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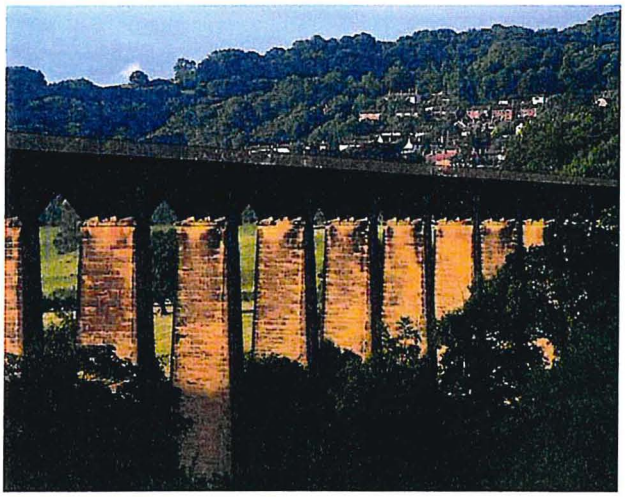
British Waterways
Dyfrffyrdd Prydain



PONTCYSYLLTE AQUEDUCT REFURBISHMENT

APPLICATION FOR SCHEDULED MONUMENT CONSENT: SUPPORTING INFORMATION

Appendix 4
Towpath restoration

JULY 2003

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Appendices

1. Introduction

Original towpath construction

1.1 The 1818 (8 May) Report of James Thomson to Telford states "the supports under tracking path are of fir – an upright in front, and diagonals crossed under path. They are 5 feet apart and very much decayed. And likewise the planking under gravel (3 inch oak plank) is now considerably failed."

1.2 In view of the relatively short life span (13 years) of the original timber construction and the health and safety implications associated with a slippery timber surface we have not considered returning the towpath to a timber construction.

Modifications to the towpath

1.3 The towpath has undergone technological changes which in themselves constitute an element in the heritage value of the Aqueduct.

1.4 Evidence from the historical research (See Appendix 1) indicates that the towpath was replaced on a number of occasions. The timber construction was replaced in 1879 with a different structure consisting of wrought iron buckle plates (see Appendix A – Dwg No. P572/OR/1)

1.5 An inspection report from 1965 confirmed that the buckle plates were seriously corroded. The structural configuration was subsequently modified to the galvanised trench sheet arrangement shown on Dwg No. P572/OR/2 in Appendix B.

Existing towpath construction

1.6 The current towpath is constructed from cast iron standards and bearers which support galvanised steel trench sheeting. The trenching is filled with emulsion/chippings and surfaced with bitumen and concrete. There is a timber fender which extends the whole length of the aqueduct.

1.7 The underside of the towpath was inspected during the trial refurbishment (February 2000) and in areas, particularly at the ends of the aqueduct, has suffered from the effects of corrosion. The support angles have suffered a significant loss of section, which is a result of poor detailing creating a water trap between the timber fender and the support angle.

1.8 One towpath support was repaired during the trial refurbishment as shown in figures 1.1 and 1.2 below.

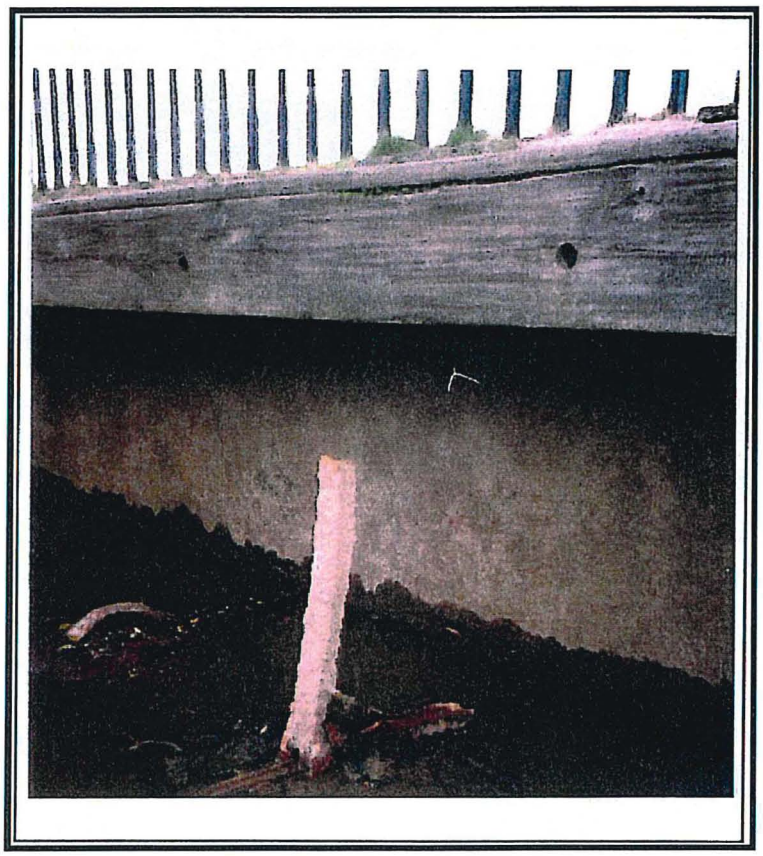


Figure 1.1 Damaged cast iron supporting leg

Figure 1.2 Repaired cast iron supporting leg

2. Removal of existing towpath

2.1 The surfacing of the towpath including galvanised trench sheeting will be broken out and lifted from the supporting structure. The material will be disposed of at a licenced tip.

