

# Proposed Decision to be made by the Portfolio Holder for Transport and Environment on or after 16 March 2018

## TUCKEY'S BRIDGE, CATHIRON LANE, HARBOROUGH MAGNA PROPOSED 10 TONNE WEIGHT LIMIT

### Recommendation

That the Portfolio Holder for Transport and Environment approves that the Warwickshire County Council (Tuckey's Canal Bridge, Cathiron Lane, Harborough Magna) (10 Tonnes Weight Restriction) Order be made as advertised.

### 1.0 Key Issues

- 1.1 A weight limit assessment has been carried out on Tuckey's Bridge, Cathiron Lane, Harborough Magna by the Canal and Rivers Trust (**Appendix A**). The Structure Location Plan is shown in **Appendix B**. The Canal and River Trust (CRT) contacted Warwickshire County Council (WCC) to inform WCC that they had assessed the load bearing capacity of this bridge based on its current condition as being 10 tonnes. As a result, and in the interest of public safety, a reduced statutory weight limit is proposed on the bridge.
- 1.2 CRT owns the structure of the bridge. CRT is obliged under the Transport Act 1968 to maintain their highway structures to a standard such that they are capable of carrying the weight of traffic which would ordinarily use the highway carried by the bridge on the day the Act came into force.
- 1.3 The standards at the time the Transport Act 1968 was enacted required masonry arches to be capable of carrying vehicles with a maximum single axle load of 11 tons or tandem 9 ton axles. This roughly equates to an 18 tonne gross vehicle weight restriction when assessed to modern standards but this is dependent on the size of the structure and it is not possible to make a direct comparison between the new and old standards. CRT is still permitted to assess and maintain their highway structures to these outdated standards and these loads are lower than the maximum permissible axle loads of modern vehicles. As a result older canal bridges are often subject to weight restrictions.
- 1.4 WCC's assessment of the load bearing capacity of Tuckey's Bridge in its current condition is that a 10 tonne maximum gross weight is suitable to prevent further damage to the bridge and to protect public safety.
- 1.5 WCC has responsibility for the safety of the public using the public highway, which, in this case, includes Cathiron Lane where it crosses Tuckey's Bridge.

- 1.6 On 7 April 2016, WCC issued a notice imposing a temporary 10 tonne weight restriction on Tuckey's Bridge for a period of 21 days. This was followed by a second temporary notice on 29 April 2016 for a further period of 21 days. On 21 May 2016, WCC made a temporary traffic order continuing the temporary 10 tonne weight restriction on Tuckey's Bridge for a period of 18 months. This temporary order has now expired.
- 1.7 As a result of the temporary weight restriction order expiring, in the interests of public safety owing to the condition of the bridge, on 15 December 2017 WCC issued a further notice imposing a temporary 10 tonne weight restriction on Tuckey's Bridge for a period of 21 days (being the maximum permissible length of time for a temporary notice). On the expiry of this notice on 5 January 2018 WCC issued another notice imposing a temporary 10 tonne weight restriction on Tuckey's Bridge for a further period of 21 days in the interests of public safety. This temporary weight restriction was subsequently extended by a second temporary traffic order which expires on 14 June 2018.
- 1.8 With regard to the longer term, CRT has informed WCC that it does not intend to apportion any funds to pay for works to strengthen Tuckey's Bridge. WCC does not receive any funding for the maintenance of the bridge structure and does not have any resources to commit to maintaining structures owned by third parties.

## **2.0 Options and Proposal**

- 2.1 In notifying WCC, CRT suggested the following options to deal with this weak bridge:
- Enact a weight limit by Traffic Regulation Order and erect appropriate signage;
  - Fund intrusive investigation works and further analysis in an attempt to demonstrate adequate load capacity; or
  - Fund strengthening works to the bridge. (In which case WCC would prefer ownership of the bridge to be transferred from CRT to the Highway Authority to avoid having split liability for future maintenance.)
- 2.2 WCC does not receive any funding for the maintenance of canal bridges and does not have the resources to strengthen structures owned by others. Further investigation and analysis is not expected to result in any significant increase in load bearing capacity therefore the preferred option is to enact a weight limit. Works to strengthen a similar weak masonry arch bridge to raise its load bearing capacity to 18 tonnes have been estimated to cost £90,000. Strengthening the bridge to carry full, unrestricted highway loading is likely require a replacement structure and would cost considerably more.
- 2.3 WCC is therefore proposing to make a Traffic Regulation Order imposing a weight limit of 10 tonnes maximum gross weight on Tuckey's Bridge to protect the structure of the bridge and to avoid danger to persons or traffic using the road which crosses the bridge or to prevent the likelihood of any such danger arising.

- 2.4 A public notice setting out WCC's proposal to make a 10 tonne weight limit traffic regulation order was published in the Rugby Observer newspaper on 12 October 2017 and a statutory consultation was undertaken.
- 2.5 The statutory criteria for decisions on the making of Traffic Regulation Orders is included in this report (**Appendix C**).

### **3.0 Support/Objections**

- 3.1 As a result of the statutory consultation, two objections have been received by WCC as outlined below.

#### **3.2 Objection 1 – local County Councillor**

*I object strongly to this attempt to downgrade this bridge. My grounds are as follows.*

*Traffic*

*Most users of this bridge are rural farmers. Most of their equipment is well over this limit, as are the delivery vehicles that serve them. This limit will involve huge and expensive diversions.*

*Pollution*

*Do we really want to increase the road miles of diesel agricultural vehicles? We are seeing the issues around their emissions, and this change will cause older agricultural vehicles to cover more miles unnecessarily.*

*Please record my objection to this consultation.*

3.3 **Objection 2 – Harborough Magna Parish Council (received via Mark Pawsey MP)**

**CONSULTATION ON PROPOSAL FOR A PERMANENT 10 TONNE WEIGHT LIMIT RESTRICTION ON TUCKEYS BRIDGE, CATHIRON LANE, HARBOROUGH MAGNA**

On behalf of the residents and businesses within Harborough Magna, the Parish Council would like to firmly object to the proposed significantly reduced weight limit.

Our objection to this proposal is on the basis that this will inconvenience local residents who farm either side of the bridge but of greater significance, it will impact on local businesses to the point where some may be unable to receive deliveries. In making this objection we would like you to consider the following points:

1. There are other similar bridges in the area which have had their weight limits reduced: Bridge 34 by Town Thorns and Bridge 51 by Brownsover Lane. The combined impact of these on businesses is very detrimental.
2. The harsh reality is that the bridge is only facing the weight closure because the Canal & River Trust (and their predecessor organisation British Waterways) and Warwickshire County Council have failed to provide significant maintenance over many years. The Canal & River Trust have failed to honour the commitments made when the transfer to a new organisation was completed. *This is unacceptable.* We have requested details of maintenance under an FOI request and to date this has not been provided.

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*Letter continues on next page of report*

3. We have correspondence from British Waterways from 2006 making a commitment to undertake repairs to the bridge. This work was never completed.
4. Simply reducing the weight limit **will not ensure the life of the bridge continues** – without proper maintenance, the bridge will continue to deteriorate.
5. In recent years the bridge has been damaged on several occasions by heavy vehicles from the Network Rail Track Maintenance Yard, just beyond the bridge. The most recent occasion was when a vehicle caused significant damage to the road surface, other vehicles have gouged tracks on the bridge walls.

Users to this rail yard have continued to use the bridge during the period that the temporary weight limit has been in place – when challenged by local residents, their responses have been offensive and they continued on their journey, crossing the bridge. **It is clear that vehicles, in excess of the weight limit, using the rail yard will continue to use the bridge and risk damaging it further.**

6. While the rail yard has admitted liability for damage, we have not had confirmation that they have paid for the repairs to the bridge surface. Had Warwickshire County Council pursued them for payment, this could have gone some way to maintaining a higher weight limit on the bridge.
7. The Canal & River Trust and the Council has agreed to seek the lower weight limit **without undertaking any studies to assess the impact** of the reduced weight limit on local residents and businesses.
8. WCC must undertake a proper assessment – with effective surveillance of the bridge over a reasonable time frame, to assess the impact of the proposed lower weight limit.
9. The Council should also put pressure on the Canal & River Trust to fund an effective restoration project so that the bridge could continue with a higher weight limit. This should be an immediate action as a renovation was promised by the CRT over three years ago, to repair/replace coping stones which had been removed in 2005. This promise has not been met.
10. The Council must put pressure on the Network Rail to contribute to the bridge's restoration – and going forward they must put in place an effective communication programme to ensure that visitors to the rail yard are aware of the bridge and act responsibly. It may be that a surveillance camera should be installed to monitor their traffic.

We hope that the County Council will reconsider its proposal and take forward the impact study, talk further with the Canal & River Trust and pursue the Network Rail for them to reimburse the costs.

If all three concerns accepted their individual liabilities for the project, the project would be shared fairly and could proceed at a reasonable cost and timescale.

However if the Council decides to ignore our concerns we believe at the very minimum, the Council has a responsibility to

- A. Enter into a dialogue with the Canal & River Trust to see what of the outstanding maintenance tasks can be completed within a reasonable timescale to enable the bridge to take vehicles up to 17 tonnes. This would allow some heavier vehicles to cross the bridge and assist local businesses.
- B. Provide additional road signs that will enable local businesses to continue – the present planned signs suggest that the no vehicles above 10 tonnes can access businesses on Cathiron Road. If this is acceptable we will provide a list of businesses, whose access should be marked by permanent signs.

We have copied this response to the Canal & River Trust as they have responsibilities and obligations in this matter that they must honour.

Yours sincerely

### 3.4 **Warwickshire County Council Response to both objections**

The bridge known as Tuckey's Canal Bridge has been assessed as being structurally unable to support vehicles exceeding 10 tonnes maximum gross weight.

As previously mentioned in this report, the bridge structure is owned by the CRT and the CRT have previously stated that it does not intend to fund any works to strengthen the bridge. The CRT's position is that they are meeting their statutory obligations under the Transport Act 1968 and as such are under no legal obligation to undertake works to strengthen the bridge.

An alternative route has been identified for vehicles heavier than 10 tonne maximum gross weight, avoiding Tuckey's Bridge. This route follows the B4112 to the east of Cathiron Lane and follows a similar north to south routing. This road is more suited to heavier traffic than Cathiron Lane. The route increases journey lengths by up to four miles and will be clearly signed. Traffic count data from taken from Cathiron Lane to the north-east of the bridge indicates that traffic flows in the area are very low. The low traffic flows and relatively short diversion route indicates that the impact on local residents and businesses will be low.

WCC does not have funds available to spend on structures such as this bridge, which it neither owns nor controls and does not have a legal responsibility to maintain. Therefore, funding intended for some other priority would have to be diverted. Similar considerations arise in relation to other

bridges owned by third parties in the county and that would add to the pressure on funding intended for purposes where WCC does have a legal duty to act. The policy of Parliament in the Transport Act 1968 effectively accepts that bridges owned by transport organisations like the Canal Trust will be unable to accommodate heavy goods traffic as standard vehicle weights increase. In this instance, the diversion of traffic will have an impact but it is not considered that the net economic and environmental impacts are such as to justify the significant expenditure that would be required to bring the bridge up to modern standards. WCC would be happy to work with the Canal and Rivers Trust in developing a scheme to increase the load bearing capacity of the structure should it identify other funding.

WCC have contacted Network Rail on two occasions to ensure that their drivers are made aware of the weight restriction and use suitable alternative routes when travelling to and from their site on Cathiron Lane.

