

AngellThompson

Consulting Structural Engineers & Surveyors

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Contract No. 250725
Sheet No. /01.
Reference Drg.
Date Sept 25
Prepared By

64 Stanley Crescent DA12 5SY

Loadings

Roof/Loft.

$$\begin{aligned} u &= 0.25W L^2 + 0.75W L^2 \\ D &= \text{tiles (plan)} = 1.05 \\ \text{timbers/batts} &= 0.30 \\ \text{Ins} &= 0.05 \\ \text{Ceiling (up)} &= 0.30 \\ &= 1.50W L^2 \end{aligned}$$

First Floor.

$$\begin{aligned} u &= 1.50W L^2 \\ D &= \text{Brds} = 0.10 \\ \text{Joist} &= 0.20 \\ \text{Celly} &= 0.30 \\ &= 0.60W L^2 \end{aligned}$$

Wall (due to base assume blk cavity)

$$\begin{aligned} \text{Render} &= 0.50 \\ 2 \text{ skins} &= 4.80 \\ \text{Plaster} &= 0.30 \\ &= 5.60W L^2 \end{aligned}$$

Extension Roof

$$\begin{aligned} u &= 0.75W L^2 \\ D &= \text{Brd} = 0.10 \\ \text{Joist} &= 0.15 \\ \text{Ins} &= 0.05 \\ \text{Ceiling} &= 0.25 \\ \text{Fn} &= 0.20 \\ &= 0.75W L^2 \end{aligned}$$

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Contract No.

250725

Sheet No.

102

Reference Drg.

Date

Sept 25

Prepared By

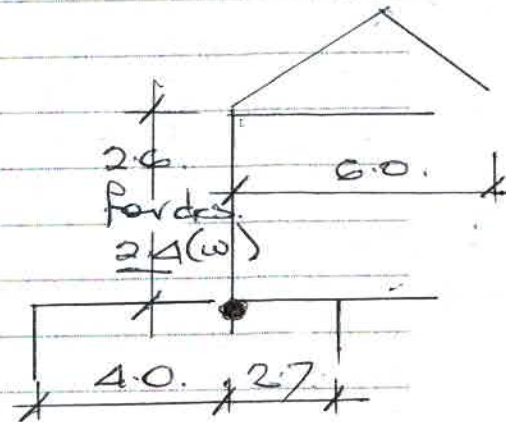
E

New Opening In Rear Wall
(cavity or solid over & strut or truss?)

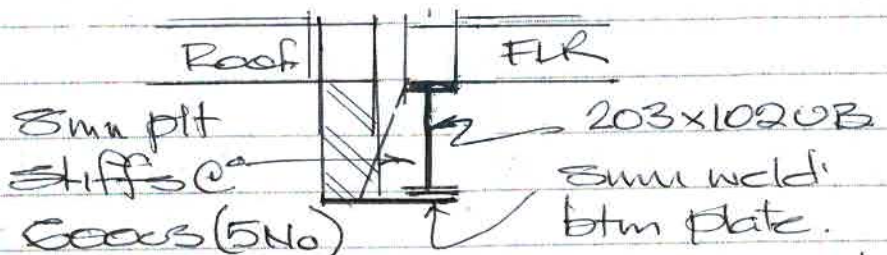
Option 1 - 2.60m
(Single Steel)

$$u = (0.75 \times 2) + (0.75 \times 3) + (1.5 \times 1.35) = 5.80 \text{ kN}$$

$$w = (0.75 \times 2) + (1.6 \times 3) + (0.6 \times 1.35) + (5.6 \times 2.4) = 20.60 \text{ kN}$$

