
STRUCTURAL CALCULATION REPORT

JOB TITLE: MILLENNIUM BRIDGE, STOKE ST MICHAEL, RADSTOCK, BA3
JOB NO: 356

22 July 2024


AND DESIGN BATH LTD

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Contents

Item	Page no.
Introduction and Loading	3
References and Figures	4
Bridge Deck: Precast Concrete Planks	5
Foundations	6

	Chapter	Revision	Page no. 3
	Project Millennium Bridge Rebuild, Stoke St Michael, Radstock, BA3	Job Number 357	
	Structural Calculations	Created by/Date JMR/ 22/07/24	
		Checked by/Date	

Introduction

These calculations provide member sizing for the rebuilding of the Millennium Footbridge in Stoke St Michael, as reflected on the architect's GA drawing A224/05/01 (produced by Barrie Christian Architect).

They should be read in conjunction with marked up structural notes on this drawing to fully explain the proposals.

Loading

A summary of the design loading assumed is as follows:

Bridge Foot Deck		Make-up (assumed)	Load (kN/m²)
	Dead Load	50 stone paviors, 15 mortar bed, membrane	1.50
		100 precast concrete plank	2.50
		total	4.00
	Imposed Load	pedestrian traffic	3.00
Bridge Walls		Make-up (assumed)	Load (kN/m²)
	Dead Load	400 stone (2200kg/m ³)	8.80
		total	8.80

AD	Chapter	Revision	Page no.	
	Project		Job Number	
	Millennium Bridge Rebuild, Stoke St Michael, Radstock, BA3		357	
	Structural Calculations		Created by/Date JMR/ 22/07/24	
			Checked by/Date	

References used for the element design within these calculations are given in Figures 1-3 below:

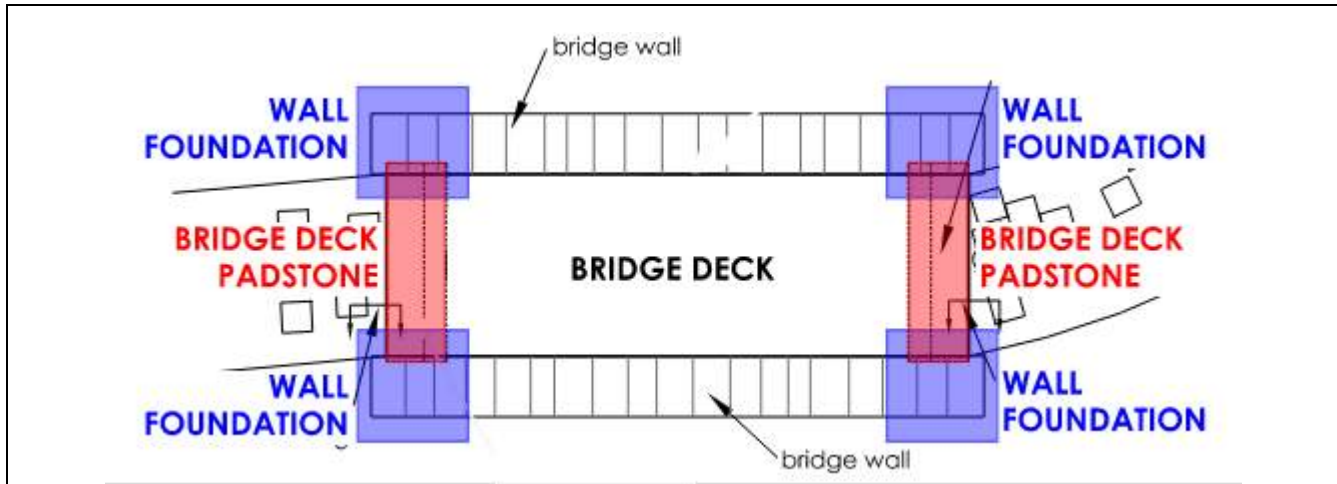


Figure 1: Plan: Bridge Deck, Wall, Padstone and Foundation References

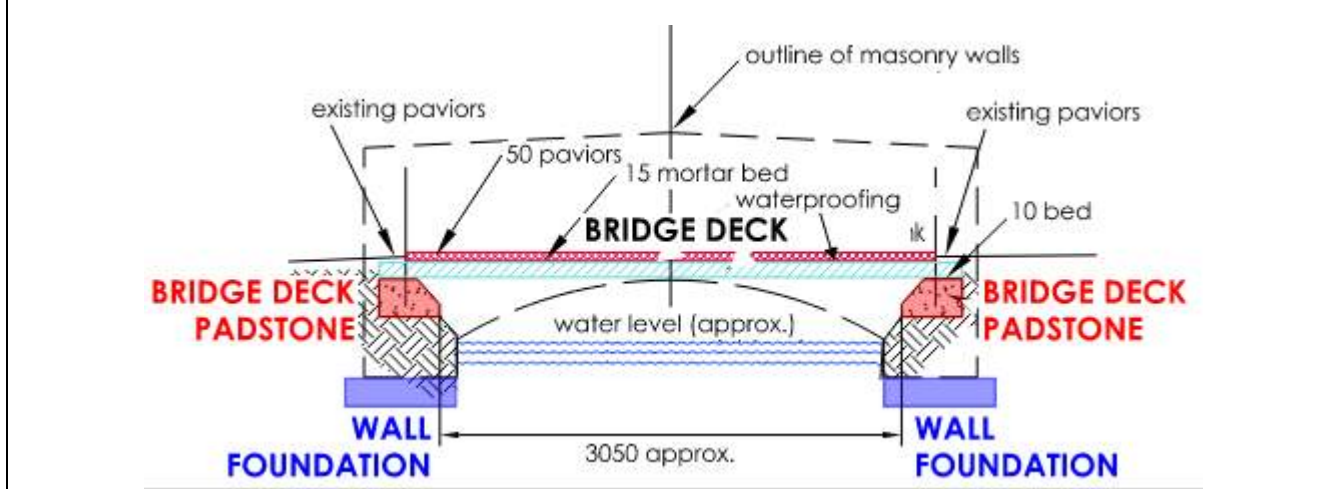


Figure 2: Section: Bridge Deck, Wall, Padstone and Foundation References

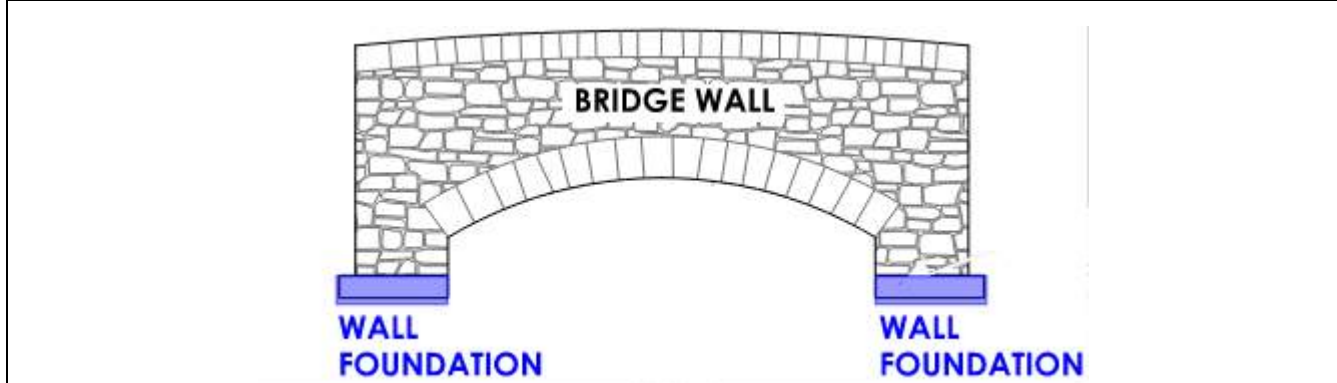



Figure 3: Elevation: Bridge Deck, Wall, Padstone and Foundation References

	Chapter	Revision	Page no. 5
	Project Millennium Bridge Rebuild, Stoke St Michael, Radstock, BA3	Job Number 357	
	Structural Calculations	Created by/Date JMR/ 22/07/24	
		Checked by/Date	

BRIDGE DECK

Precast Deck (1.2m wide planks)

max span = 3.50m (centre to centre of supports)

superimposed DL, $w_{DL} = 1.50\text{kN/m}^2$ (ie not including s/wt plank)

imposed LL, $w_{LL} = 3.00\text{kN/m}^2$

From safe load/span tables (see extract from Coltman Precast Concrete below):