From both financial and public safety perspectives, it is recommended that a 10 tonne maximum gross weight limit should be made permanent on Cathiron Lane where it crosses Tuckey's Bridge over the Oxford Canal.

#### **4.0 Timescales associated with the decision and next steps**

4.1 If the decision by the Portfolio Holder is to go ahead with the weight restriction traffic regulation order, the order could be sealed within a month of the decision, with the aim of the order commencing within six months. Objectors will be notified within fourteen days of the sealing of the order in accordance with the statutory requirements. Permanent traffic signs showing the 10 tonne weight restriction and appropriate alternative route signs will be installed on site and on roads in the vicinity within six months.

#### **5.0 Financial implications**

5.1 All works under this scheme will be funded from within existing 2017/18 approved budgets.

#### **6.0 Background papers**

1. Email objection to TRO proposal
2. Letter from Mark Pawsey MP enclosing copy of letter from Chair of Harborough Magna Parish Council

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The report was circulated to the following members prior to publication:

Local Member(s): Cllr Adrian Warwick

Other members: Councillors Horner, Shilton, Singh Birdi, Clarke and Chattaway



<b>Name of Project</b>	<b>H&gt;D Arch Assessments</b>
<b>Name of Bridge or Structure</b>	<b>Multiple Structures (all single span arches)</b>
<b>Structure Ref No</b>	<b>Various</b>

**1. HIGHWAY DETAILS**

- 1.1 Type of highway Single carriageways: A roads, B roads and unclassified roads.
- 1.2 Permitted traffic speed Various speed limits up to and including national speed limit.
- 1.3 Existing restrictions Predominantly no weight limits, some 7.5T, 10T, 13T and 18T limits.

**2. SITE DETAILS**

- 2.1 Obstacles crossed Various canals.

**3. PROPOSED STRUCTURE**

- 3.1 Description of structure and design working life Existing historic brick or stone arches.
  - 3.2 Structural type Solid spandrel single span arch.
  - 3.3 Foundation type Brick or stone gravity abutments with spread footings.
  - 3.4 Span arrangements Mix of square span and skew span arches.
  - 3.5 Articulation arrangements Solid spandrel arches.
  - 3.6 Classes and levels (in accordance with BS EN 1990 Annex B) 4
    - 3.6.1 Consequence class **CC2**
    - 3.6.2 Reliability class **RC2**
    - 3.6.3 Inspection level **IL2**
  - 3.7 Road restraint systems requirements Outside the scope of this Assessment.
  - 3.8 Proposed arrangements for future maintenance and inspection
    - 3.8.1 ~~Traffic management~~ Outside the scope of this Assessment.
    - 3.8.2 ~~Arrangements for future maintenance and inspection of structure. Access arrangements to structure.~~ Outside the scope of this Assessment.
  - 3.9 Environment and sustainability Promote extended life-span of existing structures.
  - 3.10 ~~Durability, Materials and finishes~~ Outside the scope of this Assessment.
  - 3.11 ~~Risks and hazards considered for design, execution, maintenance and demolition.~~ Outside the scope of this Assessment.
- ~~Consultation with and/or agreement from CDM co-ordinator~~ N/A for Assessment.

## APPROVAL IN PRINCIPAL

(Bridge and other Highway Structures), EuroCodes

## H>D Arch Assessments Multiple Structures

- 3.12 ~~Estimated cost of proposed structure together with other structural forms considered (including where appropriate proprietary manufactured structure), and the reasons for their rejection (including comparative whole life costs with dates of estimates)~~ N/A for Assessment.
- 3.13 ~~Proposed arrangements for construction~~ N/A for Assessment.
- 3.13.1 ~~Construction of structure~~
  - 3.13.2 ~~Traffic management~~
  - 3.13.3 ~~Service diversions~~
  - 3.13.4 ~~Interface with existing structures~~

## 4. DESIGN ASSESSMENT CRITERIA

- 4.1 Actions In accordance with Assessment codes BA 16/97 and BD21/01 and BE 3/73.
- 4.1.1 Permanent actions
  - 4.1.2 ~~Snow, Wind and Thermal actions~~
  - 4.1.3 Actions relating to normal traffic under AW regulations and C&U regulations
  - 4.1.4 Actions relating to General Order traffic under STGO regulations
  - 4.1.5 ~~Footway or footbridge variable actions~~
  - 4.1.6 ~~Actions relating to Special Order traffic, provision for exceptional abnormal indivisible loads including location of vehicle track on deck cross-section~~
  - 4.1.7 Accidental actions
  - 4.1.8 ~~Action during construction~~
  - 4.1.9 ~~Any special action not covered above~~
- 4.2 Heavy or high load route requirements and arrangements being made to preserve the route, including any provision for future heavier loads or future widening N/A for Assessment.
- 4.3 Minimum headroom provided As Existing
- 4.4 ~~Authorities consulted and any special conditions required~~
- 4.5 Standards and documents listed in the Technical Approval Schedule
- 4.6 ~~Proposed Departures relating to departures from standards given in 4.5~~
- 4.7 ~~Proposed Departures relating to methods dealing with aspects not covered by standards in 4.5~~
- 4.8 ~~(Wales only) List of record of options and choices (for Categories 2 and 3 checks)~~

**5. STRUCTURAL ANALYSIS**

5.1 Methods of analysis proposed for superstructure, substructure and foundations  
MEXE analysis to BE 3/73 and BD 21/01 with H limited to D for the latter.

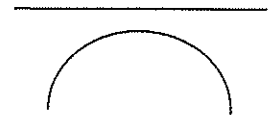
ARCHIE M analysis where MEXE unable to demonstrate required load capacity.

Intrusive investigations (e.g. core drilling or trial holes) to establish backing levels where ARCHIE M analysis is unable to demonstrate required load capacity without backing.

Where backing type and levels are confirmed, further ARCHIE M analysis with this information.

5.2 Description and diagram of idealised structure to be used for analysis

Solid spandrel arch on masonry abutments.



5.3 Assumptions intended for calculation of structural element stiffness

Each structure's brickwork / stonework properties determined in accordance with BD21/01 Fig 4.2 & 4.3

5.4 ~~Proposed range of soil parameters to be used in the design of earth retaining elements~~

Outside the scope of this Assessment.

**6. GEOTECHNICAL CONDITIONS** Outside the scope of this Assessment.

6.1 ~~Acceptance of recommendations of the Geotechnical Design Report to be used in the design and reasons for any proposed changes~~

6.2 ~~Summary of design for highway structure in the Geotechnical Design Report~~

6.3 ~~Differential settlement to be allowed for in the design of the structure~~

6.4 ~~If the Geotechnical Design Report is not yet available, state when the results are expected and list the sources of information used to justify the preliminary choice of foundations~~

**7. CHECK**

7.1 Proposed Category and Design Supervision Level    Category 1 Check    Assessment not Design

7.2 ~~If Category 3, name of proposed Independent Checker~~

7.3 ~~Erection proposals or temporary works for which Types S and P Proposals will be required, listing structural parts of the permanent structure affected with reasons~~    N/A for Assessment

**8. DRAWINGS AND DOCUMENTS**

8.1 ~~List of drawings (including numbers) and documents accompanying the submission~~  
N/A for Assessment

**APPROVAL IN PRINCIPAL**

(Bridge and other Highway Structures), EuroCodes

**H>D Arch Assessments****Multiple Structures****9. THE ABOVE IS SUBMITTED FOR ACCEPTANCE**

We confirm that ~~details of the temporary works design will be/have been passed to the permanent works Designer for review~~ no temporary works are required.

Signed Daniel Preston  
 Name Daniel T Preston  
Design Assessment Team Leader  
 Engineering Qualifications MEng CEng MICE  
 Name of Organisation Canal & River Trust  
 Date 01/09/2015

**10. THE ABOVE IS REJECTED/AGREED<sup>15</sup> SUBJECT TO THE AMENDMENTS AND CONDITIONS SHOWN BELOW<sup>16</sup>**

Signed R. Howe  
 Name Rod Howe  
 Position held Chief Structures Engineer  
 Engineering Qualifications CEng MICE <sup>17</sup>  
 TAA Canal & River Trust  
 Date 1/9/15

**TECHNICAL APPROVAL SCHEDULE** (July 2015)

**BRITISH STANDARDS, EUROCODES AND UK NATIONAL ANNEXES**

BS EN 1990	Basis of Structural Design
BS EN 1990 NA	National Annex to Basis of Structural Design
BS EN 1991	Actions on Structures
Part 1-1	Densities, Self-Weight, Loads for Buildings
Part 1-1 NA	National Annex to Densities, Self-Weight, Loads for Buildings
PD 6688-1-1	Background Paper to UK NA to BS EN 1991-1-1
Part 1-4	Wind Actions
Part 1-4 NA	National Annex to Wind Actions
PD 6688-1-4	Background Paper to UK NA to BS EN 1991-1-4
Part 1-5	Thermal Actions
Part 1-5 NA	National Annex to Thermal Actions
PD 6688-1-5	Background Paper to UK NA to BS EN 1991-1-5
Part 1-6	Actions During Execution
Part 1-6 NA	National Annex to Actions During Execution
Part 1-7	Accidental Actions
Part 1-7 NA	National Annex to Accidental Actions
PD 6688-1-7	Recommendations for Design of Structures to BS EN 1991-1-7
Part 2	Traffic Loads on Bridges
Part 2 NA	National Annex to Traffic Loads on Bridges
PD 6688-2	Recommendations for Design of Bridges to BS EN 1991-2
BS EN 1992	Design of Concrete Structures
Part 1-1	General Rules and Rules for Buildings
Part 1-1 NA	National Annex to General Rules and Rules for Buildings
Part 2	Concrete Bridges — Design and Detailing Rules
Part 2 NA	National Annex to Concrete Bridges — Design and Detailing Rules
PD 6687-1	Background paper to UK NA to BS EN 1992
PD 6687-2	Recommendations for Design of Structures to BS EN 1992
BS EN 13670	Execution of Concrete Structures

## APPROVAL IN PRINCIPAL

(Bridge and other Highway Structures), EuroCodes

H>D Arch Assessments  
Multiple Structures

BS 8500	Concrete	Complimentary British Standard to BS EN 206-1
Part 1	Method of Specifying and Guidance for the Supplier	
Part 2	Specification for Constituent Materials and Concrete	
BS EN 1993	Design of Steel Structures	
Part 1-1	General Rules and Rules for Buildings	
Part 1-1 NA	National Annex to General Rules and Rules for Buildings	
Part 1-5	Design of Plated Structural Elements	
Part 1-5 NA	National Annex to Plated Structural Elements	
Part 1-7	Plated Structures Subject to Out of Plane Loading	
Part 1-7 NA	National Annex to Plated Structures Subject to Out of Plane Loading	
Part 1-8	Design of Joints	
Part 1-8 NA	National Annex to Design of Joints	
Part 1-11	Design of Structures with Tension Components	
Part 1-11 NA	National Annex to Design of Structures with Tension Components	
Part 2	Steel Bridges	
Part 2 NA	National Annex to Steel Bridges	
PD 6695-2	Recommendations for Design of Bridges to BE EN 1993	
BS 153	Part 3A	Specification for Steel Girder Bridges (see BE 1/77)
BS EN 1090	Execution of Steel and Aluminium Structures	
Part 1	Requirements for Conformity Assessment of Structural Components	
Part 2	Technical Requirements for the Execution of Steel Structures	
Part 3	Technical Requirements for the Execution of Aluminium Structures	
BS EN 1994	Design of Composite Steel and Concrete Structures	
Part 1-1	General Rules and Rules for Buildings	
Part 1-1 NA	National Annex to General Rules and Rules for Buildings	
Part 2	General Rules and Rules for Bridges	
Part 2 NA	National Annex to General Rules and Rules for Bridges	
PD6696-2	Background Paper to BS EN 1994-2 and BE EN 1994-2 NA	

