INSPECTION DEPARTMENT
DEMAG MW3 INSPECTION DATE: 16TH/17 JAN 2009

On the evening of Friday the 16th of January 2009, an operational procedure to remove the expansion joint plates at the North West main tower was carried out for inspection purposes. It should be recorded that no refurbishment work was to be carried out unless it was deemed absolutely necessary by F.E.T.A. management. Below is recorded the actual approximate times of the sequence of events for the removal of the plates only.

Main tower expansion joint plate removal.

Location: Main tower North west joint No 3. slow lane.

Sequence of events & times for the removal of plates only. :

19.45. : Crane driver & supervisor given induction by Inspector G. Hamilton.

Access on site : Traffic management began approx.- 19.30 Hrs.
Traffic management completed approx. – 21.45 Hrs.
Access to carriageway, permission to access. 21.50 Hrs.

Positioning of lifting equipment : Crane positioned on site at approx, 22.00 to 22,.20. as per drawing no – BC06 – 63-01-16.

Removal of plate anti skid surfacing.(Safe-track 1000 HW.) – Removal of required areas on plates to locate tongue plate pins. 22.30 to 22.45. Hrs

Removal of plate fixings (tongue plate springs & pins) (East & West) on MW 3.. – Removal operation began - 22.50.hrs. (West removed at) 22.55 Hrs (East removed at) 23.00.

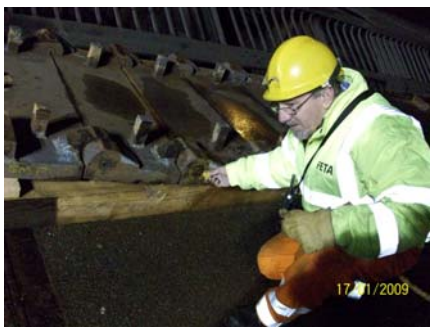
Operational procedure for removal of tongue plate: Lifting plate attachment as per drawing no - BC. 06-63-01-17 rev 2 & BC. 06-63-01-50 rev 2.fitted at 23.15.Hrs.

Tongue plate removed as per drawing no. 63-01-18. rev 2. at 23.25 hrs.

Removal of plate fixings (rocker plate spring & pin). 23. 35.hrs to 23.40.hrs.

Operational procedure for removal rocker & shuttle plate: Lifting plate attachment as per drawing no - BC. 06-63-01-17 rev 2 .operation began at 23.50.hrs – completed at 24.40.hrs.

Any problems encountered during operational procedures .: On attempting to lift Rocker plate & shuttle plate as drawing no. BC. 06-63-01-17 rev 2. on MW 3, pin on shuttle plate No 3. East face was preventing the shuttle plate from lifting out. A visual inspection was carried out on the underside, and it was found to be protruding by approx 4 mm. Three attempted lifts failed to release the plates. Following consultation with maintenance manager, a decision was taken that to allow plate MW3 to have enough clearance to be lifted out, that we release the tongue plate spring (West) only on tongue plate no MW4. On completion of the removal of the spring the order was given to the crane driver to lift the plates.. This proved to be successful and the plates were removed. On inspection following removal of plate it was found that on MW 3, pin on shuttle plate no 3. had seized. Tongue plate spring to plate (MW4 west) was replaced with a new spring fitted before cleaning down of radius arm girder began.



Inspector: marking offending pin. Related to above comments.

Cleaning of radius arm girders. : Cleaning down of radius arm girders, tongue plate & rocker plate & other required areas began at 01.00 am.

Bridge inspector began cleaning down tongue plate bearing block welds at approx 01.40 am completed cleaning down at 02.00 am. Welds visually appeared to be satisfactory.

At approx 02.00 a.m. Adjustable props (accrows) were positioned between plates MW2 to MW4. hydraulic jacks were positioned on the face of plate MW2. pressure was applied .this operation was carried out to ensure that the re-positioning of plates MW3.would be made as easy as possible.

