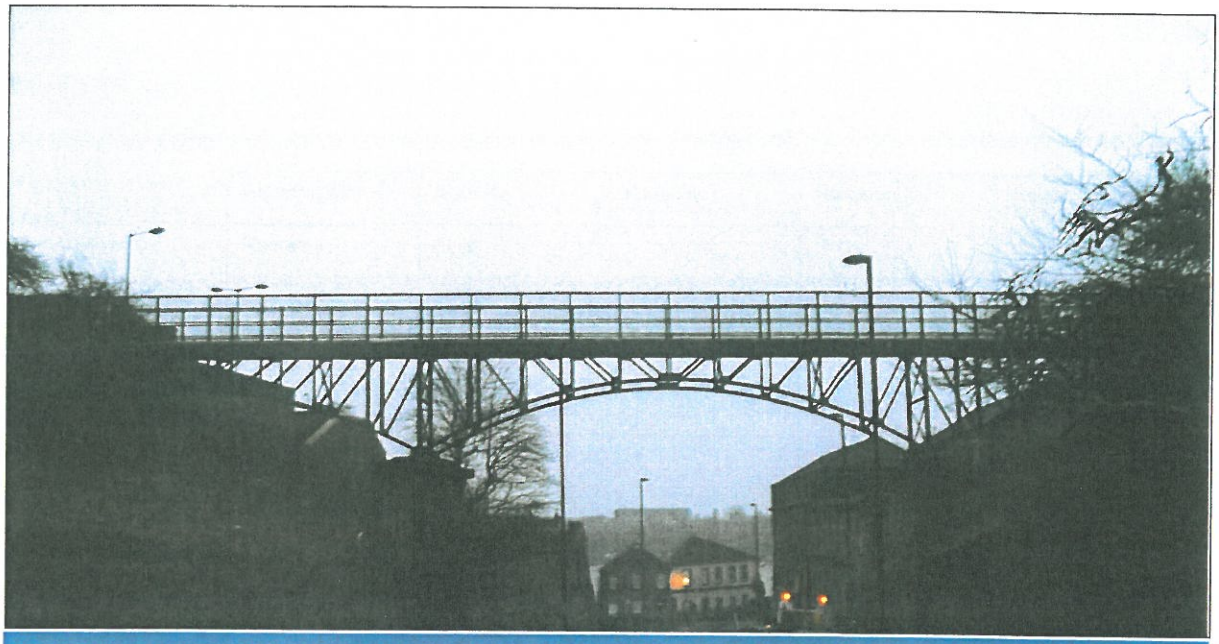


UNITED BY OUR DIFFERENCE

WSP

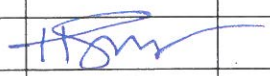
340 Borough Road Footbridge
Principal Inspection
North Tyneside Council

22 February 2011

North Tyneside Council

REF:10330058/PI340

QM

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	Final			
Date	20 Jan 2012			
Prepared by	Harpreet Jagdey			
Signature				
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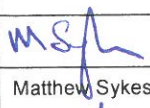
Signature				
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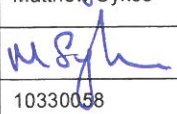
Signature				
Project number	10330058			
File reference	10330058/PI340			

WSP Infrastructure
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Contents

Executive Summary

The steel lattice arch footbridge is in fair condition.

Instances of paint failure and associated corrosion were noted throughout the superstructure. Moderate to heavy corrosion has occurred at the connection of the superstructure to the north and south abutment. Calcites were noted to the concrete deck soffit indicating water penetration through the deck.

Vegetation growth and algal staining is evident to the masonry abutment shelves. The masonry piers have dry staining, pointing loss, graffiti and general weathering throughout their surfaces.

The steel mesh parapets are showing signs of paint failure in general. Moderate corrosion has also occurred to the top of the parapet posts.

The footway surfacing is in generally good condition but has a number of minor cracks in the top layer. Cracks were also noted on the paved approaches to the footbridge.

It is recommended that the following works are undertaken to maintain the integrity of the footbridge:-

Substructure

- De-vegetation of the abutments and cleaning of algal staining is required over both abutments.
- Masonry repair works (e.g. re-pointing etc. as required) should be undertaken to the abutments and piers.

Superstructure

- It is recommended that a special inspection is undertaken to verify the existing paint condition of the superstructure, as per BD 87/05. Following the inspection, appropriate actions should be adopted in accordance with the guidance.

Footway Surfacing

- The footway surfacing should be renewed to prevent water ingress to the deck slab.

1 Detailed Inspection Report

1.1 TITLE SHEET

1.1.1	Structure Name:	Borough Road Footbridge
1.1.2	Structure Number:	340
1.1.3	Grid Reference:	435568 567948
1.1.4	Date of Construction:	Not Known

1.2 DESCRIPTION OF STRUCTURE

GENERAL DESCRIPTION

1.2.1 Borough Road Footbridge is a 3 span steel lattice arch structure with reinforced concrete deck slab. It is supported over masonry piers and abutments. The central span of the footbridge is 17m with two end spans of 11m each. The clear width of footway is 2m. The parapets are of steel construction with mesh in-fill between the posts. The footbridge provides access for pedestrains between Waldon Street and Tennyson Terrace over the Borough Road in North Tyneside.

ANCILLARIES

1.2.2 None present

FOUNDATIONS

1.2.3 The foundations were not visible for inspection. However, they are believed to be spread footings for the piers and abutments.

DRAINAGE SYSTEM AND WATERPROOFING

1.2.4 It is believed that the surfacing to the top of bridge deck is acting as waterproofing to the bridge deck.

1.3 DESCRIPTION OF INSPECTION

PREVIOUS INSPECTIONS

1.3.1 Not known

PREVIOUS TEST DATA

1.3.2 None available

INSPECTING ENGINEER(S)

1.3.3 D.Garvie and K.Hancock

DATE(S) OF INSPECTIONS

1.3.4 22 February 2011

WEATHER CONDITIONS

1.3.5 Dark, wet and misty

DESCRIPTION OF HOW INSPECTION WAS UNDERTAKEN

1.3.6 All inspection works were carried out in accordance with the Risk Assessment and Method Statement. Traffic management was in place and MEWP was used for the inspection.

1.4 RESULTS OF INSPECTION

GENERAL

The footbridge is considered to be in generally fair condition.

FOUNDATIONS

1.4.1 The foundations are buried and were not visible for inspection. However, there were no apparent signs of foundation movement or settlement.