2.2 An archaeological survey, including photographs and sketches of the remaining skeletal structure will be carried out to accurately record the position and condition of the supporting structure.

2.3 Each element of the towpath support structure will be separately tagged and recorded on the survey drawings.

3 Towpath restoration - Option 1 – Modern steel buckle plate (Preferred)

Modern steel buckle plates

3.1 This option is to restore the towpath generally to the 1879 buckle plate construction. British Waterways propose to retain as much of the original structure as possible but replace the galvanised sheeting with a modern steel buckle plate is proposed as the replacement for the wrought iron buckle plate (see Appendix C Dwg No. P572/OR/3).

Supporting structure and materials

3.2 The cast iron supports will be mechanically wire brushed clean and inspected to assess their adequacy for the intended pedestrian loads. The general condition of the cast iron supports appears to be relatively good.

3.3 If deemed necessary damaged or defective cast iron supports will be replaced with new cast iron members. An original cast iron standard is stored in the brick building adjacent to the north east end of the aqueduct and will be used as the pattern.

3.4 Where the supports can be repaired a welded repair as undertaken during the trial refurbishment (See figure 1.2) is proposed.

3.5 The angle iron, running along the edges of the towpath, is known to be in very poor condition and will be replaced with a modern mild steel angle to the appropriate dimensions for retaining the towpath filling material.

3.6 The removed galvanised trench sheeting will be replaced with mild steel buckle plates.

3.7 The dimensions for each individual buckle plate will be measured separately to confirm the size and shape of each component. If necessary, the elements will be made to measure.

3.8 Welding will not be used to connect the new sections to the Aqueduct trough.

Towpath surfacing

3.9 The towpath surfacing will consist of a granular fill material with a bitumen finish.

Surface preparation and protective coating

3.10 The surfaces of the supporting structural elements will be prepared and coated in accordance with the coating gaining approval from Cadw.

4. Towpath restoration – Option 2 – Restoration to 1879 buckle plate design

Wrought iron buckle plate

4.1 This option considers returning the towpath supporting structure to the 1879 wrought iron buckle plate design (See Appendix A – Dwg No. P572/OR/1).

Supporting structure and materials

4.2 The cast iron supports will be mechanically wire brushed clean and inspected to assess their adequacy for the intended pedestrian loads.

4.3 If deemed necessary damaged or defective cast iron supports will be replaced with a new cast iron support. An original cast iron standard is stored in the brick building adjacent to the north east end of the aqueduct and will be used as the pattern.

4.4 Where the supports can be repaired a welded repair is proposed as shown in figure 1.2.

4.5 The angle iron, running along the edges of the towpath, is known to be in very poor condition and will be replaced with a modern mild steel angle to the appropriate dimensions for retaining the towpath filling material.

4.6 The removed galvanised trench sheeting will be replaced with wrought iron buckle plates. However, it should be noted that tentative investigations have identified that sourcing of the quantity of material necessary for complete replacement with wrought iron may be prohibitive.

4.7 The dimensions for each individual element will be measured separately to confirm the size and shape of each component. If necessary, the elements will be made to measure.

4.8 Welding will not be used to connect the new sections to the Aqueduct trough.

Towpath surface

4.9 The towpath surfacing will consist of a granular fill material with a bitumen finish.

Surface preparation and protective coating

4.10 The surfaces of the supporting structural elements will be prepared and coated in accordance with the coating gaining approval from Cadw.

5. Towpath restoration – Option 3 – Refurbish existing structure

Towpath structure

5.1 The general condition of the towpath structure is generally good. However, the galvanised sheeting and supporting angles running along the front and rear edges of the towpath are in a poor condition and require replacement.

5.2 This option proposes to replace the angle irons and trench sheeting like for like.

5.3 During the trial refurbishment a cast iron support was repaired by welding the sections together. The cast iron supports will be inspected and where possible repaired in-situ. If a repair is not possible (eg a section is missing) the defective section will be replaced with a new cast iron support using the pattern of the cast iron support stored in the brick building at the northern end of the Aqueduct.

Towpath surface

5.4 The towpath surfacing will also be replaced and will consist of a granular fill material with a bitumen finish.

Surface preparation and protective coating

5.5 The surfaces of the supporting structural elements will be prepared and coated in accordance with the coating gaining approval from Cadw.

6 Towpath restoration - Option 4 – Total Replacement

Proposal

6.1 This option is for the complete replacement of the towpath with a more modern design utilising modern materials as indicated in drawing P572/OR/4 in Appendix D.

Supporting structure and materials

6.2 The cast iron supports will be replaced with channel sections and secured in position using cleats.

6.3 The removed galvanised trench sheeting will be replaced with mild steel buckle plates.

6.4 The dimensions for each individual element will be measured separately to confirm the size and shape of each component. If necessary, the elements will be made to measure.