Bridge inspector carried out liquid penetrant inspection of welds in accordance with BS. EN. 571-1. on tongue plate bearing block welds. Approx 02.10 a.m. to 02.40 a.m. Contact or dwell time of penetrant – 30 mins. Welds produced satisfactory results. Temperatures recorded at time of inspection : surface temp 1.7c. air temp 3.4c. Information recorded from structure sensors and relayed from bridge control.

Bridge inspector carried out measurements on radius arm girder wear-down at approx 03.00 am. Completed measurements at approx. 03.30.am.

Refurbishment work required to be carried out. : No refurbishment of any kind was carried out on night-shift.

To the best of my knowledge these were the approximate times of the reported sequence of events.

Radius arm girder weardown. Nightshift. 16/01/09.

A visual inspection to record the actual depths of wear-down evident on the radius arm girders both East & West sides of the removed plates MW 3. Distances recorded as below.

Radius arm girder total length. : 3.785mtrs.

Locations & sizes of weardown. : measurements .East.radius arm.

South to North. –

measurement of 860. mm. followed by-

wear-down area of 310mm. wear-down depth.- 5mm.

followed by- measurement of 145. mm
.
wear-down area of 290 mm. wear-down depth.- 4 mm.

followed by- measurement of 160. mm.

wear-down area of 245 mm. wear-down depth.- 4 mm.

followed by- measurement of 160. mm.

wear-down area of 200 mm. wear-down depth.- 3 mm.

followed by- measurement of 1.415mtrs.

Total length . : 3.785mtrs.

Radius arm girder weardown. Nightshift. 16/01/09.

A visual inspection to record the actual depths of wear-down evident on the radius arm girders both East & West sides of the removed plates MW 3. Distances recorded as below.

Radius arm girder total length. : 3.785mtrs.

Locations & sizes of weardown. : measurements .West.radius arm.

South to North. –

measurement of 870. mm. followed by.

wear-down area of 310mm. wear-down depth.- 8mm.

followed by- measurement of 150. mm.

wear-down area of 230 mm. wear-down depth.- 6 mm.

followed by- measurement of 165. mm.

wear-down area of 265 mm. wear-down depth.- 3 mm.

followed by- measurement of 165. mm.

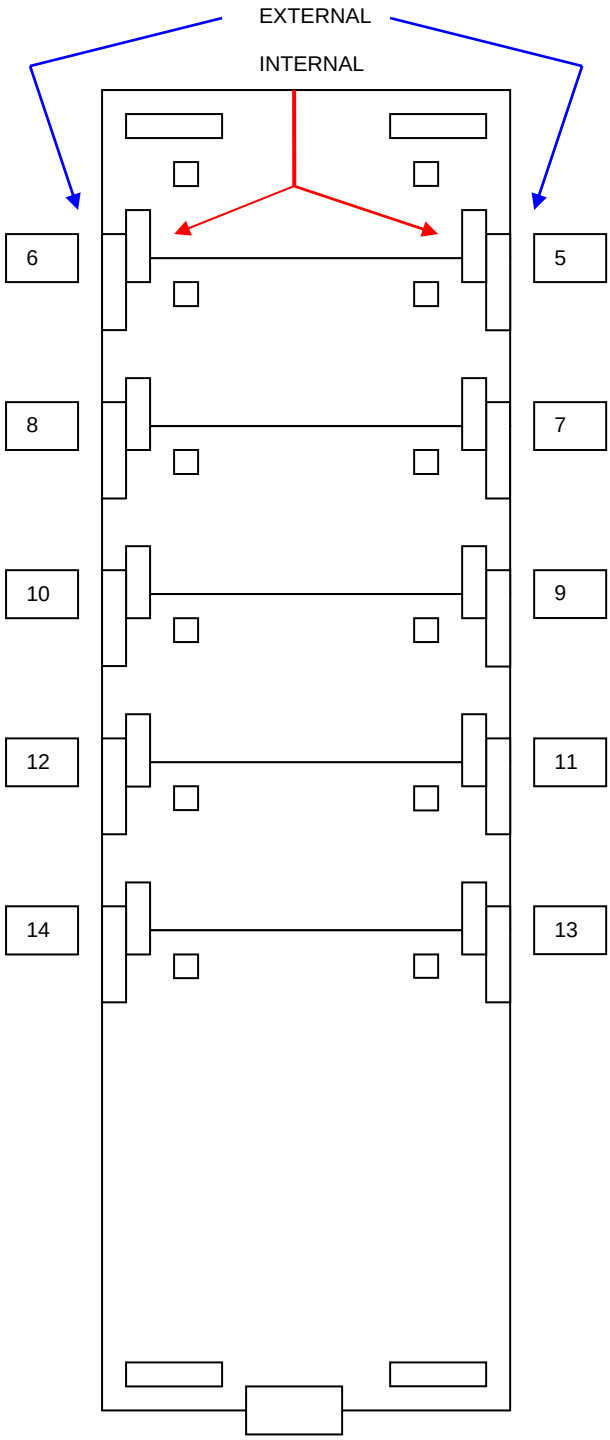
wear-down area of 250 mm. wear-down depth.- 2 mm.

