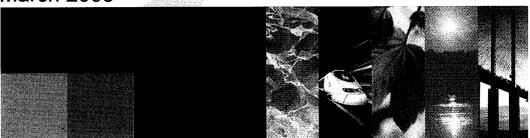
## **Gloucestershire County Council**

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Rail Property Ltd Bridge Assessments

The Stud Bridge FFD 86m 20ch Assessment and Inspection Report March 2003



**Halcrow Group Limited** 



## **Gloucestershire County Council**

Rail Property Ltd Bridge Assessments

The Stud Bridge FFD 86m 20ch Assessment and Inspection Report March 2003

## **Halcrow Group Limited**

Document Ref No TB.2116.B560.Doc.01 Copy No.

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# **Gloucestershire County Council**

Rail Property Ltd Bridge Assessments The Stud Bridge FFD 86m 20ch Assessment and Inspection Report

## Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	0	First Issue	Mar 03	Aw

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## 1 Executive Summary

### 1.1 Background

Halcrow Group Limited were commissioned by Gloucestershire County Council (GCC) to undertake an inspection and assessment of the Stud Bridge in accordance with Department of Transport Standard BD 21/01 "The Assessment of Highway Bridges and Structures"

The bridge is currently owned and maintained by Rail Property Ltd who are also the Technical Approval Authority. The bridge carries an unclassified county road over a disused railway line at FFD 86m 20ch and OS grid reference SP 210 006. A location plan is included in Appendix A.

This report provides a description and summary of the inspection and includes the results of the assessment.

## 1.2 Assessment Capacity

Based on the assumptions made in this report, the steel trough deck has a capacity of 40 tonnes Assessment Live Loading (ALL) in accordance with BD21/01. However, by observation, the west edge deck plate would fail under accidental wheel load to BD21/01.

A qualitative assessment of the abutments and wingwalls was carried out in accordance with BD21/01. There were no signs of distress visible so further assessment was not considered necessary.

The foundations were not inspected or assessed but there were no visible signs of movement or settlement of the substructure.

The existing parapets were not assessed but by observation they would not provide vehicular containment to meet current standards.

# 2 Introduction

2.1

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### Structure Details

General information about the structure is contained in Table 1.

COUNTY BRIDGE NAME:

The Stud Bridge

COUNTY BRIDGE No:

**56**0

RAILTRACK PROPERTY LTD Ref:

BRIDGE ELR & MILEAGE:

FFD 86m 20ch

MAP REFERENCE:

SP 210 006

**DIMENSIONS** 

No of spans:

1

Clear span:

3.900m (square) 12° (approx.)

Skew: Width of carriageway:

4.720m

Width of verges:

0.860m (east), 0.550m (west)

Headroom:

3.70m (approx)

Total width between parapets:

6.130m

### LOADING

Is structure subject to a weight restriction order: No If yes give details: N/A date order made: N/A

#### CONSTRUCTION

General Construction:

The bridge is a single span, steel trough deck

with stone abutments and brick wingwalls.

Trough deck:

Steel (assumed)

Bearings:

N/A

Parapet material:

The parapets are of timber and corrugated

metal sheets, with stone pilasters.

Average depth of fill:

0.176m

Type of fill:

Road surfacing (bituminous) approx.

120mm. Concrete infill.

Table 1: General Details of The Stud Bridge, FFD 86m 20ch

2.2 History of Structure and Record Drawings

Record drawings of the structure are not available, but a brief maintenance history was provided by Rail Property Ltd.

2.3 Current Loading

The vehicular loading permitted on the structure is currently 38 tonne under the Construction & Use Regulations.

## 3 Inspection Details

#### 3.1 Introduction

Halcrow Group Limited carried out the inspection of the Stud Bridge (see Figure 1) on 20 May 2002. The weather was dry and sunny.

All accessible parts of the structure were visually examined within touching distance. A portable aluminium scaffold tower was used to access the steel trough deck and abutments.

The structure was inspected for defects and corrosion which may reduce the deck cross section and affect its load carrying capacity.



Figure 1: The Stud bridge

#### 3.2 Foundations

The foundations were not inspected but there were no defects evident that would suggest failure or settlement.

#### 3.3 Wingwalls

All visible parts of the wingwalls were in good condition with only localised areas of mortar loss. Large areas were covered in vegetation (see Figure 2), particularly along the coping stones. This had caused localised spalling of the brickwork and cracking in the coping stones.



Figure 2: South- west wingwall

#### 3.4 Abutments

Both abutments are constructed in stonework but many repairs have been carried out in brickwork and concrete blockwork (see Figure 3). Generally the stonework and all repairs were in good condition.

The steel deck bears on a layer of brickwork at the top of each abutment. There were several vertical cracks up to 3mm wide running through this brick supporting layer and it is considered that this is a result of thermal movement of the trough deck.

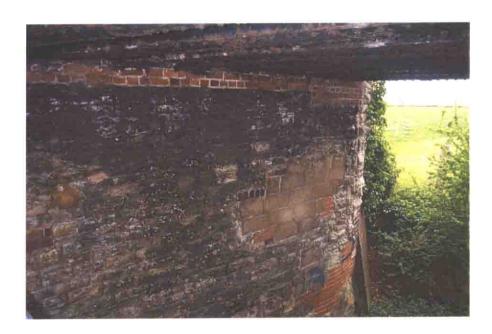


Figure 3: South abutment

### Steel Trough Deck

3.5

Main recorded defects are shown on Drawing No TB.2116.B560.SK02.

The trough deck is built up in sections. The paint system was generally in reasonable condition except along the edges of the top and bottom plates (see Figure 4). Here there was heavy surface corrosion and delamination of the plate.



Figure 4: General condition of trough deck

Corrosion was most severe at the joint between each plate and the web where approximately 3mm of section loss was evident.

All webs were in good condition with the majority of the paint system in tact.

The rivet heads were generally in good condition although there were some isolated areas where corrosion had occurred.



Figure 5: West side of trough deck

At west side of the bridge the edge deck plate was severely corroded over its entire length (see Figure 5). Delamination of the plate had occurred with complete section loss in places. Exposed rivet holes (shown in Figure 5) at the edge of the plate had corroded away.

### 3.6 Parapets

Both parapets comprise timber frames supporting corrugated metal sheets. By observation it was apparent that they provide minimal containment. The corrugated metal panels were severely dented on the east side, probably caused by vehicular impact.

### 3.7 Carriageway inspection

The road surface was in good condition. There was a slight depression in the surfacing on both approaches behind each abutment. It is considered this is a result of settlement of the fill material (see Figure 6).



Figure 6: Carriageway level

### 3.8 Summary of Inspection

Generally the structure was in a reasonable condition except for the west edge deck plate which was severely corroded.

Areas of reduced sections due to corrosion and delamination of the trough deck were considered in the assessment.

### **Public Utilities** 4

4.1

#### Services

Initial service enquiries for The Stud Bridge were sent out in April 2002. Enquiry responses are as follows:

British Telecom Reported no apparatus present.

Thames Water Reported no apparatus present.

National Grid Reported no apparatus present.

Scottish and Southern Energy plc Reported no apparatus present.

Transco Underground plant present.

Energis Reported no apparatus present.

Cable and Wireless Reported no apparatus present.

Readers of this report are reminded that the statutory bodies have supplied information with no guarantee of accuracy. Any person who uses information relating to apparatus does so at their own risk. Planners of future works are advised to verify the presence of statutory apparatus at that time.

## 5 Assessment

## 5.1 Assessment Details and Assumptions

The steel trough deck was assessed in accordance with BD 21/01 and BD 56/96. Simple load distribution and dispersal techniques for trough decks were used in accordance with Chapter 6 of BD21/01.

An intrusive investigation carried out on the top of the bridge revealed the fill material comprised bituminous road surfacing and concrete fill. It was assumed this was representative across the entire bridge deck and remained of constant depth.

The following assumptions were also made:

- Dead and superimposed dead loads used in the assessment were determined from information collected during the inspection.
- The trough deck was laterally restrained along its full length by the infill concrete.
- All deck surfaces masked by the fill material were in similar condition to exposed surfaces. An intrusive investigation to expose the top plate and webs at one location indicated the masked surfaces were in reasonable condition.
- Web, top and bottom plate thickness were taken from maintenance record information provided by Rail Property Ltd.
- All trough sections were steel.

Areas of reduced section due to corrosion and delamination of the steel were considered in the assessment.

A qualitative assessment was carried out for all other parts of the structure.

## 5.2 Assessment results

Based on the above assumptions the structure has the following capacity:-

Steel Trough Deck

Bending

40 tonnes Assessment Live Loading (ALL)

Shear

40 tonnes Assessment Live Loading (ALL)

By observation, the west edge deck plate would fail under accidental wheel load to BD21/01

Other parts of structure

A qualitative assessment of the abutments and wingwalls indicated no significant defects and these are assumed to be adequate with no further assessment considered necessary.

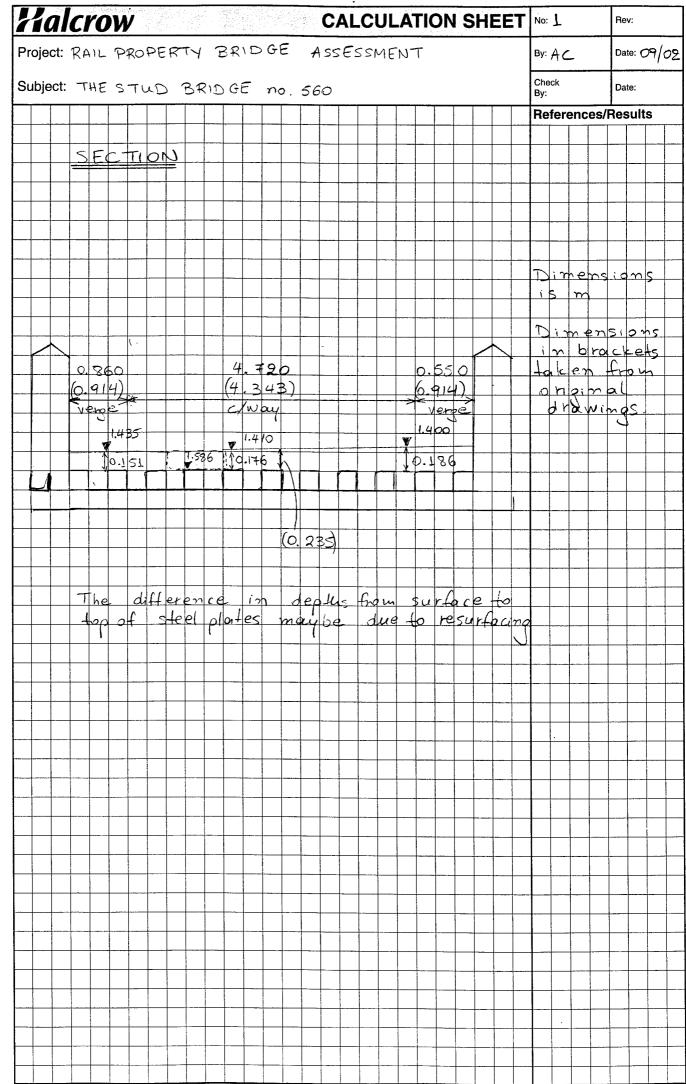
The foundations and parapets were not assessed.

# 6 Conclusion

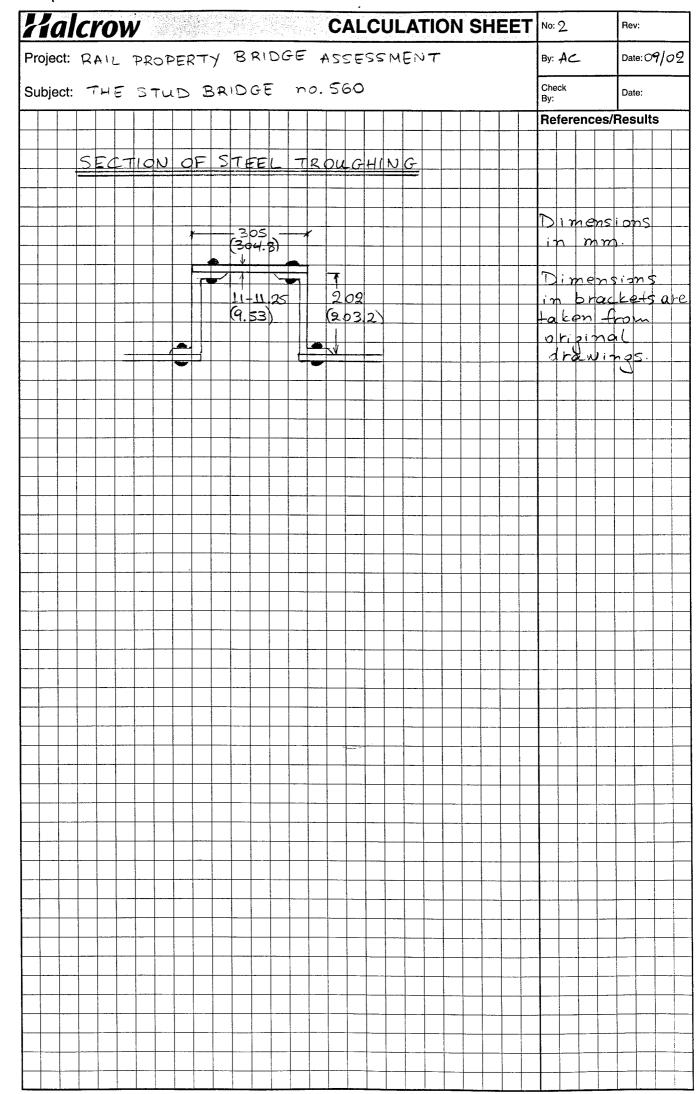
Based on the assumptions within this report the assessment capacity of the trough deck is 40 tonnes Assessment Live Loading (ALL) in accordance with Department of Transport Standard BD 21/01.

However, by observation the edge deck plate immediately adjacent to the west parapet, under the grass verge would fail under accidental wheel loading to BD 21/01. It is considered that this area of the deck is susceptible to traffic loading.

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in the	2.5m wide notional lane, by a KEL value of assessment live		
6 aden	2 value, 120 kN, by 2.		
			65
Keduch	on Factor 4=0.76	1588	page.5
A	nent Factor for KEI:		
Horusti	I.d. Sanda Artista Control of the Co	1 : :	
Hogust. AE	= 1.46	see	page 5
	ment Factor for KEL: = 1.46	See	page 5
		See	page 5
Ulere	Nove, adjusted LEL = 120 - 82.9 km		page 5
Ulere		BD 2	
Urele! Lane A	Nove, adjusted KEL = 120 = 82.9 km utor = 1.0	BD 2	1/01
Urele! Lane A	Nove, adjusted KEL = 120 = 82.9 km utor = 1.0	BD 2	1/01
Lane for	Pore, adjusted KEL = 120 - 82.9 km ictor = 1.0  Theel boods are applied over a 0.3 m x 0.3 m contact area with a 1.8 m	BD 2	1/01
Lane for The Usquate transue	Pore, adjusted KEL = 120 = 82.9 kW refor = 1.0  Theel bods are applied over a 0.3 m x 0.3 m contact area with a 1.8 m rese spacing between their centres	3D 2 C. 1 B D 3 C.L	1/01
Unerell Lane for The U Square Hoansue	Pore, adjusted KEL = 120 = 82.9 kW refor = 1.0  Theel bods are applied over a 0.3 m x 0.3 m contact area with a 1.8 m rese spacing between their centres	3D 2 C. 1 B D 3 C.L	1/01
Unerell Lane for The U Square Hoansue	Pore, adjusted KEL = 120 - 82.9 km ictor = 1.0  Theel boods are applied over a 0.3 m x 0.3 m contact area with a 1.8 m	3D 2 C. 1 B D 3 C.L	1/01

Halcre	ow		CAL	CULATIO	N SHEET	No: 8	Rev:	
	20.000.000.000	PROPERTY BOA	ARD ASSES	SMENTS		By: A	AC Date:	09/02
roject: ubject:		THE STUD B				Check	Date:	
ibject.		INE STOD B	AIDGE 110. S	100		By: Refere	ences/Resu	ts
			and the second s			BD 2	**********	
DISTRI	BUTION	OF LOAD	<u> </u>			1	6.14	
	3 - 1 - 1	onge F	<b>.</b>					
see s	skeld on	T S						
Propor	tion of	kel wa	d tak	en by I	se			
trough	deck is	41.1		5.1  kN/m				
		2. <del>1</del> 20	2					
an are of the new modern transmission and	an dammanduk, sasimse sasifawa ni an	ar manamana mana sana sana sana	- Andrewson - Andr					
The A	istribution	diaonar	n for	the two c	adjacent	BD	21/01	
wheel	istribution Woods ov	erlaps, 1	herefor	re the an	roumt	CL	. 6.14	
2000	1 talcon 1	so the t	touch.	located	within.			
the ove	erlap area	x is obt	aine9	by adding	-lie			energia energia ev
individu	على المصطع	A CONTRACT C	100				Penagenian suar suar senior	According several artists of the several
Divide	by 3, 0	rs Three	ralf-2	scowe E	×13T.			
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Halcron	V	CAL	CULATION	SHEET	No: 9	Rev:
Project:	RAIL PROPERTY	BOARD ASSESSI	MENTS		ву: АС	Date: 09/02
Subject:	THE STUD BRIDGE no. 560		0		Check By:	Date:
					Reference	s/Results
			, and a second s			
Single	Axle Lood	<u></u>			BD 21	/oL
					<u>C</u> L-5	31
For Law	1 traffice Go	od Surfe	ce mad	1 1	ILP 5	5.3.1
Nomina		txle loc	ng w=11	os kn		
Axle Loo	e is consider	overa &	Sm. wide	tone.		
Le parac		ea to be	oc acess			
Distribu	tion of Loads	S			BD 21	/01
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parapet v	ege 4	4W			Hg.	6.2
	65	165	D	1		
			SO S	ad Surface		
			Topof			
			troughin	<b>1</b>		
and the second space of th						
<u> </u>		-680 <del>- 1</del>				
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						**************************************
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Acceptable of the second of th		2720	<b>.</b>			
	<u>k</u> 960 → 3					
7		D- 1 -	1			
me arst	nbution diagra	m torthe	the amount	CW C		
Coad to	ken by the	trough C	ocated uni	thim		
the ove	ads overlaps - kem by the rlap area is	ablaimed	by addin	e the		
indiudui	L shool Ix			4	va	<b></b>
						James and the second
Hence:	$\left(\frac{82.5}{2.160} + \frac{82}{2.7}\right)$	25	68.5 km	/m		arneanan amanan 100 maa seus anda
and the second s	(2.160 27	t20 /				Commence of the Commence of th

Malcrow CALCULATION SHEET	No:	10	Re	v:	
Project: RAIL PROPERTY BOARD ASSESSMENTS	Ву:	AC	Da	04	109
Subject: THE STUD BRIDGE no. 560	Chec	ck	Da	te:	
	Re	References		suits	*******
Divide by 3 as thee half-sections exist				<u> </u>	a
in he averlap area.					****
					******
Cherefore: 68.5 - 22.8 kV/m					
	************				
			Commence of the same of the sa		
					**************************************
	-				
Single Wheel Load				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	!
For Law traffic Good Surface road	B	D 2	1/01		ļ
For Low traffic Good Surface road Nominal Single wheel Load W= 82KN		L	5.32		<u> </u>
	.  🏲	b . :	5.3.5	2	-
Wheel load is applied over a 0.3m ×0.3m  square contact area	***	المدا			) }
square contact area	_		Tel sommittee o		
112 ref from its considered to be adjacent				1	
Worst case is considered to be adjacent to the parapet					
			Action to account the sail		
			. / .		
Dielribution of loads			1/01		
parapet		- L . Fi o	6.14		
paraper verxe dw Road		72	_0		
Top of					
- Houghing				· · · · · · · · · · · · · · · · · ·	
£ 680 +					
	nacenne	<u> </u>			.a}
		. juunijuu			
				and the same of th	
<del>&lt; 1</del> 2160		and a second			
The amount of load taken by the half-section			manual and harmon		
is 82/2.160 = 5.4 kN/m		. 1	ا الماد المحمد المحمد ا		
A supplied to the supplied to			G121 F	01(Excel)	

Rale	row		CA	LCUL	ATIO	N SHE	ΕT	No: 11	Rev:
Project:		RAIL PROPERTY	BOARD ASSE	SSMENT	3			ву: АС	Date: 09/02
Subject:	THE STUD BRIDGE no. 560						Check By:	Date:	
	7					the state of the s	a vegev	Reference	s/Results
Par	tal Fac	for for L	oads, X	<b>,</b>				BD 21/	01
				<u> </u>				763	
	LImm,	## =	1.05 1.20						
	iele All, zuma	\$6 = 34 =	1.75				**************************************		n ne nekata manan kada ke kaca da manan kada
Live		XFL =	1.50						
						. 7.0			
	iction fo			KEL,	K-C	, 76		an and the second second second	A CANADA
#SSE	ssment	- Louis	La constantina de la						a saadaa ahaa ahaa ahaa ahaa ahaa ahaa a
o de la compansa de l									
Stee	el Plate	Grder	= 0.6	2 × 1	.05	=0.65K	plm		
	crete All		= 1.15						
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( <b>a</b> )	HA Low	ding		and the same of the same				a land appear and a	Same and Sa
	UDL =	10-9×1	5 × 0.76	= 1	2.4	kN/m			and the region of the second o
									and the second s
	LEL =	10.1 ~ 1.	.s <u>~0.7</u>	6 = 1	11.S	FN			mandaner & mandanersky 200
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	Simple A							ma cano management approxima	accompanies and companies of the
	w = 22.5	8 ×1.5 =	34.2	Lev .					a care and management of the care as a second-
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	W = 5.4	1 x 1.5 =	- 8.1	kn.					and a same a sa
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		***************************************				ļļ			a practical designation of the second se
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Project: Subject:	RAIL PROPERTY BOARD ASSESSMENTS  THE STUD BRIDGE no. 560	By: AC	Date: 09/09
		By: References	/Results
MOMENT .	nd S.HEAR	****	
Dead Look	$\pm$		
9	0.65 × 4.137 = 1.4 km		
$M = \frac{W_1^2}{8}$	$\frac{0.65 \times 4.137}{8} = 1.4 \text{ km}$		
and the second s			
V = WL =	0.65 × 4.137 = 1.35 kN	man and a second second second	<u> </u>
2	2		
The state of the s			
Superimpos	ed Dead Load	Maria Company and an analysis of the company	
		na - Landania	management of the second of th
M- WL2	$= (1.4 + 1.5) \times 4.137^2 = 6.9$ kum	man I see	
nana una nanany	8		
Anna anna anna an an ann an ann ann an an			
V = WL =	$(1.4 + 1.5) \times 4.137 = 6.0 \text{ KN}$	***************************************	
9	7	ener in a servener commence and	
Live Load			
(a) HA Loac	line		
$M = W_{-}^{2}$	PL - 12.4×4.137 <sup>2</sup> 11.5×4.137		
- 221	1 kvm 8 4		
	To Carlotte and the second sec		
V = WL	P _ 19.4×4.137 , 11.5		
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31.4	EN		
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710	CALCULATION SHEET	No: <u>1</u> 3	Rev:
Project:	RAIL PROPERTY BOARD ASSESSMENTS	ву: АС	Date: 09/o
Subject:	THE STUD BRIDGE no. 560	Check By:	Date:
1 ;		References/Res	s/Results
(L)	Single Axle Load		
- 1 A B	The second secon		
	Mmax when 34.9 kN load at midspan		and a more or in common and and and
	134.2		A CONTRACTOR OF THE PARTY OF TH
	B		
	7 1		
			and the same and t
and the second	2.07 2.07	nes como ganoem canado o	and the second
	IMQA: (34.2 × 2.07) = RB × 4.137	and the constitution of the	
18 mm + 17 8 mm	The second secon	The state of the s	
	Rs = Lt.L LD		
and the second second second	:. RA = 17.1 KN		· · · · · · · · · · · · · · · · · · ·
4 ***		esaa. Landone vood 680,270 mm o	Annual Market Pro-
			and a committee
	$M_{\text{max}} = 17.1 \times 2.07 = 33.7 \text{ RUm}$		
	$M_{\text{max}} = 17.1 \times 2.07 = 35.4 \text{ km}$ V = 17.1  kN	n seen and a see a se	Name and A Williams
		A SALE AND A CONTRACT OF A SALE AND A SALE A	Annual Control of State
	Mmax = 17.1 x 2.07 = 35.7 RUm V = 17.1 kN Vmax when 34.2 kN wad at support;		
	Vmax when 34.2 kN was at support;		
	Vmax when 34.2 kN was at support;		
	Vmax when 34.2 kN was at support;		
	Vmax when 34.2 kN was at support;		
	Vmax when 34.2 kN wad at support;  A V  4.137		
	Vmax when 34.2 kN was at support;		
	Vmax when 34.2 kN wad at support;  A V  4.137		
	Vmax when 34.2 kN wad at support;  A V  4.137		
	Vmax when 34.2 kN wad at support;  A V  4.137		
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	Vmax when 34.2 kN wad at support;  A V  4.137		

	CYOW CALCULATION SHEET	No:	14	Rev:
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	Sunda universitation	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Marine San	
(ک	Single Wheel God			water and the same of
	Mmax when 8.1 kN Good at midspan			
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	A B		A STATE OF THE STA	Sharanna e sa Sa mananidan - sag - an mendanidan
AND A CONTRACTOR OF THE PARTY O	2.07 - 2.07			
	2.07 - 2.01			and greater the second second
	NA B1 81 × 4137			A A A A A A A A A A A A A A A A A A A
	$M_{max} = PL = 8.1 \times 4.137$		and a second	
	= 8.4 kvm		) ) ) )	
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SHARAPARAPARAPARAPARAPARAPARAPARAPARAPARA	W Silver Silver Load at suggest		and the second	American Company of the Company of t
	Vmax when 8.1 kN wood at support			The second secon
- Samuelan and Art Service	18.1			go sendence a product com No. 5
<u> </u>	<u> </u>			opposition of the second of the second
				eminimum version of
	4.137			Same distance of the contract
				was and a control of
	the state of the s	214 1000	1 5	4
	Vmax = 81 KN		i y	Annana (1900) (1904) (1904) (1904) (1904)
	Vmax = 81 KN			Annahaba an
	Vmax = 81 KN			managamin same and reserve
	Vmax = 81 KN			
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	Vmax = 81 kW			
	Vmax = 81 KN			
	Vmax = 81 kN			
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	Vmax = 81 kD			
	Vmax = 8.1 kD			
	Vmax = 21 kD			
	Vmax = 8-1 kN			
	Vmax = 81 kN			

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270	ICTOW GALCULATION SHEET	No:	15	Rev:	
Project:	RAIL PROPERTY BOARD ASSESSMENTS	Ву:	AC	Date:	09/02
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	laximum Moment with HA loading:				
		on a sprom	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
	Mmax - 1.4+6.9+38.4 = 46 KUm			on particular of the second	:
******	- a db 4 share			3	
المدائد	vo-exident Shear: V= 1.35+6.0+31.4= 38.75 EN				
					# 1 mm 8 1 mm 8
		26.00 - 1.0046			
				omnograss et e	
·····	Maximum Shear with Single Axle Load				
	Vmax = 1.35 + 6.0 + 34.2 = 41.55 kN				سىنى سىلىن
	vmax = 1.351 0.0		Constraint 1	To the second second	•• • •
	co-existent moment.		e e e e e e e e e e e e e e e e e e e	i manifestation is a	. Shanesad
	M = 7.6 KNm				
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Project: Subject:  THE STUD BRIDGE no. 500  THE STUD BRIDGE no. 500  References/Results  BENDING RESISTANCE  For a Compact Section  Webs partly in complection and in length of the beam and the compressive edge of the web is:  95.5-12 - 73.5 mm  and should not exceed 28 th 355  Where the line functions of the web plate  = 12.7 mm  Other morninal yield stress of the BD 21/01  Where 28 th 355 - 28-12.7 230  Therefore the section of the web plate  = 141.3 mm  Therefore the sections of the web plate  = 141.3 mm  Therefore the sections of the web plate  = 141.3 mm  Therefore the sections of the web plate  = 141.3 mm  Therefore the sections of the web plate  = 141.3 mm  Therefore the compression flange substand:  Therefore the compression flange substand:  The 355  Other Dates  The 355  Other Dates  Therefore the section of the compression flange substand:  The 355  Other Dates  Therefore the section of the section of the section of the section of the compression flange substand:  The 355  Other Board  The 355  Other Board  Therefore the section of the section o	Palcrow CALCULATION SHEET	No: ]	6	Rev:
Subject:  THE STUD BRIDGE no. 550  The property of References/Results  References/Resu	Project: RAIL PROPERTY BOARD ASSESSMENTS	Ву:	AC	Date: 09/02
References/Fesults  BENDING RESISTANCE  For a Compact Section  Webs partly in compression and in -leasing: CL. 9.3.7.2.1  Tople is tween it cleasts neutral axis of the beam and the compressive edge of the web is:  95.5-12 - 83.5 mm  and should not exceed 28 tw 355				Date:
For a compact section  Webs partly in compression and in least of the beam and the compressive edge of the web is:  95.5-12 = 73.5 mm  and should not exceed 28 tw 355			rences	Results
For a compact section  Webs partly in compression and in least of the beam and the compressive edge of the web is:  95.5-12 = 73.5 mm  and should not exceed 28 tw 355	BENDING RESISTANCE	and and the second	Comment Comment	Anery attention and a state of the state of
Webs partly in compression and in lension:  Ch. 9.3.7.2.1  Teph solvern the elastic neutral axis of the beam and the compressive edge of the web is:  95.5-12 - 83.5 mm  and should not exceed 28 tw 355  Other in all yield stress of the web plate  = 12.7 mm  Other in all yield stress of the bound of the compression of the web plate  = 230 N/mm <sup>2</sup> Hence 28 tw 355 - 28-12.7 = 355  Other in all yield stress of the compression for a constant of the constant o				Service and the service of the servi
Webs partly in compression and in lension:  Ch. 9.3.7.2.1  Teph solvern the elastic neutral axis of the beam and the compressive edge of the web is:  95.5-12 - 83.5 mm  and should not exceed 28 tw 355  Other in all yield stress of the web plate  = 12.7 mm  Other in all yield stress of the bound of the compression of the web plate  = 230 N/mm <sup>2</sup> Hence 28 tw 355 - 28-12.7 = 355  Other in all yield stress of the compression for a constant of the constant o	For a compact section		= 6 /0	
Depth solvern lic elastic neutral axis af the beam and the compressive edge of the web is:  95.5-12-83.5mm  and should not exceed 28 to 355  where to = the trickness of the web plate  = 12.7mm  OTW = nominal yield stress of the  BD 21/0!  CL 4.3  = 230 N/mm²  Hence 28 to 355 = 28-12.7 \$\frac{255}{230}  = 441.8mm  ADFOUNTE  Compression flange outstands  Projection of the compression flange outstand:  \$\frac{1}{2} = \frac{355}{04} = \frac{355}{04				
and should not exceed 28 to 255  where twill be firstness of the web plate  = 12.7 mm  Other nominal yield stress of the BD 21/01  web material  = 230 1/mm <sup>2</sup> Hence 28 to 355 - 28-19.7 × 255  230  = 441.8 mm  in AD FRUHTE  Compression flarge outstands  Projection of the compression flarge outstand:  \$10 = 20mm and should not exceed  \$10 = 2.7.3.1  The 355  Other  where off = nominal yield stress of the flarge  material  = 230 1/mm <sup>2</sup> the material			***************************************	And the second s
and should not exceed 28 to 255  where twill be firstness of the web plate  = 12.7 mm  Other nominal yield stress of the BD 21/01  web material  = 230 1/mm <sup>2</sup> Hence 28 to 355 - 28-19.7 × 255  230  = 441.8 mm  in AD FRUHTE  Compression flarge outstands  Projection of the compression flarge outstand:  \$10 = 20mm and should not exceed  \$10 = 2.7.3.1  The 355  Other  where off = nominal yield stress of the flarge  material  = 230 1/mm <sup>2</sup> the material	Deplu between the elastic neutral axis of the	"		
and should not exceed 28 to 255  where twill be firstness of the web plate  = 12.7 mm  Other nominal yield stress of the BD 21/01  web material  = 230 1/mm <sup>2</sup> Hence 28 to 355 - 28-19.7 × 255  230  = 441.8 mm  in AD FRUHTE  Compression flarge outstands  Projection of the compression flarge outstand:  \$10 = 20mm and should not exceed  \$10 = 2.7.3.1  The 355  Other  where off = nominal yield stress of the flarge  material  = 230 1/mm <sup>2</sup> the material	beam and the compressive edge of the web is:			Control of the second of the s
and should not exceed 28 to 355  where tw= the thickness of the web plate = 12.7 mm  Other nominal yield stress of the  wish material = 230 1 //mm <sup>2</sup> Hence 28 to 355 - 28-12.7 < 255 230 = 441.8 mm  ADFOUNTE  Compression large outstands  Protection of the compression flange outstand  blo = 80mm and Should not exceed  Cl. 9.3.2.1  The 355  Other  where at = nominal yield stress of the flange material = 230 N/mm <sup>2</sup> the = 18mm  BD 56/96 CL 9.3.21	and the second s			The second secon
where tw= lie fuckness of he web plate  = 12.7 mm	The second secon		1	Share a suspension of the same state of the same
where tw= lie fuckness of he web plate  = 12.7 mm	and should not exceed 28 tw/355		i ngas sestemen	
The second should not exceed  The se	and the second s			No. 10. 1 TO 10. 10. 1
There is a solution of the compression flowed and should not exceed  There are a nominal yield stress of the BD SQ96  There are a nominal yield stress of the flange and the final are and the formation of the compression flange outstand.  The solution of the flange outstand.				2 COL
Hence 28 by 355 = 28-12.7 × 255  Toger = 441.8 mm  ADFRUATE  Compression large outstands  Trojection of the compression thange outstand:  Lo = 80mm and should not exceed  Li 9.3.2.1  The 355  Type  Where at = nominal yield stress of the france  material  = 23.0 N/mm <sup>2</sup> - 23.0 N/mm <sup>2</sup> - 16 = mean thickness of the autstand  BD 56/96  - 12mm	on = nominal yield stress of he			
Hence 28 by 355 - 28-12.7 × 255  - 441.8 mm  ADFRUATE  Compression flange outstands  Projection of the compression flange outstand:  20.3,7,3,1  Projection and should not exceed  Lip = 20mm and should not exceed  Lip = 355  Out  Where out = nominal yield stress of the flange material  - 230 N/mm <sup>2</sup> - 230 N/mm <sup>2</sup> - mean thickness of the outstand  BD 56/96  CL 9.3.21	web material.	(	L4.	3
Compression flange outstands  Compression flange outstands  Projection of the compression flange outstand  Lo = 20mm and should not exceed  Cl 9.3.2.1  The flange outstand  Where at = nominal yield stress of the flange material  = 230 N/mm <sup>2</sup> Lo = mean hickness of the outstand  BD 56/96  Cl 9.3.21	= 230 Nmm =			and the second second
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Projection of the compression flange outstand:  \$10 = 80mm and should not exceed  CL 9.3.2.1  The \$\int_{355}\$  Off  Where \$\alpha_{17} = nominal yield stress of the flange material  = 230 N/mm <sup>2</sup> The mean hickness of the outstand BD 56/96  CL 9.3.21			in the second	Adv. Transfer Committee Co
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where $a_{ff}$ = nominal yield stiess of the Grange  = 230 N/mm <sup>2</sup> = 230 N/mm <sup>2</sup> = 12mm  CL. 9.3.21		J.,		e, in the experiments of the second
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where off = nominal yield stress of the Grange  = 230 N/mm <sup>2</sup> = 12mm  Log = 1	5,6			SAC STREET, AND SACRET AND SACRET STREET, SACRET
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Project:	RAIL PROPERTY BOARD ASSESSMENTS	ву: АС	Date: 09/02
Subject:	THE STUD BRIDGE no. 560	Check By:	Date:
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	$\left[ \left( \frac{-2.1 \times 10^{3}}{12} \right) + \left( 72.1 \times 100.5^{2} \right) \right]$	ma las atransminantes	Nace Annual Company of the Company o
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	= 2.3710 ×10 <sup>7</sup> mm		
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Rev	= <u>353101.81</u> = \$2.2 mm	BPG1	21_F01(Excel)