6.5 Welding will not be used to connect the new sections to the Aqueduct trough.

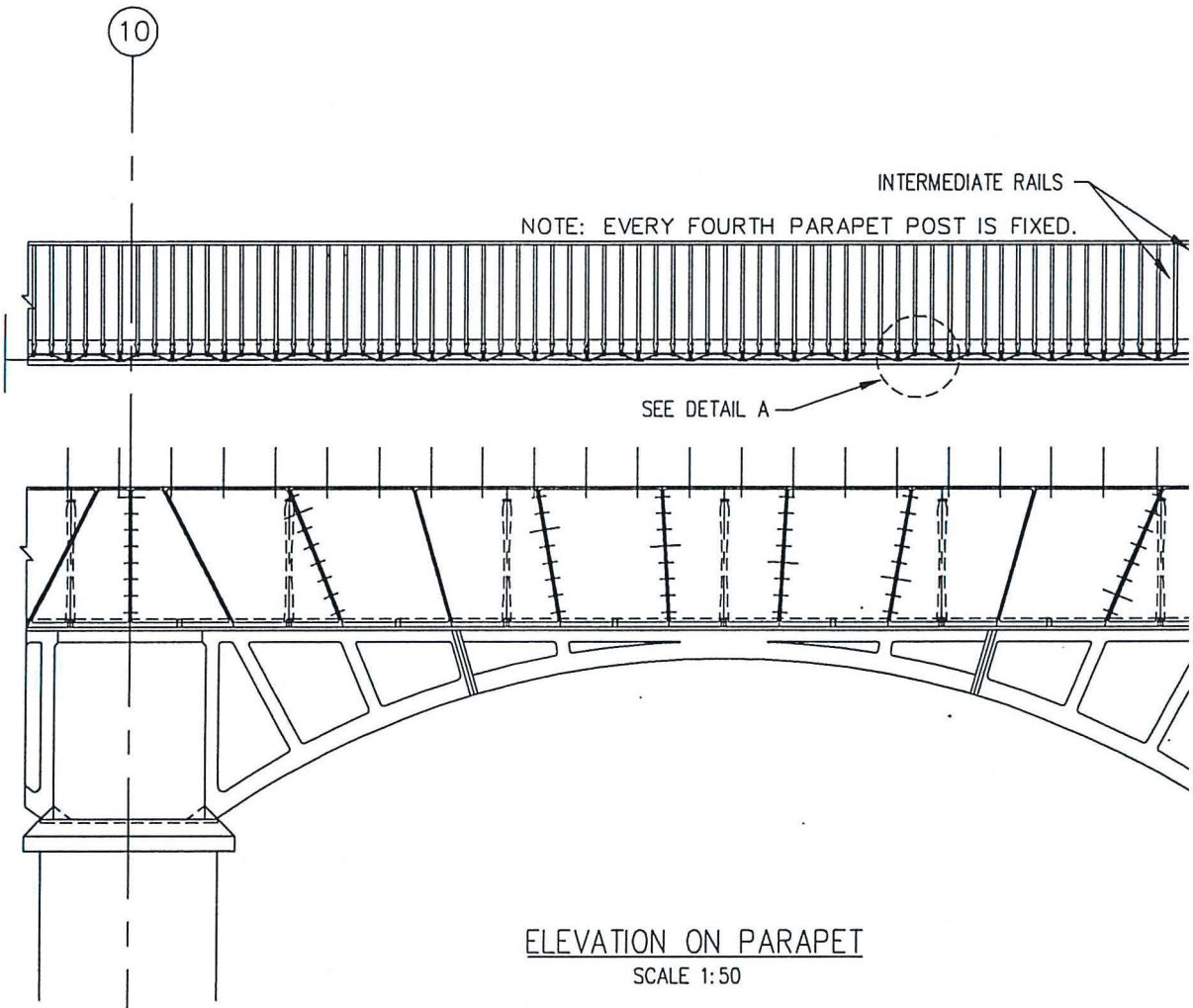
Towpath surfacing

6.6 The towpath surfacing will consist of a granular fill material with a bitumen finish.

Surface preparation and protective coating

6.7 The surfaces of the supporting structural elements will be prepared and coated in accordance with the coating gaining Cadw approval.

Appendix A – Historical drawing – Dwg No P572/OR/1



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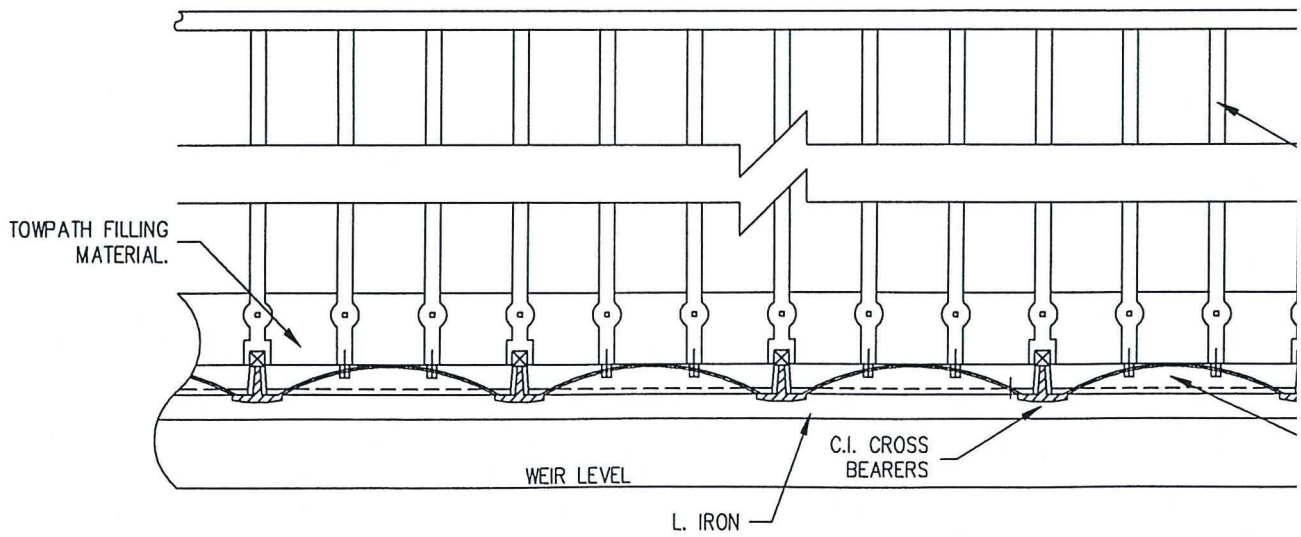


