

Navigation Committee

10 June 2021

Agenda item number 8

Carrow Road Bridge repairs

Report by Chief Executive and Director of Operations

Purpose

This report seeks members' views on Norfolk County Council's proposal to carry out repairs to Carrow Road Bridge, and fix the deck into position, during the summer of 2022.

Broads Plan context

Objective 4.1 is to "Maintain existing navigation water space and develop appropriate opportunities to expand or extend access for various types of craft." Objective 4.3 is to "Implement, promote and monitor measures to maintain and improve safety and security for the navigation and boats."

1. Introduction

- 1.1. Prior to the last meeting of this Committee on 15 April, members received a copy of a summary report to Norfolk County Council's (NCC) Cabinet regarding the future maintenance of Carrow Bridge, together with a verbal update at the meeting following a conversation between officers and the Director of Highways and Waste. NCC has since provided a copy of a report setting out the options it has considered (see Appendix 1).

2. Carrow Bridge, Norwich

- 2.1. Carrow Bridge was constructed in 1923 to carry the A147 (Carrow Road) Norwich Ring Road over the River Wensum. The bridge has a single leaf bascule rolling lifting span, which when open allows tall vessels to pass on their way to the Port of Norwich. The bridge has a 4.27m (14ft) clearance at average high water.
- 2.2. In 1995, the bridge deck was waterproofed with Acme plywood deck panels, a propriety system with a panel surface having a high-skid resistant coating pre-applied. This decking system is now failing, with most of the original (1995) panels being replaced through maintenance carried out under emergency weekend road closures. These bridge deck repairs and weekend closures are becoming more frequent and expensive.
- 2.3. NCC is proposing to carry out repairs to the bridge deck during the summer of 2022.

- 2.4. NCC's report states the preferred option is estimated to cost £150,000 and involves "temporary maintenance and deck fixing" (para 4.3 of that report). It states that "The bridge would be fixed into position so it would not lift, on a temporary basis pending longer term strategic decisions for lifting bridges in the area". This is justified in order "to reduce disruption for maintenance". Officers' understanding, following a meeting with The Director of Highways and Waste, is that "temporary" would be for a period of at least five years.
- 2.5. The second option, "to refurbish the bridge as a working bascule bridge" has, according to the report, "significant drawbacks on cost (£2m+) and disruption to all highway users as works could result in closure of the bridge for at least three months".
- 2.6. NCC's report references, in para 7.4, "studies looking at Trowse Rail Bridge and whether a new rail bridge to double track the railway over the river is required, and on how to access development sites in East Norwich". Our current understanding is that there is not a strong economic justification for double tracking Trowse Rail Bridge. There is discussion about the provision of a marina downstream of the rail bridge, which could to some extent ameliorate the loss of access by larger boats to the Port of Norwich. However, the timescale and commitment to such provision is far from certain.

3. Present access arrangements

- 3.1. A navigator with a vessel needing bridge openings and wanting access to the Port of Norwich will have a number of bridges to negotiate. Bridge openings are as follows:
 - Trowse Rail Bridge – opened following a 7-day pre-arranged agreement with Network Rail.
 - Carrow Bridge and pedestrian bridges (Lady Julien & Novi Sad) - operated by NCC and also requiring advance notice to open.
- 3.2. Although demand for large vessels to navigate to the upper reaches of the River Wensum has declined in recent years, the frustrating and inconsistent opening schedule of the bridges and the various Network Rail and NCC departments one needs to liaise with to arrange an opening deters many navigators, driving this demand down even further.

4. Legal implications

- 4.1. Under the Norwich Corporation Act 1920, in reference to Carrow Bridge, the Corporation is required by virtue of s.61(1) to ensure that "the bridge shall at all times be maintained opened and worked by the Corporation so as to give priority to vessels requiring to pass through the opening span of the bridge over road traffic requiring to use the bridge." S.61(2) sets a penalty if any vessel is detained or unreasonably obstructed at the bridge, and s.61(3) gives the Corporation power to make byelaws as to the opening and closing of the bridge (however not so as to frustrate the

requirement to open the bridge, i.e. they could not have the effect of closing it continuously). Those duties and powers now fall to NCC.

4.2. The Broads Authority has a general statutory duty “to manage the Broads for the purposes of protecting the interests of navigation”.

4.3. The Norfolk & Suffolk Broads Act 1989, Section 11 – (1) states that:

“No person shall construct, alter, renew or extend any works or undertake any dredging, within or adjacent to the navigation area, unless –

- a) neither the work in question nor the manner in which it is carried out will interfere with navigation in any part of the navigation area or of the Haven or be likely to do so, or
- b) that person holds a licence under this section authorising works, complies with conditions attached to that licence, carries out that work in accordance with approved plans, sections and particulars.”

4.4. NCC will require a Works Licence from the Broads Authority to be able to undertake its proposed work.

5. Conclusion

5.1. While NCC’s preferred option (see para 2.4 above) is cheaper than their second option (para 2.5) and would create less disruption for highway users, the purported temporary sealing of the bridge for five years would create a precedent that would, in all probability, effectively end access to the Port of Norwich by tall vessels.

5.2. The long-term implications of this proposal need to be carefully considered, along with the clauses in the Norwich Corporation Act 1920 (unchanged) that require the bridge to open as a priority over vehicles.

Author: John Packman and Rob Rogers

Date of report: 24 May 2021

Background papers: [Highways Capital Programme 2021/22/23/24 and Transport Asset Management Plan - item 9](#)

[Broads Plan](#) strategic actions: 4.1, 4.3

Appendix 1 – NCC Carrow Bridge Options report

Norwich - Carrow Bridge

Options Report

March 2021

Prepared by Bridges Team

Norwich - Carrow Bridge

Options Report

March 2021

Prepared by:-

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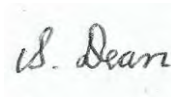
Options Report

Author of Report:-

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File Reference:

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Contents

- 1. Introduction**
- 2. Background**
- 3. Current Condition of the Structure**
- 4. Options**
- 5. Financial Implications**
- 6. Legal Implications**
- 7. Recommendations**

Appendices

- A Maintenance Records 2004 to 2020**
- B Special Inspections Records**
- C Option 1 Drawings**
- D Supporting report (extract from MCF bid October 2019)**
- E MCF Bid - Forecast Spreadsheet**
- F Option 2 Drawings**
- G Diversion Plans**

1. Introduction

This report summarises the options investigated by the County Council's Bridges Team to improve the life and serviceability of Carrow Bridge in Norwich. This is a complex and historic structure which requires specific and careful maintenance due to its age and its mechanical and electrical operation as a bascule bridge.

2 Background

- 2.1 Carrow Road River Bridge carries the A147 (Carrow Road) Norwich ring road, over the River Wensum in Norwich. The bridge is 98 years old, being constructed in 1923. This section of the Norwich ring road combines both the inner and outer ring roads and is heavily used by all highway modes.
- 2.2 It has an operational single leaf bascule rolling lifting span. When open, this allows tall vessels sailing on the River Wensum to pass to or from Norwich city centre. Smaller and leisure vessels do not require the bridge to be lifted and they can pass underneath at any time.
- 2.3 In 1995, the deck was waterproofed and 'Acme' plywood deck panels (a proprietary system of plywood deck panels coated on their top surface with a high skid resistance surfacing material) were installed to form the carriageway surfacing.
- 2.4 Since then the deck panels have been an expensive maintenance liability due to them becoming loose and breaking up due to the heavy and continuous road traffic. Most, if not all, of the original panels have had to be replaced with new panels. This has required the upper levels of the original deck troughing infill to be replaced with modern cementitious repair materials to provide a better anchorage for the additional fixings.
- 2.5 Emergency repairs facilitated by weekend road closures are becoming a regular quarterly event. In 2020, a road closure had to be extended due to problems with the materials setting. This caused considerable congestion within Norwich and significantly impacted the highway network.
- 2.6 Demand for lifting the bridge has reduced in recent years and only 2 vessels have passed in the last 3 years. One was the Vagabond (floating restaurant) in March 2020, the other being the TS Nelson in 2018. On both occasions, this was to allow the vessels to leave their long-term moorings and sail downstream. Since the Riverside development in the 1990's, the function of the area has changed, and there is no current demand for vessels (requiring the bridge to be opened) to enter the Port of Norwich. It should however be noted that the limit of navigation is New Mills, although hire craft are not permitted beyond Bishops Bridge.
- 2.7 As well as being a key part of the highway network, well used by cyclists and pedestrians, and where the inner and outer ring roads for Norwich meet, next to the bridge is Norwich City Football Club stadium. The proximity of this stadium along with the Premiership season means that road closures require planning to either miss planned home games or works be undertaken at the end of the football season.

- 2.8 As highlighted above, the City road network here is very well used by all modes including pedestrians, cyclists and vehicle users. The road typically has an annual average daily traffic flow (AADT) in excess of 25,000 vehicles each day. This location is even more key as the inner and outer City ring road system merges into one. It is significant to note that although over 25,000 vehicles use the crossing each day, the bridge has only been lifted two times in recent years for tall river vessels and this was for these vessels to be moved downstream. Leisure craft can pass under the bridge unobstructed.
- 2.9 Pedestrians and cyclist have a suitable and nearby diversion route by using the existing pedestrian and cycle bridges Novi Sad Bridge and Lady Julian Bridge. However, there is no such suitable nearby crossing for vehicles using the inner and outer City ring road. The alternative routes for these are the A47 southern bypass or using Foundry Bridge near the city centre. Foundry Bridge is a key walking route between the city centre and the railway station. The diversion plans are detailed in Appendix G.
- 2.10 The environmental impact of these vehicles using the diversion routes is significant. In terms of vehicle emissions, the daily extra vehicle miles travelled would be around 7.5 miles. Given the traffic flow figures, this equates to nearly 187,500 additional vehicle miles for each day of the bridge closure. Therefore, there is a clear environmental benefit in minimising the duration of any bridge closure.

3. Current Condition of the Structure

- 3.1 The bridge is inspected and maintained by the County Council on a regular basis. Appendix A and B details maintenance and inspection records, including the recent detailed Special Inspection reports for the bridge.
- 3.2 The condition of the bridge deck, which carries the combined Norwich inner and outer ring roads, is in poor condition and the deck panels are expensive to maintain. In addition, each time replacement or repairs are required, a road closure is necessary, causing considerable highway disruption to the City centre. Costs in recent years are as follows:

2016/17	£10, 400
2017/18	£20, 300
2018/19	£25, 000
2019/20	£27, 700
2020/21	£31, 200

- 3.3 Maintenance work undertaken is detailed in the following appendices:

- Appendix A maintenance records 2004 to 2020
- Appendix B Special Inspections records

- 3.4 In recent years maintenance/repair work has consisted mainly of patching and repairs to the uneven carriageway surface, requiring frequent repeat visits associated with heavy traffic use.

- 3.5 Evidence of the current condition of the bridge deck, including photos, is contained in Special Inspection Report 1 of 8 included at the front of Appendix B. This crucially identifies high priority repairs that constitute Option 1.
- 3.6 The bridge deck repairs are reaching the end of their life. The bridge deck concrete has been drilled into so many times over the past two decades, that it is becoming increasingly difficult to connect into solid concrete and achieve the required bolt embedment.
- 3.7 The photos below in Figure 1 illustrate the poor condition of the existing bridge deck. As the bridge is a bascule bridge which opens, the deck itself has to be of lightweight materials. As well as the fixings into the existing concrete being difficult due to the number of times the concrete has been drilled into over the past decades, these lightweight materials are not as durable as a more substantial and heavier deck plates. However, the bridge could not lift using these more substantial materials. Additional photos of the bridge deck can be found in Appendix B.





Figure 1: Photos illustrating the condition of the bridge deck

4. Options

- 4.1 A number of options to improve the condition and serviceability of the bridge have been investigated by the Council's Bridges team. This assessment has reviewed all options ranging from a do nothing through to full replacement and rebuilding of the structure.
- 4.2 The do-nothing option was discounted at an early stage for the reasons described in 3.6.
- 4.3 Option 1 is the temporary maintenance and deck fixing proposal. This scheme is estimated to cost £150,000, requiring a road closure for approximately three weeks (Details in Special Inspection 1 of 8 included at the front of Appendix B). At the same time, to reduce disruption for maintenance, the bridge would be fixed into position so it would not lift, on a temporary basis pending longer term strategic decisions for the lifting bridges in the area, which depends on future decisions around the Trowse Rail Bridge and wider area.
- 4.4 Option 2 is for an extensive bridge refurbishment scheme including the deck replacement and also replacement of the mechanical and electrical equipment which has reached the end of its service life. This would maintain the lifting bridge capability and would cost a minimum of £2.15m. It would also require a minimum three-month closure of the bridge to all highway and river users to allow the work to be undertaken safely. This would be immensely disruptive to road users on this heavily trafficked section of the Norwich ring road.
- 4.5 Supporting details for Option 2 including plans, timescales, alternative routes etc are in the following Appendices:

D- Supporting report (extract from MCF bid Oct 2019)

E- MCF Bid - Forecast Spreadsheet

F- Option 2 drawings

- 4.6 It should be noted that the estimated cost of £2.15m for Option 2 and the estimated three-month closure of the bridge to all highway and river users are minimum values. Our experience of maintaining and improving structures of this age and complexity suggests that these values are likely to increase as the works progress.
- 4.7 Both options would be a short-term fix while a longer-term solution is agreed upon. A further option for full bridge replacement would be needed in the longer term. Significant feasibility and design work on developing this option is required. Significantly longer construction duration and costs in the region £10m to £25m are anticipated.
- 4.8 It has been suggested that there is evidence of a demand for vessels to enter the Port of Norwich. This proposal would still allow all but very large vessels to pass under the bridge as they do currently. In the last five years, the bridge has only been opened for regular bridge maintenance works and to allow the floating restaurant and training ship to sail downstream. In addition, the whole Riverside area has changed significantly since large vessels last used the area. The warehouses and other port buildings have all disappeared and been replaced mainly by apartments and leisure facilities such as pubs and restaurants.

5. Financial Implications

- 5.1 As outlined in the previous section, the estimated scheme cost for Option 1 is £150,000 requiring a road closure for approximately three weeks. These costs could be met from the County Council's existing highways (bridges) capital programme.
- 5.2 The estimated scheme cost for Option 2 is a minimum of £2.15m, requiring a minimum three-month closure of the bridge to all highway and river users to allow the work to be undertaken safely. Given the significant amount of funding, this exceeds the annual approximate £1.5m bridges capital budget for Norfolk. Therefore, alternative funding options would need to be explored.

6. Legal Implications:

- 6.1 The County Council recognises the Broads Authority's Navigation Authority duties, and accordingly the Council recognises that if Option 1 was progressed (which would temporarily fix the bridge deck closed) this would need to be a temporary option until funding for a significant improvement or replacement of the existing structure can be delivered. This strikes a reasonable balance between the needs of river users and those of highway users who would be significantly impacted by Option 2.
- 6.2 It is recognised that any proposed scheme is strictly subject to the Broads Authority granting the required works licence required under section 11 of the Norfolk and Suffolk Broads Act 1988. The County Council recognises that one of the Broads Authority's three general duties (section two) is "protecting the interests of navigation" and as the river is tidal at Carrow Bridge there is a public right of navigation to protect.