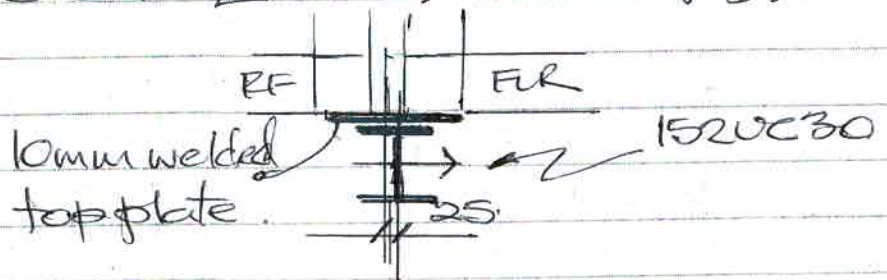


1A - 203x102 UB23 Steel + 8mm welded btm plate & plt stiff's



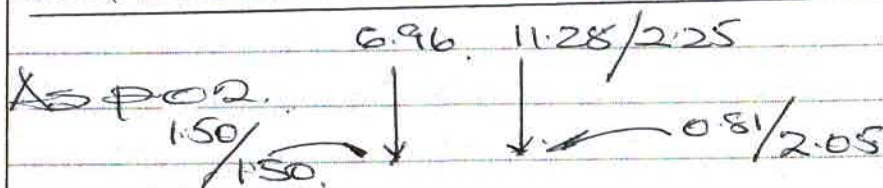
Note Full Bearing to UB & Btm Plate

1B - 152x152 UC 30 + 10mm welded top plate (to sort wall over)
(NB IF g'll over use 203UC 46)
(load 1/3 & 2/3 so design check with ecc. to & wall, or destabilising)



(5) 1.80
1.50
↓
(9) 6.96
↓ = 14
outer
6.48 + 4.8 = 11.28
+ 2.25 (24)
↓
inner
0.81 + 2.25 (5)
↓
1.25
+ 2.5

Option 2 - Double Steels

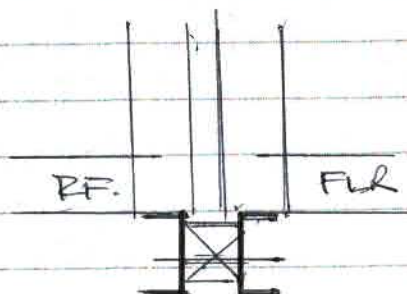


Check on Inner Skin Steel

$$u = 2.25 + 2.05 = 4.30m$$

$$d = 11.28 + 0.81 = 12.10m$$

Use 2/150 x 75 PFC's (15kg x 2)
with bolted spacers & connections



1) 150x75 PFC's centred on extg wall skins.

(Any Issues up to 150x90 PFC.)

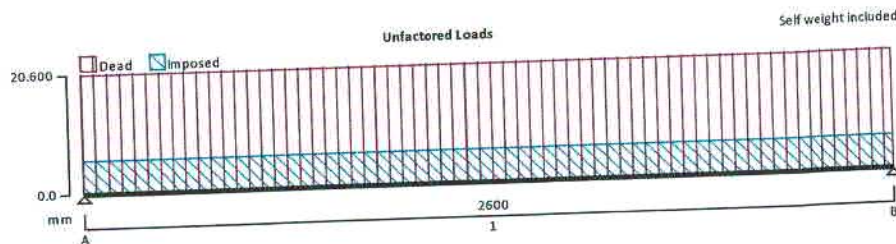
2) At 600cs (5N°) pfc or shs spacers
Bolted to & thru both PFC steel
webs

Tekla Tedds ANGELL THOMPSON & PRNRS LTD 01737 360136	Project 64 STANLEY CRESCENT GRAVESEND			Job no. 25072S	
	Calcs for REAR WALL OPENING STEEL - OPTION 1A			Start page no./Revision 1	
	Calcs by C	Calcs date 12/09/2025	Checked by	Checked date	Approved by Approved date

STEEL BEAM ANALYSIS & DESIGN (BS5950)