followed by- measurement of 1.380mtrs.

Total length . : 3.785mtrs.

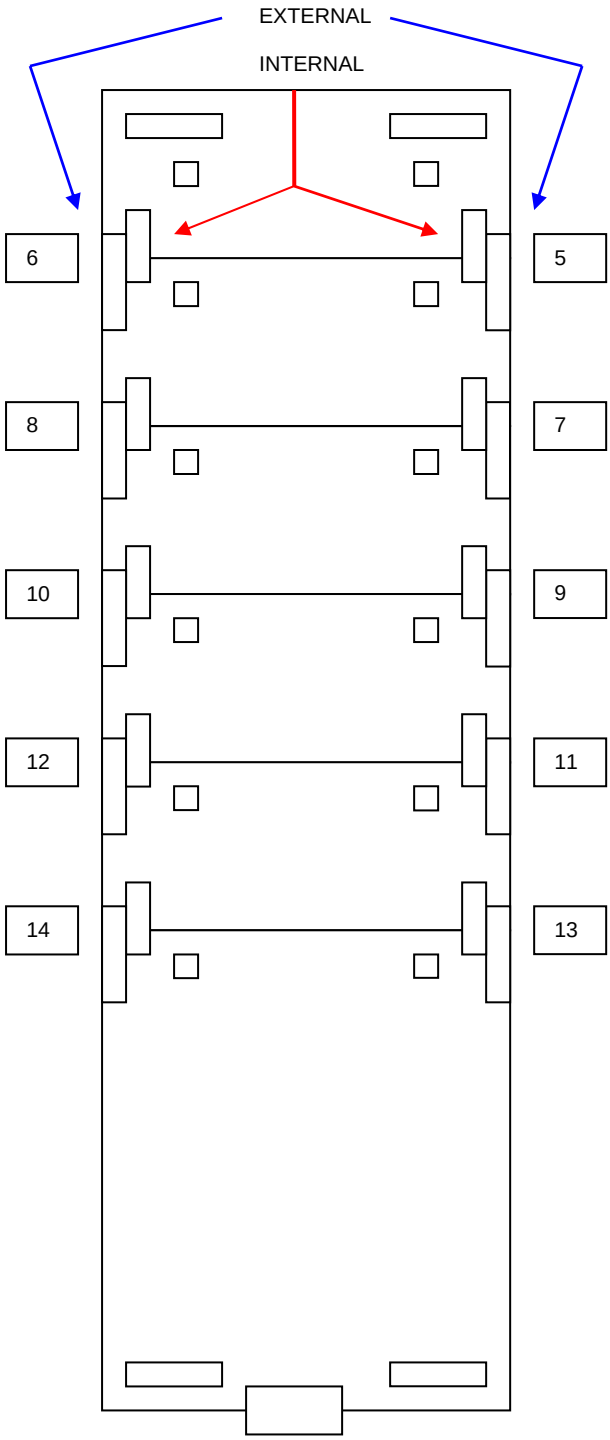
Bridge Inspector..