7. Recommendation

- 7.1 On balance, taking account of costs to the public purse, value for money, minimising disruption to highway and river users, it is recommended that Option 1 is explored further. This is also the preferred option in terms of environmental aspects given the long vehicle diversion route coupled with the significant numbers of vehicles affected each day. This includes detailed discussions with the Broads Authority with a view to gaining the necessary works licence.
- 7.2 Option 1 has the support of the County Council's Cabinet and the following is extracted from the report "Highways Capital Programme 2021/22/23/24 and Transport Asset Management Plan" approved by the County Council's Cabinet at its meeting on [8th March 2021](#).
- 7.3 Therefore, subject to obtaining a works licence from the Broads Authority, it is proposed to carry out repairs to the bridge and at the same time, fix the deck into position during the summer of 2022. This will remove the need for such frequent maintenance work on the bridge and therefore minimising disruption for highway users. It will also mean that the bridge will be unable to open to enable tall vessels to pass through and therefore, given the limit of navigation, is only proposed as a temporary solution. It is important to note that this is not considered a straightforward matter and is constrained by statutory considerations and the views of various river users. The alternative option is to refurbish the bridge as a working bascule bridge but this has significant drawbacks on cost (£2m+) and disruption to all highway user grounds as works could result in closure of the bridge for at least three months.
- 7.4 The Cabinet also agreed that work will be carried out to determine a long-term solution for the bridge. This will be influenced by any decision taken on the replacement of the nearby single-track railway Trowse swing bridge. The County Council is a partner on the Trowse Rail Bridge Group and the East Norwich Partnership which, between them, are looking at the issues in this area and developing a long-term strategy. These include studies looking at Trowse Rail Bridge and whether a new rail bridge to double track the railway over the river is required, and on how to access development sites in East Norwich.
- 7.5 The Cabinet also agreed that once this strategy is finalised, if required, funding bids can then be developed for either full refurbishment or replacement of Carrow Bridge.

Appendix A

Carrow Road River Bridge (CRRB) (TG20100)
Record of movable span carriageway surfacing maintenance works

The following is a record of maintenance works relating to the carriageway surfacing on the movable span of Carrow Road River Bridge.

The record is intended to give some indication of the extent of the carriageway deck panel repairs that have had to be carried out in the past.

The following more recent works were carried out with weekend night road closures. They involved quite extensive carriageway repairs mainly repairing areas of the broken or failing carriageway deck boards with repair surfacing material.

No. ref.	Year	Road closures req'd. (No. of nights)	Dates of night closures
1.	2020	2	Fri 09/Sat 10 & Sat10/Sun 11 October 2020
2.	2020	1	Sat17/Sun 18 October 2020
3.	2019	2	Fri 06/Sat 07 & Sat07/Sun 08 September 2019
4.	2019	2	Fri 13/Sat 14 & Sat14/Sun 15 September 2019
5.	2018	2	Fri 13/Sat 14 & Sat14/Sun 15 July 2018
6.	2017	1	Sun 19/Mon 20 November 2017
7.	2016	1	4 October 2016

The following 'Record of Completed Bridge Maintenance' forms are less recent works, in chronological order starting at 15/06/2004 and ending on 30/03/2016.

SPECIAL INSPECTION REPORT

DATE. 15/6/04

STRUCTURE NO. TG20100

NAME/PARISH Carrow River/ Norwich

ROAD NO. A147

INSPECTED BY.

SIGNATURE.

PLANNING & TRANSPORTATION
REFERENCE

05259

GRID REF. TG2391 0774

UNDER 900MM

☐

OVER 900MM

X

REPORT

Carrow River Bridge, Damaged Deck Panels

Introduction

During a routine bridge opening a metal plate, at the north east corner of the lifting deck, snagged on two adjacent timber panels on the fixed section of the bridge. A section of the top layer of plywood, has been torn away on one board and on the other the top layer of plywood has been de-laminated and is standing proud of the footway surface. Both panels required immediate repair.

It is thought likely the boards were damaged because fixings holding the panels down had failed due to corrosion. This allowed the panels to lift and catch the lifting span.

Repair

Holes have been drilled through the plywood panels and the steel angle plate below. Coach bolts have been installed fixing the panels back down to the steelwork. Areas of de-laminated boards were then secured together with wood screws.

Conclusion.

Repairs to the boards are only seen as a temporary measure. The boards should be replaced at the same time as future planned panel maintenance.

Recommendation

Replace 2 No. footway decking panels.

Estimated Costs: _

Priority

H	M	L
X	<input type="checkbox"/>	<input type="checkbox"/>

Repair Works: £ £300

Supervision : £ 20

Admin : £ 50

Recommended Works : £ 1200

Supervision : £ 500

Admin : £ 100

Signed Project Engineer, Technical Group (Bridges)

Date

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: Carrow River Bridge	Bridge No.: TG20100
Project Code: ¹⁷² BMW190-05259	Brief No.: 05259
Contractor: Norfolk P&T Partnership (North)	Actual Cost: £299.64
Dates Works Carried Out: 15/06/04	Order No: LA368331
	Estimate: £200.00

Element Numbers of Ordered Maintenance Works	Report/date *
<p>Description of Completed Maintenance Works (Including element numbers) :- Drill deck panel and steel work and bolt down panel at Northwest end of footway.</p>	
<p>Notes: To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.</p>	
Maintenance Painting System Sheet Attached	Estimated By :- [REDACTED]

Signed Clerk Of Works : [REDACTED]	Date : 12/11/04
Approved (PEBM) : [REDACTED]	Date : 28-11-04
Date Passed To PBEN :	113 DEC 2004

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW BRIDGE		Bridge No.: TG20100	
Project Code: BMW172-04217		Brief No.: 04217	
Contractor : NORFOLK P&T PARTNERSHIP (N)		Approx. Cost : £1301.70	
Dates Works Carried Out : 23/06/04 01/07/04	Order No : la363114	Estimate : £900.00	

Element Numbers of Ordered Maintenance Works	Report/Date :- * S 22/4/04 21
--	----------------------------------

Description of Completed Maintenance Works (Including element numbers) :-

Metal nosing plates fabricated and fitted to footway deck boards
Special tool provided to tighten deck board holding down bolts.
Remedial work to deck boards in the carriageway as instructed by [REDACTED]

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached <input type="checkbox"/>	Estimate Prepared By : [REDACTED]
---	-----------------------------------

Signed Clerk Of Works : [REDACTED]	Date : 12/01/04
Approved (PEBM) : [REDACTED]	Date : 1/3/05
Date Passed To PBEN :	1-3 MAR 2005

SPECIAL INSPECTION REPORT

DATE.	<input type="text" value="4/5/05"/>	STRUCTURE NO.	<input type="text" value="TG20100"/>
NAME/PARISH	<input type="text" value="Carrow Bridge/Norwich"/>	ROAD NO.	<input type="text" value="A147"/>
INSPECTED BY.	<input type="text" value="REDACTED"/>		
SIGNATURE.	<input type="text" value="REDACTED"/>		
PLANNING & TRANSPORTATION REFERENCE	<input type="text"/>	GRID REF.	<input type="text" value="TG2391 0774"/>
		UNDER 900MM	<input type="checkbox"/>
		OVER 900MM	<input checked="" type="checkbox"/>

REPORT

Introduction

It was noted that several timber boards on the bridge deck were moving under traffic loading. An SI was carried out to assess the condition of the deck boards and the maintenance requirements. Due to the volume of traffic over the bridge and the positioning of pedestrian fencing over the deck a close (hands on) inspection was not possible therefore the damaged deck boards were viewed from the footway behind the fencing.

Inspection

Several of the boards were moving under lorry and car loading. In most cases it was the edges of the boards that were flexing however, in one instance approximately 1/2 of the board appeared to be moving under traffic loading. Failure of the stud fixings is the main cause of the defects and many of the stud had nuts missing and appeared to be severely corroded. Despite the movement of the boards they still appear to be in fair condition with no obvious danger to traffic and it is extremely unlikely that lifting the bridge will cause panels to be dislodged.

In addition to the failed fixings and board movements it was also noted that many of the epoxy resin blocks cast into the deck boards were breaking up and an area of carriageway surfacing adjacent to the end of the deck was also breaking up.

Recommendation

Provide traffic management to allow a detailed inspection/survey to be carried out with the deck board representative present to advise on repair options. The initial inspection should be carried out within the next 4 – 6 weeks and repairs to the deck boards should be planned for Aug/Sept.

At the same time as this initial inspection the damaged area of carriageway should be repair using fast setting concrete.

Estimated Costs: _

Priority

H	M	L
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Recommended Works : £ 500

Supervision : £ 300

Admin : £ 30

Signed Project Engineer, Technical Group (Bridges)

Date 11/5/05.

TG20100

**Planning and Transportation
Internal Work Request**

Form DOPM 39/A

TO: Group Manager ()

Fac  Bridges

FROM:

Principal Bridge
Engineer Network

Tel No: 3298

Project Number and Work Code (to be used for charging purposes):- 06/590

Project Title:- A149 - Carrow Road River Bridge - TG20100

For Fixed and Scale Fee State Allocation of
Fee for this Work Request: _____

Work Request

Anglian Water is seeking a road closure near to Carrow Bridge in late March or early April. Please inspect the deck boards to see if there is an opportunity to bring forward the annual deck board maintenance. Provide a Special Inspection report and programme repairs if required.

In addition the footway on the fixed span near the football ground is ponding. Please investigate and reinstall a proper drainage outlet.

Charge to PH4410 57700 P00003.

Enc. ☐

Signed: _____

Date: 16/2/06

Response

order issued 30/04/06

Enc. ☒

Confirmation of fee estimate £ _____ (telephoned in advance)

Signed: _____

Date: 16/2/06

WHITE: Addressee Copy **BLUE:** Acknowledgements Copy **YELLOW:** File Copy

SPECIAL INSPECTION REPORT

DATE 9/3/06

STRUCTURE NO. TG20100

NAME/PARISH Carrow Bridge

ROAD NO. A147

INSPECTED BY.

SIGNATURE.

PLANNING & TRANSPORTATION
REFERENCE

06/632

GRID REF. TG2391 0774

UNDER 900MM ☐OVER 900MM ☒

REPORT

A147 Carrow Bridge Deck Panels TG20100

Inspection

The deck boards are in fair condition. Many of the fixings have failed, many boards flex under traffic loading and localised areas of protective epoxy coating are missing (see attached sketch). Boards in the wheel tracks are affected most.

Conclusions

All of these defects form part of the long standing maintenance problems on this bridge and are not considered to be an indication of imminent failure of the boards. A long-term solution will be to take up and replace flexing panels and failed fixings, however, experience has shown that despite the loss of fixings and movement, at this time, the panels are still adequately fixed and are not likely to break up in the next 6 months.

At the time of the inspection the deck boards were in a safe condition for road users. Many of the panels will require replacement in the next 3 years but this is not necessary at this time. Preventative maintenance is likely to extend the life of the existing panels.

As part of the routine maintenance carried out on the deck boards in 2005, trial repairs were conducted using epoxy resins. The epoxy was pumped under flexing insitu deck boards to fill any voids and stop movement. After 6 months the trial boards remain fixed with no flexing under traffic loadings.

Recommendation

The pumped epoxy repair method should be used in areas of panel movement to stabilise the deck boards. Once these repairs have been carried out the deck boards are likely to remain serviceable for at least 18 months.

Estimated Costs: _

Priority

H	M	L
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Recommended Works : £ 3000

Supervision : £ 500

Admin : £ 100

Signed Project Engineer, Technical Group (Bridges)

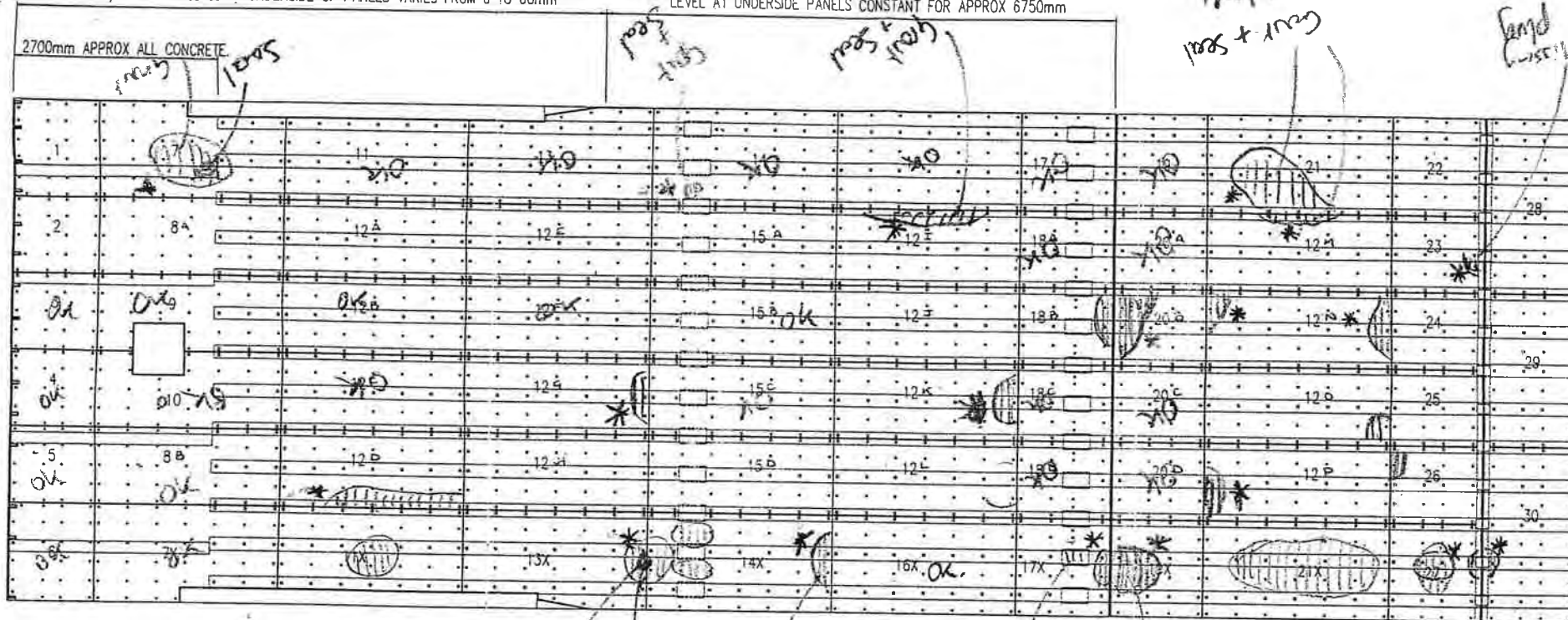
Date

14/3/06

STEEL/CONCRETE LEVEL AT UNDERSIDE OF PANELS VARIES FROM 0 TO 60mm

LEVEL AT UNDERSIDE PANELS CONSTANT FOR APPROX 6750mm

2700mm APPROX ALL CONCRETE



Seal Board
More cement
Possible grout
under.

Cut cut
broken up.
Replace
Possible grout
under.