In accordance with BS5950-1:2000 incorporating Corrigendum No.1

TEDDS calculation version 3.0.07



Support conditions

Support A

Vertically restrained

Rotationally free

Support B

Vertically restrained

Rotationally free

Applied loading

Beam loads

Dead self weight of beam $\times 1$

Imposed UDL 5.8 kN/m from 0 mm to 2600 mm

Span 1 loads

Dead UDL 20.6 kN/m from 0 mm to 2600 mm

Load combinations

Load combination 1

Support A

Dead $\times 1.40$

Imposed $\times 1.60$

Dead $\times 1.40$

Imposed $\times 1.60$

Support B

Dead $\times 1.40$

Imposed $\times 1.60$

Analysis results

Maximum moment

$M_{max} = 32.5$ kNm

$M_{min} = 0$ kNm

Maximum shear

$V_{max} = 50$ kN

$V_{min} = -50$ kN

Deflection

$\delta_{max} = 3.7$ mm

$\delta_{min} = 0$ mm

Maximum reaction at support A

$R_{A_{max}} = 50$ kN

$R_{A_{min}} = 50$ kN

Unfactored dead load reaction at support A

$R_{A_{Dead}} = 27.1$ kN

Unfactored imposed load reaction at support A

$R_{A_{Imposed}} = 7.5$ kN

Maximum reaction at support B

$R_{B_{max}} = 50$ kN

$R_{B_{min}} = 50$ kN

Unfactored dead load reaction at support B

$R_{B_{Dead}} = 27.1$ kN

Unfactored imposed load reaction at support B

$R_{B_{Imposed}} = 7.5$ kN

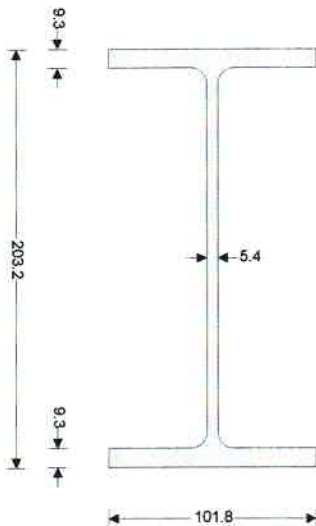
Section details

Section type

UB 203x102x23 (British Steel Section Range 2022 (BS4-1)) Steel grade

S275

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	Calcs for REAR WALL OPENING STEEL - OPTION 1A			Start page no./Revision 2	
	Calcs by C	Calcs date 12/09/2025	Checked by	Checked date	Approved by Approved date



Classification of cross sections - Section 3.5

Tensile strain coefficient $\epsilon = 1.00$ Section classification **Plastic**

Shear capacity - Section 4.2.3

Design shear force $F_v = 50 \text{ kN}$ Design shear resistance $P_v = 181.1 \text{ kN}$
PASS - Design shear resistance exceeds design shear force

Moment capacity - Section 4.2.5

Design bending moment $M = 32.5 \text{ kNm}$ Moment capacity low shear $M_c = 64.4 \text{ kNm}$

Buckling resistance moment - Section 4.3.6.4

Buckling resistance moment $M_b = 33.5 \text{ kNm}$ $M_b / m_{LT} = 36.2 \text{ kNm}$
PASS - Buckling resistance moment exceeds design bending moment

Check vertical deflection - Section 2.5.2

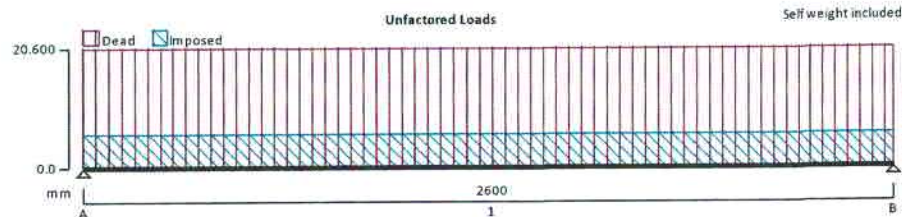
Consider deflection due to dead and imposed loads
Limiting deflection $\delta_{lim} = 7.222 \text{ mm}$ Maximum deflection $\delta = 3.672 \text{ mm}$
PASS - Maximum deflection does not exceed deflection limit

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	64 STANLEY CRESCENT GRAVESEND		25072S	
	Calcs for		Start page no./Revision	
	REAR WALL OPENING STEEL - OPTION 1B		1	
	Calcs by	Calcs date	Checked by	Checked date
	C	12/09/2025		
			Approved by	Approved date

STEEL BEAM ANALYSIS & DESIGN (BS5950)