DETAIL A
SCALE 1:20

OFFICE
Navigation Road
Northwich
Cheshire
CW8 1BH
Telephone: 01606 723800
Fax: 01606 871471

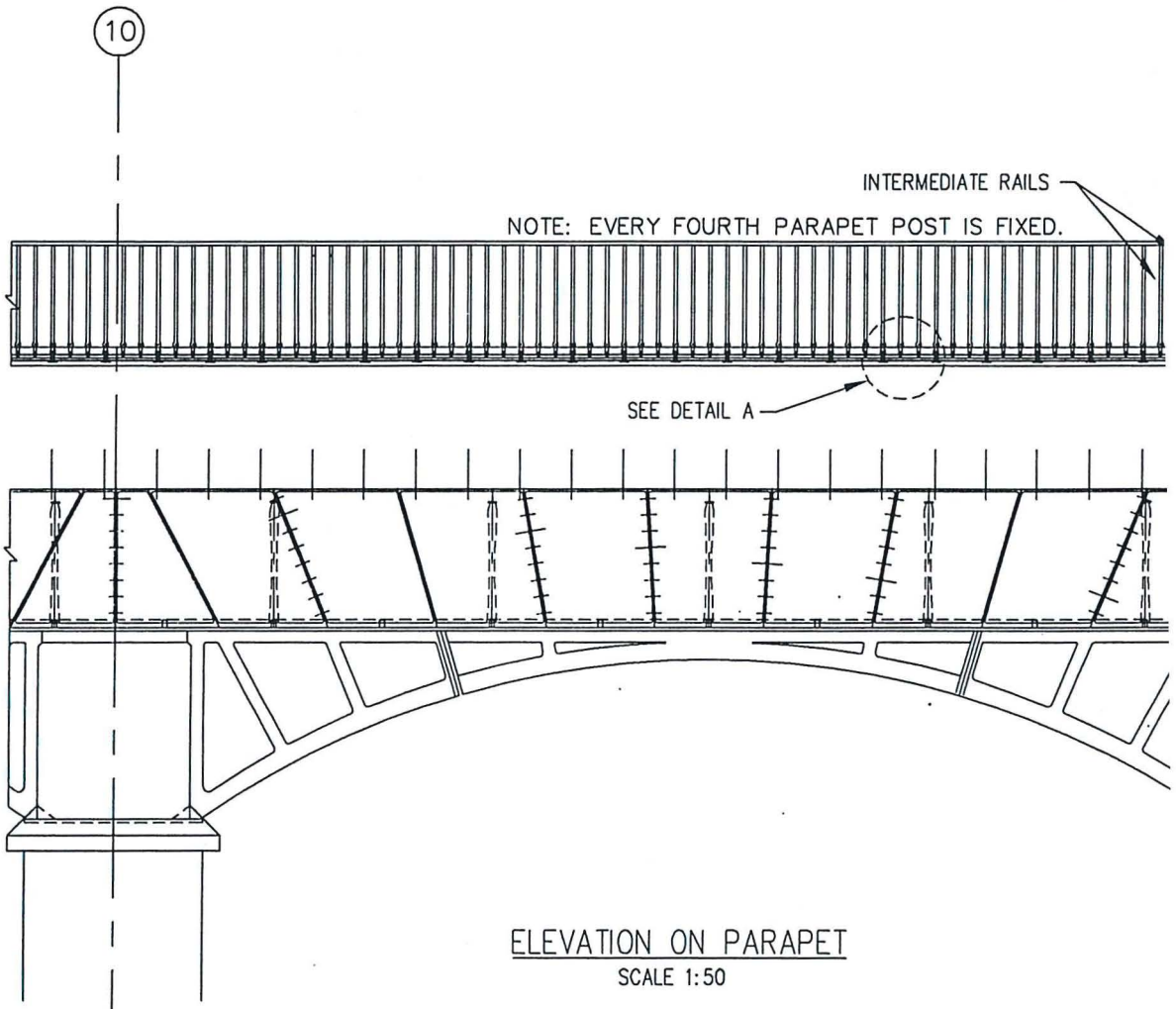
British Waterways

North West Region

TITLE

TOWPATH CONSTR W.I. BUCKLE PLAT OPTION 2.