ITEM	QUANTITY	DESCRIPTION	REMARKS
183		PANELS TOTAL	
450		3/8 UNC x 18mm LAW WELD STUDS	
450		3/8 UNC x 110mm LAW WELD STUDS	
400		3/8 UNC x 58mm LAW WELD STUDS	
1100		3/8 UNC B2P HALF NUTS	
1100		3/8 TORX C B2P WASHERS	
1100		M10 RESIN ANCHOR STUDS	
1100		M10 RESIN CAPSULES	
1100		M10 B2P FLAT NUTS	
1100		M10 B2P WASHERS	
27		PACKS RESIN/AGGREGATE TO SEAL FILING HOLES	
180		SAUSAGES OF GUN APPLIED MASTIC	
1		BULK GUN APPLICATOR	
ORDER LIST			
<small>THE DRAWING IS CONFIDENTIAL AND IS SUPPLIED ON THE UNDERSTANDING THAT IT SHALL NOT BE LOANED, COPIED OR OTHERWISE REPRODUCED OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF BOCALITE. THE USER SHALL BE RESPONSIBLE FOR THE PROTECTION OF THIS INFORMATION.</small>			

CADD FILE No. 2559
 BOCALITE No. H 0016710
 OPERATOR No. O 8458C
 CHECKER No. AS 2670/6

SPECIAL INSPECTION REPORT

DATE.	<div>22 March 07</div>	STRUCTURE NO.	<div>TG20100</div>
NAME/PARISH	<div>Carrow River Bridge Norwich City</div>	ROAD NO.	<div>A147</div>
INSPECTED BY		<div>[REDACTED]</div>	
SIGNATURE.		<div>[REDACTED]</div>	
PLANNING & TRANSPORTATION			
REFERENCE	<div>BMW172 07/611</div>	GRID. REF.	<div>TG2391 0774</div>
UNDER 900MM		<input type="checkbox"/>	OVER 900MM <input checked="" type="checkbox"/>

REPORT

Carrow Bridge Deck Board Inspection

Inspection date: 29 March 2005

Attendants: [REDACTED]

Traffic Management comprising single lane working controlled by stop-go boards.

Survey Defects Noted

- Three deck board were in very poor condition (Ref. 18B, 13x & 14x). Up to 10% of the resin coating was missing and the plywood is locally delaminating and breaking up. These boards should be replaced as a high priority.
- Three more deck boards are in fair to poor condition and are flexing significantly under loading (Ref. 19x, 21x & 21). The resin coating is mostly intact however cracking and failure at fixing recess indicates that the board is beginning to delaminate. These should be programmed for replacement however it is likely that these boards would last until next year if necessary.
- Approximately 40% of all the deck boards have areas of medium to small flexural movement under loading. Generally the movement occurred at the edges of the boards and all flexing was in locations where the fixings have failed.
- Many of the Cecol filled cut-outs are breaking up. Although these are not in a dangerous condition at this time they should be replaced as a high priority.

Failures are due to the following:

- Corrosion of the fixing studs, anchors, bolts and washers causing the metal fixing to disintegrate and fail (Typical failure mode).
- Resin anchor failure due to unsuitable concrete substrate (Typical failure mode).
- Movement of the board due to uneven or failing substrate causes the timber directly below the top hats to wear and fixing no longer bears on board. Loss of resin coating and cracking due to movement allows water into the ply and delaminating occurs (Typical failure mode).
- Top hat nuts unscrewing with traffic vibration / board movements (not wide-spread).
- Failure of the stud welds (not wide-spread).

See Continuation Sheet For Recommendations

Estimated Costs:-

Recommended Works: £20,000 Supervision: £500 Admin: £3000

Signed Project Engineer. [REDACTED]

Date 5-6-7

Recommended Works :-

Have Been Ordered | Are Awaiting An Order | Require A Brief Issuing

Priority		
<input checked="" type="radio"/> H	<input type="radio"/> M	<input type="radio"/> L

Recommendations

- All boards should be replaced as a high priority. This will require a road closure as one of the boards is in the centre of the road.
- Boards which have small areas of movement due to localised fixing failures should have grout injected below the board while the board is instu. This should prevent the movement of the panel without the need to replace it. Panels to be injected will be identified on site.
- Resin plugs should be broken out and replaced using a polyurethane resin not usual epoxy. This will reduce the curing times and should allow the road to be closed for 24 not usual 48 hours.
- Missing / failed mastic between boards and in fixing plugs should be replaced and any fixings that have worked proud of the deck should be ground flush or removed.

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW BRIDGE - 2007 BOARD MAINTENANCE		Bridge No.: TG20100
Project Code: BMW172-07611		Brief No.: 07611
Contractor : NORFOLK P&T PARTNERSHIP (N)	Approx. Cost : £166.88	
Dates Works Carried Out : 27/03/07	Order No : BR164/33	Estimate : £250.00

Element Numbers of Ordered Maintenance Works	Report/Date :- *
---	-------------------------

Description of Completed Maintenance Works (Including element numbers) :-

T.M. provided for deck board inspection.
TM comprises stop/go boards for half a day.

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached ☐Estimate Prepared By :- **Signed Clerk Of Works :** **Date :** 10/04/07**Approved (PEBM) :** **Date :** 24/05/07**Date Passed To PBEN :** 125 MAY 2007 **As Built Drwgs. Being Micro-filmed :**

**Planning and Transportation
Internal Work Request**

Form DOPM 39/A

TO: Group Manager ()

Fao [redacted] Bridges

FROM:

Principal Bridge
Engineer Network

Tel No: 3298
08/602

Project Number and Work Code (to be used for charging purposes):-

Project Title:- A147 – Carrow Road River Bridge – TG20100

For Fixed and Scale Fee State Allocation of
Fee for this Work Request:

Work Request

Fill hole in wheel track as a matter of urgency.

Charge PH4410 57700.

Estimate £300.

Enc. ☐

Signed: [redacted]

Date: 19/3/08

Response

order issued BR174/30

Enc. ☒

Confirmation of fee estimate £ (telephoned in advance)

Signed: [redacted]

Date: 19/3/08

WHITE: Addressee Copy **BLUE:** Acknowledgements Copy **YELLOW:** File Copy

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW ROAD RIVER BRIDGE		Bridge No.: TG20100
Project Code: BMW232-08602		Brief No.: 08602
Contractor : NORFOLK P&T PARTNERSHIP (N)	Approx. Cost : £298.15	
Dates Works Carried Out : 26/03/08	Order No : BR174/30	Estimate : £300.00

Element Numbers of Ordered Maintenance Works

Report/Date :- *

Description of Completed Maintenance Works (Including element numbers) :-

Pot hole filled in the bridge deck using E33 epoxy resin with added granite aggregate. Topped with cure anti slip coating.
A steel plate was fixed to the surrounding boards to allow the epoxy to cure with traffic running.

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached ☐

Estimate Prepared By :-

Signed Clerk Of Works :

Date : 18/04/08

Approved (PEBM) :

Date : 28/04/08

Date Passed To PBEN :

As Built Drawings. Being Micro-filmed :

11 Nov 07

Date	18 July 2008	From	[REDACTED]
To	[REDACTED]	Mobile	[REDACTED]
Company	Norfolk County Council	E-mail	[REDACTED]
Tel No	[REDACTED]	Ref	10507154A
E-mail	[REDACTED]	No of Pages	03

Quotation

Supply Only

Safe Step Acme Panels®



Acme panels®



Giccol Acme grip

Epoxo™

SAFE STEP

Pro-tread™



18 July 2008

Dear [REDACTED]

Project Reference: Single Replacement Acme anti-slip panel – Carrow Bridge, Norwich

Further to your recent enquiry I am pleased to confirm our proposal and quotation as follows:

ROCOL Safe Step Acme Panels® is a made-to-order anti-slip decking system engineered to fit a wide range of applications from walkways, railway platforms, platforms around machinery, to complex road and bridge constructions.

ROCOL Safe Step Acme Panels® are supplied to bespoke specifications, sizes and designs. Each Panel is fully resin encapsulated, with options of anti-slip surface texture, colour and panel thickness. They are delivered complete with all fixings, approved sealants and a coded installation plan.

Specification for Rocol Safe Step Acme panels®

All panels will be made-to-order under ISO 9001 factory controlled conditions and are approved by Local Authorities, Highways Agency, Network Rail etc, Link Up number 2488

- Finnish Birch load bearing certification BS 5268
- 24mm, Reference 16 anti-slip surface finish
- Colour Black

Panels will be supplied complete with:

- All necessary fixings and sealants – drillscrews bzp
- Resin and aggregate to seal all fixing holes on completion to prevent moisture penetration and to match the surrounding panel surface

To cover an area not exceeding 1.3 square metres	£184.00
Delivery 6 weeks from receipt of order, drawings & survey details	£100.00
<hr/>	
Total (£)	£284.00

ROCOL Site Safety Systems

ROCOL House, Swillington, Leeds LS26 8BS Telephone: 0113 232 2600 Fax: 0113 232 2850

A Division of **ITW** Ltd. Registered Company No. 559693 VAT No. 651 3938 29

www.rocol.com

Registered Office: Admiral House, St. Leonard's Road, Windsor, Berkshire SL4 3BL

18 July 2008

Project Reference: Single Replacement Acme anti-slip panel – Carrow Bridge, Norwich

Prices quoted are subject to:

- Confirmation of final design detail and dimensions
- VAT at standard rate and remains open for acceptance for a period of 30 days from the quotation date
- Substrate to be level, sound and able to retain the panel fixings
- We accept no liability for subsequent problems attributable to the condition of the substrate

All sales by ROCOL Site Safety Systems are subject to our Standard Terms & Conditions of Trading, which are available on request. Payment strictly net 20th of the month following the date of invoice to accredited customers

We thank you for the opportunity to submit our quotation and look forward to hearing from you in the near future.

Yours sincerely


Senior Sales Engineer
Rocol Slip Prevention



Our Ref: Q2022/1488/DBJ/MD

Your Ref: PTB/BS/2/14/1 ✓

Date: 5th May 1988

Norfolk County Council

County Surveyor
County Hall,
Martineau Lane,
Norwich. NR1 2DH.

Dear Sir,

Re: Walkways - Carrow Road Bascule Bridge

Further to our recent telephone conversations regarding the redecking of the above, we have pleasure in submitting our proposals and quotation all in accordance with information given on your drawing No. 14/1/33, as follows:

Our calculations are based on;

- 2 moving span walkways each 1830mm x 21106mm
- 2 fixed span walkways each 2290mm x 8892mm
- Tapering to 1830mm at abutment of panels.

The individual panels would be supported as follows:

- 1830 wide - (76-751-76-751-76-100)
- 2290 wide - (76-751-76-751-76-484-76)
- Ensuring that maximum clear span is 751mm.

At which span 24mm plywood panels will carry a distributed load of 5kn/m² (100lb/sq.ft.).

Individual panels would be: fixed to supporting steelwork by the stud weld method whereby panels would be laid on steel and studs applied using panels as template.

Grooved at abutting edges and supplied complete with loose epoxy resin seal coated tongues.

After laying abutting panels joints would be sealed with gun applied mastic and heads of fixings sealed with pigmented epoxy resin and bauxite to resemble surface texture of panels.

/cont.....

St Peter's Road Huntingdon Cambs PE18 7DN Telephone: 0480 52141
Director: A.W. Garolds (Managing)
Regd. Office: St Peter's Road Huntingdon Cambs Regd. in London No. 914850

Acneflooring Limited

5th May 1988

- 2 -

QUOTATION

Supply and Deliver Only

24mm WBP Finnish Birch throughout plywood panels cut to require size, grooved, predrilled and counterbored etc. prior to surface coating Ref. 26 "Black" and double sealing edges and underside with black pigmented epoxy resin.

Complete with:

- Epoxy resin seal coated plywood tongues
- Bright zinc plated acme stud nuts
- Bright zinc plated welding studs and ferrules
- Chuck assembly and ferrule tube for use with stud welding equipment
- Gap applied mastic to seal abutting panel and kerb side longitudinal joint
- Pigmented epoxy resin, calcined bauxite aggregate to seal heads of fixings.

To cover a total gross area not exceeding 112m².

For the sum of: £8,075.00 delivered.

EXTRA COSTS

To supply all necessary labour and equipment to carry out the installation of materials previously described.

The budget price of £2,595.00/£3,000.00 subject to confirmation of programme and site survey details.

This price assumes free and uninterrupted access to a prepared sub-base surface and that work is carried out during normal working hours in one continuous visit to site.

Terms and Conditions

Payment:

Strictly nett 30 days from date of invoice. Subject to V.A.T. at statutory rate.

Fixed price for a period of 60 days from 5th May 1988.

Delivery:

4-6 weeks from receipt of information necessary to prepare working drawings.

/cont.....

Acme flooring Limited

5th May 1980

- 3 -

We thank you for the opportunity of submitting our quotation
and look forward to hearing from you in due course.

Yours faithfully,
ACMEFLOORING LIMITED

A large, solid black rectangular block redacting the signature and name of the representative of Acme Flooring Limited.

Project Engineer.

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW BRIDGE DECK MAINTENANCE		Bridge No.: TG20100
Project Code: BMW172-08314		Brief No.: 08314
Contractor : NORFOLK P&T PARTNERSHIP (N)	Approx. Cost : £ 908.07	
Dates Works Carried Out : 14/09/2007 03+007/10/08	Order No : BR184/10	Estimate : £700.00

Element Numbers of Ordered Maintenance Works	Report/Date :- *
---	-------------------------

Description of Completed Maintenance Works (Including element numbers) :-

Footway deck board 9x replaced with a new board.

Steel plate screwed over damaged area of board 10x coated with anti slip surfacing

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached <input type="checkbox"/>	Estimate Prepared By :- [REDACTED]
--	---

Signed Clerk Of Works : [REDACTED]	Date : 21/11/08
Approved (PEBM) : [REDACTED]	Date : 24/11/08
Date Passed To PBEN 02 NOV 2008 As Built Drwgs. Being Micro-filmed :	

**Planning and Transportation
Internal Work Request**

BMW 172
Form DOPM 39/A

TO:
Project Engineer (Bridge Maintenance)

FROM: Bridge Network Manager

Tel No: 4454

Project Number and Work Code (to be used for charging purposes):- 09/086

Project Title:- A147 Norwich - Carrow Road River Bridge TG20100

For Fixed and Scale Fee State Allocation of
Fee for this Work Request:

Work Request

Carry out a special inspection and subsequently arrange annual maintenance works to the deck boards

Estimate £

Charge to PH4410 57700

Enc. ☐

Signed: 

Date: 21/5/08

Response

order issued Be 184/5

Enc. ☒

Confirmation of fee estimate £ (telephoned in advance)

Signed: 

Date: 22/5/08

WHITE: Addressee Copy **BLUE:** Acknowledgements Copy **YELLOW:** File Copy

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW ROAD RIVER BRIDGE		Bridge No.: TG20100
Project Code: BMW172-09086		Brief No.: 09086
Contractor : NORFOLK P&T PARTNERSHIP (N)	Approx. Cost : £4187.43	
Dates Works Carried Out : 03-19/09/08	Order No : BR184/5	Estimate : £400.00


Element Numbers of Ordered Maintenance Works	Report/Date :- *
--	------------------

Description of Completed Maintenance Works (Including element numbers) :-

²⁴ Deck boards (as attached drawing) injected with Teeroc Thixotropic Epoxy Injection grout. Rotten area of board 11 cut out and replaced with an epoxy patch

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached <input type="checkbox"/>	Estimate Prepared By :- 
---	---

Signed Clerk Of Works : 	Date : 17/10/08
Approved (PEBM) : 	Date : 19-1-09
Date Passed To PBEN 20 JAN 2009 As Built Drwgs. Being Micro-filmed :	

spary patch

			13	<input type="checkbox"/> <input type="checkbox"/>	14	16	17		21	
2	8A	12A					18A			
3		12B	12F	<input type="checkbox"/>		12J	18B	20B	12N	
	10	12C	12G	<input type="checkbox"/>	15		18C			
	8B	12D	12H	<input type="checkbox"/>	15D	12L	18D	20D	12P	26
	7X	11X	13X	<input type="checkbox"/> <input type="checkbox"/>	14X	16X	17X	19X	21X	30

~~Area infected by spary growth~~

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW BRIDGE		Bridge No.: TG20100
Project Code: BMW172-10042		Brief No.: 10042
Contractor : NORFOLK P&T PARTNERSHIP (N)	Approx. Cost : £104.50	
Dates Works Carried Out : 01/09/09	Order No : BR194/4	Estimate : £200.00

Element Numbers of Ordered Maintenance Works	Report/Date :- *
---	-------------------------

Description of Completed Maintenance Works (Including element numbers) :-

Traffic management assistance provided for deck board inspection

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached <input type="checkbox"/>	Estimate Prepared By : [REDACTED]
--	--

Signed Clerk Of Works : [REDACTED]	Date : 04/06/09
Approved (PEBM) : [REDACTED]	Date : 3/9/09
Date Passed To PBEN : 129 SEP 2009 As Built Drwgs. Being Micro-filmed :	

TO: Group Manager ()

Fao **Bridges**

FROM:

Principal Bridge
Engineer Network

Tel No: 3298
08/239

Project Number and Work Code (to be used for charging purposes):-

A147 – Carrow Road River Bridge – TG20100

Project Title:-

**For Fixed and Scale Fee State Allocation of
Fee for this Work Request:**

Work Request

Repair timber deck boards in footway adjacent to office damaged by bridge lifts.