BS EN 1995	Design of Timber Structures
Part 1	Common Rules and Rules for Buildings
Part 1-1 NA	National Annex to Common Rules and Rules for Buildings
Part 2	Timber Bridges
Part 2 NA	National Annex to Timber Bridges
BS EN 1996	Design of Masonry Structures
Part 1-1	General Rules
Part 1-1 NA	National Annex to General Rules
Part 2	Design Considerations, Selection of Materials & Execution of Masonry
Part 2 NA	National Annex to Design Considerations, Selection of Materials & Execution of Masonry
Part 3	Simplified Calculation Methods for Unreinforced Masonry
Part 3 NA	National Annex to Simplified Calculation Methods for Unreinforced Masonry
BS EN 1997	Geotechnical Design
Part 1	General Rules
Part 1 NA	National Annex to General Rules
PD 6694-1	Recommendations for the Design of Structures Subject to Traffic Loading to BS EN 1997-1
Part 2	Ground Investigation
Part 2 NA	National Annex to Ground Investigation
BS 8006:2010	Code of Practice for Strengthening / Reinforced Soils and Other Fills
BS EN 1337	Structural Bearings
Part 1	General Rules
PD6703	Guidance on the Use of Structural Bearings
BS EN 1317	Road Restraint Systems
Part 1	Terminology and General Criteria for Test Methods (see IAN44/02)
Part 2	Performance Classes, Impact test Acceptance Criteria and Test Methods for Safety Barriers (see IAN 44/02)

## **APPROVAL IN PRINCIPAL**

(Bridge and other Highway Structures), EuroCodes

**H>D Arch Assessments  
Multiple Structures**

<del>Part 3</del>	<del>Performance Classes, Impact test Acceptance Criteria and Test Methods for Crash Cushions</del>
<del>Part 4</del>	<del>Terminals and Transitions (see IAN 44/02)</del>
<del>Part 5</del>	<del>Product Requirements and Evaluation of Conformity for Vehicle Restraint Systems</del>
<del>Part 6</del>	<del>Pedestrian Restraint Systems — Pedestrian Parapets</del>
<del>BS 6779</del>	<del>Highway Parapets for Bridges and Other Structures</del>
<del>Part 1: 1998</del>	<del>Specification for Vehicle Containment Parapets of Metal Construction</del>
<del>Part 2: 1991</del>	<del>Specification for Vehicle Containment Parapets of Concrete Construction</del>
<del>Part 3: 1994</del>	<del>Specification for Vehicle Containment Parapets of Combined Steel and Concrete Construction</del>
<del>Part 4: 1999</del>	<del>Specification for Vehicle Containment Parapets of Reinforced and Unreinforced Masonry Construction (see IRRRS July 2004)</del>
<del>BS 6651</del>	<del>Protection of Structures Against Lightning (see BD 51/98)</del>

## **THE MANUAL CONTRACT DOCUMENT FOR HIGHWAY WORKS (MCHW)**

~~Volume 1~~ — ~~Specification for Highway Works~~

~~Volume 2~~ — ~~Notes for Guidance on the Specification for Highway Works~~

~~Volumes 3 & 3a~~ — ~~Highway Construction Details~~

## **THE DESIGN MANUAL FOR ROADS AND BRIDGES (DMRB)**

Volume 1      Highway Structures: Approval Procedures and General Design

Section 1      Approval Procedures  
BD 2/12      Technical Approval of Highway Structures



**APPROVAL IN PRINCIPAL**

(Bridge and other Highway Structures), EuroCodes

**H>D Arch Assessments****Multiple Structures**Section 2 Other Procedural Documents

BD 36/92	Evaluation of Maintenance Costs in Comparing Alternative Designs for Highway Structures
BA 28/92	Evaluation of Maintenance Costs in Comparing Alternative Designs for Highway Structures
BD 95/07	Treatment of Existing Structures on Highway Widening Schemes

Section 3 General Design

BD 24/92	Design of Concrete Highway Bridges and Structures. Use of BS 5400: Part 4: 1990
BD 15/92	General Principles for the Design and Construction of Bridges. Use of BS 5400: Part 1: 1988
BD 40/01	Design Rules for Aerodynamic Effects on Bridges
BA 40/93	Tack Welding of Reinforcing Bars
BD 60/04	Design of Highway Bridges for Vehicle Collision Loads
BA 59/94	Design of Highway Bridges for Hydraulic Action
BD 57/01	Design for Durability
BA 57/01	Design for Durability
BD 58/94	Design of Bridges and Concrete Structures with External and Unbonded Prestressing
BA 58/94	Design of Bridges and Concrete Structures with External and Unbonded Prestressing
BA 41/98	Design and Appearance of Bridges
BA 42/96	The Design of Integral Bridges [Inc. Amendment No.1 dated May 03]
BA 53/94	Bracing Systems and the Use of U-Frames in Steel Highway Bridges
BD 10/97	Design of Highway Structures in Areas of Mining Subsidence
BD 9/81	Implementation of BS 5400: Part 10: 1980 CoP for Fatigue
BA 19/85	Use of BS 5400: Part 3: 1982
BA 24/87	Early Thermal Cracking of Concrete [Inc. Amendment No.1 dated Aug 89]
BD 37/01	Loads for Highway Bridges
BA 9/81	The Use of BS 5400 Part 10: 1980 Code of Practice for Fatigue [Incorporating Amendment No.1 dated November 1983]
BA 19/85	Use of BS 5400: Part 3: 1982
BA 24/87	Early Thermal Cracking of Concrete [Inc. Amendment No.1 dated Aug 89]
BD 84/02	Strengthening of Concrete Bridge Supports for Vehicle Impact Using Fibre Reinforced Polymers
BD 90/05	Design of FRP Bridges and Highway Structures
BD 85/08	Strengthening Highway Structures Using Externally Bonded Fibre Reinforced Polymer
BE 23/70	Shear Key Decks
BE 5/75	Rules for the Design and Use of Freyssinet Concrete Hinges in Highway Structures

Volume 2 Highway Structures: Design (Substructures and Special Structures) MaterialsSection 1 Substructures

BD 41/97	Reinforced Clay Brickwork Retaining Walls of Pocket Type and Grouted Cavity Type Construction
BD 42/00	Design of Embedded Retaining Walls and Bridge Abutments
BD 68/97	Crib Retaining Walls
BA 68/97	Crib Retaining Walls
BD 70/03	Strengthened/Reinforced Soils and other Fills for Retaining Walls and Bridge Abutments.
	Use of BS 8006: 1995, Inc. Amendment No.1 (Issue 2 March 1999)
BA 80/99	Use of Rock Bolts
BD 74/00	Foundations

Section 2 Special Structures

BD 94/07	Design of Minor Structures
BD 51/14	Portal and Cantilever Signs/Signal Gantries
BD 65/14	Design Criteria for Collision Protection Beams
BD 12/01	Design of Corrugated Steel Buried Structures with Spans Greater than 0.9 Metres and up to 8 Metres
BD 67/96	Enclosure of Bridges
BA 67/96	Enclosure of Bridges
BD 29/04	Design Criteria for Footbridges
BE 7/04	Departmental Standard (Interim) Motorway Sign/Signal Gantries
TD 19/06	Requirement for Road Restraint Systems
BD 78/99	Design of Road Tunnels
BD 82/00	Design of Buried Rigid Pipes
BD 31/01	Design of Buried Concrete Box and Portal Frame Structures
BD 91/04	Unreinforced Masonry Arch Bridges

Section 3 Materials and Components

BD 20/92	Bridge Bearings. Use of BS 5400: Part 9: 1983
BA 37/92	Priority Ranking of Existing Parapets
BD 47/99	Waterproofing and Surfacing of Concrete Bridge Decks
BA 47/99	Waterproofing and Surfacing of Concrete Bridge Decks
BD 33/94	Expansion Joints for Use in Highway Bridge Decks
BA 26/94	Expansion Joints for Use in Highway Bridge Decks
BA 36/90	Use of Permanent Formwork
BA 82/00	Formation of Continuity Joints in Bridge Decks
BD 7/01	Weathering Steel for Highway Structures
BA 92/07	Use of Recycled Concrete Aggregates in Structural Concrete

Section 4 Paints and Other Protective Coatings

BD 35/14	Quality Assurance Scheme for Paints and Similar Protective Coatings
BD 43/03	Impregnation of Reinforced and Pre-Stressed Concrete Highway Structures using Hydrophobic Pore Lining Impregnants
BA 85/04	Coatings for Concrete Highway Structures & Ancillary Structures

<u>Volume 3</u>	<u>Highway Structures: Inspection and Maintenance</u>	
Section 1	<u>Inspection</u>	
	<del>BA 93/09</del>	<del>Structural Assessment of Bridges with Deck Hinges</del>
	<del>BA 86/06</del>	<del>Advice Notes on the Non-Destructive Testing of Highway Structures</del>
Section 2	<u>Maintenance</u>	
	<del>BD 87/05</del>	<del>Maintenance Painting of Steelwork</del>
	BD 89/03	Conservation of Highway Structures English Addendum applicable for use in England Welsh Addendum applicable for use in Wales
Section 3	<u>Repair</u>	
	<del>BA 30/94</del>	<del>Strengthening of Concrete Highway Structures Using Externally Bonded Plates</del>
	<del>BD 27/86</del>	<del>Materials for the Repair of Concrete Highway Structures</del>
	<del>BA 35/90</del>	<del>Inspection and Repair of Concrete Highway Structures</del>
	<del>BA 83/02</del>	<del>Cathodic Protection for Use in Reinforced Concrete Highway Structures</del>
Section 4	<u>Assessment</u>	
	BD 21/01	Assessment of Highway Bridges and Structures
	BA 16/97	Assessment of Highway Bridges and Structures [Incorporating Amendment No. 1 dated November 1997 and Amendment No.2 dated November 2001]
	<del>BA 38/93</del>	<del>Assessment of Fatigue Life of Corroded or Damaged Reinforcing Bars</del>
	<del>BA 39/93</del>	<del>Assessment of Reinforced Concrete Half-joints</del>
	<del>BD 48/93</del>	<del>Assessment and Strengthening of Highway Bridge Supports</del>
	<del>BA 54/94</del>	<del>Load Testing for Bridge Assessment</del>
	<del>BA 55/06</del>	<del>Assessment of Bridge Substructures and Foundations, Retaining Walls and Buried Structures</del>
	<del>BA 52/94</del>	<del>Assessment of Concrete Structures Affected by Alkali-Silica Reaction</del>
	<del>BD 56/10</del>	<del>Assessment of Steel Highway Bridges and Structures</del>
	<del>BA 51/95</del>	<del>Assessment of Concrete Structures Affected by Steel Corrosion</del>
	<del>BD 44/95</del>	<del>Assessment of Concrete Highway Bridges and Structures</del>
	<del>BA 44/96</del>	<del>Assessment of Concrete Highway Bridges and Structures</del>
	<del>BD 61/10</del>	<del>Assessment of Composite Highway Bridges and Structures</del>
	BE 13	Fatigue Risk in Bailey Bridges
	BD 79/13	Management of Sub-standard Highway Structures
	BD 86/11	Assessment of Highway Bridges and Structures For The Effects of Special Types General Order (STGO) and Special Order (SO) Vehicles
	<del>BD 81/02</del>	<del>Use of Compressive Membrane Action in Bridge Decks</del>
	<del>BD 97/12</del>	<del>Assessment of Scour &amp; Other Hydraulic Actions at Highway Structures</del>
	BD 101/11	Structural Review and Assessment of Highway Structures

## **APPROVAL IN PRINCIPAL**

(Bridge and other Highway Structures), EuroCodes

**H>D Arch Assessments  
Multiple Structures**

### Volume 4      Geotechnics and Drainage

#### Section 1      Earthworks

~~————— HD 22/08 ————— Managing Geotechnical Risk~~  
~~————— HA 68/94 ————— Design Methods for Reinforcement of Highway Slopes by Reinforced~~  
~~————— Soil and Soil Nailing Techniques~~

### Volume 6      Road Geometry

#### Section 1      Links

~~————— TD 9/93 ————— Road Layout and Geometry — Highway Link Design~~  
~~————— TD 27/05 ————— Cross-Sections and Headroom~~

#### Section 2      Highway Features

~~————— TD 36/93 ————— Pedestrian Subways — Layouts and Dimensions~~

## **INTERIM ADVICE NOTES (OR EQUIVALENT IN SCOTLAND WALES & NORTHERN IRELAND)**

~~IAN 04/96 ————— BD 44/95 Assessment of Concrete Highway Bridges and Structures~~  
~~IAN 05/96 ————— BD 24/92 Design of Concrete Highway Structures. Use of BS 5400: Part 4:1990~~  
~~IAN 53/04 ————— Concrete Half Joint Deck Structures~~  
~~IAN 91/07 ————— Interim Advice on the identification of 'Particularly at Risk' Bridge Supports~~  
~~IAN 96/07 r1 ————— Guidance on Implementing Results of Research on Bridge Deck Waterproofing~~  
~~IAN 97/07 ————— Assessment and upgrading of existing parapets~~  
~~IAN 104/15 ————— Anchorage of Reinforcement & Fixings in Hardened Concrete~~  
~~IAN 124/11 ————— Implementation of EuroCodes for the design of new and existing highway structures.~~  
~~IAN 127/10 ————— The use of foamed concrete~~  
~~IAN 131/11 ————— Deflection of Permanent Formwork~~  
~~IAN 174/13 ————— Implementation of BD 97/12 — Assessment of Scour and Other Hydraulic Actions at~~  
~~————— Highway Structures~~

**OTHER RELEVANT SUPPLEMENTARY REFERENCES**

~~ICE Code of Practice 2 ————— Earth Retaining Structures~~

~~Current Information Sheet 35 ————— Assessment of Metal Hogging Plates in Metal Beam Bridge Decks~~

~~CCS Report 1/95 ————— Assessment and Design of Unreinforced Masonry Parapets~~

~~Circular Roads no. 61/72 ————— Routes for Heavy and High Abnormal Loads~~

Transport Act 1968

Traffic Management Act 2004

Construction (Design and Management) Regulations 2015



BRITISH WATERWAYS - NSU BRIDGES  
 ARCH BRIDGE ASSESSMENT  
 (Modified MEXE method BD21/01, BA16/97)

Bridge Name: TUCKEY'S BRIDGE Br.Sec.Ref. 43

BRIDGE SPAN (L)	= 6.465m	BARREL FACTOR	= 0.800
RISE AT CROWN (rc)	= 1.493m	FILL FACTOR	= 0.700
RISE AT QUARTER (rq)	= 1.172m	JOINT WIDTH FACTOR	= 0.900
BARREL DEPTH (D)	= 0.230m	MORTAR FACTOR	= 1.000
H+D VALUE	= 0.460m	CONDITION FACTOR (Fcab)	= 0.750
ADJUSTMENT TO D	= 0.010m		

NOTE THAT THE DEPTH OF FILL AT THE CROWN IS GREATER THAN THE THICKNESS OF THE ARCH BARREL.

ADJ. BARREL DEPTH	= 0.220m	SPAN/RISE FACTOR	= 0.951
DEPTH OF FILL (H)	= 0.230m	PROFILE FACTOR	= 0.915
ADJ. H+D VALUE	= 0.450m	MATERIAL FACTOR	= 0.749
SPAN/RISE RATIO	= 4.330	JOINT FACTOR	= 0.900

PROVISIONAL AXLE LOAD = 13.241 TONNES  
 MODIFIED AXLE LOAD = 5.824 TONNES

ALLOWABLE AXLE LOADS

...SINGLE AXLE	=	7.875 TONNES
DOUBLE AXLE NO LIFT OFF	=	5.824 TONNES
DOUBLE AXLE LIFT OFF	=	4.104 TONNES
TRIPLE AXLE (2.6m) NO LIFT OFF	=	5.711 TONNES

LOAD CAPACITY OF ARCH BARREL

(Lift-off case is not relevant)

ARCH BARREL IS BELOW FULL STRENGTH  
 =====

As such the following restrictions should be imposed:

Vehicles to AW Regs. should be restricted to :

MAX GROSS VEHICLE WEIGHT = 10.0 TONNES  
 =====  
 WEIGHT RESTRICTION = 10.0 TONNES  
 =====

Fire Appliances permitted - group 2 only

ASSESSED BY: D PRESTON

Date: 09/04/15 (12:51)

CHECKED BY: *David Lee*

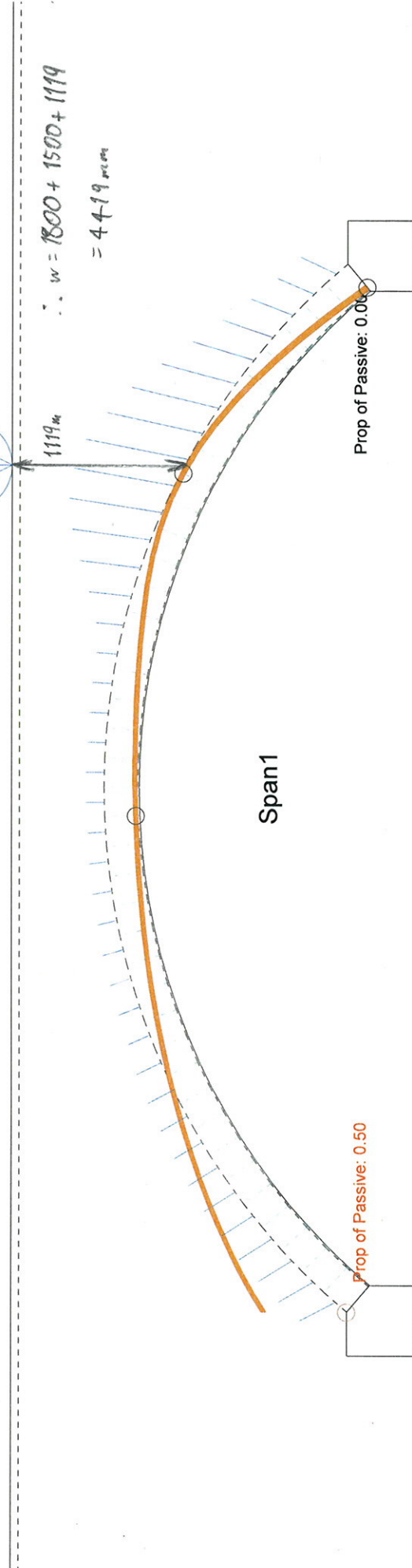
Program version 4.1

# Tuckeys

10-t Single Axle with Impact at 5326 mm  
 10 T RESTRICTION  
 7.07 AXLE

23.94

$$\therefore w = 1800 + 1500 + 1119 = 4419 \text{ per m}$$



gammaFI dead load: 1.00  
 gammaFI superimposed: 1.00  
 gammaFI live load: 1.90  
 gammaF3 load effect: 1.00  
 gammaM material: 1.00  
 File path: \\BWFS06\Depts\NSU\_fs\Structures\Bridges\ID Prest\H greater than DIOX-017-001 Br43 Tuckeys\Tuckeys.brg

NAME: Tuckeys  
 LOCATION: Oxford Canal  
 NUMBER: 43  
 CRT  
 DATE: 09 April 2015  
 Printed on: Thursday, April 09, 2015 13:29:15  
 DEFAULT LANE WIDTH



Bridge Name: Tuckeys Bridge Location: Oxford Canal  
 Bridge Number: 43  
 Number of spans: 1

**SAFETY FACTORS**

Factor for deadload: 1.00 Factor for superimposed deadload: 1.00 Factor for surfacing: 1.00  
 Factor for live load: 1.90 Factor for load effect: 1.00 Factor for material strength: 1.00

**APPLIED LOAD CASES**

1. 10-t Single Axle with Impact Total weight: 68.67 [kN] Position: 5326 [mm]  
 7.00 1 1.00 12.60 1.00 1.80 2.50  
 Effective lane width: 2500 [mm] Distribution length: 934 [mm]

Applied distribution mode: Archie/Multi  
 Applied live load pressure: Active pressure

**STRUCTURE PROPERTIES**

Road shape: Flat line (1-point method)  
 Road points: (3233, 2320)  
 Depth of surfacing: 50 Depth of overlay: 0  
 Surface unit weight: 23.00 [kN/m<sup>3</sup>] Overlay unit weight: 23.00 [kN/m<sup>3</sup>]  
 Lane width: 2500

Fill unit weight: 18.00 [kN/m<sup>3</sup>] Fill phi: 30 degree

Left abutment Base level:-305 [mm] Height: 0 [mm] Width: 457 [mm]  
 Right abutment Base level:-305 [mm] Height: 0 [mm] Width: 457 [mm]

Right abutment Base level:-305 [mm] Height: 0 [mm] Width: 457 [mm]

Shape: Circular

Span: 6465 [mm] Rise: 1493 [mm] Q-rise: 1172 [mm]

Ring thickness at crown:20.69 [mm] Ring thickness at springing: 229 [mm] Mortar loss: 10 [mm]

Masonry unit weight:20.60 [kN/m<sup>3</sup>] Masonry strength: 5.10 [MPa]

↳ BRICK ↳ MEDIUM STRENGTH BRICKS (E.G. FLETONS) IN CEMENT MORTAR

Segment Intrados.x Intrados.z Extrados.x Extrados.z Road.z Fx dead Fz dead My dead Fx live Fz live My live Fx passive Fx total Fz total My total Thrust in Thrust out Extra-Thrust

1	122137.46	2932320	2.75	-5.78	0.06	0.00	-0.00	0.00	0.88	-123.49	-81.09	-89.16	607636	-417	***			
2	25026989	4322320	2.47	-5.67	0.07	0.00	-0.00	0.00	1.25	-126.83	-75.41	-82.33	561589	-370	***			
3	38439523	30562320	2.20	-5.54	0.08	0.00	-0.00	0.00	1.51	-130.28	-69.87	-75.57	513541	-322	***			
4	52251637	6692320	1.95	-5.38	0.10	0.00	-0.00	0.00	1.66	-133.73	-64.49	-68.86	464492	-273	***			
5	65663052	88122320	1.71	-5.21	0.11	0.00	-0.00	0.00	1.73	-137.11	-59.28	-62.22	415443	-224	***			
6	81573868	59262320	1.50	-5.02	0.12	0.00	-0.00	0.00	1.73	-140.34	-54.26	-55.66	366395	-176	***			
7	96883984	610332320	1.30	-4.83	0.14	0.00	-0.00	0.00	1.68	-143.37	-49.43	-49.24	319348	-129	***			
8	1126	9331012	1.12	-4.63	0.15	0.00	-0.00	0.00	1.58	-146.17	-44.81	-43.00	274303	-84	***			
9	1287	1021	1.82	1.225	2320	0.96	-4.43	0.16	0.00	-0.00	0.00	1.46	-148.71	-40.38	-37.00	231260	-41	***
10	1452	1102	1356	1310	2320	0.82	-4.23	0.17	0.00	-0.00	0.00	1.31	-150.99	-36.15	-31.30	191221	-2	***
11	1621	1175	1534	1387	2320	0.69	-4.04	0.18	0.00	-0.00	0.00	1.16	-152.98	-32.11	-25.96	154184	35	***
12	1792	1241	1714	1457	2320	0.57	-3.86	0.19	0.00	-0.00	0.00	1.00	-154.72	-28.25	-21.04	120151	68	***
13	1966	1300	1898	1518	2320	0.47	-3.69	0.20	0.00	-0.00	0.00	0.85	-156.19	-24.57	-16.59	91	12198	
14	2143	1351	2084	1572	2320	0.38	-3.53	0.21	0.00	-0.00	0.00	0.70	-157.42	-21.04	-12.68	65	96	123
15	2321	1394	2272	1618	2320	0.30	-3.39	0.22	0.00	-0.00	0.00	0.56	-158.42	-17.65	-9.34	43	74	145
16	2501	1430	2462	1655	2320	0.24	-3.27	0.23	0.00	-0.00	0.00	0.42	-159.22	-14.37	-6.62	26	57	162
17	2683	1457	2653	1684	2320	0.17	-3.18	0.24	0.00	-0.00	0.00	0.30	-159.81	-11.19	-4.56	13	44	175
18	2866	1477	2846	1705	2320	0.12	-3.10	0.25	0.00	-0.00	0.00	0.18	-160.23	-8.09	-3.17	4	35	184

19	3049	1489	3039	1718	2320	0.07	-3.05	0.26	0.00	-0.00	0.00	0.00	-160.48	-5.04	-2.47	-0	31	188
20	3232	1493	3232	1722	2320	0.02	-3.03	0.27	0.00	-0.00	0.00	0.00	-160.50	-2.01	-2.47	-0	31	188
21	3416	1489	3426	1718	2320	-0.02	-3.03	0.29	-0.00	-0.00	0.00	0.00	-160.48	1.02	-3.21	4	36	183
22	3599	1477	3619	1705	2320	-0.07	-3.05	0.30	-0.00	-0.00	0.00	0.00	-160.41	4.08	-4.68	14	45	174
23	3782	1457	3812	1684	2320	-0.12	-3.10	0.32	-0.00	-0.00	0.00	0.00	-160.29	7.18	-6.88	27	59	160
24	3964	1430	4003	1655	2320	-0.17	-3.18	0.35	-0.00	-0.00	0.00	0.00	-160.11	10.36	-9.79	46	77	142
25	4144	1394	4193	1618	2320	-0.24	-3.27	0.37	-0.01	-0.14	0.02	0.00	-159.87	13.77	-13.39	69	100	119
26	4322	1351	4381	1572	2320	-0.30	-3.39	0.40	-0.10	-1.28	0.19	0.00	-159.46	18.44	-17.60	95	126	93
27	4499	1300	4567	1518	2320	-0.38	-3.53	0.43	-0.34	-3.53	0.51	0.00	-158.74	25.50	-22.14	124	155	64
28	4673	1241	4751	1457	2320	-0.47	-3.69	0.47	-0.71	-6.33	0.91	0.00	-157.56	35.51	-26.58	150	182	37
29	4844	1175	4931	1387	2320	-0.57	-3.86	0.51	-1.16	-9.06	1.34	0.00	-155.82	48.43	-30.42	171	203	16
30	5013	1102	5109	1310	2320	-0.69	-4.04	0.55	-1.63	-11.19	1.69	0.00	-153.51	63.66	-33.20	184	216	3
31	5178	1021	5283	1225	2320	-0.82	-4.23	0.59	-2.01	-12.32	1.90	0.00	-150.69	80.21	-34.60	186	219	-0
32	5339	933	5453	1132	2320	-0.96	-4.43	0.64	-2.23	-12.33	1.95	0.00	-147.50	96.97	-34.46	178	213	6
33	5497	839	5561	1033	2320	-1.12	-4.63	0.69	-2.26	-11.29	1.83	0.00	-144.11	112.88	-32.82	162	198	21
34	5650	738	5780	926	2320	-1.30	-4.83	0.74	-2.09	-9.47	1.57	0.00	-140.73	127.18	-29.88	140	177	42
35	5799	630	5937	812	2320	-1.50	-5.02	0.79	-1.75	-7.23	1.22	0.00	-137.48	139.44	-25.96	115	153	66
36	5943	516	6089	692	2320	-1.71	-5.21	0.84	-1.31	-4.95	0.85	0.00	-134.46	149.60	-21.46	88	127	92
37	6081	395	6235	565	2320	-1.95	-5.38	0.89	-0.85	-2.94	0.51	0.00	-131.66	157.92	-16.75	62	102	117
38	6215	269	6376	432	2320	-2.20	-5.54	0.94	-0.44	-1.40	0.24	0.00	-129.02	164.86	-12.19	38	79	140
39	6343	137	6511	293	2320	-2.47	-5.67	0.98	-0.15	-0.44	0.07	0.00	-126.41	170.97	-8.02	17	59	160
40	6465	0	6639	148	2320	-2.75	-5.78	1.03	-0.01	-0.04	0.01	0.00	-123.64	176.80	-4.43	-0	42	177

\*\*\*

Tuckeys

10T RESTRICTION  
7.0T AXLE

10-t Single Axle with Impact at 1326 mm

23.94

1026 mm

$\therefore w = 1800 + 1500 + 1026$   
 $= 4326 \text{ mm}$

Span1

Prop of Passive: 0.00

Prop of Passive: 0.43

gammaFI dead load: 1.00 10-t Single Axle with Impact @ 1326 [mm]

gammaFI superimposed: 1.00

gammaFI live load: 1.90

gammaF3 load effect: 1.00

gammaM material: 1.00

File path: \\BWFS06\Depts\NSU\_fs\Structures\Bridges\ID Prest\H greater than DIOX-017-001 Br43 Tuckeys\Tuckeys.brg

NAME: Tuckeys

LOCATION: Oxford Canal **ITERATE LANE WIDTH**

NUMBER: 43

CRT

DATE: 09 April 2015

Printed on: Thursday, April 09, 2015 13:32:00

Bridge Name: Tuckeys Bridge Location: Oxford Canal  
 Bridge Number: 43  
 Number of spans: 1

**SAFETY FACTORS**

Factor for deadload: 1.00 Factor for superimposed deadload: 1.00 Factor for surfacing: 1.00  
 Factor for live load: 1.90 Factor for load effect: 1.00 Factor for material strength: 1.00

**APPLIED LOAD CASES**

1. 10-t Single Axle with Impact Total weight: 68.67 [kN] Position: 1326 [mm]  
 7.00 1 1.00 12.60 1.00 1.80 2.50  
 Effective lane width: 4325 [mm] Distribution length: 888 [mm]

Applied distribution mode: Archie/Multi  
 Applied live load pressure: Active pressure

**STRUCTURE PROPERTIES**

Road shape: Flat line (1-point method)  
 Road points: (3233, 2320)  
 Depth of surfacing: 50 Depth of overlay: 0  
 Surface unit weight: 23.00 [kN/m3] Overlay unit weight: 23.00 [kN/m3]  
 Lane width: 2500

Fill unit weight: 18.00 [kN/m3] Fill phi: 30 degree

Left abutment Base level: -305 [mm] Height: 0 [mm] Width: 457 [mm]  
 Right abutment Base level: -305 [mm] Height: 0 [mm] Width: 457 [mm]

Right abutment Base level: -305 [mm] Height: 0 [mm] Width: 457 [mm]  
 Shape: Circular

Span: 6465 [mm] Rise: 1493 [mm] Q-rise: 1172 [mm]  
 Ring thickness at crown: 229 [mm] Ring thickness at springing: 229 [mm]  
 Masonry unit weight: 20.60 [kN/m3] Masonry strength: 5.10 [MPa]

Segment	Intrados.z		Extrados.z		Road.z	Fx dead	Fz dead	My dead	Fx live	Fz live	My live	Fx passive	Fx total	Fz total	My total	Thrust in	Thrust out	Extra-Thr
	0	1	0	1														
0	0	0	-174	148	2320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-91.65	-132.73	-2.50	-0	31	188
1	122	137	-46	293	2320	2.75	-5.78	0.06	0.00	-0.00	0.00	0.00	-94.40	-126.94	-5.11	17	48	171
2	250	269	89	432	2320	2.47	-5.67	0.07	0.00	-0.00	0.00	0.00	-96.87	-121.27	-7.93	36	67	152
3	384	395	230	565	2320	2.20	-5.54	0.08	0.02	-0.05	0.00	0.00	-99.08	-115.68	-10.96	58	87	132
4	522	516	376	692	2320	1.95	-5.38	0.10	0.13	-0.44	0.01	0.00	-101.15	-109.86	-14.16	81	110	109
5	666	630	528	812	2320	1.71	-5.21	0.11	0.34	-1.28	0.01	0.00	-103.20	-103.36	-17.38	106	134	85
6	815	738	685	926	2320	1.50	-5.02	0.12	0.61	-2.54	0.03	0.00	-105.32	-95.80	-20.42	131	159	60
7	968	839	846	1033	2320	1.30	-4.83	0.14	0.89	-4.05	0.05	0.00	-107.51	-86.92	-23.05	154	181	38
8	1126	933	1012	1132	2320	1.12	-4.63	0.15	1.12	-5.60	0.09	0.00	-109.76	-76.70	-24.99	174	201	18
9	1287	1021	1182	1225	2320	0.96	-4.43	0.16	1.25	-6.89	0.15	0.00	-111.96	-65.38	-26.04	188	214	5
10	1452	1102	1356	1310	2320	0.82	-4.23	0.17	1.24	-7.64	0.20	0.00	-114.02	-53.50	-26.05	194	219	-0
11	1621	1175	1534	1387	2320	0.69	-4.04	0.18	1.11	-8.87	0.23	0.00	-115.82	-41.81	-25.00	215	215	4
12	1792	1241	1714	1457	2320	0.57	-3.86	0.19	0.88	-9.67	0.24	0.00	-117.28	-31.08	-23.01	178	202	17
13	1966	1300	1898	1518	2320	0.47	-3.69	0.20	0.61	-10.41	0.21	0.00	-118.35	-21.99	-20.31	158	182	37
14	2143	1351	2084	1572	2320	0.38	-3.53	0.21	0.34	-11.18	0.15	0.00	-119.08	-14.89	-17.21	133	156	63
15	2321	1394	2272	1618	2320	0.30	-3.39	0.22	0.14	-11.94	0.08	0.00	-119.53	-9.71	-14.06	107	130	89
16	2501	1430	2462	1655	2320	0.24	-3.27	0.23	0.03	-12.70	0.02	0.00	-119.79	-5.95	-11.11	82	105	114
17	2683	1457	2653	1684	2320	0.17	-3.18	0.24	0.00	-13.51	-0.00	0.00	-119.97	-2.75	-8.51	60	83	136
18	2866	1477	2846	1705	2320	0.12	-3.10	0.25	-0.00	-14.34	0.00	0.00	-120.09	0.35	-6.31	41	64	155

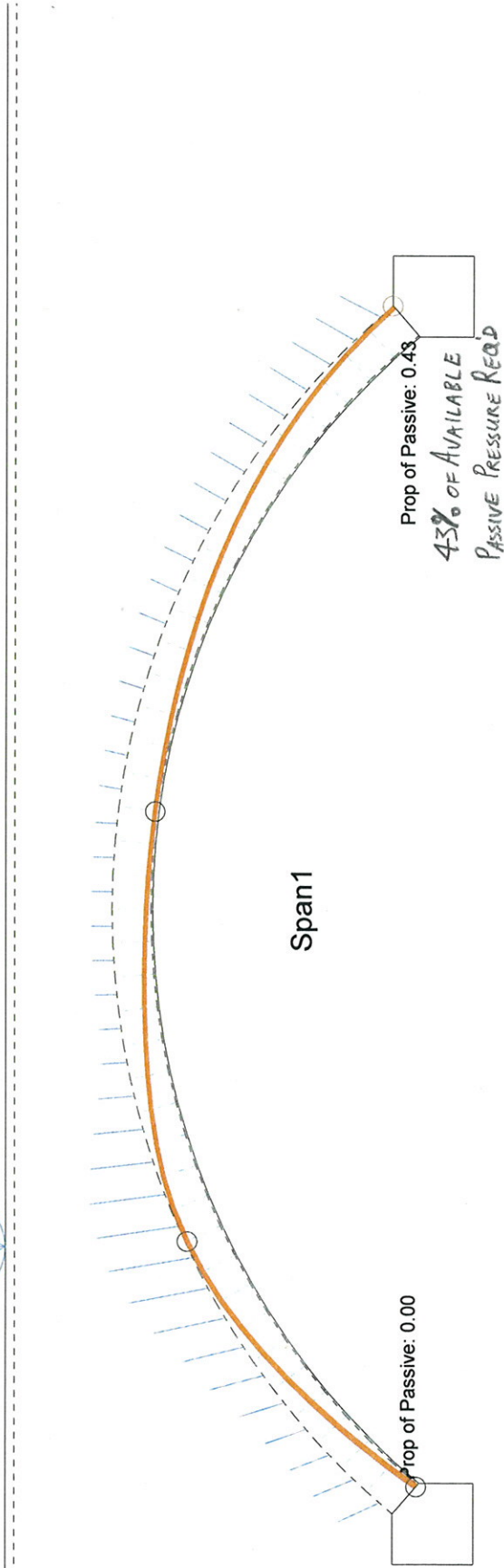
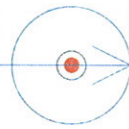
19	3049	1489	3039	1718	2320	0.07	-3.05	0.26	-0.00	0.00	0.00	-120.16	3.41	-4.50	26	49	170
20	3232	1493	3232	1722	2320	0.02	-3.03	0.27	-0.00	0.00	0.00	-120.18	6.44	-3.11	14	38	181
21	3416	1489	3426	1718	2320	-0.02	-3.03	0.29	0.00	0.00	0.00	-120.16	9.46	-2.13	6	30	189
22	3599	1477	3619	1705	2320	-0.07	-3.05	0.30	0.00	0.00	0.00	-120.09	12.52	-1.57	1	25	194
23	3782	1457	3812	1684	2320	-0.12	-3.10	0.32	0.00	0.00	-0.37	-119.97	15.62	-1.42	-0	24	195
24	3964	1430	4003	1655	2320	-0.17	-3.18	0.35	0.00	0.00	-0.49	-119.43	18.80	-1.59	1	25	194
25	4144	1394	4193	1618	2320	-0.24	-3.27	0.37	0.00	0.00	-0.61	-118.70	22.07	-2.11	6	29	190
26	4322	1351	4381	1572	2320	-0.30	-3.39	0.40	0.00	0.00	-0.74	-117.79	25.47	-2.95	13	36	183
27	4499	1300	4567	1518	2320	-0.38	-3.53	0.43	0.00	0.00	-0.87	-116.67	29.00	-4.08	22	46	173
28	4673	1241	4751	1457	2320	-0.47	-3.69	0.47	0.00	0.00	-1.01	-115.32	32.68	-5.46	34	57	162
29	4844	1175	4931	1387	2320	-0.57	-3.86	0.51	0.00	0.00	-1.14	-113.74	36.54	-7.04	47	71	148
30	5013	1102	5109	1310	2320	-0.69	-4.04	0.55	0.00	0.00	-1.27	-111.91	40.58	-8.79	62	86	133
31	5178	1021	5283	1225	2320	-0.82	-4.23	0.59	0.00	0.00	-1.37	-109.83	44.81	-10.64	79	102	117
32	5339	933	5453	1132	2320	-0.96	-4.43	0.64	0.00	0.00	-1.45	-107.50	49.23	-12.56	95	118	101
33	5497	839	5619	1033	2320	-1.12	-4.63	0.69	0.00	0.00	-1.50	-104.92	53.86	-14.49	112	135	84
34	5650	738	5780	926	2320	-1.30	-4.83	0.74	0.00	0.00	-1.50	-102.12	58.69	-16.38	128	151	68
35	5799	630	5937	812	2320	-1.50	-5.02	0.79	0.00	0.00	-1.43	-99.13	63.71	-18.20	143	166	53
36	5943	516	6089	692	2320	-1.71	-5.21	0.84	0.00	0.00	-1.29	-95.98	68.92	-19.91	157	180	39
37	6081	395	6235	565	2320	-1.95	-5.38	0.89	0.00	0.00	-1.06	-92.74	74.30	-21.50	170	193	26
38	6215	269	6376	432	2320	-2.20	-5.54	0.94	0.00	0.00	-0.73	-89.48	79.84	-22.96	180	203	16
39	6343	137	6511	293	2320	-2.47	-5.67	0.98	0.00	0.00	-0.27	-86.29	85.52	-24.32	188	212	7
40	6465	0	6639	148	2320	-2.75	-5.78	1.03	0.00	0.00	0.00	-83.28	91.30	-25.60	195	219	-0

# Tuckeys

10T RESTRICTION  
7.0T AXLE

10-t Single Axle with Impact at 1326 mm

23.94



gammaFI dead load: 1.00 10-t Single Axle with Impact @ 1326 [mm]

gammaFI superimposed: 1.00

gammaFI live load: 1.90

gammaF3 load effect: 1.00

gammaM material: 1.00

File path: \\BWFS06\Depts\INSU\_fs\Structures\Bridges\ID Prest\H greater than DIOX-017-001 Br43 Tuckeys\Tuckeys.brg

NAME: Tuckeys

LOCATION: Oxford Canal

NUMBER: 43

CRT

DATE: 09 April 2015

Printed on: Thursday, April 09, 2015 13:35:27

Bridge Name: Tuckeys  
 Bridge Number: 43  
 Number of spans: 1  
 Bridge Location: Oxford Canal

SAFETY FACTORS  
 Factor for deadload: 1.00  
 Factor for live load: 1.90  
 Factor for superimposed deadload: 1.00  
 Factor for material strength: 1.00  
 Factor for surfacing: 1.00  
 Factor for material strength: 1.00

APPLIED LOAD CASES  
 1. 10-t Single Axle with Impact  
 7.00 1  
 Effective lane width: 4325 [mm]  
 Total weight: 68.67 [kN]  
 12.60 1.00  
 1.80 2.50  
 Distribution length: 888 [mm]  
 Position: 1326 [mm]

Applied distribution mode: Archie/Multi  
 Applied live load pressure: Active pressure

STRUCTURE PROPERTIES  
 Road shape: Flat line (1-point method)  
 Road points: (3233, 2320)  
 Depth of surfacing: 50  
 Surface unit weight: 23.00 [kN/m3]  
 Lane width: 2500  
 Depth of overlay: 0  
 Overlay unit weight: 23.00 [kN/m3]

Fill unit weight: 18.00 [kN/m3]  
 Fill phi: 30 degree

Left abutment  
 Right abutment  
 Right abutment  
 Shape: Circular  
 Span: 6465 [mm]  
 Rise: 1493 [mm]  
 Ring thickness at crown: 229 [mm]  
 Ring thickness at springing: 229 [mm]  
 Masonry unit weight: 20.60 [kN/m3]  
 Masonry strength: 5.10 [MPa]

Segment  
 0 0  
 1 122  
 2 250  
 3 384  
 4 522  
 5 666  
 6 815  
 7 968  
 8 1126  
 9 1287  
 10 1452  
 11 1621  
 12 1792  
 13 1966  
 14 2143  
 15 2321  
 16 2501  
 17 2683  
 18 2866

Segment	Intrados.x	Intrados.z	Extrados.x	Extrados.z	Road.z	Fx dead	Fz dead	My dead	Fx live	Fz live	My live	Fx passive	Fx total	Fz total	My total	Thrust in	Thrust out	Extra-Thru.
0	0	0	-174	148	2320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-91.65	-132.73	-2.50	-0	31	188
1	122	137	-46	293	2320	2.75	-5.78	0.06	0.00	0.00	0.00	0.00	-94.40	-126.94	-5.11	17	48	171
2	250	269	89	432	2320	2.47	-5.67	0.07	0.00	-0.00	0.00	0.00	-96.87	-121.27	-7.93	36	67	152
3	384	395	230	565	2320	2.20	-5.54	0.08	0.02	-0.05	0.00	0.00	-99.08	-115.68	-10.96	58	87	132
4	522	516	376	692	2320	1.95	-5.38	0.10	0.13	-0.44	0.01	0.00	-101.15	-109.86	-14.16	81	110	109
5	666	630	528	812	2320	1.71	-5.21	0.11	0.34	-1.28	0.01	0.00	-103.20	-103.36	-17.38	106	134	85
6	815	738	685	926	2320	1.50	-5.02	0.12	0.61	-2.54	0.03	0.00	-105.32	-95.80	-20.42	131	159	60
7	968	839	846	1033	2320	1.30	-4.83	0.14	0.89	-4.05	0.05	0.00	-107.51	-86.92	-23.05	154	181	38
8	1126	933	1012	1132	2320	1.12	-4.63	0.15	1.12	-5.60	0.09	0.00	-109.76	-76.70	-24.99	174	201	18
9	1287	1021	1182	1225	2320	0.96	-4.43	0.16	1.25	-6.89	0.15	0.00	-111.96	-65.38	-26.04	188	214	5
10	1452	1102	1356	1310	2320	0.82	-4.23	0.17	1.24	-7.64	0.20	0.00	-114.02	-53.50	-26.05	194	219	-0
11	1621	1175	1534	1387	2320	0.69	-4.04	0.18	1.11	-7.66	0.23	0.00	-115.82	-41.81	-25.00	191	215	4
12	1792	1241	1714	1457	2320	0.57	-3.86	0.19	0.88	-6.87	0.24	0.00	-117.28	-31.08	-23.01	178	202	17
13	1966	1300	1898	1518	2320	0.47	-3.69	0.20	0.61	-5.41	0.21	0.00	-118.35	-21.99	-20.31	158	182	37
14	2143	1351	2084	1572	2320	0.38	-3.53	0.21	0.34	-3.57	0.15	0.00	-119.08	-14.89	-17.21	133	156	63
15	2321	1394	2272	1618	2320	0.30	-3.39	0.22	0.14	-1.78	0.08	0.00	-119.53	-9.71	-14.06	107	130	89
16	2501	1430	2462	1655	2320	0.24	-3.27	0.23	0.03	-0.49	0.02	0.00	-119.79	-5.95	-11.11	82	105	114
17	2683	1457	2653	1684	2320	0.17	-3.18	0.24	0.00	-0.02	-0.00	0.00	-119.97	-2.75	-8.51	60	83	136
18	2866	1477	2846	1705	2320	0.12	-3.10	0.25	-0.00	0.00	0.00	0.00	-120.09	0.35	-6.31	41	64	155

Mortar loss: 10 [mm]

Fx live Fz live My live  
 Fx dead Fz dead My dead  
 Fx spring Fz spring My spring

FLETONS IN CEMENT MORTAR

19	3049	1489	3039	1718	2320	0.07	-3.05	0.26	-0.00	0.00	0.00	0.00	-120.16	3.41	-4.50	26	49	170
20	3232	1493	3232	1722	2320	0.02	-3.03	0.27	-0.00	0.00	0.00	0.00	-120.18	6.44	-3.11	14	38	181
21	3416	1489	3426	1718	2320	-0.02	-3.03	0.29	0.00	0.00	0.00	0.00	-120.16	9.46	-2.13	6	30	189
22	3599	1477	3619	1705	2320	-0.07	-3.05	0.30	0.00	0.00	0.00	0.00	-120.09	12.52	-1.57	1	25	194
23	3782	1457	3812	1684	2320	-0.12	-3.10	0.32	0.00	0.00	0.00	-0.37	-119.97	15.62	-1.42	-0	24	195
24	3964	1430	4003	1655	2320	-0.17	-3.18	0.35	0.00	0.00	0.00	-0.49	-119.43	18.80	-1.59	1	25	194
25	4144	1394	4193	1618	2320	-0.24	-3.27	0.37	0.00	0.00	0.00	-0.61	-118.70	22.07	-2.11	6	29	190
26	4322	1351	4381	1572	2320	-0.30	-3.39	0.40	0.00	0.00	0.00	-0.74	-117.79	25.47	-2.95	13	36	183
27	4499	1300	4567	1518	2320	-0.38	-3.53	0.43	0.00	0.00	0.00	-0.87	-116.67	29.00	-4.08	22	46	173
28	4673	1241	4751	1457	2320	-0.47	-3.69	0.47	0.00	0.00	0.00	-1.01	-115.32	32.68	-5.46	34	57	162
29	4844	1175	4931	1387	2320	-0.57	-3.86	0.51	0.00	0.00	0.00	-1.14	-113.74	36.54	-7.04	47	71	148
30	5013	1102	5109	1310	2320	-0.69	-4.04	0.55	0.00	0.00	0.00	-1.27	-111.91	40.58	-8.79	62	86	133
31	5178	1021	5283	1225	2320	-0.82	-4.23	0.59	0.00	0.00	0.00	-1.37	-109.83	44.81	-10.64	79	102	117
32	5339	933	5453	1132	2320	-0.96	-4.43	0.64	0.00	0.00	0.00	-1.45	-107.50	49.23	-12.56	95	118	101
33	5497	839	5619	1033	2320	-1.12	-4.63	0.69	0.00	0.00	0.00	-1.50	-104.92	53.86	-14.49	112	135	84
34	5650	738	5780	926	2320	-1.30	-4.83	0.74	0.00	0.00	0.00	-1.50	-102.12	58.69	-16.38	128	151	68
35	5799	630	5937	812	2320	-1.50	-5.02	0.79	0.00	0.00	0.00	-1.43	-99.13	63.71	-18.20	143	166	53
36	5943	516	6089	692	2320	-1.71	-5.21	0.84	0.00	0.00	0.00	-1.29	-95.98	68.92	-19.91	157	180	39
37	6081	395	6235	565	2320	-1.95	-5.38	0.89	0.00	0.00	0.00	-1.06	-92.74	74.30	-21.50	170	193	26
38	6215	269	6376	432	2320	-2.20	-5.54	0.94	0.00	0.00	0.00	-0.73	-89.48	79.84	-22.96	180	203	16
39	6343	137	6511	293	2320	-2.47	-5.67	0.98	0.00	0.00	0.00	-0.27	-86.29	85.52	-24.32	188	212	7
40	6465	0	6639	148	2320	-2.75	-5.78	1.03	0.00	0.00	0.00	0.00	-83.28	91.30	-25.60	195	219	-0

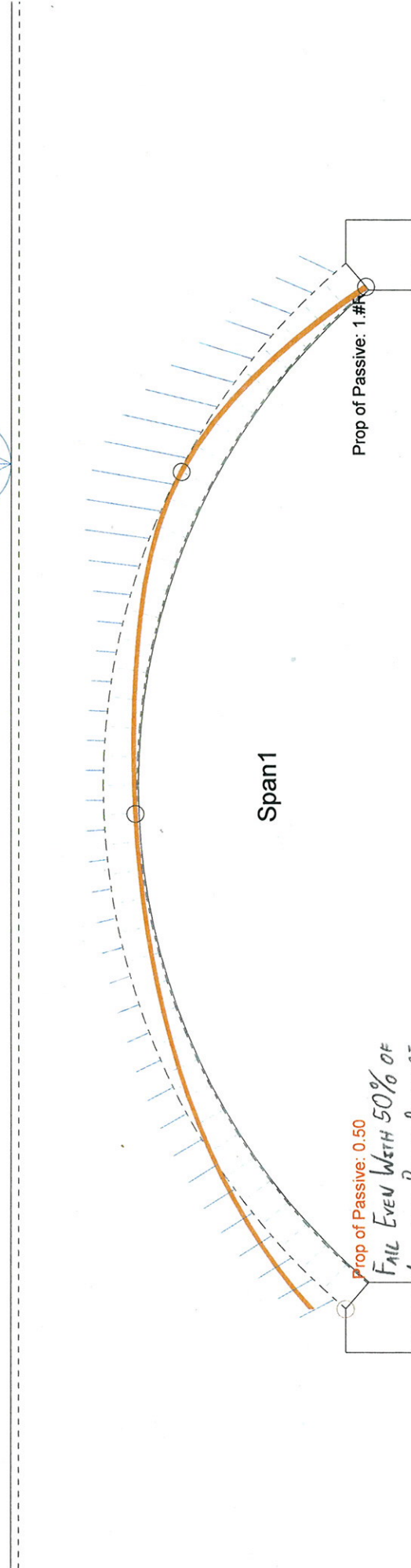


Tuckeys

13T RESTRICTION  
9.0T AXLE

13-t Single Axle with Impact at 5326 mm

30.78



Prop of Passive: 0.50  
FAIL EVEN WITH 50% OF  
AVAILABLE PASSIVE PRESSURE  
I.E.  $FoS < 2.0$ .  $\therefore$  10T CAPACITY

gammaFI dead load: 1.00  
gammaFI superimposed: 1.00  
gammaFI live load: 1.90  
gammaF3 load effect: 1.00  
gammaM material: 1.00  
File path: \\BWFS06\Depts\NSU\_fs\Structures\Bridges\ID Prest\H greater than D\OX-017-001 Br43 Tuckeys\Tuckeys.brg

NAME: Tuckeys  
LOCATION: Oxford Canal  
NUMBER: 43  
CRT  
DATE: 09 April 2015  
Printed on: Thursday, April 09, 2015 13:36:07

Bridge Name: Tuckeys Bridge Location: Oxford Canal  
Bridge Number: 43  
Number of spans: 1

SAFETY FACTORS  
Factor for deadload: 1.00 Factor for superimposed deadload: 1.00 Factor for surfacing: 1.00  
Factor for live load: 1.90 Factor for load effect: 1.00 Factor for material strength: 1.00

APPLIED LOAD CASES  
1. 13-t Single Axle with Impact Total weight: 88.29 [kN] Position: 5326 [mm]  
9.00 1 1.00 16.20 1.00 1.80 2.50  
Effective lane width: 4326 [mm] Distribution length: 934 [mm]

Applied distribution mode: Archie/Multi  
Applied live load pressure: Active pressure

STRUCTURE PROPERTIES

Road shape: Flat line (1-point method)  
Road points: (3233, 2320)  
Depth of surfacing: 50  
Surface unit weight: 23.00 [kN/m3] Overlay unit weight: 23.00 [kN/m3]  
Lane width: 2500

Fill unit weight: 18.00 [kN/m3] Fill phi: 30 degree

Left abutment Base level: -305 [mm] Height: 0 [mm] Width: 457 [mm]  
Right abutment Base level: -305 [mm] Height: 0 [mm] Width: 457 [mm]

Right abutment Base level: -305 [mm] Height: 0 [mm] Width: 457 [mm]

Shape: Circular  
Span: 6465 [mm] Rise: 1493 [mm] Q-rise: 1172 [mm]  
Ring thickness at crown: 229 [mm] Ring thickness at springing: 229 [mm]  
Masonry unit weight: 20.60 [kN/m3] Masonry strength: 5.10 [MPa]

→ FLETTONS IN CEMENT MORTAR

Segment	Intrados.x	Intrados.z	Extrados.x	Extrados.z	Road.z	Fx dead	Fz dead	My dead	Fx live	Fz live	Mortar loss: 10		Fx passive	Fx total	Fz total	My total	Thrust in	Thrust out	Extra-Thr
											Fx live	Fz live							
0	0	0	148	2320	2320	0.00	0.00	0.00	0.00	0.00	0.35	-93.56	-88.95	-48.91	368	394	-175		
1	122	137	293	2320	2320	2.75	-5.78	0.06	0.00	0.00	0.87	-96.67	-83.16	-45.93	350	375	-156		
2	250	269	432	2320	2320	2.47	-5.67	0.07	0.00	0.00	1.25	-100.00	-77.49	-42.92	329	354	-135		
3	384	395	565	2320	2320	2.20	-5.54	0.08	0.00	0.00	1.50	-103.45	-71.95	-39.83	306	331	-112		
4	522	516	692	2320	2320	1.95	-5.38	0.10	0.00	0.00	1.66	-106.90	-66.57	-36.64	281	306	-87		
5	666	630	812	2320	2320	1.71	-5.21	0.11	0.00	0.00	1.73	-110.27	-61.36	-33.36	255	279	-60		
6	815	738	926	2320	2320	1.50	-5.02	0.12	0.00	0.00	1.73	-113.50	-56.34	-30.02	227	252	-33		
7	968	839	1033	2320	2320	1.30	-4.83	0.14	0.00	0.00	1.67	-116.53	-51.51	-26.64	199	224	-5		
8	1126	933	1132	2320	2320	1.12	-4.63	0.15	0.00	0.00	1.58	-119.33	-46.88	-23.27	171	196	23		
9	1287	1021	1225	2320	2320	0.96	-4.43	0.16	0.00	0.00	1.46	-121.87	-42.45	-19.97	144	169	50		
10	1452	1102	1356	2320	2320	0.82	-4.23	0.17	0.00	0.00	1.31	-124.14	-38.22	-16.78	118	143	76		
11	1621	1175	1534	2320	2320	0.69	-4.04	0.18	0.00	0.00	1.16	-126.14	-34.19	-13.76	93	119	100		
12	1792	1241	1714	2320	2320	0.57	-3.86	0.19	0.00	0.00	1.00	-127.87	-30.33	-10.98	71	97	122		
13	1966	1300	1898	2320	2320	0.47	-3.69	0.20	0.00	0.00	0.85	-129.34	-26.64	-8.47	52	77	142		
14	2143	1351	2084	2320	2320	0.38	-3.53	0.21	0.00	0.00	0.70	-130.57	-23.11	-6.30	35	61	158		
15	2321	1394	2272	2320	2320	0.30	-3.39	0.22	0.00	0.00	0.56	-131.58	-19.72	-4.50	21	47	173		
16	2501	1430	2462	2320	2320	0.24	-3.27	0.23	0.00	0.00	0.42	-132.37	-16.45	-3.11	10	36	183		
17	2683	1457	2653	2320	2320	0.17	-3.18	0.24	0.00	0.00	0.30	-132.97	-13.27	-2.17	3	29	190		
18	2866	1477	2846	2320	2320	0.12	-3.10	0.25	0.00	0.00	0.18	-133.38	-10.17	-1.69	-0	26	193		

19	3049	1489	3039	1718	2320	0.07	-3.05	0.26	0.00	-0.00	0.00	0.00	-133.63	-7.11	-1.70	-0	26	193
20	3232	1493	3232	1722	2320	0.02	-3.03	0.27	0.00	-0.00	0.00	0.00	-133.65	-4.08	-2.19	3	29	190
21	3416	1489	3426	1718	2320	-0.02	-3.03	0.29	-0.00	-0.00	0.00	0.00	-133.63	-1.05	-3.20	11	37	182
22	3599	1477	3619	1705	2320	-0.07	-3.05	0.30	-0.00	-0.00	0.00	0.00	-133.56	2.00	4.73	22	49	170
23	3782	1457	3812	1684	2320	-0.12	-3.10	0.32	-0.00	-0.00	0.00	0.00	-133.44	5.10	-6.78	38	64	155
24	3964	1430	4003	1655	2320	-0.17	-3.18	0.35	-0.00	-0.00	0.00	0.00	-133.26	8.28	-9.32	57	83	136
25	4144	1394	4193	1618	2320	-0.24	-3.27	0.37	-0.01	-0.10	0.02	0.00	-133.02	11.66	-12.34	80	106	113
26	4322	1351	4381	1572	2320	-0.30	-3.39	0.40	-0.08	-0.95	0.14	0.00	-132.64	16.00	-15.78	106	132	87
27	4499	1300	4567	1518	2320	-0.38	-3.53	0.43	-0.25	-2.62	0.38	0.00	-132.01	22.15	-19.41	133	159	60
28	4673	1241	4751	1457	2320	-0.47	-3.69	0.47	-0.53	-4.70	0.68	0.00	-131.01	30.54	-22.92	158	185	34
29	4844	1175	4931	1387	2320	-0.57	-3.86	0.51	-0.87	-6.74	0.99	0.00	-129.57	41.13	-25.93	178	205	14
30	5013	1102	5109	1310	2320	-0.69	-4.04	0.55	-1.21	-8.31	1.25	0.00	-127.68	53.48	-28.10	190	217	2
31	5178	1021	5283	1225	2320	-0.82	-4.23	0.59	-1.49	-9.16	1.41	0.00	-125.37	66.87	-29.18	191	219	-0
32	5339	933	5453	1132	2320	-0.96	-4.43	0.64	-1.66	-9.16	1.45	0.00	-122.75	80.46	-29.03	184	213	6
33	5497	839	5619	1033	2320	-1.12	-4.63	0.69	-1.68	-8.39	1.36	0.00	-119.95	93.47	-27.70	168	198	21
34	5650	738	5780	926	2320	-1.30	-4.83	0.74	-1.55	-7.04	1.16	0.00	-117.10	105.33	-25.31	147	177	42
35	5799	630	5937	812	2320	-1.50	-5.02	0.79	-1.30	-5.37	0.91	0.00	-114.30	115.73	-22.10	122	153	66
36	5943	516	6089	692	2320	-1.71	-5.21	0.84	-0.97	-3.68	0.63	0.00	-111.61	124.62	-18.37	95	127	92
37	6081	395	6235	565	2320	-1.95	-5.38	0.89	-0.63	-2.18	0.38	0.00	-109.04	132.19	-14.39	68	101	118
38	6215	269	6376	432	2320	-2.20	-5.54	0.94	-0.33	-1.04	0.18	0.00	-106.51	138.77	-10.41	43	77	142
39	6343	137	6511	293	2320	-2.47	-5.67	0.98	-0.11	-0.33	0.06	0.00	-103.94	144.77	-6.61	20	55	164
40	6465	0	6639	148	2320	-2.75	-5.78	1.03	-0.01	-0.03	0.00	0.00	-101.17	150.58	-3.13	-0	35	184

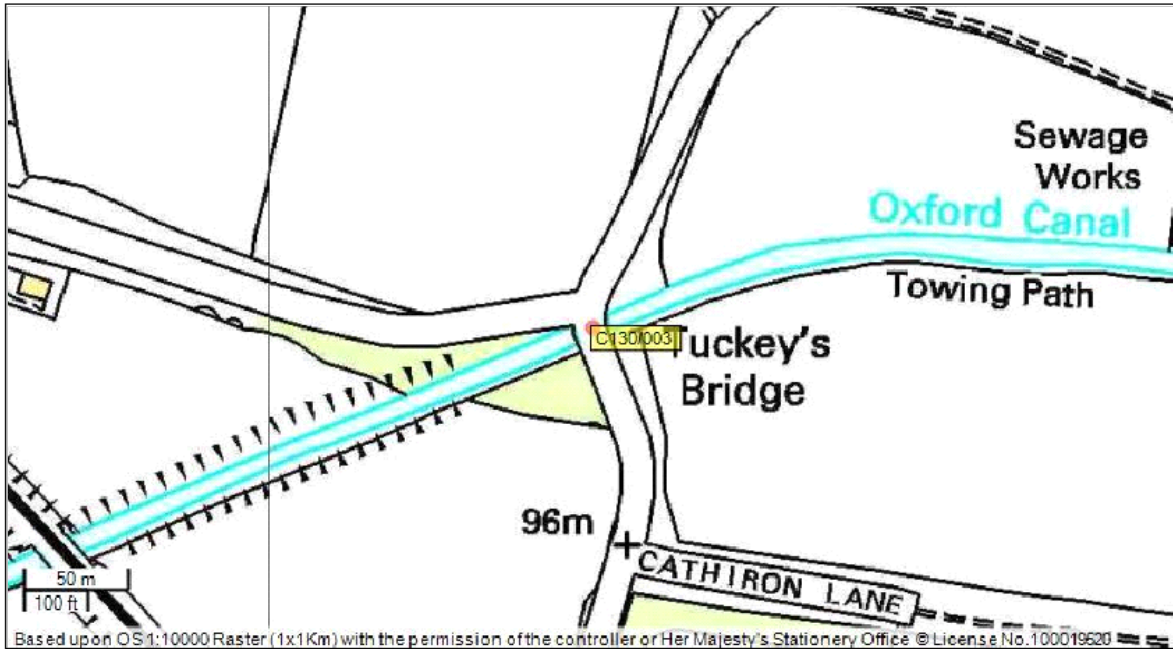
# Appendix B Structure Location

## WARWICKSHIRE SMS BRIDGE CARD

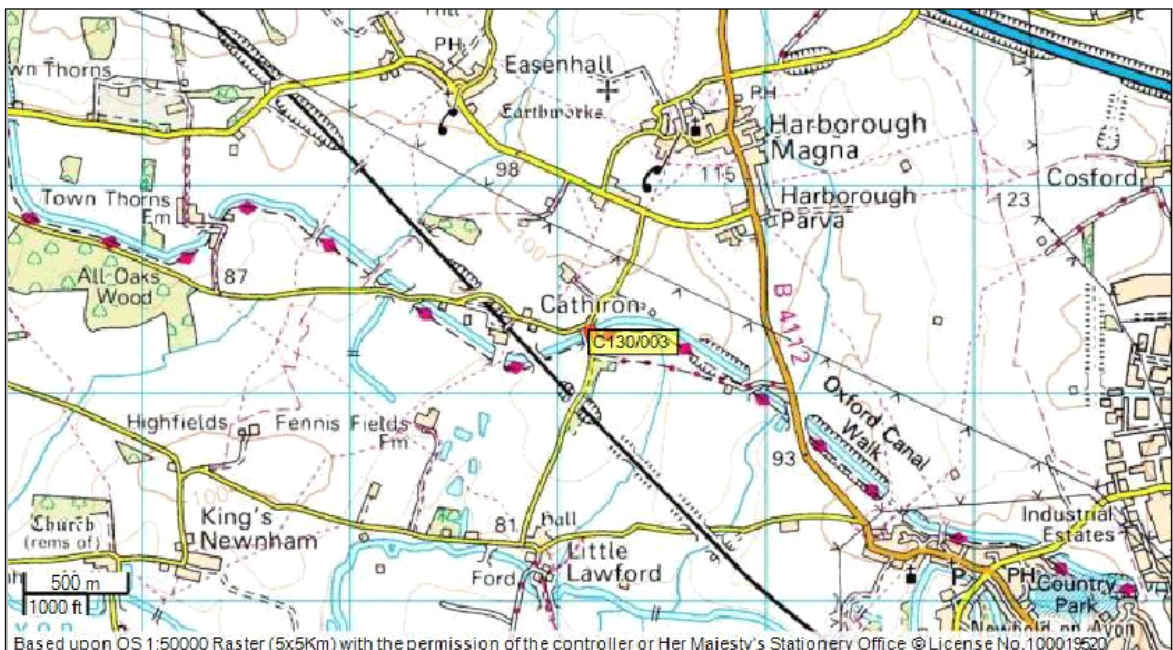


**Bridge Name:** Tuckeys Canal  
**Bridge Ref/No:** C130/003

### MAP



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## **Appendix C**

### **Statutory criteria for decisions on the making of Traffic Regulation Orders**

The Road Traffic Regulation Act 1984 enables the Council to implement Traffic Regulation Orders (TROs) for one or more of the following purposes:-

- a) avoiding danger to persons or traffic;
- b) preventing damage to the road or to buildings nearby;
- c) facilitating the passage of traffic;
- d) preventing use by unsuitable traffic;
- e) preserving the character of a road especially suitable for walking and horseriding;
- f) preserving or improving amenities of the area through which the road runs;
- g) for any of the purposes specified in section 87(1)(a) to (c) of the Environment Act 1995 in relation to air quality.

TROs are designed to regulate, restrict or prohibit the use of a road or any part of the width of a road by vehicular traffic or pedestrians. Permanent TROs remain in force until superseded or revoked.

TROs must not have the effect of preventing pedestrian access at any time or preventing vehicular access for more than 8 hours in 24 to premises on or adjacent to the road. This restriction does not apply if the Council states in the order that it requires vehicular access to be limited for more than 8 hours in 24.

In deciding whether or not to make a TRO, the Council is required to have regard to the matters set out in section 122 of the 1984 Act. Section 122(1) requires the Council to exercise the functions conferred on it by the 1984 Act as (so far as practicable having regard to the matters specified in section 122(2)) to secure the expeditious, convenient and safe movement of vehicular and other traffic (including pedestrians), and the provision of suitable and adequate parking facilities on and off the highway.

The matters to which the Council must have regard are:-

- the desirability of securing and maintaining reasonable access to premises;
- the effect on the amenities of any locality affected and the importance of regulating and restricting the use of roads by heavy commercial vehicles so as to preserve or improve the amenities of the areas through which the roads run;
- the national air quality strategy prepared under section 80 of the Environmental Protection Act 1995;
- the importance of facilitating the passage of public service vehicles and of securing the safety and convenience of persons using or desiring to use such vehicles
- and any other matters appearing to the Council to be relevant

Therefore whilst the overall objective of the Council must be to secure the expeditious convenient and safe movement of vehicular traffic this will sometimes

need to give way to the objectives in section 122(2) and a balance has to be achieved between the overall objective and the matters set out in section 122(2).