Appendix B – Existing towpath construction – Dwg No. P572/OR/2



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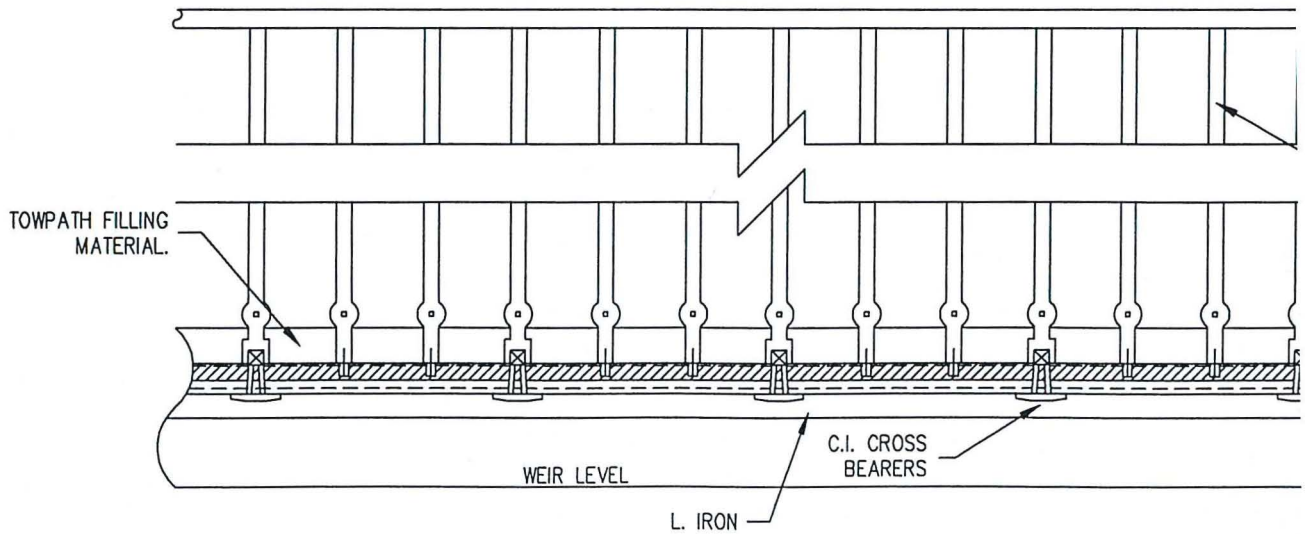


DETAIL A
SCALE 1:20

OFFICE
Navigation Road
Northwich
Cheshire
CW8 1BH
Telephone: 01606 723800
Fax: 01606 871471