Repair timber deck board and gully (adjacent to football ground).

Estimate £500.

Charge PH4410 57700

Enc. ☐

Signed:

Date:

6/8/7

Response

Work carried out on brief no 10/249.

Order no PS 10/251

Enc. ☐

Confirmation of fee estimate £ (telephoned in advance)

Signed:

Date:

9/7/10

WHITE: Addressee Copy **BLUE:** Acknowledgements Copy **YELLOW:** File Copy

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW RIVER BRIDGE	Bridge No.: TG20100	
Project Code: BMW172-10601	Brief No.: 10501	
Contractor: MAY GURNEY ROUTINE CONTRACT	Approx. Cost: £9712.81	
Dates Works Carried Out: 31/08/10	Order No: PS10/147	Estimate: 26,500.00

Element Numbers of Ordered Maintenance Works

Report/Date :- *

Description of Completed Maintenance Works (including element numbers) :-

24 Deck boards 10, 11, 11X, 12K, 12N and 27 supplied and stored at Carrow Stone Shed for use at a later date.

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached ☐

Estimate Prepared By : [REDACTED]

Signed Clerk Of Works : [REDACTED]

Date : 25/08/10

Approved (PEBM) : [REDACTED]

Date : 7/9/10

Date Passed To PBEN : 8/9/10

As Built Drwgs. Being Micro-filmed :

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: Carrow Bridge		Bridge No.: TG20100	
Project Code: BMW172-10042		Brief No.: 10042	
Contractor : May Gurney Routine Contract		Actual Cost £12456.01	
Dates Works Carried Out : 4-5/07/09	Order No : PS19/169	Estimate : £8500.00	

**Element Numbers of Ordered
Maintenance Works**

Description of Completed Maintenance Works (Including element number)

Routine deck board Maintenance as follows

Board 29

Lifted and existing fixings ground off, new studs welded to troughs and threaded studs grouted into 50mm diameter holes drilled in infill concrete using Tecroc E33 epoxy grout.

Board 10

Area of failed /delaminated board cut out and replaced with an epoxy concrete (Tecroc E3 with 12mm granite aggregate) patch. The top of the patch finished with Rocol anti slip resin.

Board 11

As above

Areas marked with cross hatching on attached sketch were injected under with Tecroc Thixotropic epoxy injection grout. Bolt recesses filled with Rocol resin with anti slip resin and any joints between the deckboards filled with Sika 11FC polyurethane sealant.



Notes:

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

~~Maintenance Painting System Sheet Attached~~

Estimated By: [Redacted]

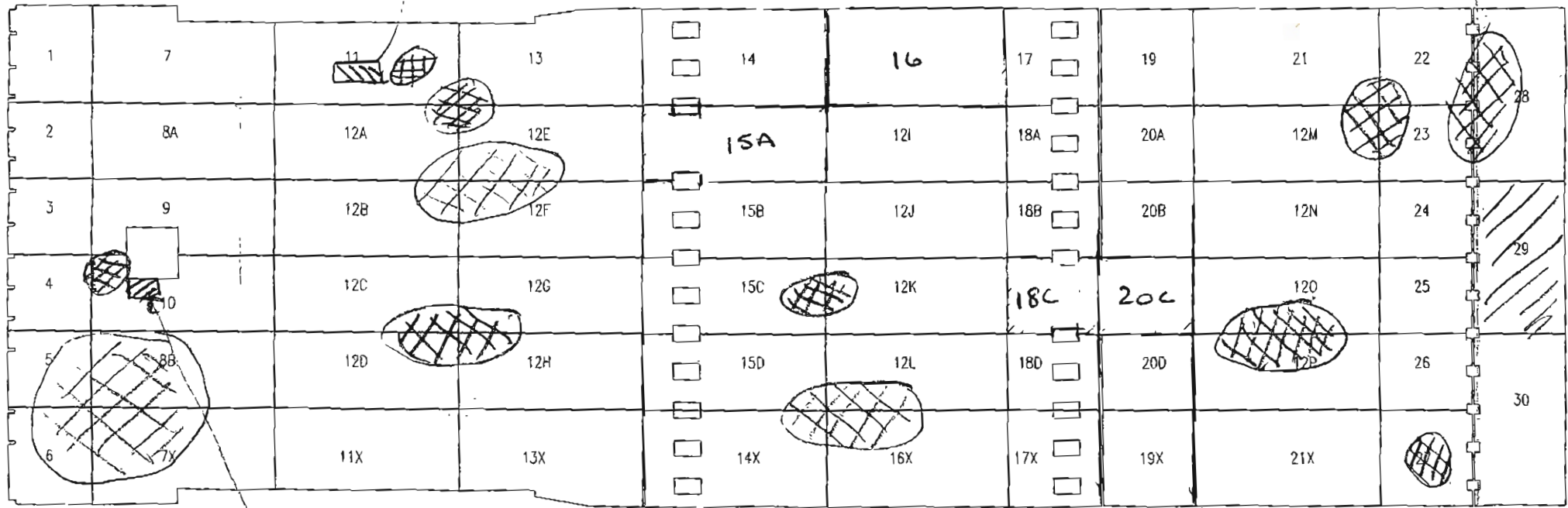
Signed Clerk Of Works : [Redacted] **Date :** 04/06/10

Approved (PEBM) : [Redacted] **Date :** 23/3/11

Date Passed To PBEN : 23/3/11

Carrow Budge Deck Board Maintenance 2009

Epoxy Patch.



Board
29
killed
after
fixed

Epoxy Patch.



Injected with

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW RIVER BRIDGE		Bridge No.: TG20100
Project Code: BMW172-10501		Brief No.: 10501
Contractor : MAY GURNEY ROUTINE CONTRACT	Approx. Cost : £143.73	
Dates Works Carried Out : 2/01/10	Order No : PS29/412	Estimate : £150.00

Element Numbers of Ordered Maintenance Works	Report/Date :- *
--	------------------

Description of Completed Maintenance Works (Including element numbers) :-

Labour with Stop/Go boards provided for
Carrow deck board inspection

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached <input checked="" type="checkbox"/>	Estimate Prepared By :- [REDACTED]
--	------------------------------------

Signed Clerk Of Works : [REDACTED]	Date : 06/05/10
Approved (PEBM) : [REDACTED]	Date : 23/3/11
Date Passed To PBEN : 23/3/11 As Built Drwgs. Being Micro-filmed :	

WORKS SPECIFICATION FOR DECK BOARD REPLACEMENT

CARROW ROAD BRIDGE NO. TG20100

Road No. & Name: A147 Carrow Road
 Parish: Norwich City
 O.S. Grid Ref.: E 623905 N 307733
 Watercourse Name: River Wensum
 Construction Type: Steel lifting bridge with timber deck boards
 Inspection(s): Various (refer to Database)

The work can only be carried out during good weather so three possible dates have been booked to allow for bad weather cancellations. The decision to go ahead with the planned works will be taken by MS or DM, 24 hours before the closure (i.e. Friday morning). This decision will be relayed immediate to all affected parties by either Mark Sharman or David McCarter on 01603 223304.

Introduction

Carrow bridge lifting deck comprises steel troughing filled with low strength lightweight concrete. The running surface comprises plywood panels bolted to the deck with welded steel studs and resin/grouted anchors.

Extent of Works

Replace 6 no carriageway boards.
 Stabilise moving boards by pumping epoxy grout underneath
 Repair patches of worn epoxy resin
 Repair epoxy infill
 Repair concrete troughing fill were required
 Seal around boards and fixings

Plant Required

1 no Hilti TE905 electric breaker
 3 no Generators with 2 no (1.5m) cable cover strips
 2 no Sledge hammers
 2 no Hand held hydraulic coring machines with 50mm cutters
 1 no Wet vac
 1 no Disc cutter
 1 no Electric hand held grinder with 6 no spare metal cutting & grinding discs
 2 no Stud welding sets
 2 no Hand held electric drills and 4 no 10mm drill bits
 1 no Paddle for mixing resins with drill
 1 no Gas melting kettle & can
 2 no Felt tip pens
 1 no Bolt croppers
 1 no Ratchet and sockets to fit top hats & bolts
 1 no Sealant guns & silicon sausages

9. Cored holes are filled with the epoxy grout, the panel is placed immediately and the M10 x 120mm long threaded studs are placed into the grout fill holes.

Sunday

10. Top hats are placed on the welded studs and torqued up.
11. Each grouted anchor is tapped to ensure it is fully home and bonded with the wet grout.
12. If recesses are present the joint around the bottom of the recess is sealed with silicon sealant. Epoxy grout is then poured into the recess and towelled to give a flat even surface. The top of the epoxy should be 2-3mm below the surface of the board. Once the epoxy is cured a resin that matches the resin on the boards (supplied by the board manufacturer) is mixed and poured on top of the epoxy and the aggregate sprinkled evenly onto the wet resin. The stone will sink into the resin, which will bulk up, so more aggregate will need to be reapplied.
13. Joints between the deck boards are then sealed with Nitoseal MS600

Pumping grout under boards

1. Survey deck boards by walking over surface noting areas of boards that bounce under load.
2. Drill 10mm holes through the boards at approximately 300mm centres in the areas of movement.
3. Mix thixotropic epoxy grout and, using the cardboard cartridges and sealant gun, pump the grout through the holes to fill voids below the boards. Watch adjacent holes and edges joints for signs that the grout is flowing successfully under the panel. If the grout does not appear to be pumping well a small crowbar can be used to lever the edges of the board slightly to encourage flow.
4. Once the process is finished clean excess epoxy from the top of the board. Place cone over newly grouted panels to prevent anyone walking on the board and squeezing out unset grout.


Hot Poured Bitumen



1. Clean out bituminous material from cut outs in the deck surfacing at the toe of the bridge.
2. Seal joints around the base of the hole with silicon.
3. Fill hole with tar coated chippings and then pour in melted bitumen to fill hole.

Once works are completed and materials have sufficiently dried take down fencing/barriers and inform contractor to clear traffic management.

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW ROAD RIVER BRIDGE		Bridge No.: TG20100
Project Code: BMW255-10249		Brief No.: 10249
Contractor : MAY GURNEY ROUTINE CONTRACT	Approx. Cost : £74,866.17	
Dates Works Carried Out : 14/07/10	Order No : PS10/251	Estimate : £35,000.00

Element Numbers of Ordered Maintenance Works	Report/Date :- *
<p>Description of Completed Maintenance Works (Including element numbers) :-</p> <p>25) Replacement of all (26 no.) downstream side footway wooden panels.</p> <p>19) Repainting of cantilever footway structure and below to approx 1m of downstream face.</p> <p>• For full details of board replacement sizes see Drawing No 1429-D1 rev B.</p> <p>• For full limits of Repainting see Drawing No: BMW 172 - 10501-002.</p> <p>• Form HA/P1 Attached (Paint Maintenance sheet).</p> <p>• For full details of Scheme see 2010 Maintenance Manual.</p> <p>Notes : To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.</p>	
Maintenance Painting System Sheet Attached <input checked="" type="checkbox"/>	Estimate Prepared By :- 

Signed Clerk Of Works : 	Date : 28/02/11
Approved (PEBM) : 	Date : 28/2/11
Date Passed To PBEN : 5/4/11	As Built Drwgs. Being Micro-filmed :

WORK REQUEST FORM

Brief No. 11366

PROJECT NO. BMW255-11366

TO

M.G.

Supervisor :

Designer :

WORK TO BE CARRIED OUT OR GOODS TO BE DELIVERED TO

Structure No.: TG20100

Name : CARROW RIVER BRIDGE

Grid Ref: 623906 307736

Maintenance Area : N2

Road : A147 CARROW ROAD

Road Section: A147/186

Parish : THORPE HAMLET PARISH WARD

District : Norwich

N.R.A.S.W. ENQUIRY :- Yes / ☒ No / Issue ExistingCopy To PROW ☐

DESCRIPTION

Repair Pot-hole @ NW corner of the approach span, as per attached S.I. report

ELEMENTS 24

ESTIMATED COST

£1500

BUDGET:- REVENUE

FEES:- GLOBAL

COST CODE :- PH4410/PH4400 57700

APPROVED :-

Designer

Date

11/11/10

Budget Holder

Date

FIMS REQ. NO.

ORDER / EXOR No.