On Saturday 17th January 2009 the inspection to the Demag expansion joint MW3, continued after its extraction and initial inspection checks on nightshift 16th/17th January.
The dayshift inspections consisted of: Link pin diameter check (without pin removal), Bronze bush thickness checks of visible ends, Liquid penetrant weld inspection of randomly chosen areas of underside of sliding plates and inspection of a tongue plate bearing beam.



PIN No.	EXTERNAL	INTERNAL
5	39mm	39mm
Bush thickness		
Top	4mm	4mm
Bottom	4mm	4mm
North	4mm	4mm
South	4mm	4mm
6	39mm	39mm
Bush thickness		
Top	4mm	3mm
Bottom	4mm	3mm
North	4mm	3mm
South	4mm	3mm
7	39mm	39mm
Bush thickness		
Top	- mm	4mm
Bottom	3mm	4mm
North	3mm	4mm
South	3mm	4mm
8	39mm	39mm
Bush thickness		
Top	CORRODED	3mm
Bottom		3mm
North		3mm
South		3mm
9	39mm	39mm
Bush thickness		
Top	3mm	3mm
Bottom	4mm	3mm
North	3mm	1mm
South	2mm	3mm
10	39mm	39mm
Bush thickness		
Top	2mm	3.5mm
Bottom	2mm	2mm
North	2.5mm	1mm
South	1mm	2mm

FORTH ROAD BRIDGE



PIN No.	EXTERNAL	INTERNAL
11	39mm	39mm
Bush thickness		
Top	2mm	3mm
Bottom	4mm	3mm
North	4mm	0mm
South	0mm	3mm
12	39mm	39mm
Bush thickness		
Top	2mm	0mm
Bottom	0mm	2mm
North	0mm	0mm
South	0mm	2mm
13	39mm	39mm
Bush thickness		
Top	0 mm	1mm
Bottom	0mm	2mm
North	0mm	0mm
South	0mm	2mm
14	39mm	39mm
Bush thickness		
Top	0mm	2mm
Bottom	3mm	2mm
North	2mm	0mm
South	0mm	2mm

FORTH ROAD BRIDGE

Position No. 8 External: Protruding pin, seized on inner lug. Pin ground down to ease reinstatement.

Position No.14: External.