British Waterways

North West Region

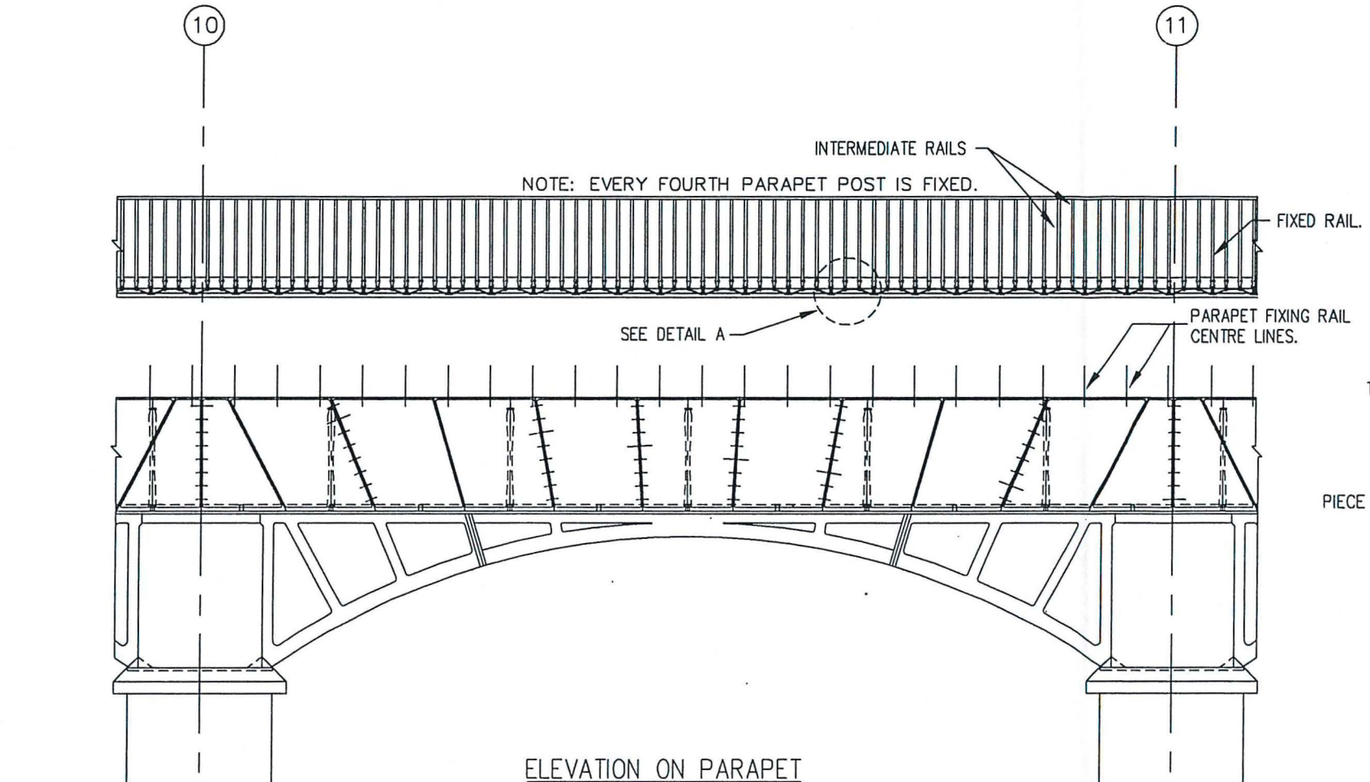
TITLE

TOWPATH CONSTRU

1/4" TRENCH SHE

OPTION 3.

Appendix C – Proposed refurbishment – Option 1 – P572/OR/3