PS20/118

EXOR ONLY (Road Section/Area)

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW ROAD RIVER BRIDGE		Bridge No.: TG20100
Project Code: BMW255-11366		Brief No.: 11366
Contractor : MAY GURNEY ROUTINE CONTRACT	Approx. Cost : £1539.94	
Dates Works Carried Out : 17-18/4/10	Order No : PS20/118	Estimate : £1,500.00


Element Numbers of Ordered Maintenance Works	Report/Date :- *
--	------------------



Description of Completed Maintenance Works (Including element numbers) :-

24) Failed concrete removed from below the pot hole at the Northwest corner of the side span and replaced with Fosroc. PSC-10 concrete. The repair was then finished with HRA 30/14 & Surf 40/60 with coated chips

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached <input type="checkbox"/>	Estimate Prepared By :- 
---	---

Signed Clerk Of Works : 	Date : 12/04/11
Approved (PEBM) : 	Date : 28/5/11
Date Passed To PBEN :	As Built Drawgs. Being Micro-filmed :

ORDER REQUEST FORM

No 2011 /

PROJECT NO. BMW172 BMW255	
TO M9	
Area : NORTH	District : NORWICH CITY

WORK TO BE CARRIED OUT OR GOODS TO BE DELIVERED TO	
Structure No.: T420100	Name: CARROW ROAD RIVER BRIDGE
Grid Ref: 623906 307736	Maintenance Area N2
Road: A147	Road Name: CARROW ROAD Road Section: A147 / 192
Parish: THORPE HAMLET WARD	Fees:- Specific <input type="checkbox"/> Global <input checked="" type="checkbox"/>

N.R.A.S.W. ENQUIRY :- Yes / No / Issue Existing	Copy TO PROW <input type="checkbox"/>
Supervisor: [REDACTED]	Designer: [REDACTED]

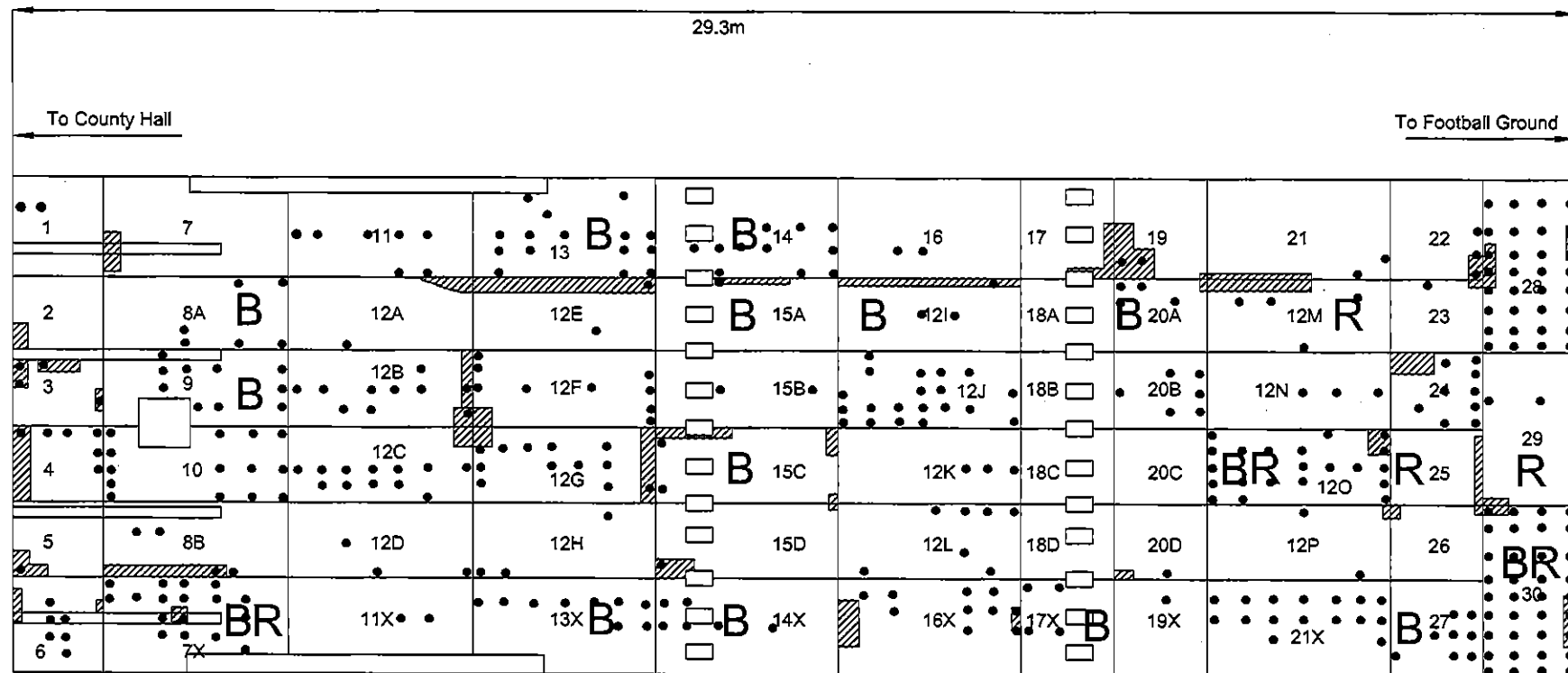
DESCRIPTION	QTY	UNIT PRICE	TOTAL AMOUNT
PROVIDE TRAFFIC MANAGEMENT (TWO-WAY STOP/GO) TO ASSIST INSPECTOR IN CARRIAGENAY PANEL INSPECTION. DATE TO BE AGREED WITH [REDACTED] (Week beginning 18 July 2011)			

ESTIMATED COST	£400
SITE SUPERVISION	£ ✓
ADMINISTRATION	£ ✓

BRIEF No.	COST CODE. 57700
-----------	------------------

APPROVED :-

Project Engineer [REDACTED]	Date 13/6/11
Group Manager [REDACTED]	Date 13/6/11
FIMS REQ. NO.	ORDER / EXOR No. PS11/15 - N107
EXOR ONLY	
INSPECTION NO.	DEFECT NO.



KEY

B Board bouncing

Surface texture loss

• Fixing hole to be filled

R Benefit from replacement

NB - All Locations and sizes approximate



RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW RIVER BRIDGE MAINTENANCE		Bridge No.: TG20100
Project Code: BMW172		Brief No.:
Contractor: MAY GURNEY ROUTINE CONTRACT	Approx. Cost: £157.54	
Dates Works Carried Out: 22/07/11	Order No: PS11/15-N107	Estimate: £400.00

Element Numbers of Ordered Maintenance Works	Report/Date :- *
--	------------------

Description of Completed Maintenance Works (Including element numbers) :-

Stop & go boards provided for board inspection
to Carrow Bridge deck boards

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached ☐

Estimate Prepared By :-

Signed Clerk Of Works :

Date :

Approved (PEBM) :

Date :

Date Passed To PBEN :

As Built Drwgs. Being Micro-filmed :

WORK REQUEST FORM

Brief No. 12208

PROJECT NO. BMW255-12208

TO MG

Supervisor :

Designer :

WORK TO BE CARRIED OUT OR GOODS TO BE DELIVERED TO

Structure No.: TG20100

Name : CARROW RIVER BRIDGE

Grid Ref: 623906 307736

Maintenance Area : N2

Road : A147

CARROW ROAD

Road Section:

A147/186

Parish : THORPE HAMLET PARISH WARD

District :

Norwich

N.R.A.S.W. ENQUIRY :- Yes / No / Issue Existing

Copy To PROW

☐

DESCRIPTION

CARRY OUT REPAIR WORKS AS PER ATTACHED SPECIAL INSPECTION REPORT DATED 16/8/11. RE-BED MOVING BOARDS WITH THIXOTROPIC EPOXY INJECTION AND REINSTATE WORN SURFACING AND EMPTY FIXING HOLES WITH C10/12. WORKS TO START ON SITE AT 1900. EXISTING TREE PEDESTRIAN TRAFFIC LIGHTS TO BE TURNED OFF AND AN ADDITIONAL SET OF LIGHTS TO BE ERECTED TO ALLOW A LANE CLOSURE OVER THE BRIDGE. LIGHTS TO BE LEFT ON OVERNIGHT TO ALLOW MATERIALS TO CURE THEN BE REMOVED AT 06.00 AND PEDESTRIAN LIGHTS REINSTATED. WORKS TO BE CARRIED OUT FROM 30/8/11 TO 2/9/11

ELEMENTS

24

COPY OF TMA FORM ATTACHED.

ESTIMATED COST

£3500

£0.00

BUDGET:- REVENUE

FEES:- GLOBAL

COST CODE :- PH4410/PH4400 57700

APPROVED :-

Designer

Date

19/8/11

Budget Holder

Date

19/8/11

FIMS REQ. NO.

ORDER / EXOR No.

PS11/15 - N135

EXOR ONLY (Road Section/Area)

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW RIVER BRIDGE		Bridge No.: TG20100
Project Code: BMW255-12208		Brief No.: 12208
Contractor : MAY GURNEY ROUTINE CONTRACT	Approx. Cost : £9570.31	
Dates Works Carried Out : 30/8 to 02/09/11	Order No : PS11/15-N135	Estimate : £3,500.00

Element Numbers of Ordered Maintenance Works	Report/Date :- * S 16/08/2011 24
--	-------------------------------------

Description of Completed Maintenance Works (Including element numbers) :-


24) Moving boards drilled and injected with Terevoc Thixotropic Epoxy injection grout. areas injected as drawing BMW255-12208/SK01/AB.

Areas of worn surfacing prepared and resurfaced using Cicol NT together with empty fixing down holes areas repaired marked on drawing BMW255-12208/SK03/AB

Rotten/damaged areas of deck boards removed and replaced with Terevoc epoxy E patches and finished with Cicol NT. areas marked on drawing BMW255-12208/SK02/AB.

Notes :

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached <input type="checkbox"/>	Estimate Prepared By :- 
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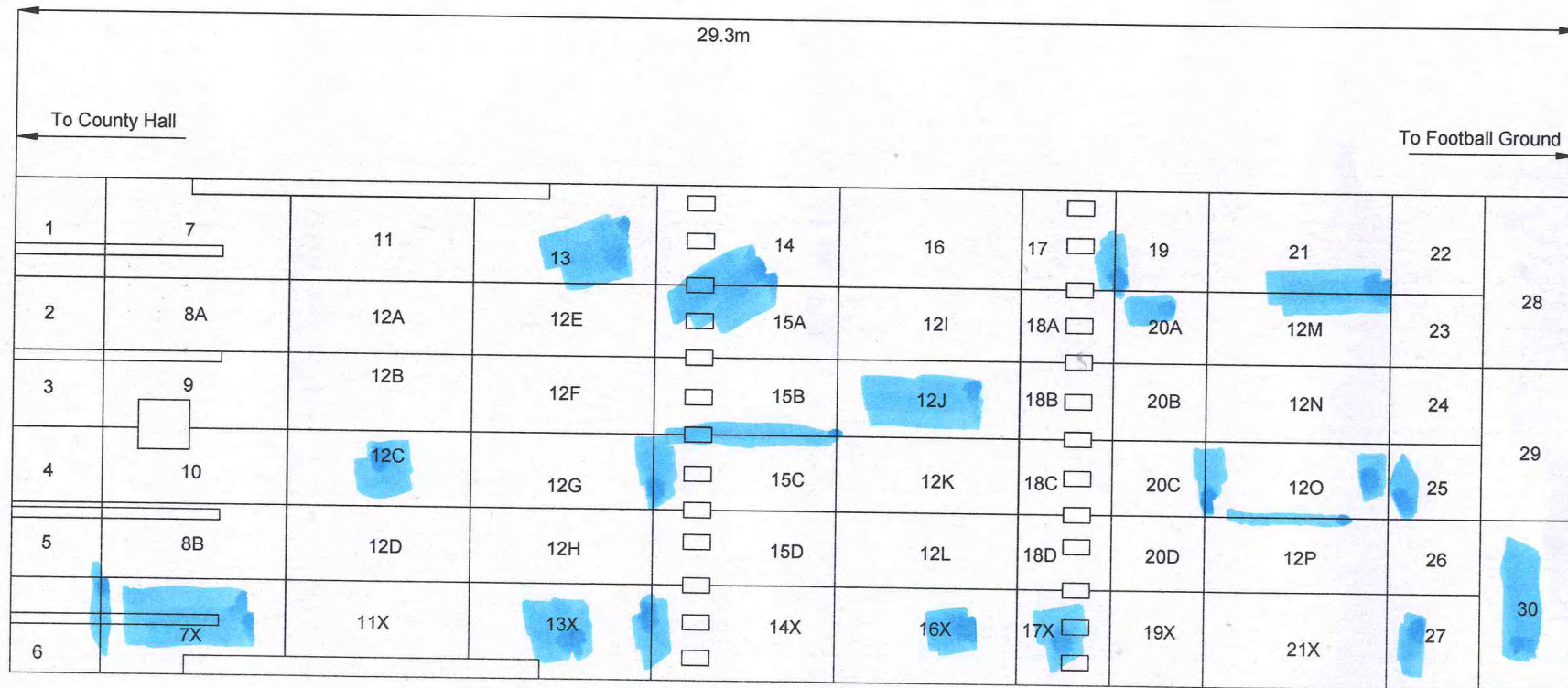
Signed Clerk Of Works : 	Date : 07/12/11
Approved (PEBM) : 	Date : 23/12/11
Date Passed To PBEN :	As Built Drwgs. Being Micro-filmed :

29.3m											
To County Hall						To Football Ground					
1	7	11	13	<input type="checkbox"/>	14	16	17	19	21	22	28
2	8A	12A	12E	<input type="checkbox"/>	15A	12I	18A	20A	12M	23	
3	9	12B	12F	<input type="checkbox"/>	15B	12J	18B	20B	12N	24	29
4	10	12C	12G	<input type="checkbox"/>	15C	12K	18C	20C	12O	25	
5	8B	12D	12H	<input type="checkbox"/>	15D	12L	18D	20D	12P	26	30
6	7X	11X	13X	<input type="checkbox"/>	14X	16X	17X	19X	21X	27	



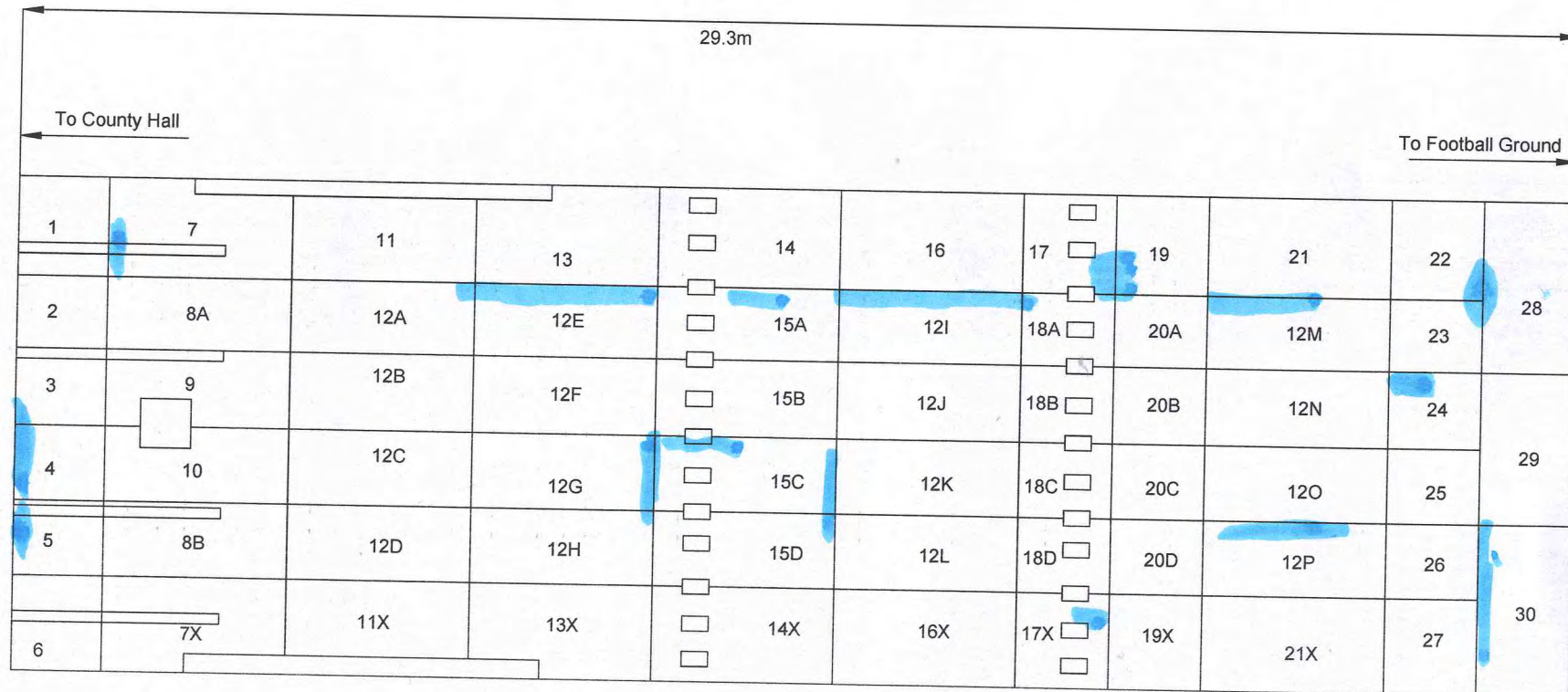
EPOXY PATCH REPAIRS

BMW 255-12208/SK02/AB



INJECTED WITH EPOXY

BMW 255-12208/SK01/AB



BOARD SURFACE REPAIRS

BMW 255-12208/SK03/AR

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: CARROW RIVER BRIDGE		Bridge No.: TG20100
Project Code: BMW172-12640		Brief No.: 12640
Contractor: MAY GURNEY ROUTINE CONTRACT	Approx. Cost: £209.43	
Dates Works Carried Out: 04/04/12	Order No: ps12/19-m068	Estimate: £300.00