▲ COLTMAN PRE-STRESSED CONCRETE SOLID AND HOLLOW CORE SLABS

Coltman Pre-stressed Concrete Solid and Hollow Core Slabs • Imposed Live Load vs Clear Span Tables •
Design to Eurocode EC2 • 60 Minutes Fire Resistance


Type	Depth of precast unit (mm)	Self weight including infill (kN/m^2)	Allowable clear span (m) for imposed live load (kN/m^2) and floor usage										
			Domestic/Residential/Offices						Retail/Congregation		Storage		
			0.75	1.50	2.00	2.50	3.00	4.00	5.00	7.50	10.00	15.00	
Solid K75	75	1.76	3.80	3.79	3.69	3.61	3.53	3.39	2.83	2.50	2.05	1.78	
Solid L100	100	2.35	5.30	5.30	5.18	5.07	4.97	4.78	3.87	3.37	2.77	2.40	
Solid Z150	150	3.53	7.69	7.47	7.34	7.13	6.90	6.49	5.87	5.11	4.20	3.66	
Solid X200	200	4.71	9.66	9.43	9.28	9.14	8.88	8.41	7.69	6.85	5.64	4.91	
Hollow Core A150	150	2.35	7.80	7.80	7.80	7.70	7.54	7.20	5.64	4.92	4.04	3.52	
Hollow Core high Density D150	150	2.96	7.80	7.80	7.76	7.61	7.47	7.09	5.83	5.08	4.18	3.64	
Hollow Core C200	200	2.94	10.30	10.16	9.96	9.76	9.58	9.26	7.43	6.48	5.33	4.64	
Hollow Core E250	250	3.66	11.80	11.80	11.79	11.59	11.40	11.05	9.21	8.03	6.61	5.76	

Data include 1.75 kN/m^2 for finishes

Using solid L100 unit (as highlighted); with $\text{SDL} = 1.75\text{kN/m}^2$ and $\text{LL} = 3.00\text{kN/m}^2$

max. safe span = $4.97\text{m} > 3.50\text{m} \therefore \text{OK}$

USE: 100dp PRESTRESSED CONCRETE PLANKS
(SOLID L100, BY COLTMAN PRECAST CONCRETE, OR EQUAL APPROVED)

	Chapter	Revision	Page no. 6
	Project Millennium Bridge Rebuild, Stoke St Michael, Radstock, BA3		Job Number 357
	Structural Calculations		Created by/Date JMR/ 22/07/24
			Checked by/Date

FOUNDATION LOADS

Foundation loads have been assessed based on available data from BGS geology maps and existing boreholes. The site lies on the boundary between the Avon Group Formation (limestone) and Black Rock Formation (limestone subgroup) with no superficial deposits. The nearest boreholes with any detailed strata description (ref [ST64NE17/A-1](#)) indicate approx. 0.30-0.40m topsoil overlying between 0.7m-1.6m firm sandy clay overlying weathered limestone. The boreholes were terminated between 1.0m-2.0m depth on the weathered limestone formation. No water was encountered. Due to the proximity of the stream, a maximum allowable bearing pressure of 50kN/m² has been adopted for the design of the bridge bearings and wall footings

Load Take Down: New Bridge Bearing/Padstone: considering 1.0m width

Element	width / height m	DL		LL	
		kN/m ²	kN	kN/m ²	kN
Bridge deck	2.0	4.00	8.0	3.00	6.0
s/wt 250 deep padstone	0.5	6.25	0.3	-	-
Total (SLS)			8.3		6.0

Assuming safe bearing pressure of 50kN/m²
width req'd = (8.3+6.0)/50 = 0.286m

USE: MIN. 400w x 250dp MASS CONCRETE FOOTING

Load Take Down: New Bridge Wall Footing

Element	width / height m	DL		LL	
		kN/m ²	kN	kN/m ²	kN
s/wt stone wall	2.0 x 1.25	8.80	22.0	-	-
s/wt 200 deep footing	0.75	4.80	3.6	-	-
Total (SLS)			25.6		-

Assuming safe bearing pressure of 50kN/m²
Area req'd = 25.6/50 = 0.512m²

Width/Length of pad req'd = $\sqrt{0.512\text{m}^2} = 0.716\text{m}$

USE: MIN. 750 x 750 x 200dp MASS CONCRETE PAD FOOTING