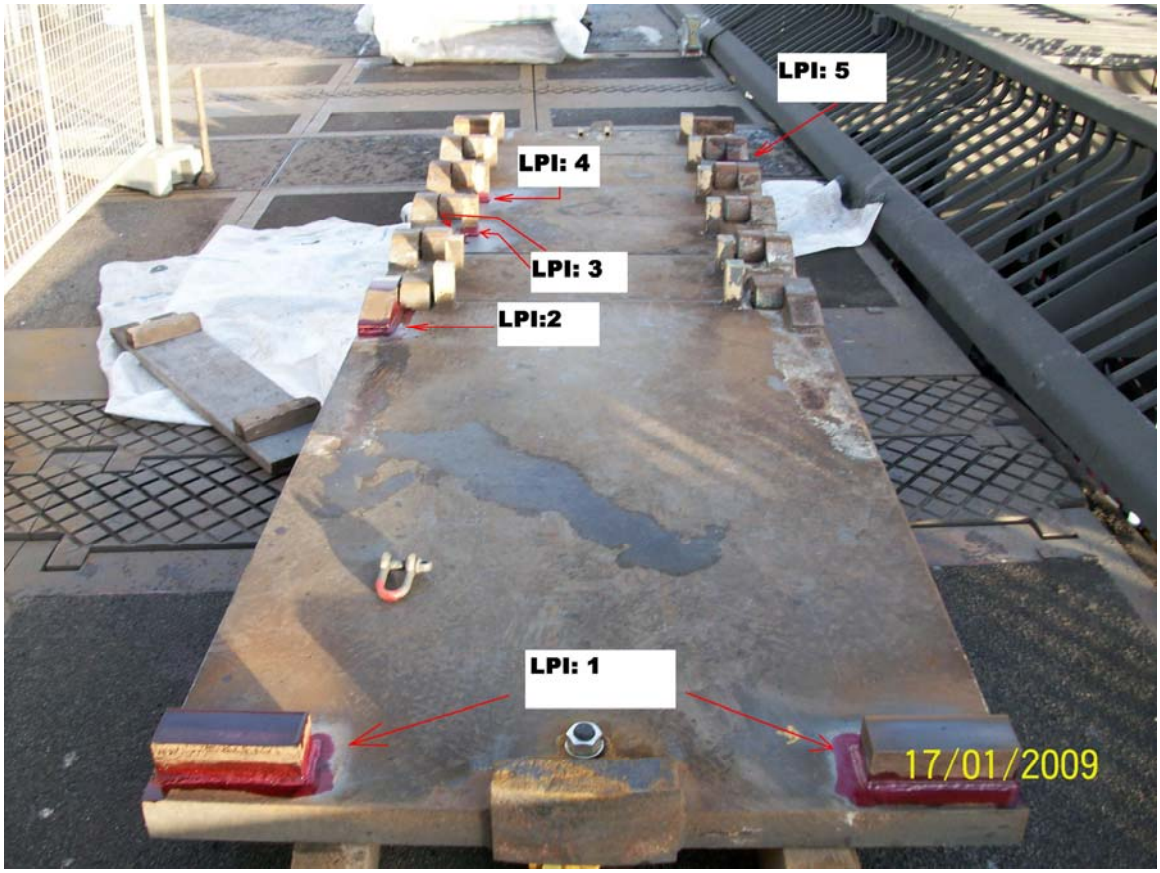
Position No.12: Internal.

Position No.13: Internal.

Position No. 13 External.

FORTH ROAD BRIDGE

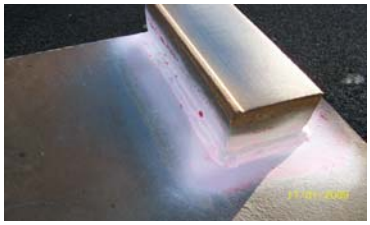
The liquid penetrant weld inspection consisted of five locations randomly chosen.
Below shows positions inspected, followed by individual inspection reports.



FORTH ROAD BRIDGE

FORTH ESTUARY TRANSPORT AUTHORITY

L.P.I. WELD INSPECTION REPORT		
Technician Signature:	Inspection Qualification: **P.C.N. LEVEL 2**	Date: 17/01/09
Work Pack No. N/A	Drg No. N/A	Inspection Part: MW3 Rocker Plt. Bearing Blocks
Inspection Document Conforming To BSEN 571-1:1997& BSEN1289:1998. Additional Info see FETA WP 15 &16		
Acceptance Standard:	BSEN 1289: 1998	
Acceptance Level:(Highlighted)	**1** **2** **3**	
Area Examined:(BSEN571-1)	Welds & Heat Affected Zone	
Process Type(Highlighted)	**Fluorescent** **Colour Contrast** **Combined**	
Type/Make of Consumables:	Rocol Flaw: Cleaner, Penetrant, Developer	
Method of Application:	Spraying/Brushing	
Penetration Time:	20mins to 30mins	
Development Time:	15mins	
Surface Condition:	As Welded	Dressed
Surface Preparation:	Dry & free of all dirt, grease, scale, spatter, oil etc.	
Illumination:	Natural	Auxiliary
Fabrication Stage:	Fabrication Complete.	
Purpose of Test:	To find all surface breaking defects/ indications.	
Name of Welder: N/A	I.D. No: N/A	Results:
Comments: Inspection to determine if any **NEW** defects have appeared, other than any old defects. No new defects found. Only defects to be found were original: start pool porosity and small indication of under cut.		Accept: **YES**
		Reject:



FORTH ESTUARY TRANSPORT AUTHORITY

L.P.I. WELD INSPECTION REPORT		
Technician Signature:	Inspection Qualification: **P.C.N. LEVEL 2**	Date: 17/01/09
Work Pack No. N/A	Drg No. N/A	Inspection Part: MW3 DEMAG POS. 14 EXT.
Inspection Document Conforming To BSEN 571-1:1997& BSEN1289:1998. Additional Info see FETA WP 15 &16		
Acceptance Standard:	BSEN 1289: 1998	
Acceptance Level:(Highlighted)	**1** **2** **3**	
Area Examined:(BSEN571-1)	Welds & Heat Affected Zone	
Process Type(Highlighted)	**Fluorescent** **Colour Contrast** **Combined**	
Type/Make of Consumables:	Rocol Flaw: Cleaner, Penetrant, Developer	
Method of Application:	Spraying/Brushing	
Penetration Time:	20mins to 30mins	
Development Time:	15mins	
Surface Condition:	As Welded	Dressed
Surface Preparation:	Dry & free of all dirt, grease, scale, spatter, oil etc.	
Illumination:	Natural	Auxiliary
Fabrication Stage:	Fabrication Complete.	
Purpose of Test:	To find all surface breaking defects/ indications.	
Name of Welder: N/A	I.D. No: N/A	Results:
Comments: Inspection to determine if any **NEW** defects have appeared, other than any old defects. No new defects found. Only defects to be found were original: small indications of under cut.  		Accept: **YES**

FORTH ESTUARY TRANSPORT AUTHORITY

L.P.I. WELD INSPECTION REPORT		
Technician: Signature:	Inspection Qualification: **P.C.N. LEVEL 2**	Date: 17/01/09
Work Pack No. N/A	Drg No. N/A	Inspection Part: MW3 DEMAG POS. 12 INT. & POS 12 GUIDE BLOCK
Inspection Document Conforming To BSEN 571-1:1997& BSEN1289:1998. Additional Info see FETA WP 15 &16		
Acceptance Standard:	BSEN 1289: 1998	
Acceptance Level:(Highlighted)	**1** **2** **3**	
Area Examined:(BSEN571-1)	Welds & Heat Affected Zone	
Process Type(Highlighted)	**Fluorescent** **Colour Contrast** **Combined**	
Type/Make of Consumables:	Rocol Flaw: Cleaner, Penetrant, Developer	
Method of Application:	Spraying/Brushing	
Penetration Time:	20mins to 30mins	
Development Time:	15mins	
Surface Condition:	As Welded	Dressed
Surface Preparation:	Dry & free of all dirt, grease, scale, spatter, oil etc.	
Illumination:	Natural	Auxiliary
Fabrication Stage:	Fabrication Complete.	
Purpose of Test:	To find all surface breaking defects/ indications.	
Name of Welder: N/A	I.D. No: N/A	Results:
Comments: Inspection to determine if any **NEW** defects have appeared, other than any old defects. No new defects found. Only defects to be found were original: small indications of under cut.  		Accept: **YES** Reject:

FORTH ESTUARY TRANSPORT AUTHORITY

L.P.I. WELD INSPECTION REPORT		
Technician: Signature:	Inspection Qualification: **P.C.N. LEVEL 2**	Date: 17/01/09
Work Pack No. N/A	Drg No. N/A	Inspection Part: MW3 DEMAG POS. 8 GUIDE BLOCK