Element Numbers of Ordered Maintenance Works	Report/Date :- *
--	------------------

Description of Completed Maintenance Works (Including element numbers) :-

24) Traffic management provided for deck board inspection

Notes :


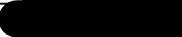

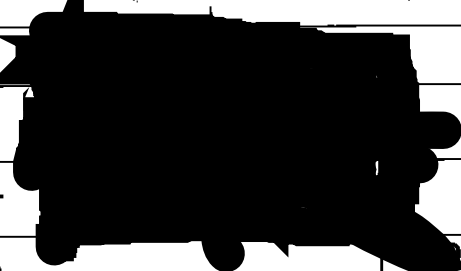
To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached <input type="checkbox"/>	Estimate Prepared By :-
---	-------------------------

Signed Clerk Of Works	Date: 14/09/12
Approved (PEBM):	Date: 11/10/12
Date Passed To PBEN:	As Built Drwgs. Being Micro-filmed:

WORK REQUEST FORM

Brief No. 12640

PROJECT NO. BMW172-12640	
TO MG 	
Supervisor : 	Designer : 
WORK TO BE CARRIED OUT OR GOODS TO BE DELIVERED TO	
Structure No.: TG20100	Name : CARROW RIVER BRIDGE
Grid Ref: 623906 307736	Maintenance Area : N2
Road : A147 CARROW ROAD	Road Section: A147/186
Parish : THORPE HAMLET PARISH WARD	District : Norwich
N.R.A.S.W. ENQUIRY :- Yes <input checked="" type="radio"/> (No) / Issue Existing Copy To PROW <input type="checkbox"/>	
DESCRIPTION* WORKS TO TAKE PLACE OVER 5 NIGHTS FROM 2/7/12 * REPLACE BOARD NUMBER 12M AND PATCH REPAIR BOARDS 12B AND 12O. OPEN FIXING HOLES TO BE FILLED WITH C100L NT. THIXOTROPIC EPOXY INJECTION TO BE USED TO RE AFFIX THE MOVING DECK BOARDS. C100L NT TO BE USED TO REINSTATE THE SURFACE WEARING COURSE. * WORKS TO BE CARRIED OUT UNDER 2 WAY LIGHTS ON OFF PEAK HOURS (7AM TO 6AM) - DATE TO BE CONFIRMED. SEE DRAWING 2 - 2012/13 DECK BOARD INSPECTION FOR SCOPE OF WORKS + BOARD 12M	
ELEMENTS 24	
ESTIMATED COST	£4500
BUDGET:- REVENUE	FEES:- GLOBAL
COST CODE :- PH4410/PH4400 57700 PX0001.	
APPROVED :- 	
Designer	Date 25/4/12
Budget Holder	Date 2/5/10
FIMS REQ. NO.	EXOR / EXOR No. PS12/124-.m136
EXOR ONLY (Road Section/Area)	

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: Carrow River Bridge	Bridge No.: TG20100
Project Code: BMW255-12640	Brief No.: 12640
Contractor : May Gurney Routine Contract Site Technician [REDACTED]	Approx. Cost : £17072.44
Dates Works Carried Out : 02/07>14/09/12	Order No PS12/19-M136
Estimate Rev £18000	

Element Numbers of Ordered Maintenance Works	Report / Date: SI 04/04/12 and SI 12/09/12 Element: 24
---	---

Description of Completed Maintenance Works (Including element numbers) :-

24) Repair and replacement of resin coated timber deck boards:- Deck board number 12B old worn out panel removed and replaced with new deck board provided by Gripdeck Ltd, method of fixing, fixing points to the top of the steel deck troughs drilled and tapped with a M10 thread to take a M10x60 bolt and the fixing points to the concrete trough infill drilled with 40mm diameter holes 130mm deep, these holes then filled with Tecroc E33 epoxy grout and with the deck board in position M10 stainless steel threaded rod 125mm long with a stainless steel nut and washer pushed into the grout and after 6 hours curing all nuts and bolts tightened. Deck boards 12B and 12O damaged/decayed areas cut out and repaired using Tecroc E33 grout bulked up with 6mm granite aggregate, these patches then coated with anti skid resin surfacing supplied by Gripdeck Ltd. All open fixing holes filled with resin repair kits supplied by Gripdeck Ltd. Joint around deck board 12B and any other failed joints sealed using Fosroc Nitoseal MS600.

Moving deck boards grouted using Tecroc thixotropic epoxy injection grout. Areas in the deck boards to be injected drilled with 10mm diameter holes and the thixotropic epoxy grout injected under pressure using a large mastic gun and disposable card board tubes.

Pot hole in the East bound carriageway cut out and repaired with HRA by CMS surfacing. Gap between the footway and the hinged plate at the Southwest corner of the bridge filled by welding a plate over the gap and the anti skid surfacing reinstated. This work carried out under two way traffic lights on 13/09/12.

All steel work carried out by Norwich Steel.


Notes:

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached	Estimated Prepared By :- [REDACTED]
--	-------------------------------------

Signed Site Technician : [REDACTED]	Date : 21/10/13
Approved (PEBM) : [REDACTED]	Date : 28/10/13
Date Passed To PBEN : [REDACTED]	As Built Drwgs. Being Micro-filmed :

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: Carrow River Bridge		Bridge No.: TG20100	
Project Code: BMW255-12640		Brief No.: 12640	
Contractor : May Gurney Routine Contract		Approx. Cost : £209.43	
Site Technician 			
Dates Works Carried Out : 04/04/12	Order No PS12/19	Estimate £300	


Element Numbers of Ordered Maintenance Works	Report / Date: SI 04/04/12 Element: 24
---	---

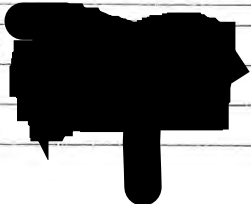


Description of Completed Maintenance Works (Including element numbers) :-

24) Stop go boards and labour supplied to carry out deck board inspection.

Notes:

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached	Estimated Prepared By :- 
---	---

Signed Site Technician : 	Date : 18/10/13
Approved (PEBM) : 	Date : 28/10/13
Date Passed To PBEN : 	As Built Drawgs. Being Micro-filmed :

RECORD OF BRIDGE MAINTENANCE WORKS

Bridge Name: Carrow Bridge	Bridge No.: TG20100	
Project Code: BMW255-12208	Brief No.: 12208	
Contractor: May Gurney Routine Contract Site Technician [REDACTED]	Approx. Cost: £9570.31	
Dates Works Carried Out: 30/08>02/09/11	Order No PS12/19	Estimate £ 3500.00

Element Numbers of Ordered Maintenance Works	Report / Date: SI 22/07/11 Element: 24
---	---

Description of Completed Maintenance Works (Including element numbers) :-

24) Grout beneath moving deck boards using Tecroc Thixotropic epoxy injection grout. Areas in the deck boards to be injected drilled with 10mm diameter holes and the thixotropic epoxy grout injected under pressure using a large mastic gun and disposable card board tubes. Any open bolt holes and 'bald patches' in the anti slip surfacing made good with repair kits supplied by Gripdeck Ltd. Failed joints around the deck boards sealed using Fosroc Nitoseal MS600.

Work carried out over 4 evenings under 2 way traffic lights TM supplied by Trek.

Notes:

To include suppliers & types of pipes, bricks, parapets, concrete etc. Adjacent landowners for access etc.

Maintenance Painting System Sheet Attached	Estimated Prepared By :- [REDACTED]
---	--


Signed Site Technician [REDACTED]	Date: 18/10/13
Approved (PEBM): [REDACTED]	Date: 28/10/13
Date Passed To PBEN:	As Built Drwgs. Being Micro-filmed:



Environment, Transport & Development

Form BG 1/A

Record of Bridge Maintenance Works

Bridge Name:		CARROW ROAD RIVER BRIDGE		Bridge No:		TG20100	
Project Code:		BMw172-14421		Brief No:		14421	
Contractor:				Approx Cost:		£	
Date works carried out:		Order No:	PS13/167-U110	Estimate:		£0.00	

Element Numbers of Ordered Maintenance Works	
Description of Completed Maintenance Works (Including element numbers) :-	
	Estimate Prepared By :- 


Signed Clerk Of Works :		Date :	26/06/2014
Approved (PEBM) :		Date :	26/06/2014
Date Passed To PBEN :	26/06/2014	As Built Drwgs. Being Micro-filmed :	No



Environment, Transport & Development

Form BG 1/A

Record of Bridge Maintenance Works

Bridge Name:	CARROW ROAD RIVER BRIDGE		Bridge No:	TG20100	
Project Code:	BMW255-15033		Brief No:	15033	
Contractor:	LT		Approx Cost:	£13229	
Date works carried out:	12/09/2014	Order No:	LS24/160	Estimate:	£10,960.10

Element Numbers of Ordered Maintenance Works	1
<p>Description of Completed Maintenance Works (Including element numbers) :-</p> <p>1) Areas of severe decay in deck panels 1, 11x, 13x, 22, 23 and 30 cut out and the resulting recess filled with Parex E33 epoxy grout with the addition of 10mm granite aggregate to form an epoxy concrete, failed splice plate recesses made good with the same epoxy concrete, the tops of these patches finished with anti slip resin as supplied by Gripdeck</p> <p>Areas surface texture loss made good together with open fixing holes filled with anti slip resin as supplied by Gripdeck.</p> <p>All identified loose fixings in the deck boards replaced last year had the resin cored out and the bolts retightened to 35NM + 90 degrees, recesses filled with anti slip resin as supplied by Gripdeck</p> <p>Identified bouncing boards injected beneath using Parex Thixotropic epoxy injection grout.</p> <p>Failed fixings in the deck boards replaced by drilling a 12mm hole in the deck board and counter boring a 30mm hole 15mm deep to take a stainless steel M10 nut and 2mm thick washer, the up troughs then drilled and tapped with a M10 thread and the deck boards bolted down using M10x70mm set screws and finally tightened to 35NM + 90 degrees with the bolt recess being filled with anti slip</p>	
	Estimate Prepared By :- 

Signed Clerk Of Works :		Date :	05/11/2014
Approved (PEBM) :		Date :	27/01/2015
Date Passed To PBEN :	05/11/2014	As Built Drwgs. Being Micro-filmed :	No


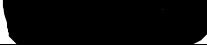
Environment, Transport & Development

Form BG 1/A

Record of Bridge Maintenance Works

Bridge Name:	CARROW ROAD RIVER BRIDGE		Bridge No:	TG20100	
Project Code:	BMW255-15312		Brief No:	15312	
Contractor:	LT		Approx Cost:	£182	
Date works carried out:	19/01/2015	Order No:	LS24/601	Estimate:	£250.00

Element Numbers of Ordered Maintenance Works	
Description of Completed Maintenance Works (Including element numbers) :- 23) Traffic management provided to allow the inspection of the deck boards.	
	Estimate Prepared By :-


Signed Clerk Of Works :		Date :	12/02/2015
Approved (PEBM) :		Date :	07/05/2015
Date Passed To PBEN :	12/02/2015	As Built Drwgs. Being Micro-filmed :	No


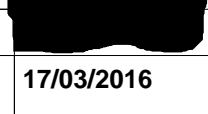
Environment, Transport & Development

Form BG 1/A

Record of Bridge Maintenance Works

Bridge Name:		CARROW ROAD RIVER BRIDGE		Bridge No:		TG20100					
Project Code:		BMW172-15355		Brief No:		15355					
Contractor:		LT		Approx Cost:		£4220					
Date works carried out:		01/06/2015		Order No:		LS24/707		Estimate:		£4,440.66	

Element Numbers of Ordered Maintenance Works	24
<p>Description of Completed Maintenance Works (Including element numbers) :-</p> <p>Deck boards 11X, 12C, 12G, 13X, 15C, 17X, 18C, 19X, 20B, 21X and 22 supply only for carriageway works in 2015/16. Supplied by GripDeck.</p>	
	Estimate Prepared By :- 


Signed Clerk Of Works :		Date :	17/03/2016
Approved (PEBM) :		Date :	21/03/2016
Date Passed To PBEN :	17/03/2016	As Built Drwgs. Being Micro-filmed :	No

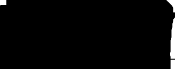

Environment, Transport & Development

Form BG 1/A

Record of Bridge Maintenance Works

Bridge Name:	CARROW ROAD RIVER BRIDGE			Bridge No:	TG20100	
Project Code:	BMW257-16035			Brief No:	16035	
Contractor:	Tarmac			Approx Cost:	£159	
Date works carried out:	30/03/2016	Order No:	LB15/473	Estimate:	£170.87	

Element Numbers of Ordered Maintenance Works	24
Description of Completed Maintenance Works (Including element numbers) :- Stop + go boards provided for deck board inspection	
Estimate Prepared By :- 	

Signed Clerk Of Works :		Date :	18/05/2016
Approved (PEBM) :		Date :	27/05/2016
Date Passed To PBEN :	18/05/2016	As Built Drwgs. Being Micro-filmed :	No

Appendix B

Carrow Road River Bridge (CRRB) (TG20100)
Movable span - carriageway surfacing photographs

Four photographs taken on 11/05/2021 to show current condition of the carriageway surfacing, along with two photographs showing the condition on 10/09/2018 to give an indication of the deterioration since then.

Carrow Road River Bridge (CRRB) (TG20100)
Movable span - carriageway surfacing photographs



Photograph 1. Looking northwards towards football stadium side.



Photograph 2. General view.

Carrow Road River Bridge (CRRB) (TG20100)
Movable span - carriageway surfacing photographs



Photograph 3. General view.



Photograph 4. Looking southwards towards County Hall side.

Carrow Road River Bridge (CRRB) (TG20100)
Movable span - carriageway surfacing photographs



Photograph 5. Looking northwards towards football stadium side. 2018.



Photograph 6. Looking southwards towards County Hall side. 2018.

Carrow Road River Bridge (CRRB) (TG20100)
Special Inspections

Special Inspections relating to the carriageway surfacing of Carrow Road River Bridge

There are 11 no. Special Inspection reports on the Norfolk County Council bridges database for the bridge and 8 no. of these relate to the carriageway surfacing. One relates to the steel nosing plate on the fixed span at the southern side of the bridge but the remaining ones relate to the plywood deck boards on the movable span.

Inspection dates range from October 2020 to May 2014. They are presented with the latest first.

Special Inspection 1 of 8.