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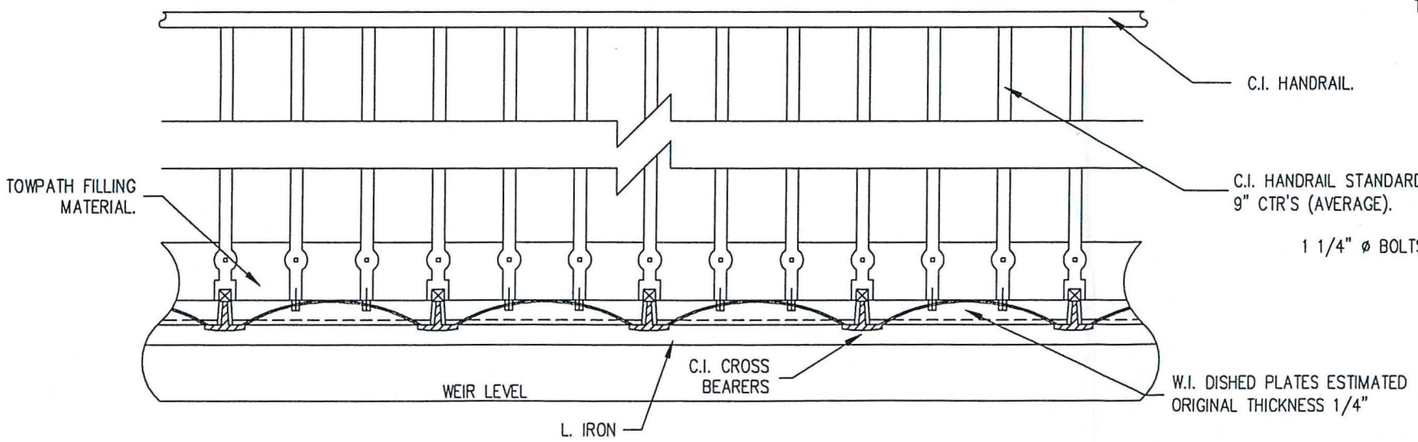

DETAIL A
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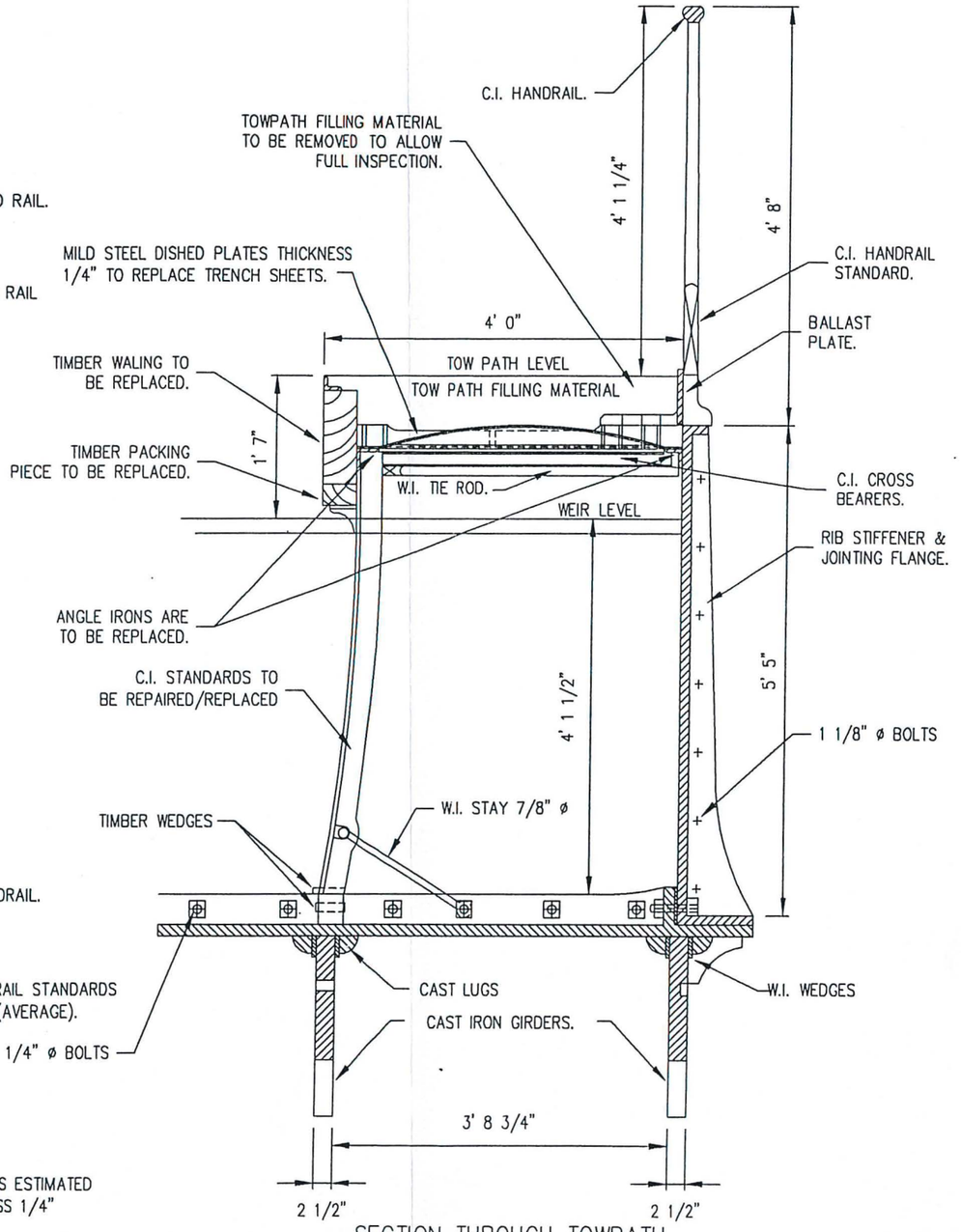