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Project:	RAIL PROPERTY BOARD ASSESSMENTS		ву: АС	Date: 09/09
Subject:	THE STUD BRIDGE no. 560		Check By:	Date:
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<b>Halcrow</b>	CALCULATION SHEET	No: 22	Rev:
Project: RA	IL PROPERTY BOARD ASSESSMENTS	ву: АС	Date: 09/09
Subject:	THE STUD BRIDGE no. 560	Check	Date:
		By: Reference	s/Results
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A DECEMBER OF THE PROPERTY OF		in a commence on a constant	wa nagan wa sana da ca sana sa sana sa
ASSESSMENT	LOADS		
Dead Load			and the second second
		The second section of the second	**************************************
Plate Girder	Since the control of		AAAAAAA
			A Commence of the Commence of
Area =	$(2 \times 305 \times 11) + (2 \times 4485.4)$ = 15680.8 mm <sup>2</sup>		manager studies of
المناسبة الم	= 15680.8 mm= - 7850 h-/m3	BD 21/	61
WILLIAM CONTRACTOR	= 78.5 KN /m 3	76.4.	
Self-weight	$= 7850 \text{ kg/m}^3$ $= 78.5 \text{ kg/m}^3$ $= 0.0156808 \times 78.5$		and the second s
	= 1.23  kN/m	en e	· · · · · · · · · · · · · · · · · · ·
i saasii i kaa saa saa saa saa saa saa saa saa saa			w
Super imposed	Dead Load		
and the second s	A STATE OF THE STA		Anna Carlos Carl
Concrete Fill:		and the second section of the second	www.come.come.come.come.come.come.come.come
n al man and a manager account and a man and a man a		The second of th	and the second s
Atea =	101202.4 mm <sup>2</sup> 2300 kg/m <sup>3</sup>		eminimum de de la
W/T-Wague	$\frac{23}{23}$ $\frac{23}{100}$ $23$		magning . To one, more a se.
Self-weight =	= 101202.4 × 23×10 <sup>-6</sup> = 2.3 kN/m	Control Control	ALANDAN AND A STATE OF THE STAT
a company and a second company	= 2.3 kN/m	i i i i i i i i i i i i i i i i i i i	was de la companya de
		on management of the second	an angles per anning a per anni
Surfacing:			
Area =	120 × 612.6	a consequence de la consequencia della della consequencia de la conseq	A CONTRACTOR OF THE CONTRACTOR
and the second s	73512 mm <sup>2</sup>	pose services and a service of	unigen i de la company
	and the second s		anagama ya 11 ana an c 11
unit meight.	= $2300  \text{kg/m}^3$ = $23  \text{kn/m}^3$	*** **********************************	
A SOURCE OF THE SECOND STATE OF THE SECOND STA			COLUMN SAN SAN SAN SAN SAN SAN SAN SAN SAN SA
Seff-weight =	73512 × 23 × 10 <sup>-6</sup>		
· · · · · · · · · · · · · · · · · · ·	= 1.7 kWm	The second secon	yanga yanninga, sansayan maning me
and the second s		ine constitution in the same	
and the magnitude of the state		a james array	
e de la companya de La companya de la comp		· · · · · · · · · · · · · · · · · · ·	e vandaren erre erre erre erre erre erre erre
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Halcrow CALCULATION SHEET	No: 23	Rev:
Project: RAIL PROPERTY BOARD ASSESSMENTS	By: AC	Date:09/09
Subject: THE STUD BRIDGE no. 560	Check By:	Date:
	Reference	s/Results
Live Load		manuscus comments
Length of beam = 4.002m		acangan manananan A
(distance between abutments)		was a water with a second
Depth of section = 0.202 m		
$Span = 4.002 + (\frac{2}{3} \times 0.202)$	And the state of t	and depart of some of the source of the sour
= 4.137m	Andrews of the second	A Comment
The state of the s		
HA Loading	***	empire control of the second
<u>udl</u>	The second secon	
$W = 336 \left(\frac{1}{L}\right)^{0.67}$	BD 24	01
where Listhe Gooded length		<u> </u>
$336\left(\frac{1}{4.137}\right)^{0.67} = 129.8 \text{ kWm}$		
Assessment live loading values shall be determined by the application of Reduction Factors in accordance with BD21/01 CL 5.21	BD 21	<u>/01</u>
Hence, from fig. S.7, for a low traffic good surface road and a loaded length of 4.137m, Reduction Factor k=6.76.		managa ar sa garan (a sa
4.137m, Reduction to ctor k=0.76.		A CONTRACTOR OF THE CONTRACTOR
Adjustment Factor for UDL:	BD 21 U.S.	
For $0 \le L \le 20$ $AF = a_1$ , where $a_1 = 3.65 \text{ m}$		
2.5 2. AF = 3.65 1.46		
$\frac{2.5}{2.5} = 1.46$		e agus agus agus agus agus agus agus agus
Adjusted UDL = $\frac{129.8}{1.46}$ = $88.9$ kN/m		nang Summara ya Maka Mara Mara Mara Mara Mara Mara Mar
		and the second second
Lane factor = 1.0	BD 21/	
		1_F01(Excel)

Halcrow CALCULATION SHEET	No: 24	Rev:
Project: RAIL PROPERTY BOARD ASSESSMENTS	ву: АС	Date: 09/09
Subject: THE STUD BRIDGE no. 560	Check By:	Date:
		ces/Results
ubl is applied over a 25m wide lane to	BD 21	101
UDL is applied over a 2.5 m wide lane to occupy most one rous position.		6.10
und is taken as two Compitudinal stra looks	sama s ta jaman kan kan haka	
uplis taken as two longitudinal stop bods applied in the notional lane	are a francisco de cara	
		January and the second
tach longitudinal strip load is applied over	BD	21/01
Each longitudinal strip load is applied over a transverse width of 0.3m with a 1.8m transverse spacing between the centre lines of the two strips.	and Sections	
of the two strips?	man i saaraa faas oo	
and the second s		
Most onerous position at the edge of the carriageway, adjacent to the verge		aga yan ana yayas
		dament of our control of the second
Distribution of Conds	BD 2	1/01
Distribution of woods:	CL.	
See Stetch on page 6.	Fig.	
	2	a waa waxay ay a
Proportion of God taken by the section is 44.45 = 16.4 kN/m		
$\frac{44.45}{100} = 16.4  \text{kN/m}$		A COLOR DE LA COLO
2.720	a a circumstance	
The distribution diagram for the two adjacent		22.
ship woods overlaps, therefore the amount	een ook maana soome	and a second sec
of Loud taken by the trough lacated within the overlap area is obtained by adding	ean sammannana	· Account and the control of the con
I the individual lands		
Divide by 2 as two sections exist in		Andrew Committee and the same of
the overlap area		Andrew and Andrew
Merefore: 16.4 x 2 = 16.4 kN/m		***************************************
$\frac{2}{2}$		ACAMMAN ANNINAS CAMADER SAM
		understande and in the second
<u> </u>		manifestration of methods of the second of t
LEL is taken as two wheel loads applied in	BNE	21/01
the 2.5m wide notional lane, by dividing		6.10
LEL value of assessment live loading value,		amilanosa municipalista de la compania de la compa
190 km, by 2.		and the second s
		and the second s
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Project:	RAIL PROPERTY BOARD ASSESSMENTS	ву: АС	Date: 09/02
Subject:	THE STUD BRIDGE no. 560	Check	Date:
		By: Reference	_ls/Results
Reduction F	actor k = 0.76	see nou	ae 5
and the second s	and the second s	see pou	1
Adjustmen	t Factor for KEL:		
AF	<u>1 • 4 6                                 </u>	sec pa	je 5
Cherefore	adjusted $kEL = \frac{120}{1.46} = 82.2 \text{ kN}$	and the state of t	Company of the control of the contro
and the second s	ONAMAN CONTRACTOR OF SECURITY	game of the second second second second	en e
Lane fa	clor = Lo	BD 21/	
		CL. S	29
the wh	eel boads are applied over a	BD 24	/01
0.3 m x0	3m square contact area with	CL. 6	· · · · · · · · · · · · · · · · · · ·
a 1.8 m	eel loods are applied over a	. gas — a v assar	energy were the control of the contr
CEN PEY		am 1 a combination for	
Worst car	se is at the edge of the corriageuply, to the verge.	The state of the s	
adjacent	to the verge.	par i research est i e	
			a de la companya de l La companya de la co
Distribution	on of Loads:		
		in the supposed the following	in the second second
See sket	chan page 6	BD 21/	01
Phone	n of KEL wood taken by the	CL.	0.1.7
trough	teck is 41.1 _ 15.1 kN/m	Annual Comments of the	***************************
	2.720		and the second s
71.0 1.01	Inbution diagram for the two adjacent	2001	/01
wheel h	ads overlaps, therefore the amount		6.14
of Como	taken by the trough located		
within	the overlap area is obtained by	and the second second	Company of American
Divide 5	the individual loads.  y 2, as two sections exist in the	Look A seems and amounted As to	A SA A SA
overlop	area		and the second s
in teaching a second control of the		and an engagement	
Therefor	$e : \frac{15.1 \times 2}{9} = 15.1 \text{ cm}$		
and the second s			or a second seco
			and the second s
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and the same of the same was a second	and the same of th	<u> </u>	and the second s
			The second s
			The second second
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Project: RAIL PROPERTY BOARD ASSESSMENTS		ву: АС	Date: 09/02
Subject: THE STUD BRIDGE no. 560		Check	Date:
		By: Reference	s/Resuits
Single Axle Load		BD 21/	
	***************************************	CL S	1 - 1 - 1
For low traffic good surface road Nominal Single Axle Load W=165k		76. S	
Nominal Single Axle Load W=165k	<i>N</i>		
months of the contraction of the state of the contraction of the contr	ani rentaliseration amigania.		
Axle Load is applied over a 2.5m u			
Lane Worst case is considered to be a to be parapet	w/acent	agama sanaanin aan sanassan	
to he parapet		and Joseph and State of the Sta	
			mangenome fun in processing in
Distribution of Gods	an and a summary of the sum of	802	1/01
		CL.	
See sketch on page 9		Fig	6.2
		3	American Committee Committ
The distribution dragram for the two		BD 21,	101
adjacent wheel bads overlaps, the		CL. G	
the amount of load taken by the tra		Total Communication Springer Springer Springer	AND THE PROPERTY OF A PARTY
located within the overlap airea is			
by adding the individual loads	*************************	and the second s	and the second second second
Hence / 88.5 + 82.5   = 68.5 LD	/m	and the second of the second o	
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	*****************************	var	was a same a same a same
Divide by 2 as two sections exis	4		and the second s
the overlap area.	<u> </u>		American analysis in grane enfor
Therefore: 68.5 = 34.95 kN/m			Marine Companie
			anneadan ser er er was dande
Single wheel load			
a de la companya del la companya de			maniama de la comunición
For low traffic good surface road Non Single wheel load W= 82 LN	ninal	BD 21/	
517,218 Wheel -1000 W = 87 KD		CL. S	5.3.2
wheel load is applied over a 0.3m	20,3m		
wheel load is applied over a 0.3 m square contact area	een ur una vaa ne ne graansansa jaraasa.		amandaman
and the second s			LAMANIAN SILVERY
Worst case is considered to be adjaced	cent		
to the parapet	ennes en		A CONTRACTOR OF THE SECTION OF THE S
	en e		e magazine e e e e e e e e e e e e e e e e e e
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Project: RAIL PROPERTY BOARD ASSESSMENTS	ву: АС	Date: 09/09
Subject: THE STUD BRIDGE no. 560	Check Bv:	Date:
	References	s/Results
Distribution of Goods.  See Stefanon page 10:	BD 21 FJ 6	à.14
the amount of Good taken by the section is: $82/2.160 = 12.6$ kN/m		
Partial Factors for Wads, off.  Steel plate, off = 1.05  Concrete fill, off = 1.75  Surfacing, off = 1.75  Live, off = 1.50	BD 21/ 76.3	
Reduction Factor for UDL and KEL, K=0.76  Assessment Loads  Steel Plate Girder = 1.93×1.05 = 1.3 kN/n Concrete Fill = 2.3 ×1.90 = 2.8 kN/m Surfacing = 1.71 × 1.75 = 3.0 kN/m		
Live:  (a) HA Loading  upl = $16.4 \times 1.5 \times 0.76 = 18.7 \text{ km/m}$ $\text{kel} = 15.1 \times 1.5 \times 0.76 = 17.2 \text{ km}$		
(b) Single Axle Load:		
W= 34.25 ×1.5 = 51.4 LN  C) Single Wheel Load		manufacture of agreement of the second
$W = 12.6 \times 1.5 = 18.9 \text{ kb}$		
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roject:		RAIL PRO	PERTY B	SOARD ASS	SESSME	NTS				Ву:	AC	Date:09/09
ubject:		•	THE STUD	BRIDGE r	no. 560					Check		Date:
	-		· · · · · · · · · · · · · · · · · · ·			1				By: Refe	rences	 s/Results
Моме	-NT as	d	A SHE	R		termina in mandami.			*****	AA 1 VA 1000 140		NAME OF THE PERSON OF THE PERS
										m. n. Apanana		makan sa masa sambaa
Dead	Load	<u> </u>										
	<u>u²</u>		< 4.15	172			. 1	-			-	
M = <u>w</u>	<u>ц —                                    </u>	132	<u>&lt; 4.15</u> 8	<u> </u>	2	.8 k	Um.	<u> </u>	***************************************			
				American Company							and the same	
V = wL	<u>L</u>	1.3 >	4.13	<u> 3</u>	2,	7 K1	J			C. C. All III SASASSAS		naniem
2	•		2	1							d land	And the second s
a was a second		<u> </u>							*****	: :		maritime of the second of the
Super	1200 mi	ed T	Sead	لەما	d				*****			and a second
•									*************	***		wage with a second common second
M =	WL2 =	(2.	<b>2</b> + 3	.o) × 4	1.1372		12.4	ki	m_	· · · · · · · · · · · · · · · · · · ·		and the second process of the second process
The second of th	8			8						*****		
								3	1	:	*	eren eren eren eren eren eren eren eren
	man in the second			: 	إدامه الأستندية	······································	1		ann ann air i ann		angramana (1999)	
V = <u>w</u>		2.8+	·3.0)	× 4.137	<u> </u>	12.0	) ka	)			Angelor approximation	A Company of the Comp
V = \(\frac{w}{2}\)	2	2.8+	·3.0)	× 4.13 ¬	<b>1</b>	12.0		)		2		
V= <u>w</u>	2	2.8+	-3.0) 2	×4.137	7	12	) ka	)		2	The second of th	
V = W	2	2.8+	-3.0) 2	× 4.137	<b>F</b>	12.0						
	2		-3.0)	×4.(37	7	12.0		)				
	Load		2	× 4.13 ¬		12.						
Live	Load		-3.0)	× 4.137	7	12.0						
	Load	ů m g	2									
Live	Load		2		* 4.13		17.9		37			
Live (a) HA	Load Load WL <sup>2</sup> 8	ung PL	2						37			
Live (a) HA	Load	ung PL	2		* 4.13				37			
Live (a) HA	Load Load WL <sup>2</sup> 8	ung PL	2		* 4.13				37			
Live (a) HA	1 Load WL <sup>2</sup> 51.8	ing PL kum		18.7	× 413	77			37			
Live (a) HA	1 Load WL <sup>2</sup> 51.8	ing PL kum	2	18.7.	× 413				37			
Live (a) HA	Load Load WL <sup>2</sup> 8 57.8	ing PL kum		18.7.	× 413	77			37			
Live (a) HA	2 Load WL2 8 ST.8	1 P L k D m	2	18.7.	× 413	77			37			
Live (a) HA M=	1 Load WL <sup>2</sup> 51.8	ing PL kum	2	18.7.	× 413	77			37			
Live (a) HA	2 Load WL2 8 ST.8	1 P L k D m	2	18.7.	× 413	77			37			
Live (a) HA	2 Load WL2 8 ST.8	1 P L k D m	2	18.7.	× 413	77			37			
Live (a) HA	2 Load WL2 8 ST.8	1 P L k D m	2	18.7.	× 413	77			37			
Live (a) HA	2 Load WL2 8 ST.8	1 P L k D m	2	18.7.	× 413	77			37			
Live (a) HA	2 Load WL2 8 ST.8	1 P L k D m	2	18.7.	× 413	77			37			
Live (a) HA	2 Load WL2 8 ST.8	1 P L k D m	2 1 1 18,7×	18.7.	× 413	77			37			
Live (a) HA	2 Load WL2 8 ST.8	1 P L k D m	2 1 1 18,7×	18.7.	× 413	77			37			
Live (a) HA	2 Load WL2 8 ST.8	1 P L k D m	2 1 1 18,7×	18.7.	× 413	77			37			

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Project:	RAIL PROPERTY BOARD ASSESSMENTS	ву: АС	Date: 09/02
Subject:	THE STUD BRIDGE no. 560	Check By:	Date:
		Reference	s/Results
(L) S	ingle Axle Load		
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Project:	RAIL PROPERTY BOARD ASSESSMENTS	ву: АС	Date: 09/09
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and the same of th	873 = 1.1		2.4.3	3.3
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roject:	RAIL PROPERTY BOARD ASSESSMENTS	Ву: АС	Date: 09/09
ubject:	THE STUD BRIDGE no. 560	Check By:	Date:
		Reference	_/ s/Results
Z	$= (305 \times 12 \times 103.79) + (185.4 \times 12 \times 92.22)$	************************	
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Project:	RAIL PROPERTY BOARD ASSESSMENTS	Ву:	AC	Date: 09/02
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and the second s	between flaxeles			<u> </u>
	hn = the height of the largest hole	J		Section 11 ( % Section 11)
and the second of the second o	hn = the height of the largest hole or cut-out within the panel.	500 - CONF. #		The Company of the Co
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to the management and a second and analysis of the second and the	$\delta f_3 = 1.1$			Company of the Administration of the Company of the
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Subject:  THE STUD BRIDGE no. 560  By:  References/Results  May 2 of bie 4?  Where bre is the smallest of:  (a) 104; 355 10 23 355 = 285.7 mm  for 102 355 230.7 mm  (b) the distance from the modelane of the web to the nearer edge of the flange  306.3 mm  1. mfw = 230.7885. Tx 23  2 × 230 × 182 × 25.4  = 0.09  From Fg. !5 and !6:  Ce = 1.02  Where G = Cyw 230 = 132.8 N/mm²  1. Te = 135.5 N/mm²  Hence, Vo = (25.4 × 178) × 135.5 × 163  1.2 × 1.1  = 464.1 kM	1 10,000.		Date: Oq/
mfw = 04f brett?  2a, dwe tw  ushele bre is the smallest of:  (a) 10tf 355 = 10.23 355 = 285.7 mm  (b) the distorce from the inid-plane of the web to the nearer edge of the flange  206.3 mm  206.3 mm  208.785.722  2×230×182×25.4  = 0.09  From Fg. 15 and 16:  Ce = 1.02  Where a = 04w = 230 = 132.8 N/mm²  Where a = 054 178   125.5 × 10.2  Hence, Vo = (25.4×178) × 125.5 × 10.2  Hence, Vo = (25.4×178) × 125.5 × 10.2  10.2 Vmax	Subject: THE STUD BRIDGE no. 560	1	
Where boe is the smallest of:  (a) 10tf   355 = 10-23   255 = 285.7 mm   1230    (b) the distorce from the mid-plane of the web to the neater edge of the flange   1230-285.7 × 23    230-285.7 × 23   2×230-132×95.4    = 0.09  From Fg. 15 and 16:  Te = 1.02  Where Gq = Gyw = 230 = 132.8 N/mm²  Where Gq = Gyw = 230 = 132.8 N/mm²  Hence, VD = (25.4 × 178) × 125.5 × 10-3    1.2 × 1.02   1.02   1.02    Hence, VD = (25.4 × 178) × 125.5 × 10-3    1.2 × 1.02   1.02   1.02    4.04 × 1.02   1.02   1.02    1.02 × 1.02   1.02   1.02    1.03 × 1.03		Reference	s/Results
Where bre is the smallest of:  (a) 10tf 355 = 10-23 355 = 285.7 mm 127  1230  (b) the distorce from the mid-plane of the web to the neater edge of the flange  i. 306.3 mm  i. ma = 230-285.7 × 23 2 × 230 × 132 × 25.4  = 0.09  From Fg. 15 and 16:  Te = 1.02  The man is a sign of the sample of the web to the sample of the sample of the web to the sample of the	ma - oyt blett?		and the second of the second o
Where bre is the smallest of:  (a) 10tf 355 = 10-23 355 = 285.7 mm 127  1230  (b) the distorce from the mid-plane of the web to the neater edge of the flange  i. 306.3 mm  i. ma = 230-285.7 × 23 2 × 230 × 132 × 25.4  = 0.09  From Fg. 15 and 16:  Te = 1.02  The man is a sign of the sample of the web to the sample of the sample of the web to the sample of the	25 dus 24w		
(b) the distance from the mid-plane of the web to the neater edge of the flonge  i. 206.3 mm  i. mf. = 230 × 285.7 × 23  2 × 230 × 173 × 25.4  = 0.09  From Fg. 15 and 16:  Ce = 1.02  Where Cy = Oyw = 230 × 132.8 N/mm²  ii. Te = 135.5 N/mm²  Hence, Vo = (25.4 × 178) × 125.5 × 10 <sup>-3</sup> 1. 2 × 1.02  Hence, Vo = (25.4 × 178) × 125.5 × 10 <sup>-3</sup> 1. 464.1 kN			
(b) the distance from the mid-plane of the web to the neater edge of the flange  i. mp = 230 × 285. 7 × 23  2 × 230 × 182 × 25.4  = 0.09  From Fg. 15 and 16:  C2 × 1.02  Where cy = 0yw = 230 × 182.8 N/mm²  i. Te = 135.5 N/mm²  Hence, VD = (25.4 × 178) × 125.5 × 10 <sup>-3</sup> 1.2 × 1.11 × N  VD > Vmax	uzhere ho is the smallest of		
(b) the distorce from the mid-plane of the web to the neater edge of the flampe  .: 306.3 mm  .: mg = 230.885.7 × 23  2 × 230 × 173.2 × 25.4  = 0.09  From Fig. 15 and 16:  Te = 1.02  Ty  Where Gy = Tyw = 230 - 132.8 N/mm²  13  15  Te = 135.5 N/mm²  Hence, No = (25.4 × 178) × 135.5 × 10²  19 × 11 × 11 × 11  VD > Vmax			
(b) the distance from the mid-plane of the web to the neater edge of the flampe  .: 306.3 mm  .: may = 230 × 985.7 × 23 2 × 230 × 182 × 25.4  = 0.09  From Fig. 15 and 16:  Te = 1.09  Ty = 135.5 N/mm²  Hence, No = (25.4 × 178) × 135.5 × 10²  1.9 × 1.1  1.9 × 1.1  VD > Vmax	(a) $10 \pm 1355 \pm 10.23355 = 285.7 \text{ mm}$		
(b) the distance from the mid-plane of the web to the neater edge of the flange .: 306.3 mm  i. mg = 230 × 985.7 × 23 2 × 230 × 132 × 25.4  = 0.09  From Fig. 15 and 16:  Te = 1.02  Where a = Cyw = 230 = 132.8 N/mm² 13	σ4Λ √230	weeks were a second or consistency	many management
neater edge of five flange  306.3 mm $T_{W} = \frac{230 \times 285.7 \times 23^{2}}{2 \times 230 \times 13^{2} \times 25.4}$ $= 0.09$ From Fig. 15 and 16: $T_{e} = 1.09$ $T_{W} = \frac{1.09}{13}$ Where $T_{W} = \frac{0.09}{13}$ $T_{W} = \frac{0.09}{13}$ $T_{W} = \frac{0.09}{13}$ Hence, $T_{W} = \frac{0.09}{1.9 \times 1.1}$	and the second s	walkaning and a survey of a su	Same a constant to the constan
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:. $306.3 \text{ mm}$ :. $m_{AW} = 230 \times 285.7 \times 23^{2}$ $2 \times 230 \times 13^{2} \times 25.4$ = 0.09  From Fig. 15 and 16: $Ce \sim 1.09$ $T_{AW} = \frac{15}{15} = \frac{15}{15}$ :. $T_{AW} = \frac{15}{15} = 1$	neater edge of the flampe	·	
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	i. mp = 230×285.7×23°		Language of the personal pro-
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From Eq. 15 and 16: $\frac{Ce}{4} \sim 1.09$ $\frac{Ce}{4$		grander of the second s	
From Fq. 15 and 16:  \[ \frac{\text{Te}}{\text{q}} \sim \text{1.09} \]  \[ \text{Where}  \text{q} = \frac{\text{Tyw}}{\text{18}} = \frac{\text{30}}{\text{3}} \]  \[ \text{i.} \text{Te} = \frac{\text{135.5}}{\text{N/mm}^2} \]  \[ \text{Hence}, \text{Vo} = \begin{pmatrix} 25.4 \text{148} & 135.5 \text{10}^3 \\ 1.9 \text{11} & \text{11} \\ 1.9 \text{11} & \text{11} \\ 1.9 \text{11} & \text{11} \\ 1.9 \text{11} & \text{12} \\ 1.9 \text{11} & \text{12} & \text{135.5} \\ \end{pmatrix} \]	= 0.09	awa na	a se a success
$\frac{C_{e}}{C_{y}} = 1.02$ $\frac{C_{e}}{C_{y}} = \frac{O_{yw}}{\sqrt{3}} = \frac{230 - 132.8 \text{ N/mm}^{2}}{\sqrt{3}}$ $\frac{C_{e}}{\sqrt{3}} = \frac{O_{yw}}{\sqrt{3}} = \frac{230 - 132.8 \text{ N/mm}^{2}}{\sqrt{3}}$ $\frac{C_{e}}{\sqrt{3}} = \frac{O_{yw}}{\sqrt{3}} = \frac{230 - 132.8 \text{ N/mm}^{2}}{\sqrt{3}}$ $\frac{C_{e}}{\sqrt{3}} = \frac{O_{yw}}{\sqrt{3}} = \frac{230 - 132.8 \text{ N/mm}^{2}}{\sqrt{3}}$ $\frac{C_{e}}{\sqrt{3}} = \frac{O_{yw}}{\sqrt{3}} = \frac{230 - 132.8 \text{ N/mm}^{2}}{\sqrt{3}}$ $\frac{C_{e}}{\sqrt{3}} = \frac{O_{yw}}{\sqrt{3}} = \frac{230 - 132.8 \text{ N/mm}^{2}}{\sqrt{3}}$ $\frac{C_{e}}{\sqrt{3}} = \frac{O_{yw}}{\sqrt{3}} = \frac{230 - 132.8 \text{ N/mm}^{2}}{\sqrt{3}}$ $\frac{C_{e}}{\sqrt{3}} = \frac{O_{yw}}{\sqrt{3}} = \frac{230 - 132.8 \text{ N/mm}^{2}}{\sqrt{3}}$ $\frac{C_{e}}{\sqrt{3}} = \frac{O_{yw}}{\sqrt{3}} = \frac{230 - 132.8 \text{ N/mm}^{2}}{\sqrt{3}}$ $\frac{C_{e}}{\sqrt{3}} = \frac{O_{yw}}{\sqrt{3}} = \frac{O_{yw}}{$	The second secon		ng paga pagaban
$\frac{C_{2}}{C_{3}} = 1.02$ $\frac{C_{4}}{C_{5}} = \frac{O_{4}W}{13} = \frac{230 - 132.8 \text{ N/mm}^{2}}{13}$ $\frac{C_{5}}{C_{5}} = \frac{135.5 \text{ N/mm}^{2}}{1.2 \times 1.1}$ $\frac{C_{5}}{C_{5}} = \frac{25.4 \times 178}{1.2 \times 1.1} \times 135.5 \times 10^{-3}$ $= 464.1 \text{ kN}$ $V_{D} > V_{max}$	From Eq. 15 and 16		enne i e e mare mile ess
Where $G_1 = \frac{C_{1}W}{V_3} = \frac{230 - 132.8 \text{ N/mm}^2}{V_3}$ i. $C_2 = \frac{135.5 \text{ N/mm}^2}{1.35.5 \text{ N/mm}^2}$ Hence, $V_D = \left(\frac{25.4 \times 178}{1.9 \times 1.1}\right) \times \frac{135.5 \times 10^{-3}}{1.9 \times 1.1}$ = 464.1 LN		makaana ahii hamaana	ARRAU IIIA (I.A. II APRAMIARAMA
Where $G_1 = \frac{C_{1}W}{V_3} = \frac{230 - 132.8 \text{ N/mm}^2}{V_3}$ i. $C_2 = \frac{135.5 \text{ N/mm}^2}{1.35.5 \text{ N/mm}^2}$ Hence, $V_D = \left(\frac{25.4 \times 178}{1.9 \times 1.1}\right) \times \frac{135.5 \times 10^{-3}}{1.9 \times 1.1}$ = 464.1 LN	<u>Ce</u> ≈ 1.02		
	4		
	T 220 120 a 1/ 9		
$i = T_e = 135.5 \text{ N/mm}^2$ Hence, $V_D = \begin{pmatrix} 25.4 \times 178 \\ 1.9 \times 111 \end{pmatrix} \times 135.5 \times 10^{-3}$ = 464.1 VN	Where a = 20 - 152.8 10/mm	and a particular design of the second of	***************************************
Hence, $V_D = (25.4 \times 178) \times 135.5 \times 10^{-3}$ = 464.1 LN			The same of the sa
Hence, $V_D = (25.4 \times 178) \times 135.5 \times 10^{-3}$ = 464.1 LN	° 7 - 125 5 N/m 2		ann response e la france e la france
1.9 × 1.1 = 464.1 W	2 - Q = 153 · 2 · M/mm		. maann akersaa jaanaan of mu
1.9 × 1.1 = 464.1 W		***************************************	
1.9 × 1.1 = 464.1 W VD > Vmax	Hence 1 = 25.4×178 135.5×10-3		
$V_D > V_{max}$			
$V_D > V_{max}$	= 464.1 kN		graphic or agree in adjunction waves when
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	$V_D > V_{max}$		
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Plaicrow CALCULATION SHEET	No: 36	Rev:
Project: RAIL PROPERTY BOARD ASSESSMENTS	ву: АС	Date: 09/09
Subject: THE STUD BRIDGE no. 560	Check By:	Date:
	Reference	s/Results
STRENGTH OF FASTENERS		
Shear Flow resisted by the rivets		
z = vAq	200 - 100 20 - 100 Q 20 00 00 00 00 00 00 00 00 00 00 00 00	
where V = the shear force	ings - in the same state of th	
= 66.1 kN	and the state of t	and a second second second second second
		and an arrange of the second second second
A = area of section above the	in a Caramana was	
shear plane = 3355 mm <sup>2</sup>		***************************************
		The state of the s
7 = depth to neutral axis from the		South a south of the south of the south
centroid of the section being		and the second access and access to the second
Considered.	The second secon	The second secon
= 103-72 mm	SA CONTRACTOR OF SAME	
I = Moment of inertia of alea	VI	
= 11.8288 × 107 mm		
	,	
:. 7- 66.1 × 3355× 103.72×103 - 194.45 kN/m	o	
11.82.33×107	a a a a a a a a a a a a a a a a a a a	
Rivet Spacing at Loomm c/c		***************************************
So 20 studs/m		
		a service and a
Shear on each rivet = 194.45 = 9.72 km	Section of American Conference on Conference	
Area of rivet shaft = T1×2062 333.3 mm2		
Nominal yield stress = 230 N/mm2		
		on the second se
Stress on rivets = $9720 - 29.9 \text{ N/mm}^2$		
		The second secon
29.2 N/mu² > 230 N/mm²		The state of the s
:. Rivets adequate in Shear		The same management of the same
		and the same of th
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<b>Halcrow</b>	CALCUI	LATION	SHEET	No: 35	3	Rev:	
Project: RAIL PROPERTY BOARD A	SSESSMENT	S		Ву: А	C	Date: (	9/02
Subject: THE STUD BRIDG	E no. 560			Check By:		Date:	
	779	To the second of		Refere	nces/	Result	S
ASSESSMENT LOADS							
						ļ	<b>-</b>
						<u> </u>	
Dead Load	•						<u> </u>
DI C ()						<u> </u>	
Plate Girder:							,
Area = (2×305	: × L1 ) -1	-(2 × 44	85.4)	1119. 9.79 (114.40.10.10.10.10.1			
	).8 mm	<b>X</b> - 1 1					<u> </u>
[m+ 11200 l+ - 7850 ka	/m 3			BD	21,	/oI	<u></u>
0 = 78.5 kg	/m <sup>3</sup>			546	. 4.	1	
Self-weight = 0.0156 = 1.23 km	808 *	78.S				<u>.</u>	
= 1.23 k	1/m						
						ļ	
C and Dead In							
Superimposed Dead Lo	O.Co.					charmon e AAA	
A STATE OF THE STA							
Parapet:							
						<u> </u>	
Assume dead Load from	ow pan	spet o	.SkU/m			<u> </u>	
2							
Surfoang:						1	1
Area = 120 × 612.6	G						
= 735/2  m	y 2						
linif weight = 2300 kg = 23 kN/	/m3						
0 = 23 kN/	m <sup>3</sup>				· · · · · · · · · · · · · · · · · · ·		
Self-weight = 73512 = 1.7	×23 >	· 10-°					
The state of the s	cN/m						
Concete Fil:							
Area = 35887.4n	m 2						
unit Weight = 2300 kg/m = 23 kN/m	3						
0 = 23 kV/m	5						
		. +6		and annual agreemen			
Self-weight = 85887.4 = 2.0 km/	×23 >	ا مك					
2 = 2.0 kW	m	· · · · · · · · · · · · · · · · · · ·					
		****			adacea		
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Project: RAIL PROPERTY BOARD ASSESSMENTS		By: AC	Date: 09/02
Subject: THE STUD BRIDGE no. 560	ſ	Check By:	Date:
		References	/Results
Live Load			
Span of beam = 4.137 m			
Single Wheel Load:	-		
		666	4
For low traffic good surface mad Nominal Single wheel load		BD 21	32
W = 82 LN			3.9
Wheel Load is applied over a 0.3mx0 square confact area	.3 <sub>m</sub>		
sough confact area			
			me and an anglammaja sa
Distribution of Goods		BD 21/	
parapet			14
r verge x dway		- hg	6.2
	-		
82 Rood Surface			
Top of			
troughing.			
¥ 602 +			
The amount of Good taken by the section is	<u>. L</u>		
	***************************************		
$\frac{82}{2000} = 18.7  \text{kN/m}$			
3			
	*****		
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		en since simon serious servicios	***************************************
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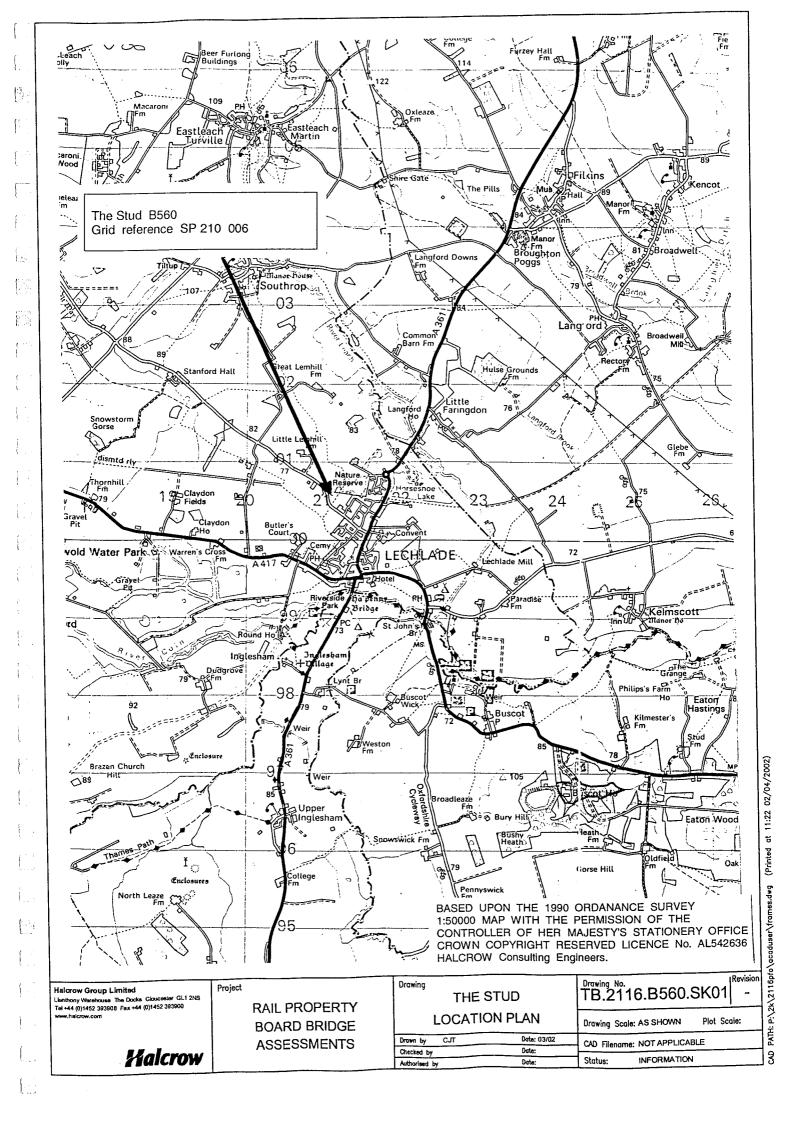
roject:  RAL PROPERTY BOARD ASSESSMENTS  THE STUD BRIDGE no. 560  Purts of Factors for Go. ds. fg. References/Results  Steel plane fg. = 1.05  Concrete fill fg. = 1.95  Suefacina ff. = 1.95  Pabo Pet ff. = 1.95  Pabo Pet ff. = 1.95  Pabo Pet ff. = 1.95  Suefacina ff. = 1.95  Pabo Pet ff. = 1.95  Suefacina ff. = 1.95  Contrele Fill = 2.0 × 1.90 = 9.4 kW/m  Suefacina ff. = 2.0 × 1.90 = 9.4 kW/m  Paraget = 9.5 × 1.90 = 9.4 kW/m  Paraget = 9.5 × 1.90 = 9.0 kW/m  Live Single Wheel Go. = 13.7 × 1.5 = 9.0 G. kW/m	•.	· Alter formation			
THE STUD BRIDGE no. 560  Check By:  References/Results  Partial Factors for loads, off   BD 21/01   Th. B. 1    Steel plate, off = 1.05  Concrete fill off = 1.90  Surfacing off = 1.50  Very off   Steel plate   Off   Surfacing   Surfac	<b>Zalcro</b>	W	CALCULATION SHEE	No: 40	
THE STUD BRIDGE no. 560  By:  References/Results  BD 21/01  Tho. B. 1  Sheel plate of the end of th	Project:	RAIL PROPERTY B	OARD ASSESSMENTS		Date:09/09
References/Results	ubject:	THE STUD	BRIDGE no. 560		Date:
Steel plate, the = 1.05  Concrete fill office = 1.20  Surfacing office = 1.20  To. 3.1  Surfacing office = 1.20  Assessment loads  Steel Mode Girder = 1.23×1.05 = 1.3 kW/m  Concrete Fill = 2.0×1.20 = 2.4 kW/m  Surfacing = 1.7×1.75 = 3.0 kW/m  Parapet = 0.5×1.20 = 0.6 kW/m	control of the contro		The second secon		Results
Steel plate, the = 1.05  Concrete fill the = 1.20  Surfacing the = 1.20  To. 3.1  Surfacing the = 1.20  Ive the = 1.20  Assessment loads  Steel Mode Girder = 1.23×1.05 = 1.3 kW/m  Concrete Fill = 2.0×1.20 = 2.4 kW/m  Surfacing = 1.7×1.75 = 3.0 kW/m  Parapet = 0.5×1.20 = 0.6 kW/m	Palla	Fostors for la	ands to	BD 21/01	
Concrete fill offi = 190 Surfacing offi = 175 Parapet offi = 120 Ive offi = 1.50  Assessment Loads  Sleet Made Girder = 1.23×1.05 = 1.3 kN/m Concrete Fill = 2.0 × 1.90 = 2.4 kN/m Surfacing = 17×175 = 3.0 kN/m Parapet = 0.5 × 1.20 = 0.6 kN/m			1994		
Concrete fill of $= 1.90$ Surfacing of $= 1.90$ Parapet ods  Steel Mate Girder $= 1.23 \times 1.05 = 1.3 \text{ kWm}$ Concrete Fill $= 2.0 \times 1.90 = 9.4 \text{ kWm}$ Surfacing $= 1.7 \times 1.75 = 3.0 \text{ kWm}$ Parapet $= 0.5 \times 1.90 = 0.6 \text{ kWm}$	Steel	plate to =	1.05		
Surfacing, $G_L = 1.75$ Paralet  The Surfacing of $G_L = 1.20$ Assessment loads  Steel Mate Girder = 1.23×1.05 = 1.3 kN/m  Concrete Fill = 2.0 × 1.20 = 2.4 kN/m  Surfacing = 1.7×1.75 = 3.0 kN/m  Paralet = 0.5 × 1.20 = 0.6 kN/m	Concrete	5 fill , pro =		***************************************	
Assessment loads  Steel Mate Girder = 1.23×1.05 = 1.3 kN/m  Concrete Fill = 2.0 × 1.20 = 2.4 kN/m  Surfacing = 1.7×175 = 3.0 kN/m  Parapet = 0.5 × 1.20 = 0.6 kN/m		na fi			
Assessment Loads  Steel Plate Girder = 1,23×10s = 13 kN/m  Concrete Fix = 2.0×1.90 = 2.4 kN/m  Surfacing = 1.7×175 = 3.0 kN/m  Parapet = 0.5×1.20 = 0.6 kN/m					
Assessment Loads  Steel Plate Girder = $1.93 \times 1.05 = 1.3 \text{ kV/m}$ Concrete Fig = $2.0 \times 1.90 = 9.4 \text{ kV/m}$ Surfacing = $1.7 \times 1.75 = 3.0 \text{ kV/m}$ Parapet = $0.5 \times 1.20 = 0.6 \text{ kV/m}$	Live				
Steel Role Girder = 1.23 × 1.05 = 1.3 kV/m Concrete Fig = 2.0 × 1.20 = 2.4 kV/m Surfacine = 1.7 × 1.75 = 3.0 kV/m Parapet = 0.5 × 1.20 = 0.6 kV/m					
Steel Male Girder = 1.23 × 1.05 = 1.3 kN/m Concrete Fill = 2.0 × 1.20 = 2.4 kN/m Surfacine = 1.7 × 1.75 = 3.0 kN/m Parapet = 0.5 × 1.20 = 0.6 kN/m	Samuel Control of the	and the state of t			
Steel Rule Girder = 1.23 × 1.05 = 1.3 kN/m Concrete Fit = 2.0 × 1.20 = 2.4 kN/m Surfacine = 1.7 × 1.75 = 3.0 kN/m Parapet = 0.5 × 1.20 = 0.6 kN/m					
Concrete Fig = $2.0 \times 1.20 = 2.4 \text{ kWm}$ Surfacine = $1.7 \times 1.75 = 3.0 \text{ kWm}$ Parapet = $0.5 \times 1.20 = 0.6 \text{ kWm}$	Assessm	ent Loads			
Concrete Fig = $2.0 \times 1.20 = 2.4 \text{ kW/m}$ Surfacine = $1.7 \times 1.75 = 3.0 \text{ kW/m}$ Parapet = $0.5 \times 1.20 = 0.6 \text{ kW/m}$					
Surfacine = $1.7 \times 1.75 = 3.0 \text{ kV/m}$ Parapet = $0.5 \times 1.90 = 0.6 \text{ kV/m}$		7		Marie Marie Andre Andre A more de la marie	
Parapet = $0.5 \times 1.90 = 0.6 \text{ keV/m}$		1 1 1 <b>\</b>		and the state of t	
				*****	
Single Wheel (bad = 13.7+15 = 20.6 LN/m)					
		le Wheel bad	= 13.7*15 = 20.6 LN/	m	
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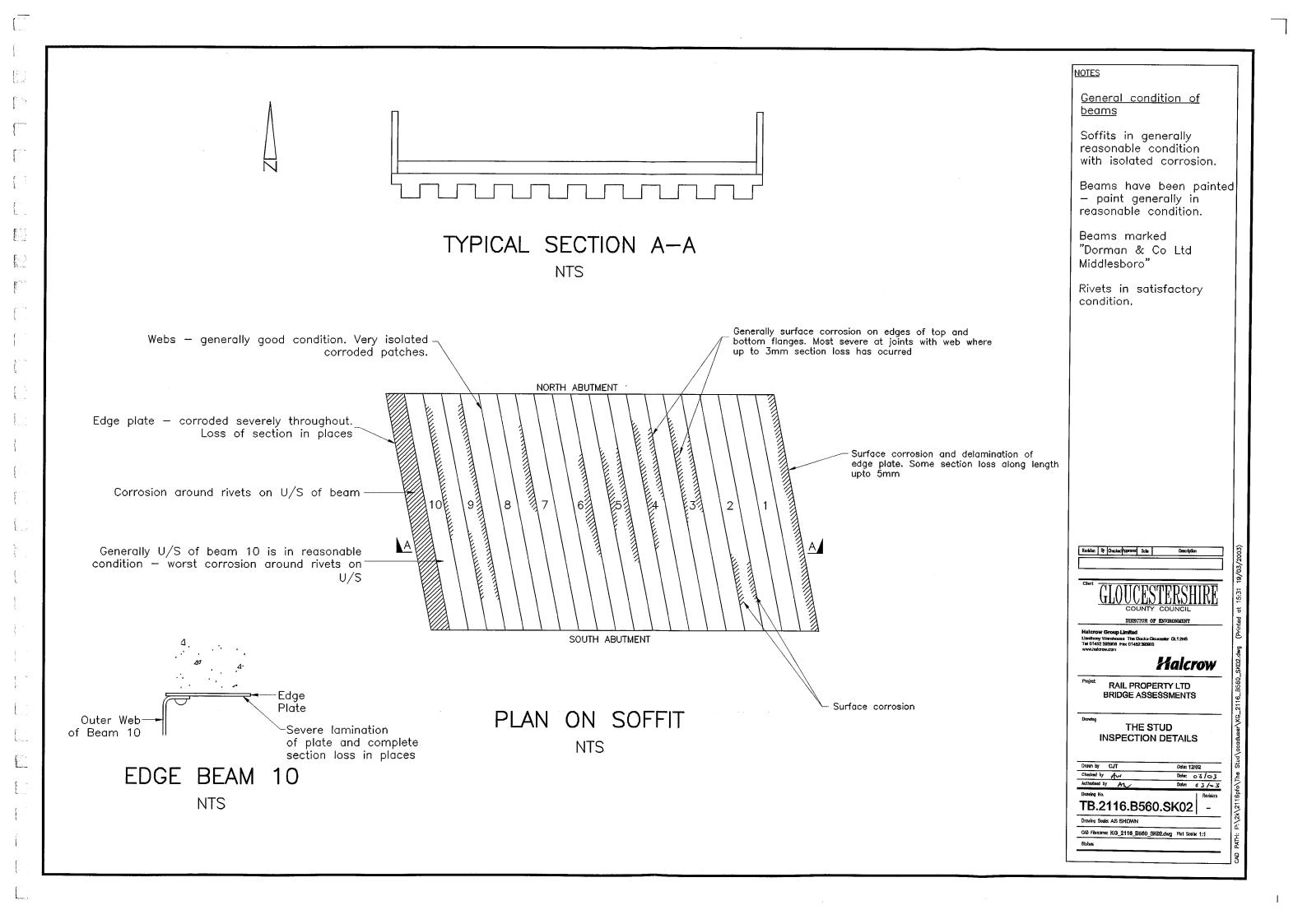
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Project:	RAIL PROPE	ERTY BOA	RD AS	SESS	MEN	TS					Ву	:	AC		Date: ()	19/02
Subject:	TH	E STUD B	RIDGE	no. 56	<b>30</b>							eck		1	Date:	
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MOMENT am	d SHE	ΔΩ						·		<b>-</b>					***************************************	
HOME OCAM																
Dead Load							· · · · · · · · · · · · · · · · · · ·									
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M = WL2 -	1.3 ×		7	•	2.	8	دلاء	മ .		ļ						
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# Appendix A – Location Plan – Drawing TB.2116.B560.SK02





## Appendix B – Form AA and Form AA/1

(1), 2-1, (1), 2-1, (1), 2-1,

Group Standard

FORM 'AA' (BRIDGES)

ELR/ Bridge No: FFD 86m 20c

GC/TP0356

Appendix: 4 Issue: 1

Revision: B (Nov 2000)

## APPROVAL IN PRINCIPLE FOR ASSESSMENT

1. Bridge/Line Name

The Stud Bridge

Disused railway

2. ELR/Bridge No.

FFD 86m 20c

County bridge number 560

2.1 Location and grid reference

Unclassified County road over disused rail bridge at OS grid

reference SP 210 006

3. Brief Description of Existing Bridge:

3.1 Span Arrangement:

Single span steel trough deck (built

up) on masonry abutments.

4.00m (skew span)

Skew 12° (approx)

3.2 Superstructure Type:

Steel trough deck (built up) on

masonry abutments.

Timber and corrugated metal parapet

on both sides of bridge

Square width between parapets:

6.130m

Carriageway width: 4.720m

Verge widths: 0.860m and 0.550m

3.3 Substructure Type:

Masonry abutments. Brick wing walls.

Foundations unknown

3.4 Details of any Special Features:

None

3.5 Statutory Undertakers Plant:

From the inspection and information provided by statutory bodies there is

no reason to believe that any

apparatus will affect the assessment

Group Standard

#### FORM 'AA' (BRIDGES)

GC/TP0356

Appendix: 4 Issue: 1

Revision: B (Nov 2000)

ELR/ Bridge No: FFD 86m 20c

## APPROVAL IN PRINCIPLE FOR ASSESSMENT

#### 4. Assessment Criteria

4.1 Loadings and Speed:

Speed not applicable to assessment of superstructure.

HA Live assessment loading as detailed in BD21/01.

Unit weights of superimposed dead loads shall be in accordance with BD21/01.

Footway live loading not applicable to assessment.

Calculation of abnormal load capacity shall not be undertaken.

4.2 Codes to be used

BD 21/01 The Assessment of Highway Bridges and Structures

BA 16/97 The Assessment of Highway Bridges and Structures

BD 56/96 The Assessment of Steel Highway Bridges and Structures

BA 56/96 The Assessment of Steel Highway Bridges and Structures

4.3 Proposed Method of Structural Analysis

There are no record drawings available for this structure

The superstructure shall be analysed in accordance with BD 56/96. Simple load distribution and dispersal techniques for trough decks shall be used in accordance with Chapter 6 of BD 21/01. A diagram of the idealised structure is shown on page (vi)

Initially a simple analysis shall be carried out based on the layout of structural elements recorded from the inspection.

Group Standard

#### FORM 'AA' (BRIDGES)

GC/TP0356

Appendix: 4

Issue: 1

ELR/ Bridge No: FFD 86m 20c Revision: B (Nov 2000) APPROVAL IN PRINCIPLE FOR ASSESSMENT

4.3 Proposed Method of Structural Analysis (continued)

Calculation of section properties shall consider any loss of section due to corrosion.

Parameters to be used for assessment:

Characteristic yield stress of steel 230N/mm<sup>2</sup> from Cl. 4.3, BD 21/01.

Characteristic strength of pre 1939 concrete assumed not to be greater than 15N/mm<sup>2</sup> from Cl. 4.7, BD 21/01.

A qualitative assessment shall be made of other parts of the structure.

The parapets will not be assessed.

4.4 Details of any Special Requirements

None

## FORM 'AA' (BRIDGES)

ELR/ Bridge No: FFD 86m 20c

GC/TP0356

Appendix: 4

Issue: 1

Revision: B (Nov 2000)

## APPROVAL IN PRINCIPLE FOR ASSESSMENT

5. THE ABOVE IS SUBMITTED FOR ACCEPTANCE



Title/Professional Qualification:

ENGINEER CENG MICE

Date: 20 JANUARY 2003

nior Civil Engineer's Comments
 None
Proposed Category for Independent Check
Superstructure
Substructure
Name Of Checker Suggested If Cat 2 Or 3

Category 1

The above assessment, with amendments

Signed

Title

Date

Senier Gril Engineer

Group Standard

## FORM 'AA' (BRIDGES)

GC/TP0356

ELR/ Bridge No: FFD 86m 20c

Appendix: 4 Issue: 1

Revision: B (Nov 2000)

## APPROVAL IN PRINCIPLE FOR ASSESSMENT

Category 2 and 3

The above assessment, with amendments shown, is approved in principle:

Signed	
Title	
Date	
Signed	
Title	
Data	

Group Standard

### FORM 'AA/1' (BRIDGES)

ELR/ Bridge No: FFD 86m 20c

GC/TP0356

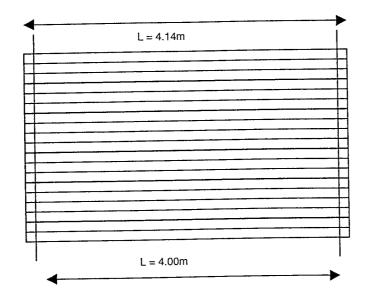
Appendix: 4

Issue: 1

Revision: B (Nov 2000)

## APPROVAL IN PRINCIPLE FOR ASSESSMENT

#### Diagram Showing the Idealised Structure



#### **Parameters for Assessment:**

Span between points of support (I): 4.14m

Clear Span between abutments (L): 4.00m

Characteristic yield stress of steel: 230N/mm<sup>2</sup>

Characteristic strength of concrete: 15N/mm<sup>2</sup>

Group Standard

#### FORM 'AA/1' (BRIDGES)

GC/TP0356

ELR/ Bridge No: FFD 86m 20c

Appendix: 4 Issue: 1 Revision: B (Nov 2000)

### APPROVAL IN PRINCIPLE FOR ASSESSMENT

Additional Information Required For BRB (Residuary) Limited Owned Public Road Overbridges Assessed As Part Of Bridgeguard III

1. Bridge/Line Name

The Stud Bridge

Disused railway line

2. ELR/Bridge No.

FFD 86m 20c

County bridge number 560

3. Scope Of Assessment

Initially a simple analysis shall be carried out based on the layout of the structural elements recorded from the inspection.

A qualitative assessment of the spandrel walls, abutments and wingwall will be undertaken.

The parapets will not be assessed.

#### 4. Assessment Criteria

(a) Standards And Codes Of Practice To Be Used In Assessment BD 21/01 The Assessment of Highway Bridges and Structures

BA 16/97 The Assessment of Highway Bridges and Structures

BD 56/96 The Assessment of Steel Highway Bridges and Structures

BA56/96 The Assessment of Steel Highway Bridges and Structures

(b) Proposed Method Of Structural Analysis

There are no record drawings available for this structure.

The superstructure shall be analysed in accordance with BD 56/96. Simple load distribution and dispersal techniques for trough decks shall be used in accordance with Chapter 6 of BD 21/01. A diagram of the idealised structure is shown on page (vi)

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Group Standard

FORM 'AA/1' (BRIDGES)

GC/TP0356

ELR/ Bridge No: FFD 86m 20c

Appendix: 4
Issue: 1

Revision: B (Nov 2000)

## APPROVAL IN PRINCIPLE FOR ASSESSMENT

(b) Proposed Method Of Structural Analysis (continued)

Calculation of section properties shall consider any loss of section due to corrosion.

Parameters to be used for assessment:

Characteristic yield stress of steel 230N/mm<sup>2</sup> from Cl.4.3, BD 21/01.

Characteristic strength of concrete assumed to be not greater than 15N/mm<sup>2</sup> from Cl.4.7, BD 21/01.

A qualitative assessment shall be made of all other parts of the structure.

The parapets will not be assessed.

(c) Planned Highway Works/Modifications At This Site There are no known planned highway works/modifications at the site.

(d) Road Designation Class And Whether Classed As A Heavy Load Route Unclassified County road

(e) Any Other Requirements

None

Group Standard

FORM 'AA/1' (BRIDGES)

GC/TP0356

Appendix: 4

Issue: 1 Revision: B (Nov 2000)

ELR/ Bridge No: FFD 86m 20c

(33

## APPROVAL IN PRINCIPLE FOR ASSESSMENT

The Above Is Agreed Subject To The Amendments And Comments Shown Below.

\*Signe

Title

Date

\*A Team Leader, Consultant Or Chief Officer Employed By An Agent Authority May Sign "For And On Behalf

Of" (Flightfure but and Where Authorised To Do So.

## GLOUCESTERSHIRE COUNTY COUNCIL RAIL PROPERTY LTD BRIDGE ASSESSMENTS THE STUD BRIDGE FFD 86m 20c GCC No: B560

Sheet: 1 of 3

Structure: The Stud Bridge Grid Ref: FFD 86m 20c Date: March 2003

#### CERTIFICATE OF ASSESSMENT AND CHECKING

## TECHNICAL APPROVAL FOR ASSESSMENT OF BRIDGES AND OTHER BRIDGES

#### 1 Identification of Bridge

Name

The Stud Bridge

Location and grid reference Engineers Line Reference SP 210 006 FFD 86m 20c

#### 2 Certification of assessment and category I check

We certify that reasonable professional skill and care have been used by a competent person in the assessment and checking of the above structure with a view to securing that:-

- (i) it has been assessed and checked in accordance with the Approval in Principle as recorded on Form AA signed by J Clarke dated 28<sup>th</sup> January 2003.
- (ii) the assessment and check comply with the following British Standards and Codes of Practice, with departures as shown:-

BD 21/01 The Assessment of Highway Bridges and Structures

BA 16/97 The Assessment of Highway Bridges and Structures

BD 56/96 The Assessment of Steel Highway Bridges and Structures

BA 56/96 The Assessment of Steel Highway Bridges and Structures

The unique numbers of the drawings used for the assessment are:

Inspection Details

TB.2116.B560.SK02

The assessed capacity of the structure is as follows:-

#### (a) Steel Trough

40 Tonnes Assessment Live Loading (ALL)

By observation the edge deck plate immediately adjacent to the west parapet would fail under accidental wheel loading.

Based on assumptions in the Assessment and Inspection Report (Document Ref. TB.2116.B560.Doc01)

## GLOUCESTERSHIRE COUNTY COUNCIL RAIL PROPERTY LTD BRIDGE ASSESSMENTS THE STUD BRIDGE FFD 86m 20c GCC No: B560

Sheet: 2 of 3

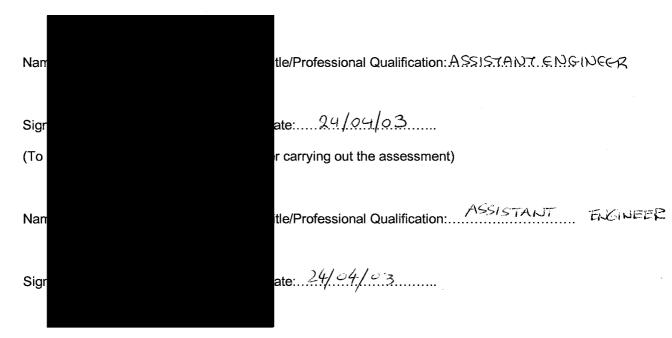
Structure: The Stud Bridge Grid Ref: FFD 86m 20c Date: March 2003

#### CERTIFICATE OF ASSESSMENT AND CHECKING

(b) Wingwalls, abutments and foundationsAll satisfactory based on a qualitative assessment.

The parapets were not assessed.

The HB capacity was not assessed.



(To be signed by the person or team leader carrying out the category I check)

## GLOUCESTERSHIRE COUNTY COUNCIL RAIL PROPERTY LTD BRIDGE ASSESSMENTS THE STUD BRIDGE FFD 86m 20c GCC No: B560

Sheet: 3 of 3

Structure: The Stud Bridge Grid Ref: FFD 86m 20c Date: March 2003

#### CERTIFICATE OF ASSESSMENT AND CHECKING

#### 3 Certification of categories II and III checks

(NB A category I check shall also be carried out in these cases)

We certify that reasonable professional skill and care have been used on the independent checking of the above structure with a view to securing that the criteria in Section 2 (i) and (ii) above have been met.

Name:	Title/Professional Qualification:
Signed:	Date:
(To be signed by the person or team lea	ader carrying out the category II or III check)

#### 4 Acceptance by the Technical Approval Authority

This certificate is accepted on behalf of Rail Property Ltd