Special Inspection Report

Date	16/10/2020	Structure Number	TG20100	
Structure Name	CARROW ROAD RIVER BRIDGE	Road Number	A147	
Parish	Lakenham Parish Ward	Inspected By	[REDACTED]	
			[REDACTED]	
		Signature	19/10/2020	
Brief Number	21162			
Grid Reference	Easting:	623906	Northing:	307736

Report

A special inspection of the timber deck panels was carried out following completion of annual emergency repairs on 10/11, 11/12 & 17/18 of October 2020 where further patches of deteriorated plywood were removed and replaced with an epoxy repair mortar. The purpose of the inspection was to record the condition of the panels, to estimate whether they are likely to last through the winter period and to consider what repairs are likely to prove possible in the future. The inspection was carried out by [REDACTED] assisted by [REDACTED] and [REDACTED] and recorded on a sketch which is attached to this SI report)

- a) The decking is in a general poor condition (even after repair), with sections cut out of all but 2 of the 64 timber plywood panels (cut edges are open to accelerated deterioration due to water ingress).
- b) A number of the retained panels (particularly in the wheel tracks) are in a poor condition and may not last through the 20/21 winter period. Replacement was not possible due to the patch size, time, material available and the strategy of replacing the worst panels first (i.e. the panels replaced were in an even worse condition).
- c) As the remaining panel sizes shrink in size and fixings deteriorate, it becomes increasingly likely that future failures will result in panels/part panels being lost and holes being left. A macadam or asphalt patch repair is unlikely to be successful as it would butt up against moving timber panels (i.e. deflect when loaded). Any such failure is likely to occur with little or no warning.
- d) The current complete deck renovation works (Long term maintenance option) has been put on hold for the foreseeable future (a number of years), while the viability of the removal of the navigation rights under the bridge is investigated.

Recommendation / Conclusions:


- i) There is a fair to good chance that the current repairs will last through the 20/21 winter period (or maybe a little longer). However there is a significant and increasing risk of further failure of the remaining plywood deck panels.
- ii) We have or are close to reaching the point where removal of section of the plywood panels and replacement with an epoxy mortar is no longer a viable option.
- iii) A future scheme, involving the replacement of the existing decking (e.g. with surfacing material or similar), needs to be made ready. While this scheme (a short term solution) should be in planned for Summer 2021, it must be ready to implement as soon as possible and at short notice as emergency works should the remaining plywood decking start lifting off/out.

Recommended Works

No.	Description	S	EX	Def	W	P	Cost	Comments
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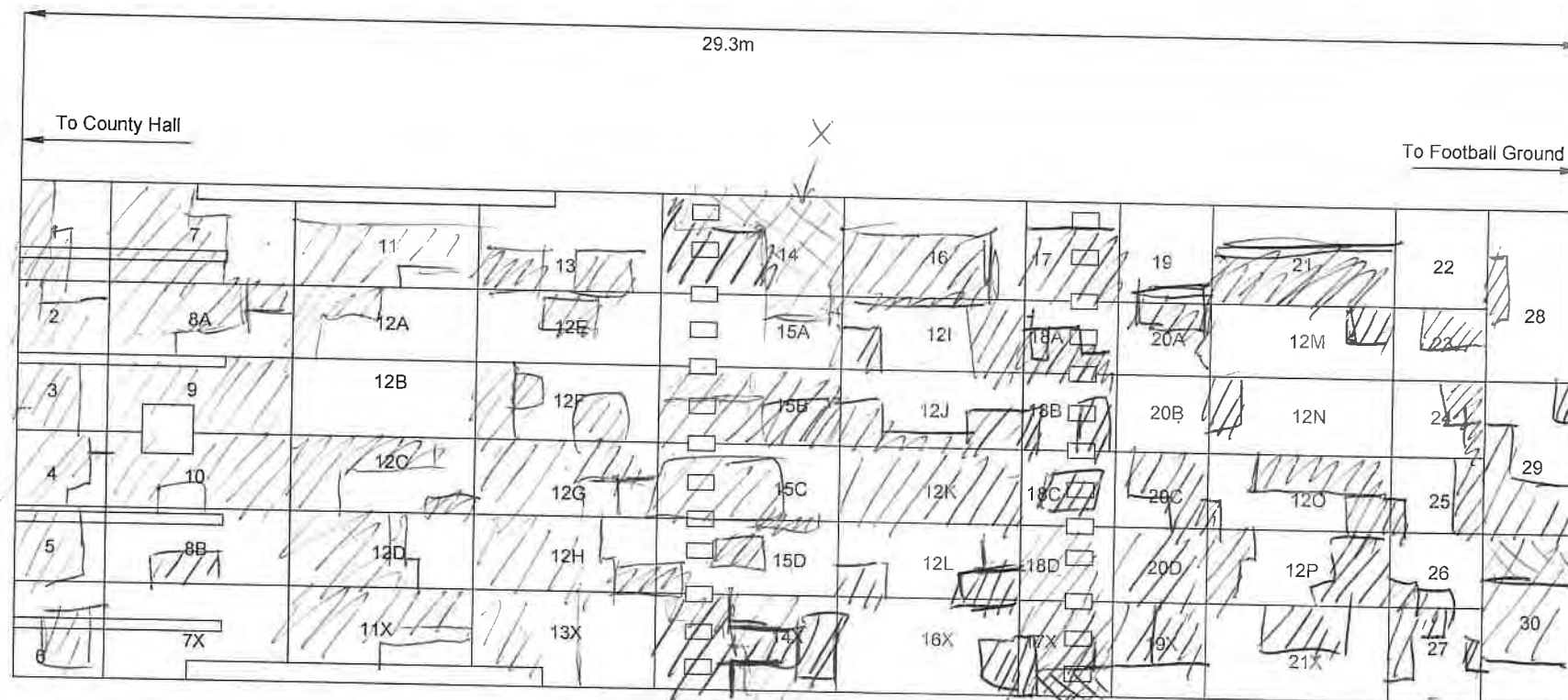
Team Manager (Bridge Maintenance)	Remarks
SP03-01-F101	Page 1 of 2
	Revision 2 (17/09/10)

Signed [REDACTED] Date 19/10/2020	

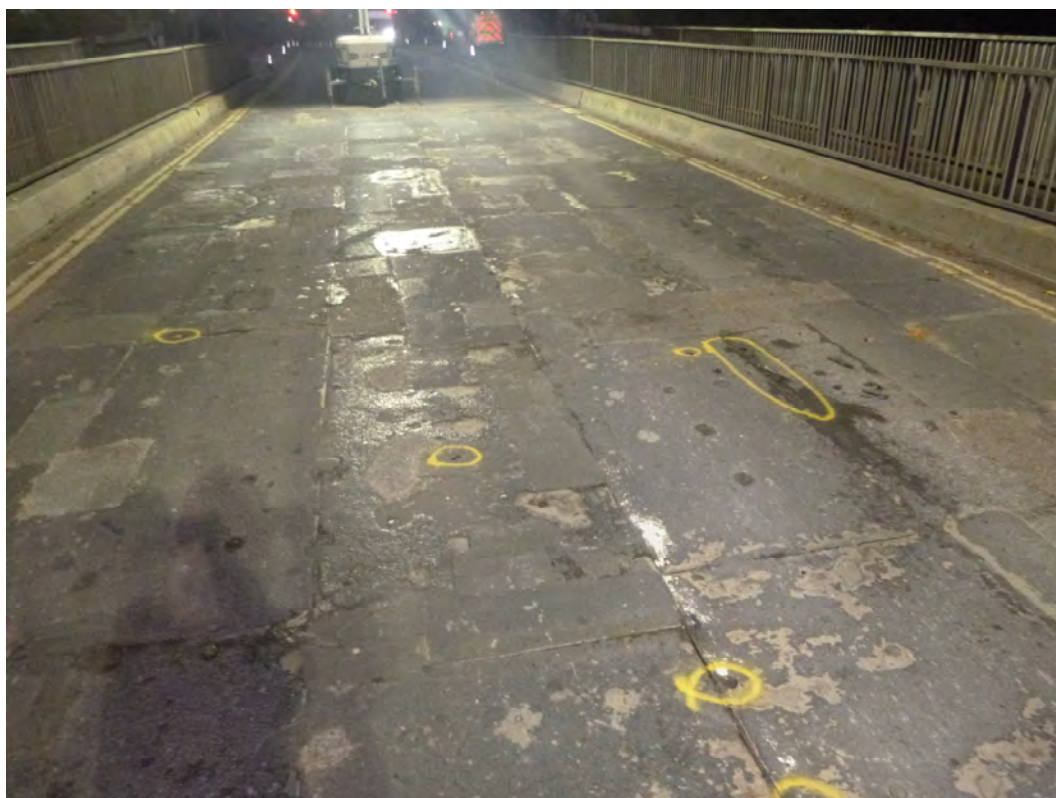
 Patch, E33

16/10/20

20:30 JT



Carrow Road River Bridge (CRRB) (TG20100)
Last Special Inspection




Photograph 1. Photograph taken 16th October 2020.



Photograph 2. Photograph taken 16th October 2020.

Special Inspection 2 of 8.

 Norfolk County Council	Community and Environmental Services		
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Special Inspection

Structure Name		CARROW ROAD RIVER BRIDGE		Parish	Lakenham Parish Ward		Structure Number	TG20100
Road Number	A147	Overall Width	7m		Depth of Water	N/amm	Depth of Soffit	N/amm
Number of spans	3	Span Details	N/a		Inspection Date		05/05/2020	
Number of construction forms in bridge/span:					Primary Deck Element Form - Table 2		04	
					Primary Deck Element Material - Table 4		E	
Number of photographs accompanying this report:				1	Secondary Deck Element Form - Table 3		35	
					Secondary Deck Element - Table 4		E	
Structure Owner	NORFOLK CC		Headroom	N/amm	Built	1923		
Is Assistance Required for inspection? No			N/a					

NUMBER OF PRO FORMAS IN REPORT	
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No.	Element Description	Old SEX	S	EX	Def	W	P	Cost	Comments/Remarks
9	Abutments (incl. arch springing)		4	D	1.4	R	H	£2,500	Steel Nosing plate to the RH (US) corner of the bridge adjacent to the shed is bouncing due to a broken weld or corner to the L shaped angle plate. which is causing a loud banging when trafficked.- repair

General Comments

Steel Nosing plate to the RH (US) corner of the bridge adjacent to the shed is bouncing due to a broken weld or corner to the L shaped angle plate. which is causing a loud banging when trafficked.

Materials

2 x boxes E33 + 10mm stone
Steel Fabricator - Arbus
2 way stop go - day time working
Piece of steel plate minimum 5mm thick


Plant

Disc cutter
Breaker Pack
Leaf blower

Blow torch

SIGNIFICANT ACCESS HAZARDS	None
Overhead Cables Present? (Y/N)	No

Inspector	Date 05/05/2020
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Team Manager (Bridge Maintenance)	Remarks:
Signed  Date 07/05/2020	

S - severity, Ex - extent, Def - defect, W - work required, P - work priority.
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Steel Noising Bouncing Due to possible Broken Weld

Special Inspection 3 of 8.

Special Inspection Report

Date	11/09/2017	Structure Number	TG20100	
Structure Name	CARROW ROAD RIVER BRIDGE	Road Number	A147	
Parish	Lakenham Parish Ward	Inspected By	[REDACTED]	
			[REDACTED]	
		Signature	11/09/2017	
Brief Number	18088			
Grid Reference	Easting:	623906	Northing:	307736

Report

I received a report from Tarmac [REDACTED] that the previous pothole repairs were breaking up. Visited site at 10am and identified a total of 6 potholes developing in boards 3,9, 15b, 18c,19 and 21. The worst potholes being 15b and 21.

Recommended Works

No.	Description	S	EX	Def	W	P	Cost	Comments
24	Carriageway surface	1	A	9.4	R	H	£2,000	Repair potholes. Visited site at 10am and identified a total of 6 potholes developing in boards 3,9, 15b, 18c,19 and 21. The worst potholes being 15b and 21.

Team Manager (Bridge Maintenance)	Remarks
Signed [REDACTED] Date 11/09/2017	

Special Inspection 4 of 8.

Special Inspection Report

Date	06/07/2017	Structure Number	TG20100	
Structure Name	CARROW ROAD RIVER BRIDGE	Road Number	A147	
Parish	Lakenham Parish Ward	Inspected By	[REDACTED]	
		Signature	06/07/2017	
Brief Number				
Grid Reference	Easting:	623906	Northing:	307736

Report

Deck boards inspected by [REDACTED] and [REDACTED] following call from CSC where member of public reported that "there is a big hole that can be seen through on the middle of the bridge. Tarmac and wood have worn away. Looks very dangerous."

[REDACTED] spoke with [REDACTED] and agreed that holes would be filled with Viafix,. Largest of holes were filled on Friday 7th July.

Recommended Works

No.	Description	S	EX	Def	W	P	Cost	Comments
24	Carriageway surface	5	E	9.4	R	H	£10,000	Areas of surface texture loss, open holding down bolt fixing holes, loose fixings and bouncing boards - Repair. Emergency works will require 1 night road closure. Defect added to this inspection report following SD/ SR visit on 25.07.2017.

Team Manager (Bridge Maintenance)	Remarks
Signed [REDACTED] Date 25/07/2017	









Special Inspection 5 of 8.

Special Inspection Report

Date	26/06/2017	Structure Number	TG20100	
Structure Name	CARROW ROAD RIVER BRIDGE	Road Number	A147	
Parish	Lakenham Parish Ward	Inspected By	[REDACTED]	
			[REDACTED]	
		Signature	27/06/2017	
Brief Number	18060			
Grid Reference	Easting:	623906	Northing:	307736

Report

Inspected deck due to report of sharp objects that could cause punctures.

Various deck boards are bouncing some with loose fixings, various other board have surface de laminations with lose of anti slip surfacing and some boards failed completely at the corners allowing pot holes to start to form.

A designer will need to visit site and observe vehicle movements over the bridge to identify What boards, fixings need replacing and areas for new anti slip surface.

I would recommend to look at replacing the complete deck with fibreglass boards as we have spent a significant amount of money patching this up over the last few years.

Please note you will never stop movement with timber deck boards.

Recommended Works								
No.	Description	S	EX	Def	W	P	Cost	Comments
24	Carriageway surface	5	E	9.4	R	H	£35,000	Areas of surface texture loss, open holding down bolt fixing holes, loose fixings and bouncing boards - Repair. Works will require 2 night road closure.

Team Manager (Bridge Maintenance)	Remarks
Signed [REDACTED] Date 28/06/2017	Repairs to be programmed as soon as practicable



Typical Loose Fixings



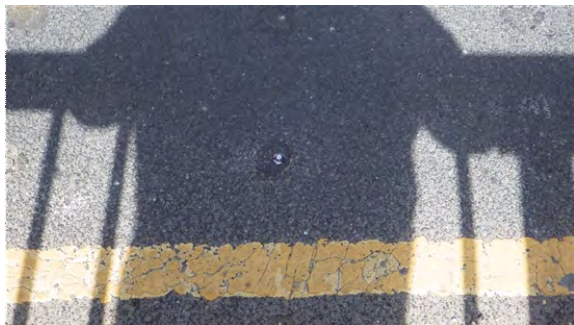
Typical view of Deck Board



Typical Anti Slip Surface Lose



Broken Corner to Deck Board



Fixing proud of Surface



Typical view of Deck Board

Special Inspection 6 of 8.

Special Inspection Report

Date	29/03/2016	Structure Number	TG20100	
Structure Name	CARROW ROAD RIVER BRIDGE	Road Number	A147	
Parish	Lakenham Parish Ward	Inspected By	[REDACTED]	
		Signature	[REDACTED]	
			04/04/2016	
Brief Number	16035			
Grid Reference	Easting:	623906	Northing:	307736

Report

Annual inspection of carriageway deck boards to identify any remedial works - see attached drawing for areas of repair.

No replacement boards recommended for this years work - but boards 3, 5, 12I, 17, 20C, 27, 28, 29 & 30 are deteriorating. These may need to be replaced next year

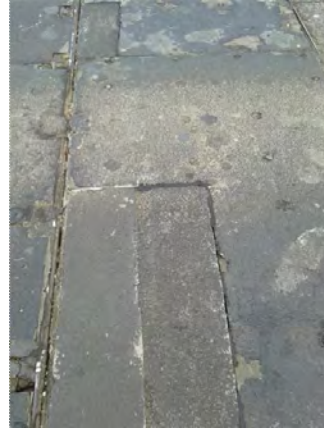
Recommended Works

No.	Description	S	EX	Def	W	P	Cost	Comments
24	Carriageway surface	3	C	9.1	R	H	£8,000	Areas of surface texture loss, open holding down bolt fixing holes and bouncing boards identified on attached drawing - Repair. Works will require 2 nights with convoy working due to works in centre of carriageway.

Team Manager (Bridge Maintenance)	Remarks
Signed [REDACTED] Date 22/04/2016	



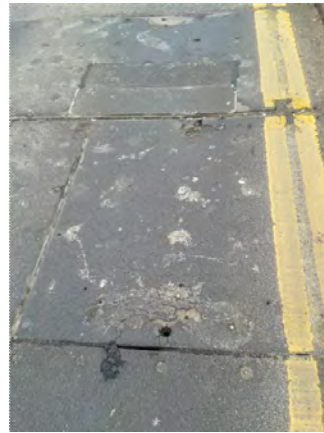
Typical view on Deck Board requiring probable replacement next financial year. a



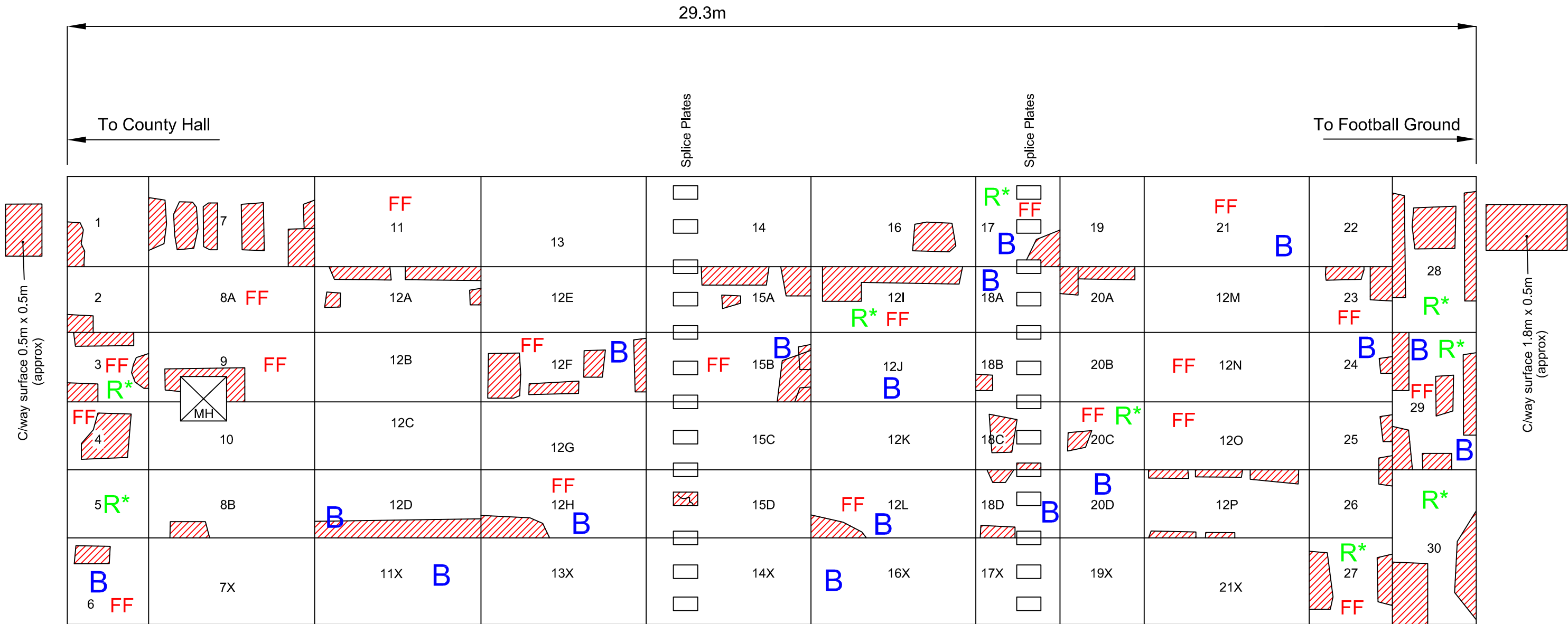
Typical view on Deck Board requiring probable replacement next financial year. c



Typical view on Deck Board requiring probable replacement next financial year. d



Typical view on Deck Board requiring probable replacement next financial year. b



KEY

B

Board bouncing



Surface texture loss

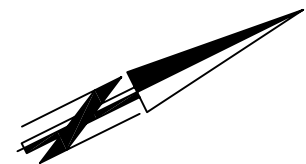
FF

Failed Fixings & Fixing holes to be filled

R*

Benefit from replacement (Next financial year - 2017/18)

Note - All Locations and sizes approximate



REV.	DESCRIPTION	CHECKED	DATE

SURVEYED BY	INITIALS	DATE	DRAWING No.
			1
DESIGNED BY	KP	03/16	PROJECT TITLE
DRAWN BY	KP	03/16	Carrow Road River Bridge Deck Boards Special Inspection
CHECKED BY	MW	03/16	SCALE NTS
			FILE No. TG20100

Special Inspection 7 of 8.

Special Inspection Report

Date	19/01/2015	Structure Number	TG20100	
Structure Name	CARROW ROAD RIVER BRIDGE	Road Number	A147	
Parish	Lakenham Parish Ward	Inspected By	[REDACTED]	
			[REDACTED]	
		Signature	19/01/2015	
Brief Number	15355			
Grid Reference	Easting:	623907.161639539	Northing:	307742.865894946

Report

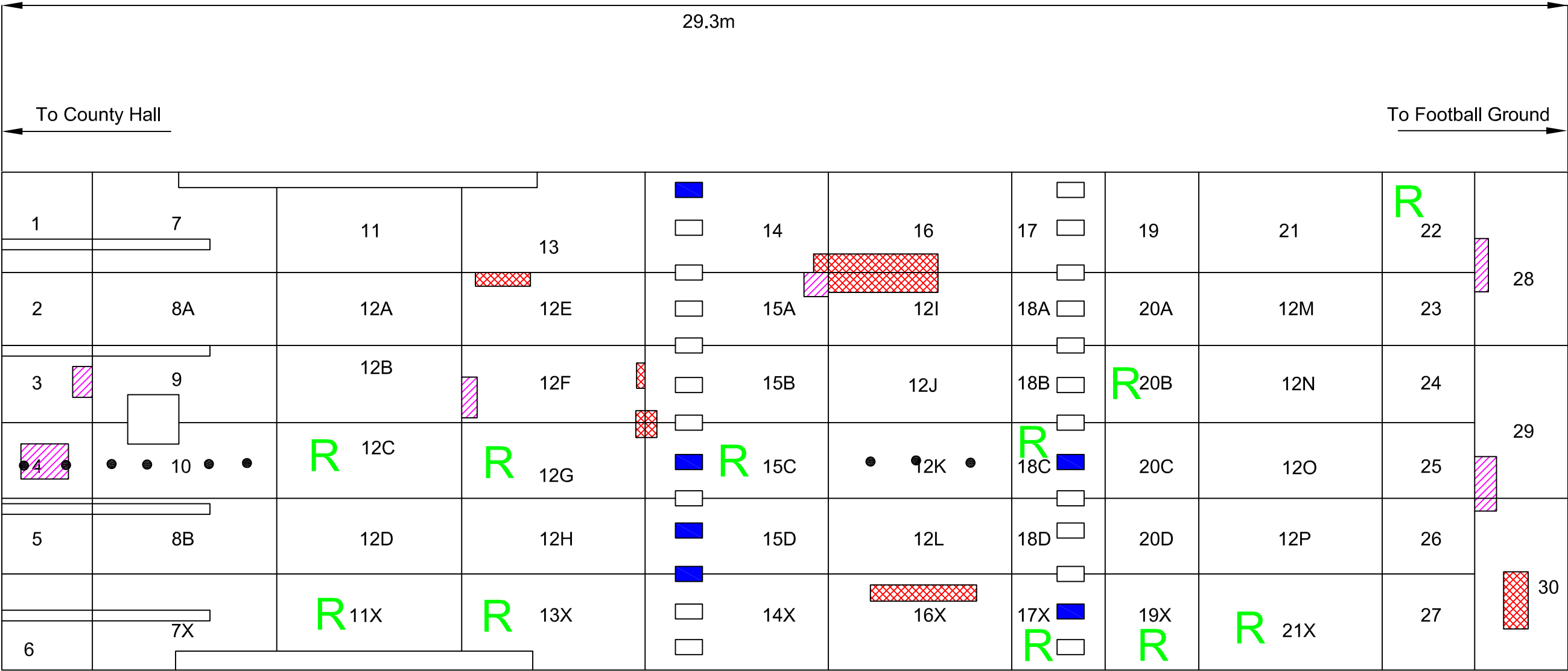
Annual inspection of carriageway deck boards to identify any remedial works - see attached drawing for areas of repair.

Replacement boards recommended for this years work - Boards 11X, 12C, 12G, 13X, 15C, 17X, 18C, 19X, 20B, 21X and 22.

Recommended Works

No.	Description	S	EX	Def	W	P	Cost	Comments
24	Carriageway surface	1	A	9.4	R	H	£45,000	Areas of surface texture loss, open holding down bolt fixing holes and boards in need of replacement identified on attached drawing - Repair. Suggest a weekend road closure to allow works in centre of carriageway to take place.

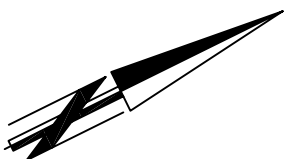
Team Manager (Bridge Maintenance)	Remarks
Signed [REDACTED] Date 26/01/2015	



KEY

- Cut out and replace splice plate with E33 patch
- Resurface with resin and gripdeck repair kit
- Cut out and create new E33 patch
- New fixing to be installed
- Board to be replaced

NB - All Locations and sizes approximate



Special Inspection 8 of 8.

Special Inspection Report

Date	16/05/2014	Structure Number	TG20100	
Structure Name	CARROW ROAD RIVER BRIDGE	Road Number	A147	
Parish	Lakenham Parish Ward	Inspected By	[REDACTED]	
			[REDACTED]	
		Signature	19/05/2014	
Brief Number	15033			
Grid Reference	Easting:	623906	Northing:	307736

Report

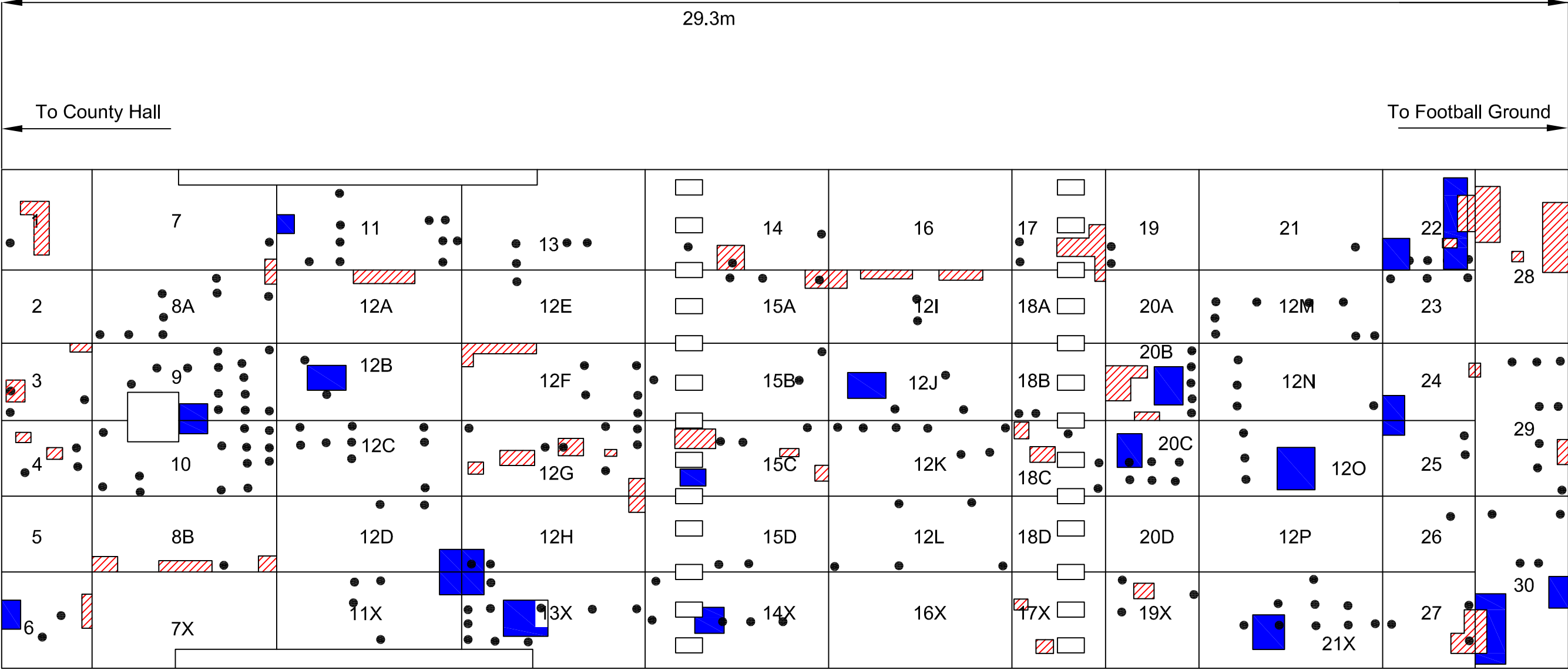
Annual inspection of carriageway deck boards to identify any remedial works - see attached drawing for areas of repair.

No replacement boards recommended for this years work - but boards 12C, 12G, 15C are deteriorating with 22, 23 and 30 following closely behind. these may need to be replaced next year





Recommended Works

No.	Description	S	EX	Def	W	P	Cost	Comments
24	Carriageway surface	3	C			H	£6,000	Areas of surface texture loss, open holding down bolt fixing holes and bouncing boards identified on attached drawing - Repair. Suggest a weekend road closure to allow works in centre of carriageway to take place.

Team Manager (Bridge Maintenance)	Remarks
Signed [REDACTED] Date 21/05/2014	



KEY

-  Board bouncing
-  Surface texture loss
-  Fixing hole to be filled
-  Benefit from replacement

NB - All Locations and sizes approximate

Boards 12B, 15B, 12J & 12O new boards - remove fixings and inject grout to stop bouncing.