Inspection Document Conforming To BSEN 571-1:1997& BSEN1289:1998. Additional Info see FETA WP 15 &16			
Acceptance Standard:	BSEN 1289: 1998		
Acceptance Level:(Highlighted)	**1**	**2**	**3**
Area Examined:(BSEN571-1)	Welds & Heat Affected Zone		
Process Type(Highlighted)	**Fluorescent**	**Colour Contrast**	**Combined**
Type/Make of Consumables:	Rocol Flaw: Cleaner, Penetrant, Developer		
Method of Application:	Spraying/Brushing		
Penetration Time:	20mins to 30mins		
Development Time:	15mins		
Surface Condition:	As Welded	Dressed	
Surface Preparation:	Dry & free of all dirt, grease, scale, spatter, oil etc.		
Illumination:	Natural	Auxiliary	
Fabrication Stage:	Fabrication Complete.		
Purpose of Test:	To find all surface breaking defects/ indications.		

Name of Welder: N/A	I.D. No: N/A	Results:
Comments: Inspection to determine if any **NEW** defects have appeared, other than any old defects. No new defects found. Only defects to be found were original: small indications of under cut.  		Accept: **YES** Reject:

FORTH ROAD BRIDGE

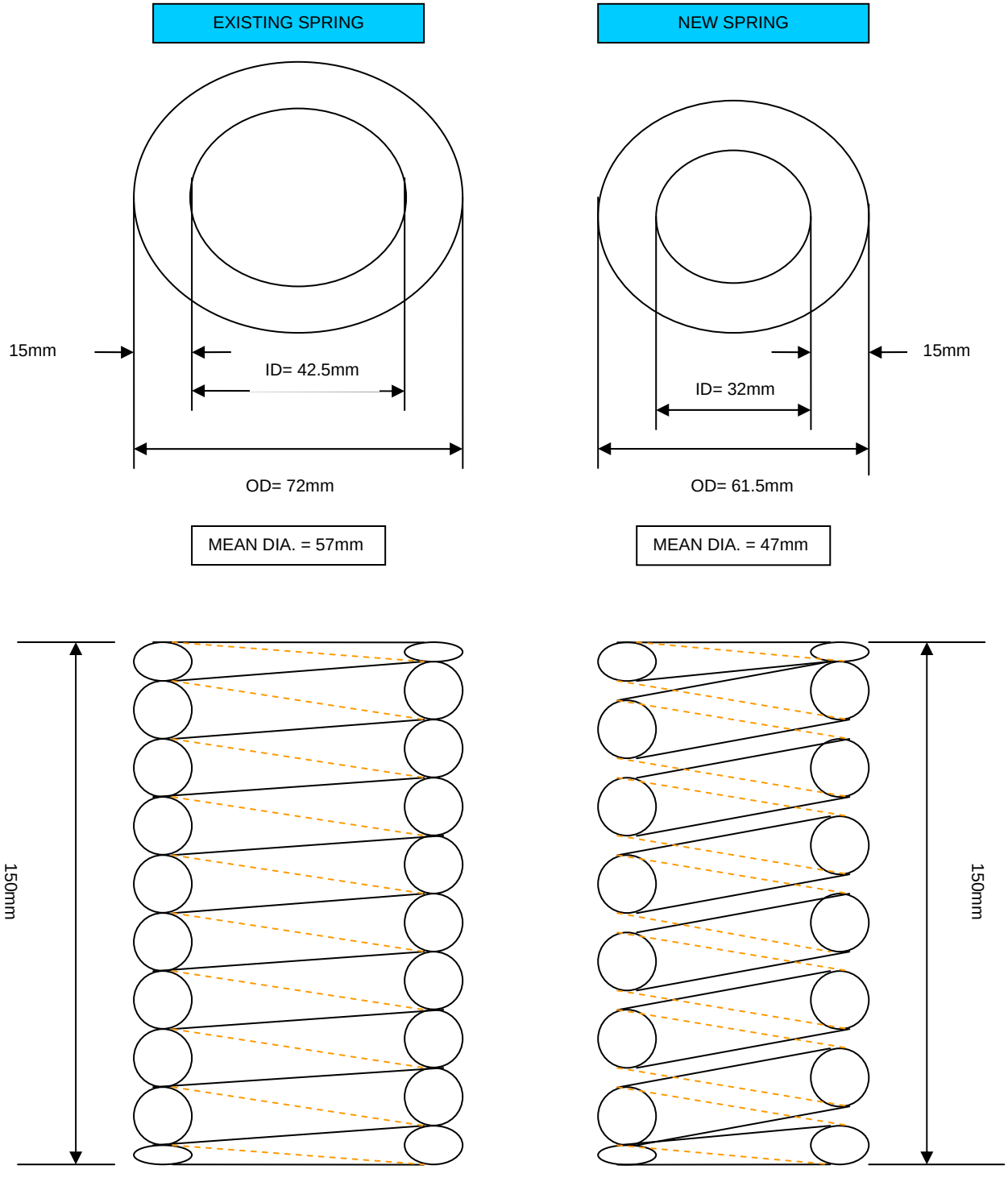
FORTH ESTUARY TRANSPORT AUTHORITY

L.P.I. WELD INSPECTION REPORT		
Technician: Signature:	Inspection Qualification: **P.C.N. LEVEL 2**	Date: 17/01/09
Work Pack No. N/A	Drg No. N/A	Inspection Part: MW3 DEMAG POS. 7 EXT.
Inspection Document Conforming To BSEN 571-1:1997& BSEN1289:1998. Additional Info see FETA WP 15 &16		
Acceptance Standard:	BSEN 1289: 1998	
Acceptance Level:(Highlighted)	**1** **2** **3**	
Area Examined:(BSEN571-1)	Welds & Heat Affected Zone	
Process Type(Highlighted)	**Fluorescent** **Colour Contrast** **Combined**	
Type/Make of Consumables:	Rocol Flaw: Cleaner, Penetrant, Developer	
Method of Application:	Spraying/Brushing	
Penetration Time:	20mins to 30mins	
Development Time:	15mins	
Surface Condition:	As Welded	Dressed
Surface Preparation:	Dry & free of all dirt, grease, scale, spatter, oil etc.	
Illumination:	Natural	Auxiliary
