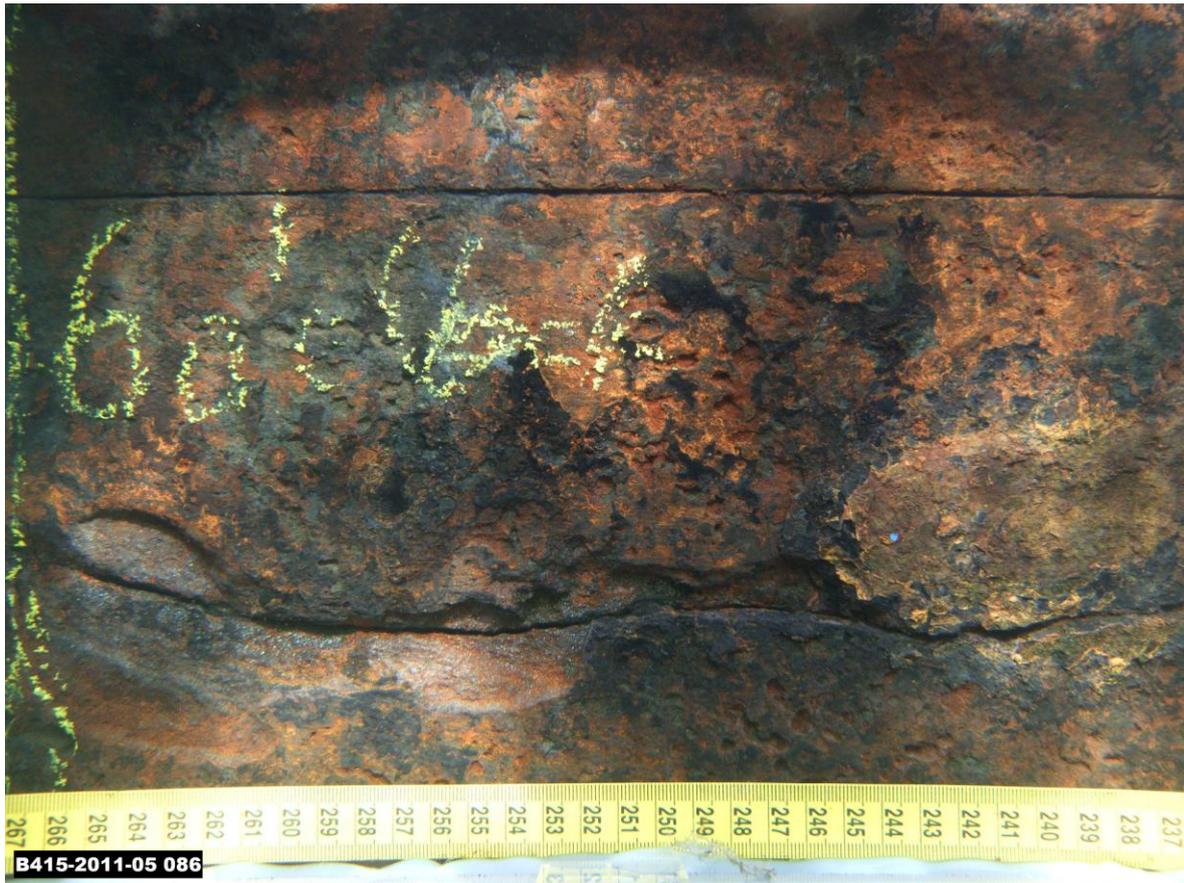
PILE: 2 (DS)

REFERENCE: Bottom edge of Caisson flange, 12o'clock=U/S













UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 7 Element No. 1 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 14m² total surface area

A. CONDITION RATING

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	14m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.75m, -3.59m, -5.43m,	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0	Bed level at pile: -7.1m	
7.5		
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 7 Element No. 2 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 15m² total surface area

A. **CONDITION RATING**

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	15m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. **DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP**

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.70m, -3.54m, -5.38m, -7.22m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5	Bed level at pile: -7.5m	
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 8 Element No. 1 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 15m² total surface area

A. CONDITION RATING

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	15m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -0.57m, -2.41m, -4.26m, -6.10m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5	Bed level at pile: -7.3m	
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 8 Element No. 2 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 15m² total surface area

A. **CONDITION RATING**

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	15m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. **DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP**

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.55m, -3.39m, -5.24m, -7.08m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		
7.5	Bed level at pile: -7.3m	
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 9 Element No. 1 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 12m² total surface area

A. **CONDITION RATING**

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	12m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. **DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP**

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -1.30m, -3.14m, -4.99m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5	Bed level at pile: -6.3m	
7.0		
7.5		
8.0		



UNDERWATER BRIDGE INSPECTION - FORM C

DETAILED INSPECTION REPORT (NOMINATED PILES or PILE CAP SURFACES)

Bridge Name: Windsor Bridge Bridge No: 415

Pier/Abutment No. 9 Element No. 2 Cleaning Method: High-pressure water
 Element Code & Type: SPIL, aprox 1.08m dia, cast iron caisson, concrete filled
 Total quantity & unit for element: HP cleaned and inspected, approx. 12m² total surface area

A. **CONDITION RATING**

Condition State	Estimated quantity in Condition State	Remarks
1		
2		
3	12m ²	Graphitisation over entire pile surface underwater, up to 15mm thick,
4		
Total		

B. **DETAILED WRITTEN LOG FOR CLEANED FACE OR STRIP**

Depth reference: Bottom edge of Caisson flange directly below concrete tie beam

Depth below reference (m)	Description of Defect or Condition	Condition State
	Caisson joins at: -0.69m, -2.53m, -4.37m, -6.21m	
	Entire underwater surface of pile is showing graphitisation. On probing, thickness of graphitised layer varies between 5 and 15mm	3
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5	Bed level at pile: -6.5m	
7.0		
7.5		
8.0		

Pile cap cleaning and inspection: (B350 /clause 4.4.6)

There are no pile caps forming part of this inspection

Video Camera Log of Deterioration: (B350 / clause 4.6)

No video camera log was requested

Water Sample Test Results: (B350 / clause 6)

2 water samples (1x from -0.5m below water and 1x -5m below water) were taken and handed over to Fred Salome, CTI Consultants, for analysis on 11.5.2011. No further samples were requested/required to be taken for analysis by CDS Pty Ltd.

Principal requested additional work: (B350 / clause 9)

4 sets of Steel Bands with monitoring sensors (supplied by Endurance Consulting, B. McInnes) were required to be fitted to the piles of Piers 4 and 6 with sensors to be aligned at 3o'clock and 9o'clock on the piles.

The bands were fitted at following depths:

P4p1: -7.49m to top of band

P4p2: -6.72m to top of band

P6p1: -7.14m to top of band

P6p2: -6.45m to top of band



Core Sampling: (B350 / clauses 7, 7.5.1, 7.5.2)

Coring in 16 location was requested and carried out between 11.5. and 20.5.2011. A total of 17 cores were recovered, 1 core was re-taken due to an apparent misalignment of entry angle.

Above water samples were 24-26mm thick with little or no graphitised layer visible.

Underwater core samples recovered showed graphitised layers ranging 5 to 20mm thick on plugs that were about 24mm thick overall (including graphitised outer surface layers)

4 of these cores were taken above the HWL mark on P5p2, -2m.

5 cores were taken in the top third of the first submerged Caisson segment on P5p1, -4m.

4 cores were taken in the bottom third of the first submerged Caisson segment on P5p1, -5m

2x 50mm diameter cores were taken through horizontal cracks: one at P5p1, -3.35m

5o'clock. The other one at P5p2, -3.39m, 9o'clock

1 core was taken through the caisson segment join at P5p2, -7.07m, 10o'clock

1 core was taken near Bed Level at P5p2, -8.3m, 9o'clock.

All but the last two cores were handed over to Fred Salome, CTI consultants, immediately after recovery of these cores.

Only the last 2 cores taken on Fri, 20.6.2011 (P) were sent to CTI Consultants by mail the following week.

All core holes were photographed and the pictures are contained in the attached Folder "B415 Core holes".





Core Hole Repairs: (B350 / clauses 7.3.3, 7.4)
Principal ordered for the core holes not to be repaired.

We trust the inspection has been completed to your requirements.
Please contact us if you require further clarification.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Martin Woschitzka'.

Martin Woschitzka
Director
COMMERCIAL DIVING SOLUTIONS PTY LTD

ATT:

- DVD with electronic reports and Photo file "B415 Windsor Bridge Photos"