SECTION THROUGH TOWPATH
SCALE 1:20

OFFICE
Navigation Road
Northwich
Cheshire
CW8 1BH
Telephone: 01606 723800
Fax: 01606 871471

British Waterways
North West Region

TITLE
TOWPATH CONSTRUCTION.
MILD STEEL BUCKLE PLATES.
OPTION 1 (PREFERRED).

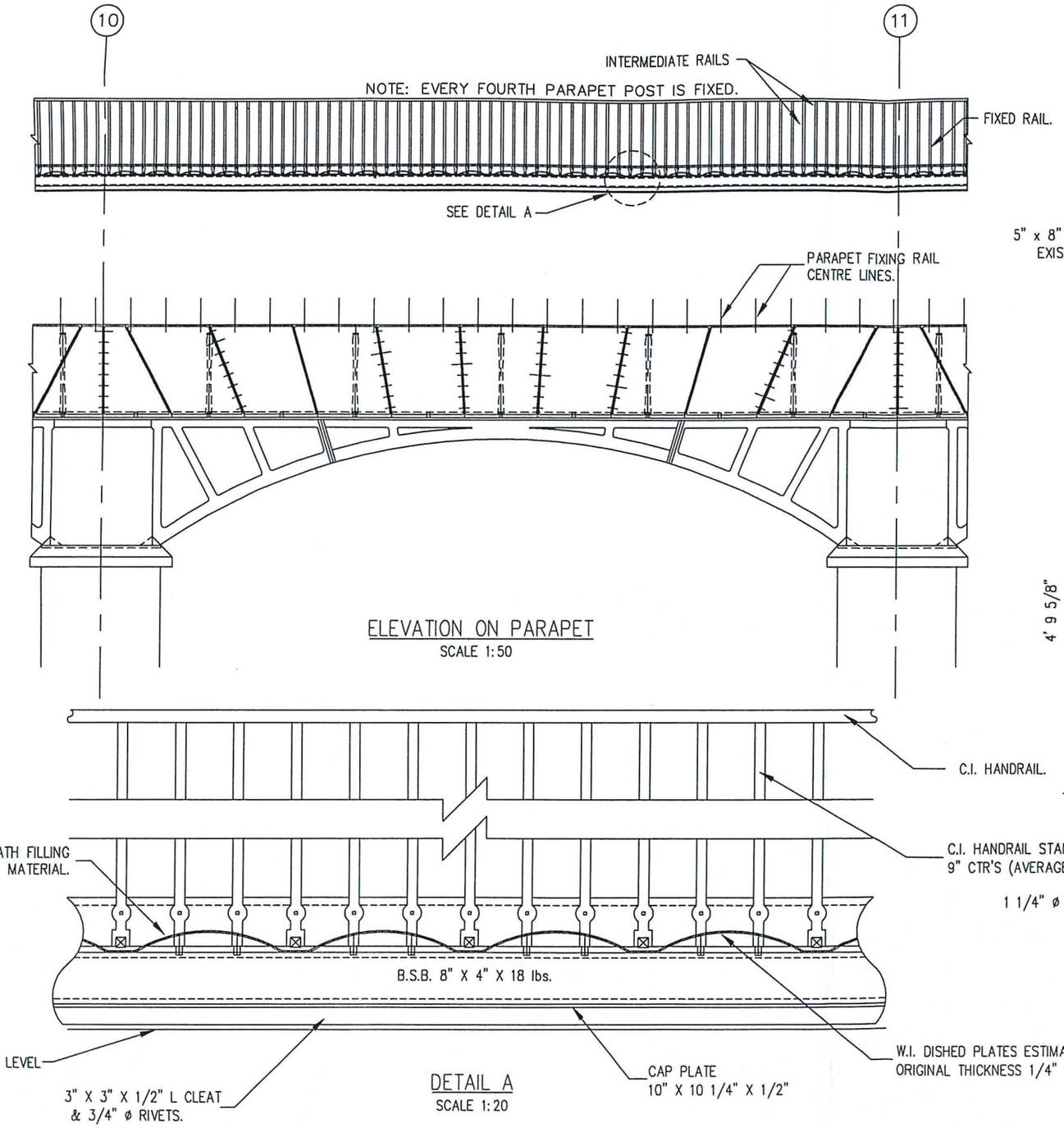
DATE
19/06/03

DRG. NO.
P/572/OR/3

REVISIONS

DRAWN BY A.P	APPROVED BY
CHECKED BY	SCALE AS SHOWN
DESIGNED BY	REVISION A

Appendix D – Total replacement – Option 4 – P572/OR/4



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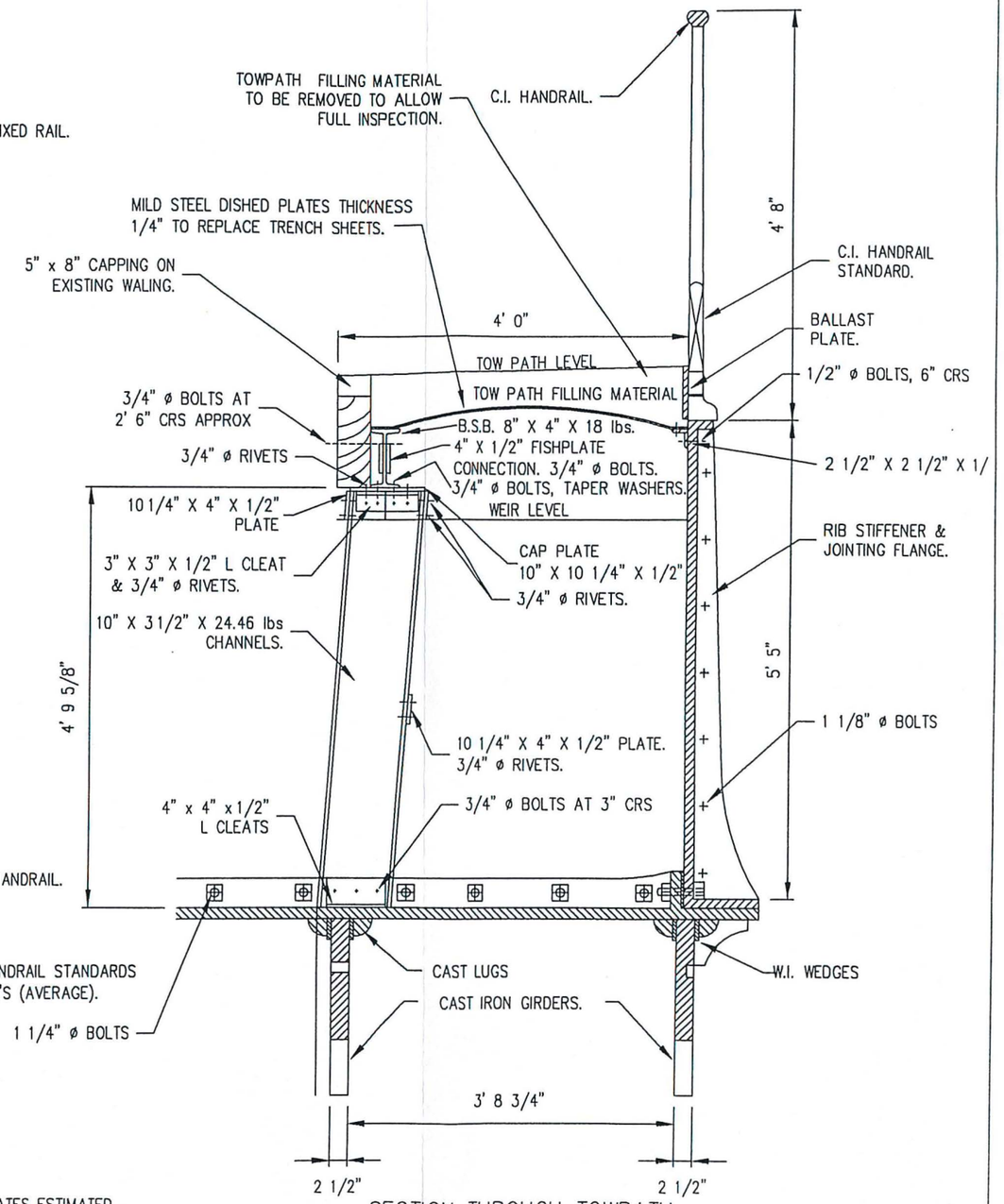
DETAIL A
SCALE 1:20



SECTION THROUGH TOWPATH
SCALE 1:20

OFFICE
Navigation Road
Northwich
Cheshire
CW8 1BH
Telephone: 01606 723800
Fax: 01606 871471

British Waterways
North West Region

TITLE
TOWPATH CONSTRUCTION.
MILD STEEL REPLACEMENT.
OPTION 4.

DATE
25/06/03

DRG. NO.
P/572/OR/4

REVISIONS

DRAWN BY A.P	APPROVED BY
CHECKED BY	SCALE AS SHOWN
DESIGNED BY	REVISION A