Fabrication Stage:	Fabrication Complete.	
Purpose of Test:	To find all surface breaking defects/ indications.	
Name of Welder: N/A	I.D. No: N/A	Results:
Comments: Inspection to determine if any **NEW** defects have appeared, other than any old defects. No new defects found. Only indications to be found were original: small indications of under cut.  	Accept: **YES** Reject:	

There was also an inspection of the west tongue plate bearing beam, which had a large amount of corrosion on its south east corner, the findings are as follows.

The flange of the beam has an approximate thickness of 18mm, when corrosion has been removed the edge thickness measures 12mm, with a depression of a thickness of 9mm.
The tongue plate pin hole is also elongated, this could be from time of installation or not. The hole measures 29mm Dia. and 36.5mm long.

On reinstating the expansion joint, new springs were fitted to MW3 tongue plate and also to MW2 (east spring only) and also to MW4 (west spring only). On installation of the rocker plate it was discovered that the newly purchased rocker plate springs were the incorrect size. The original spring was re-used as it was in good enough condition.


EXISTING SPRING
NEW SPRING
15mm
ID= 42.5mm
OD= 72mm
ID= 32mm
OD= 61.5mm
15mm
MEAN DIA. = 57mm
MEAN DIA. = 47mm
150mm
150mm

Re-instatement of expansion joint commenced at 10:45Hrs.
The re-instatement went smoothly, with the exception of the last two leaves which had the pins seized.
The operation was completed at 13:15Hrs with filling of the pin recesses.
Carriageway was handed over to operations at 14:30Hrs approx. after some unrelated remedial work in the same location.

Follow up check Monday 19/01/09:
Slide plate No.5 has still not settled back into its original position, as photos show.

As a result gaps between rocker plate and slide plate1 are still sitting at approximately 30mm± 5mm.

For additional information please refer to BC 06/MSNW 17.01.09

Bridge Inspector: