From: Bridges
To: Highways Development
Subject: RE: GI_20_195 PRE-APP CONSULTATION
Date: 18 May 2020 12:10:00
Attachments: image001.png

From a Highway Structures perspective I would wholly support any application to infill this redundant bridge. The bridge has been assessed as being substandard. Wiltshire Council did look at infilling the bridge when it undertook similar works to the redundant rail bridge in Potterne Rd Devizes but at the time didn't pursue the scheme due to difficulties over access. Wiltshire Council undertook identical works on the adjacent Potterne Rd Bridge under permitted development rights as Highway Authority, Heritage Railway Estate are a wholly managed subsidiary of the Department for Transport, also a Highway Authority so it may be permitted development rights already exist.

Julian Haines

01225 713382

07768 [redacted]

From: Highways Development
Sent: 15 May 2020 12:07
To: Bridges <xxxxxxx@xxxxxxxxx.xxx.xx>
Subject: GI_20_195 PRE-APP CONSULTATION

A planning application has been received for **Infilling of bridge** at **Hillworth Road Bridge, Devizes , Wiltshire**

This application affects the following Rights of Way -

A copy of the Application Form and Location Plan are attached. Please review these and forward any comments by e-mail to "Highways Development" No later than **22ND MAY 2020**

A 'Nil Return' will be assumed if no comments are received by this date.

Many thanks

Lorraine Gee
Registration Assistant
Sustainable Transport Group
Department for Neighbourhood & Planning

From: PLO Central
Sent: 15 May 2020 08:44
To: ecologyconsultations <xxxxxxxxxxxxxxxxxxx@xxxxxxxxx.xxx.xx>; Drainage <xxxxxxxx@xxxxxxxxx.xxx.xx>; Highways Development <xxxxxxxxxxxxxxxxxx@xxxxxxxxx.xxx.xx>; ConservationCentral <xxxxxxxxxxxxxxxxxx@xxxxxxxxx.xxx.xx>; PublicprotectionEast <xxxxxxxxxxxxxxxxxxx@xxxxxxxxx.xxx.xx>
Cc: Jones, Morgan <xxxxxx.xxxxx@xxxxxxxxx.xxx.xx>
Subject: PRE-APP CONSULTATION

Dear Sir/Madam

Consultation for request for Pre-Application

pplication No: **20/04024/PREAPP**
roposal: **Infilling of bridge**
ite Address: **Hillworth Road Bridge, Devizes , Wiltshire,**

IMPORTANT PLEASE NOTE: UNLIKE PLANNING APPLICATIONS, PRE-APPLICATION ENQUIRIES ARE OF A CONFIDENTIAL NATURE THEREFORE ALL INFORMATION DISCLOSED MUST REMAIN SO

We have received a pre-application enquiry at the above site.

Should you wish to comment on this, please email your response within two weeks from the date of this letter to developmentmanagement@wiltshire.gov.uk.

The planning officer dealing with this enquiry is Morgan Jones.

Yours faithfully

Officer's Name: Morgan Jones
Officer's Title: Senior Planning Officer
Direct Line: 01225 718616
Email: Morgan.Jones@wiltshire.gov.uk

From: [redacted] <[redacted]jacobs.com>
Sent: 23 April 2020 07:57
To: Developmentmanagement <Developmentmanagement@wiltshire.gov.uk>
Subject: BHL 85m 38ch - Disused Railway Bridge

Dear Sir/Madam,

Please find attached a letter with enquiries relating to a former railway bridge maintained by Historical Railways Estate.

Kind Regards

[redacted] | Jacobs | Civil Engineer
hre.priority.structures@Jacobs.com
20 George Hudson Street | York YO1 6WR | UK
Jacobs Challenging today. Reinventing tomorrow.

From:	Jones, Morgan
To:	[redacted]; [redacted]
Cc:	[redacted] jacobs.com
Subject:	RE: Pre-application enquiry ref 20/04024/PREAPP: Disused Railway Bridge at Devizes
Date:	10 September 2020 20:06:00
Attachments:	BHL 85m 38ch.pdf image001.png

Project Name: HRE Works Framework
Project Number: B28280JA
FAO: [redacted]

Dear [redacted]

Re: Disused Railway Bridge BHL 85m 38ch "Hillworth Road Bridge" – Infilling Works

Thank you for your letter dated 10th September 2020 confirming that your client intends on carrying out the works under permitted development rights.

I would be grateful if you could confirm that the observations and recommendations outlined within my email on the 23rd June 2020 will be taken into account and submit any structural surveys or condition reports of the bridge that may be available for our records please.

Regards,

Morgan

Morgan Jones BSc (Hons), MSc, MRTPI
Senior Planning Officer
Economic Development and Planning
Wiltshire Council

Email: xxxxxx.xxxxx@xxxxxxxxx.xxx.xx
Address: County Hall, Bythesea Road, Trowbridge, BA14 8JN
Direct Line: 01225 718 616

From: Jones, Morgan
Sent: 23 June 2020 20:49
To: xxx.xxxxxxxx.xxxxxxxxxx@xxxxxx.xxx
Cc: [redacted] jacobs.com
Subject: RE: Pre-application enquiry ref 20/04024/PREAPP: Disused Railway Bridge at Devizes

Project Name: HRE Works Framework
Project Number: B28280JA
FAO: [redacted]

Dear [redacted]

Re: Disused Railway Bridge BHL 85m 38ch "Hillworth Road Bridge" – Infilling Works

Jacobs

20, George Hudson Street
York YO1 6WR
United Kingdom
T +44 (0)1904 559 900

www.jacobs.com

10th September 2020

Wiltshire Council
Bythesea Road
Trowbridge
Wiltshire
BA14 8JN

Project Name: HRE Works Framework
Project Number: B28280JA

Subject: Disused Railway Bridge BHL 85m 38ch "Hillworth Road Bridge" – Infilling works

Dear Sir/Madam

I am writing to you on behalf of our Client, Highways England, Historical Railways Estate (HRE), formerly BRB (Residuary) Ltd to inform you of planned support works to the structure BHL 85m 38ch via structural infill. HRE is responsible for the Historical Railways Estate following the abolishment of BRB (Residuary) Ltd. This responsibility is undertaken on behalf of the Department for Transport, who own the structure. Therefore, the structure is crown property.

BHL 85m 38ch, Hillworth Road Bridge, a single span brick arch bridge constructed circa 1857. The structure is in a deteriorating condition with a number of fractures through the arch barrel. It carries an unclassified road over the trackbed of the former Devizes Branch (Patney to Holt) railway line. The nearest postcode is SN10 5EU. It is located at approximate OS grid reference SU 005 610. A location plan is enclosed for your information.

As the structure represents an ongoing and increasing risk to public safety and is owned by the Secretary of State for Transport, so is deemed 'Crown Property', Highways England HRE propose to undertake the support works as permitted development in line with the 'Town & Country Planning (General Permitted Development) (England) Order 2015, Schedule 2, Part 19 Class Q'. Specifically, and for the avoidance of any ambiguity, the works are being undertaken in order to prevent an emergency arising.

Can you please confirm receipt of this letter by return email: hreprioritystructu@jacobs.com. Please do not hesitate to contact me should you require any further information.

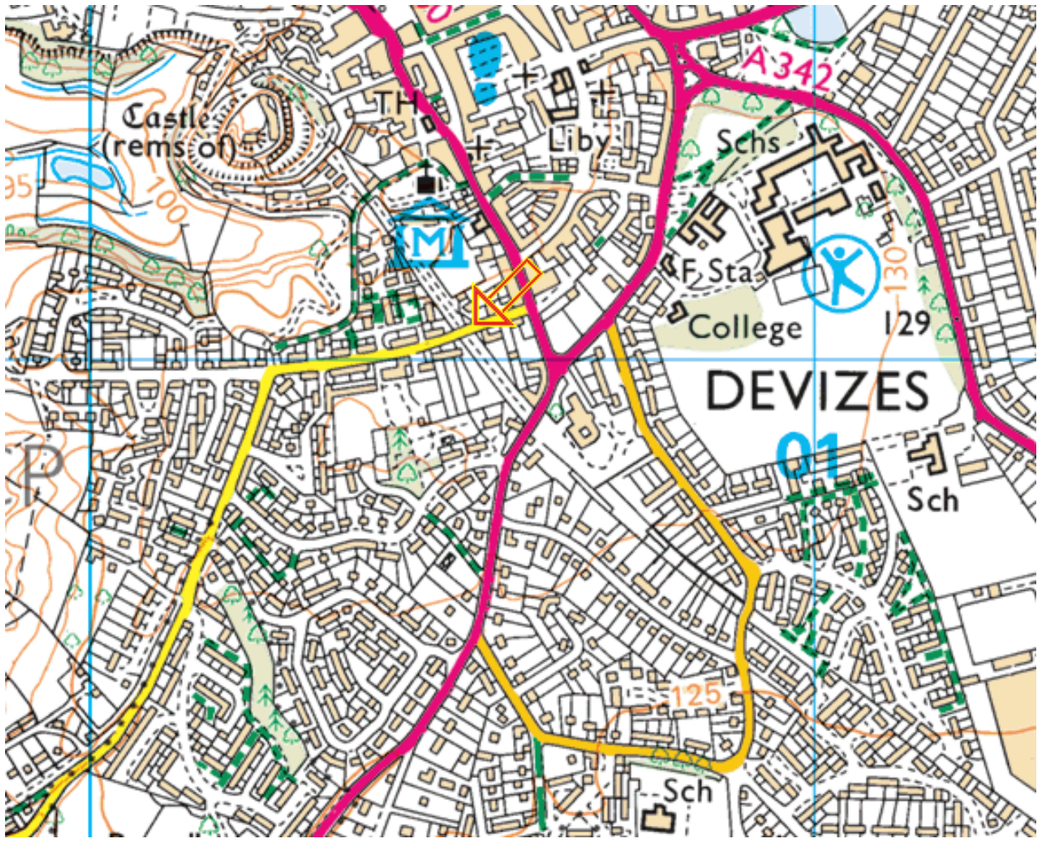
Yours faithfully

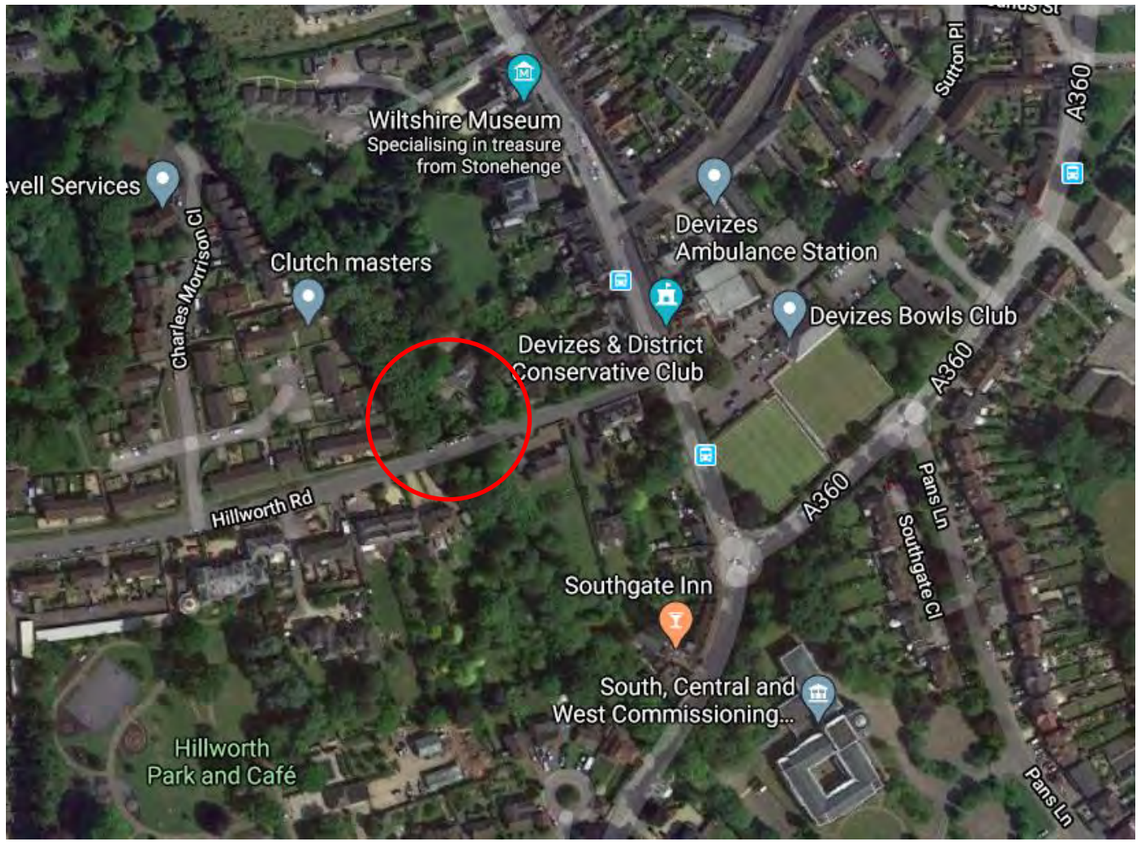
[redacted]

[redacted]
Civil Engineer

BHL 85m 38ch – Location Plan

Location Details	
OS Ref:	SU 005 610
OS X (Eastings)	400527
OX Y (Northings)	161046
Nearest Post Code	SN10 5EU





I write further to my email below on the 20th May 2020 in relation to the above pre-application enquiry.

I have received feedback from various internal consultees which is as follows:

- **Council Conservation Officer** – "I am of the view that the railway and railway bridges are considered to be heritage assets. As the Conservation Area Statement for Devizes *(copy attached)* states one of the key features of the Castle area is the line of the former railway that ran under the castle and now forms the western boundary to the Conservation Area. Wayside Cottage the former stables and coach house to Hillworth House is the closest listed building.

  I am unsure how the site will be accessed but if is near Wayside cottage there needs to be adequate protection of the cottage from accidental damage. In terms of the infilling of the bridge this is an irreversible process, but it will secure the road bridge element and it appears that there is no pubic access to the railway side. The work is undesirable in terms of the railway element but may be necessary to ensure the structural integrity of the bridge."

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  There are many trees situated along both embankments which regularly collapse over the previous trackway. As this area is protected by virtue of a TPO, it would be necessary for the applicant to submit details of any tree removals in relation to the planned restructuring and how it may affect the overall cohesive nature of the land in conjunction with the ecological findings.

  I'm not sure whether the owners/applicants are considered 'Statutory Undertakers' in respect of the Town and Country Planning Act 1990 or Town and Country Planning (Tree Preservation) (England) Regulations 2012, so I think a formal TPO application and tree assessment would be needed in this instance unless it can be demonstrated that they are exempt".

- **Council Public Protection Officer –** I've attached the standard guidance booklet from the Environmental Health department for your information.

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  At further application stage we will want a bit more detail about the surface water drainage strategy, this however sounds like it has already been considered in the attached doc *(covering letter dated 23rd April 2020 by Jacobs).*

  The surface water flood risk maps also appear to show the flow of storm water along the disused railway, we will want to see evidence that the infill will not create a blockage of such flows and potential increase to flood risk behind the structure."

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  The previous ecological survey work found that bat/s were already roosting in Hillworth Road bridge and that bat baxes were erected on the bridge too. The old railway forms a significant link that various bat species found in Devizes likely commute across town between habitat features outside the urban settlement, and they will use the dark space underneath the bridge to move. Likewise badgers currently have free movement along the railway. By filling in Hillworth Road bridge it completely severs the connection it currently provides for wildlife.

  I suggest that you liaise with the Bridges and Structures team (Julian Haines) at the council, and Fiona Elphick who worked with the team on the previous bridge project, to establish what current and historical knowledge there is of the disused railway. Further any future application will need to be supported by, as a minimum:
- Badger and bat surveys of the bridge
- Records of any use of previous bat boxes on the bridge by bats
- Evidence showing the functionality of the old railway line for movement of wildlife
- Evidence showing that the development results in Biodiversity Net Gain; compensatory measures off site may be required to achieve this."

The **Highway Authority** (comments provided by Julian Haines) has previously expressed support for the proposal as outlined within my email below. However, in light of the comments outlined above, the proposed development has the potential to have a significant ecological impact and affect trees protected by a Tree Preservation Order.

I trust these observations will be of assistance but I would be grateful if you could clarify whether you consider the works can be undertaken under permitted development rights. Furthermore, if you would like to discuss the proposal in further detail or contact relevant departments (Highway Authority – Julian Haines | Ecology – Fiona Elphick | Trees – David Wyatt) please let me know.

Regards,

Morgan

Morgan Jones BSc (Hons), MSc, MRTPI
Senior Planning Officer
Economic Development and Planning
Wiltshire Council

Email: xxxxxx.xxxxx@xxxxxxxxx.xxx.xx
Address: County Hall, Bythesea Road, Trowbridge, BA14 8JN

Direct Line: 01225 718 616

From: Jones, Morgan
Sent: 20 May 2020 20:16
To: xxx.xxxxxxxx.xxxxxxxxxx@xxxxxx.xxx
Cc: [redacted]jacobs.com
Subject: Pre-application enquiry ref 20/04024/PREAPP: Disused Railway Bridge at Devizes

Project Name: HRE Works Framework
Project Number: B28280JA
FAO: [redacted]

Dear [redacted]

Re: Disused Railway Bridge BHL 85m 38ch "Hillworth Road Bridge" – Infilling Works

I write in relation to your letter dated 21st April 2020 in regarding the above.

I note you your enquiry seeks general comments from the Local Planning Authority on the proposal and detail of any constraints that may be imposed on the works. It is therefore understood that it is your intention to apply for full planning permission in due course for the engineering operation. An ecological assessment and an assessment of any impacts on designated sites will also be carried out to inform the works. I note the artistic impression submitted with your letter. Do you have any scaled plans or more precise details of the condition of the bridge or the extent of works to help inform our assessment?

The Local Planning Authority has sought comments from the Council's Public Protection Officer, Highways Officer, Drainage Engineer, Ecologist and Conservation Officer and I'll provide a full response once I have all their observations. I have however carried out an initial desk based assessment to establish the site constraints as see that the trees directly to the south of the bridge are protected by a Tree Preservation Order (ref E/481/W1 – 'trees between Hillworth Road and Potterne Road aliong the old railway line').

In terms of the planning history of the site, I've identified two applications which relate to the land immediately to the south of the bridge:-

1. Application ref 18/10881/TPO: Tree works within the Old Railway Cutting – Approved 02.01.19;
2. Application K/80/0368: Fill disused railway cutting with waste material and on completion to form part of the adjoining site owned by Watney Mann (West) Limited – Refused 09.10.80.

I have received comments from the Highway Authority who advised me of the following:-

"From a Highway Structures perspective I would wholly support any application to infill this redundant bridge. The bridge has been assessed as being substandard. Wiltshire Council did look at infilling the bridge when it undertook similar works to the redundant rail bridge in Potterne Rd Devizes but at the time didn't pursue the scheme due to difficulties over access. Wiltshire Council

undertook identical works on the adjacent Potterne Rd Bridge under permitted development rights as Highway Authority, Heritage Railway Estate are a wholly managed subsidiary of the Department for Transport, also a Highway Authority so it may be permitted development rights already exist."

In light of the above observations I would be grateful if you could clarify whether you feel the works could benefit from permitted development rights or require full planning permission. If you could also advise of the extent of tree removal required I can obtain the view of the department's Arboricultural Officer who can advise on the need for permission to carry out TPO tree work.

If you would like to discuss the proposal at any stage please let me know and we can schedule a suitable time to discuss.

Regards,

Morgan

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Senior Planning Officer
Economic Development and Planning
Wiltshire Council

Email: xxxxxx.xxxxx@xxxxxxxxx.xxx.xx
Address: County Hall, Bythesea Road, Trowbridge, BA14 8JN
Direct Line: 01225 718 616

From:	Jones, Morgan
To:	xxx.xxxxxxxx.xxxxxxxxxx@xxxxxx.xxxx.xxxxxxxx.xxxxxxx@xxxxxx.xxx
Cc:	[redacted] jacobs.com
Subject:	RE: Pre-application enquiry ref 20/04024/PREAPP: Disused Railway Bridge at Devizes
Date:	16 February 2021 20:40:00
Attachments:	Bridge Infill (Wiltshire Council).docx image001.png

Project Name: HRE Works Framework
Project Number: B28280JA
FAO: [redacted]

Dear [redacted]

Re: Disused Railway Bridge BHL 85m 38ch "Hillworth Road Bridge" – Infilling Works

Further to my email below please see attached letter from Railfuture for your information.

Regards,

Morgan

Morgan Jones BSc (Hons), MSc, MRTPI
Senior Planning Officer
Economic Development and Planning
Wiltshire Council

Email: xxxxxx.xxxxx@xxxxxxxxx.xxx.xx
Address: County Hall, Bythesea Road, Trowbridge, BA14 8JN
Direct Line: 01225 718 616

From: Jones, Morgan
Sent: 10 September 2020 20:06
To: xxx.xxxxxxxx.xxxxxxxxxx@xxxxxx.xxx; xxx.xxxxxxxx.xxxxxxx@xxxxxx.xxx
Cc: [redacted] jacobs.com
Subject: RE: Pre-application enquiry ref 20/04024/PREAPP: Disused Railway Bridge at Devizes

Project Name: HRE Works Framework
Project Number: B28280JA
FAO: [redacted]

Dear [redacted]

Re: Disused Railway Bridge BHL 85m 38ch "Hillworth Road Bridge" – Infilling Works

Thank you for your letter dated 10th September 2020 confirming that your client intends on carrying out the works under permitted development rights.

I would be grateful if you could confirm that the observations and recommendations outlined

railfuture

Campaigning for better services over a bigger rail network

please reply to:
23 James Way
Hucclecote
GLOUCESTER
GL3 3TE

[redacted]railfuture.org.uk

Wiltshire Council
County Hall
Bythesea Road
TROWBRIDGE
BA14 8JN

For the attention of Director of Planning

developmentmanagement@wiltshire.gov.uk

15th February 2021

Dear Sir or Madam

Hillworth Road / Devizes Castle bridge, Devizes

I understand that Highways England is proposing to infill the above bridge, which was part of the former Devizes branch railway. Whilst there may not be any plans to reopen the line, Railfuture believes a case could be made for it in the longer term, partly because the Bowerhill development extends right up to the course of the former railway.

Railfuture strongly supports the proposed Devizes Parkway station as the best way to reconnect Devizes to the rail network in the near future. However, we would also ask your Council to consider safeguarding the formation of the original line with a view to its possible future use.

Yours sincerely

[redacted]

[redacted]
Railfuture
[redacted]

within my email on the 23rd June 2020 will be taken into account and submit any structural surveys or condition reports of the bridge that may be available for our records please.

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Morgan

Morgan Jones BSc (Hons), MSc, MRTPI
Senior Planning Officer
Economic Development and Planning
Wiltshire Council

Email: xxxxxx.xxxxx@xxxxxxxxx.xxx.xx
Address: County Hall, Bythesea Road, Trowbridge, BA14 8JN
Direct Line: 01225 718 616

From: Jones, Morgan
Sent: 23 June 2020 20:49
To: xxx.xxxxxxxx.xxxxxxxxxx@xxxxxx.xxx
Cc: [redacted]jacobs.com
Subject: RE: Pre-application enquiry ref 20/04024/PREAPP: Disused Railway Bridge at Devizes

Project Name: HRE Works Framework
Project Number: B28280JA
FAO: [redacted]

Dear [redacted]

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Economic Development and Planning
Wiltshire Council

Email: xxxxxx.xxxxx@xxxxxxxxx.xxx.xx
Address: County Hall, Bythesea Road, Trowbridge, BA14 8JN
Direct Line: 01225 718 616

From: Jones, Morgan
Sent: 20 May 2020 20:16
To: xxx.xxxxxxxx.xxxxxxxxxx@xxxxxx.xxx
Cc: [redacted]jacobs.com
Subject: Pre-application enquiry ref 20/04024/PREAPP: Disused Railway Bridge at Devizes

Project Name: HRE Works Framework
Project Number: B28280JA
FAO: [redacted]

Dear [redacted]

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Email: xxxxxx.xxxxx@xxxxxxxxx.xxx.xx
Address: County Hall, Bythesea Road, Trowbridge, BA14 8JN
Direct Line: 01225 718 616

From:	Jones, Morgan
To:	[redacted]
Cc:	[redacted] jacobs.com
Subject:	RE: Pre-application enquiry ref 20/04024/PREAPP: Disused Railway Bridge at Devizes
Date:	23 June 2020 20:48:00
Attachments:	image001.png Environmental Health advice for developers and other planning applicants V2 April 2020.pdf DEVIZES - Approved Statement.pdf

Project Name: HRE Works Framework
Project Number: B28280JA
FAO: [redacted]

Dear [redacted]

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  The surface water flood risk maps also appear to show the flow of storm water along the disused railway, we will want to see evidence that the infill will not create a blockage of such flows and potential increase to flood risk behind the structure."

- **Council Ecologist** – "Some years ago, the ecology team were engaged by the Bridges and Structures team of Wiltshire Council to look into the need to infill an adjacent bridge to Hillworth Road Bridge. That bridge was to the south, next to SouthBridge/Southgate House. The disused railway line was shown to be a key piece of wildlife corridor network, supporting badger setts and bat roosts. I understand that this previous bridge has since been filled in by the council, and various badger and bat mitigation was included; this incorporated badger tunnels running through the infilling.

  The previous ecological survey work found that bat/s were already roosting in Hillworth Road bridge and that bat baxes were erected on the bridge too. The old railway forms a significant link that various bat species found in Devizes likely commute across town between habitat features outside the urban settlement, and they will use the dark space underneath the bridge to move. Likewise badgers currently have free movement along the railway. By filling in Hillworth Road bridge it completely severs the connection it currently provides for wildlife.

  I suggest that you liaise with the Bridges and Structures team (Julian Haines) at the council, and Fiona Elphick who worked with the team on the previous bridge project, to establish what current and historical knowledge there is of the disused railway. Further any future application will need to be supported by, as a minimum:
- Badger and bat surveys of the bridge
- Records of any use of previous bat boxes on the bridge by bats
- Evidence showing the functionality of the old railway line for movement of wildlife
- Evidence showing that the development results in Biodiversity Net Gain; compensatory measures off site may be required to achieve this."

The **Highway Authority** (comments provided by Julian Haines) has previously expressed support for the proposal as outlined within my email below. However, in light of the comments outlined above, the proposed development has the potential to have a significant ecological impact and affect trees protected by a Tree Preservation Order.

I trust these observations will be of assistance but I would be grateful if you could clarify whether

you consider the works can be undertaken under permitted development rights. Furthermore, if you would like to discuss the proposal in further detail or contact relevant departments (Highway Authority – Julian Haines | Ecology – Fiona Elphick | Trees – David Wyatt) please let me know.

Regards,

Morgan

Morgan Jones BSc (Hons), MSc, MRTPI
Senior Planning Officer
Economic Development and Planning
Wiltshire Council

Email: xxxxxx.xxxxx@xxxxxxxxx.xxx.xx
Address: County Hall, Bythesea Road, Trowbridge, BA14 8JN
Direct Line: 01225 718 616

From: Jones, Morgan
Sent: 20 May 2020 20:16
To: xxx.xxxxxxxx.xxxxxxxxxx@xxxxxx.xxx
Cc: [redacted]jacobs.com
Subject: Pre-application enquiry ref 20/04024/PREAPP: Disused Railway Bridge at Devizes

Project Name: HRE Works Framework
Project Number: B28280JA
FAO: [redacted]

Dear [redacted]

Re: Disused Railway Bridge BHL 85m 38ch "Hillworth Road Bridge" – Infilling Works

I write in relation to your letter dated 21st April 2020 in regarding the above.

I note you your enquiry seeks general comments from the Local Planning Authority on the proposal and detail of any constraints that may be imposed on the works. It is therefore understood that it is your intention to apply for full planning permission in due course for the engineering operation. An ecological assessment and an assessment of any impacts on designated sites will also be carried out to inform the works. I note the artistic impression submitted with your letter. Do you have any scaled plans or more precise details of the condition of the bridge or the extent of works to help inform our assessment?

The Local Planning Authority has sought comments from the Council's Public Protection Officer, Highways Officer, Drainage Engineer, Ecologist and Conservation Officer and I'll provide a full response once I have all their observations. I have however carried out an initial desk based assessment to establish the site constraints as see that the trees directly to the south of the bridge are protected by a Tree Preservation Order (ref E/481/W1 – 'trees between Hillworth

Road and Potterne Road aliong the old railway line').

In terms of the planning history of the site, I've identified two applications which relate to the land immediately to the south of the bridge:-

1. Application ref 18/10881/TPO: Tree works within the Old Railway Cutting – Approved 02.01.19;
2. Application K/80/0368: Fill disused railway cutting with waste material and on completion to form part of the adjoining site owned by Watney Mann (West) Limited – Refused 09.10.80.

I have received comments from the Highway Authority who advised me of the following:-

"From a Highway Structures perspective I would wholly support any application to infill this redundant bridge. The bridge has been assessed as being substandard. Wiltshire Council did look at infilling the bridge when it undertook similar works to the redundant rail bridge in Potterne Rd Devizes but at the time didn't pursue the scheme due to difficulties over access. Wiltshire Council undertook identical works on the adjacent Potterne Rd Bridge under permitted development rights as Highway Authority, Heritage Railway Estate are a wholly managed subsidiary of the Department for Transport, also a Highway Authority so it may be permitted development rights already exist."

In light of the above observations I would be grateful if you could clarify whether you feel the works could benefit from permitted development rights or require full planning permission. If you could also advise of the extent of tree removal required I can obtain the view of the department's Arboricultural Officer who can advise on the need for permission to carry out TPO tree work.

If you would like to discuss the proposal at any stage please let me know and we can schedule a suitable time to discuss.

Regards,

Morgan

Morgan Jones BSc (Hons), MSc, MRTPI
Senior Planning Officer
Economic Development and Planning
Wiltshire Council

Email: xxxxxx.xxxxx@xxxxxxxxx.xxx.xx
Address: County Hall, Bythesea Road, Trowbridge, BA14 8JN
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- ProPG: Planning and Noise – Professional Practice Guidance on Planning and Noise
  Provides guidance on a recommended approach to the management of noise within the Planning system and encourages the process of good acoustic design for new residential development aiming to protect people from the harmful effects of noise.

Smaller scale projects e.g. a corner shop installing an air conditioning unit, refrigeration plant or other small scale plant/ equipment, will need to assess as far as possible any likely impact from noise on the surrounding community for example; hours of operation of the plant, location of the nearest noise sensitive receptor, noise output of the plant/equipment, acoustic treatments to be installed.

Noise & Dust during the construction phase

If there are residential properties close to your development, you will need to consider how noise & dust will be controlled during the construction phase. The Council recommends that noisy activities should not be carried out on site, outside the following hours:

Monday to Friday 08.00 - 18:00
Saturday 08:00 - 13:00
Not at all on Sundays or Bank Holidays

Where complaints are received from members of the public about noise from the site, a legal notice may be served under the Control of Pollution Act 1974 to formally restrict the time for noisy works.

We would expect a Construction Management Plan to be submitted with any major development whose construction/demolition phase is likely to be ongoing for a long period of time.

Odour impacts

In some instances an odour impact assessment may be required to ensure odour from certain sources (slurry lagoons, sewage works, poultry houses etc.) will not adversely impact upon new or existing residents, which should include appropriate mitigation measures.

Odour from takeaways and restaurants can also be highly intrusive. Appropriate methods of odour dispersal and abatement should be considered by your ventilation engineer. Further guidance can be found at;

- **DEFRA; Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems 2005**– This has been withdrawn but provides guidance for estimating the odour risk taking into account the stack/exhaust height, size and type of the kitchen and proximity to sensitive receptors

- **IAQM; Guidance on the assessment of odour for planning 2018**

- **Environmental Health Licences and Permits –** Larger industrial plant such as coating & spraying will need to approach their suppliers for specialist advice. You may also require a permit under the Environmental Permitting regulations and you are therefore advised to contract Environmental protection direct

Smoke

Chimneys and flues must be located away from neighbouring windows. Chimneys must be sufficiently high to allow free dispersal; e.g. if you are on a hillside for example you might need a higher chimney than normal to take the smoke away from an adjoining neighbour higher up the hill.

Large scale boiler operators will need to provide a chimney height calculation in accordance with the appropriate relevant guidance such as D1 or the chimney height memorandum.

Light

For developments with proposed significant external light which will have line of sight to residential properties or other sensitive receptors we will require the submission of a lighting impact assessment and proposed mitigation measures in accordance with guidance set out in The Institute of Lighting Professionals "Guidance Notes for the Reduction of Obtrusive Light".

Further information can be found on the GOV.UK website under Light Pollution which provides advice on how to consider light within the planning system. Including, the Guidance on sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005 – Statutory Nuisance from Insects and Artificial Light.

Pests

If it is likely that pests (including flies) may arise from the proposals we would expect the submission of a management plan to detail how pests will be effectively managed and mitigated against to prevent having an adverse impact on local sensitive receptors.

This includes

- Fly Management Guidance

Informative

This advice is provided without prejudice and all applications will be determined on their individual merits.

Other planning applications

Environmental Impact Assessments

Some complex or large scale developments may require a full Environmental Impact Assessment (EIA) and such developments are defined in the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 and the Town and Country Planning (Environmental Impact Assessment) Regulations 1999. Any EIA must include references to the impact of noise and other environmental related amenity issues associated with the proposal.

Change of use

If your application involves a change of use for a commercial premises or a change in the hours of operation for a business, you will need to consider the following as part of your application:

- **Change of use** - If in changing the use of the business there is likely to be a change in the noise arising from the business, e.g. a retail unit turning into a bar, you will need to consider this in your application and include details of any potential noise control measures, e.g. improvements to sound insulation, noise limiters, lobby doors, double glazing, noise management plan

- **Change in the hours of operation** - you will need to check with Planning Services whether there are any conditions relating to the hours of operation on the current planning permission. They can be contacted by telephone; 0300 456 0114 or by email Developmentmanagement@wiltshire.gov.uk and further advice can be accessed online at http://www.wiltshire.gov.uk/planning-new,
  If there are restrictions on the hours of operation and you plan to open beyond this you will need to submit an application to vary the condition. You should be aware that the community will be more sensitive to noise after 23.00 hrs and before 07:00 hrs and additional control measures may be required if the new business will be producing noise during this time. This needs to be addressed in the planning application.

General Permitted Development

Permitted development rights have temporarily been extended under the Town and Country Planning (General Permitted Development) (Amendment) (England) Order 2018. In accordance with this Order the Environmental & Control Protection Team is no longer consulted on the full range of environment issues which may be caused by or associated with such a change of use.

Those who wish to utilise these new rights are advised that, notwithstanding the Town and Country Planning (General Permitted Development) (Amendment) (England) Order 2018, you have a duty to ensure that:

i. The occupants of the development are adequately protected against environmental issues or emissions which exist in the area of the development; and

ii. Those living or working nearby are adequately protected from environmental issues or emissions caused by the development or use thereof.

There are a wide range of environmental issues or emissions which may affect the health or wellbeing of other local residents or businesses including the environmental factors that are considered in this guidance document. These issues or emissions can be present in the local environment generally or can be caused by specific activities or operations taking place nearby.

You must consider whether your development will be affected by, or will cause, any of the environmental issues mentioned in this document, air quality and contaminated land. If so you must take the appropriate steps to ensure that both the future occupants of your development and those living or working nearby are adequately protected. Where it is not possible to take steps to prevent, or protect people from, these issues you should reconsider whether the change of use should take place.

If the change of use is to change or introduce a business activity and that business activity subsequently causes a “statutory nuisance” the advice given in this document may affect that business’ ability to claim any statutory defence of “best practicable means” in any action taken against it under the Environmental Protection Act 1990.

By addressing these issues before the development takes place you will reduce the risk of any adverse effects, and reduce the chances of the local authority using its enforcement powers in the future to resolve the problem.

KENNET District Council

Keeping Kennet Special

DEVIZES CONSERVATION AREA STATEMENT

September 2005

Planning Services

Development Control & Conservation

Forward Planning & Transportation

Building Control & Property Management

Devizes is a town with a remarkable architectural and historic legacy. The pattern of streets and spaces still reflects the organisation of the Norman castle and this, together with the 500 or so listed buildings, provides a town centre of individuality and distinction.

The range of historic buildings, particularly from the 15th century, includes many of high architectural quality. Variations in the use of materials and details create interesting and attractive streets and there are many occasions where the quality of craftsmanship sets a standard that regrettably is no longer achieved.

The character of Devizes depends on its buildings and spaces, landscape setting and trees, and uses. Commercial activity in the town centre is an integral part of the town's character and its attraction needs to be maintained.

Creative conservation is all about managing change. This Statement is not intended as an exercise in preservation - its main purpose is to ensure that the significance of the architectural and historic heritage of Devizes is fully recognised and is taken onto account in making decisions about the future of the town.

DEVIZES CONSERVATION AREA STATEMENT

DEVIZES CONSERVATION AREA

The quality of the Devizes Conservation Area is in the layout of streets, spaces and historic buildings. Also the variety of styles of architecture and scale and juxtaposition of buildings.

The purpose of this Statement of the Devizes Conservation Area is to identify and record those special qualities of the town that make up its architectural and historic character. This is important for providing a sound basis for local plan policies and development control decisions as well as for the formulation of proposals for the preservation or enhancement of the character or appearance of the area.

The Statement contains an assessment of the Devizes Conservation Area and is intended for all those with an interest in the town, or undertaking work on its buildings, landscape, streets or public spaces. It is also essential reading for anyone contemplating development within the town. By drawing attention to the distinctive features of Devizes it is intended that its character will be protected and enhanced for the benefit of this and future generations.

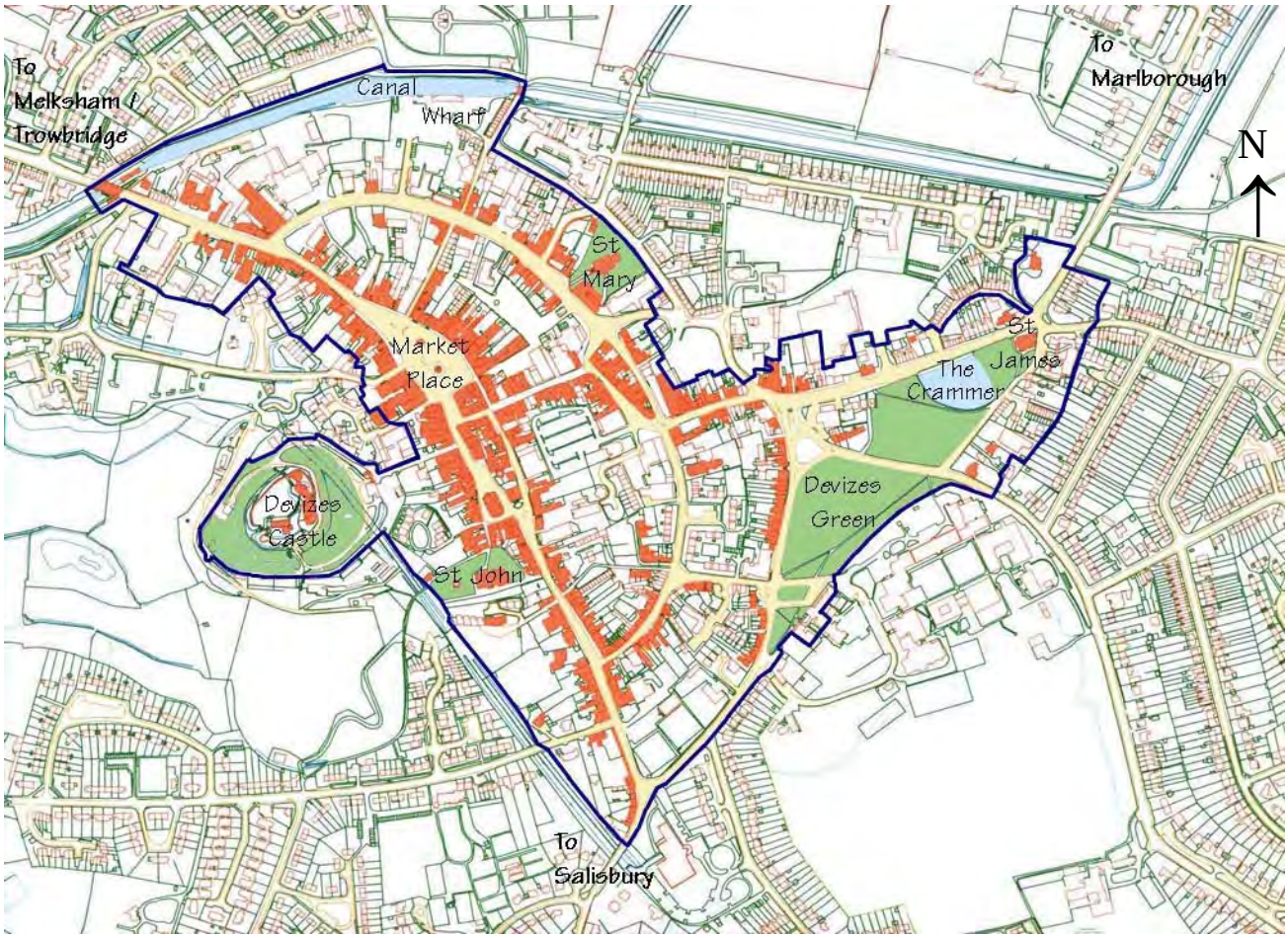
The Conservation Area was first designated on 26 November 1970 and extended on 27 October 1977 so that it now covers the whole of the town centre. The northern boundary follows a section of the Kennet and Avon Canal and then runs southwards around the outer wall of the Castle and following the line of the former railway, cutting back along Southbroom Road and the eastern side of The Green. The boundary then turns to the north-east of St. James's Church, and back just north of Estcourt Street and north-westwards along Commercial Road, to The Wharf.

The main characteristics of the Devizes Conservation Area are:

At a closer look many of the buildings in the Conservation Area are intricately detailed with a high quality of design, materials and craftsmanship.

- A unique town plan based on the layout of the Castle and the Norman origins of Devizes
- A remarkable collection of historic buildings dating from the 15th to the 19th centuries with a number of especially high quality 18th century buildings
- A town market place almost entirely surrounded by listed buildings and including historic monuments
- Attractive vistas along historic streets frequently terminated by buildings of high quality
- Two especially fine churches of Romanesque origin, St. John originally located within the confines of the Castle to serve the garrison and St. Mary outside to serve the townsfolk
- Public open space in the form of Devizes Green together with The Crammer
- A small section of the Kennet and Avon Canal including the Wharf

The history of Devizes relates directly to the Norman Castle, the siting of which is fundamental to the layout and setting of the town. This has defined the street pattern, most of which has survived. The visual impact of the present Castle on the town centre and the Conservation Area is limited by its comparative seclusion.



Devizes Conservation Area with the listed buildings marked in red. This map shows the overall form of the town and the relationship between the castle and the subsequent layout of streets.

Geology and topography

Devizes is geographically at the centre of Wiltshire and has a population of around 15,000 in the urban area. It is approximately 20 miles east of Bath and 20 miles south of Swindon. Chippenham is 10 miles to the north-west and Salisbury 26 miles south. The A361 running east-west from Swindon to Trowbridge passes through the town.

The town is located at the western lip of Pewsey Vale which separates the Marlborough Downs and Salisbury Plain. The town is built on more or less level ground to the north and east of the Castle at around the 130 metre contour and sits on a plateau of Upper Greensand at a point where several platforms of greensand line the western edge of the Wiltshire chalkland. The land falls away sharply to the south towards Salisbury Plain and to the west, as can be seen at Caen Hill. Gault clay extends from the west in two dry valleys almost up to the Castle walls.

Devizes is also at the division of the Bristol and Salisbury Avon river systems of Wiltshire and, being at the watershed, had a limited water supply with virtually all drinking water obtained from wells within the town. This situation was slightly eased in 1810 by the arrival of the canal but it was not until 1877 that a water supply was piped in from the east.

Origins and development

One of the earliest surviving buildings - the impressive view of St. John's Church seen from Long Street.

The historical content of this Conservation Area Statement is intended to show the links between the town's history and present day streets and buildings. The original plan and layout of the town and the subsequent pattern of growth are major influences on the character of Devizes and these links need to be recognised as the starting point for considering the form and scale of future change.

The Statement is not a definitive history of the town: the history of Devizes is well documented and a selected list of books on the subject is included in the Bibliography.

Origins

The development of Devizes starts with the Castle. It is possible that the Castle's history began with an Iron Age hillfort but our starting point is the wooden construction in 1080 by Osmund, Bishop of Salisbury. His castle, built on the boundaries of his manors of Potterne and Cannings and the King's manor of Rowde, was known as 'castrum ad divisas' - the castle at the boundaries. The site was easily defended with the Castle built on a spur of land with three sloping sides and a link to the plateau to the east.

In the street scenes St Mary's Church mostly appears behind other buildings and is only seen in its entirety from the churchyard.

The timber castle burned down in 1113 and was replaced in stone by Osmund's successor, Bishop Roger of Caen. The Castle played an important part in the Civil War of 1139-1141 and the reward to the townspeople of Devizes for their support in winning back the Castle for The Empress Maud was a Royal Charter of 1141 guaranteeing traders freedom from market tolls throughout the land. A further Charter of 1218 gave the burgesses of Devizes a large measure of local jurisdiction and underlined the increasing significance of the town.

The town grew to support the Castle although the expansion was restricted by the topography to the level area of land east of the Castle. The plan form of Devizes, which has more or less remained intact to the present day, is based on the concentric lines of castle defence.

Economic activity in the town was encouraged by the Charter and in the early 14th century the tradesmen seemed to be mainly leather workers although later there are references to metal workers. It was not until the 15th century that weavers and clothiers became prominent.

Although Great Porch House dates from the 15th century many of the external features such as the Georgian sash windows are later.

Early buildings in Devizes are the Churches of St. John and St. Mary. St. John's is an important Norman church with an impressive rectangular crossing tower and an attached round stair turret, built to serve the Castle. St. Mary's also has a Norman chancel and dates from around the same time as that of St. John.

The Church of St. James, Southbroom, is first mentioned in a document of 1461 and was, until the 19th century, a Chapel of Ease for the parish of Bishops Cannings. The building of St. James's Church marks a stage in the growth of the town when the population was no longer forced to shelter within the Castle ramparts.

The market recorded in 1228 was in a wide space south of St. Mary's Church and market trading increased in importance as the town developed.

In medieval times the buildings of Devizes were timber frame, probably with wattle and daub infill, as still can be seen in St John's Alley. Limestone paving setts complement the buildings.

Steep pitch gables facing the street are characteristic of 16th and 17th century building represented here at the Three Crowns PH. Form and scale is in marked contrast to the 20th century building alongside.

There are a number of 18th century buildings in the Market Place. Number 17 in brick on the south side and Parnella House in stone on the north are examples of particular quality. The Brewery dates from 1885.

As the military importance of the Castle declined there was less need for strong defence and by the 14th century there was evidence that the outer bailey walls had been breached and redevelopment had taken place within. It was therefore possible for the tradesmen to make use of the open space of the outer bailey. This area became known as the New Port with the former market place known as the Old Port. The new street then laid out between the north and south gates of the town included what are now Northgate Street, Market Place and Long Street. Infilling at the south-east end of the Market Place by the 15th century produced St John's Street and Wine Street. Just beyond is St. John's Alley, once linked to Wine Street, where medieval buildings still survive. Great Porch House in Monday Market Street is another early building with origins dating from the 15th century.

16th Century

The 16th century saw the considerable growth and influence of the administration of the Borough by the Mayor and Burgesses. This was evident in the supervision of trade, including the maintenance of standards and the registration of apprentices and in the various aspects of public interest such as health, housing, highways and poor relief. The Borough was also responsible for a considerable amount of property. The other major role for the Borough Council was as a Court of Law.

Evidence of 16th century buildings survives at the southern wing of the Bear Hotel and behind the later frontage of the Four Seasons in High Street. The Three Crowns PH in Maryport Street also dates from the 16th century. Buildings in St. John's Alley date from the early 16th to mid 17th century and still illustrate the architecture of the time.

17th Century

Limited development continued in the 17th century and buildings, or remains of such buildings, from this time can still be found in a number of streets. These early houses were constructed of timber frame with wattle and daub infill and probably had thatched roofs. Characteristics of the 17th century are gables facing the street and steep pitched roofs such as can be seen at the restored Elm Tree Inn. This and other gable fronted buildings give an impression of how the town would have looked at the time. 17th century remains survive at 39 New Park Street, and at 6-10 The Island. Much of Long Street has 17th century, or earlier, origins and 4 St. John's Court has a medieval core behind a late 18th / early 19th century stone front.

Detailed investigations are needed to determine the exact dates of buildings and further studies may reveal a more accurate picture of the town at this time, particularly as knowledge is accumulated and investigative techniques become more sophisticated.

18th Century

The 18th century was a time of economic prosperity for Devizes, evidence of which can be seen in many of the town's fine buildings. A rebuilding programme began around 1700 and was to continue for the next 150 years or so changing the character of Devizes from medieval to the various phases of Georgian. Building lines and streets were largely unchanged but many houses were rebuilt and others refronted.

Brownston House is one of the high status buildings of Devizes and is typical of the style and materials used in the 18th century. Gates and gatepiers complement the setting.

Much of this prosperity was based on cloth and other industries but was also due to the location of the town on one of the major routes to Bath which saw Devizes develop as a coaching town. During this time market activities continued to expand and Devizes was seen as having one of the best markets in the west of England. This economic activity encouraged various professions to the town bringing with them the need for good quality buildings, although the lack of a supply of running water for industry, power and transport undoubtedly constrained the development of the town.

Georgian architecture in Devizes occurred as new-build or re-fronting of existing buildings giving the town a strong Georgian character. Brownston House in New Park Street and 17 Market Place are high quality 18th century brick buildings, now listed grade I, and Parnella House is another fine 18th century building, this time in stone. Many of the houses in Long Street were refronted in both brick and render and this gives the street a most attractive Georgian character, although in a number of cases hiding much earlier buildings.

The attractive 19th century stone entrance to the Museum between 18th century brick buildings introduces variety and interest to the street scene.

Also towards the end of the 18th century the Devizes Improvement Commission began to clean the streets and erect lamps and pave certain routes. Trading encouraged travel and brought with it the need for accommodation. In 1776 the town had 41 inns and alehouses, 26 in the New Port, 11 in the Old Port and 4 on The Green. Some of these, including The Bear, could be traced back to the 16th century and former sites are commemorated in street names such as Old Swan Yard.

Although in 1637 there was a regular journey made by carriers from Devizes to London, the improvement of roads created the opportunity for longer and more frequent journeys. A Devizes Turnpike Trust was established in the early 18th century and the works undertaken encouraged increased passenger and goods transport. Devizes had its first turnpike road in 1706 and by 1753 a complete route had been opened up from London to Bath by way of Marlborough and Devizes, although the main route was the Great West Road that ran from Marlborough to Chippenham.

Longs Stores in New Park Street, the former Anstie's Mill, built in 1785 is one of the earliest factory buildings in the south-west of England. This prominent industrial building used as a silk mill, and later for snuff and tobacco, is a now converted to residential use.

The Market Hall of 1835 is one of a number of buildings that demonstrate the prosperity of Devizes in the 19th century.

19th Century

The position of Devizes led naturally to its establishment as an administrative and service centre with new buildings constructed to serve this role. Public buildings erected included the Town Hall of 1808, the former Assize Courts in Northgate Street and the Market Hall, both of 1835. The Market Cross, a distinguished monument in the Market Place, is 1814.

The completion of the canal in 1810 was another major influence on Devizes, not only because of its effect on the layout and economic activity of the town but also by providing the ability to move building materials such as Bath stone and Welsh slate thereby influencing the architecture of the period. The stone bridges over the canal together with the buildings at the wharf are integral parts of this legacy.

The Corn Exchange, 1857, is notable for its imposing front and contribution to the townscape of the Market Place. The fashion for buildings of style can also be seen at Lloyds Bank in the Market Place. The building dated 1892 and designed with early Georgian and 17th century motifs represents a high point in the quality of building. Handel House in Sidmouth Street and the Northgate Brewery of 1885 are other landmark 19th century buildings.

Nonconformist churches and chapels date mostly from this period although the former Congregational Church in Northgate Street was enlarged from a building of 1776. The Baptist Chapel in Sheep Street is 1851-2 and the Maryport Old Baptist Chapel 1780 but enlarged 1818. The Salem Chapel in New Park Street is 1838. The Methodist Chapel in Long Street was opened in 1899.

Devizes in 1900 showing the remarkable survival of the compact town plan. The Conservation Area covers the whole of the historic town centre including most of the buildings shown on this map.

These late 18th and early 19th century brick and stone houses at Southbroom Terrace enjoy an open aspect over The Green.

In the mid-19th century the arrival of the railway brought about increased industrial and commercial activity and led to a steady expansion in the population of the town. This was reflected in new housing in Bridewell Street, Sheep Street and Southbroom and in rebuilding and infilling within the town centre. Burgage plots were sub-divided, the medieval Brittox widened, and many timber-framed buildings replaced. Much of the rebuilding was a direct consequence of the establishment of another Improvement Commission this time in 1825.

20th century

As with many towns across the country there was relatively little development and change in the early part of the 20th century. The effects of the First World War and the general economic circumstances of the time reduced the amount of activity and investment and many areas and buildings fell gradually into decline.

Buildings in Sheep Street on either side and across the road from the New Baptist Chapel of 1851-2 are mid to late 20th century and relate to the architecture of the period.

By the end of the Second World War a view was taken that action was required to improve the town and particularly to provide better living conditions for its inhabitants. In the 1960s a number of buildings in the town were demolished and replaced.

The largest scheme was demolition and redevelopment in Sheep Street where houses were replaced by three and four storey flats. Frontage cottages and rear courtyard groups were swept away to accommodate the new housing and places such as Jeffries Court, Royal Oak Court and Alexandra Court are names long forgotten.

Close by there was later redevelopment in Hare and Hounds Street, including Sutton Place and Tylees Court. Other 20th century building can be seen in Maryport Street (Tesco), the County Library, Job Centre and former Post Office and the row of shops and flats at the Maryport Street junction with New Park Street.

The growing use of private cars in the post-war period was one of the factors leading to the closure of the railway in 1966. The station buildings were subsequently demolished providing space for the Station Road car park, located just outside the Conservation Area.

A number of shops in the town are post-war buildings designed with varying degrees of success. Some of the 20th century buildings in The Brittox fit more comfortably into the pattern of the town than such buildings elsewhere as here in Maryport Street.

Prominent mid/late 20th century developments occur along New Park Street where the former filling station east of Wadworths Brewery and other facilities to serve the motorist, such as the tyre depots and car sales areas, are in marked contrast to the architecture of their surroundings. Similar large-scale redevelopments are the warehouses for the brewing industry, one adjoining Wadworths Brewery and another in Northgate Street.

After many years of neglect the canal and wharf were brought back into use largely due to the initial efforts of the Kennet and Avon Canal Trust and the canal was formally reopened in 1990. Similarly from 1975 there was significant financial input from the local authorities to encourage the conservation of historic buildings in the town centre. Around this time a number of derelict buildings were rescued including the important medieval structures in St. John's Alley. Further details on the contribution made to the character of Devizes by the Devizes Historic Buildings Joint Committee are included as Appendix 2.

Accommodating large vehicles remains a problem. In Estcourt Street there are a number of places where the frontage has been interrupted to provide new access.

Later in the 20th century infill residential developments were undertaken such as the construction of dwellings in the grounds of The Ark behind the Museum in Long Street and at Castle Court south of St. John's Street.

It is impossible to ignore the effects of the motor vehicle on the town centre as major changes were made to accommodate both moving and parked cars. The most obvious alteration was the removal of buildings and construction of a new section of road at the south end of New Park Street to divert through traffic through Gains Lane and away from Monday Market Street and Sidmouth Street.

Demolition was also undertaken in other parts of the town to provide car parking for shoppers and visitors and more recently traffic management schemes have been introduced including work in the Market Place.

Many of the 20th century changes in Devizes occurred outside the town centre with major expansion of both residential and commercial areas.

Archaeological significance

A number of individual buildings and courtyards in the town have been demolished for redevelopment or cleared away to make space for car parking and have provided the opportunity for archaeological investigations.

The evidence for prehistoric settlement in the area of the modern town of Devizes is slender at best and a few Neolithic flints have turned up south of the town. In the Roman period there was a villa at the base of Roundway Down and Roman pottery and coins have been found across the area south and east of the medieval town. Other evidence of Romano-British activity has been found at Southbroom and at Pan's lane. Although there were several Saxon settlements around Devizes only two Saxon finds are recorded from Devizes itself, both from outside the study area.

The Castle would initially have been a wooden construction but this burnt down in 1113 and was rebuilt in stone between then and 1121. Nothing remains of the first Castle although the early ditch found in excavations at the Corn Exchange in 1994 was probably part of the defences. The outer bailey defences have been examined in several places and are better known. The ditch was roughly 8 metres wide and 4-5 metres deep and has been observed in three separate locations, Estcourt Hill, the rear of 33 Market Place, at Vales Lane and most recently at Snuff Street to the rear of 27/28 Market Place.

Archaeological evidence for the following centuries up to 1750 is fragmentary. The levelling of the Castle rampart probably took place after the Civil War or even after 1723, at which time Stukeley's drawing of the town shows a substantial rampart standing in the area of Castle Lane. Other excavations within the town provide evidence of post-medieval work.

Industrial archaeology in Devizes is focused on the Kennet and Avon Canal and the former railway. The most significant industrial buildings to survive in the town are the former Anstie's Mill (Longs Stores) and Wadworths Brewery. Numerous archaeological features have been recorded from the 18th and 19th centuries.

Sites for new buildings within the centre will provide an opportunity for additional knowledge of the town's history to be obtained and archaeological investigations are likely to be required before construction is undertaken.

Architectural and historic character

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The townscape quality of Devizes is exceptionally high with long street frontages of historic buildings and well-defined urban spaces. The character of the town is not uniform and variations can be identified based on the relationships between buildings, roads and spaces and on the dates of development and consistency or variation in the architecture. The divisions between the boundaries merge and are not hard lines.

The areas identified in this study are:

1. The Market Place
2. Northgate Street and New Park Street
3. St John's Street, High Street and Wine Street
4. Long Street
5. The Brittox, Monday Market Street and Maryport Street
6. Bridewell, Sheep Street and Hare & Hounds Street
7. Southbroom Road and the Green
8. Estcourt Street, St James Church and The Crammer
9. Southgate Street
10. The Canal and Wharf
11. The Castle

The key elements identified in each of the sectors defined above are intended to highlight the main items of interest. The layout of streets and spaces throughout the Conservation Area is of considerable historic significance because of the way the plan of the town is based on the layout of the original Castle. In addition some 500 listed buildings make a major contribution to the quality and character of Devizes, as do many of non-listed traditionally built structures.

For obvious reasons the photographs used to illustrate this report were taken on bright days but it should be remembered that the character of an area changes from day to night and across the seasons.

The Market Place

The Market Place is the focus of the town and is an especially attractive space almost completely surrounded by historic buildings, a number of which are also of considerable architectural interest. The buildings are mostly three storeys in height giving a pleasing uniformity to this part of the town, although dates of construction and building materials vary creating interest within the overall picture. Rooflines, chimneys and monuments produce a varied skyline.

Key elements are:

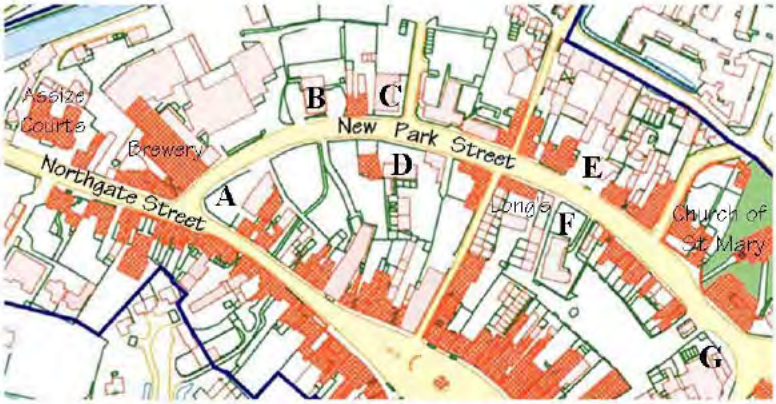
- The size and shape of the Market Place, its historic use as a town market and the relationship between the space and the buildings around it.
- The importance of the Market Place as an integral part of the economic and commercial life of Devizes.
- The alignment of roads into and out of the Market Place which brings certain buildings into prominence, in particular Wadworths Brewery looking north-west and the former Cheese Hall (now Cheltenham and Gloucester) to the south.
- A remarkable collection of historic buildings of varying dates.
- Features in the Market Place - the Market Cross and the Fountain
- Trees as a counterpoint to the fine and varied architectural facades.

There are a number of key buildings in the Market Place, in particular the Corn Exchange, the Bear Hotel and The Shambles. Other buildings recognised as of special architectural interest are the grade I listed 17 Market Place and Parnella House.

For much of the daytime the open character of the Market Place is obscured by parked and moving vehicles including service vehicles and buses. The two important historic features here are the Fountain, erected in 1879 in memory of T. Sotheron Estcourt, the town's MP in the mid 19th century, and The Monument that carries the legend of Ruth Pearce. The trees around the Fountain and the street lights rise above the building outlines and become part of the skyline. The Market Place, including the cinema, is the main centre of evening activity in the town.

Northgate Street and New Park Street

There is considerable traffic movement through Devizes on the east-west axis, most of which travels through these streets and has an influence on their character. The domestic buildings along the north side of Northgate Street are relatively small in scale which gives greater emphasis to the former Assize Courts and Wadworths Brewery. Buildings on the south side of Northgate Street have a higher status, especially Northgate House and Sandcliffe.



Within New Park Street are a number of sites that detract from the quality of the Conservation Area, these being:

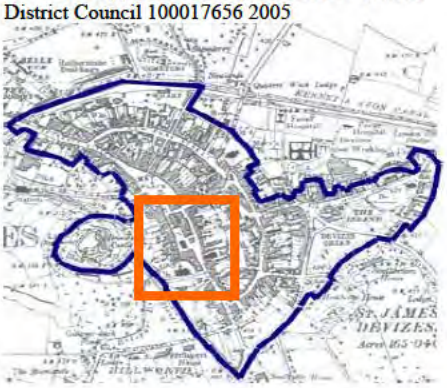
A The car park gap site
B the former filling station east of the Brewery
C the tyre depot at Wharf Street
D the former auction rooms
E the vehicle sales opposite Longs Stores
F the Health Clinic and associated parking area
G the *Iceland* block at the junction with Maryport Street

Key elements are:

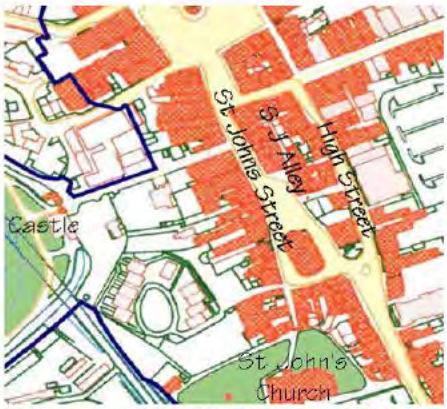
- The historic alignment of New Park Street in relation to the outer bailey of the Castle
- Individual buildings of architectural and historic interest, in particular the former Assize Courts, Northgate House, Wadworths Brewery, Longs Stores, Brownstone House, St. Mary's Church (behind the frontage) and the Castle Hotel
- Northgate Street being the main route into the town from the west

New Park Street is now used as a through route for passing traffic. The architecture here is varied with a number of historic buildings of quality. Interspersed between the frontage buildings are mid to late 20th century developments, many of which are set back from the road and thereby create a visual break in the street scene. The curve of the street presents a constantly changing picture.

St John's Street, High Street and Wine Street



The important historic focus in this area is St. John's Alley where medieval structures can still be seen, although the Alley is secluded and often missed by the casual visitor. St. John's Street, running north from Long Street to the Market Place, provides an attractive route into the town centre with historic buildings on both sides. To the west is the access to the Castle although the Castle itself is hidden from this view. Looking south the key buildings are the former New Hall, the Town Hall of 1806-08 (prominent where the road swings past the building and into Long Street), and St John's Church, which is seen in the vista along St John's Court.



Key elements are:

- The medieval origins of the area as seen in St John's Alley and St John's Court
- The close-knit character as defined by narrow streets and some relatively tall buildings
- The glimpses of Devizes Castle from St John's Street
- Devizes Town Hall and its setting
- Views to the Church of St John the Baptist along St John's Court
- The tranquil atmosphere of the churchyard and the quality of surrounding buildings

There are interesting building relationships in High Street. Looking from the south there is a remarkable difference in scale between the Elm Tree, the Four Seasons and Greystone House. Efforts were made in 1971 to integrate the supermarket into the street scene by breaking up the front elevation and this is rather more successful than some of the 1960s development in the town. Also in the High Street is the attractive 1991 development of Old Swan Yard which is successful because of the scale and arrangement of buildings, including the incorporation of a number of historic structures. The traditional stone paving adds to the quality of the scheme.

At the junction of Wine Street with St. John's Street is the decorative *Boots Corner* building which presents an attractive view to both streets.

Long Street

Long Street is the important historic route running south from the Market Place to Salisbury. On both sides of the street are almost continuous rows of listed buildings, a number dating from medieval times. The character of the street is however determined by work undertaken in the Georgian period. Evidence shows that many buildings from the 17th century (or earlier) have been refronted, and in some cases enlarged, and this is most evident south of Bridewell Street where there is an especially fine group of Georgian brick elevations.

Key elements of Long Street are:

- The alignment of the street and the relationship between the height of buildings, the width of the street and the simple line of the pavement
- A range of buildings of obvious architectural and historic interest including the grade II* listed buildings of Lansdowne House, the Museum and Number 27
- The variation in architectural treatment of buildings either side of the junction with Bridewell Street, those to the north being predominantly 17th and 18th century with rendered fronts and to the south 18th and 19th century and predominantly brick
- St. John's Church and the churchyard which make an important contribution to the character of the Conservation Area but have only a limited impact on the character of Long Street
- A pleasing lack of street clutter

The buildings of Long Street are mainly brick or render with painted timber sash and casement windows. The Georgian fronts usually have parapets thus obscuring roof coverings. Roofs are more prominent on the rendered buildings and are clay tile or Welsh slate. The quality of 18th century joinery is generally high with panelled doors and fanlights. The rendered buildings show an attractive use of colour with an obvious recognition of the effect on the street scene. Colour is often dismissed as simply a matter of taste but in Long Street care has clearly been taken to ensure variety and compatibility.

The Brittox, Monday Market Street, Maryport Street and Sidmouth Street

The layout of The Brittox is directly related to the former Castle and the Victoria County History notes that the road through the outer bailey crossed two bridges "between which in 1380 was a barbican." The name of the street derives from this historic association. The alignments of Monday Market Street and Maryport Street are similarly of considerable historic significance. Sidmouth Street was until comparatively recently the main route to the town centre from the east.

Buildings that detract from the quality of the Conservation Area are:

A The 1960's development in Maryport Street opposite The White Bear

B The Tesco Store

C The former Job Centre and Post Office on the corner of Sheep Street

D Indicates the Devizes link road constructed in the 1980s

Key elements are:

- The historic alignments of the streets, as indicated above
- Buildings of considerable historic interest, in particular Great Porch House which dates from the 15th century
- Continuous frontages of listed buildings especially in Maryport Street and on the southern side of The Brittox

The Brittox was pedestrianised in the late 1970s, the kerb lines taken up and the area paved. The character of the street is therefore derived from its width and the height of buildings on either side together with the buildings at each end that provide a visual stop looking north or south. Buildings along the street vary in date and style ranging from early 18th to mid 20th century.

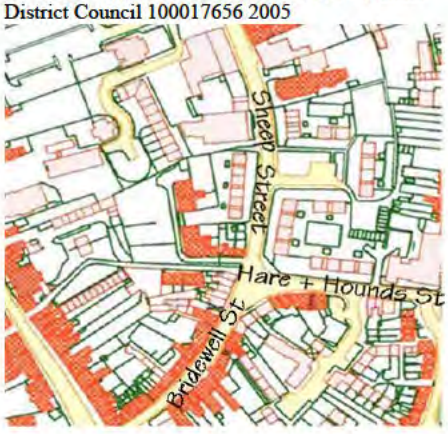
Monday Market Street is notable for Number 8, Great Porch House, one of the earliest surviving buildings of Devizes, although the street itself is now of relatively little architectural interest. Sidmouth Street and Maryport Street, with almost continuous lines of small shops, have retained much of their historic character. Handel House and the stone buildings of Albion Place are distinguished.

The incongruous part of this area is the 1980's road that was cut through to link New Park Street with Sidmouth Street. The objective was to remove through traffic from Monday Market Street and Sidmouth Street but unfortunately the link was conceived as a road rather than a town street. The open view of the car park and rear of the supermarket are not visually attractive additions to the town.

Bridewell Street, Sheep Street and Hare & Hounds Street

Buildings in Bridewell Street are predominantly 18th and 19th century two storey brick with the curved alignment of the street creating an interesting townscape view, the T-junction with Long Street being a good example of this.

Sheep Street and Hare & Hounds Street is an area that has seen considerable change. Much of Sheep Street is 1960s redevelopment where three/four storey flats replaced earlier housing. Redevelopment also took place in the vicinity of Hare & Hounds Street in the 1970s. The scale and form of Sheep Street does not relate to historic Devizes; the buildings have been set back from the street frontages and are geometrically arranged. In contrast the later development at Hare & Hounds Street in part was kept to the original building line and the character of the south side of the street thereby maintained with new housing at Sutton Place and Tylees Court built behind. The historic scale of two and three storey houses can be seen in Bridewell Street.



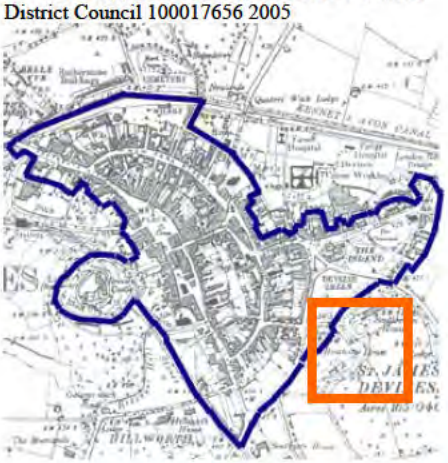
Key elements are:

- The historic and architectural character of Bridewell Street and in particular the range of building on the north side from the junction with Long Street
- The townscape importance of the Baptist Church in Sheep Street
- The intimate and dignified Regency character of Lansdowne Walk, Lansdowne Terrace and Lansdowne Grove
- Small scale development behind frontages such as Albert Terrace

An interesting feature in Bridewell Street is the 19th century Gothic style arched doorway to The Grange. Morris Lane, which provides a pedestrian link between Sheep Street and Long Street, contains the attractive early 19th century Lansdowne Terrace and, to the north, the secluded Regency villas of Lansdowne Grove.

In Sheep Street the County Library of 1968 and the Post Office and Job centre of 1966 are buildings typical of the period. These were built before the Conservation Area was designated and are indicative that unsympathetic modern buildings are detrimental to townscape character.

Southbroom Road and The Green



The south-eastern approach to Devizes town centre from Upavon arrives at The Green which is a feature of the town that dates back to medieval times. Today it provides a visual and physical attraction maintaining the historical link with town fairs and at the same time offering an attractive prospect for those buildings that surround it. The Green is an important space much cherished by the town's inhabitants and used for a range of activities from quiet contemplation to events and shows.

With the exception of the buildings on the corner of Hare & Hounds Street most of the houses along Southbroom Road are 18th and 19th century. The buildings form an almost continuous line of development with only slight variations in height and style. To the south they are two storey increasing to three towards the junction with Estcourt Street

Key elements are:

- The size and configuration of The Green and the many mature trees
- Extensive and long views across The Green including views to the hills beyond
- The historic origins of The Island - Nos. 6-10 are refaced timber frame buildings dating from the 17th century
- 18th and 19th century brick and stone terrace houses along the west side of Southbroom Road
- Heathcote House on the east side (listed grade II*)
- School activity on the edge of the Conservation Area

The character of The Green varies according to the seasons. In winter the surrounding buildings define the space, whereas in the summer trees become much more dominant. Trees in this area are predominantly lime with a small percentage of London plane, maple and silver birch. Maintenance of The Green is the responsibility of the Town Council.

Small scale features often define local identity and provide a different view of history and the town's inhabitants. Near the Fire Station is the horse trough dedicated to Richard Hickley Gundry *who was kind to every living thing - OB 1896.*

Estcourt Street, St. James Church and The Crammer

As previously indicated, the Church of St James was originally in the Parish of Bishops Cannings and became part of Devizes as a result of boundary changes. Estcourt Street is the road route eastwards out of the town and is therefore a busy traffic route. This area includes the eastern part of The Green.

Buildings to the western end of Estcourt Street are on the edge of the town centre although the construction of the Safeway (now Morrisons) supermarket has tended to alter the centre of gravity of the trading area. Buildings on the north side of Estcourt Street have the attraction of facing onto The Green and The Crammer (in evidence before 1654) and have the benefit of a southerly aspect.

Many of the buildings are painted render and unlike much of the rest of Devizes the majority are unlisted. This should not be taken to indicate that they are of little or no interest. It is more that these are relatively later buildings and therefore ineligible for listing under present criteria.

Key elements are:

- The historic and townscape importance of the Church of St James
- The eastern portion of The Green and the mature trees, especially those shown in the above photograph
- The Crammer - site of the famous "Moonrakers" story
- Views - along streets and across The Green
- The relative calm of Church Walk with some attractive unlisted buildings

In recent times a number of gaps have appeared along Estcourt Street. As can be seen from the 1900 map the Kwik-Fit development replaced earlier buildings where there would have been a greater sense of enclosure. Similarly the service bay and main access to the supermarket have created sizeable breaks in the street frontage. Further east along the street the open character is of a different kind with the combination of the water of The Crammer and the eastern end of The Green provide an attractive setting for the Church and other buildings. The route of the A361 brings considerable traffic to this part of the town.

Southgate Street

As the name implies Southgate (like Northgate) goes back to the origins of the Castle and surrounding layout. The Potterne Road south to Salisbury is an important route and Southgate also defines the extent of historic Devizes. Much of what is built beyond is 20th century. The earlier route south was further west via Hartmoor and then on to Potterne.

The small terrace of cottages at Southgate is brick built with clay roofs as is the pub beyond. Tree cover on the east side of the road encloses the view and approaching from the south the open space and tree cover to the Bowling Club is a significant green feature.

Key elements are:

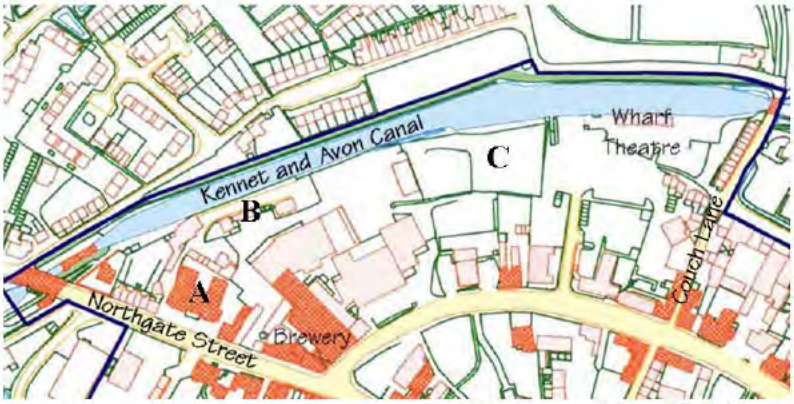
- The climb from the south along Potterne Road (just outside the Conservation Area) emphasising the elevated location of the town
- Historic importance as the site of the "South Gate"
- Mature trees and tree groups in the grounds of Southgate House and around the Bowling greens
- The open space of the Bowls Club giving a more rural feel to the locality

Approaching Southgate from the south the road crosses the line of the former railway with brick parapets of the bridge on either side. Arriving at the junction of Potterne Road with Southbroom Road there is an enticing view north as the buildings of Long Street come into view and descend towards the town. In the reverse view from Long Street leaving the town centre the trees provide an important backdrop.

Looking east along Southbroom Road trees and hedges provide enclosure. Further east is the brick and slate Scout Hut of 1919, the semi-detached houses to the south-east side being outside the Conservation Area. Beyond is The Green emphasising the edge of town centre character of this part of Devizes. The mature trees on The Green are prominent in this view.

The Canal and Wharf

The canal and wharf are now the focus of recreational activity both on the water and alongside. Former wharf buildings are in use as the Information Centre for the Kennet and Avon Canal Trust and the Wharf Theatre. A substantial part of the land is used for car parking. There are new houses to the south where a pedestrian link is provided into the town centre.



Building at risk:
A Former Assize Courts

Opportunity areas:
B Lower wharf
C Gas works site

Key elements are:

- The canal including the bridges and the lock
- The vegetation providing a green "lung" through the built-up area
- The tranquil atmosphere created by the canal and its setting together with the slow and quiet movement of boats
- The Wharf Theatre and Canal Trust building

From the towpath the views are contained and the curvature of the canal is apparent. The stone bridges enclose the space. Trees on the canal bank and within the cemetery (outside the Conservation Area) are prominent. On the north side is a World War 2 brick and concrete pill box, a remnant of a defensive line constructed in 1940/41. On the south side of the canal to the rear of the former Assize Courts the area has an air of neglect.

The Castle

The impact of Devizes Castle is best viewed from the south where there is a footpath from Hillworth Road. Here it is possible to appreciate the importance of the original Castle as a defensive structure. The present Castle derives from a Victorian conversion to a dwelling (now flats) with the building and grounds in private use.

Key elements are:

- The present castle building and associated structures
- The topography and in particular the spur on which the castle stands
- The surviving ramparts that now form the setting to the castle
- Groups of trees planted in and around the castle grounds
- The line of the former railway that ran under the castle and now forms the western boundary to the Conservation Area

By the early 18th century the castle had all but disappeared. Stukeley's drawing of the town in 1723 shows that whilst the motte and ramparts appear to survive, the only buildings to be seen were a pair of windmills, which remained in place until 1840 when they were demolished to make way for the present house. It is believed that the tower of the house stands on the foundations of one of the windmills which itself was built on the base of a medieval tower. West of the Conservation Area and on the lower land below was a medieval Deer Park.

In addition to the castle building and the former ramparts, the site contains a gatehouse of around 1860, various walls which encircle the castle mound, and remains of the original castle including part of the foundations of the original keep.

Viewed from Station Road the castle buildings are completely hidden by the trees and even from Castle Lane there are only glimpses of the building. There is a gateway part way along Castle Walk preventing public access. At this point is the 1960s telephone exchange which is an ugly, flat roofed, concrete frame building that runs through to Castle Lane.

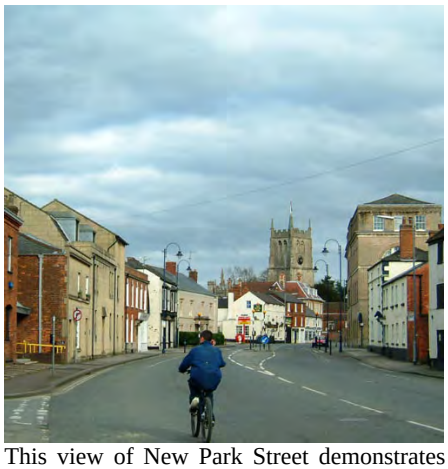
Traditional streetscapes

Streets and spaces in historic towns almost always have an obvious function which makes them look attractive and feel comfortable to walk in.

Historic town centres are places of streets and lanes as opposed to the lower density roads found away from the centres and in 20th century suburban developments. Reference has previously been made to the historic importance of the development of the town centre streets of Devizes and it is significant that changes in direction and alignment bring certain buildings and groups of buildings into prominence. This is evident throughout the town and particularly in the Market Place, New Park Street and St John's Street.

The historic character of the streets is most distinctive where the frontage buildings rise directly from the back of the footpath and form a continuous and often sinuous line. These characteristic back-of-footpath facades frequently frame a view as can be seen at the northern end of Long Street and the junction of Bridewell Street with Long Street, although there are many others. The views of the former Cheese Hall and the present Town Hall looking south from the Market Place are especially distinctive and present real quality to the town.

In Devizes more than in other towns the historic street lines are an essential part of the character of the town and the relationship between the buildings and the pavements is particularly important.



This view of New Park Street demonstrates the importance of the road alignment - buildings on the outside of the curve are part of a continually changing scene.

The relationship between the height of buildings and width of the street determines the character of the spaces between. Narrow streets with relatively tall buildings such as The Brittox and Wine Street have a distinct sense of enclosure, especially where the end views are contained by buildings. Wider streets or spaces with lower buildings create the opportunity for longer views and have a more open character.

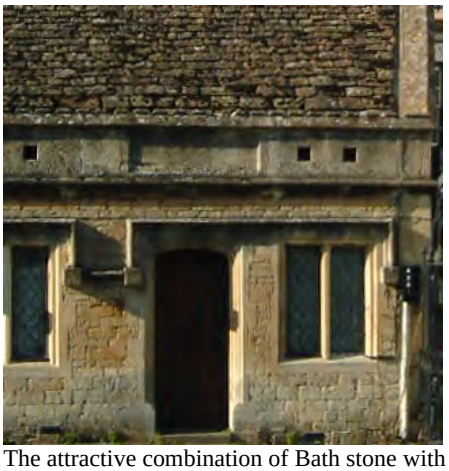
Paving materials are an integral part of the town's character with kerbs, slabs, and steps of special note. Natural stone kerbs are extensively used in the town centre streets and are usually Pennant stone. In some places this is matched by natural stone paving, with occasional use of limestone setts such as remain at St John's Court and the entrance to the Churches of St Mary and St John. Paving around the Market Cross and the Fountain is especially noteworthy.

Within the street scenes there are individual elements that enhance the town and add interest. Examples of this are the porches of the Georgian frontages of Long Street and other doorways of note such as the corner entrance to the HSBC Bank. Alongside pavements architectural features such as the stone entrance to the Museum and the gates and railings to Numbers 16 and 17 Market Place are important in the townscape.

Devizes contains many unlisted buildings of architectural and historic interest - they need to be treated with care with original features (especially doors and windows) retained.

The character of the Market Place has been altered by the recently completed traffic management scheme including the welcome renewal of paving. The removal of kerbside parking to the north-east kerbs is a definite improvement and the care taken in the overall design of the scheme is evident, particularly when compared to what was there before. There is some additional visual intrusion with more signs and street furniture and care now needs to be taken to avoid adding to this.

The need for clear signage is an obvious aspect of street design but signs, however well-designed, can cause great harm to the character of an historic street if they are badly sited or of an inappropriate scale.



The attractive combination of Bath stone with a stone tile roof - here in 19th century Tudor style.

Street lighting also makes a major contribution to character because of the visual impact of lighting columns and fittings and the way in which these create the night-time atmosphere. In all cases the siting of street and security lighting and its relationship to building facades is important.

The amount of carved stonework evident on buildings and walls, especially in the Market Place, is a demonstration of the care taken by those who commissioned and crafted the town's buildings and these elements add greatly to the interest and quality of their surroundings.

Building materials and details

Buildings in Devizes reveal the use of a wide range of materials from timber frame in the 15th century to brick and stone in the 18th and 19th centuries and the introduction of modern materials in the 20th century.

High quality brickwork, often with stone dressings, is a particular feature of many Georgian and later buildings in Devizes. The window surrounds here in Long Street are cast imitation stone.

The selection of materials used in building construction comes directly from those easily obtainable at the time. This explains the use of timber framing for 15th, 16th and 17th century building and the later use of brick, stone and slate. In the 19th century bricks were manufactured just outside the town at Caen Hill, and the use of local materials provided a consistency in colour and texture. The opening of the Kennet and Avon Canal in 1810 created an easy route for the importation of Bath stone and Welsh slate.

Much of the timber framing used in the town is now hidden but interesting examples can still be seen at Great Porch House and St. John's Alley. In addition, work recently undertaken at 35 Market Place (*the little house of coffee*) has uncovered a medieval roof structure. Traditional infill to timber framing is wattle and daub, an example of which is evident to the rear of Great Porch House. Infill panels in St. John's Alley are replacements inserted when the buildings were comprehensively repaired in 1988.

The colour and texture of the bricks and the pattern used in construction influence the visual quality of the building. The mortar and jointing techniques used are also significant. This brickwork in Sheep Street is in Flemish bond with overburnt blue headers to provide contrast.

Brickwork forms a significant element throughout the Devizes Conservation Area and there are many good brick or brick faced buildings especially from the 18th and 19th centuries. 17 The Market Place and Brownstone House, New Park Street, are excellent examples of high quality brickwork. There are also examples in the town of "penny joint" brickwork which is a technique of minimising the visual effect of the mortar. The quality of historic brickwork derives from the colour, texture and size of the brick and the bond used, together with the colour and texture of the mortar. The standard of workmanship is an important consideration and it is obvious that standards in Devizes were high.

Stone buildings in Devizes are generally of high status, thus we see, in addition to the churches, stone used in the 18th century at New Hall in Wine Street, Parnella House in the Market Place and the Town Hall. 19th century examples are the former Assize Courts in Northgate Street and the Corn Exchange and The Shambles in the Market Place. Especially distinctive is the considerable use of carved stonework which adds appreciably to the townscape qualities of the buildings. It is significant that when the Museum was opened in Long Street in the late 19th century the decision was made to build a new entrance in stone.

The thick glazing bars of the early 18th century. This building on the corner of St John's Court is timber frame with a rendered exterior and is dated 1740 on the rain water head but there is an earlier structure beneath.

The refinement of the late 18th century with slim glazing bars to the sash windows and contemporary wrought iron railings. Ionic columns support the elaborately detailed pediment to the front portico. The finish is painted stucco.

This attractive use of colour in Long Street emphasises the form of the buildings and the plot boundaries, details that are lost once the buildings are all the same colour.

The medieval origins of buildings in Long Street are now largely hidden and the buildings which are not faced in brick are generally rendered and painted. For the most part the buildings now seem to be cement rendered with modern paints. Decorative plasterwork is nowadays a relatively unusual external finish but there is an interesting example at Boots Corner (now Abbey Bank) dated 1912.

Early roof coverings in the town would have been thatch and stone tile and although there are no longer any thatch roofs a number of stone tile roofs survive. Roof coverings on 18th century buildings are mostly clay tile, both plain and profiled. Later buildings are clay tile or Welsh slate and there are only a small number of buildings in the Conservation Area with concrete tiles.

There are few examples of early windows in the Conservation Area as these are frequently replaced with the passage of time. One of the earliest examples is at St. John's Churchyard where the contrast between the stone mullion window of the 16th century and the 18th century replacement sash window can be clearly seen.

Windows of the 18th century were generally double-hung small-pane sashes, the earlier examples having thick glazing bars and the windows being set further forward, whereas later refinement was to set the windows back and use slender glazing bars. The tradition for sash windows continued into the 19th century and the number of glazing bars reduced as glass sizes increased. Interesting comparisons of this can be seen in the town including New Park Street where No. 76 adjoins the former Long's Stores. The survival of historic windows depends on regular maintenance and where this is not undertaken or where fashion suggests a move to larger glazing original windows have been lost.

Windows will often reveal the date of a building and on occasion the social status and aspirations of the original occupants. Casement windows, often seen as inferior to sashes, are more evident on small cottages and 19th century buildings. Casements have also been used in early buildings as replacements.

Very few early doors survive and for the most part the doors on residential buildings are four or six panel or occasionally eight, the design and complexity of the door reflecting the importance of the building. In many cases front doors are set within a decorative doorcase, as at Greystone House High Street and Heathcote House just off The Green, or within a porch such as at Lansdowne House and No. 27 Long Street. Doors are generally painted and original handles, knockers and other door furniture add interest.

High status buildings were often constructed with matching boundary walls, gates and fences, good examples of which are 17 Market Place and Brownstone House. Railings were once in evidence at the Town Hall where only sections now remain. Other notable gates and railings can be found at the entrances to the churchyards.

Rendered buildings provide an opportunity for the use of colour and there are a number of interesting examples in Devizes. In recent years the lower part of Long Street has been enlivened by some imaginative colour schemes and it is pleasing that the schemes are complementary suggesting care taken by the owners to respect the street scene.

Shopfronts and Signs

Traditional shopfronts and painted fascias add considerably to the quality of the town centre. Colour schemes are important.

Commercial activity in Devizes has long been an important part of its function and many town centre historic buildings have, over the years, been altered to accommodate trade and industry. In the later part of the 20th century the introduction of new building materials and the growth of corporate identity brought a standardised approach to retailing which has adversely affected the appearance of towns and cities, including Devizes.

Period shopfronts within historic buildings are nowadays seen as adding to their character, whereas modern shopfronts are often viewed as obtrusive. The reason for this is the tendency to disregard elevational design and stretch shopfronts, and particularly fascias, over the whole frontage of a building leaving the upper floors visually unsupported.

It is perfectly reasonable that national companies seek to use a house style that clearly identifies them wherever they seek to trade but some of these styles are incongruous in historic settings. The retention of the character of the town centre requires recognition of its individuality and this will demand adjustments to the standard approach. Local distinctiveness is a positive asset in attracting shoppers and visitors and should be seen as such.

The restrained lettering on The Lamb PH is particularly distinctive and an attractive way of advertising.

Devizes contains a number of historic shopfronts. Of particular note are those at 25 The Brittox, 1 Maryport Street, 37/38 St. John's Street and Handel House in Sidmouth Street. An exceptional example is 20 The Brittox where the early 20th century shopfront has a glass frame. This list is not exhaustive and other good examples can be found. In recent years there has been a tendency to replace mid or late 20th century shopfronts with period styles, some of which are not convincing.

There are some glaring examples of incongruous shopfronts visually unrelated to the buildings on which they are placed, similarly, there are out of scale and excessively large modern fascias. Both can dominate a street scene degrading its character and the pursuit of size becomes counterproductive as each trader seeks to compete with his neighbour.

The introduction of new shops away from the main frontages adds interest to the town and good examples of this can be seen at The Ginnell and Old Swan Yard. To be commercially successful there needs to be signs to direct customers and the occasional display board is acceptable. Excessive use of display boards outside properties can however become a problem, particularly where that causes obstructions, as is evident in The Brittox.

Fortunately there are not too many examples similar to the above where large fascia boards disfigure the building and obscure first floor windows but where they do occur they are very damaging to the character of the town.

Hanging signs are a traditional method of drawing attention to a particular trade and a number of good examples can be found in the centre of Devizes. The most attractive of these are the signs which demonstrate a degree of care and craftsmanship such as painted pub signs or others in painted timber on traditional brackets. Illuminated box signs are a late 20th century invention, the detailing tends to be crude and they generally look out of keeping. Their use is restricted and the signs that are in place pre-date current regulations.

The retention and enhancement of the character of the commercial part of Devizes requires particular attention to the size, scale and detailed design of shopfronts, fascias and hanging signs.

Landscape setting and the contribution made by green spaces and trees

St John's churchyard provides an attractive setting for surrounding buildings and space for tree planting. This is also one of the long distance public views to the castle

There are two areas in the town where the open space is created or enhanced by water - the canal and The Crammer. The trees at St James's Church are both an integral part of the street scene and form a backdrop to The Crammer.

In a number of cases trees frame the view and the south end of Long Street is a good example of this.

Locations within the Conservation Area where the contribution made by trees and green spaces is especially conspicuous are:

- the line of the Canal, including The Wharf
- the churchyards (St John and St Mary)
- The Green, which visually includes The Crammer and the churchyard of St. James's
- Lansdowne Grove and locality
- the bowling club in Long Street
- the Castle grounds

In addition there are a number of street trees and trees in private gardens within the Conservation Area.

The Kennet and Avon Canal forms an attractive green route through the northern part of the town and, although only a small part of the canal is within the Conservation Area, it nevertheless has a significant bearing on the character of the town. Many trees have been planted along the banks and these, together with trees in the cemetery grounds, are especially notable seen from the Wharf.

Trees within the churchyards of St. John and St. Mary are important features. St. John's Churchyard, which lies west of Long Street, also provides an attractive setting to the church and the surrounding buildings and here yew, lime and holm oak dominate. The churchyard of St. Mary has a more secluded character than that of St. John. The church is set behind street frontage buildings and the churchyard only fully appreciated by those who walk through. Tree species vary but yew and beech are of particular note. Publicly accessible green space in the historic core of the town is limited and both churchyards are notable exceptions.

Approaching the centre of Devizes from the east and south-east, The Green provides a large open area both as a setting for surrounding buildings and as a space for recreational activity. The mature trees surrounding The Green are important in defining the character of the area. These are mostly middle age and mature lime, some of which have had to have extensive surgery in recent years. The Crammer between Estcourt Street and Church walk is visually part of this impressive open space.

The construction of the Castle on a spur on the edge of the Upper Greensand provides a clearly defined boundary to the southern side of the town. This edge has considerable tree cover running down the hillside, particularly north-west of the Castle. Whether the Castle grounds were historically wooded is a debatable point but the area has been the subject of a large scale Victorian planting scheme of mixed coniferous and broadleaf species and these trees are now a major and dominant feature of Devizes. This is especially so seen from Hillworth Road, Castle Lane and Station Road.

Between Long Street and Sheep Street the gardens of Lansdowne Grove and the surrounding area contain many large mature trees which form important skyline features visible from many parts of the town. A large redwood, holm oak and copper beech are of particular importance.

Street trees at the corner of Sheep street and Sidmouth Street. The position of street trees and species used need to be selected with care and once planted carefully looked after.

Trees have been a feature of the Market Place since 1875, the existing trees being recent replacements. At Albion Court in Sidmouth Street are hornbeams that add considerable quality to the space and enhance the setting of Handel House. The pollarded limes at Northgate Street and pollarded sycamores at Estcourt Street are in decline. At the eastern end of Estcourt Street two limes and a sycamore form an important termination to the vista.

Problems and eyesores

It is important to recognise that the town centre is by day a centre for commerce and employment and by night and weekends a location for leisure and enjoyment. In Conservation Area terms problems are seen generally as those sites or buildings where uses have disappeared or where **replacement buildings or alterations or extensions to buildings** are **out of keeping** with their surroundings. Lack of care or attention to public streets and spaces will also be seen as problems.

Repairing the former Assize Courts and bringing the building back into use is a priority. For far too long this has been a blight on the town.

As with almost every other town, **moving and parked vehicles** are intrusive. The dilemma of commercial activity and car parking is always contentious and there is a balance to be struck between the demands of transport and the protection and enhancement of the character of the Conservation Area. In visual terms car parks present certain problems, either because they have been created from previously developed areas and reveal the rear areas of properties fronting the main streets, or because they open up a gap in otherwise developed frontages.

The main east-west route through the town includes New Park Street and here the townscape has been damaged by 20th century development often related to the use of the motor car. The former petrol filling station on the north side together with tyre depots, break up the street frontage but do not provide attractive spaces. This problem is also evident on the south side where there are additional **breaks in the street frontages at** the clinic and the former auction building.

The contrast between styles of architecture could not be more apparent. The *Iceland* building looks worse from New Park Street. One day there needs to be an opportunity for rebuilding (or remodelling).

The early and mid **20th century** was not kind to Devizes bringing with it **architecture of little merit.** The fashionable style of building was rectangular in both plan and elevation with flat roofs frequently used. Redevelopment carried out at the time did not therefore follow original street lines or building footprints but imposed the 1960s style. Thus we now see the development on the corner of Monday Market Street and New Park Street as incongruous and unattractive, especially when seen from the service areas to the rear. The former Post Office at the junction of Monday Market Street and Maryport Street and the Tesco store to the side are similar. Efforts were made in the High Street to break down the scale of what is now the Somerfield supermarket but the design considerations disregard the rear service areas onto the car park which appear as an afterthought and are unattractive.

With few exceptions the architecture in Devizes town centre is of exceptionally high quality and needs to be recognised as such. This means that **modern fascias and lettering** will look incongruous, especially where these are large in relation to the building and run close to or above first floor window cills.

Display boards are prominent in various places, especially The Brittox. If used to excess they can be visually unattractive as well as hazardous to pedestrians.

Replacement doors and windows can spoil and devalue traditional buildings. If repair is not possible then accurate copies of the original should be used.

Signs and especially fascias should be designed to relate to the building on which they are located. Traditional painted signs are part of the character of the town - excessively large fascias if removed will often reveal an attractive period detail underneath, as is hinted in this picture.

Direction and warning signs on main roads need to be kept to a minimum and other alterations for traffic reasons need to respect the historic streets. Signs that are redundant or non-essential for safety reasons such as these above should be removed.

The standard of building maintenance within Conservation Areas is in some cases high and in others less so. The Devizes Town Scheme, that ran from 1975 to 2003, (see appendix 2), was an initiative to encourage the careful repair and retention of historic buildings and to improve maintenance standards. Over the years the Scheme made a major impact on the improvement of the **condition of buildings** in the town centre but a few problems remain or new problems have appeared. The most prominent of these is the sad condition of the former Assize Courts where a viable new use is desperately needed. 42 Market Place is another prominent building where action is required. Plans have been agreed for the reuse and repair of the former Beales shop in St John's Street but work has not yet started and the boarded-up building has a depressing effect on its surroundings.

One of the problems arising from the provision of car parks and the construction of the Devizes Link Road between New Park Street and Gains Lane is the **space left over at the edges of sites**. Efforts have been made to enhance with, for example, the planting of an occasional tree but urban design considerations and integration with existing street scenes remain unresolved. Public spaces work well where there is a clearly defined purpose or function. The space left over from a development will nearly always look like an afterthought if not properly designed.

Alterations to listed buildings are subject to control which means that doors and windows are for the most part in keeping. **Replacement doors and windows** are evident in unlisted buildings within the Conservation Area and many of these are poorly related to the original designs for the buildings.

Observations concerning fascia boards and signs on commercial properties have already been mentioned. Equally important in the overall picture are the effects of **public signs and street furniture**. In recent years there has been a tendency to introduce more and more signs, usually to give direction or impose control. The results of this are to clutter the streets and although new signs are added old signs hardly ever seem to be taken away.

Service cables on street elevations can be unsightly. In some locations overhead cables are also conspicuous.

Preservation and enhancement

Preservation and enhancement can be achieved by control or by positive action and both are equally important. Protection of the character of the Conservation Area depends on all who undertake work in the town either as owners, occupiers, the Town and District Councils and other service providers. Owners and occupiers of land and buildings have the ability to enhance the area through their direct activities, some of which may require planning permission or listed building or conservation area consent.

The District Council is responsible for planning control, and preservation of the character of the Conservation Area is a statutory duty. Work carried out within the highway, undertaken by those providing electricity and telephone supplies, can affect the quality of the environment.

Preservation of existing character

The access to St Mary's Church dictated the position of the new buildings on the right with the result that the church is attractively framed in this view from Monday Market Street.

It is the aim of the District and Town Councils that the character and appearance of the Devizes Conservation Area should be preserved and there are various ways in which this can be achieved. The following list is not exhaustive but is intended as a guide to the type of work that would contribute to maintaining the quality of the town.

Action by the District Council:

- Applications for planning permission and conservation area consent to be assessed with reference to this character appraisal.
- Advice to be made available to owners of historic buildings, listed and unlisted, to encourage good standards of maintenance and repair and the retention of original materials and details.
- Establish formal liaison with the County Highway Authority, and involving the Community Plan Transport sub-group, concerning the need for careful design of any works within the Conservation Area and a reduction in the number and sizes of highway signs.
- Proposals for selective tree planting to be encouraged, especially in locations where mature trees will in due course need replacement.
- Recognition needs to be given of the importance of surviving historic detail. Historic street lines are an essential part of the character of the town and the relationship between the buildings and pavements is particularly important. Paving materials are an integral part of the town's character with natural stone kerbs, slabs and setts of special note. The Council will seek to ensure that such elements are retained.

Refronting of buildings in the 18th century did not always relate to the structural form as the fashion was for a designed elevation. These top floor windows at Long Street are blind hiding the roofs behind.

Action by owners:

- All potential changes to buildings and surroundings need to be seen in context. Those seeking planning permission or listed building consent should ensure that their schemes take into account their setting and are shown together with their immediate surroundings. Where new construction is involved take particular care in the choice of materials and quality of work.
- Repair rather than replace original features: where undertaking alterations to doors and windows on traditional buildings copy original styles and details.
- When considering maintenance or re-decoration do not necessarily follow what has been done before but look to see if the appearance of the property can be improved.

There are a number of locations where trees frame the view but there are others where trees are the view. Mature trees will need to be replaced in due course and replanting programmes need to anticipate this.

Devizes Town Council has responsibility for a number of historic buildings. Repairing the Corn Exchange and giving it a new lease of life is just one of its many conservation projects undertaken in recent years.

Enhancement

Where areas or features in the Devizes Conservation Area are out of keeping with the character of the town it will be desirable to seek improvements or undertake replacements. The way to achieve enhancement is to recognise and respect the intrinsic character of Devizes, design accordingly and undertake all work using appropriate materials and details. There is considerable potential to enhance the area in particular the following:

The canalside area behind the Assize Courts is an enhancement opportunity.

- Major redevelopment opportunities for mixed and civic uses exist at The Wharf (former Gas Works site) and the North Gate, for which a Development Brief has been approved. In addition, there are a number of smaller sites where redevelopment would be beneficial. For the most part these are the areas that were developed in the 1960s when concern for architecture and the quality of building was at an all time low. Examples of such development are the "Iceland" block on the corner of Maryport Street and New Park Street and the Health Centre and tyre and car sales depots also in New Park Street.

- Traffic in Devizes is a key issue and the impact of both moving and parked vehicles has a detrimental effect on town streets. Traffic calming has been implemented in the Sidmouth Street/Maryport Street area but is not visually successful. There is an excessive use of bollards and the block paved ramps and raised areas are showing signs of premature failure. Signs and other items of street furniture related to traffic movement are frequently too large, too many and obtrusive. An audit of signs with the intention of removing all those that are non-essential would be of considerable benefit.

Swan Yard is an award winning example of sensitive remodelling and infill development completed in 1991. The timber framing is based on an earlier framed building in this position but is not a copy.

- The condition of many of the buildings in the centre of Devizes has been improved in recent years, in some cases very significantly. Much of this results from the Devizes Town Scheme initiative which was set up in 1975. The cumulative effect of a small number of projects year by year is of benefit to town centre character but further work is needed and continuing maintenance will be required. Repair and reuse of the former Assize Courts needs to be a priority. Reuse and enhancement of 41 Market Place is also required.

- Commercial activity in Devizes is a vital part of its character. Efforts to promote individual business activity appear in the form of fascias and other signs, together with display boards. A balance needs to be achieved between the desire to maintain and enhance visual character and the promotion of economic activity. It is not necessary for fascia boards to dominate buildings and streets and there is a danger that signs simply get larger and the advertising more obtrusive. Similarly, display boards on the footway can have a useful function provided that they are used with discretion and do not present a danger to the public, especially the disabled.

Parking signs are a present day necessity, using the post box does at least avoid yet another signpost.

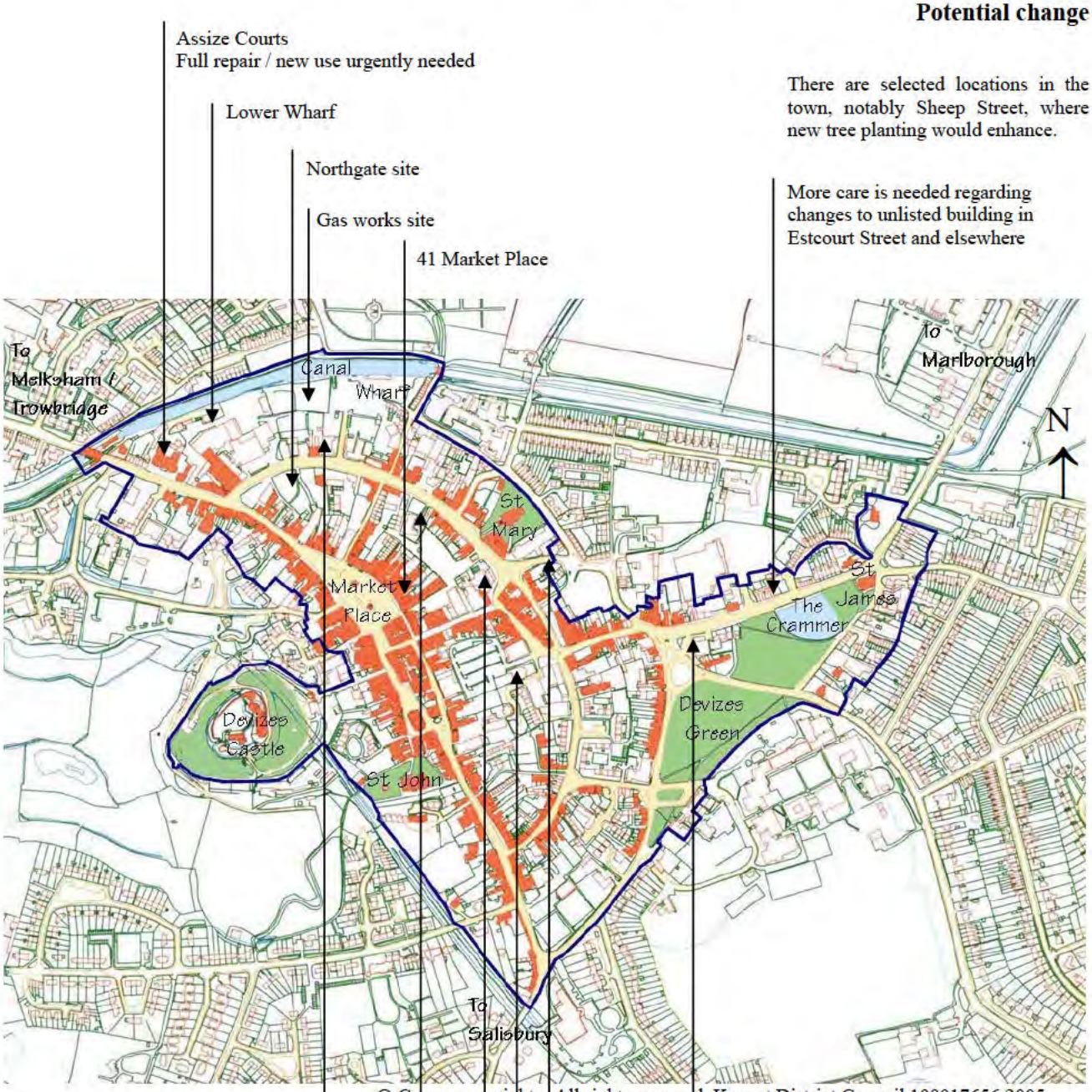
- Car parking within the Market Place is seen as an essential component of shopping activity and a major scheme to reorganise parking, vehicular and pedestrian movement has recently been implemented, including the provision of bus stops and shelters. For the most part the scheme has recognised the quality of the space although the prominence given to the identification of routes for vehicles has led to areas of paving being built arbitrarily into the carriageway. These together with an increasing number of traffic islands, bollards and line painting are visually obtrusive.

- Paving is important in defining the quality of a street and the improvements carried out in the Market Place are an example to be followed. The priority for future repaving schemes should be Northgate Street, St John's Street, Wine Street and The Brittox.

- Swan Yard and The Ginnell illustrate the kind of changes that enliven the town. Other opportunities, such as the court behind 4-5 Northgate Street, do exist and should be encouraged.

Areas of potential change or future enhancement opportunities

Potential change



Longer term opportunities

Redevelopment of Kwik-Fit site

Create a sense of enclosure on the south side of the link road

Redevelopment of 1960's buildings
Tesco / Job Centre /Post Office

Redevelopment / remodelling of the *Iceland* block

Redevelopment of the Health Centre site

Redevelopment of Hi-Q and Checkpoint in New Park Street

This plan shows only the larger sites - smaller areas of opportunity do exist but cannot be included on a map of this scale

Design considerations

It is highly unlikely that permission would be given today to alter an 18th or 19th century building in this way but equally damaging proposals are sometimes presented to the Council.

There is no doubt that Devizes will continue to see large and small scale changes within the town centre reflecting the economic and social circumstances prevailing at the time. Apart from the redevelopment sites already identified there are likely to be new ideas and opportunities, all of which will need to be assessed within the conservation context. Large sites or gap sites provide the opportunity for enhancement provided that a high quality of design and construction is achieved.

How to achieve the required quality will be a matter of debate but it should be an informed debate, not simply a requirement to "be in keeping". The way in which buildings are made to "look right" is in proportion and scale and in the design of doors, windows and other features. The layout and arrangement of floor plans is also significant. The construction of buildings in earlier centuries was dictated by the use of materials such as the length of timber beams but this is no longer a controlling factor.


Gap sights present a challenge. There needs to be respect for the adjoining buildings and an aim to add to the quality of architecture in the town.

Recent publications from English Heritage and the Commission for Architecture and the Built Environment, in particular *Building in Context*, emphasise the need for high quality design in conservation areas and provide useful guidelines.

To quote "In final analysis it is true that there is a subjective element in judgements about design quality and people often disagree about what they like. Such differences of opinion and matters of taste should not be allowed to obscure the fact that it is possible to arrive at opinions about design based on objective criteria." These include:

- The relationship of the building to its site
- The relationship of the building to its wider setting
- How is the density of the proposal related to that of existing and neighbouring uses?
- The impact of the building in close view
- What materials are used? How do they relate to those of surrounding buildings?
- Is the architecture of the building suitable for the uses it contains? Is it trying to be too grand or pretending to be more modest than it really is?
- How does the architecture present itself to the viewer?
- What contribution, if any, does the proposal make to the public realm? If new open space is created, is it clear that it will provide a positive benefit and have a genuine use?
- In the wider setting, has the impact of the building in views and distance been considered? Does it make a positive or negative impact? Does is detract the eye from the focus of the view and, if so, does it provide something better to look at?

The 1930's infill in the Market Place is usually dismissed as an eyesore but is this the right place for a pseudo period building? Design considerations need to be more than just debates about style.

Specific and complex sites will require particular consideration but where there is any redevelopment potential within the Conservation Area the opportunity should be taken to reintroduce missing street frontages. In such cases the relationship to adjoining buildings and factors such as height, scale and use of materials are major considerations.

The planning context

An interesting example of the scale of development over the centuries. To the right of the Market Cross (1814) the coffee shop gable end is 17th century and is in marked contrast to the 18th century building next door. Lloyds Bank is 1892.

The Planning (Listed Buildings and Conservation Areas) Act 1990 places a duty on local planning authorities to determine which parts of their area are "Areas of Special Architectural or Historic Interest, the character or appearance of which it is desirable to preserve or enhance" and to designate them as Conservation Areas.

The Act, and Government advice given in Planning Policy Guidance Note 15, Planning and the Historic Environment, states that the local planning authority should formulate and publish proposals for the preservation and enhancement of all Conservation Areas and this assessment, published as the Devizes Conservation Area Statement, is part of the process.

This Conservation Area Statement was adopted by the Council as Supplementary Planning Guidance on 8 September 2005. SPG provides additional information on the interpretation and implementation of policies and proposals contained in a Local Plan.

Consultation procedures, consistent with the advice contained at paragraph 4.7 of PPG15 – *Planning and the Historic Environment*, have been undertaken during the preparation of this Statement. Paragraph 3.16 of PPG12 – *Development Plans*, also states that adequate consultation is a requirement for adoption of SPG. The Council considers that the consultation undertaken meets the obligations for consultations set out in PPG12.

The Kennet Local Plan 2001-2011 has been adopted by the Council and became operative on 30th April 2004. This Statement provides detailed background information for the interpretation of the Local Plan, particularly Policies HH5 and HH6.

In addition, the guidance will be relevant to the application of Policies PD1, HC2, HC3, HC5, HC10, HC21, ED8, ED17, ED18, ED19, ED20, ED21, ED22, AT4, AT20 and AT21.

Details are important in the streets and spaces of the town. The quality of these areas and their visual attractiveness depends on the form and alignment of the streets, the position, heights and scale of the buildings and the materials and details used in construction. At first glimpse the details may not be apparent especially above the ground floor. Looking up can often be rewarding.

The Conservation Area of Devizes is complex and, although priority has been given to highlighting the main features, omission of items from the text or from the illustrations should not be regarded as an indication that they are unimportant in conservation or planning terms.

Summary and Conclusions

This group of buildings at the north end of Long Street includes examples from the 17th, 18th, 19th and 20th centuries. Any alterations will change the character: the challenge is to ensure that any such works are an enhancement.

There will be occasions where preservation is a priority. Craftsmanship at the level seen at Lansdowne Grove is not likely to be achieved in future building.

Adaptation and reuse of historic buildings is an ongoing process of which The Wharf Theatre is just one example. Providing buildings with a new use in an attractive setting is good conservation practice.

Summary

Devizes is a town with a remarkable architectural and historic legacy but with a few blemishes. The pattern of streets and spaces has survived almost intact for over 800 years and this, together with the 500 or so listed buildings, provides a town centre of individuality and distinction. The range of historic buildings from the 15th century includes many buildings of high architectural quality. Variations in the use of materials and details create interesting and attractive streets and there are many occasions where the quality of craftsmanship sets a standard that regrettably is no longer achieved.

The character of the town depends on more than just buildings and spaces and uses are an important component. The importance of commercial activity in the town centre needs to be recognised and its attraction maintained.

Up until the middle of the 20th century development was concentrated in the town but in recent years, in common with other settlements, the built up area of Devizes has expanded considerably. Within the Conservation Area there are a number of 20th century buildings that are now seen as incongruous and which make little or no contribution to the character of the town. There are also a number of gap sites that present the opportunity for new development.

Conclusions

Creative conservation is all about managing change and the purpose of Conservation Area designation is to draw attention to the quality and character of an area in order to influence future decisions. The Statement is not intended as an exercise in preservation - it is intended to prevent the loss of important parts of our built heritage.

Devizes is a thriving market town and a place of employment and enjoyment. Businesses come and go and this is a natural occurrence in town centres. An important consideration is that new uses should be compatible with the buildings in which they are located and, where alterations are needed, that these respect the character of the building and its wider setting.

There are vacant sites and opportunities for new development within the Conservation Area and these have the potential to add to the interest of Devizes. In this context new schemes should be designed to reflect the form and grain of the town taking into account historic boundaries and overall density.

The important message of this Conservation Area Statement is the need for all those intending to carry out work in the town which affects its buildings, their settings, open spaces and street scenes, to examine the implications of change and see all perspective alterations within the larger picture. If change and development in the town are to be based on historic forms then it is important to have a clear understanding of period style and detail. Alternatively, it may be more appropriate to seek a 21st century solution that recognises and respects historic precedent but does not try to imitate it.

Retention and enhancement of the special character of the town is for the benefit of existing and future residents, businesses and visitors. The information in this character assessment is intended to assist this process and provide guidance for the future.

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July 2005

This leaflet is one in a series of Conservation Area Statements and Guidance Notes produced by Kennet District Council. For an up to date list, or if you require further information or advice, please contact:

The Conservation Section, Community Services Group
Kennet District Council, Browfort, Bath Road, Devizes SN10 2AT
☏ 01380 724911 www.kennet.gov.uk

Appendix 1 - The Time Line

DATE		BUILDINGS - SURVIVING EXAMPLES	NOTABLE EVENTS
			Evidence of Roman settlement in the Southbroom and Wick areas
11th and 12 centuries	Norman	Church of St John Chancel of Church of St Mary	1080 Construction of the first (wooden) Castle 1106 Robert Duke of Normandy (son of William the Conqueror) imprisoned in Devizes Castle for 20 years 1113 Castle burns down and is rebuilt in stone 1141 Borough Charter granted by Empress Maud
13th to 15th century	Medieval	Great Porch House Monday Market Street 4 St John's Court The Bridewell (remains now known as The Grange)	1228 First recorded Market 1306 First Mayor of Devizes The Brittox then called La Bretasche (derivation from brattice or stockade)
16th century	Tudor Elizabethan 1558-1603	Buildings believed to date from the 16th century include: The Bear Hotel (north section) 9 Long Street 2 & 3 St John's Alley and No. 12 (Patch Cottage) 1-3 St. John's Court The Three Crowns PH	
17th century	Jacobean 1603-1625 Stuart 1625-1702	39 New Park Street Sexton's Cottage St. John's Churchyard St. John's Alley 33 & 34 St. John's Street The Elm Tree 6-10 The Island The Lamb Inn	1643 Battle of Roundway 1645 Cromwell besieges the castle
18th century	Georgian 1702-1830	The Bear Hotel (south section) 1720 Brownston House rebuilt 1731 Greystone House 1737 The Black Swan and 8 Long Street 1740 Parnella House 1752 the New Hall (former Cheese Hall now C&G offices) 1776 Congregational Chapel Northgate Street (later extended) 1780 Old Baptist Chapel Maryport (enlarged 1818) 1785 Long's Stores New Park Street Other prominent 18th century buildings include: 1-4 Estcourt Street Heathcote House (Southbroom Road) 35 St. John's Street 39 St. John's Street (Crown Centre) 41 St. John's Street (Nat West Bank) Lansdowne House (Long Street) 40/41 Long Street (The Museum)	1706-7 The first turnpike 1753 The story of Ruth Pearce 1759 Map of Devizes published by Edward Dore 1775 First bank opened in Devizes 1781 First body of Improvement Commissioners - Act of 1780

DATE		BUILDINGS - SURVIVING EXAMPLES	NOTABLE EVENTS
19th century	Victorian (includes Gothic Revival and Classical Revival)	1808 The Town Hall (rebuilt on the site of the Wool Hall) 1814 The Market Cross (Gothic Revival) 1817 Devizes Prison 1827 Opening of the Gas Works next to the canal Wharf 1835 Assize Courts (Classical Revival) 1835 Market Hall Market Place (Classical Revival) 1838 Salem Chapel New Park Street 1852 New Baptist Chapel Sheep Street (Gothic Revival) 1857 The Corn Exchange (Classical Revival) 1866 40 Market Place 1872 Cottage Hospital at New Park Road Museum entrance Long Street 1879 Estcourt Fountain 1885 New Northgate Brewery 1892 Lloyds Bank 1899 Methodist Church Long Street Other notable 19th century buildings include: Albion Place Handel House 15 High Street 1-4 Lansdowne Grove 1-4 Lansdowne Terrace 5 Maryport Street (Halifax)	1801 population 3460 1810 Kennet and Avon Canal completed 1825 Establishment of new Improvement Commissioners with increased powers 1827 Gas works built (closed 1955) 1833 Literary and Scientific Institute formed 1835 Municipal Corporations Act - Borough reincorporated as 'Mayor and Burgesses of the Borough of Devizes' 1838 Castle used as private house 1854 Establishment of Brown & May Engineers 1857 Arrival of the railway from the west 1862 Extension of the railway to the east 1871 population 6840 1874 Wiltshire Archaeological and Natural History Society acquires premises in Long Street 1875 HA Wadworth enters the brewing industry 1884 W.E. Chivers & Sons Building Contractors
Early 20th century	Edwardian	1903 11 St. John's Street 1907 Literary and Scientific Institute Northgate Street (formerly a British School of 1822) HSBC (Market Place) The Electric Palace Cinema 1912 Boots Corner (now Abbey Bank)	1926 Southbroom House purchased by County Education Committee 1927 First County Library
Mid/late 20th century		1968 Public Library Sheep Street 1976 Police Station New Park Street 1976 Wharf building converted to Wharf Theatre 1977 Regeneration of the Hare & Hounds Street area 1980 Restoration of St. John's Alley 1991 Swan Yard based on the location of the original yard	1957 – 1973 demolition in Sheep Street and construction of blocks of flats 1966 closure of the railway 1967 WCC proposal to take down / move Great Porch House for construction of link road 1967 Trust for Devizes formed 1970 Conservation Area designated 1974 Creation of Kennet District Council 1975 Establishment of the Devizes Town Scheme 1976 The Brittox closed to vehicular traffic 1977 Conservation Area extended 1990 Queen Elizabeth II visits Devizes to officially mark the completion of the restoration of the canal

St John's Alley in 1975

Neglect of historic buildings was much in evidence in the 1970's. In addition there were many abandoned upper floors in buildings across the

St John's Alley today

The Devizes Town Scheme was established in 1975 and ran until 2003. Its purpose was to encourage the proper care and conservation of historic buildings by the allocation of grant aid. The scheme, introduced following an appraisal of historic buildings, identified poor standards of maintenance and in some cases dereliction which threatened the town's character and historic interest. 180 buildings were initially included, mainly in the Market Place, but over the next two decades the Scheme was extended to cover some 400 listed buildings in the town centre.

Financial support was provided by the Department for the Environment (later English Heritage) and the County, Town and District Councils and the scheme was a recognition of the contribution made by historic buildings to the economic life and vitality of the town.

A condition of buildings survey undertaken in 1975 revealed a large number of problems including particular difficulties with some of the 16th and 17th century buildings. There was major concern about a group of 16 buildings in High Street, St. John's Alley and St. John's Street that had been acquired for redevelopment and were threatened with demolition. The redevelopment then proposed failed because of an economic recession and all of the buildings were subsequently retained, repaired and brought back into use.

Over the years of the scheme some 100 buildings were repaired and many hundreds of thousands of pounds invested by both public and private sectors. One of the concerns at the time was a need to bring disused upper floors back into use and there are a number of examples where this has been successfully achieved.

Considerable progress has been made since 1975 in improving the standard of care of the town centre historic buildings, much of which can be attributed to the assistance provided under the Town Scheme. Credit must also be given to the many building owners who have themselves made a substantial investment. The conservation of Devizes is however an ongoing exercise and more work remains to be done. Protection of the town's historic buildings is fundamental to retaining Conservation Area character.

Studies undertaken as part of this Conservation Area Appraisal reveal that changes to unlisted buildings within the Conservation Area are often incongruous even though many of these buildings are of architectural and historic interest. They may not meet the current criteria for listing but their contribution to the character of the town should not be ignored, especially where they are in prominent locations. Similarly maintenance is sometimes seen to be incorrectly specified and poorly executed with a damaging effect on the buildings concerned.

The provision of specialist technical advice on the protection of historic buildings is an important function of the Council's activity. An analysis of the work undertaken in the last 20 years indicates that many of the problems of preserving historic buildings in the town result from badly executed alterations and inadequate standards of repair. These together with poor or non-existent maintenance remain a concern. Consideration needs to be given to how these concerns can be addressed.

From: Haines, Julian
To: "[redacted] highwaysengland.co.uk"
Subject: Hillworth Road / Devizes Castle Bridge, Devizes 85m 38c BHL
Date: 14 September 2016 09:23:00

[redacted]

We have this structure as a substandard bridge and need to start looking at possible mitigation / strengthening measures. The first thing we will do is undertake a further assessment and profile survey; if you know the bridge you'll realise the difficulties in getting a true profile, recent scanning technology should however solve that for us. I was wondering do you have an up to date PBI for the bridge that you would be willing to share, this would save us the expense of getting scaffold / underbridge unit in .

Cheers

Julian Haines
Structures and Highway Improvements
Wiltshire Council
Bythesea Road
Trowbridge
Wiltshire
BA14 8JD

Direct Dial 01225 713382
Mob [redacted]

E-mail: julian.haines@wiltshire.gov.uk
Website: www.wiltshire.gov.uk

From: Haines, Julian
To: [redacted]
Subject: RE: Hillworth Road / Devizes Castle Bridge, Devizes 85m 38c BHL
Date: 10 July 2017 07:36:00
Attachments: WHCC_BS-ATK-SBR-TO2134_S01-RP-S-0002 A1.pdf

[redacted]

I had our Consultant take a look at this bridge as there were always doubts in my mind about the original assessments. They have concluded that the bridge might / should be rated at 40T, could you have a look at their report and let me know what you think?

Cheers

Julian Haines
Structures and Highway Improvements
Wiltshire Council
Bythesea Road
Trowbridge
Wiltshire
BA14 8JD

Direct Dial 01225 713382
Mob [redacted]

E-mail: julian.haines@wiltshire.gov.uk
Website: www.wiltshire.gov.uk

From: [redacted] [mailto:[redacted]highwaysengland.co.uk]
Sent: 14 September 2016 10:16
To: Haines, Julian
Subject: RE: Hillworth Road / Devizes Castle Bridge, Devizes 85m 38c BHL

Morning Julian

In terms of exams reports – the most recent Detailed Exam report is from 2011 and the most recent Visual Exam report is from 2015. I've attached these. As you can see by the dates, we should be receiving the 2016 VE sometime in the next few weeks, so I can forward that when received.

I'm not sure what your timeframes for work are like, but the next DE will be July/Aug next year, which will obviously necessitate 'touching distance' access, so there may be scope for you to piggy-back onto this or for me to see if the examiners will pick up measurements for you – just a thought.

Cheers

[redacted]
Highways England, Historical Railways Estate (on behalf of Department for Transport)
[redacted]
Web: http://www.highwaysengland.co.uk

From: Haines, Julian [mailto:Julian.Haines@wiltshire.gov.uk]
Sent: 14 September 2016 09:24
To: [redacted]
Subject: Hillworth Road / Devizes Castle Bridge, Devizes 85m 38c BHL

[redacted]

We have this structure as a substandard bridge and need to start looking at possible mitigation / strengthening measures. The first thing we will do is undertake a further assessment and profile survey; if you know the bridge you'll realise the difficulties in getting a true profile, recent scanning technology should however solve that for us. I was wondering do you have an up to date PBI for the bridge that you would be willing to share, this would save us the expense of getting scaffold / underbridge unit in .

Cheers

Julian Haines
Structures and Highway Improvements
Wiltshire Council
Bythesea Road
Trowbridge
Wiltshire
BA14 8JD

Direct Dial 01225 713382
Mob [redacted]

E-mail: julian.haines@wiltshire.gov.uk
Website: www.wiltshire.gov.uk

ATKINS

Devizes Castle Assessment Report

Wiltshire Council County Bridge Assessments

July 2017

Notice

This document and its contents have been prepared and are intended solely for Wiltshire Council's information and use in relation to structural assessment of Devizes Castle Bridge.

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Document history

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Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
A1	Final	KN	SA	JGH	SA	07/07/17

Table of contents

Executive summary

Devizes Castle Bridge carries the unclassified single carriageway, Hillworth Road over the disused Devizes Branch railway line. Highways England own the structure, however Wiltshire Council requested an assessment to determine its provisional capacity.

An earlier assessment report dated May 2002 by Ringway Parkman concluded the structure to have a 3t restricted capacity. This report details the assessment of the structure in accordance with BA 16/97 and BD 21/01, using RING 3.2 and Archie M software. The client requested the assessments were to be carried out using information from the latest inspection reports and a topographic survey of the arch profile. Both assessments concluded a structural capacity for the bridge of 40t ALL, subject to a number of assumptions as detailed below:

- 564mm arch barrel thickness,
- condition factor = 1.0. 12mm uniform loss in barrel thickness to take account of spalling,
- Engineering Brick B in 1:3 Lime mortar (4.2N/mm^2),
- backing ignored,
- and assuming bonded rings.

Without the availability of record drawings or testing information from cores there is some uncertainty as to the adopted characteristic masonry strength. Sensitivity analysis has been undertaken for both methods to determine the level of capacity with a range of assumed masonry strengths. The sensitivity analysis concluded an upper bound capacity of 40t and a lower bound capacity of 12.5t. The structure achieved 40t capacity with all assumed brick strengths apart from 3.5N/mm^2 (wirecut bricks in 1:3 lime mortar) under 11.5t single axle loading, where the bridge was assessed to have a reduced capacity of 12.5t.

From the information available it is uncertain whether the arch rings are bonded. The structural capacity assuming de-bonded rings was concluded to be 3t restricted loading. It is recommended site testing is performed to determine with certainty whether the arch rings are bonded. If de-bonded areas are found, stitching from the intrados of the arch is the recommended remedial measure,

1. Introduction

This report has been prepared by Atkins Transportation. Atkins was commissioned by Wiltshire Council to undertake and assessment of Devizes Castle Bridge, which is located at grid reference SU 005 610 in Devizes, Wiltshire. The purpose of this assessment is to determine the provisional structural capacity using RING 3.2 software and verify using Archie M software. The assessments have been carried out using information from latest inspection reports and a topographic survey on the arch profile.

The structure is a single span brick masonry arch spanning approximately 16.2m, with brick spandrels and brick masonry parapet. It carries the unclassified single carriageway, Hillworth Road over the disused Devizes Branch railway line. The arch structure has a 16º skew with a carriageway width of 6.1m and narrow footways on either side. Following the topographical survey, the arch barrel is uniformly taken to be 0.564m.

An earlier assessment report dated May 2002 by Ringway Parkman concluded the structure to have a 3t restricted capacity. This assessment is deemed to be conservative as discussed in section 5.1.

1.1. Scope of Assessment

The client requested the assessments were to be carried out using information from latest inspection reports and a topographic survey of the arch profile A topographical survey was carried out in January 2017 by Brunel Surveys Ltd, to determine an accurate profile of the arch. No inspection for assessment was carried out.

As a single span masonry arch of 16.2m span, Devizes Castle Bridge is classed as Category 2. An Approval in Principal (AIP) for this assessment was issued by Atkins to Wiltshire Council in May 2017.

The RING 3.2 and Archie M assessments were performed in accordance with BA 16/97 (Amendment No 2) and BD 21/01. . Two independent assessment teams undertook the assessment of Devizes Castle bridge using RING and Archie M software.

There is some uncertainty as to the characteristic masonry strength and the assessments have been carried out using a conservative assumption of Engineering Brick B in 1:3 lime mortar following review of previous inspection photographs. Subsequent to the initial assessments, a sensitivity analysis was carried out to determine the structural capacity with four different assumed masonry strengths as outlined in section 3.2.

2. Previous Bridge Inspections

Devizes Castle is scheduled for a Principal Bridge Inspection in July 2017. As a result, Wiltshire Council requested the assessment by Atkins was to be carried out using information from the latest inspection reports and topographic survey of the arch profile rather than performing an inspection for assessment. Following the principal inspection in July 2017 the assessment can be retrospectively reviewed.

The available previous inspections are a 2011 ‘Detailed Inspection Report’ by Birse Rail Consultancy and a 2015 ‘Visual Inspection Report’ by Balfour Beatty. A topographical survey was carried out in December 2016 and is presented in Appendix C.

The Detailed Inspection in 2011 stated the overall condition of the bridge to be fair, and the main defects were noted to be:

- Longitudinal cracking to the arch barrel
- Vertical cracking to the south parapet
- Slight flattening of the arches
- Deep spalling to south arch ring face
- Brick voids to the wing walls
- General spalling, damp and calcite staining throughout

The Visual Inspection in 2015 stated the defects to be long-standing and the condition deemed not to have changed since the previous Principal Inspection.

3. RING 3.2 Assessment

3.1. Initial Assessment

The RING version 3.2 software models the arch in 2D, as a series of interacting blocks held in place by equilibrium of forces. The single, double and triple axle vehicle loads from BA 16/97 Table 3/6 are applied to the arch, with the effective arch width taken into account. The software calculates the critical failure mechanism for each applied load, considering hinge formation in the arch, masonry crushing and masonry sliding. The RING 3.2 calculations can be found in Appendix A.

The bridge was assessed for 40t Assessment Live Load (ALL) and the lower restricted loads, where applicable. The bridge adequacy factor for each applied load is defined by the Adequacy Factor output from RING (AF_{RING}) multiplied by the condition factor (F_{cM}). If this is more than 1.0, the structure passes the particular category of ALL. No failure mechanisms were restricted for the assessment.

As per the client request, the assessment shall be carried out using existing information from the previous 2011 and 2015 reports and topographic survey of the arch profile. The following are considered for the analysis.

- Uniform thickness of 564mm is assumed for the bridge arch barrel obtained from previous assessment calculations and photographs.
- The arch rings are assumed to be bonded.
- Engineering Bricks B in 1:3 Lime mortar is assumed.
- Backing is conservatively assumed to be absent.
- The bridge has a straight alignment and hence axle lift off condition shall not be considered.
- The skew span of the arch is considered for the RING analysis.
- The adopted condition factor is 1.0. The effect of spalling is considered by reducing the thickness of the arch barrel by 12mm. The deep spalling is prominent in face rings which are under the parapet. However, the spalling is only localised in other regions of the arch. Hence 1.0 is considered appropriate.

The RING 3.2 assessment gave a bridge capacity of 40t with a minimum adequacy factor of 1.06. Refer to the assessment calculations in Appendix A, for the critical axle load of each load category.

The condition factor is designed to be an objective assessment of the importance of the various cracks and deformation found on the arch barrel. In this assessment, a condition factor of 1.0 was adopted because from the available information the arch barrel was deemed to be in good condition with localised areas of spalling. The spalling has been accounted for by a uniform 12mm reduction in the arch barrel thickness. The adopted condition factor has a strong influence on the structural capacity of the bridge. For example, if the condition factor was reduced to 0.9 with no loss to the arch barrel thickness the bridge capacity drops to 33t restricted loading.

3.2. Sensitivity Analysis

The assessment of Devizes Castle Bridge was carried out based on the previous reports. There are no available record drawings of the bridge and testing of cores from the arch barrel was not carried out, hence there is some uncertainty in the adopted characteristic strength of the masonry. Consequently, following the initial RING 3.2 assessment, a sensitivity analysis was carried out to determine the capacity of the structure with four different assumed masonry strengths, listed below.

a. Brick masonry characteristic strength of 10.5 N/mm^2 assuming Engineering Brick A in 1:2:9 mortar.
b. Brick masonry characteristic strength of 8.75 N/mm^2 assuming Engineering Brick B in 1:2:9 mortar.
c. Brick masonry characteristic strength of 6.5 N/mm^2 assuming wirecut bricks in 1:2:9 mortar.
d. Brick masonry characteristic strength of 3.5 N/mm^2 assuming wirecut bricks in 1:3 lime mortar

It can be seen from the results presented in Appendix A, the adequacy factor falls as the brick masonry strength reduces. The lowest characteristic brick masonry strength for which 40t ALL capacity can be achieved is in fact 4.2N/mm^2. With a masonry brick strength of 3.5N/mm^2 the bridge structural capacity reduces to 33t restricted loading.

From the information available, it is uncertain whether the arch rings are bonded. A sensitivity analysis was carried out to compare the adequacy factor for the worst load case (11.5t Driving axle) as obtained from the assessment results for single ring of 564mm thickness with five de-bonded rings of 112.8mm thickness. As per the above assessments, the thickness of the outermost ring was reduced by 12mm to account for spalling. Assuming de-bonded rings significantly reduces the bridge structural capacity from 40t to 3t restricted loading, as presented in the results in Appendix A.

4. Archie M Assessment

4.1. Initial Assessment

Archie M carries out a thrust analysis and models the 2D line of compression of the arch. The software produces a graphical result, which either fails or passes the applied load. Unlike RING 3.2 software adequacy factors cannot be determined for loading categories. The structure either passes with an adequacy factor of greater than 1.0 or fails under the applied loading.

The Archie M assessment verified the outcome from the RING 3.2 assessment with an assessed capacity of 40t ALL.

4.2. Sensitivity Analysis

The sensitivity analysis indicated a capacity of lower than 40t only when the characteristic strength is dropped to 3.5N/mm2, see Appendix B. The capacity with 3.5N/mm^2 characteristic strength was 12.5t restricted loading, although this was due to a marginal fail for the 11.5t single axle.

5. Conclusion

5.1. Structural Adequacy from Initial Assessment

The RING 3.2 assessment concluded a 40t capacity for the structure. This capacity was verified by an Archie-M assessment carried out by an independent team.

The assessed capacity of 40t is significantly greater than the 3t capacity given in the previous assessment carried out by Ringway Parkman in 2002. The previous assessment is deemed to be very conservative with an adopted condition factor of 0.7. Reviewing photographs of a typical structure with a condition factor 0.7 given in Annex D of BA 16/97, Devizes Castle is certainly in better condition with no significant longitudinal cracks to Voussoirs and little patch repair. A condition factor of 1.0 was deemed appropriate for Devizes Castle with the localised spalling accounted for, through a uniform 12mm reduction in the arch barrel thickness. The influence of the adopted condition factor was inspected by running the assessment with a reduced 0.9 condition factor. The resulting capacity was 33t restricted loading.

A topographic survey has enabled a more accurate depiction of the arch profile compared to the assumed profile by Ringway Parkman.

There is scope to retrospectively review this assessment following the Principal Inspection due for July 2017.

5.2. Sensitivity Analysis

The adopted masonry brick strength has a strong influence on the structural capacity of the bridge. A sensitivity analysis was carried out to determine the capacity of the structure with four different assumed masonry strengths. A 4.2N/mm^2 characteristic masonry strength (engineering bricks with 1:3 lime mortar) is sufficient to achieve 40t capacity. However, a reduction to 3.5N/mm^2 (wirecut bricks with 1:3 lime mortar) results in a capacity of 12.5t restricted loading according to Archie M assessment (although the RING 3.2 assessment indicated a capacity of 33t restricted loading).

Further sensitivity analysis assuming de-bonded rings concluded a 3t restricted capacity, significantly lower than the 40t structural capacity in the bonded state.

5.3. Recommendations

From the information available the bricks are likely to be some form of engineering bricks. However, it is recommended testing of cores taken from the arch barrel is carried out to ascertain with certainty the characteristic strength of the masonry.

It is recommended site testing is carried out to determine whether the rings are in fact de-bonded. The testing will initially consist of hammer tapping the barrel, the resulting nature of the sound released can indicated whether the arch rings are bonded. If the state of the rings is still uncertain, coring is recommended in critical locations. The coring can also validate the assumption that the barrel thickness is uniform. The barrel thickness may well be greater than indicated by the face rings. If de-bonding has occurred, stitching from the intrados of the arch is the recommended remedial measure.

If testing of arch barrel cores is not possible it is recommended the carriageway width is reduced using a traffic island and give-way signs are installed along Hillworth Road. This will ensure only one vehicle is ever travelling over the bridge rather than the more onerous load case considered in this assessment where both lanes are loaded.

Appendices

Appendix A. RING 3.2 Calculations

Wiltshire Highways Consultancy Contract – County Bridge Assessments

Assessment of Devizes Castle Arch Bridge

24 May 2017

Introduction

This report was developed as part of the 40 tonne Assessment Live Loading (ALL) rating for the “Devizes Castle" Masonry Arch Bridge. Sensitivity analysis was carried out to compare the effect of characteristic masonry strength, bonded and de-bonded rings for masonry arch on capacity of the arch barrel using RING 3.2 software for HA loading in accordance with BD 21/01. If the bridge does not pass 40 tonne ALL assessment, then it is assessed for restricted vehicle capacity for the loads shown in Table 3/6 of BA16/97.

Limitation of Modified MEXE Method for Devizes Castle Arch Bridge

Modified MEXE method in reference to the section 3.0 of BA16/97 is generally considered to be suitable for assessing the capacity of masonry arch structure unless:

- The method should not be used where the arch is flat or appreciably deformed.
- The bridge is found to be inadequate and more rigorous analysis is deemed necessary to confirm the results;
- When the depth of fill at the crown is greater than the thickness of the arch barrel;

Based on the above parameters, it was deemed necessary to access the capacity of "Devizes Castle" Bridge using the Ring 3.2 since the thickness of the fill at crown was measured as 630mm and the thickness of arch barrel was only 564mm. No major deformations were being reported during the field inspection.

General Procedure for Ring 3.2 analysis

The assessment of arch barrel was carried based using the principles as outlined below:

Modelling and Analysis:

1. Check for suitability of Ring 3.0 software
    a) span < 20.0m
    b) span/rise < 6
    c) Fill depth at crown < span / 2
2. The number of notional lanes is determined based on clause 5.6 of BD 21/01.
3. The effective width of the arch barrel is calculated by the software itself. However, an upper-bound value is given which is least of:
    i) For vehicle occupied on single lane:
        a) Total width of the bridge / no of notional lanes
        b) Spacing between outer wheels of the axle of applied load + depth of fill at 1/3rd span + 1.5m
        c) Spacing between the longitudinal cracks (if cracks are continuous and widespread)
    ii) For two vehicles occupied on two lanes:
        a) Total width of the bridge.
        b) Spacing between outer wheels of the axle of applied load (1.8+1.0+1.8) + depth of fill at 1/3rd span + 1.5m
        c) Spacing between the longitudinal cracks (if cracks are continuous and widespread)
4. Joint Factor F_j, which covers the reduction for defects in Joint width(F_W), Joint depth (F_d) and Mortar loss (F_{mo}) and is modelled in Ring 3.2 as described below:
    a. Joint width and Mortar loss defects have been accounted by reducing the characteristic strength of the masonry as follows:
    The characteristic strength of normal brick masonry considering Engineering Brick B in 1:3 Lime mortar = 4.2 N/mm^2
    Therefore, reduced characteristic strength modelled in RING 3.2 = 4.2 x1.0 x 0.9 = 3.78 N/mm^2
    b. Joint depth defects have been accounted as follows:
        - F_d = 1.0 Mortar seems to be in good condition. However, 1/10 of brick thickness (12 mm) is reduced to accommodate the spalling of the bricks. Hence the depth of the barrel is taken as 552mm.
5. The dead load and weight of fill are applied by the software itself. The density is based on Table 4.1 of BD 21/01.

6. The bridge is assessed for the following single, double and triple axle live loads of
    a) 40 tonne ALL - as per Table 3/6 of BA 16/97
        - Single axle of 11.5 t – 1x11.5 t
        - Double axle of 10.0 t – 2x10.0 t
        - Triple axle of 8.0 t – 3x8.0 t
        - Driving axle of 11.5 t – 1x11.5 t + 1x7.5 t
    b) If the bridge does not pass 40 tonne ALL assessment, then it is assessed for restricted vehicle capacity for the loads shown in Table 3/6 of BA16/97.
7. The assessment is carried out based on following load factors
    a) As per Clause 6.25 of BD 21/01, two analyses shall be carried out
        1. Unfactored dead load where the partial factor for masonry weight, fill and surfacing shall be taken as 1.0
        2. All dead loads shall be factored to ULS as per Table 3.1 and Cl. 3.10 of BD 21/01
           Partial factor for masonry = 1.15 x 1.10 = 1.265
           Partial factor for fill = 1.20 x 1.10 = 1.320
           Partial factor for surfacing material = 1.75 x 1.10 = 1.925
    b) For 40 tonne ALL loading, Y_{fL} is taken as 3.4 for one critical axle and 1.9 for other axle as per clause 6.2 of BD 21/01.
    c) To account for the inaccurate assessment of the effects of loading, Y_{f3} is taken as 1.1 as per clause 3.10 of BD 21/01.

Adequacy:

If adequacy factor AF_{Ring}* F_{CM} is more than 1.0, the structure passes the assessment to the category of Assessment Live Load

40 tonnes ALL as per BD 21/01

Result Summary for 40 tonne Assessment Live Loading:

Adequacy factors from Ring 3.2

Vehicle Type	Single Lane	Double Lane	Single Lane	Double Lane
40t ALL- Table 3/6 of BA 16 / Annex A of BD 21/01 with Unfactored dead loads				
11.5 t Single axle	1.610	1.350	Pass	Pass
2 x 10 t Double axle	1.380	1.160	Pass	Pass
3 x 8 t Triple axle	1.380	1.160	Pass	Pass
11.5 t Driving axle	1.260	1.060	Pass	Pass
40t ALL- Table 3/6 of BA 16 / Annex A of BD 21/01 with factored dead loads				
11.5 t Single axle	1.720	1.450	Pass	Pass
2 x 10 t Double axle	1.460	1.230	Pass	Pass
3 x 8 t Triple axle	1.460	1.240	Pass	Pass
11.5 t Driving axle	1.340	1.130	Pass	Pass

Sensitivity Analysis

The assessment of the Devizes Castle Bridge was carried out based on the previous 2011 Detailed Inspection report and 2015 Visual Inspection report as per the client's request. Testing was not carried out and hence there is uncertainty in the strength of the masonry and the original configuration of the arch barrel. Hence, further to discussion with the Client, two sensitivity analysis was carried out. One was to compare the effect of characteristic masonry strength and the other was to compare the effect of bonded and de-bonded rings for masonry arch, on the capacity of the arch barrel.

Sensitivity analysis 1 - The effect of characteristic masonry strength on the capacity of the bridge.

A sensitivity analysis was carried out to compare the effect of characteristic masonry strength on the capacity of the arch barrel. It was carried out for the worst load case (11.5 t Driving axle with unfactored dead load) as obtained from the assessment results for:

a) Brick masonry characteristic strength of 10.5 N/mm² assuming Engineering Brick A in 1:2:9 mortar.

b) Brick masonry characteristic strength of 8.75 N/mm² assuming Engineering Brick B in 1:2:9 mortar.

c) Brick masonry characteristic strength of 6.5 N/mm² assuming wirecut bricks in 1:2:9 mortar.

d) Brick masonry characteristic strength of 3.5 N/mm² assuming wirecut bricks in 1:3 lime mortar

Result Summary for sensitivity analysis 1:

Adequacy factors from Ring 3.2

Brick masonry characteristic strength (N/mm²)	Single Lane	Double Lane	Single Lane	Double Lane
11.5t Driving double axle with Unfactored dead loads				
10.5	1.880	1.600	Pass	Pass
8.75	1.790	1.510	Pass	Pass
6.5	1.600	1.350	Pass	Pass
3.5	1.100	0.931	Pass	Fail

Sensitivity analysis 2 – The effect of bonded and de-bonded rings for masonry arch.

A sensitivity analysis was carried out to compare the adequacy factor for the worst load case (11.5 t Driving axle with unfactored dead load) as obtained from the assessment results for single ring of 564mm thickness with five rings of thickness 112.8mm each. The thickness of the outermost ring was reduced by 12mm to account for spalling.

Result Summary for sensitivity analysis 2:

Adequacy factors from Ring 3.2

Vehicle Type / Arch Barrel Ring Type	Single Lane	Double Lane	Single Lane	Double Lane
Brick masonry Strength of 4.2 N/mm2 with Unfactored dead loads				
Bonded rings with double axle 11.5t driving	1.260	1.060	Pass	Pass
De-bonded rings with 5.5t Single Axle (7.5t loading)	0.628	0.528	Fail	Fail
De-bonded rings with 2t Single Axle (3 t loading)	1.730	1.450	Pass	Pass

Recommendations:

Inspections were not carried out for the assessment. The assumptions for assessment are based on the previous 2011 Detailed Inspection report and 2015 Visual Inspection report. Hence, the validity of the assessment depends on the veracity of the assumptions which needs to be confirmed on site.

It is also recommended to carry out intrusive investigations to obtain the actual configuration of the arch barrel, the thickness of the arch barrel and the actual depth of fill. As the adequacy of the structure also depends on the masonry strength, it is recommended to carry out material testing.

Calculations

ATKINS	Project	Wiltshire-County Bridge Assessments		Job ref 5152584	
	Part of Structure	Devizes Castle Arch Bridge Ring Assessment		Calc sheet no. rev 1 of 5 P1.01	
	Drawing Ref	Calc By TB	Date 28-Apr-17	Check by RM	Date 02-May-17

Ref	Calculations	Output
	Description of Structure: The structure consists of a single span brick masonry arch with brick spandrels and brick masonry parapet. The structure carries an unclassified single carriageway, Hillworth Road over the disused Devizes Branch railway line. The design working life of the structure is unknown. The single span masonry arch is skewed at 16°. It has clear square span of 16.23 m and a skew span of 16.88 m. The carriageway width over the bridge is 6.1 m, with footways on either side. **Documents used for Assessment:** BD 21/01 BA 16/97 Previous inspection reports: i) 1716_bhl_85m38ch_dexam_20110815_3 ii) 1716_bhl_85m38ch_vexam_20150716_3 Topo Survey data i) 17651-200-01T-CastleBridge ii) 17651-100-02E iii) 17651-3Dstrings-CastleBridge	
BD 21/01 Fig. 4.2	**Type of materials used for the arch barrel** Engineering Class B Bricks with 1:3 lime mortar **Method of Analysis:** - Ring 3.2 software for 40 t Assessment Live Loading (ALL) - Skew Length is modelled in RING 3.2 - Sensitivity Analysis is carried out to compare study the effect of material strength and the effect of bonded and debonded rings in the arch capacity. **Assumptions for Assessment:**	
AIP	a).The arch barrel is formed of a brick masonry. Bonded brick structure is used for the initial assessment. b).It has been assumed the spandrel walls do not contribute to the capacity of the arch barrel. c).Backing height is taken as zero conservatively. d).Unit weight of masonry is taken as 24 kN/m^3, masonry compressive strength is assumed 4.2 N/mm^2. e).Unit weight of fill and surfacing is taken as 18 kN/m3 and 23 kN/m3, angle of friction of fill and cohesion is assumed 25° and 0.	
Topo survey	f).Total width of the bridge is approximately 9.17 m over the west abutment.	

Ref	Calculations	Output

The following loadcases are considered for the assessment

1) Unfactored dead load partial factores

2) Factored dead load partial factores

3) Sensitivity analysis 1.-The effect of characteristic masonry strength on the capacity of the bridge.

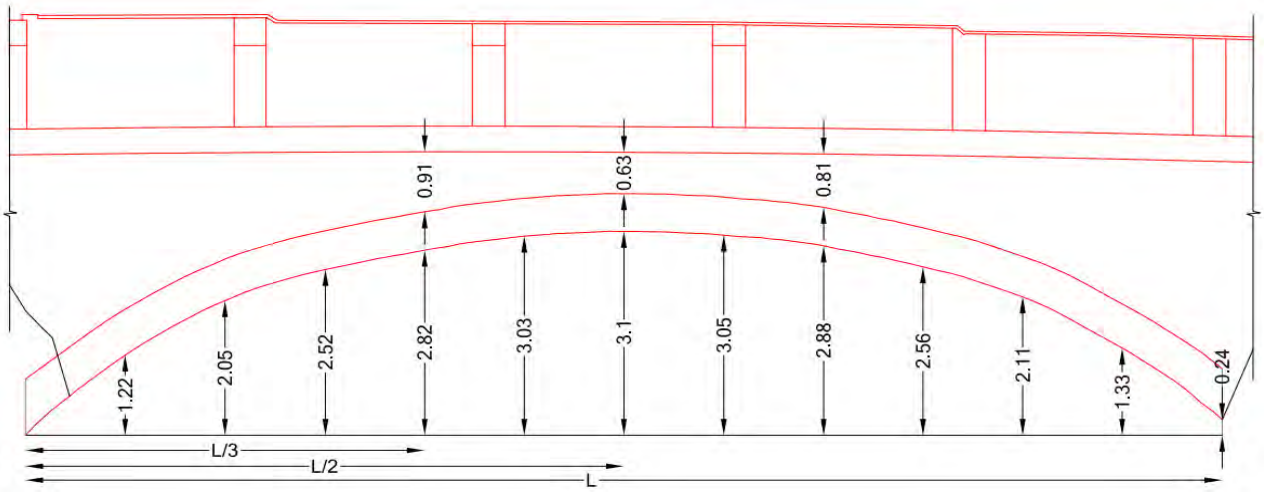
4) Sensitivity analysis 2. - The effect of bonded and de-bonded rings of masonry arch on the capacity of the bridge.

Conclusion Summary:

Loading Type		Assessed Capacity
Carriageway Width		6.1 m
Bonded rings and unfactored dead loads		40 tonne Assessment Live Loading (ALL)
Bonded rings and factored dead loads		40 tonne Assessment Live Loading (ALL)
Sensitivity analysis 1 - effect of characteristi strength		40 tonne Assessment Live Loading (ALL)
Sensitivity analysis 2 - Effect of bonded and De-bonded rings	Bonded	The structure attains the desired 40 tonne ALL for all masonry strengths, except for the masonry strength of 3.5 N/mm^2. However, 3.5 N/mm^2strength is adequate when only single lane of structure is occupied.
	De-bonded	Restricted to 3 tonne Loading

ATKINS	Project	Wiltshire-County Bridge Assessments		Job ref 5152584
	Part of Structure	Devizes Castle Arch Bridge Ring Assessment		Calc sheet no. rev 3 of 5 P1.01
	Drawing Ref	Calc By TB	Date 28-Apr-17	Check by RM / Date 02-May-17

Ref	Calculations			Output
	General data			
Topo survey	Carraigeway width	6.1	m	
	Total width of the bridge	9.17	m	
AIP cl. 1	Skew span of arch	16.880	m	
	Depth of arch barrel	0.564	m	
AIP cl. 2.1	rise at crown location	3.101	m	
	rise at 1/3rd position	2.882	m	
Topo survey	Height of fill over arch barrel at crown	0.630	m	
	Height of fill over arch barrel at 1/3rd span	0.809	m	
	phi of soil	25		
	phi of material	45		
	Axle lift off	N		
	Profile of arch			



	Factors			
	F_{cm}	1.000		
Methodology section 2.4	F_d	1.000		
	F_{mo}	1.000		
	F_w	0.900		
BD 21/01	**Partial Safety Factors**			
	Dead Load γ_{fl} (unfactored)	1.000		
Table 3.1	Dead Load γ_{fl} (factored) - masonry	1.150		
	Dead Load γ_{fl} (factored) - fill	1.200		
cl. 6.20	40t all γ_{fl}	1.000		
cl 3.10	γ_{f3}	1.100		
	γ_{fl} in Ring 3.2 for no Axle life off			
BD 21/01	Dynamic Factor for critical axle	1.800		
cl. 6.20	γ_{fl} for axle	1.900		
	Derived Data			
	Number of notional lanes	2		
Methodology	Mortor loss	0.012	m	
section 2.4	Reduced depth of arch barrel for Ring	0.552	m	
	Joint factor, $F_j = F_w \times F_{mo} \times F_d$	0.900		
Methodology	Actual Characteristic Strength	4.200	N/mm2	
section 2.5	Reduced Characteristic Strength (4.2 x 1.0 x 0.9)	3.780	N/mm2	

Ref	Calculations	Output

Modelling and Analysis

Check for suitability of Ring 3.2 software

a) Span is < 20.0m — OK

b) Span / rise < 6 — OK

c) Fill depth at crown < Span/2 — OK

DL and weight of fill (taken automatically in RING 3.2 once the unit weights are filled)

Live load Assessed

a) 11.5t Single Axle

b) 2 x 10t Double Axle

c) 3 x 8t triple axle

d) Double axle 11.5t driving

Number of notional lanes 2

Value of effective width assuming only single lane is occupied

a) Total width of the bridge/ no of notional lanes 4.585 m

b) Spacing between outer wheels + depth of fill at 1/3rd span +1.5 4.109 m

c) Spacing between longitudinal cracks* 8.570 m

(* Reduce by 0.6m based on previous detailed examination report defects 15 and 29)

Maximum effective width cosidered in Ring 3.2 4.100 m — OK

Value of effective width considering for two vehicles on two lanes

a) Total width of the bridge 9.170 m

b) Spacing between outer wheels of two vehicles + depth of fill at 1/3rd span +1.5 6.909 m

c) Spacing between longitudinal cracks* 8.570 m

(* Reduce by 0.6m based on previous detailed examination report defects 15 and 29)

Maximum effective width cosidered in Ring 3.2 6.900 m — OK

1) Results for 40TAll (Annex A vehicles) with unfactored dead loads

Adequacy factor from Ring 3.2

	$AF_{Ring}*F_{CM}$ Single Lane	$AF_{Ring}*F_{CM}$ Double Lane	Single Lane	Double Lane
a) 11.5t Single Axle	1.610	1.350	PASS	PASS
b) 2 x 10t Double Axle	1.380	1.160	PASS	PASS
c) 3 x 8t triple axle	1.380	1.160	PASS	PASS
d) Double axle 11.5t driving	1.260	1.060	PASS	PASS

Conclusion:

The structure attains the desired 40 tonne ALL.

2) Results for 40TAll (Annex A vehicles) with factored dead loads

Adequacy factor from Ring 3.2

	$AF_{Ring}*F_{CM}$ Single Lane	$AF_{Ring}*F_{CM}$ Double Lane	Single Lane	Double Lane
a) 11.5t Single Axle	1.720	1.450	PASS	PASS
b) 2 x 10t Double Axle	1.460	1.230	PASS	PASS
c) 3 x 8t triple axle	1.460	1.240	PASS	PASS
d) Double axle 11.5t driving	1.340	1.130	PASS	PASS

Conclusion:

The structure attains the desired 40 tonne ALL.

ATKINS	Project	Wiltshire-County Bridge Assessments		Job ref 5152584	
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Ref	Calculations	Output

3) Results for sensitivity analysis 1. The effect of characteristic masonry strength on the capacity of the bridge.

Critical assessed live load: Double axle 11.5t driving with unfactored dead load

Adequacy factor from Ring 3.2

	$AF_{Ring}*F_{CM}$ Single Lane	$AF_{Ring}*F_{CM}$ Double Lane	Output Single Lane	Output Double Lane
a) Masonry strength of 10.5 N/mm^2	1.880	1.600	PASS	PASS
b) Masonry strength of 8.75 N/mm^2	1.790	1.510	PASS	PASS
c) Masonry strength of 6.5 N/mm^2	1.600	1.350	PASS	PASS
d) Masonry strength of 3.5 N/mm^2	1.100	0.931	PASS	FAIL

Conclusion:

The structure attains the desired 40 tonne ALL for all masonry strengths if only single lane of the structrue is occupied.

The structure attains the desired 40 tonne ALL for masonry strengths 10.5 N/mm^2, 8.75N/mm^2 and 6.5N/mm^2 if both lanes of the structrue are occupied. However it fails for Masonry strength 3.5N/mm^2 if both lanes are occupied.

4) Results for sensitivity analysis 2. The effect of bonded and de-bonded rings of masonry arch on the capacity of the bridge.

Critical assessed live load: Double axle 11.5t driving with unfactored dead load

Adequacy factor from Ring 3.2

	$AF_{Ring}*F_{CM}$ Single Lane	$AF_{Ring}*F_{CM}$ Double Lane	Output Single Lane	Output Double Lane
a) Bonded rings with double axle 11.5t driving	1.260	1.060	PASS	PASS
b) De-bonded rings with 5.5t Single Axle (7.5t loading)	0.628	0.528	FAIL	FAIL
c) De-bonded rings with 2t Single Axle (3 t loading)	1.730	1.450	PASS	PASS

Conclusion:

Bonded rings of arch barrel structure attains the desired 40 tonne ALL.

De-bonded rings of arch barrel structure is restricted to 3 tonne

Appendices

Appendix A. Output from Ring 3.2

Sample calculations of two vehicles of Double Axle, 11.5 tonne Driving on two lanes loading with un-factored dead load, attached for reference.

This report was generated by LimitState:RING 3.2.b.20773

Summary

Details

Bridge name	Location	Reference No.	Map reference
Devizes Cast e Bridge	The bridge carries an unc assified sing e carriageway, Hi worth road over the disused Devizes branch rai way ine.	Devizes Cast e Bridge is ocated at OS grid reference of SU 005 610.	

Bridge type	Name of assessor	Assessing organization	Date of assessment
Highway	Taraka	WS Atkins	Monday, May 22, 2017

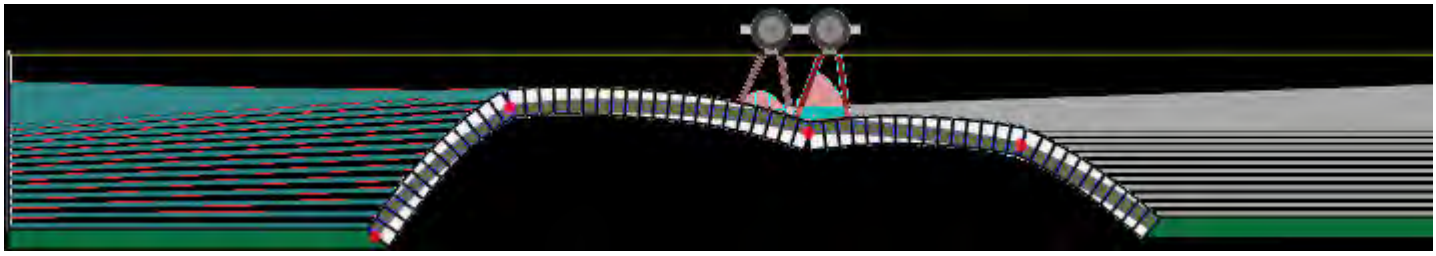
Max auto-computed effective bridge width	Extra bridge width to include	Backfill transverse spread (Degrees)	Surface fill transverse spread (Degrees)
6900	1500	26.6	26.6

Comments
Loading considered is two vehic es of Doub e driving ax e of 11.5t Unfactored dead oads are considered (Partia factor is 1.0) Number of units are considered as 60. The adequacy factor is not depending on number of units, if these are exceeding 60.

Results

Adequacy factor	Solver used (if not default)
1.06 at oad case #67 (this is the critica oad case)	CLP so ver

Mode of Response for Current Load Case



Units

Unless specified otherwise, the following units are used throughout this report:

Distance	Force*	Moment*	Angle	Unit weight	Material strength
mm	kN	kNmm	Degrees	kN/m3	N/mm2

* = per metre width

Geometry

Global:	No. Spans	Effective bridge width
	1	6850.12

Span 1:	Type	Shape	No. Rings	Bed joints normal to

			intrados
Bonded brick	User defined (interpo ated)	1	Yes

Intrados points (local to left springing of this span):

x	y
0	0
1407	1220
2814	2047
4221	2521
5628	2816
7035	3029
8442	3101
9489	3045
11256	2882
12663	2561
14070	2104
15477	1323
16884	236

Ring 1:	No. Blocks	Ring thickness
	60	552

Fill Profile Properties

Distances measured from left springing point of left span.

Horizontal distance (x)	Height to surface fill (y)	Surface fill depth (d)	Surface level (y+d)
0	4297	100	4397

Partial Factors

Loads

Masonry unit weight	Fill unit weight	Surface unit weight	Axle load	Dynamic
1	1	1	2.09	1.8

Materials

Masonry strength	Masonry friction
1	1

Fill Properties

Backfill

Unit weight	Angle of friction	Cohesion
18	25	0

Model dispersion of live load?	Model horizontal 'passive' pressures?
Yes	Yes
Dispersion type	**Cutoff angle**
Boussinesq	30
Soil arch interface, friction multiplier	**Soil arch interface, cohesion multiplier**
0.66	0.5
Mobilisation multiplier on Kp (mp)	**Mobilisation multiplier on cohesion (mpc)**
0.33	0.05
Keep mp.Kp > 1?	**Auto identify passive zones?**

Yes	Yes

Surface Fill

Unit weight	Load dispersion limiting angle
23	26.6

Backing

Position	Backing height	Passive pressures modelled?
Abutment 0	0	Yes
Abutment 1	0	Yes

Vehicles in Project

Name	Axle No.	Load magnitude	Axle position
Defaut 1kN Singe Axe	1	1	0
11.5 Tonne, Singe Axe	1	112.82	0
2x 10 Tonne, Doube Axe (1.8m Axe Spacing)	1	98.1	0
2x 10 Tonne, Doube Axe (1.8m Axe Spacing)	2	98.1	1800
3x 8 Tonne, Tripe Axe (1.4m Axe Spacing)	1	78.48	0
3x 8 Tonne, Tripe Axe (1.4m Axe Spacing)	2	78.48	1400
3x 8 Tonne, Tripe Axe (1.4m Axe Spacing)	3	78.48	2800
Doube Axe, 11.5 Tonne Driving (1.3m Axe Spacing)	1	112.82	0
Doube Axe, 11.5 Tonne Driving (1.3m Axe Spacing)	2	73.56	1300
2 vehices of 11.5 t Singe axe	1	225.63	0
2 vehices of 2x10 t, Doube axe (1.8m) spacing	1	196.2	0
2 vehices of 2x10 t, Doube axe (1.8m) spacing	2	196.2	1800
2 vehices of 3x8 t, Tripe Axe (1.4m spacing)	1	156.96	0
2 vehices of 3x8 t, Tripe Axe (1.4m spacing)	2	156.96	1400
2 vehices of 3x8 t, Tripe Axe (1.4m spacing)	3	156.96	2800
2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	1	225.64	0
2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	2	147.12	1300

Vehicles in Load Cases

#	Load Case Name	Vehicle(s)	Position	Mirror?	Dynamic Axles
1	Load Case 4	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	0	Yes	1
2	Load Case 5	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	150	Yes	1
3	Load Case 6	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	300	Yes	1
4	Load Case 7	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	450	Yes	1
5	Load Case 8	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	600	Yes	1
6	Load Case 9	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	750	Yes	1
7	Load Case 10	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	900	Yes	1
8	Load Case 11	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	1050	Yes	1
9	Load Case 12	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	1200	Yes	1
10	Load Case 13	2 vehices of Doube Axe 11.5 t Driving (1.3m spacing)	1350	Yes	1

11	Load Case 14	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	1500	Yes	1
12	Load Case 15	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	1650	Yes	1
13	Load Case 16	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	1800	Yes	1
14	Load Case 17	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	1950	Yes	1
15	Load Case 18	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	2100	Yes	1
16	Load Case 19	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	2250	Yes	1
17	Load Case 20	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	2400	Yes	1
18	Load Case 21	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	2550	Yes	1
19	Load Case 22	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	2700	Yes	1
20	Load Case 23	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	2850	Yes	1
21	Load Case 24	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	3000	Yes	1
22	Load Case 25	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	3150	Yes	1
23	Load Case 26	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	3300	Yes	1
24	Load Case 27	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	3450	Yes	1
25	Load Case 28	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	3600	Yes	1
26	Load Case 29	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	3750	Yes	1
27	Load Case 30	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	3900	Yes	1
28	Load Case 31	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	4050	Yes	1
29	Load Case 32	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	4200	Yes	1
30	Load Case 33	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	4350	Yes	1
31	Load Case 34	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	4500	Yes	1
32	Load Case 35	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	4650	Yes	1
33	Load Case 36	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	4800	Yes	1
34	Load Case 37	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	4950	Yes	1
35	Load Case 38	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	5100	Yes	1
36	Load Case 39	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	5250	Yes	1
37	Load Case 40	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	5400	Yes	1
38	Load Case 41	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	5550	Yes	1
39	Load Case 42	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	5700	Yes	1
40	Load Case 43	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	5850	Yes	1
41	Load Case 44	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	6000	Yes	1
42	Load Case 45	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	6150	Yes	1
43	Load Case 46	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	6300	Yes	1
44	Load Case 47	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	6450	Yes	1
45	Load Case 48	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	6600	Yes	1
46	Load Case 49	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	6750	Yes	1
47	Load Case 50	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	6900	Yes	1

48	Load Case 51	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	7050	Yes	1
49	Load Case 52	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	7200	Yes	1
50	Load Case 53	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	7350	Yes	1
51	Load Case 54	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	7500	Yes	1
52	Load Case 55	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	7650	Yes	1
53	Load Case 56	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	7800	Yes	1
54	Load Case 57	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	7950	Yes	1
55	Load Case 58	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	8100	Yes	1
56	Load Case 59	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	8250	Yes	1
57	Load Case 60	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	8400	Yes	1
58	Load Case 61	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	8550	Yes	1
59	Load Case 62	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	8700	Yes	1
60	Load Case 63	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	8850	Yes	1
61	Load Case 64	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	9000	Yes	1
62	Load Case 65	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	9150	Yes	1
63	Load Case 66	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	9300	Yes	1
64	Load Case 67	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	9450	Yes	1
65	Load Case 68	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	9600	Yes	1
66	Load Case 69	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	9750	Yes	1
67	Load Case 70	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	9900	Yes	1
68	Load Case 71	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	10050	Yes	1
69	Load Case 72	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	10200	Yes	1
70	Load Case 73	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	10350	Yes	1
71	Load Case 74	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	10500	Yes	1
72	Load Case 75	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	10650	Yes	1
73	Load Case 76	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	10800	Yes	1
74	Load Case 77	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	10950	Yes	1
75	Load Case 78	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	11100	Yes	1
76	Load Case 79	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	11250	Yes	1
77	Load Case 80	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	11400	Yes	1
78	Load Case 81	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	11550	Yes	1
79	Load Case 82	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	11700	Yes	1
80	Load Case 83	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	11850	Yes	1
81	Load Case 84	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	12000	Yes	1
82	Load Case 85	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	12150	Yes	1
83	Load Case 86	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	12300	Yes	1
84	Load Case 87	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	12450	Yes	1

85	Load Case 88	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	12600	Yes	1
86	Load Case 89	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	12750	Yes	1
87	Load Case 90	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	12900	Yes	1
88	Load Case 91	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	13050	Yes	1
89	Load Case 92	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	13200	Yes	1
90	Load Case 93	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	13350	Yes	1
91	Load Case 94	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	13500	Yes	1
92	Load Case 95	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	13650	Yes	1
93	Load Case 96	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	13800	Yes	1
94	Load Case 97	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	13950	Yes	1
95	Load Case 98	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	14100	Yes	1
96	Load Case 99	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	14250	Yes	1
97	Load Case 100	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	14400	Yes	1
98	Load Case 101	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	14550	Yes	1
99	Load Case 102	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	14700	Yes	1
100	Load Case 103	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	14850	Yes	1
101	Load Case 104	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	15000	Yes	1
102	Load Case 105	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	15150	Yes	1
103	Load Case 106	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	15300	Yes	1
104	Load Case 107	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	15450	Yes	1
105	Load Case 108	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	15600	Yes	1
106	Load Case 109	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	15750	Yes	1
107	Load Case 110	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	15900	Yes	1
108	Load Case 111	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	16050	Yes	1
109	Load Case 112	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	16200	Yes	1
110	Load Case 113	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	16350	Yes	1
111	Load Case 114	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	16500	Yes	1
112	Load Case 115	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	16650	Yes	1
113	Load Case 116	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	16800	Yes	1
114	Load Case 117	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	16950	Yes	1
115	Load Case 118	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	17100	Yes	1
116	Load Case 119	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	17250	Yes	1
117	Load Case 120	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	17400	Yes	1
118	Load Case 121	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	17550	Yes	1
119	Load Case 122	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	17700	Yes	1
120	Load Case 123	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	17850	Yes	1
121	Load Case 124	2 vehicles of Double Axle 11.5 t Driving (1.3m spacing)	18000	Yes	1

Load Cases

#	Load Case Name	Effective Width	Adequacy Factor
1	Load Case 4	6900	9.26
2	Load Case 5	6900	8.13
3	Load Case 6	6900	7.22
4	Load Case 7	6900	6.48
5	Load Case 8	6900	5.87
6	Load Case 9	6900	5.32
7	Load Case 10	6900	4.87
8	Load Case 11	6900	4.49
9	Load Case 12	6900	4.15
10	Load Case 13	6900	3.85
11	Load Case 14	6900	3.59
12	Load Case 15	6900	3.36
13	Load Case 16	6900	3.17
14	Load Case 17	6900	2.99
15	Load Case 18	6900	2.82
16	Load Case 19	6900	2.63
17	Load Case 20	6900	2.48
18	Load Case 21	6900	2.35
19	Load Case 22	6900	2.24
20	Load Case 23	6900	2.14
21	Load Case 24	6900	2.05
22	Load Case 25	6900	1.97
23	Load Case 26	6900	1.9
24	Load Case 27	6900	1.82
25	Load Case 28	6900	1.76
26	Load Case 29	6900	1.7
27	Load Case 30	6900	1.65
28	Load Case 31	6900	1.6
29	Load Case 32	6900	1.55
30	Load Case 33	6900	1.5
31	Load Case 34	6900	1.45
32	Load Case 35	6900	1.41
33	Load Case 36	6900	1.37
34	Load Case 37	6900	1.34
35	Load Case 38	6900	1.31
36	Load Case 39	6900	1.28
37	Load Case 40	6900	1.26
38	Load Case 41	6900	1.24
39	Load Case 42	6900	1.22
40	Load Case 43	6900	1.22
41	Load Case 44	6900	1.2
42	Load Case 45	6900	1.2
43	Load Case 46	6900	1.2
44	Load Case 47	6900	1.21
45	Load Case 48	6900	1.21
46	Load Case 49	6900	1.21
47	Load Case 50	6900	1.22
48	Load Case 51	6900	1.22
49	Load Case 52	6898.04	1.24
50	Load Case 53	6884.54	1.24
51	Load Case 54	6872.97	1.25
52	Load Case 55	6863.37	1.26
53	Load Case 56	6855.29	1.27
54	Load Case 57	6849.98	1.28
55	Load Case 58	6845.61	1.28
56	Load Case 59	6844.97	1.27
57	Load Case 60	6844.51	1.25
58	Load Case 61	6848.72	1.23
59	Load Case 62	6852.93	1.2
60	Load Case 63	6860.38	1.18
61	Load Case 64	6860.17	1.15
62	Load Case 65	6853.52	1.13

63	Load Case 66	6848.21	1.1
64	Load Case 67	6845.39	1.09
65	Load Case 68	6844.75	1.08
66	Load Case 69	6845.92	1.07
67	Load Case 70	6850.12	1.06
68	Load Case 71	6855.13	1.07
69	Load Case 72	6863	1.07
70	Load Case 73	6871.08	1.08
71	Load Case 74	6880.86	1.09
72	Load Case 75	6890.64	1.1
73	Load Case 76	6900	1.12
74	Load Case 77	6900	1.14
75	Load Case 78	6900	1.15
76	Load Case 79	6900	1.17
77	Load Case 80	6900	1.19
78	Load Case 81	6900	1.22
79	Load Case 82	6900	1.23
80	Load Case 83	6900	1.25
81	Load Case 84	6900	1.27
82	Load Case 85	6900	1.28
83	Load Case 86	6900	1.3
84	Load Case 87	6900	1.32
85	Load Case 88	6900	1.33
86	Load Case 89	6900	1.35
87	Load Case 90	6900	1.36
88	Load Case 91	6900	1.38
89	Load Case 92	6900	1.4
90	Load Case 93	6900	1.42
91	Load Case 94	6900	1.45
92	Load Case 95	6900	1.49
93	Load Case 96	6900	1.53
94	Load Case 97	6900	1.57
95	Load Case 98	6900	1.63
96	Load Case 99	6900	1.69
97	Load Case 100	6900	1.76
98	Load Case 101	6900	1.84
99	Load Case 102	6900	1.93
100	Load Case 103	6900	2.04
101	Load Case 104	6900	2.15
102	Load Case 105	6900	2.25
103	Load Case 106	6900	2.35
104	Load Case 107	6900	2.46
105	Load Case 108	6900	2.58
106	Load Case 109	6900	2.73
107	Load Case 110	6900	2.9
108	Load Case 111	6900	3.1
109	Load Case 112	6900	3.36
110	Load Case 113	6900	3.62
111	Load Case 114	6900	3.93
112	Load Case 115	6900	4.3
113	Load Case 116	6900	4.74
114	Load Case 117	6900	5.23
115	Load Case 118	6900	5.85
116	Load Case 119	6900	6.61
117	Load Case 120	6900	7.51
118	Load Case 121	6900	8.6
119	Load Case 122	6900	9.99
120	Load Case 123	6900	11.7
121	Load Case 124	6900	13.8

Blocks

Label	Position	Point 1	Point 2	Point 3	Point 4	Area	Unit weight	Support	Support movement X/Y/Rot.	Fill force (V)	Fill force (H)
Block 0	Skewback 0	8442/0	0/0	391/389	8442/389	3207259 74	24	X/Y/Rot	0/0/0	584 81	0
Block 1	Span 1, Ring	0/0	219/215	164/613	391/389	172805 47	24	None	0/0/0	16 06	15 82

	1										
Block 2	Span 1, Ring 1	219/215	442/426	68/832	164/613	172910 70	24	None	0/0/0	15 52	14 61
Block 3	Span 1, Ring 1	442/426	670/630	307/1046	68/832	173098 60	24	None	0/0/0	14 98	13 42
Block 4	Span 1, Ring 1	670/630	904/829	552/1254	307/1046	173366 94	24	None	0/0/0	14 44	12 28
Block 5	Span 1, Ring 1	904/829	1143/1021	804/1457	552/1254	173716 59	24	None	0/0/0	13 90	11 17
Block 6	Span 1, Ring 1	1143/1021	1388/1206	1062/1652	804/1457	17395752	24	None	0/0/0	13 35	10 08
Block 7	Span 1, Ring 1	1388/1206	1638/1383	1327/1839	1062/1652	174305 68	24	None	0/0/0	12 80	9 04
Block 8	Span 1, Ring 1	1638/1383	1895/1551	1600/2018	1327/1839	174774 32	24	None	0/0/0	12 27	8 05
Block 9	Span 1, Ring 1	1895/1551	2157/1710	1881/2188	1600/2018	17501711	24	None	0/0/0	11 72	708
Block 10	Span 1, Ring 1	2157/1710	2426/1858	2169/2347	1881/2188	175446 54	24	None	0/0/0	11 19	6 18
Block 11	Span 1, Ring 1	2426/1858	2700/1995	2465/2494	2169/2347	175916 95	24	None	0/0/0	10 68	5 32
Block 12	Span 1, Ring 1	2700/1995	2981/2119	2768/2629	2465/2494	176172 44	24	None	0/0/0	10 17	4 51
Block 13	Span 1, Ring 1	2981/2119	3266/2231	3076/2749	2768/2629	175774 08	24	None	0/0/0	9 61	3 76
Block 14	Span 1, Ring 1	3266/2231	3556/2331	3386/2856	3076/2749	175045 21	24	None	0/0/0	9 04	3 13
Block 15	Span 1, Ring 1	3556/2331	3850/2421	3697/2951	3386/2856	17438707	24	None	0/0/0	8 51	2 60
Block 16	Span 1, Ring 1	3850/2421	4145/2502	4007/3036	3697/2951	173445 47	24	None	0/0/0	8 00	2 18
Block 17	Span 1, Ring 1	4145/2502	4443/2575	4316/3113	4007/3036	172660 76	24	None	0/0/0	7 52	1 86
Block 18	Span 1, Ring 1	4443/2575	4742/2643	4626/3182	4316/3113	172151 14	24	None	0/0/0	7 11	1 61
Block 19	Span 1, Ring 1	4742/2643	5043/2705	4934/3247	4626/3182	171659 45	24	None	0/0/0	6 72	1 40
Block 20	Span 1, Ring 1	5043/2705	5344/2764	5242/3306	4934/3247	171150 07	24	None	0/0/0	6 36	1 23
Block 21	Span 1, Ring 1	5344/2764	5646/2819	5548/3363	5242/3306	170610 02	24	None	0/0/0	6 01	1 10
Block 22	Span 1, Ring 1	5646/2819	5948/2872	5855/3416	5548/3363	170705 41	24	None	0/0/0	5 72	1 00
Block 23	Span 1, Ring 1	5948/2872	6251/2922	6164/3467	5855/3416	171200 83	24	None	0/0/0	5 47	0 90
Block 24	Span 1, Ring 1	6251/2922	6554/2968	6476/3514	6164/3467	171638 93	24	None	0/0/0	5 24	0 79
Block 25	Span 1, Ring 1	6554/2968	6858/3008	6790/3556	6476/3514	172041 38	24	None	0/0/0	5 03	0 67
Block 26	Span 1, Ring 1	6858/3008	7163/3043	7107/3592	6790/3556	172582 19	24	None	0/0/0	4 85	0 55
Block 27	Span 1, Ring 1	7163/3043	7468/3070	7426/3620	7107/3592	173068 91	24	None	0/0/0	4 70	0 42
Block 28	Span 1, Ring 1	7468/3070	7774/3090	7747/3641	7426/3620	173443 83	24	None	0/0/0	4 59	0 29
Block 29	Span 1, Ring 1	7774/3090	8081/3101	8070/3652	7747/3641	17375739	24	None	0/0/0	4 52	0 16
Block 30	Span 1, Ring 1	8081/3101	8387/3102	8394/3654	8070/3652	174200 71	24	None	0/0/0	4 51	0 02
Block 31	Span 1, Ring 1	8387/3102	8694/3093	8717/3645	8394/3654	173915 79	24	None	0/0/0	4 51	0
Block 32	Span 1, Ring 1	8694/3093	9001/3077	9034/3628	8717/3645	172173 07	24	None	0/0/0	4 49	0
Block 33	Span 1, Ring 1	9001/3077	9307/3057	9344/3608	9034/3628	170360 80	24	None	0/0/0	4 50	0
Block 34	Span 1, Ring 1	9307/3057	9613/3037	9648/3588	9344/3608	168834 37	24	None	0/0/0	4 53	0
Block 35	Span 1, Ring 1	9613/3037	9919/3017	9955/3568	9648/3588	169483 99	24	None	0/0/0	4 67	0 00
Block 36	Span 1, Ring 1	9919/3017	10225/2996	10266/3547	9955/3568	170741 21	24	None	0/0/0	4 86	0
Block 37	Span 1, Ring 1	10225/2996	10531/2971	10581/3521	10266/3547	171786 65	24	None	0/0/0	5 05	0
Block 38	Span 1, Ring 1	10531/2971	10836/2940	10899/3488	10581/3521	172968 73	24	None	0/0/0	5 27	0
Block 39	Span 1, Ring 1	10836/2940	11140/2900	11221/3446	10899/3488	174196 48	24	None	0/0/0	5 54	0
Block 40	Span 1, Ring 1	11140/2900	11442/2850	11543/3392	11221/3446	174803 01	24	None	0/0/0	5 83	0
Block 41	Span 1, Ring 1	11442/2850	11743/2789	11860/3328	11543/3392	173794 09	24	None	0/0/0	6 07	0
Block 42	Span 1, Ring	11743/2789	12042/2720	12171/3257	11860/3328	172738 37	24	None	0/0/0	6 34	0

	1										
Block 43	Span 1, Ring 1	12042/2720	12339/2646	12477/3181	12171/3257	171704 40	24	None	0/0/0	6 64	0
Block 44	Span 1, Ring 1	12339/2646	12636/2568	12779/3101	12477/3181	170784 79	24	None	0/0/0	6 97	0
Block 45	Span 1, Ring 1	12636/2568	12932/2488	13080/3020	12779/3101	170768 99	24	None	0/0/0	7 40	0
Block 46	Span 1, Ring 1	12932/2488	13227/2403	13385/2932	13080/3020	172391 15	24	None	0/0/0	7 97	0
Block 47	Span 1, Ring 1	13227/2403	13519/2311	13694/2834	13385/2932	17384782	24	None	0/0/0	8 55	0
Block 48	Span 1, Ring 1	13519/2311	13809/2208	14003/2725	13694/2834	175152 24	24	None	0/0/0	9 16	0
Block 49	Span 1, Ring 1	13809/2208	14093/2094	14311/2601	14003/2725	176154 12	24	None	0/0/0	9 76	0
Block 50	Span 1, Ring 1	14093/2094	14372/1967	14612/2464	14311/2601	176155 99	24	None	0/0/0	10 28	0
Block 51	Span 1, Ring 1	14372/1967	14645/1828	14906/2314	14612/2464	175384 40	24	None	0/0/0	10 74	0
Block 52	Span 1, Ring 1	14645/1828	14913/1678	15191/2155	14906/2314	17474713	24	None	0/0/0	11 24	0
Block 53	Span 1, Ring 1	14913/1678	15175/1519	15469/1987	15191/2155	174195 82	24	None	0/0/0	11 77	0
Block 54	Span 1, Ring 1	15175/1519	15433/1353	15739/1812	15469/1987	173696 64	24	None	0/0/0	12 31	0
Block 55	Span 1, Ring 1	15433/1353	15686/1179	16004/1630	15739/1812	17322723	24	None	0/0/0	12 88	0
Block 56	Span 1, Ring 1	15686/1179	15934/999	16263/1442	16004/1630	172968 33	24	None	0/0/0	13 47	0
Block 57	Span 1, Ring 1	15934/999	16178/813	16517/1250	16263/1442	172530 99	24	None	0/0/0	14 06	0
Block 58	Span 1, Ring 1	16178/813	16419/623	16765/1053	16517/1250	172102 19	24	None	0/0/0	14 65	0
Block 59	Span 1, Ring 1	16419/623	16656/429	17010/853	16765/1053	171886 18	24	None	0/0/0	15 27	0
Block 60	Span 1, Ring 1	16656/429	16884/236	17244/655	17010/853	167000 21	24	None	0/0/0	15 46	0
Block 0	Skewback 1	16884/236	25326/236	25326/655	17244/655	3459296 62	24	X/Y/Rot	0/0/0	548 48	0

Key:
X = X direction, Y = Y direction, Rot. = Rotation

Contacts

Label	Position	Point 1	Point 2	Length	Loss A	Loss B	CS	FC	Status	Inter-ring?	Normal	Shear	Moment
Contact 0	Span 1, Ring 1	391/389	0/0	552 00	0	0	3 78	0 60	S/H/C/	No	721 75	60 65	13029774
Contact 1	Span 1, Ring 1	164/613	219/215	552 00	0	0	3 78	0 60	S/H/C/	No	720 29	70 21	109786 52
Contact 2	Span 1, Ring 1	68/832	442/426	552	0	0	3 78	0 60	S/H/C/	No	719 19	77 57	86609 26
Contact 3	Span 1, Ring 1	307/1046	670/630	552	0	0	3 78	0 60	S/H/C/	No	718 44	82 67	61450 13
Contact 4	Span 1, Ring 1	552/1254	904/829	552	0	0	3 78	0 60	S/H/C/	No	718 01	85 43	35014 61
Contact 5	Span 1, Ring 1	804/1457	1143/1021	552	0	0	3 78	0 60	S/H/C/	No	71787	85 77	8033 64
Contact 6	Span 1, Ring 1	1062/1652	1388/1206	552	0	0	3 78	0 60	S/H/C/	No	71798	83 62	18703 27
Contact 7	Span 1, Ring 1	1327/1839	1638/1383	552	0	0	3 78	0 60	S/H/C/	No	718 27	78 89	44410 37
Contact 8	Span 1, Ring 1	1600/2018	1895/1551	552 00	0	0	3 78	0 60	S/H/C/	No	718 65	71 50	68271 63
Contact 9	Span 1, Ring 1	1881/2188	2157/1710	552 00	0	0	3 78	0 60	S/H/C/	No	719 01	61 41	8939782
Contact 10	Span 1, Ring 1	2169/2347	2426/1858	552 00	0	0	3 78	0 60	S/H/C/	No	719 22	48 57	106933 05
Contact 11	Span 1, Ring 1	2465/2494	2700/1995	552	0	0	3 78	0 60	S/H/C/	No	719 11	32 97	119983 84
Contact 12	Span 1, Ring 1	2768/2629	2981/2119	552 00	0	0	3 78	0 60	S/H/C/	No	718 50	15 36	127686 32
Contact 13	Span 1, Ring 1	3076/2749	3266/2231	552	0	0	3 78	0 60	S/H/C/	No	71726	0 95	129913 22
Contact 14	Span 1, Ring 1	3386/2856	3556/2331	552	0	0	3 78	0 60	S/H/C/	No	715 58	14 83	127325 24
Contact 15	Span 1, Ring 1	3697/2951	3850/2421	552 00	0	0	3 78	0 60	S/H/C/	No	713 68	25 60	12083795

Contact 16	Span 1, Ring 1	4007/3036	4145/2502	552	0	0	3 78	0 60	S/H/C/	No	711 78	32 69	111566 88
Contact 17	Span 1, Ring 1	4316/3113	4443/2575	552 00	0	0	3 78	0 60	S/H/C/	No	710 03	36 42	100691 62
Contact 18	Span 1, Ring 1	4626/3182	4742/2643	552 00	0	0	3 78	0 60	S/H/C/	No	708 42	38 29	88983 26
Contact 19	Span 1, Ring 1	4934/3247	5043/2705	552	0	0	3 78	0 60	S/H/C/	No	706 99	38 25	77022 65
Contact 20	Span 1, Ring 1	5242/3306	5344/2764	552 00	0	0	3 78	0 60	S/H/C/	No	705 76	36 19	65421 53
Contact 21	Span 1, Ring 1	5548/3363	5646/2819	552 00	0	0	3 78	0 60	S/H/C/	No	704 73	32 06	54813 28
Contact 22	Span 1, Ring 1	5855/3416	5948/2872	552	0	0	3 78	0 60	S/H/C/	No	703 76	28 35	45528 62
Contact 23	Span 1, Ring 1	6164/3467	6251/2922	552 00	0	0	3 78	0 60	S/H/C/	No	702 77	27 11	36985 15
Contact 24	Span 1, Ring 1	6476/3514	6554/2968	552 00	0	0	3 78	0 60	S/H/C/	No	701 74	28 34	28421 76
Contact 25	Span 1, Ring 1	6790/3556	6858/3008	552 00	0	0	3 78	0 60	S/H/C/	No	700 64	32 06	19066 61
Contact 26	Span 1, Ring 1	7107/3592	7163/3043	552 00	0	0	3 78	0 60	S/H/C/	No	699 42	38 23	8131 68
Contact 27	Span 1, Ring 1	7426/3620	7468/3070	552 00	0	0	3 78	0 60	S/H/C/	No	698 01	46 46	5099 74
Contact 28	Span 1, Ring 1	7747/3641	7774/3090	552	0	0	3 78	0 60	S/H/C/	No	696 35	56 62	21250 80
Contact 29	Span 1, Ring 1	8070/3652	8081/3101	552 00	0	0	3 78	0 60	S/H/C/	No	694 32	67 72	40899 09
Contact 30	Span 1, Ring 1	8394/3654	8387/3102	552 00	0	0	3 78	0 60	S/H/C/	No	692 03	69 92	62791 12
Contact 31	Span 1, Ring 1	8717/3645	8694/3093	552 00	0	0	3 78	0 60	S/H/C/	No	690 73	64 21	84323 45
Contact 32	Span 1, Ring 1	9034/3628	9001/3077	552	0	0	3 78	0 60	S/H/C/	No	690 77	54 87	103158 85
Contact 33	Span 1, Ring 1	9344/3608	9307/3057	552 00	0	0	3 78	0 60	S/H/C/	No	691 38	44 72	118924 22
Contact 34	Span 1, Ring 1	9648/3588	9613/3037	552	0	0	3 78	0 60	S/H/C/	No	693 85	6 14	127821 75
Contact 35	Span 1, Ring 1	9955/3568	9919/3017	552 00	0	0	3 78	0 60	S/H/C/	No	697 19	44 48	122814 06
Contact 36	Span 1, Ring 1	10266/3547	10225/2996	552	0	0	3 78	0 60	S/H/C/	No	701 06	85 57	103012 12
Contact 37	Span 1, Ring 1	10581/3521	10531/2971	552 00	0	0	3 78	0 60	S/H/C/	No	705 07	103 26	73426 98
Contact 38	Span 1, Ring 1	10899/3488	10836/2940	552	0	0	3 78	0 60	S/H/C/	No	708 47	95 35	4231 07
Contact 39	Span 1, Ring 1	11221/3446	11140/2900	552	0	0	3 78	0 60	S/H/C/	No	712 58	82 29	14346 48
Contact 41	Span 1, Ring 1	11543/3392	11442/2850	552 00	0	0	3 78	0 60	S/H/C/	No	716 92	66 27	8870 12
Contact 42	Span 1, Ring 1	11860/3328	11743/2789	552 00	0	0	3 78	0 60	S/H/C/	No	720 75	54 84	2747 59
Contact 43	Span 1, Ring 1	12171/3257	12042/2720	552 00	0	0	3 78	0 60	S/H/C/	No	724 26	48 62	43150 99
Contact 44	Span 1, Ring 1	12477/3181	12339/2646	552 00	0	0	3 78	0 60	S/H/C/	No	727 63	47 49	57534 61
Contact 45	Span 1, Ring 1	12779/3101	12636/2568	552 00	0	0	3 78	0 60	S/H/C/	No	730 90	51 35	72216 67
Contact 46	Span 1, Ring 1	13080/3020	12932/2488	552 00	0	0	3 78	0 60	S/H/C/	No	734 46	55 16	88343 54
Contact 47	Span 1, Ring 1	13385/2932	13227/2403	552	0	0	3 78	0 60	S/H/C/	No	738 90	51 96	104653 12
Contact 48	Span 1, Ring 1	13694/2834	13519/2311	552 00	0	0	3 78	0 60	S/H/C/	No	744 13	42 04	11892 63
Contact 49	Span 1, Ring 1	14003/2725	13809/2208	552 00	0	0	3 78	0 60	S/H/C/	No	749 90	25 95	12903 53
Contact 50	Span 1, Ring 1	14311/2601	14093/2094	552 00	0	0	3 78	0 60	S/H/C/	No	755 81	4 59	133041 90
Contact 51	Span 1, Ring 1	14612/2464	14372/1967	552 00	0	0	3 78	0 60	S/H/C/	No	761 56	16 61	129864 56
Contact 52	Span 1, Ring 1	14906/2314	14645/1828	552 00	0	0	3 78	0 60	S/H/C/	No	767 31	34 31	120354 18
Contact 53	Span 1, Ring 1	15191/2155	14913/1678	552 00	0	0	3 78	0 60	S/H/C/	No	773 33	48 81	105616 76
Contact 54	Span 1, Ring 1	15469/1987	15175/1519	552 00	0	0	3 78	0 60	S/H/C/	No	779 80	60 39	86645 69
Contact 55	Span 1, Ring 1	15739/1812	15433/1353	552 00	0	0	3 78	0 60	S/H/C/	No	786 87	69 35	64333 33
Contact 56	Span 1, Ring 1	16004/1630	15686/1179	552 00	0	0	3 78	0 60	S/H/C/	No	794 63	75 91	39482 05
Contact 57	Span 1, Ring 1	16263/1442	15934/999	552 00	0	0	3 78	0 60	S/H/C/	No	803 13	80 32	12783 85

Contact 58	Span 1, Ring 1	16517/1250	16178/813	552 00	0	0	3 78	0 60	S/H/C/	No	812 42	82 75	15081 06
Contact 59	Span 1, Ring 1	16765/1053	16419/623	552 00	0	0	3 78	0 60	S/H/C/	No	822 50	83 39	43519 68
Contact 60	Span 1, Ring 1	17010/853	16656/429	552 00	0	0	3 78	0 60	S/H/C/	No	833 40	82 36	72025 72
Contact 60	Span 1, Ring 1	17244/655	16884/236	552 00	0	0	3 78	0 60	S/H/C/	No	844 79	79 88	9934723

Key:
CS = Crushing Strength, FC = Friction Coefficient, S = S iding enab ed, H = Hinging enab ed, C = Crushing enab ed, R = Reinforcement present

Appendix B. Archie-M Calculations

Devizes Castle Bridge Assessment

Category 2 Assessment using Archie-M software

Wiltshire Council

7 July 2017

Notice

This document and its contents have been prepared and are intended solely for Wiltshire Council's information and use in relation to Devizes Castle Bridge Assessment

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This document has 3 pages including the cover.

Document history

Job number: 5152584			Document ref: WHCC BS-ATK-SBR-TO2134 S01-RP-S-0001			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	Final Draft	C. Pires	C. Pires	U. O'Higgins	M. Jennings	06/07/17

ATKINS	Project	Deviszes Castle Bridge		Job ref 5152584	
	Part of Structure N/A	**Assessment using BA16/97 MEXE Method**		Calc sheet no. 1	rev 1
	Drawing Ref N/A	Calc By CP	Date 30-May-17	Check by MJ	Date 31-May-17

Ref	Calculations	Output

BA16/97 **Modified MEXE Method**

			Upper Bound
	Span	L in m	16.884
	Rise at Crown	r_c in m	3.101
	Rise at Quarter point	r_q in m	2.521
	Ring Thickness	d in m	0.564
	Depth of fill	h in m	0.630
		Depth of mortar loss wil be taken as zero however delamination of the arch barrel will be taken into account by reducing the overall depth of the arch barrel by 12mm	
	Barrel Factor	F_b	1.000
	Fill Factor	F_f	0.700
	Joint Width Factor	F_w	0.900
	Joint Mortar Factor	F_{mo}	1.000
	Horizontal Curve Radius	r in m	>600
	$v^2 = \frac{1000\ r}{r + 150}$	Centrifugal Effect Factor $F_A = 1 + \frac{0.20\ v^2}{r}$	1.000
	Joint Depth Factor	F_d	
	Average depth of missing mortar,	in m	0.000
Annex G		=> F_d	1.000
	Condition Factor	F_{cM}	1.000
		h + d in m	1.194
		L / r_c	5.445
	From Fig. 3.2 Nonogram Provisional Axle Loading	P.A.L. or $740 \times \frac{(d + h)^2}{L^{1.3}}$ = P.A.L.	26.76
From Fig. 3.3	Span/Rise Factor	F_{sr}	0.802
From Fig. 3.4	Profile Factor	$F_p = 2.3 \times [(r_c - r_q)/r_c]^{0.6}$	0.841
	Material Factor	$F_m = \frac{(F_b \times d) + (F_f \times h)}{h + d}$	0.842
	Joint Factor	$F_j = F_w \times F_{mo} \times F_d$	0.900
	MODIFIED AXLE LOAD FOR 2-AXLE BOGIE (M.A.L)	$M.A.L = F_{sr} \times F_p \times F_m \times F_j \times F_{cM} \times P.A.L$	13.680
	AXLE FACTOR (A_f - see Fig 3.5a & 3.5b	Axle lift-off (Y/N) **n**	
	Single axle -	1.75 Allowable A.L	23.9
	2-Axle bogie	1.00 Allowable A.L	13.7
	3-Axle bogie	0.75 Allowable A.L	10.3
	LOAD CAPACITY	**Max G.V.W = in tonnes**	**40**

ATKINS	Project	Deviszes Castle Bridge		Job ref 5152584	
	Part of Structure N/A	Archie M Analysis		Calc sheet no. 2	rev 1
	Drawing Ref N/A	Calc By CP	Date 30-May-17	Check by MJ	Date 31-May-17

Ref	Calculations	Output

Summary of Load Cases Considered in ArchieM Analysis:

Sensitivity analyses was carried out for different brick masonry characteristic strengths 3.5, 6.5, 8.75 and 10.5 N/mm^2

Live Load Assesment Summary			Adequacy Factor				
Case	Characteristic Strength N/mm^2	Assessment Rating	11.5t Single Axle	2 x 10t Double Axle	3 x 8t Triple Axle	11.5t Driving Axle	Result
1A	3.5	40t	<1.0*	<1.0	<1.0	<1.0*	Pass 12.5t ALL
2A	6.5	40t	>1.0	>1.0	>1.0	>1.0	Pass 40t ALL
3A	8.75	40t	>1.0	>1.0	>1.0	>1.0	Pass 40t ALL
4A	10.5	40t	>1.0	>1.0	>1.0	>1.0	Pass 40t ALL

ALL= Assessment Live Loading *marginal fail

ATKINS	Project	Deviszes Castle Bridge		Job ref 5152584	
	Part of Structure N/A	Archie M Analysis		Calc sheet no. 3	rev 1
	Drawing Ref N/A	Calc By CP	Date 30-May-17	Check by MJ	Date 31-May-17

Ref	Calculations	Output

Arch Assessment using ArchieM

Remarks

General Archie Input

BD21/01

Table 3.1	Thickness of road surfacing	=	0.1	m	road surfacing only
Table 4.1	Unit weight of road surfacing	=	23	kN/m3	
Fig 4.3	Masonry comp. strength	=	7	N/mm2	
Table 4.1	Density	=	22	kN/m^3	
	Unit weight of fill	=	18	kN/m3	(default in Archie)
	phi	=	25		From AIP

Material: Engineered Brick
Ashlar/Random?: Ashlar
with lime mortar

Assumptions

1 Roads surface assumed to be good
2 Longitudinal crack ignored as it is removed from the carriageway
3 Archie-M does not take into account ring friction so this will not be taken into account in the model
4 Neither axle lift off nor centrifugal loading will be included;
5 Backing will be ignored;
6 The angle of friction of the soil will be taken as 25 degrees (as per the AIP);
7 The abutments were not modelled

Arch Dimensions

Span (square)	=	16.884 m
Rise at crown	=	3.101 m
Rise at quarter point	=	2.521 m

		UB	LB	
Barrel thickness (d)	=	0.564	0.3384	m
Depth of fill above crown (h)	=	0.63	0.8556	m

h>d

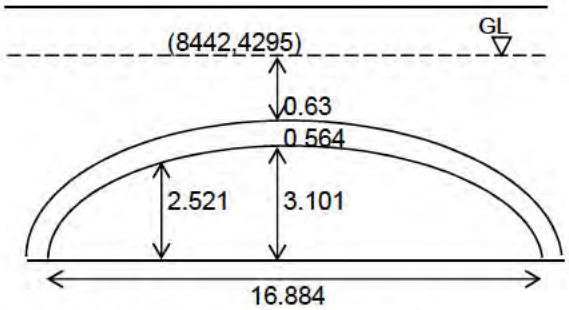


Fig.1 Arch Dimensions (Not to scale)

Lane & Load details

BD21/01 *Load assessment 40t vehicle*

	Structure loaded with	40	t vehicle
	Load per axle =	11.5	t
	Bridge effective width =	3.305	m
6.22	Distributed width of wheel load =	1.5 +h	

6.23 As per Cl.6.23 BD21/01 Axles have 1.8m track with 0.7m minimum spacing between the track width of adjacent vehicles

ATKINS	Project	Deviszes Castle Bridge	Job ref 5152584	
	Part of Structure N/A	Archie M	Calc sheet no. 5	rev 0
	Drawing Ref N/A	Calc By CP	Date 30-May-17	Check by MJ / Date 31-May-17

Ref	Calculations	Output

Details for Archie analysis

BD21/01 Cl.6.2

Condition factors, in present condition

	γ_{F3}	=	1	
Cl.6.2	γ_m	=	1	no other recorded defects which might reduce strength of masonry
Joint width factor	Fw	=	0.9	
Mortar factor	Fmo	=	1	
Average mortar loss		=	0	mm
	Fd	=	1.00	taken as 1.0 as mortar loss is modelled directly in Archie
Fj = (Fw*Fmo*Fd)		=	0.90	

- BD21/01 Annex H gives a combined γ_{FL} factor of 3.4 which is made up a load factor of 1.9 and an impact factor of 1.8. Archie includes the 1.8 impact factor in the load definitions so γ_{FL} is taken as 1.9 in the analysis
- γ_{FL} factor is 2.0 for HB load assessment

			Axle
	γ_{FL}	=	1.9
Centrifugal effect	F_A	=	1.00
Condition factor	F_{cm}	=	1
	γ_{F3}	=	1.1
Effective γ_{FL} = $\frac{\gamma_{FL} * \gamma_{F3}}{Fj*Fcm}$ xFa		=	**2.32**

Condition factors, if repair works are carried out

Fw	=	0.9	joint width does not change
Fmo	=	1	
Fd	=	1	
Fj = (Fw*Fmo*Fd)	=	0.9	

best condition γ_{FL} factor

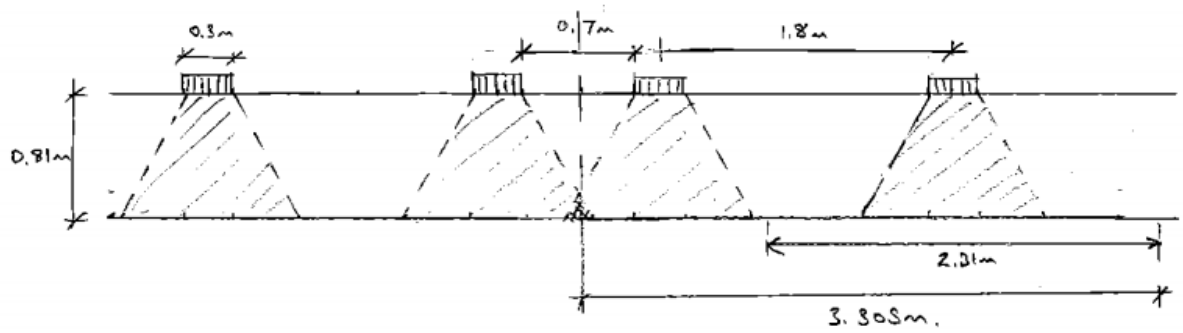
			Axle
	γ_{FL}	=	1.9
	F_A	=	1.00
	F_{cm}	=	1
	γ_{F3}	=	1.1
Effective γ_{FL} = $\frac{\gamma_{FL} * \gamma_{F3}}{Fj*Fcm}$ xFa		=	**2.32**

ATKINS	Project	Deviszes Castle Bridge	Job ref 5152584	
	Part of Structure N/A	Archie M analysis	Calc sheet no. 6	rev 0
	Drawing Ref N/A	Calc By CP	Date 30-May-17	Check by MJ / Date 31-May-17

Ref	Calculations	Output

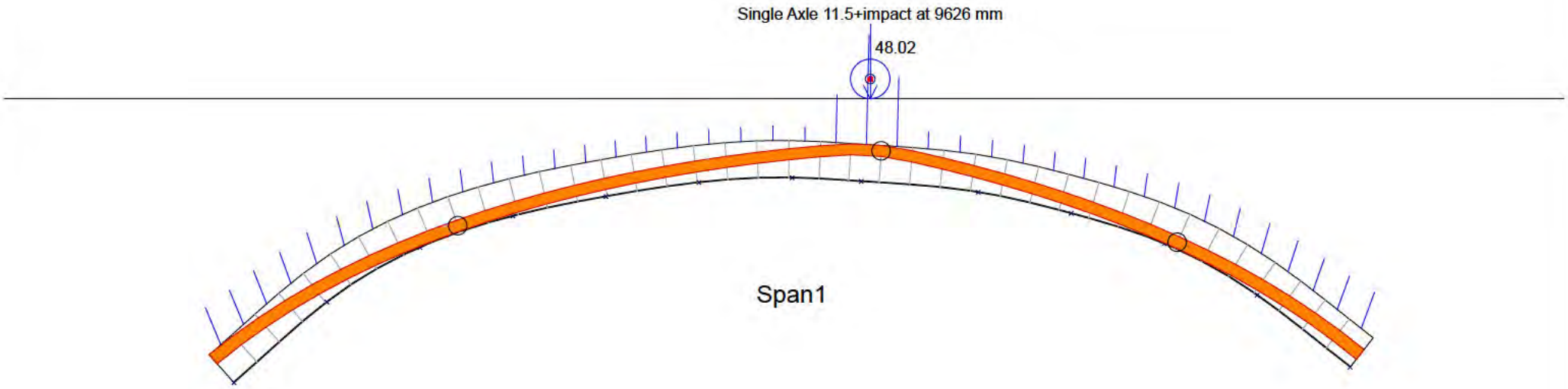
Basis of effective bridge width of 3.305m

The depth of fill at 1/3rd location was used for the calculation of effective width, as it is the critical position for comparing the effects of different axles (Ref: Annex B, Clause B2 of BA 16/97).



Effective width for one vehicle = $\frac{2.31}{2} + 1.8 + \frac{0.7}{2} = 3.305\,m$

Devizes Castle



LC1A 3.5N/mm2 Brick single axle

gammaFl dead load: 1.00 Single Axle 11.5+impact @ 9626 [mm]
gammaFl superimposed: 1.00
gammaFl live load: 2.32
gammaF3 load effect: 1.00
gammaM material: 1.00
File path: C:\Users\cpires\Documents\Deviszys Castle\Basemodel 3.305.brg

NAME: Devizes Castle
LOCATION: Hillworth Road
NUMBER:
ATKINS
DATE: 30 May 2017
Printed on: Tuesday, May 30, 2017 23:05:30

Bridge Name: Devizes Castle Bridge Location: Hillworth Road
Bridge Number:
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: 2.32 Factor for load effect: 1.00 Factor for material strength: 1.00

APPLIED LOAD CASES
1.Single Axle 11.5+impact Total weight: 112.82 [kN] Position: 9626 [mm]
11.50 1 1.00 20.70 1.00 1.80 2.50
Effective lane width: 3305 [mm] Distr bution length: 994 [mm]

Applied distribution mode: Archie-M, BD21/97
Applied live load pressure: Active pressure

STRUCTURE PROPERTIES
Road shape: Flat line (1-point method)
Road points: (0, 4295)
Depth of surfacing: 1 Depth of overlay: 0
Surface unit weight: 18.00 [kN/m3] Overlay unit weight: 18.00 [kN/m3]
Lane width: 2500

Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree

Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree
Shape: True shape
Span: 16884 [mm] Rise: 3101 [mm] Q-rise: 0 [mm]
Ring thickness at crown:564 [mm] Ring thickness at springing: 564 [mm] Mortar loss 12 [mm]
Masonry unit weight:20.00 [kN/m3] Masonry strength: 3.50 [MPa]

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 tota	Fz tota	My tota	Thrust in	Thrust out	Extra-Thrust
0	0	0	-374	4224	295	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-502.86	-413.64	-302.12	371	557	-5 ***
1	350	310	-25	7314	295	11.93	-28.60	2.16	0.00	-0.00	0.00	-0.00	-514.79	-385.04	-279.45	345	528	24
2	690	615	316	1037	4295	10.84	-26.10	1.84	0.00	-0.00	0.00	-0.01	-525.63	-358.94	-243.01	295	475	77
3	1040	922	676	1353	4295	10.18	-25.44	1.93	0.00	-0.00	0.00	-0.01	-535.81	-333.50	-197.14	226	405	147
4	1390	1206	1048	1654	4295	8.74	-23.92	1.72	0.00	-0.00	0.00	-0.01	-544.54	-309.59	-152.50	157	334	218
5	1770	1479	1457	1948	4295	7.62	-23.86	2.11	0.00	-0.00	0.00	-0.01	-552.16	-285.73	-112.38	94	270	282
6	2160	1719	1881	2209	4295	6.01	-22.30	2.11	0.00	-0.00	0.00	-0.01	-558.16	-263.44	-83.21	47	223	329
7	2570	1934	2324	2442	4295	4.76	-21.13	2.34	0.00	-0.00	0.00	-0.01	-562.91	-242.30	-63.83	17	192	360
8	2990	2121	2776	2643	4295	3.66	-19.63	2.41	0.00	-0.00	0.00	-0.00	-566.57	-222.67	-53.79	1	175	377
9	3420	2283	3235	2816	4295	2.82	-18.31	2.50	0.00	-0.00	0.00	-0.00	-569.38	-204.36	-51.91	-1	172	380
10	3850	2419	3692	2960	4295	2.11	-16.80	2.43	0.00	-0.00	0.00	0.00	-571.49	-187.56	-57.28	9	181	371
11	4300	2540	4162	3087	4295	1.67	-16.14	2.62	0.00	-0.00	0.00	0.00	-573.16	-171.42	-67.69	28	199	353
12	4740	2643	4620	3194	4295	1.29	-14.71	2.42	0.00	-0.00	0.00	0.00	-574.45	-156.71	-79.91	49	219	333
13	5200	2736	5093	3290	4295	1.05	-14.33	2.58	0.00	-0.00	0.00	0.00	-575.50	-142.38	-94.46	75	244	308
14	5650	2819	5551	3374	4295	0.85	-13.14	2.35	0.00	-0.00	0.00	0.00	-576.34	-129.24	-107.14	97	266	286
15	6100	2897	6009	3454	4295	0.73	-12.47	2.28	0.00	-0.00	0.00	0.00	-577.07	-116.77	-116.96	115	283	269
16	6550	2966	6471	3524	4295	0.59	-11.90	2.22	0.00	-0.00	0.00	0.00	-577.66	-104.87	-126.51	132	299	253
17	7010	3026	6947	3586	4295	0.48	-11.66	2.30	0.00	-0.00	0.00	0.00	-578.14	-93.21	-137.01	151	318	234
18	7470	3070	7427	3632	4295	0.33	-11.26	2.31	0.00	-0.00	0.00	0.00	-578.47	-81.95	-151.58	177	343	209
19	7930	3096	7911	3660	4295	0.18	-10.98	2.37	0.00	-0.00	0.00	0.00	-578.65	-70.97	-171.57	212	378	174
20	8390	3101	8397	3665	4295	0.03	-10.86	2.47	0.00	-0.00	0.00	0.00	-578.68	-60.10	-198.82	261	427	125
21	8850	3085	8877	3648	4295	-0.11	-10.83	2.57	-0.00	-0.13	0.06	0.00	-578.57	-49.15	-233.35	323	488	64
22	9300	3057	9336	3620	4295	-0.20	-10.59	2.54	-0.66	-26.26	8.59	0.00	-577.71	-12.29	-266.19	380	545	7
23	9760	3027	9797	3590	4295	-0.22	-10.94	2.71	-1.94	-73.11	18.94	0.00	-575.56	71.76	-272.10	387	553	-1 ***

24	10220	2996	10263	3558	4295	-0.24	-11.28	2.82	-1.14	-41.52	8.08	0.00	-574.19	124.56	-243.49	33550151
25	10680	2956	10739	3517	4295	-0.33	-11.78	3.01	-0.05	-1.52	0.11	0.00	-573.81	137.87	-206.12	269436116
26	11140	2899	11223	3457	4295	-0.50	-12.40	3.29	0.00	0.00	0.00	0.00	-573.31	150.26	-172.93	209378174
27	11590	2821	11699	3374	4295	-0.76	-12.85	3.51	0.00	0.00	0.00	0.00	-572.55	163.11	-147.66	164334218
28	12040	2721	12171	3270	4295	-1.06	-13.58	3.87	0.00	0.00	0.00	0.00	-571.49	176.69	-129.15	131302250
29	12480	2609	12623	3154	4295	-1.30	-14.02	4.04	0.00	0.00	0.00	0.00	-570.20	190.71	-113.13	103274278
30	12930	2487	13084	3030	4295	-1.56	-15.28	4.59	0.00	0.00	0.00	0.00	-568.64	205.99	-94.39	70 243309
31	13370	2357	13541	2894	4295	-1.87	-16.25	4.93	0.00	0.00	0.00	0.00	-566.76	222.24	-75.19	37 211341
32	13800	2210	13998	2738	4295	-2.40	-17.46	5.43	0.00	0.00	0.00	0.00	-564.36	239.70	-60.48	11 186366
33	14230	2034	14460	2549	4295	-3.25	-19.17	6.29	0.00	0.00	0.00	0.00	-561.11	258.87	-54.19	-1 176376
34	14640	1834	14903	2333	4295	-4.15	-20.10	6.78	0.00	0.00	0.00	0.00	-556.96	278.97	-57.98	4 182370
35	15040	1608	15332	2090	4295	-5.26	-21.49	7.59	0.00	0.00	0.00	0.00	-551.70	300.47	-70.07	22 201351
36	15430	1355	15749	1820	4295	-6.57	-22.96	8.44	0.00	0.00	0.00	0.00	-545.13	323.43	-90.31	52 233319
37	15800	1087	16138	1538	4295	-7.66	-23.62	8.82	0.00	0.00	0.00	0.00	-537.47	347.04	-114.78	89 271281
38	16160	80816508		1252	4295	-8.64	-24.52	9.30	0.00	0.00	0.00	0.00	-528.83	371.56	-137.87	121306246
39	16520	52216870		9654295		-9.51	-25.93	9.97	0.00	0.00	0.00	0.00	-519.32	397.49	-153.26	141328224
40	16884	23617232		6794295		-10.29	-27.89	10.82	0.00	0.00	0.00	0.00	-509.03	425.39	-154.83	139328224

Devizes Castle

LC1A 3.5N/mm2 Brick double axle bogie

gammaFl dead load: 1.00
gammaFl superimposed: 1.00
gammaFl live load: 2.32
gammaF3 load effect: 1.00
gammaM material: 1.00
File path: C:\Users\cpires\Documents\Deviszys Castle\Basemodel 3.305.brg

Driving Axle (1.3m air) imp right @ 11126 [mm]

NAME: Devizes Castle
LOCATION: Hillworth Road
NUMBER:
ATKINS
DATE: 30 May 2017
Printed on: Tuesday, May 30, 2017 23:04:35

Bridge Name: Devizes Castle Bridge Location: Hillworth Road
Bridge Number:
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: 2.32 Factor for load effect: 1.00 Factor for material strength: 1.00

APPLIED LOAD CASES
1.Driving Axle (1.3m air) imp right Total weight: 186.39 [kN] Position: 11126 [mm]
19.00 2 1.00 7.50 1.30 20.70 1.00 1.80 2.50
Effective lane width: 3305 [mm] Distr bution length: 1007 [mm]

Applied distribution mode: Archie-M, BD21/97
Applied live load pressure: Active pressure

STRUCTURE PROPERTIES
Road shape: Flat line (1-point method)
Road points: (0, 4295)
Depth of surfacing: 1 Depth of overlay: 0
Surface unit weight: 18.00 [kN/m3] Overlay unit weight: 18.00 [kN/m3]
Lane width: 2500

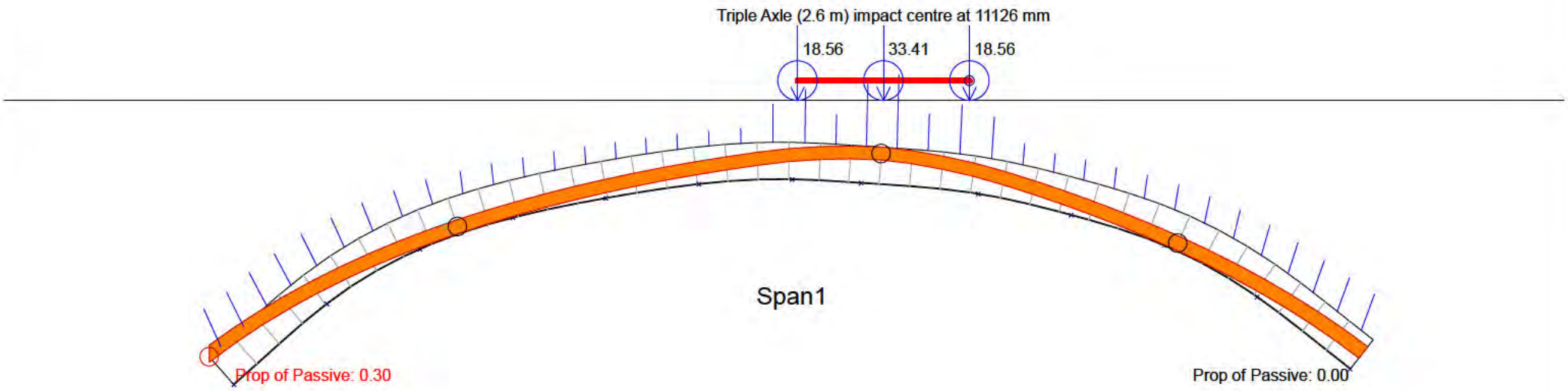
Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree

Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree
Shape: True shape
Span: 16884 [mm] Rise: 3101 [mm] Q-rise: 0 [mm]
Ring thickness at crown:564 [mm] Ring thickness at springing: 564 [mm] Mortar loss 12 [mm]
Masonry unit weight:20.00 [kN/m3] Masonry strength: 3.50 [MPa]

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 tota	Fz tota	My tota	Thrust in	Thrust out	Extra-Thrust
0	0	0	-374	4224	295	0.00	0.00	0.00	0.00	0.00	0.00	1.00	-563.72	-424.18	-433.90	517717	-165	***
1	350	310	-25	7314	295	11.93	-28.60	2.16	0.00	-0.00	0.00	2.16	-576.66	-395.58	-396.35	472670	-118	***
2	690	6153	161037	4295	10.84	-26.10	1.84	0.00	-0.00	0.00	3.21	-589.66	-369.48	-345.21	405601	-49	***	
3	1040	9226	761353	4295	10.18	-25.44	1.93	0.00	-0.00	0.00	3.77	-603.05	-344.04	-284.23	31951	438		
4	1390	1206	1048	1654	4295	8.74	-23.92	1.72	0.00	-0.00	0.00	4.13	-615.56	-320.12	-225.26	232427	125	
5	1770	1479	1457	1948	4295	7.62	-23.86	2.11	0.00	-0.00	0.00	3.89	-627.31	-296.27	-171.03	151347	205	
6	2160	1719	1881	2209	4295	6.01	-22.30	2.11	0.00	-0.00	0.00	3.52	-637.21	-273.97	-129.27	89	286266	
7	2570	1934	2324	2442	4295	4.76	-21.13	2.34	0.00	-0.00	0.00	3.01	-645.48	-252.84	-98.53	44	241311	
8	2990	2121	2776	2643	4295	3.66	-19.63	2.41	0.00	-0.00	0.00	2.51	-652.15	-233.21	-78.70	15	213339	
9	3420	2283	3235	2816	4295	2.82	-18.31	2.50	0.00	-0.00	0.00	2.01	-657.48	-214.90	-68.56	0	198354	
10	3850	2419	3692	2960	4295	2.11	-16.80	2.43	0.00	-0.00	0.00	0.00	-661.60	-198.09	-67.38	-1	196356	
11	4300	2540	4162	3087	4295	1.67	-16.14	2.62	0.00	-0.00	0.00	0.00	-663.28	-181.95	-71.63	6	202350	
12	4740	2643	4620	3194	4295	1.29	-14.71	2.42	0.00	-0.00	0.00	0.00	-664.56	-167.24	-79.19	18	213339	
13	5200	2736	5093	3290	4295	1.05	-14.33	2.58	0.00	-0.00	0.00	0.00	-665.61	-152.91	-90.21	35	230322	
14	5650	2819	5551	3374	4295	0.85	-13.14	2.35	0.00	-0.00	0.00	0.00	-666.45	-139.77	-100.15	50	244308	
15	6100	2897	6009	3454	4295	0.73	-12.47	2.28	0.00	-0.00	0.00	0.00	-667.18	-127.30	-107.67	62	256296	
16	6550	2966	6471	3524	4295	0.59	-11.90	2.22	0.00	-0.00	0.00	0.00	-667.78	-115.40	-115.7574	268284		
17	7010	3026	6947	3586	4295	0.48	-11.66	2.30	0.00	-0.00	0.00	0.00	-668.25	-103.74	-125.69	89	283269	
18	7470	3070	7427	3632	4295	0.33	-11.26	2.31	0.00	-0.00	0.00	0.00	-668.58	-92.48	-141.14	113	306246	
19	7930	3096	7911	3660	4295	0.18	-10.98	2.37	0.00	-0.00	0.00	0.00	-668.76	-81.50	-163.63	148	340212	
20	8390	3101	8397	3665	4295	0.03	-10.86	2.47	0.00	-0.00	0.00	0.00	-668.80	-70.64	-195.28	197	388164	
21	8850	3085	8877	3648	4295	-0.11	-10.83	2.57	-0.00	-0.00	0.00	0.00	-668.69	-59.81	-236.10	260	450102	
22	9300	3057	9336	3620	4295	-0.20	-10.59	2.54	-0.20	-8.01	3.05	0.00	-668.29	-41.21	-278.96	325	51537	
23	9760	3027	9797	3590	4295	-0.22	-10.94	2.71	-1.55	-58.43	16.66	0.00	-666.53	28.16	-305.37	363	553	-1 ***

24	10220	2996	10263	3558	4295	-0.24	-11.28	2.82	-1.76	-64.34	14.72	0.00	-664.53	103.79	-295.77	34553715
25	10680	2956	10739	3517	4295	-0.33	-11.78	3.01	-0.68	-19.15	4.12	0.00	-663.53	134.72	-267.45	30149359
26	11140	2899	11223	3457	4295	-0.50	-12.40	3.29	-1.19	-23.67	6.85	0.00	-661.83	170.79	-236.71	251445107
27	11590	2821	11699	3374	4295	-0.76	-12.85	3.51	-1.28	-18.18	4.46	0.00	-659.80	201.82	-205.28	201397155
28	12040	2721	12171	3270	4295	-1.06	-13.58	3.87	-0.22	-2.41	0.38	0.00	-658.52	217.80	-177.33	158355197
29	12480	2609	12623	3154	4295	-1.30	-14.02	4.04	0.00	0.00	0.00	0.00	-657.23	231.82	-152.97	121319233
30	12930	2487	13084	3030	4295	-1.56	-15.28	4.59	0.00	0.00	0.00	0.00	-655.67	247.11	-126.34	81 281271
31	13370	2357	13541	2894	4295	-1.87	-16.25	4.93	0.00	0.00	0.00	0.00	-653.79	263.36	-100.36	42 243309
32	13800	2210	13998	2738	4295	-2.40	-17.46	5.43	0.00	0.00	0.00	0.00	-651.39	280.81	-80.75	13 215337
33	14230	2034	14460	2549	4295	-3.25	-19.17	6.29	0.00	0.00	0.00	0.00	-648.14	299.99	-72.10	-1 203349
34	14640	1834	14903	2333	4295	-4.15	-20.10	6.78	0.00	0.00	0.00	0.00	-643.99	320.09	-76.44	4 209343
35	15040	1608	15332	2090	4295	-5.26	-21.49	7.59	0.00	0.00	0.00	0.00	-638.73	341.58	-91.76	24 230322
36	15430	1355	15749	1820	4295	-6.57	-22.96	8.44	0.00	0.00	0.00	0.00	-632.16	364.54	-117.9958	266286
37	15800	1087	16138	1538	4295	-7.66	-23.62	8.82	0.00	0.00	0.00	0.00	-624.50	388.16	-150.58	101310242
38	16160	80816508		1252	4295	-8.64	-24.52	9.30	0.00	0.00	0.00	0.00	-615.86	412.68	-183.15	142353199
39	16520	52216870		9654295		-9.51	-25.93	9.97	0.00	0.00	0.00	0.00	-606.35	438.61	-208.64	172386166
40	16884	23617232		6794295		-10.29	-27.89	10.82	0.00	0.00	0.00	0.00	-596.06	466.50	-220.13	183399153

Devizes Castle



LC1A 3.5N/mm2 Brick triple axle bogie

gammaFl dead load: 1.00
gammaFl superimposed: 1.00
gammaFl live load: 2.32
gammaF3 load effect: 1.00
gammaM material: 1.00
File path: C:\Users\cpires\Documents\Deviszys Castle\Basemodel 3.305.brg

Triple Axle (2.6 m) impact centre @ 11126 [mm]

NAME: Devizes Castle
LOCATION: Hillworth Road
NUMBER:
ATKINS
DATE: 30 May 2017
Printed on: Tuesday, May 30, 2017 23:06:13

Bridge Name: Devizes Castle Bridge Location: Hillworth Road
Bridge Number:
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: 2.32 Factor for load effect: 1.00 Factor for material strength: 1.00

APPLIED LOAD CASES
1.Triple Axle (2.6 m) impact centre Total weight: 235.44 [kN] Position: 11126 [mm]
24.00 3 1.00 8.00 1.30 14.40 2.60 8.00 1.00 1.80 2.50
Effective lane width: 3305 [mm] Distr bution length: 935 [mm]

Applied distribution mode: Archie-M, BD21/97
Applied live load pressure: Active pressure

STRUCTURE PROPERTIES
Road shape: Flat line (1-point method)
Road points: (0, 4295)
Depth of surfacing: 1 Depth of overlay: 0
Surface unit weight: 18.00 [kN/m3] Overlay unit weight: 18.00 [kN/m3]
Lane width: 2500

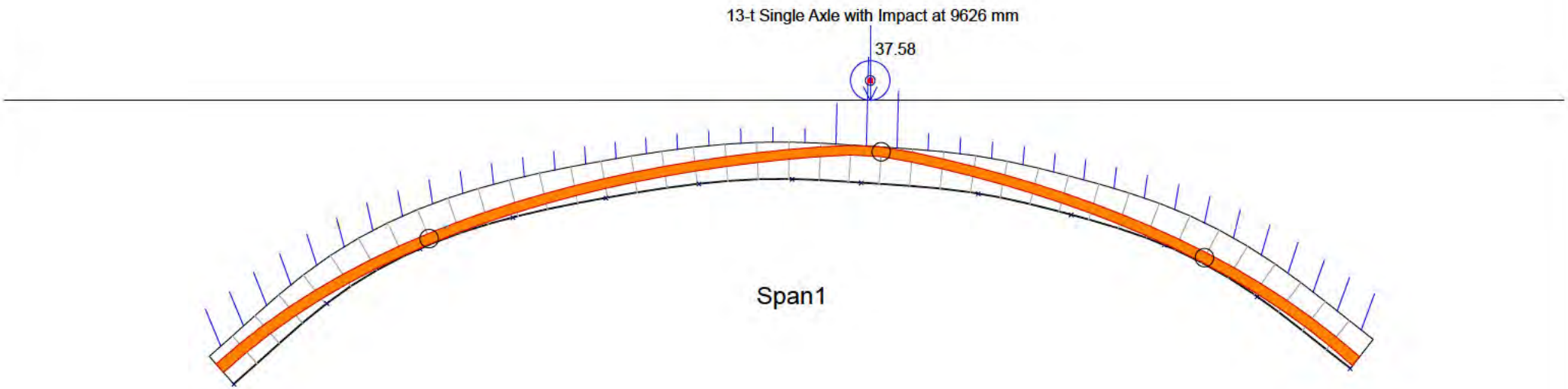
Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree

Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree
Shape: True shape
Span: 16884 [mm] Rise: 3101 [mm] Q-rise: 0 [mm]
Ring thickness at crown:564 [mm] Ring thickness at springing: 564 [mm] Mortar loss 12 [mm]
Masonry unit weight:20.00 [kN/m3] Masonry strength: 3.50 [MPa]

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 tota	Fz tota	My tota	Thrust in	Thrust out	Extra-Thrust
0	0	0	-374	4224	295	0.00	0.00	0.00	0.00	0.00	0.00	1.07	-576.71	-436.32	-425.27	487693	-141	***
1	350	310	-25	7314	295	11.93	-28.60	2.16	0.00	-0.00	0.00	2.29	-589.71	-407.72	-387.96	444647	-95	***
2	690	615	3161037	4295	10.84	-26.10	1.84	0.00	-0.00	0.00	3.40	-602.84	-381.62	-337.00	378579	-27	***	
3	1040	922	6761353	4295	10.18	-25.44	1.93	0.00	-0.00	0.00	3.99	-616.42	-356.18	-276.28	29449	458		
4	1390	1206	1048	1654	4295	8.74	-23.92	1.72	0.00	-0.00	0.00	4.38	-629.16	-332.26	-217.83	210411	141	
5	1770	1479	1457	1948	4295	7.62	-23.86	2.11	0.00	-0.00	0.00	4.11	-641.15	-308.41	-164.58	133334	218	
6	2160	1719	1881	2209	4295	6.01	-22.30	2.11	0.00	-0.00	0.00	3.72	-651.28	-286.11	-124.31	75	277275	
7	2570	1934	2324	2442	4295	4.76	-21.13	2.34	0.00	-0.00	0.00	3.19	-659.76	-264.98	-95.61	33	236316	
8	2990	2121	2776	2643	4295	3.66	-19.63	2.41	0.00	-0.00	0.00	2.66	-666.60	-245.35	-78.28	9	212340	
9	3420	2283	3235	2816	4295	2.82	-18.31	2.50	0.00	-0.00	0.00	0.00	-672.08	-227.04	-71.10	-1	202350	
10	3850	2419	3692	2960	4295	2.11	-16.80	2.43	0.00	-0.00	0.00	0.00	-674.20	-210.24	-72.23	1	203349	
11	4300	2540	4162	3087	4295	1.67	-16.14	2.62	0.00	-0.00	0.00	0.00	-675.87	-194.10	-80.43	14	215337	
12	4740	2643	4620	3194	4295	1.29	-14.71	2.42	0.00	-0.00	0.00	0.00	-677.15	-179.39	-92.04	32	231321	
13	5200	2736	5093	3290	4295	1.05	-14.33	2.58	0.00	-0.00	0.00	0.00	-678.20	-165.05	-107.48	55	254298	
14	5650	2819	5551	3374	4295	0.85	-13.14	2.35	0.00	-0.00	0.00	0.00	-679.05	-151.91	-121.83	76	275277	
15	6100	2897	6009	3454	4295	0.73	-12.47	2.28	0.00	-0.00	0.00	0.00	-679.77	-139.44	-133.85	94	292260	
16	6550	2966	6471	3524	4295	0.59	-11.90	2.22	0.00	-0.00	0.00	0.00	-680.37	-127.54	-146.52	113	311241	
17	7010	3026	6947	3586	4295	0.48	-11.66	2.30	0.00	-0.00	0.00	0.00	-680.84	-115.89	-161.29	135	332220	
18	7470	3070	7427	3632	4295	0.33	-11.26	2.31	0.00	-0.00	0.00	0.00	-681.17	-104.63	-181.78	166	363189	
19	7930	3096	7911	3660	4295	0.18	-10.98	2.37	0.01	-0.45	0.19	0.00	-681.36	-93.19	-209.51	209	404148	
20	8390	3101	8397	3665	4295	0.03	-10.86	2.47	0.08	-18.22	5.34	0.00	-681.48	-64.11	-243.44	26	045597	
21	8850	3085	8877	3648	4295	-0.11	-10.83	2.57	-0.42	-29.83	6.63	0.00	-680.95	-23.44	-274.34	30	750151	
22	9300	3057	9336	3620	4295	-0.20	-10.59	2.54	-0.31	-12.16	2.96	0.00	-680.45	-0.70	-299.21	34	453814	
23	9760	3027	9797	3590	4295	-0.22	-10.94	2.71	-1.08	-40.64	11.59	0.00	-679.16	50.89	-310.47	359	553	-1 ***

24	10220	2996	10263	3558	4295	-0.24	-11.28	2.82	-1.23	-44.77	10.25	0.00	-677.70	106.94	-295.35	33453022
25	10680	2956	10739	3517	4295	-0.33	-11.78	3.01	-0.57	-16.05	3.83	0.00	-676.80	134.77	-267.25	29148765
26	11140	2899	11223	3457	4295	-0.50	-12.40	3.29	-1.27	-25.25	7.31	0.00	-675.03	172.42	-236.97	243441111
27	11590	2821	11699	3374	4295	-0.76	-12.85	3.51	-1.36	-19.39	4.76	0.00	-672.91	204.66	-205.58	194394158
28	12040	2721	12171	3270	4295	-1.06	-13.58	3.87	-0.23	-2.57	0.40	0.00	-671.62	220.81	-177.61	151353199
29	12480	2609	12623	3154	4295	-1.30	-14.02	4.04	0.00	0.00	0.00	0.00	-670.32	234.83	-153.39	116318234
30	12930	2487	13084	3030	4295	-1.56	-15.28	4.59	0.00	0.00	0.00	0.00	-668.76	250.11	-127.00	77 280272
31	13370	2357	13541	2894	4295	-1.87	-16.25	4.93	0.00	0.00	0.00	0.00	-666.89	266.36	-101.40	39 244308
32	13800	2210	13998	2738	4295	-2.40	-17.46	5.43	0.00	0.00	0.00	0.00	-664.48	283.82	-82.43	11 217335
33	14230	2034	14460	2549	4295	-3.25	-19.17	6.29	0.00	0.00	0.00	0.00	-661.24	302.99	-74.79	-1 207345
34	14640	1834	14903	2333	4295	-4.15	-20.10	6.78	0.00	0.00	0.00	0.00	-657.08	323.09	-80.52	5 215337
35	15040	1608	15332	2090	4295	-5.26	-21.49	7.59	0.00	0.00	0.00	0.00	-651.82	344.59	-97.59	27 238314
36	15430	1355	15749	1820	4295	-6.57	-22.96	8.44	0.00	0.00	0.00	0.00	-645.25	367.55	-125.97	65 276276
37	15800	1087	16138	1538	4295	-7.66	-23.62	8.82	0.00	0.00	0.00	0.00	-637.59	391.16	-160.96	110323229
38	16160	80816508		1252	4295	-8.64	-24.52	9.30	0.00	0.00	0.00	0.00	-628.95	415.68	-196.11	154368184
39	16520	52216870		9654295		-9.51	-25.93	9.97	0.00	0.00	0.00	0.00	-619.44	441.61	-224.26	187404148
40	16884	23617232		6794295		-10.29	-27.89	10.82	0.00	0.00	0.00	0.00	-609.15	469.51	-238.39	200420132

Devizes Castle



LC1A 3.5N/mm2 13t single axle with impact

gammaFl dead load: 1.00
gammaFl superimposed: 1.00
gammaFl live load: 2.32
gammaF3 load effect: 1.00
gammaM material: 1.00
File path: C:\Users\cpires\Documents\Deviszys Castle\Basemodel 3.305.brg

13-t Single Axle with Impact @ 9626 [mm]

NAME: Devizes Castle
LOCATION: Hillworth Road
NUMBER:
ATKINS
DATE: 30 May 2017
Printed on: Tuesday, May 30, 2017 23:07:21

Bridge Name: Devizes Castle Bridge Location: Hillworth Road
Bridge Number:
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: 2.32 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: 9626 [mm]
9.00 1 1.00 16.20 1.00 1.80 2.50
Effective lane width: 3305 [mm] Distr bution length: 994 [mm]

Applied distribution mode: Archie-M, BD21/97
Applied live load pressure: Active pressure

STRUCTURE PROPERTIES
Road shape: Flat line (1-point method)
Road points: (0, 4295)
Depth of surfacing: 1 Depth of overlay: 0
Surface unit weight: 18.00 [kN/m3] Overlay unit weight: 18.00 [kN/m3]
Lane width: 2500

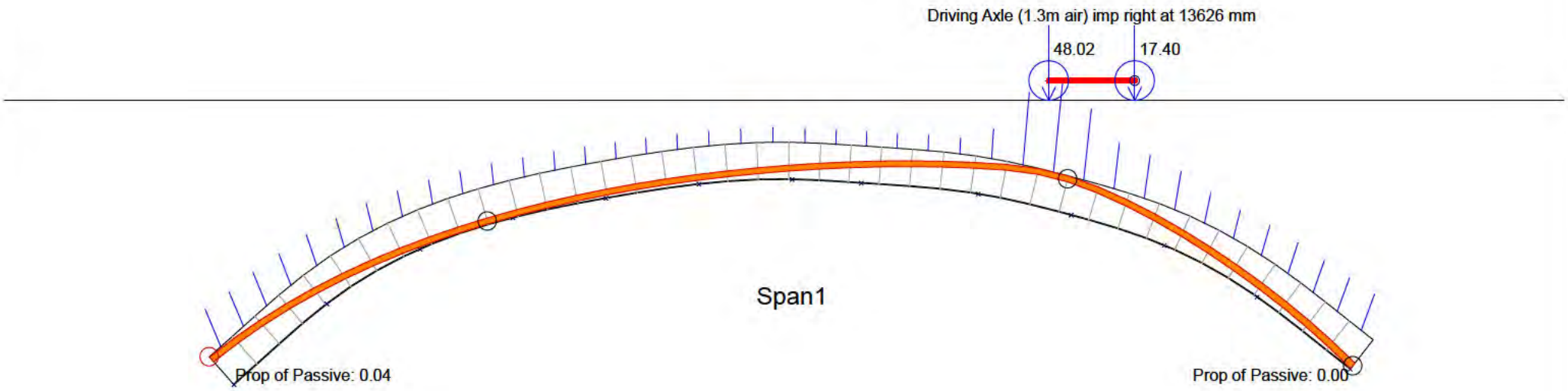
Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree

Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree
Shape: True shape
Span: 16884 [mm] Rise: 3101 [mm] Q-rise: 0 [mm]
Ring thickness at crown:564 [mm] Ring thickness at springing: 564 [mm] Mortar loss 12 [mm]
Masonry unit weight:20.00 [kN/m3] Masonry strength: 3.50 [MPa]

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 tota	Fz tota	My tota	Thrust in	Thrust out	Extra-Thrust
0	0	0	-374	4224	295	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-436.51	-401.63	-185.42	228	397	155
1	350	310	-25	7314	295	11.93	-28.60	2.16	0.00	-0.00	0.00	0.00	-448.44	-373.03	-179.12	224	391	161
2	690	615	316	1037	4295	10.84	-26.10	1.84	0.00	-0.00	0.00	0.00	-459.29	-346.93	-158.83	195	359	193
3	1040	922	676	1353	4295	10.18	-25.44	1.93	0.00	-0.00	0.00	0.00	-469.47	-321.49	-129.14	147	309	243
4	1390	1206	1048	1654	4295	8.74	-23.92	1.72	0.00	-0.00	0.00	0.00	-478.21	-297.58	-99.16	97	257	295
5	1770	1479	1457	1948	4295	7.62	-23.86	2.11	0.00	-0.00	0.00	0.00	-485.83	-273.72	-72.60	51	210	342
6	2160	1719	1881	2209	4295	6.01	-22.30	2.11	0.00	-0.00	0.00	0.00	-491.84	-251.43	-54.69	20	178	374
7	2570	1934	2324	2442	4295	4.76	-21.13	2.34	0.00	-0.00	0.00	0.00	-496.60	-230.29	-44.66	3	160	392
8	2990	2121	2776	2643	4295	3.66	-19.63	2.41	0.00	-0.00	0.00	0.00	-500.26	-210.66	-41.99	-0	155	397
9	3420	2283	3235	2816	4295	2.82	-18.31	2.50	0.00	-0.00	0.00	0.00	-503.08	-192.35	-45.70	8	162	390
10	3850	2419	3692	2960	4295	2.11	-16.80	2.43	0.00	-0.00	0.00	0.00	-505.19	-175.55	-54.92	27	179	373
11	4300	2540	4162	3087	4295	1.67	-16.14	2.62	0.00	-0.00	0.00	0.00	-506.87	-159.41	-67.96	52	204	348
12	4740	2643	4620	3194	4295	1.29	-14.71	2.42	0.00	-0.00	0.00	0.00	-508.15	-144.70	-81.72	80	230	322
13	5200	2736	5093	3290	4295	1.05	-14.33	2.58	0.00	-0.00	0.00	0.00	-509.20	-130.37	-96.91	110	260	292
14	5650	2819	5551	3374	4295	0.85	-13.14	2.35	0.00	-0.00	0.00	0.00	-510.04	-117.22	-109.69	135	285	267
15	6100	2897	6009	3454	4295	0.73	-12.47	2.28	0.00	-0.00	0.00	0.00	-510.77	-104.75	-119.27	155	303	249
16	6550	2966	6471	3524	4295	0.59	-11.90	2.22	0.00	-0.00	0.00	0.00	-511.36	-92.85	-127.99	172	321	231
17	7010	3026	6947	3586	4295	0.48	-11.66	2.30	0.00	-0.00	0.00	0.00	-511.84	-81.20	-136.94	191	338	214
18	7470	3070	7427	3632	4295	0.33	-11.26	2.31	0.00	-0.00	0.00	0.00	-512.17	-69.94	-148.90	215	362	190
19	7930	3096	7911	3660	4295	0.18	-10.98	2.37	0.00	-0.00	0.00	0.00	-512.35	-58.96	-165.08	248	395	157
20	8390	3101	8397	3665	4295	0.03	-10.86	2.47	0.00	-0.00	0.00	0.00	-512.39	-48.09	-187.14	293	439	113
21	8850	3085	8877	3648	4295	-0.11	-10.83	2.57	-0.00	-0.10	0.05	0.00	-512.27	-37.16	-215.07	34	949	557
22	9300	3057	9336	3620	4295	-0.20	-10.59	2.54	-0.52	-20.55	6.72	0.00	-511.56	-6.02	-241.37	4005	466	
23	9760	3027	9797	3590	4295	-0.22	-10.94	2.71	-1.51	-57.22	14.82	0.00	-509.83	62.14	-245.61	406	552	-0 ***

24	10220	2996	10263	3558	4295	-0.24	-11.28	2.82	-0.89	-32.49	6.32	0.00	-508.71	105.92	-221.80	35750448
25	10680	2956	10739	3517	4295	-0.33	-11.78	3.01	-0.04	-1.19	0.09	0.00	-508.34	118.89	-190.52	294442110
26	11140	2899	11223	3457	4295	-0.50	-12.40	3.29	0.00	0.00	0.00	0.00	-507.83	131.29	-162.34	237386166
27	11590	2821	11699	3374	4295	-0.76	-12.85	3.51	0.00	0.00	0.00	0.00	-507.08	144.13	-140.50	192342210
28	12040	2721	12171	3270	4295	-1.06	-13.58	3.87	0.00	0.00	0.00	0.00	-506.02	157.71	-123.98	159310242
29	12480	2609	12623	3154	4295	-1.30	-14.02	4.04	0.00	0.00	0.00	0.00	-504.72	171.73	-108.98	129281271
30	12930	2487	13084	3030	4295	-1.56	-15.28	4.59	0.00	0.00	0.00	0.00	-503.16	187.01	-90.79	93 246306
31	13370	2357	13541	2894	4295	-1.87	-16.25	4.93	0.00	0.00	0.00	0.00	-501.29	203.27	-71.43	55 209343
32	13800	2210	13998	2738	4295	-2.40	-17.46	5.43	0.00	0.00	0.00	0.00	-498.89	220.72	-55.25	24 179373
33	14230	2034	14460	2549	4295	-3.25	-19.17	6.29	0.00	0.00	0.00	0.00	-495.64	239.90	-45.60	4 161391
34	14640	1834	14903	2333	4295	-4.15	-20.10	6.78	0.00	0.00	0.00	0.00	-491.48	259.99	-44.06	-0 159393
35	15040	1608	15332	2090	4295	-5.26	-21.49	7.59	0.00	0.00	0.00	0.00	-486.22	281.49	-48.93	7 167385
36	15430	1355	15749	1820	4295	-6.57	-22.96	8.44	0.00	0.00	0.00	0.00	-479.66	304.45	-59.99	25 187365
37	15800	1087	16138	1538	4295	-7.66	-23.62	8.82	0.00	0.00	0.00	0.00	-471.99	328.06	-73.93	47 211341
38	16160	80816508	1252	4295	-8.64	-24.52	9.30	0.00	0.00	0.00	0.00	-463.36	352.59	-85.57	64 230322	
39	16520	52216870	9654295	-9.51	-25.93	9.97	0.00	0.00	0.00	0.00	-453.84	378.52	-89.07	66 235317		
40	16884	23617232	6794295	-10.29	-27.89	10.82	0.00	0.00	0.00	0.00	-443.56	406.41	-78.82	46 217335		

Devizes Castle



LC2A 6.5N/mm2 Brick Most onerous vehicle

gammaFl dead load: 1.00
gammaFl superimposed: 1.00
gammaFl live load: 2.32
gammaF3 load effect: 1.00
gammaM material: 1.00
File path: C:\Users\cpires\Documents\Deviszys Castle\Basemodel 3.305.brg

Driving Axle (1.3m air) imp right @ 13626 [mm]

NAME: Devizes Castle
LOCATION: Hillworth Road
NUMBER:
ATKINS
DATE: 30 May 2017
Printed on: Tuesday, May 30, 2017 22:55:15

Bridge Name: Devizes Castle Bridge Location: Hillworth Road
Bridge Number:
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: 2.32 Factor for load effect: 1.00 Factor for material strength: 1.00

APPLIED LOAD CASES
1.Driving Axle (1.3m air) imp right Total weight: 186.39 [kN] Position: 13626 [mm]
19.00 2 1.00 7.50 1.30 20.70 1.00 1.80 2.50
Effective lane width: 3305 [mm] Distr bution length: 1365 [mm]

Applied distribution mode: Archie-M, BD21/97
Applied live load pressure: Active pressure

STRUCTURE PROPERTIES
Road shape: Flat line (1-point method)
Road points: (0, 4295)
Depth of surfacing: 1 Depth of overlay: 0
Surface unit weight: 18.00 [kN/m3] Overlay unit weight: 18.00 [kN/m3]
Lane width: 2500

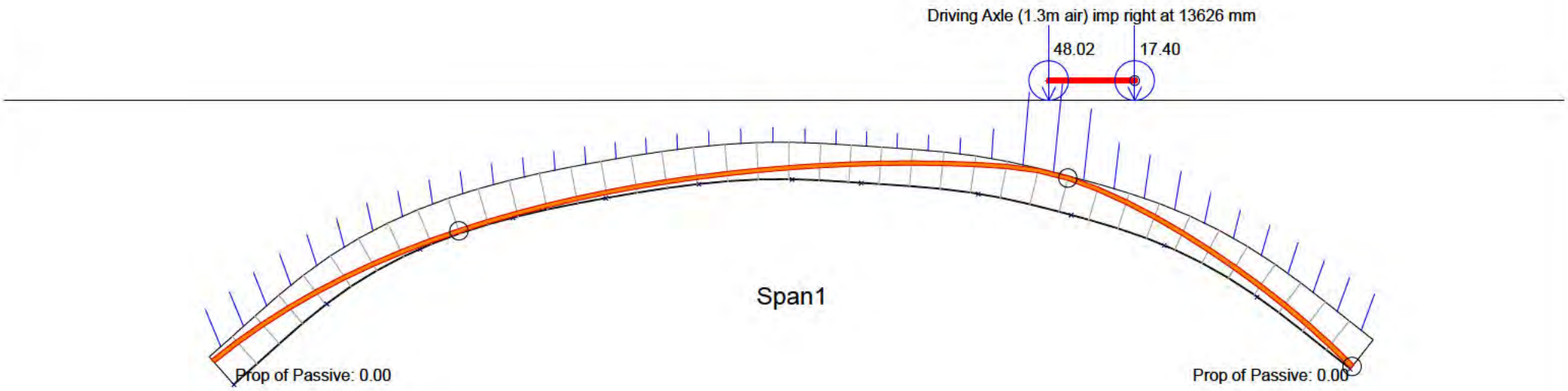
Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree

Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree
Shape: True shape
Span: 16884 [mm] Rise: 3101 [mm] Q-rise: 0 [mm]
Ring thickness at crown:564 [mm] Ring thickness at springing: 564 [mm] Mortar loss 12 [mm]
Masonry unit weight:20.00 [kN/m3] Masonry strength: 6.50 [MPa]

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 tota	Fz tota	My tota	Thrust in	Thrust out	Extra-Thrust
0	0	0	-374	4224	295	0.00	0.00	0.00	0.00	0.00	0.00	0.10	-490.81	-395.39	-314.34	4515	484	
1	350	310	-25	7314	295	11.93	-28.60	2.16	0.00	-0.00	0.00	0.25	-502.85	-366.79	-289.05	4195	1438	
2	690	615	316	1037	4295	10.84	-26.10	1.84	0.00	-0.00	0.00	0.38	-513.94	-340.69	-250.12	3634	5795	
3	1040	922	676	1353	4295	10.18	-25.44	1.93	0.00	-0.00	0.00	0.45	-524.50	-315.25	-201.55	2873	80172	
4	1390	1206	1048	1654	4295	8.74	-23.92	1.72	0.00	-0.00	0.00	0.50	-533.70	-291.34	-153.87	2103	02250	
5	1770	1479	1457	1948	4295	7.62	-23.86	2.11	0.00	-0.00	0.00	0.47	-541.82	-267.48	-109.92	1372	30322	
6	2160	1719	1881	2209	4295	6.01	-22.30	2.11	0.00	-0.00	0.00	0.43	-548.30	-245.19	-76.27	82	174378	
7	2570	1934	2324	2442	4295	4.76	-21.13	2.34	0.00	-0.00	0.00	0.37	-553.48	-224.05	-51.68	41	133419	
8	2990	2121	2776	2643	4295	3.66	-19.63	2.41	0.00	-0.00	0.00	0.31	-557.51	-204.42	-35.89	15	106446	
9	3420	2283	3235	2816	4295	2.82	-18.31	2.50	0.00	-0.00	0.00	0.25	-560.64	-186.11	-27.76	2	92	460
10	3850	2419	3692	2960	4295	2.11	-16.80	2.43	0.00	-0.00	0.00	0.00	-563.00	-169.31	-26.56	-0	90	462
11	4300	2540	4162	3087	4295	1.67	-16.14	2.62	0.00	-0.00	0.00	0.00	-564.67	-153.17	-29.78	6	96	456
12	4740	2643	4620	3194	4295	1.29	-14.71	2.42	0.00	-0.00	0.00	0.00	-565.96	-138.46	-34.84	15	105447	
13	5200	2736	5093	3290	4295	1.05	-14.33	2.58	0.00	-0.00	0.00	0.00	-567.00	-124.13	-41.78	27	117435	
14	5650	2819	5551	3374	4295	0.85	-13.14	2.35	0.00	-0.00	0.00	0.00	-567.85	-110.98	-46.95	37	126426	
15	6100	2897	6009	3454	4295	0.73	-12.47	2.28	0.00	-0.00	0.00	0.00	-568.58	-98.51	-49.21	41	130422	
16	6550	2966	6471	3524	4295	0.59	-11.90	2.22	0.00	-0.00	0.00	0.00	-569.17	-86.61	-51.14	45	133419	
17	7010	3026	6947	3586	4295	0.48	-11.66	2.30	0.00	-0.00	0.00	0.00	-569.64	-74.96	-53.74	49	138414	
18	7470	3070	7427	3632	4295	0.33	-11.26	2.31	0.00	-0.00	0.00	0.00	-569.97	-63.70	-60.28	61	149403	
19	7930	3096	7911	3660	4295	0.18	-10.98	2.37	0.00	-0.00	0.00	0.00	-570.16	-52.72	-72.08	82	170382	
20	8390	3101	8397	3665	4295	0.03	-10.86	2.47	0.00	-0.00	0.00	0.00	-570.19	-41.85	-90.97	116	204348	
21	8850	3085	8877	3648	4295	-0.11	-10.83	2.57	-0.00	-0.00	0.00	0.00	-570.08	-31.02	-116.96	162	250302	
22	9300	3057	9336	3620	4295	-0.20	-10.59	2.54	-0.00	-0.00	0.00	0.00	-569.89	-20.43	-144.66	211	299253	
23	9760	3027	9797	3590	4295	-0.22	-10.94	2.71	-0.00	-0.00	0.00	0.00	-569.67	-9.49	-168.83	254	341211	

24	10220	2996	10263	3558	4295	-0.24	-11.28	2.82	-0.00	-0.00	0.00	0.00	-569.43	1.79	-188.49	288376176	
25	10680	2956	10739	3517	4295	-0.33	-11.78	3.01	-0.00	-0.00	0.00	0.00	-569.11	13.57	-208.04	323410142	
26	11140	2899	11223	3457	4295	-0.50	-12.40	3.29	-0.00	-0.01	0.00	0.00	-568.60	25.98	-231.82	36645399	
27	11590	2821	11699	3374	4295	-0.76	-12.85	3.51	-0.70	-9.89	3.85	0.00	-567.15	48.71	-261.52	41950646	
28	12040	2721	12171	3270	4295	-1.06	-13.58	3.87	-3.82	-42.36	13.93	0.00	-562.28	104.65	-288.45	4615493	
29	12480	2609	12623	3154	4295	-1.30	-14.02	4.04	-5.70	-55.20	16.71	0.00	-555.28	173.87	-294.89	463552-0	***
30	12930	2487	13084	3030	4295	-1.56	-15.28	4.59	-4.33	-39.36	11.50	0.00	-549.39	228.52	-275.15	42051141	
31	13370	2357	13541	2894	4295	-1.87	-16.25	4.93	-2.22	-18.54	5.61	0.00	-545.29	263.31	-240.68	355448104	
32	13800	2210	13998	2738	4295	-2.40	-17.46	5.43	-2.16	-15.54	5.09	0.00	-540.73	296.31	-203.21	286380172	
33	14230	2034	14460	2549	4295	-3.25	-19.17	6.29	-1.71	-10.29	3.33	0.00	-535.77	325.77	-166.98	221316236	
34	14640	1834	14903	2333	4295	-4.15	-20.10	6.78	-0.58	-2.93	0.85	0.00	-531.04	348.79	-137.75	169266286	
35	15040	1608	15332	2090	4295	-5.26	-21.49	7.59	-0.02	-0.08	0.01	0.00	-525.76	370.36	-115.98	131230322	
36	15430	1355	15749	1820	4295	-6.57	-22.96	8.44	0.00	0.00	0.00	0.00	-519.19	393.32	-102.35	107207345	
37	15800	1087	16138	1538	4295	-7.66	-23.62	8.82	0.00	0.00	0.00	0.00	-511.53	416.94	-93.97	92	193359
38	16160	80816508		1252	4295	-8.64	-24.52	9.30	0.00	0.00	0.00	0.00	-502.89	441.46	-84.64	75	178374
39	16520	52216870		9654295		-9.51	-25.93	9.97	0.00	0.00	0.00	0.00	-493.38	467.39	-67.45	48	152400
40	16884	23617232		6794295		-10.29	-27.89	10.82	0.00	0.00	0.00	0.00	-483.09	495.29	-36.15	-0	105447

Devizes Castle



LC3A 8.75N/mm2 Brick Most onerous vehicle

gammaFl dead load: 1.00 Driving Axle (1.3m air) imp right @ 13626 [mm]
gammaFl superimposed: 1.00
gammaFl live load: 2.32
gammaF3 load effect: 1.00
gammaM material: 1.00
File path: C:\Users\cpires\Documents\Deviszys Castle\Basemodel 3.305.brg

NAME: Devizes Castle
LOCATION: Hillworth Road
NUMBER:
ATKINS
DATE: 30 May 2017
Printed on: Tuesday, May 30, 2017 22:56:20

Bridge Name: Devizes Castle Bridge Location: Hillworth Road
Bridge Number:
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: 2.32 Factor for load effect: 1.00 Factor for material strength: 1.00

APPLIED LOAD CASES
1.Driving Axle (1.3m air) imp right Total weight: 186.39 [kN] Position: 13626 [mm]
19.00 2 1.00 7.50 1.30 20.70 1.00 1.80 2.50
Effective lane width: 3305 [mm] Distr bution length: 1365 [mm]

Applied distribution mode: Archie-M, BD21/97
Applied live load pressure: Active pressure

STRUCTURE PROPERTIES
Road shape: Flat line (1-point method)
Road points: (0, 4295)
Depth of surfacing: 1 Depth of overlay: 0
Surface unit weight: 18.00 [kN/m3] Overlay unit weight: 18.00 [kN/m3]
Lane width: 2500

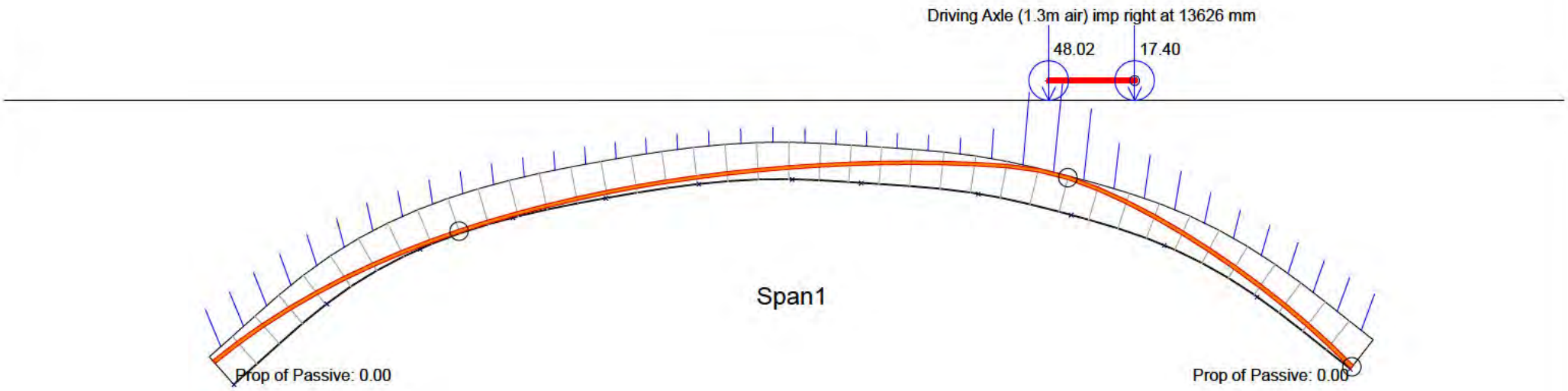
Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree

Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree
Shape: True shape
Span: 16884 [mm] Rise: 3101 [mm] Q-rise: 0 [mm]
Ring thickness at crown:564 [mm] Ring thickness at springing: 564 [mm] Mortar loss 12 [mm]
Masonry unit weight:20.00 [kN/m3] Masonry strength: 8.75 [MPa]

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 tota	Fz tota	My tota	Thrust in	Thrust out	Extra-Thrust
0	0	0	-374	4224	295	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-487.02	-396.40	-292.58	43050	250	
1	350	310	-25	7314	295	11.93	-28.60	2.16	0.00	-0.00	0.00	0.00	-498.95	-367.80	-268.79	40047	181	
2	690	615	3161037	4295	10.84	-26.10	1.84	0.00	-0.00	0.00	0.00	-509.80	-341.70	-231.31	346415	137		
3	1040	922	6761353	4295	10.18	-25.44	1.93	0.00	-0.00	0.00	0.00	-519.98	-316.26	-184.27	272341	211		
4	1390	1206	1048	1654	4295	8.74	-23.92	1.72	0.00	-0.00	0.00	0.00	-528.72	-292.34	-138.09	197265	287	
5	1770	1479	1457	1948	4295	7.62	-23.86	2.11	0.00	-0.00	0.00	0.00	-536.34	-268.49	-95.73	127195	357	
6	2160	1719	1881	2209	4295	6.01	-22.30	2.11	0.00	-0.00	0.00	0.00	-542.35	-246.19	-63.63	73	141411	
7	2570	1934	2324	2442	4295	4.76	-21.13	2.34	0.00	-0.00	0.00	0.00	-547.11	-225.06	-40.57	35	102450	
8	2990	2121	2776	2643	4295	3.66	-19.63	2.41	0.00	-0.00	0.00	0.00	-550.77	-205.43	-26.24	11	78	474
9	3420	2283	3235	2816	4295	2.82	-18.31	2.50	0.00	-0.00	0.00	0.00	-553.59	-187.12	-19.50	-0	67	485
10	3850	2419	3692	2960	4295	2.11	-16.80	2.43	0.00	-0.00	0.00	0.00	-555.70	-170.31	-19.59	0	67	485
11	4300	2540	4162	3087	4295	1.67	-16.14	2.62	0.00	-0.00	0.00	0.00	-557.38	-154.17	-24.15	9	75	477
12	4740	2643	4620	3194	4295	1.29	-14.71	2.42	0.00	-0.00	0.00	0.00	-558.66	-139.46	-30.40	20	86	466
13	5200	2736	5093	3290	4295	1.05	-14.33	2.58	0.00	-0.00	0.00	0.00	-559.71	-125.13	-38.49	34	100	452
14	5650	2819	5551	3374	4295	0.85	-13.14	2.35	0.00	-0.00	0.00	0.00	-560.55	-111.99	-44.71	46	111	441
15	6100	2897	6009	3454	4295	0.73	-12.47	2.28	0.00	-0.00	0.00	0.00	-561.28	-99.52	-48.00	52	117	435
16	6550	2966	6471	3524	4295	0.59	-11.90	2.22	0.00	-0.00	0.00	0.00	-561.87	-87.62	-50.88	57	122	430
17	7010	3026	6947	3586	4295	0.48	-11.66	2.30	0.00	-0.00	0.00	0.00	-562.35	-75.96	-54.38	63	128	424
18	7470	3070	7427	3632	4295	0.33	-11.26	2.31	0.00	-0.00	0.00	0.00	-562.68	-64.71	-61.71	77	141	411
19	7930	3096	7911	3660	4295	0.18	-10.98	2.37	0.00	-0.00	0.00	0.00	-562.86	-53.72	-74.17	99	164	388
20	8390	3101	8397	3665	4295	0.03	-10.86	2.47	0.00	-0.00	0.00	0.00	-562.90	-42.86	-93.55	134	198	354
21	8850	3085	8877	3648	4295	-0.11	-10.83	2.57	-0.00	-0.00	0.00	0.00	-562.79	-32.03	-119.89	182	246	306
22	9300	3057	9336	3620	4295	-0.20	-10.59	2.54	-0.00	-0.00	0.00	0.00	-562.59	-21.44	-147.84	232	296	256
23	9760	3027	9797	3590	4295	-0.22	-10.94	2.71	-0.00	-0.00	0.00	0.00	-562.37	-10.50	-172.25	275	339	213

24	10220	2996	10263	3558	4295	-0.24	-11.28	2.82	-0.00	-0.00	0.00	0.00	-562.14	0.78	-192.15	311	375177
25	10680	2956	10739	3517	4295	-0.33	-11.78	3.01	-0.00	-0.00	0.00	0.00	-561.81	12.57	-211.87	346	410142
26	11140	2899	11223	3457	4295	-0.50	-12.40	3.29	-0.00	-0.01	0.00	0.00	-561.31	24.97	-235.70	39	045498
27	11590	2821	11699	3374	4295	-0.76	-12.85	3.51	-0.70	-9.89	3.85	0.00	-559.86	47.70	-265.28	44	350745
28	12040	2721	12171	3270	4295	-1.06	-13.58	3.87	-3.82	-42.36	13.93	0.00	-554.98	103.64	-291.94	4	855502
29	12480	2609	12623	3154	4295	-1.30	-14.02	4.04	-5.70	-55.20	16.71	0.00	-547.99	172.86	-298.00	486	552-0 ***
30	12930	2487	13084	3030	4295	-1.56	-15.28	4.59	-4.33	-39.36	11.50	0.00	-542.09	227.51	-277.82	44	350943
31	13370	2357	13541	2894	4295	-1.87	-16.25	4.93	-2.22	-18.54	5.61	0.00	-538.00	262.30	-242.85	376	444108
32	13800	2210	13998	2738	4295	-2.40	-17.46	5.43	-2.16	-15.54	5.09	0.00	-533.43	295.30	-204.74	305	374178
33	14230	2034	14460	2549	4295	-3.25	-19.17	6.29	-1.71	-10.29	3.33	0.00	-528.48	324.76	-167.66	237	308244
34	14640	1834	14903	2333	4295	-4.15	-20.10	6.78	-0.58	-2.93	0.85	0.00	-523.74	347.79	-137.38	184	255297
35	15040	1608	15332	2090	4295	-5.26	-21.49	7.59	-0.02	-0.08	0.01	0.00	-518.47	369.36	-114.36	144	216336
36	15430	1355	15749	1820	4295	-6.57	-22.96	8.44	0.00	0.00	0.00	0.00	-511.90	392.32	-99.27	117	191361
37	15800	1087	16138	1538	4295	-7.66	-23.62	8.82	0.00	0.00	0.00	0.00	-504.24	415.93	-89.31	99	174378
38	16160	80816508		1252	4295	-8.64	-24.52	9.30	0.00	0.00	0.00	0.00	-495.60	440.45	-78.30	81	156396
39	16520	52216870		9654295		-9.51	-25.93	9.97	0.00	0.00	0.00	0.00	-486.09	466.39	-59.39	50	127425
40	16884	23617232		6794295		-10.29	-27.89	10.82	0.00	0.00	0.00	0.00	-475.80	494.28	-26.38	-0	78 474

Devizes Castle



LC4A 10.5N/mm2 Brick Most onerous vehicle

gammaFl dead load: 1.00 Driving Axle (1.3m air) imp right @ 13626 [mm]
gammaFl superimposed: 1.00
gammaFl live load: 2.32
gammaF3 load effect: 1.00
gammaM material: 1.00
File path: C:\Users\cpires\Documents\Deviszys Castle\Basemodel 3.305.brg

NAME: Devizes Castle
LOCATION: Hillworth Road
NUMBER:
ATKINS
DATE: 30 May 2017
Printed on: Tuesday, May 30, 2017 22:57:20

Bridge Name: Devizes Castle Bridge Location: Hillworth Road
Bridge Number:
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: 2.32 Factor for load effect: 1.00 Factor for material strength: 1.00

APPLIED LOAD CASES
1.Driving Axle (1.3m air) imp right Total weight: 186.39 [kN] Position: 13626 [mm]
19.00 2 1.00 7.50 1.30 20.70 1.00 1.80 2.50
Effective lane width: 3305 [mm] Distr bution length: 1365 [mm]

Applied distribution mode: Archie-M, BD21/97
Applied live load pressure: Active pressure

STRUCTURE PROPERTIES
Road shape: Flat line (1-point method)
Road points: (0, 4295)
Depth of surfacing: 1 Depth of overlay: 0
Surface unit weight: 18.00 [kN/m3] Overlay unit weight: 18.00 [kN/m3]
Lane width: 2500

Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree

Fill unit weight: 18.00 [kN/m3] Fill phi: 25 degree
Shape: True shape
Span: 16884 [mm] Rise: 3101 [mm] Q-rise: 0 [mm]
Ring thickness at crown:564 [mm] Ring thickness at springing: 564 [mm] Mortar loss 12 [mm]
Masonry unit weight:20.00 [kN/m3] Masonry strength: 10.50 [MPa]

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 tota	Fz tota	My tota	Thrust in	Thrust out	Extra-Thrust
0	0	0	-374	4224	295	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-483.69	-396.82	-280.1141847874			
1	350	310	-25	7314	295	11.93	-28.60	2.16	0.00	-0.00	0.00	0.00	-495.62	-368.22	-257.50	389448104		
2	690	6153	161037	4295	10.84	-26.10	1.84	0.00	-0.00	0.00	0.00	-506.47	-342.12	-221.19	336394158			
3	1040	9226	761353	4295	10.18	-25.44	1.93	0.00	-0.00	0.00	0.00	-516.65	-316.68	-175.31	264321231			
4	1390	1206	1048	1654	4295	8.74	-23.92	1.72	0.00	-0.00	0.00	0.00	-525.39	-292.76	-130.23	190247305		
5	1770	1479	1457	1948	4295	7.62	-23.86	2.11	0.00	-0.00	0.00	0.00	-533.01	-268.91	-88.94	122178374		
6	2160	1719	1881	2209	4295	6.01	-22.30	2.11	0.00	-0.00	0.00	0.00	-539.02	-246.61	-57.80	70	126426	
7	2570	1934	2324	2442	4295	4.76	-21.13	2.34	0.00	-0.00	0.00	0.00	-543.78	-225.48	-35.63	33	89	463
8	2990	2121	2776	2643	4295	3.66	-19.63	2.41	0.00	-0.00	0.00	0.00	-547.44	-205.85	-22.11	10	66	486
9	3420	2283	3235	2816	4295	2.82	-18.31	2.50	0.00	-0.00	0.00	0.00	-550.26	-187.54	-16.09	-0	55	497
10	3850	2419	3692	2960	4295	2.11	-16.80	2.43	0.00	-0.00	0.00	0.00	-552.37	-170.73	-16.81	2	57	495
11	4300	2540	4162	3087	4295	1.67	-16.14	2.62	0.00	-0.00	0.00	0.00	-554.05	-154.59	-21.96	11	66	486
12	4740	2643	4620	3194	4295	1.29	-14.71	2.42	0.00	-0.00	0.00	0.00	-555.33	-139.88	-28.74	23	77	475
13	5200	2736	5093	3290	4295	1.05	-14.33	2.58	0.00	-0.00	0.00	0.00	-556.38	-125.55	-37.33	38	93	459
14	5650	2819	5551	3374	4295	0.85	-13.14	2.35	0.00	-0.00	0.00	0.00	-557.22	-112.41	-44.02	50	105	447
15	6100	2897	6009	3454	4295	0.73	-12.47	2.28	0.00	-0.00	0.00	0.00	-557.95	-99.94	-47.75	57	111	441
16	6550	2966	6471	3524	4295	0.59	-11.90	2.22	0.00	-0.00	0.00	0.00	-558.54	-88.04	-51.05	63	117	435
17	7010	3026	6947	3586	4295	0.48	-11.66	2.30	0.00	-0.00	0.00	0.00	-559.02	-76.38	-54.95	71	124	428
18	7470	3070	7427	3632	4295	0.33	-11.26	2.31	0.00	-0.00	0.00	0.00	-559.35	-65.13	-62.62	84	138	414
19	7930	3096	7911	3660	4295	0.18	-10.98	2.37	0.00	-0.00	0.00	0.00	-559.53	-54.14	-75.35	108	161	391
20	8390	3101	8397	3665	4295	0.03	-10.86	2.47	0.00	-0.00	0.00	0.00	-559.57	-43.28	-94.95	143	196	356
21	8850	3085	8877	3648	4295	-0.11	-10.83	2.57	-0.00	-0.00	0.00	0.00	-559.46	-32.45	-121.43	191	244	308
22	9300	3057	9336	3620	4295	-0.20	-10.59	2.54	-0.00	-0.00	0.00	0.00	-559.26	-21.86	-149.47	242	295	257
23	9760	3027	9797	3590	4295	-0.22	-10.94	2.71	-0.00	-0.00	0.00	0.00	-559.04	-10.92	-173.98	286	339	213

24	10220	2996	10263	3558	4295	-0.24	-11.28	2.82	-0.00	-0.00	0.00	0.00	-558.81	0.36	-193.96	322375177	
25	10680	2956	10739	3517	4295	-0.33	-11.78	3.01	-0.00	-0.00	0.00	0.00	-558.48	12.15	-213.74	357410142	
26	11140	2899	11223	3457	4295	-0.50	-12.40	3.29	-0.00	-0.01	0.00	0.00	-557.98	24.55	-237.58	40145498	
27	11590	2821	11699	3374	4295	-0.76	-12.85	3.51	-0.70	-9.89	3.85	0.00	-556.53	47.28	-267.09	45550844	
28	12040	2721	12171	3270	4295	-1.06	-13.58	3.87	-3.82	-42.36	13.93	0.00	-551.65	103.22	-293.60	4975502	
29	12480	2609	12623	3154	4295	-1.30	-14.02	4.04	-5.70	-55.20	16.71	0.00	-544.66	172.44	-299.47	498552-0	***
30	12930	2487	13084	3030	4295	-1.56	-15.28	4.59	-4.33	-39.36	11.50	0.00	-538.76	227.09	-279.08	45350943	
31	13370	2357	13541	2894	4295	-1.87	-16.25	4.93	-2.22	-18.54	5.61	0.00	-534.67	261.88	-243.86	386442110	
32	13800	2210	13998	2738	4295	-2.40	-17.46	5.43	-2.16	-15.54	5.09	0.00	-530.10	294.88	-205.44	314371181	
33	14230	2034	14460	2549	4295	-3.25	-19.17	6.29	-1.71	-10.29	3.33	0.00	-525.15	324.34	-167.95	245304248	
34	14640	1834	14903	2333	4295	-4.15	-20.10	6.78	-0.58	-2.93	0.85	0.00	-520.41	347.37	-137.18	191250302	
35	15040	1608	15332	2090	4295	-5.26	-21.49	7.59	-0.02	-0.08	0.01	0.00	-515.14	368.94	-113.58	150210342	
36	15430	1355	15749	1820	4295	-6.57	-22.96	8.44	0.00	0.00	0.00	0.00	-508.57	391.90	-97.81	122183369	
37	15800	1087	16138	1538	4295	-7.66	-23.62	8.82	0.00	0.00	0.00	0.00	-500.91	415.51	-87.11	103165387	
38	16160	80816508		1252	4295	-8.64	-24.52	9.30	0.00	0.00	0.00	0.00	-492.27	440.03	-75.33	83	146406
39	16520	52216870		9654295		-9.51	-25.93	9.97	0.00	0.00	0.00	0.00	-482.76	465.97	-55.61	51	115437
40	16884	23617232		6794295		-10.29	-27.89	10.82	0.00	0.00	0.00	0.00	-472.47	493.86	-21.80	-0	64 488

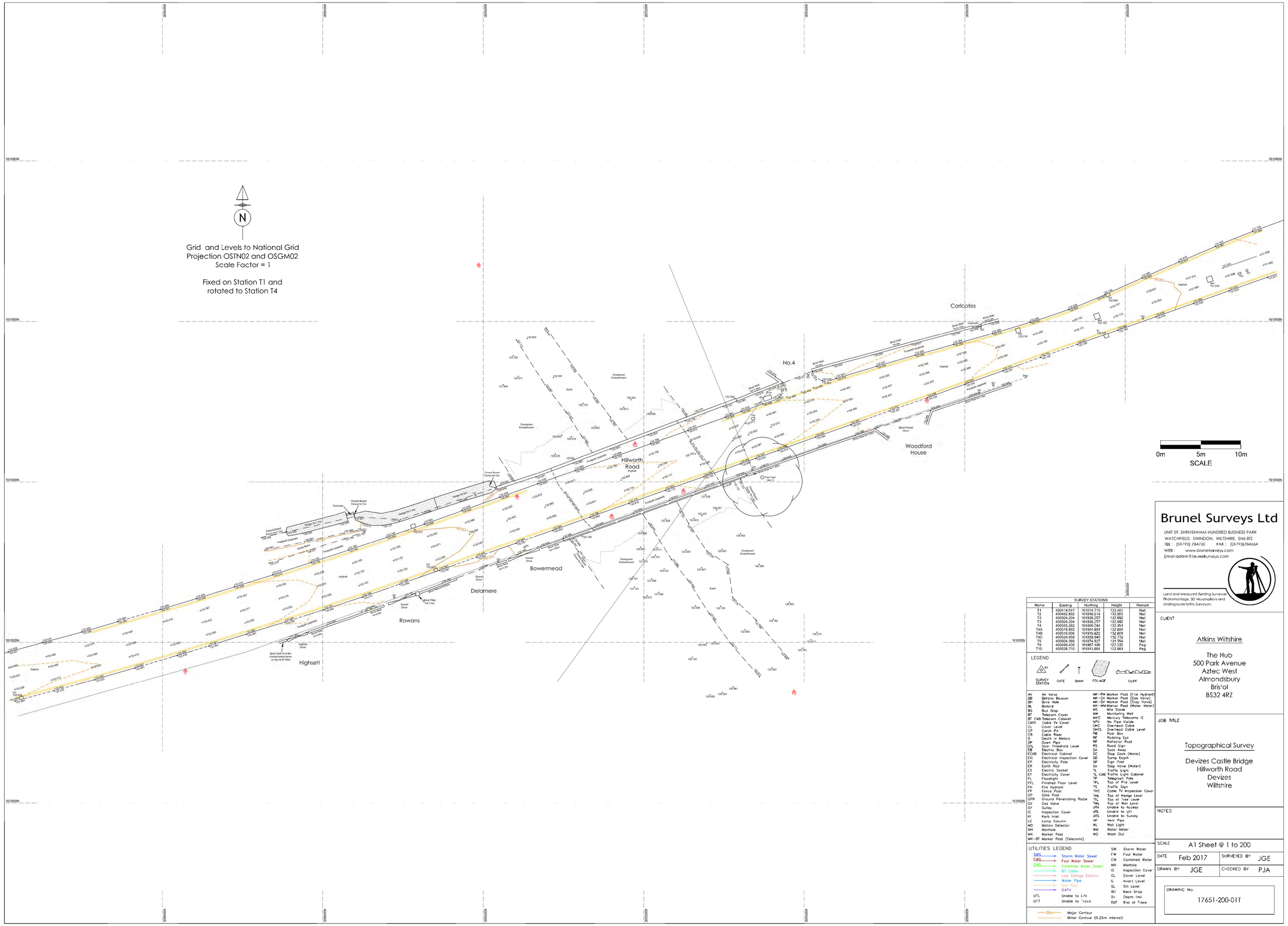
Chris Pires
Atkins, Unit 2200,
Cork Airport Business Park, Co. Cork.

chris.pires@atkinsglobal.com
0044 (0)21 4290 300

Appendix C. Topographical Survey

Grid and Levels to National Grid
Projection OSTN02 and OSGM02
Scale Factor = 1

Fixed on Station T1 and
rotated to Station T4



SURVEY STATIONS				
Name	Easting	Northing	Height	Remark
T1	400414.647	161014.715	133.451	Nail
T2	400462.882	161316.314	133.365	Nail
T3	400504.204	161338.257	132.882	Nail
T3	400504.204	161338.257	132.882	Nail
T4	400555.262	161050.244	132.351	Nail
T4A	400518.893	161044.801	132.804	Nail
T4B	400516.006	161035.822	132.809	Nail
T4C	400524.958	161038.949	132.772	Nail
T5	400604.366	161074.927	131.554	Nail
T9	400469.430	161067.100	122.232	Peg
T10	400538.710	161013.884	122.861	Peg

LEGEND

SURVEY STATION · GATE · BANK · FOLIAGE · CLIFF

AV	Air Valve	MK-FH	Marker Post (Fire Hydrant)
BB	Bersha Beacon	MK-GV	Marker Post (Gas Valve)
BH	Bore Hole	MK-SV	Marker Post (Stop Valve)
BL	Bollard	MK-WM	Marker Post (Water Meter)
BS	Bus Stop	MS	Mile Stone
BT	Telecom Cover	MW	Monitoring Well
BT CAB	Telecom Cabinet	MYC	Mercury Telecoms IC
CATV	Cable TV Cover	NPV	No Pipe Visible
CL	Cover Level	OHC	Overhead Cable
CP	Catch Pit	OHCL	Overhead Cable Level
CR	Cable Riser	PB	Post Box
D	Depth in Meters	RE	Rodding Eye
DP	Down Pipe	RP	Reflector Post
DTL	Door Threshold Level	RS	Road Sign
EB	Electric Box	SA	Soak Away
ECAB	Electrical Cabinet	SC	Stop Cock (Water)
EIC	Electrical Inspection Cover	SD	Sump Depth
EP	Electricity Pole	SP	Sign Post
ER	Earth Rod	SV	Stop Valve (Water)
ES	Electric Socket	TL	Traffic Light
EY	Electricity Cover	TL CAB	Traffic Light Cabinet
FL	Floodlight	TP	Telegraph Pole
FFL	Finished Floor Level	TPL	Top of Pile Level
FH	Fire Hydrant	TS	Traffic Sign
FP	Fence Post	TVIC	Cable TV Inspection Cover
GP	Gate Post	THL	Top of Hedge Level
GPR	Ground Penetrating Radar	TTL	Top of Tree Level
GV	Gas Valve	TWL	Top of Wall Level
GY	Gulley	UTA	Unable to Access
IC	Inspection Cover	UTL	Unable to Lift
KI	Kerb Inlet	UTS	Unable to Survey
LC	Lamp Column	VP	Vent Pipe
MD	Motion Detector	WL	Wall Light
MH	Manhole	WM	Water Meter
MK	Marker Post	WO	Wash Out
MK-BT	Marker Post (Telecoms)		

UTILITIES LEGEND

SWS	Storm Water Sewer	SW	Storm Water
FWS	Foul Water Sewer	FW	Foul Water
CWS	Combined Water Sewer	CW	Combined Water
	BT Cable	MH	Manhole
	Low Voltage Electric	IC	Inspection Cover
	Water Pipe	CL	Cover Level
	Gas Pipe	IL	Invert Level
	CATV	SL	Silt Level
UTL	Unable to Lift	BD	Back Drop
UTT	Unable to Trace	D=	Depth (m)
		EOT	End of Trace

Brunel Surveys Ltd

UNIT 59, SHRIVENHAM HUNDRED BUSINESS PARK
WATCHFIELD, SWINDON, WILTSHIRE, SN6 8TZ
TEL : (01793) 784700 FAX : (01793)784664
WEB : www.brunelsurveys.com
Email:admin@brunelsurveys.com

Land and Measured Building Surveyors
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Underground Utility Surveyors

CLIENT

Atkins Wiltshire

The Hub
500 Park Avenue
Aztec West
Almondsbury
Bris*ol
BS32 4RZ

JOB TITLE

Topographical Survey

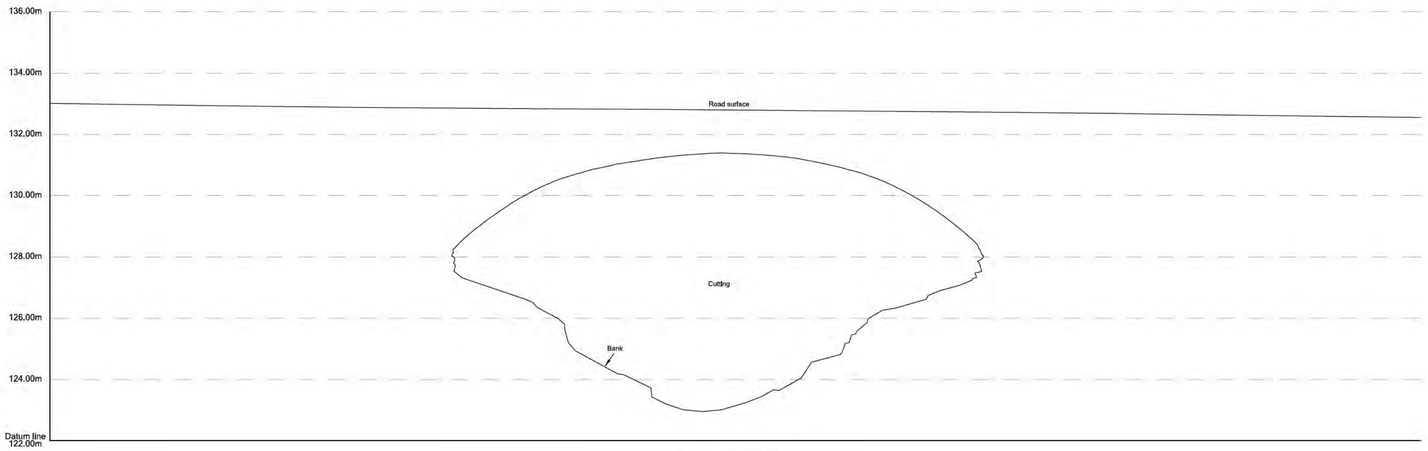
Devizes Castle Bridge
Hillworth Road
Devizes
Wiltshire

NOTES

SCALE	A1 Sheet @ 1 to 200		
DATE	Feb 2017	SURVEYED BY	JGE
DRAWN BY	JGE	CHECKED BY	PJA

DRAWING No.

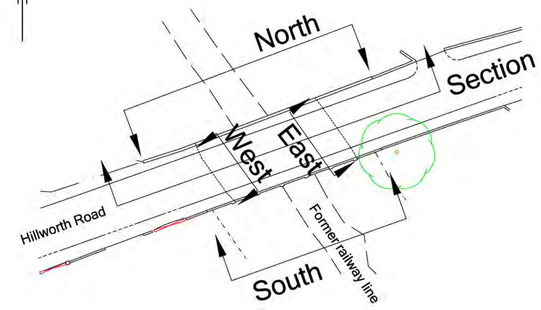
17651-200-01T



LONG SECTION

NORTH

Location Plan - not to scale



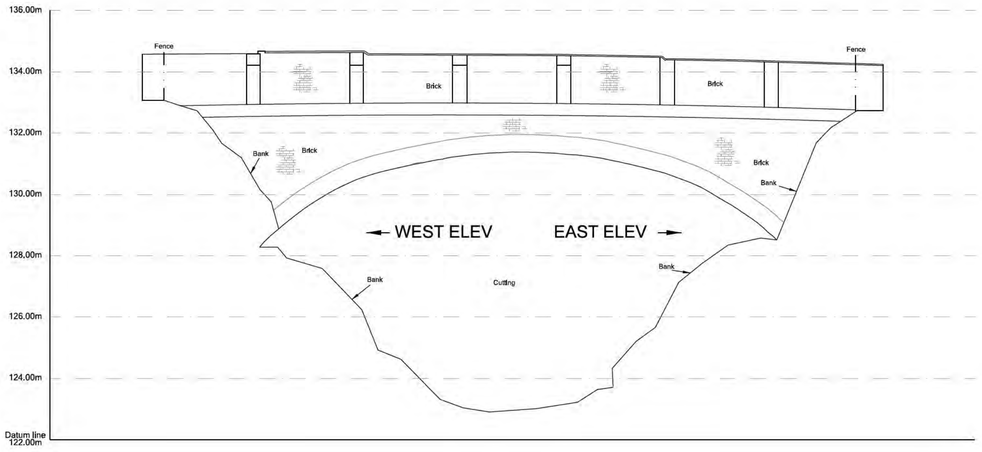
SCALE 0 5 10 Metres

NOTES

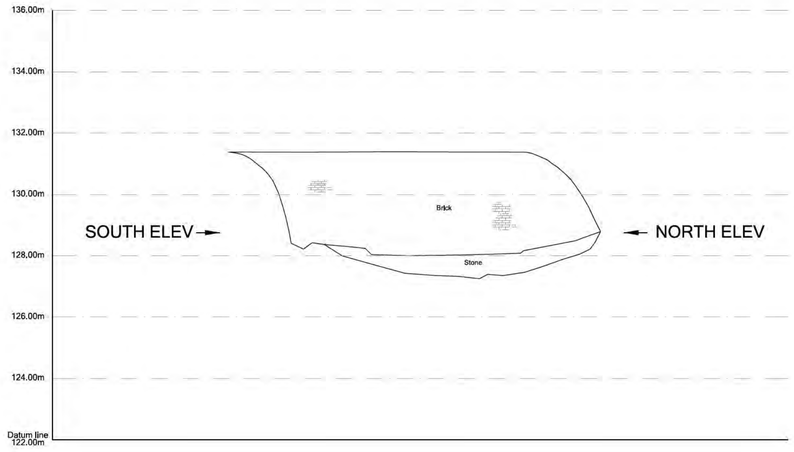
Grid and levels are related to National Grid OSGM15 & OSTN15

LEGEND

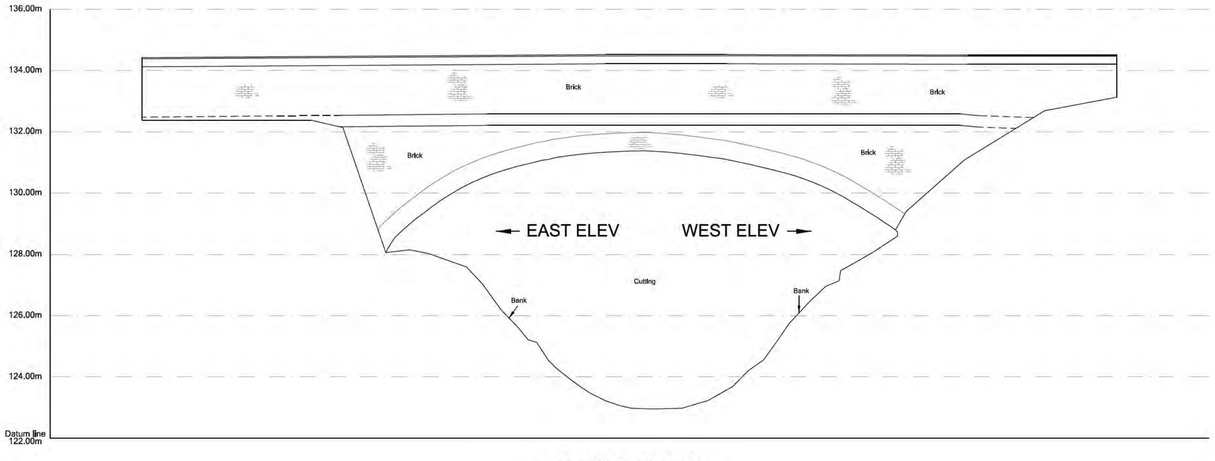
CL	Cill Level
DP	Down pipe
FFL	Finished Floor Level
FCL	Finished Ceiling Level
GY	Gulley
HL	Head Level
IC	Inspection Cover
OHB	Underside Overhead Beam Level
SHL	Structural Head Level
SPL	Spring Point Level
TWL	Top of Wall Level



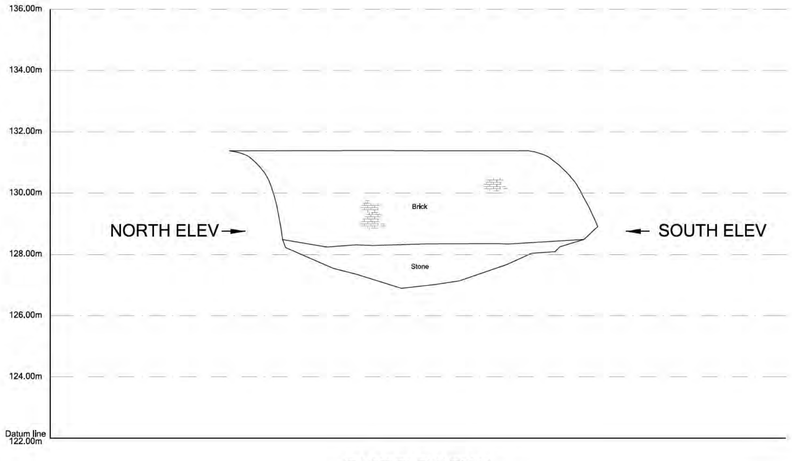
SOUTH ELEVATION



WEST ELEVATION



NORTH ELEVATION



EAST ELEVATION

Brunel Surveys Ltd

UNIT 59, SHRIVENHAM HUNDRED BUSINESS PARK
WATCHFIELD, SWINDON, WILTSHIRE, SN6 8TZ
TEL : (01793) 784700 FAX : (01793)784664
WEB : www.brunelsurveys.com
Email:admin@brunelsurveys.com

Land and Measured Building Surveyors
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Underground Utility Surveyors

CLIENT

Atkins Wiltshire

The Hub
500 Park Avenue
Aztec West
Almondsbury
Bristol
BS32 4RZ

JOB TITLE

Devizes Castle Bridge

Hillworth Road
Devizes
Wiltshire

Ground Floor Plan

REVISIONS

SCALE	A1 Sheet 1 to 100
DATE Jan 2017	SURVEYED BY PJW
DRAWN BY PJW	CHECKED BY PJA

DRAWING No.
17651-100-02E

Sami Ahmed
Atkins Limited
500 Park Avenue
Aztec West, Almondsbury
Bristol, BS32 4RZ
United Kingdom

sami.ahmed@atkinsglobal.com
+44(0) 1454 662240

From: Haines, Julian
To: [redacted]
Subject: RE: Hillworth Road / Devizes Castle Bridge, Devizes 85m 38c BHL
Date: 14 September 2017 14:52:00
Attachments: image001.png

[redacted]

I think the problem we have had all along with this structure is trying to get an accurate arch profile, not only is it difficult to reach but also it springs from the sides of the cutting rather than having conventional abutments. Having personally been involved in the 2002 report survey I wouldn't claim that to be 100% accurate.

The survey we did for this latest assessment was a laser scan of the structure so I am confident it is correct. I believe the span / rise we have used is the centreline of the bridge rather than one of the elevations which was possibly what was used before; the photo below shows why there is probably some ambiguity between the two. Quite why there is such a large difference between your archive data and what we have found through laser scanning I'm not sure, it does look as if there has been some localised embankment erosion which may have led to an apparent increase in span in the absence of any 'fixed' abutments.

I think this bridge was due it's next detailed inspection earlier this summer, would you be able to share the report once you have received it?

Julian Haines
Structures and Highway Improvements
Wiltshire Council
Bythesea Road
Trowbridge
Wiltshire
BA14 8JD

Direct Dial 01225 713382

Mob [redacted]

E-mail: julian.haines@wiltshire.gov.uk
Website: www.wiltshire.gov.uk

From: [redacted] [mailto:[redacted]highwaysengland.co.uk]
Sent: 14 September 2017 13:43
To: Haines, Julian
Subject: RE: Hillworth Road / Devizes Castle Bridge, Devizes 85m 38c BHL

Hi Julian

Apologies for the delayed response.

I've just had an initial scan through and the first concern I have is in the span/rise dimensions that we appear to have for each face of this structure:

The archive data gives the face spans as 14.86m & 14.94m.

The 2002 assessment report gives them as 16.4m & 16.7m (with 2.75 & 3.37m 'rise at crown' readings respectively)

This latest assessment gives them as 16.88m with 3.1m 'rise at crown' (presumably taking the worst case)

The spread of results appears quite large, which raises the question as to whether the measurements were inaccurate, and if so which? A possible alternative is that all readings have been accurate and the bridge is spreading/flattening. Comparing the 2017 and 2002 data, the 2017 span is larger than either previously recorded and the 'rise' falls roughly midway between both previously measured. This would, if the results are all accurate, suggest a trend towards a flattening/spreading of the arch.

So, at the risk of a loaded question, how confident are you in the 2002 and 2017 measurements?

Thanks

[redacted]

From: Haines, Julian [mailto:Julian.Haines@wiltshire.gov.uk]
Sent: 10 July 2017 07:37
To: [redacted]
Subject: RE: Hillworth Road / Devizes Castle Bridge, Devizes 85m 38c BHL

[redacted]

I had our Consultant take a look at this bridge as there were always doubts in my mind about the original assessments. They have concluded that the bridge might / should be rated at 40T, could you have a look at their report and let me know what you think?

Cheers

Julian Haines
Structures and Highway Improvements
Wiltshire Council
Bythesea Road
Trowbridge
Wiltshire
BA14 8JD

Direct Dial 01225 713382
Mob [redacted]

E-mail: julian.haines@wiltshire.gov.uk
Website: www.wiltshire.gov.uk

From: [redacted] [mailto:[redacted]highwaysengland.co.uk]
Sent: 14 September 2016 10:16
To: Haines, Julian
Subject: RE: Hillworth Road / Devizes Castle Bridge, Devizes 85m 38c BHL

Morning Julian

In terms of exams reports – the most recent Detailed Exam report is from 2011 and the most recent Visual Exam report is from 2015. I've attached these. As you can see by the dates, we should be receiving the 2016 VE sometime in the next few weeks, so I can forward that when received.
I'm not sure what your timeframes for work are like, but the next DE will be July/Aug next year, which will obviously necessitate 'touching distance' access, so there may be scope for you to piggy-back onto this or for me to see if the examiners will pick up measurements for you – just a thought.
Cheers

[redacted]
Highways England, Historical Railways Estate (on behalf of Department for Transport)
[redacted]
Web: http://www.highwaysengland.co.uk

From: Haines, Julian [mailto:Julian.Haines@wiltshire.gov.uk]
Sent: 14 September 2016 09:24
To: [redacted]
Subject: Hillworth Road / Devizes Castle Bridge, Devizes 85m 38c BHL
[redacted]

We have this structure as a substandard bridge and need to start looking at possible mitigation / strengthening measures. The first thing we will do is undertake a further assessment and profile survey; if you know the bridge you'll realise the difficulties in getting a true profile, recent scanning technology should however solve that for us. I was wondering do you have an up to date PBI for the bridge that you would be willing to share, this would save us the expense of getting scaffold / underbridge unit in .
Cheers

Julian Haines
Structures and Highway Improvements
Wiltshire Council
Bythesea Road
Trowbridge
Wiltshire
BA14 8JD

Direct Dial 01225 713382
Mob [redacted]

E-mail: julian.haines@wiltshire.gov.uk
Website: www.wiltshire.gov.uk