SUBSTRUCTURE

1.4.2 North Abutment

- Algal staining was noted to the surface of the abutment (photograph 2).
- Growth of vegetation to the abutment shelves, between the masonry blocks was noted (photograph 1).
- Mortar loss and open joints were noted to the block masonry to the west of the abutment (photograph 2).

1.4.3 South Abutment

- The south abutment was found to be subject to algal staining for most of the visible surface area with rust stains on the bearing stones (photograph 3).
- Growth of vegetation to the abutment shelves, between the masonry blocks was noted (photograph 3).
- Displaced blocks and open joints were noted to the block masonry to the east of abutment (photograph 4).

1.4.4 North and South Pier

- Both of the piers were noted to have pointing loss (upto 25% of surface area) due to weathering (photographs 5, 6).
- Dry staining and soot deposits were observed on both of the pier surfaces (photographs 7 & 10).
- The bearing pad of the north pier is showing signs of scaling (photograph 9).
- Algal staining and vegetation growth was noted to the top of the pier surfaces (photograph 8).

SUPERSTRUCTURE

1.4.5 Steel Lattice Arch

- The steel members were found to have paint loss and associated corrosion in general. Minor steel flaking has occurred at a few places, also due to failure of the paint coating (photographs 12 – 18).
- Corrosion is more severe at the connection of the superstructure to the abutment and piers. Steel flaking was also observed at these locations (photographs 19, 20).

- Graffiti was noted on the steel members near to the abutments (photograph 17).

1.4.6 Deck Slab

- Accumulation of calcites was noted at a few locations to the deck soffit (photograph 21).
- Algal staining and minor honeycombing was observed on the edges of the deck slab (photograph 22).

COMPONENTS

1.4.7 Parapets

- Moderate corrosion was noted to the connection of vertical and horizontal posts at the top (photograph 24).
- General paint failure and associated minor corrosion was observed to the parapet members at a few locations (photograph 25).
- Minor pointing loss has occurred on the masonry approach parapets (photograph 28).

1.4.8 Footway Surfacing

- Cracks were noted to the top layer of the footway surfacing (photograph 27). The concrete surfacing over the approaches is also showing the signs of cracking (photograph 28).
- Vegetation growth was observed to the edges of the footway for the whole length of the footbridge (photograph 26).

1.4.9 Waterproofing

- The bridge deck soffit was generally found to be dry apart from instances of accumulation of calcites at a few locations. This is most probably due cracks on the footway surfacing that are allowing water penetration through the deck (photograph 21).

1.4.10 Joints

- No joints were visible for inspection. However it is assumed that buried joints over the abutments are leaking allowing water ingress on to the abutments.

1.4.11 Bearings

- The abutment bearing plates under the longitudinal members are believed to be corroded as is indicated by rust stains to the abutments (typical photograph 29).

1.4.12 Drainage

- The drainage over the footbridge appears to be in good working order as there is no ponding over the footway surfacing.

CONCLUSIONS

The bridge has a number of defects, but these are not currently affecting the integrity of the structure. However, it is recommended that these defects be repaired to avoid any worsening of the defects in the future.

1.4.13 Substructure

- De-vegetation of the abutments and cleaning of algal staining is required over both abutments.
- Masonry repair works (e.g. re-pointing etc. as required) should be undertaken to the abutments and piers.

1.4.14 Superstructure

- It is recommended that a special inspection is undertaken to verify the existing paint condition of the superstructure, as per BD 87/05. Following the inspection, appropriate actions should be adopted in accordance with the guidance.

1.4.15 Footway Surfacing

- The footway surfacing should be renewed to prevent water penetration through the deck.

Appendix A - Photographs

Photo 1: View showing north abutment bearing shelf

Photo 2: Mortar loss, open joints and algal staining at north abutment

Photo 3: Algal staining and vegetation growth to the south abutment bearing shelf

Photo 4: Displaced block and open joints over the south abutment

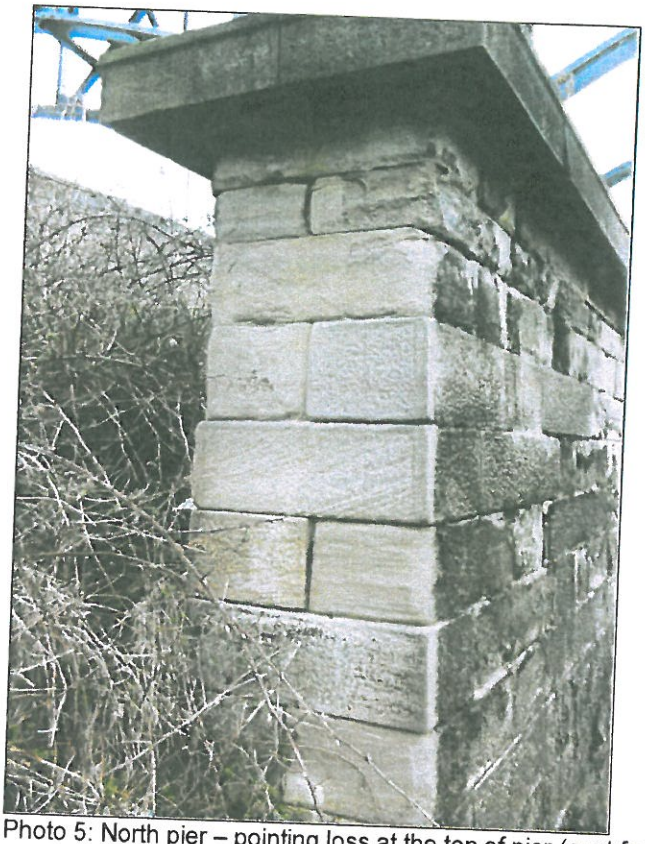


Photo 5: North pier – pointing loss at the top of pier (east face)

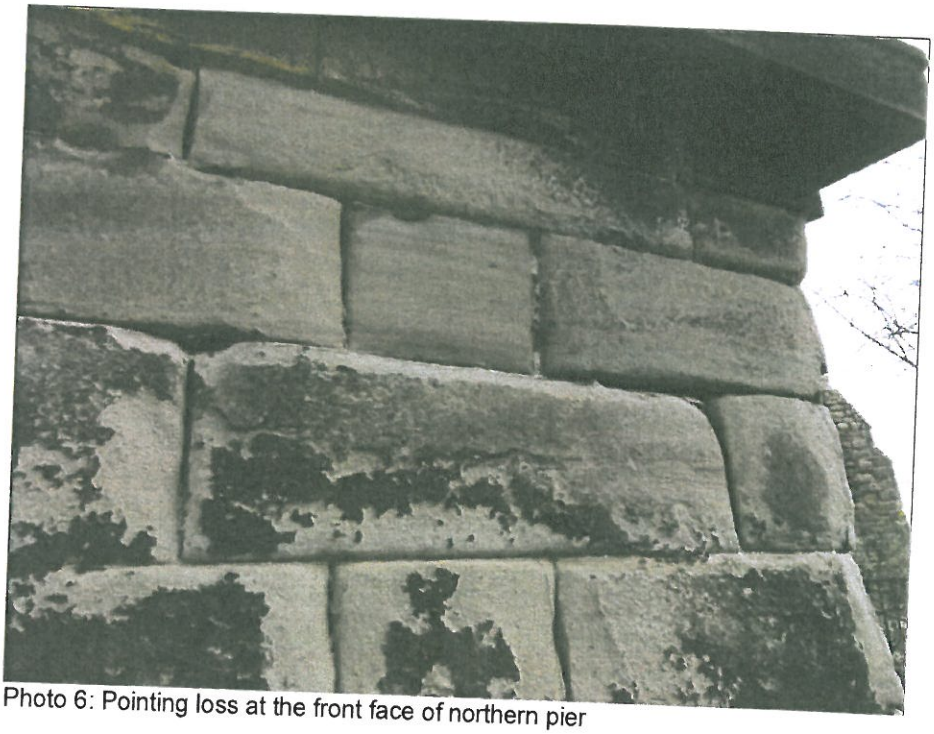


Photo 6: Pointing loss at the front face of northern pier

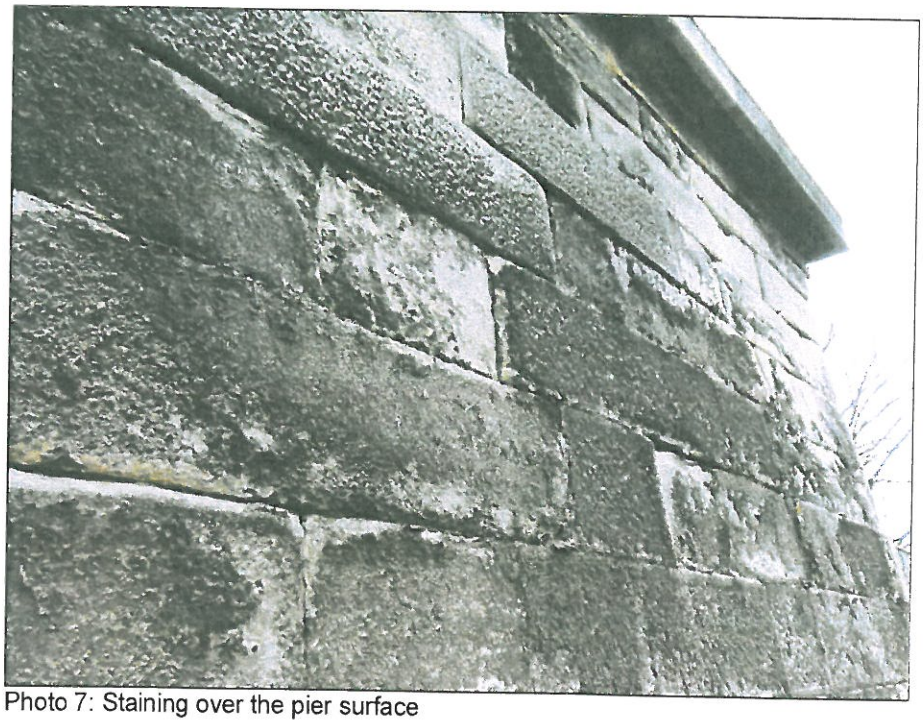


Photo 7: Staining over the pier surface

Photo 8: Algal staining and vegetation growth at the top of north pier

Photo 9: Scaling at the bearing plinth over the northern pier

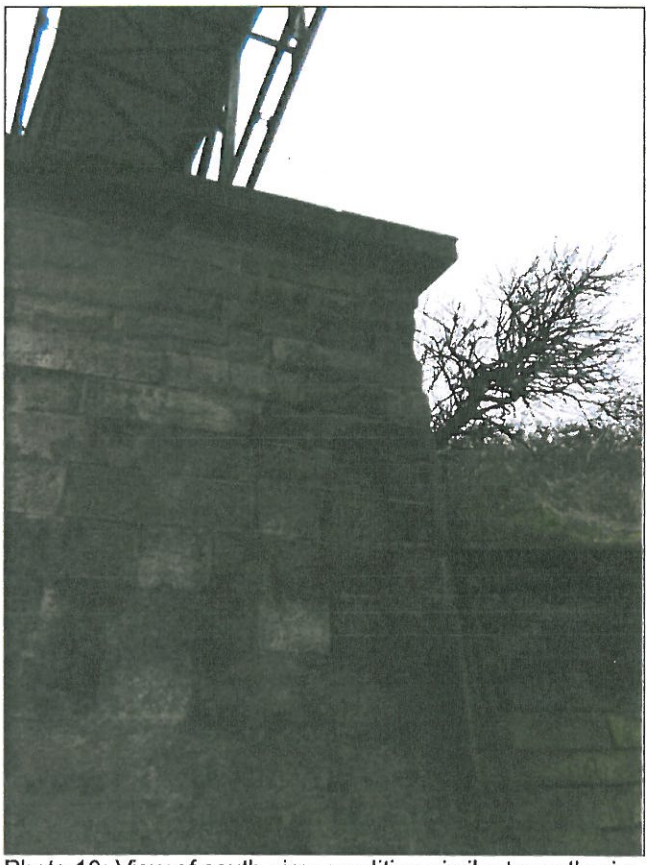


Photo 10: View of south pier- condition similar to north pier

Photo 11: Graffiti at the pier elements

Photo 12: View showing paint failure and associated corrosion on the superstructure

Photo 13: Paint failure and associated corrosion at the connection – typical

Photo 14: Another view of paint failure and associated corrosion on superstructure

Photo 15: Paint failure and associated corrosion at splice connection

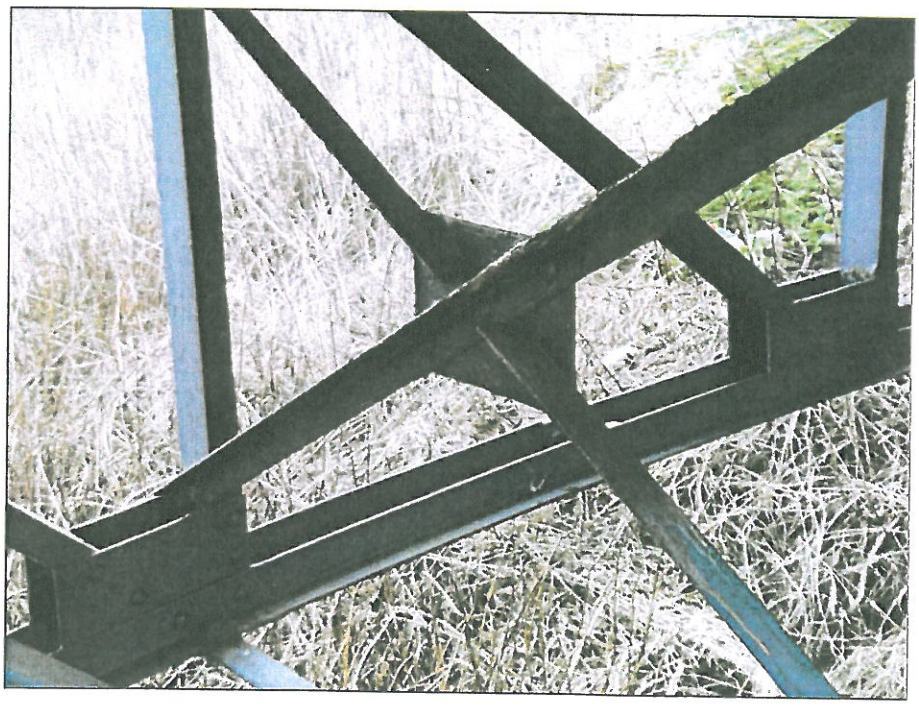


Photo 16: Paint failure and associated corrosion on the bracing members

Photo 17: Graffiti on superstructure members

Photo 18: Steel flaking at the steel member

Photo 19: Corrosion to steel members over the abutment connection – typical

Photo 20: Corrosion and steel flaking at the pier connection – typical

Photo 21: Accumulation of leaching salts on the deck soffit - typical

Photo 22: Algal staining and honey combing over the deck edges

Photo 23: General view of the parapet

Photo 24: Paint failure and steel flaking at top of parapet – typical for few locations

Photo 25: General paint failure and associated corrosion to parapet members

Photo 26: View of footbridge surfacing showing vegetation at the edges of footway

Photo 27: Cracks visible on the top of surfacing

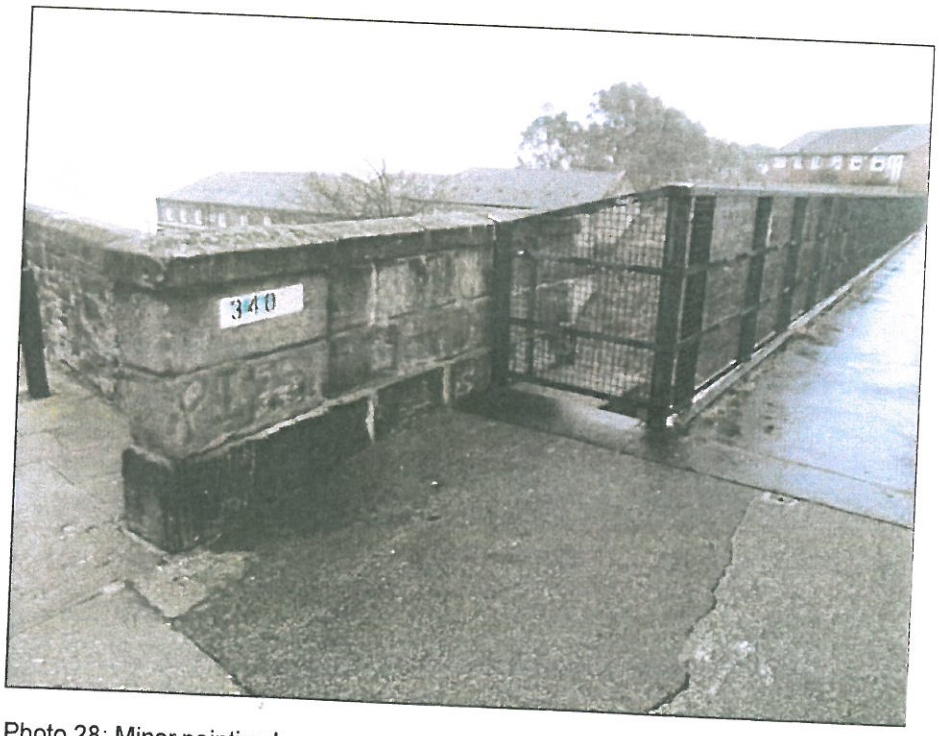
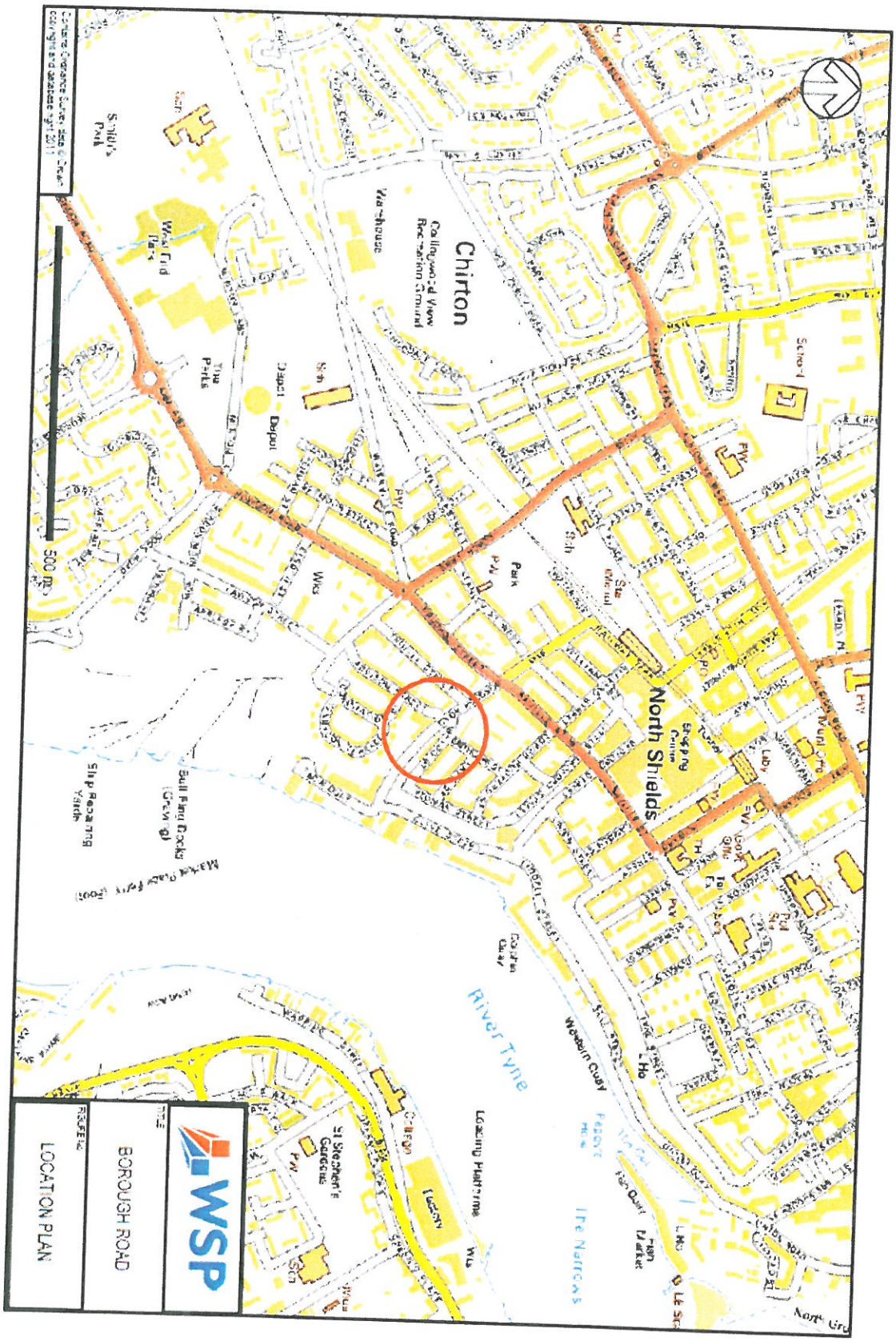


Photo 28: Minor pointing loss over the approach parapets

Photo 29: Corroded bearing plate under the longitudinal steel members

Appendix B - Location Plan



Appendix C - General Arrangement

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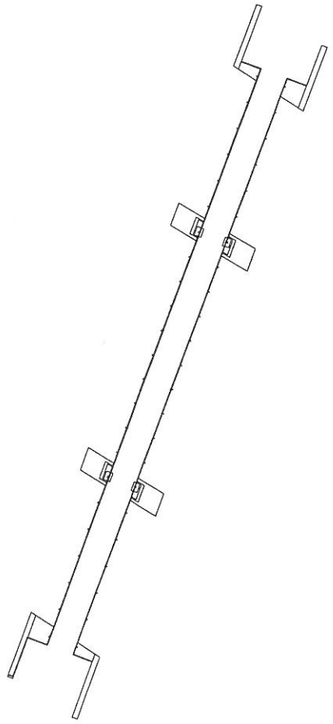
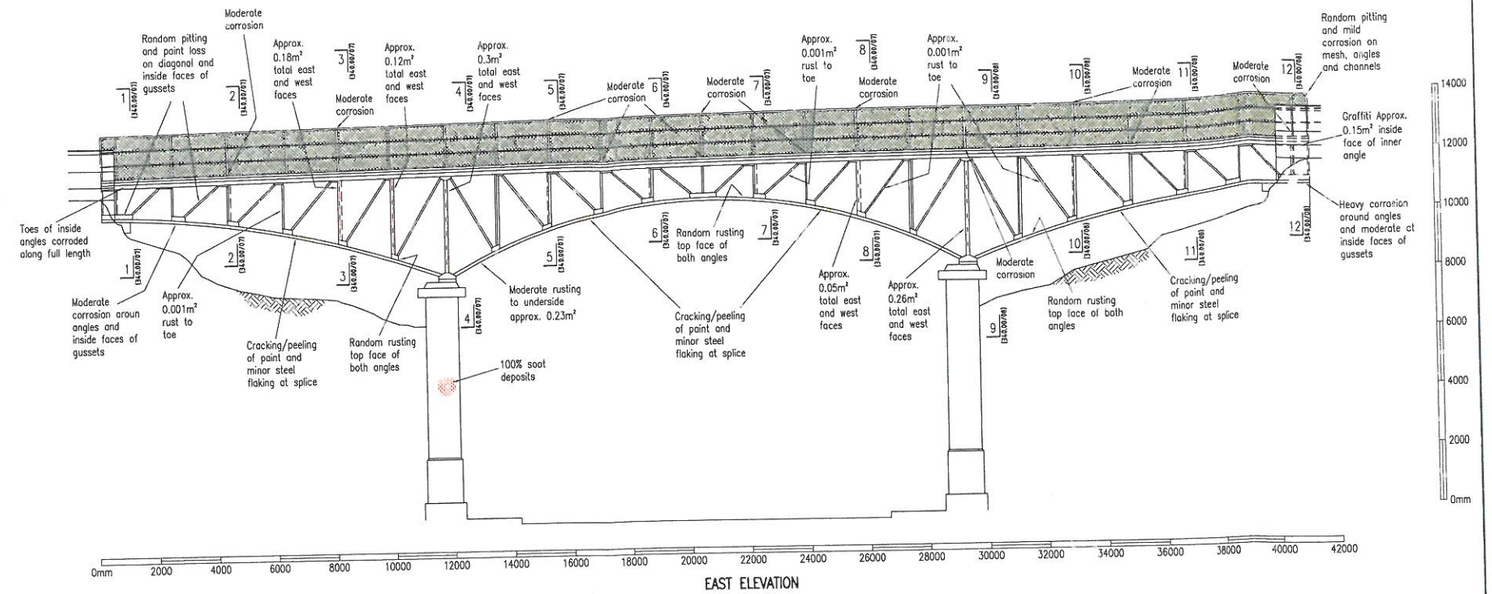
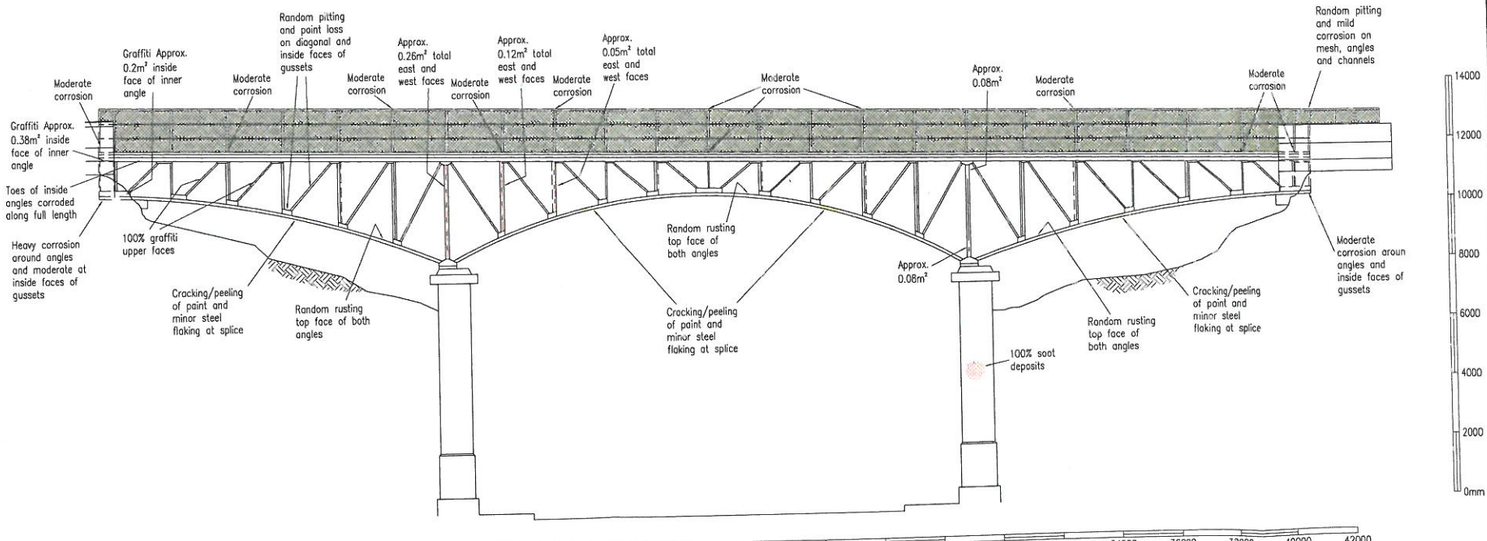


PLAN
Scale 1:200



EAST ELEVATION
Scale 1:100



WEST ELEVATION
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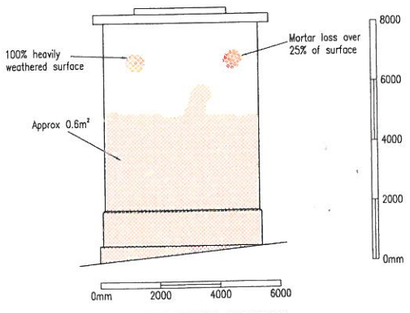
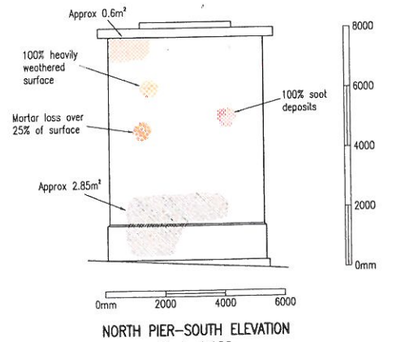
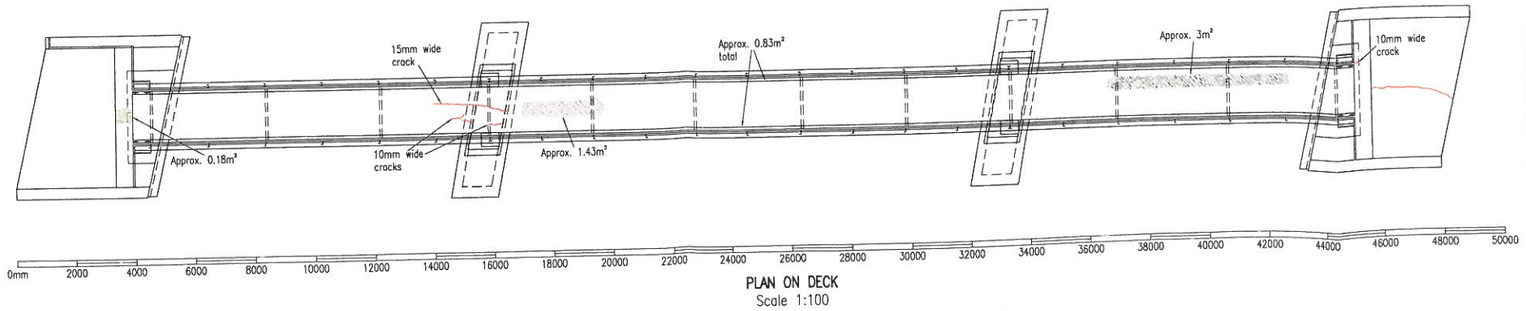


SOUTH PIER–SOUTH ELEVATION
Scale 1:100



NORTH PIER–SOUTH ELEVATION
Scale 1:100



PLAN ON DECK
Scale 1:100

Defect Key

SPALLING · LEACHATE · REPAIR · SMOKE DEPOSITS · MORTAR LOSS · DRY STAINING · RUST STAINING · GRAFFITI · VEGETATION · MASONRY EROSION

REV	DATE	BY	DESCRIPTION	CHK	APD

DRAWING STATUS: FINAL

WSP
Weymouth House, Hampshire Court, Newcastle Upon Tyne NE4 7YG
Tel: +44 (0)191 273 3123 Fax: +44 (0)191 226 1791
http://www.wspgroup.com

CLIENT: NORTH TYNESIDE COUNCIL

ARCHITECT:

PROJECT: NORTH TYNESIDE MINI TENDER

TITLE: 340.00 BOROUGH ROAD

SCALE @ A1:	CHECKED:	APPROVED:
AS SHOWN	-	-
CAD FILE: 10330058\340	DESIGN-DRAWN: KH	DATE: 01 March 2011
PROJECT No: 10330058	DRAWING No: 10330058\340	REV: A

Appendix D - Bridge Inspection Pro Forma

Bridge Inspection Pro Forma Version: July 2004

☐ Superficial	☐ General	☒ Principal	☐ Special	**Form 1 of 3 for this bridge**

Inspector: D Garvie	Date: **22/02/2011**	Next Inspection Type/Date: **GI/Feb 2013**
Bridge Name: **Borough Road Footbridge**	Bridge Ref/No: **340**	Road Ref/No: **F**
Map Ref:	O.S.E **435568**	O.S.N **567948**
Span **1 of 3 (N to S)**	Span Width (m): **2.0**	Span Length (m): **11.00**
All above ground elements inspected: YES ☒ NO ☐		Photographs? YES ☒ NO ☐
Number of construction forms in bridge/span*: 1 ☒ 2 ☐ 3 ☐ more ☐ (*delete as appropriate)		

Bridge Code		
Primary deck form Table 2	02
Primary deck material Table 4	E
Secondary deck form Table 3	34
Secondary deck material Table 4	A

Set	No	Element Description	S	Ex	Def	W	P	Cost	Comments/Remarks
Deck Elements	1	Primary deck element (Table 2)	2	B	1.2	R	2	£1,000	Minor to moderate corrosion to steel members
	2	Secondary deck element/s: Transverse beams	2	B	1.2	R	2		Cost included in element 1
	3	Secondary deck element/s: Element from Table 3	1	A	2.2	N	1	0	
	4	Half joints							
	5	Tie beam/rod							
	6	Parapet beam or cantilever	1	A	5.1	N	1	0	
	7	Deck bracing							
Load-bearing Substructure	8	Foundations	1	A	6.1	N	1	0	
	9	Abutments (incl. arch springing)	2	B	M	R	2	£1,000	
	10	Spandrel wall/head wall							
	11	Pier/column	2	B	3.2	R	2	£1,000	
	12	Cross-head/capping beam							
	13	Bearings	2	B	12.1	R	3	£1,000	
	14	Bearing plinth/shelf	2	B	5.1	R	2	£500	
Durability Elements	15	Superstructure drainage	1	A	8.1	N	1	0	
	16	Substructure drainage							
	17	Waterproofing	2	B	14.2	R	2		Repair cost in element 25
	18	Movement/expansion joints	2	B	10.12	R	2	£2,000	Leakage over the abutment
	19	Finishes: deck elements	4	C	4.1	R	3	£10,000	
	20	Finishes: substructure elements							
	21	Finishes: parapets/safety fences	4	B	4.1	R	3	£1,000	
Safety Elements	22	Access/walkways/gantries							
	23	Handrail/parapets/safety fences	2	B	1.2	R	3	£1,000	
	24	Carriageway surfacing							
	25	Footway/verge/footbridge surfacing	2	B	9.4	R	3	£3,000	
Other Bridge Elements	26	Invert/river bed							
	27	Aprons							
	28	Fenders/cutwaters/collision prot.							
	29	River training works							
	30	Revetment/batter paving							
	31	Wing walls							
	32	Retaining walls							
	33	Embankments							
	34	Machinery							
Ancillary Elements	35	Approach rails/barriers/walls	2	B	3.2	R	2	£500	
	36	Signs							
	37	Lighting							
	38	Services							
	39								
	40								
	41								
	42								

S – severity, **Ex** – extent, **Def** – defect, **W** – work required, **P** – work priority, **Cost** – Cost of work

MULTIPLE DEFECTS

Element No.	Defect 1			Defect 2			Defect 3			Comments
	S	Ex	Def	S	Ex	Def	S	Ex	Def	
9	2	B	3.2	2	B	3.7	2	B	5.1	

INSPECTOR'S COMMENTS

1	The superstructure elements were found to be affected with paint failure and associated corrosion.
1	Moderate to heavy corrosion was noted at the connection elements of the superstructure to the abutment
3	Calcite were found on the deck soffit
18	Joints were found to be leaking.
25	Cracks noted on the surfacing.

Name: D Garvie | Signed: for GHGarvie | Date: 19/1/12

ENGINEER'S COMMENTS

	The structure is in fair condition overall. The recommended actions are listed in the work required table below.

Name: Harpreet Jagdey | Signed: HJagdey | Date: 19/1/12

WORK REQUIRED

Ref. No	Suggested Remedial Work	Priority	Estimated Cost	Action/Work Ordered?
1,2, 19	Cleaning of rust/corrosion of the steel members and apply protective coating	3	£11,000	
9, 11, 14	Masonry repairs to abutments and piers	2	£2,500	
13	Repair to bearing plates	3	£1,000	
18	Abutment joint repair	3	£2,000	
21, 23	Repair to parapets and protective coating	2	£2,000	
25	Repair to footway surfacing	3	£3,000	
35	Repair to masonry approach parapets	2	£500	

Name: Harpreet Jagdey | Signed HJagdey | Date: 19/1/12

☐ Superficial	☐ General	☒ Principal	☐ Special	Form 2 of 3 for this bridge
Inspector: D Garvie		Date: 22/02/2011		Next Inspection Type/Date: GI/Feb 2013
Bridge Name: **Borugh Road Footbridge**			Bridge Ref/No: 340	Road Ref/No: F
Map Ref:	O.S.E 435568		O.S.N 567948	
Span 2 of 3 (N to S)	Span Width (m): 2.0		Span Length (m): 17.00	
All above ground elements inspected: YES ☒ NO ☐			Photographs? YES ☒ NO ☐	
Number of construction forms in bridge/span*: 1 ☒ 2 ☐ 3 ☐ more ☐ (*delete as appropriate)				

Bridge Code		
Primary deck form Table 2	02	
Primary deck material Table 4	E	
Secondary deck form Table 3	34	
Secondary deck material Table 4	A	

Set	No	Element Description	S	Ex	Def	W	P	Cost	Comments/Remarks
Deck Elements	1	Primary deck element (Table 2)	2	B	1.2	R	2	£2,000	Minor to moderate corrosion to steel members.
	2	Secondary deck element/s: Transverse beams	2	B	1.2	R	2		Cost included in element 1
	3	Secondary deck element/s: Element from Table 3	1	A	2.2	N	1	0	
	4	Half joints							
	5	Tie beam/rod							
	6	Parapet beam or cantilever	1	A	5.1	N	1	0	
	7	Deck bracing							
Load-bearing Substructure	8	Foundations	1	A	6.1	N	1	0	
	9	Abutments (incl. arch springing)							
	10	Spandrel wall/head wall							
	11	Pier/column	2	B	3.2	R	2	£1,000	
	12	Cross-head/capping beam							
	13	Bearings	2	B	12.1	R	3	£1,000	
	14	Bearing plinth/shelf	2	B	5.1	R	2	£500	
Durability Elements	15	Superstructure drainage	1	A	8.1	N	1	0	
	16	Substructure drainage							
	17	Waterproofing	2	B	14.2	R	2		Repair cost in element 25
	18	Movement/expansion joints							
	19	Finishes: deck elements	4	C	4.1	R	3	£17,000	
	20	Finishes: substructure elements							
	21	Finishes: parapets/safety fences	4	B	4.1	R	3	£1,000	
Safety Elements	22	Access/walkways/gantries							
	23	Handrail/parapets/safety fences	2	B	1.2	R	3	£1,000	Cost in form 1
	24	Carriageway surfacing							
	25	Footway/verge/footbridge surfacing	2	B	9.4	R	3	£5,000	Cost in form 1
Other Bridge Elements	26	Invert/river bed							
	27	Aprons							
	28	Fenders/cutwaters/collision prot.							
	29	River training works							
	30	Revetment/batter paving							
	31	Wing walls							
	32	Retaining walls							
	33	Embankments							
	34	Machinery							
Ancillary Elements	35	Approach rails/barriers/walls							
	36	Signs							
	37	Lighting							
	38	Services							
	39								
	40								
	41								
	42								

S – severity, **Ex** – extent, **Def** – defect, **W** – work required, **P** – work priority, **Cost** – Cost of work

MULTIPLE DEFECTS

Element No.	Defect 1			Defect 2			Defect 3			Comments
	S	Ex	Def	S	Ex	Def	S	Ex	Def	

INSPECTOR'S COMMENTS

1	The superstructure elements were found to be affected with paint failure and associated corrosion.
1	Moderate to heavy corrosion was noted at the connection elements of the superstructure to the abutment
3	Calcite were found on the deck soffit
25	Cracks noted on the surfacing.

Name: D Garvie	Signed:	Date: 19/1/12

ENGINEER'S COMMENTS

	The structure is in fair condition overall. The recommended actions are listed in the work required table below.

Name: Harpreet Jagdey	Signed:	Date: 19/1/12

WORK REQUIRED

Ref. No	Suggested Remedial Work	Priority	Estimated Cost	Action/Work Ordered?
1,2, 19	Cleaning of rust/corrosion of the steel members and apply protective coating	3	£19,000	
11, 14	Masonry repairs to abutments and piers	2	£1,500	
13	Repair to bearing plates	3	£1,000	
21, 23	Repair to parapets and protective coating	2	£2,000	
25	Repair to footway surfacing	3	£5,000	

Name: Harpreet Jagdey	Signed	Date: 19/1/12

☐ Superficial	☐ General	☒ Principal	☐ Special	**Form 3 of 3 for this bridge**
Inspector: D Garvie		Date: **22/02/2011**		Next Inspection Type/Date: **GI/Feb 2013**
Bridge Name: **Borugh Road Footbridge**			Bridge Ref/No: **340**	Road Ref/No: **F**
Map Ref:	O.S.E **435568**		O.S.N **567948**	
Span **3 of 3 (N to S)**	Span Width (m): **2.0**		Span Length (m): **11.00**	
All above ground elements inspected: YES ☒ NO ☐			Photographs? YES ☒ NO ☐	
Number of construction forms in bridge/span*: 1 ☒ 2 ☐ 3 ☐ more ☐ (*delete as appropriate)				

Bridge Code		
	Primary deck form Table 2	02
	Primary deck material Table 4	E
	Secondary deck form Table 3	34
	Secondary deck material Table 4	A

Set	No	Element Description	S	Ex	Def	W	P	Cost	Comments/Remarks
Deck Elements	1	Primary deck element (Table 2)	2	B	1.2	R	2	£1,000	Minor to moderate corrosion to steel members.
	2	Secondary deck element/s: Transverse beams	2	B	1.2	R	2		Cost included in element 1
	3	Secondary deck element/s: Element from Table 3	1	A	2.2	N	1	0	
	4	Half joints							
	5	Tie beam/rod							
	6	Parapet beam or cantilever	1	A	5.1	N	1	0	
	7	Deck bracing							
Load-bearing Substructure	8	Foundations	1	A	6.1	N	1	0	
	9	Abutments (incl. arch springing)	2	B	M	R	2	£1,000	
	10	Spandrel wall/head wall							
	11	Pier/column	2	B	3.2	R	2	£1,000	
	12	Cross-head/capping beam							
	13	Bearings	2	B	12.1	R	3	£1,000	
	14	Bearing plinth/shelf	2	B	5.1	R	2	£500	
Durability Elements	15	Superstructure drainage	1	A	8.1	N	1	0	
	16	Substructure drainage							
	17	Waterproofing	2	B	14.2	R	2		Repair cost in element 25
	18	Movement/expansion joints	2	B	10.12	R	2		Leakage over the abutment. Cost in form 1
	19	Finishes: deck elements	4	C	4.1	R	3	£10,000	
	20	Finishes: substructure elements							
	21	Finishes: parapets/safety fences	4	B	4.1	R	3	£1,000	
Safety Elements	22	Access/walkways/gantries							
	23	Handrail/parapets/safety fences	2	B	1.2	R	3	£1,000	
	24	Carriageway surfacing							
	25	Footway/verge/footbridge surfacing	2	B	9.4	R	3	£3,000	
Other Bridge Elements	26	Invert/river bed							
	27	Aprons							
	28	Fenders/cutwaters/collision prot.							
	29	River training works							
	30	Revetment/batter paving							
	31	Wing walls							
	32	Retaining walls							
	33	Embankments							
	34	Machinery							
Ancillary Elements	35	Approach rails/barriers/walls	2	B	3.2	R	2	£500	
	36	Signs							
	37	Lighting							
	38	Services							
	39								
	40								
	41								
	42								

S – severity, **Ex** – extent, **Def** – defect, **W** – work required, **P** – work priority, **Cost** – Cost of work

MULTIPLE DEFECTS

Element No.	Defect 1			Defect 2			Defect 3			Comments
	S	Ex	Def	S	Ex	Def	S	Ex	Def	
9	2	B	3.2	2	B	3.7	2	B	5.1	

INSPECTOR'S COMMENTS

1	The superstructure elements were found to be affected with paint failure and associated corrosion.
1	Moderate to heavy corrosion was noted at the connection elements of the superstructure to the abutment
3	Calcite were found on the deck soffit
18	Joints were found to be leaking.
25	Cracks noted on the surfacing.

Name: D Garvie | Signed: [signature] | Date: 19/1/12

ENGINEER'S COMMENTS

	. The structure is in fair condition overall. The recommended actions are listed in the work required table below.

Name: Harpreet Jagdey | Signed: [signature] | Date: 19/1/12

WORK REQUIRED

Ref. No	Suggested Remedial Work	Priority	Estimated Cost	Action/Work Ordered?
1,2, 19	Cleaning of rust/corrosion of the steel members and apply protective coating	3	£11,000	
9, 11, 14	Masonry repairs to abutments and piers	2	£2,500	
13	Repair to bearing plates	3	£1,000	
18	Abutment joint repair	3	£2,000	
21, 23	Repair to parapets and protective coating	2	£2,000	
25	Repair to footway surfacing	3	£3,000	
35	Repair to masonry approach parapets	2	£500	

Name: Harpreet Jagdey | Signed [signature] | Date: 19/1/12