In accordance with BS5950-1:2000 incorporating Corrigendum No.1

TEDDS calculation version 3.0.07



Support conditions

Support A

Vertically restrained

Rotationally free

Support B

Vertically restrained

Rotationally free

Applied loading

Beam loads

Dead self weight of beam $\times 1$

Span 1 loads

Imposed UDL 5.8 kN/m from 0 mm to 2600 mm

Dead UDL 20.6 kN/m from 0 mm to 2600 mm

Load combinations

Load combination 1

Support A

Dead $\times 1.40$

Imposed $\times 1.60$

Dead $\times 1.40$

Imposed $\times 1.60$

Support B

Dead $\times 1.40$

Imposed $\times 1.60$

Analysis results

Maximum moment

$M_{max} = 32.5$ kNm

$M_{min} = 0$ kNm

Maximum shear

$V_{max} = 50$ kN

$V_{min} = -50$ kN

Deflection

$\delta_{max} = 6.2$ mm

$\delta_{min} = 0$ mm

Maximum reaction at support A

$R_{A_{max}} = 50$ kN

$R_{A_{min}} = 50$ kN

Unfactored dead load reaction at support A

$R_{A_{Dead}} = 27.1$ kN

Unfactored imposed load reaction at support A

$R_{A_{Imposed}} = 7.5$ kN

Maximum reaction at support B

$R_{B_{max}} = 50$ kN

$R_{B_{min}} = 50$ kN

Unfactored dead load reaction at support B

$R_{B_{Dead}} = 27.1$ kN

Unfactored imposed load reaction at support B

$R_{B_{Imposed}} = 7.5$ kN

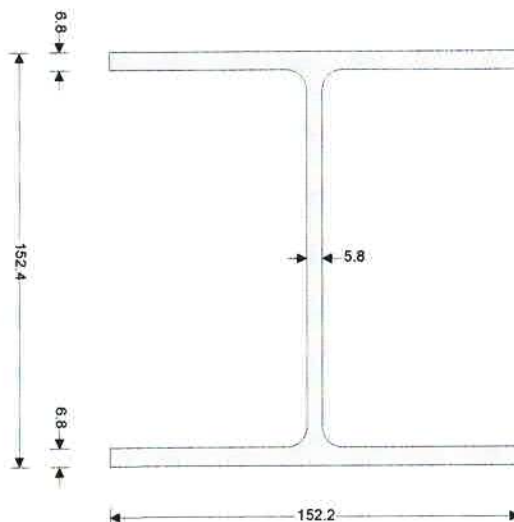
Section details

Section type

UC 152x152x23 (British Steel Section Range 2022 (BS4-1)) Steel grade S275

03:04

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	Calcs for REAR WALL OPENING STEEL - OPTION 1B				Start page no./Revision 2	
	Calcs by C	Calcs date 12/09/2025	Checked by	Checked date	Approved by	Approved date



Classification of cross sections - Section 3.5

Tensile strain coefficient $\varepsilon = 1.00$

Section classification **Semi-compact**

Shear capacity - Section 4.2.3

Design shear force $F_v = 50$ kN

Design shear resistance $P_v = 145.8$ kN

PASS - Design shear resistance exceeds design shear force

Moment capacity - Section 4.2.5

Design bending moment $M = 32.5$ kNm

Moment capacity low shear $M_c = 48.5$ kNm

Buckling resistance moment - Section 4.3.6.4

Buckling resistance moment $M_b = 35$ kNm

$M_b / m_{LT} = 35$ kNm

PASS - Buckling resistance moment exceeds design bending moment

Check vertical deflection - Section 2.5.2

Consider deflection due to dead and imposed loads

Limiting deflection $\delta_{lim} = 7.222$ mm

Maximum deflection $\delta = 6.183$ mm

PASS - Maximum deflection does not exceed deflection limit

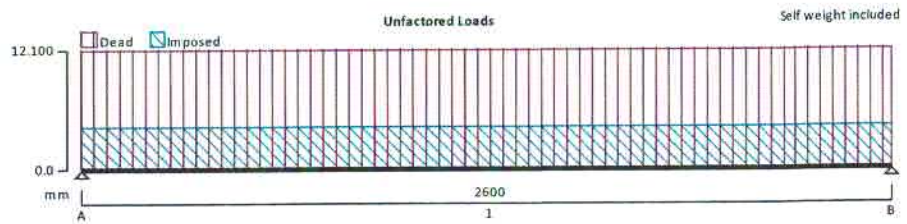
03.05

 ANGELL THOMPSON & PRNRS LTD 01737 360136	Project 64 STANLEY CRESCENT GRAVESEND				Job no. 25072S	
	Calcs for REAR WALL OPENING STEEL - OPTION 2				Start page no./Revision 1	
	Calcs by C	Calcs date 12/09/2025	Checked by	Checked date	Approved by	Approved date

STEEL BEAM ANALYSIS & DESIGN (BS5950)

In accordance with BS5950-1:2000 incorporating Corrigendum No.1

TEDDS calculation version 3.0.07



Support conditions

Support A	Vertically restrained Rotationally free
Support B	Vertically restrained Rotationally free

Applied loading

Beam loads	Dead self weight of beam $\times 1$
Span 1 loads	Imposed UDL 4.3 kN/m from 0 mm to 2600 mm Dead UDL 12.1 kN/m from 0 mm to 2600 mm

Load combinations

Load combination 1	Support A	Dead $\times 1.40$
		Imposed $\times 1.60$
	Support B	Dead $\times 1.40$
		Imposed $\times 1.60$

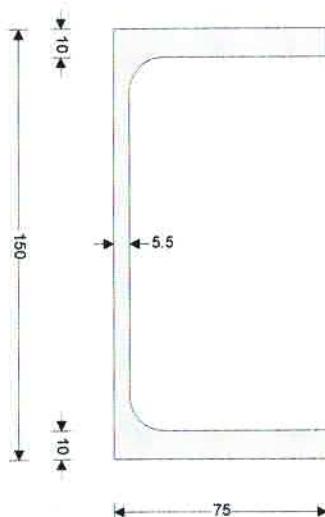
Analysis results

Maximum moment	$M_{max} = 20.3 \text{ kNm}$	$M_{min} = 0 \text{ kNm}$
Maximum shear	$V_{max} = 31.3 \text{ kN}$	$V_{min} = -31.3 \text{ kN}$
Deflection	$\delta_{max} = 5.6 \text{ mm}$	$\delta_{min} = 0 \text{ mm}$
Maximum reaction at support A	$R_{A_max} = 31.3 \text{ kN}$	$R_{A_min} = 31.3 \text{ kN}$
Unfactored dead load reaction at support A	$R_{A_Dead} = 16 \text{ kN}$	
Unfactored imposed load reaction at support A	$R_{A_Imposed} = 5.6 \text{ kN}$	
Maximum reaction at support B	$R_{B_max} = 31.3 \text{ kN}$	$R_{B_min} = 31.3 \text{ kN}$
Unfactored dead load reaction at support B	$R_{B_Dead} = 16 \text{ kN}$	
Unfactored imposed load reaction at support B	$R_{B_Imposed} = 5.6 \text{ kN}$	

Section details

Section type	PFC 150x75x18 (British Steel Section Range 2022 (BS4-1))	Steel grade	S275
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Tekla Tedds ANGELL THOMPSON & PRNRS LTD 01737 360136	Project		Job no.	
	64 STANLEY CRESCENT GRAVESEND		25072S	
	Calcs for		Start page no./Revision	
	REAR WALL OPENING STEEL - OPTION 2		2	
	Calcs by	Calcs date	Checked by	Checked date
	C	12/09/2025		
			Approved by	Approved date


Classification of cross sections - Section 3.5

Tensile strain coefficient $\varepsilon = 1.00$

Section classification **Plastic**
Shear capacity - Section 4.2.3

Design shear force $F_v = 31.3 \text{ kN}$

Design shear resistance $P_v = 136.1 \text{ kN}$
PASS - Design shear resistance exceeds design shear force
Moment capacity - Section 4.2.5

Design bending moment $M = 20.3 \text{ kNm}$

Moment capacity low shear $M_c = 36.3 \text{ kNm}$
Buckling resistance moment - Section 4.3.6.4

Buckling resistance moment $M_b = 20.4 \text{ kNm}$
 $M_b / m_{LT} = 20.4 \text{ kNm}$
PASS - Buckling resistance moment exceeds design bending moment
Check vertical deflection - Section 2.5.2

Consider deflection due to dead and imposed loads

Limiting deflection $\delta_{lim} = 7.222 \text{ mm}$

Maximum deflection $\delta = 5.588 \text{ mm}$
PASS - Maximum deflection does not exceed deflection limit

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Contract No.

25072S

Sheet No.

104

Reference Drg.

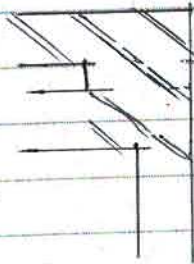
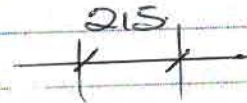
Date

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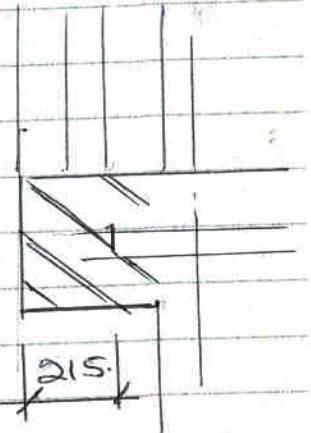
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Bearings - 3/28 kN



150 Steel
Bearings
+
200 Brck
+
Padstone



Padstone - wall width x 200 x
150 mm deep

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	Calcs for BEARING CHECK			Start page no./Revision 1	
	Calcs by C	Calcs date 12/09/2025	Checked by	Checked date	Approved by Approved date

MASONRY BEARING DESIGN TO BS5628-1:2005

TEDDS calculation version 1.0.08

Masonry details

Masonry type

Compressive strength

Masonry units

Partial safety factor

Leaf thickness

Wall height

Clay or calcium silicate bricks

 $p_{unit} = 20.0 \text{ N/mm}^2$

Category II

 $\gamma_m = 3.5$ $t = 215 \text{ mm}$ $h = 2400 \text{ mm}$

Mortar designation

Construction control

Characteristic strength

Effective wall thickness

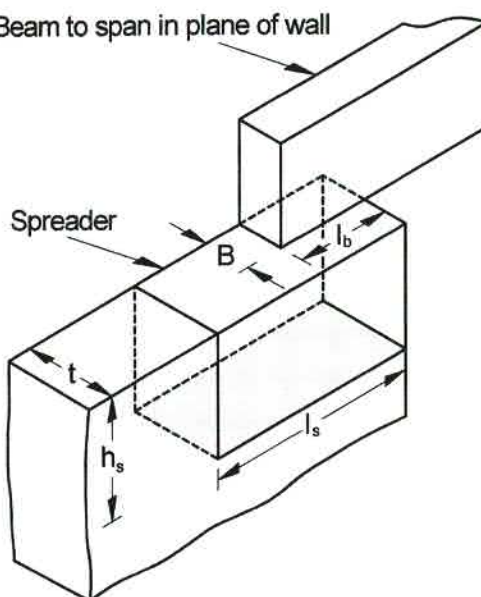
Effective height of wall

iii

Normal

 $f_k = 5.0 \text{ N/mm}^2$ $t_{ef} = 215 \text{ mm}$ $h_{ef} = 2400 \text{ mm}$

Beam to span in plane of wall



Bearing details

Beam spanning in plane of wall

Width of bearing

 $B = 150 \text{ mm}$

Length of bearing

 $l_b = 150 \text{ mm}$

Loading details

Concentrated dead load

 $G_k = 28 \text{ kN}$

Concentrated imposed load

 $Q_k = 8 \text{ kN}$

Design concentrated load

 $F = 52.0 \text{ kN}$

Distributed dead load

 $g_k = 0.0 \text{ kN/m}$

Distributed imposed load

 $q_k = 0.0 \text{ kN/m}$

Design distributed load

 $f = 0.0 \text{ kN/m}$

Masonry bearing type

Bearing type

Type 2

Bearing safety factor

 $\gamma_{bear} = 1.50$

Check design bearing without a spreader

Design bearing stress

 $f_{ca} = 2.311 \text{ N/mm}^2$

Allowable bearing stress

 $f_{cp} = 2.143 \text{ N/mm}^2$ **FAIL - Design bearing stress exceeds allowable bearing stress, use a spreader**

Spreader details

Length of spreader

 $l_s = 200 \text{ mm}$

Depth of spreader

 $h_s = 150 \text{ mm}$

Edge distance

 $s_{edge} = 0 \text{ mm}$

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	Calcs for BEARING CHECK				Start page no./Revision 2	
	Calcs by C	Calcs date 12/09/2025	Checked by	Checked date	Approved by	Approved date

Spreader bearing type

Bearing type **Type 3** Bearing safety factor $\gamma_{\text{bear}} = 2.00$

Check design bearing with a spreader

Loading acts eccentrically within middle third – triangular stress distribution

Design bearing stress $f_{ca} = 2.116 \text{ N/mm}^2$ Allowable bearing stress $f_{cp} = 2.857 \text{ N/mm}^2$

PASS - Allowable bearing stress exceeds design bearing stress

Check design bearing at $0.4 \times h$ below the bearing level

Design bearing stress $f_{ca} = 0.218 \text{ N/mm}^2$ Allowable bearing stress $f_{cp} = 1.414 \text{ N/mm}^2$

PASS - Allowable bearing stress at $0.4 \times h$ below bearing level exceeds design bearing stress