

Revision M: Supporting Calculations



BDS | SCAFFOLD
DESIGN
SPECIALISTS

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Date: 30/03/2026		
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Date: 30/03/2026	Project: India House, Manchester	Drawing Ref: C0002-11385-1-Rev-M
Checked By: Mike Brown	Drawing Title: External Access Scaffold	Associated Revision Pages: 11-32
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Components & Material Properties

Items listed below are for information purposes only, & are not necessarily used in this design.

All tubes used in this design are based on type 4, unless otherwise stated.

All couplers used in this design are based on class "B", unless otherwise stated.

NASC TG20:21 - Page 119 - Table 5.9Steel Tube (Type 4)

Area	=	5.57cm ²
Wall Thickness	=	4mm
Self Weight	=	4.37kg/m (0.043kN/m)
Diameter	=	48.3mm
Radius of Gyration	=	1.57cm
Plastic Modulus	=	7.87cm ³
Design Strength	=	235N/mm ²
Modulus of Elasticity	=	210000N/mm ²
Moment of Inertia	=	13.8cm ⁴
Moment Capacity	=	1.12kNm
Shear Capacity	=	29.1kN

NASC TG20:21 - Page 121 - Table 5.10

<u>Effective Length (L_E)</u>	<u>Slenderness ratio - λ</u>	<u>Safe axial load -P_c</u>
1.0m	63.50	58.60kN
1.1m	70.00	55.25kN
1.2m	76.50	51.90kN
1.3m	82.70	48.60kN
1.4m	88.90	45.30kN
1.5m	95.30	42.25kN
1.6m	101.70	39.20kN
1.7m	108.05	36.45kN
1.8m	114.40	33.70kN
1.9m	120.75	31.40kN
2.0m	127.10	29.10kN
2.1m	133.45	27.20kN
2.2m	139.80	25.30kN
2.3m	146.15	23.65kN
2.4m	152.50	22.00kN
2.5m	158.85	20.65kN
2.6m	165.20	19.30kN
2.7m	171.55	18.20kN
2.8m	177.90	17.10kN
2.9m	184.25	16.15kN
3.0m	190.60	15.20kN
3.1m	196.95	14.40kN
3.2m	203.30	13.60kN
3.3m	209.65	12.90kN
3.4m	216.00	12.20kN

<u>Effective Length (L_e)</u>	<u>Slenderness ratio - λ</u>	<u>Safe axial load - P_c</u>
3.5m	222.35	11.60kN
3.6m	228.70	11.00kN
3.7m	235.05	10.50kN
3.8m	241.40	10.00kN
3.9m	247.75	9.55kN
4.0m	254.10	9.10kN

NASC TG20:21 - Page 129 - Table 5.14

Effective lengths, L_e of standards in ledger braced tied independent scaffolds with 2m lifts with effective façade bracing

Vertical intervals betw Bay lengths

lines of ties	1.2m	1.5m	1.8m	2.0m	2.1m	2.4m	2.7m
2m with 2m 1st lift	2.5	2.5	2.5	2.5	2.55	2.75	2.9
2m with 2.7m 1st lift	2.7	2.7	2.7	2.7	2.7	2.9	3
4m	3.2	3.2	3.2	3.2	3.2	3.2	3.2
6m	4	4	4	4	4	4	4

NASC TG20:21 - Page 166 - Table C1

Aluminium Tube

Area	=	6.15cm ²
Wall Thickness	=	4.47mm
Self Weight	=	1.65kg/m
Diameter	=	48.3mm
Radius of Gyration	=	1.56cm
Plastic Modulus	=	8.61cm ³
Design Strength	=	255N/mm ²
Modulus of Elasticity	=	70000N/mm ²
Moment of Inertia	=	14.9cm ⁴
Moment Capacity	=	1.33kNm

NASC TG20:21 - Page 167 - Table C.2

<u>Effective Length (L_e)</u>	<u>Slenderness ratio - λ</u>	<u>Safe axial load - P_c</u>
1.0m	64.2	48.90kN
1.2m	77	36.60kN
1.4m	89.9	27.90kN
1.6m	102.7	21.80kN
1.8m	115.5	17.50kN
2.0m	128.4	14.40kN
2.2m	141.2	12.00kN
2.4m	154	10.10kN
2.6m	166.9	8.70kN
2.8m	179.7	7.50kN

NASC TG20:21 - Page 135 - Table 5.15**Couplers**

Right Angle Coupler (Double) Class "A"	SWL =	6.10kN	Slip
Right Angle Coupler (Double) Class "B"	SWL =	9.10kN	Slip
Band & plate (Double) coupler	SWL =	6.10kN	Slip
Right Angle Coupler (Double) Self Weight	SW =	1.25kg	
Swivel Coupler Class "A"	SWL =	6.10kN	Slip
Swivel Coupler Class "B"	SWL =	9.10kN	Slip
Swivel Coupler Self Weight	SW =	1.33kg	
Sleeve Coupler Class "A"	SWL =	3.60kN	Tension
Adjustable Screw Jack (200mm extension)	SWL =	35.00kN	Compression
Girder Coupler (must be used in pairs)	SWL =	10.00kN	"X" Axis
	SWL =	30.00kN	"Y" Axis
	SWL =	12.50kN	"Z" Axis
Girder Coupler Self Weight (each)	SW =	1.50kg	

Timber Scaffold Boards

Self Weight	=	25kg/m ²
Width	=	225mm
Thickness	=	38mm
Section Modulus	=	47.5cm ³
Moment Capacity	=	0.48kNm

300mm Ladder Beams* (Steel) Laced at 1m c/c

Self Weight	=	0.30kN	(laced & braced)
Moment Capacity	=	10.40kNm	
Shear Capacity	=	18.00kN	

*For further information refer to manufacturer

RMD Superslim Soldiers

Moment Capacity	=	38.0kNm
Shear Capacity	=	75.0kN

*For further information refer to manufacturer

450mm Apollo Beams* (Aluminium) Laced at 1m c/c

Self Weight	=	0.14kN	(laced & braced)
Moment Capacity	=	15.70kNm	
Shear Capacity	=	13.90kN	

*For further information refer to manufacturer

750mm Apollo Beams* (Aluminium) Laced at 1m c/c

Self Weight	=	0.28kN	(laced & braced)
Moment Capacity	=	42.90kNm	
Shear Capacity	=	45.50kN	

*For further information refer to manufacturer

1300mm Apollo Beams* (Aluminium) Laced at 1m c/c

Self Weight	=	Varies TBC	(laced & braced)
Moment Capacity	=	98.52kNm	
Shear Capacity	=	44.25kN	

*For further information refer to manufacturer

1500mm Apollo Beams* (Aluminium) Laced at 1m c/c

Self Weight	=	Varies TBC (laced & braced)
Moment Capacity	=	255.00kNm
Shear Capacity	=	60.00kN

*For further information refer to manufacturer

1300mm Asterix Beams* (Aluminium)

Self Weight	=	Varies TBC (laced & braced)
Moment Capacity	=	102.20kNm Laced at 1m c/c
Moment Capacity	=	77.70kNm Laced at 1.5m c/c
Shear Capacity	=	42.10kN (Top & Bottom chords connected)
Shear Capacity	=	32.60kN (Bottom chord connected)

*For further information refer to manufacturer

450mm Layher Beams* (Aluminium) Laced at 1m c/c

Self Weight	=	0.14kN (laced & braced)
Moment Capacity	=	13.94kNm
Shear Capacity	=	12.32kN

*For further information refer to manufacturer

450mm Layher Beams* (Aluminium) Laced at 1.5m c/c

Self Weight	=	0.14kN (laced & braced)
Moment Capacity	=	8.06kNm
Shear Capacity	=	12.32kN

*For further information refer to manufacturer

450mm Layher Beams* (Aluminium) Laced at 2m c/c

Self Weight	=	0.14kN (laced & braced)
Moment Capacity	=	5.14kNm
Shear Capacity	=	12.32kN

*For further information refer to manufacturer

780mm Dessa Beams* (Aluminium) Laced at 1m c/c. (6no. bolts 3 each side of spigot)

Self Weight	=	0.28kN (laced & braced)
Moment Capacity	=	38.84kNm
Shear Capacity	=	23.71kN

*For further information refer to manufacturer

Relevant Design Standards/guidance (only a selection of the below standards are applicable for this design)

BS EN 39	:2001	Specification for steel scaffold tube.
BS EN 74-1	:2005	Couplers, spigot pins & baseplates for use in falsework & scaffolds.
BS EN 12811-1	:2003	Temporary works equipment: Scaffolds - Performance requirements & general design.☒
BS EN 12812-1	:2008	Falsework: Performance requirements & general design.
BS EN 1139-1-2	:1990	Metal scaffolding - part 1: Tubes - Specification for aluminium tube.
BS EN 1139-2-2	:2009	Metal scaffolding - part 2: Couplers - Specification for aluminium couplers.
BS EN 1991-1-1	:2002	Eurocode 1: Actions on structures - Densities, self-weight & imposed loads.
BS EN 1991-1-3	:2003	Eurocode 1: Actions on structures - Snow loads.
BS EN 1991-1-4	:2005	Eurocode 1: Actions on structures - Wind loads.
BS EN 1991-2	:2003	Eurocode 1: Actions on structures - Part2: Traffic load and bridges
BS EN 13374	:2013	Temporary edge protection systems - Product specification, test methods.
BS 5975	:2019	Code of practise for temporary work procedures & the per design of false work.
BS 2482	:2009	Specification for timber scaffold boards.
TG3:19		Erection, use & dismantling of temporary rubbish chutes on scaffold.
TG4:19		Anchorage systems.
TG9:18		Guide to the design & construction of temporary roofs & buildings.
TG12:17		Tying down of scaffold boards.
TG13:16		Non-standard boarded platforms.
TG16:21		Anchoring to the ground.
TG20:21		Technical guidance on the use of BS EN 12811-1.
SG4:15		Preventing falls in scaffolding.
SG5:18		Overhead power sources.
SG25:20		Access & egress from scaffolds.
SG27:09		Temporary edge protection on open steelwork.
SG28:17		Safe system of work for scaffolding associated with timber frame building construction.
SG29:17		Internal edge protection on scaffold platforms.
SG32:17		Provision of extended & telescopic transoms & board brackets.
SG34:17		Guidance on protection of the public

Job Description: External Access Scaffold

Safe Working Loads: Independent with 1no. Lift at: 2 kN/m²
 All inside deck at: 0.75 kN/m²
 Loading bay with 1no. Lift at: 2 kN/m²
 Roof Saddle with 1no. Lift at: 1.5 kN/m²
 Hoist Arm Max 200kg

Consider Load From Hoist Arm

Load	*	Gravity	=	Load
200kg	*	0.00981	=	1.96kN
Load	*	FoS	=	Total
1.96kN	*	1.5	=	2.94kN

Item: Independent

Max Bay Length: 3.00m
 Max Bay Width: 1.00m (3 decks)
 Max Transom Centres: N/A
 Max Standard Load: Refer to DWG's

Item: Loading Bay

Max Bay Length: 2.50m
 Max Bay Width: 2.00m
 Max Transom Centres: N/A
 Max Standard Load: Refer to DWG's

Item: Roof Saddle

Max Bay Length: 2.50m
 Max Bay Width: 1.50m
 Max Transom Centres: N/A
 Max Standard Load: Refer to DWG's

Item: Roof Canopy

Max Bay Length: 1.75m
 Max Bay Width: 1.75m
 Max Transom Centres: 0.88m
 Max Standard Load: Refer to DWG's

Item: Ties (Tension)

Max Tie Load: 6.12kN
 Preliminary Test: 12.24kN
 Proof Test: 7.65kN

Item: Band & Plate Ties (Tension)

Max Tie Load: 3.93kN
 Preliminary Test: 7.86kN
 Proof Test: 4.91kN

Item: Band & Plate Ties (Shear)

Max Tie Load: 2.88kN
 Preliminary Test: 5.75kN

Additional Comments (if required)

- System scaffold to be built in accordance with manufacturers guidelines & recommendations

Item: **Canopy** Y

Bay Lengths (m)	Bay Widths (m)	Transom C/C (m)	No. Inside Boards	SWL (kN/m ²)
1.75	1.75	0.875	0	1.5

Dynamic Load Applied (25%)	Board Dead Load (kN/m ²)
N/A	0.25

Consider Scaffold Boards Spanning

Dead Load	Centres	Width	Load	Results
Boards	0.875 m	0.225 m	0.25 kN/m ²	(kN) = 0.049
Imposed Loads	0.875 m	0.225 m	1.5 kN/m ²	(kN) = 0.295
Bending Moment	0.049	+	0.295 X 0.875 / 8	(kNm) = 0.038
Allowable Bending Moment For Scaffold Boards = 0.48kNm				(kNm) > 0.038
PASSES				

Transoms With No Inside Boards

Dead Load	Centres	Span	Load	Results
Boards	0.875 m	1.75 m	0.25 kN/m ²	(kN) = 0.383
Tube	1.75 m	X	0.043 kN/m	(kN) = 0.075
Total	0.383 kN	+	0.075 kN	(kN) = 0.458
Imposed Load	0.875 m	1.75 m	1.5 kN/m ²	(kN) = 2.297
Non-cantilevered Transom BM as TG20:21 - section 5.11.1.1 - M = 0.125 X W X L (kNm)				
Bending Moment	0.125	2.75 kN	1.75 m	(kNm) = 0.603
Allowable Bending Moment For Scaffold Tube = 1.12kNm				(kNm) > 0.603
PASSES				

Transoms With Inside Boards

Dead Load	Centres	Span	Load	Results
Boards	0.875 m	0 m	0.25 kN/m ²	(kN) = 0.000
Tube	0 m	X	0.043 kN/m	(kN) = 0.000
Total	0.000 kN	+	0.000 kN	(kN) = 0.000
Imposed Load	0.875 m	0 m	0.75 kN/m²	(kN) = 0.000
Cantilevered Transom BM as TG20:21 - section 5.11.1.2 - M _c = 0.5 X W _c X L _c (kNm)				
Bending Moment	0.5	0.00 kN	0 m	(kNm) = 0.000
Allowable Bending Moment For Scaffold Tube = 1.12kNm				(kNm) > 0.000
PASSES				

Continuous Transoms e.g. Birdcage

Consider The Transoms Spanning		1.75 m			
Dead Load	Centres	Span	Load	Results	
Boards	0.875 m	1.75 m	0.25 kN/m ²	(kN) =	0.383
Tube	1.75 m	X	0.043 kN/m	(kN) =	0.075
Total	0.383 kN	+	0.075 kN	(kN) =	0.458
Imposed Load	0.875 m	1.75 m	1.5 kN/m ²	(kN) =	2.297
Continuous Transom BM as TG20:21 - section 5.11.1.3 - $M = 0.086 \times W \times L$ (kNm)					
Bending Moment	0.086	2.75 kN	1.75 m	(kNm) =	0.415
Allowable Bending Moment For Scaffold Tube = 1.12kNm				(kNm) >	0.415
PASSES					

Simply Supported Ledger

Consider The Ledger Spanning		1.75 m			
Transom Point Load		2.75 kN			
Simply supported ledger as TG20:21 - section 5.12.1.1 - $M = 0.25 \times P \times L$ (kNm)					
Bending Moment	0.25	2.75 kN	1.75 m	(kNm) =	1.205
Allowable Bending Moment For Scaffold Tube = 1.12kNm				(kNm) >	1.205
FAILS					
Refer To Comments Below					

Continuous Ledger

Consider The Ledger Spanning		1.75 m			
Transom Point Load		2.75 kN			
Continuously supported ledger as TG20:21 - section 5.12.1.2 - $M = 0.167 \times P \times L$ (kNm)					
Bending Moment	0.167	2.75 kN	1.75 m	(kNm) =	0.805
Allowable Bending Moment For Scaffold Tube = 1.12kNm				(kNm) >	0.805
PASSES					

Part Continuous Ledger (end bay)

Consider The Ledger Spanning		1.75 m			
Transom Point Load		2.75 kN			
Part continuous supported ledger as TG20:21 - section 5.12.1.2 - $M = 0.172 \times P \times L$ (kNm)					
Bending Moment	0.172	2.75 kN	1.75 m	(kNm) =	0.829
Allowable Bending Moment For Scaffold Tube = 1.12kNm				(kNm) >	0.829
PASSES					

Additional Platform Check Comments (if required)

Simply supported ledgers not applicable within this item.

Consider Load Per Node Capacities**Item:** **Canopy**

Bay Widths (m)	Bay Length (m)	SWL (kN/m ²)	Bds Dead Load (kN/m ²)	Tube Dead Load (kN)
0.95	0.9	1.5	0.25	0.9
No. Inside Boards	SWL (kN/m ²) inside bds			
0	0			

Coupler Type Used - Class A:		6.1kN	No. of Primary Connections:	1
Coupler Type Used - Class B:	Y	9.1kN	No. of Supplementary Connections:	1
Strength of Connection:				15.20kN

Loads in accordance with TG20:21, 5.9.2

Perimeter Node

Bay Width	*	Bay Length	*	(SWL	+	BDS _{sw})	+	T _{sw}	Result
0.48m	*	0.90m	*	1.5	+	0.25	+	0.45kN	1.20kN
				1.20kN	<	15.20kN	Therefore	PASSES	

Centre Node

Bay Width	*	Bay Length	*	(SWL	+	BDS _{sw})	+	T _{sw}	Result
0.95m	*	0.90m	*	1.5	+	0.25	+	0.90kN	2.40kN
				2.40kN	<	15.20kN	Therefore	PASSES	

750mm Beam - Support Towers**INSIDE STANDARD**Allowance For Double Width: **N/A**

Tube DL	0.033kN/m	Decks DL	0.23	Fittings	0.018	Length (m)	Width (m)	Quantity	Length (or) Area
Standard DL	0.047kN/m	(kN/m ²) (kN/m)	0.056	(kN)					
Toe Board DL	0.027kN/m								
Bracing DL	0.044kN/m								
Bay Size						1.50m	1.00m		
Standards (lift height)								1	2.00m
Ledgers								1	1.50m
Beam						kN/m		0	1.50m
Transom								1	0.50m
Guardrails								0	1.50m
Decked (Main Platform)								1	0.75
Decked (Inside Decks)								2	0.68
Toe Boards								0	1.50m
Ledger Bracing								0	2.40m
Façade Bracing								0	2.65m
Plan Bracing								0	2.15m
Fittings								0	N/A
Live Loads Applied								15	
								14	

Total Number of Lifts:

Number of Boarded Lifts:

(SWL) 100%	2.00kN /m ²	Total Dead Load Per Lift:	0.16kN
(SWL) Snow	0.50kN /m ²	Total Dead Load	5.13kN
(SWL) Inside bds	0.75kN /m ²		
Maximum No. Lifts at 100%	1	Total Live Load:	2.89kN
Snow	1		
No. Lifts with inside bds loaded	2	Total Load Combined:	8.01kN

No. Support Stds/Puncheons **1**

Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result
8.01kN	2.5m	18.00kN	0.5m	22.50kN	PASSES
					PASSES

Ground Bearing Pressure (GBP)**Sole Pad Arrangements**

	Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement	0.225	0.450	0.10125
Increased Arrangement	0.450	0.450	0.2025
Tredda Plate	0.210	0.210	0.0441
Other			0
Imposed Load:	8.01 kN		
GBP:	79.14 kN/m ²		

Additional Comments If Required

750mm Beam - Support Towers**Single Width****CENTRE PUNCHEON**Allowance For Double Width: **N/A**

Tube DL	0.033kN/m	Decks DL	0.23	Fittings	0.018	Length (m)	Width (m)	Quantity	Length (or) Area
Standard DL	0.047kN/m	(kN/m ²) (kN/m)	0.056	(kN)					
Toe Board DL	0.027kN/m								
Bracing DL	0.044kN/m								

Bay Size	1.50m	1.00m		
Standards (lift height)			1	2.00m
Ledgers			1	1.50m
Beam	kN/m		0	1.50m
Transom			1	0.50m
Guardrails			2	1.50m
Decked (Main Platform)			1	0.75
Decked (Inside Decks)			0	0.00
Toe Boards			1	1.50m
Ledger Bracing			0	2.40m
Façade Bracing			1	2.65m
Plan Bracing			0	2.15m
Fittings			0	N/A
Live Loads Applied				
		Total Number of Lifts:	12	
		Number of Boarded Lifts:	11	

(SWL) 100%	0.00kN /m ²	Total Dead Load Per Lift:	0.42kN
(SWL) Snow	0.50kN /m ²	Total Dead Load	6.89kN
(SWL) Inside bds	0.00kN /m ²		
Maximum No. Lifts at 100%	1	Total Live Load:	0.38kN
Snow	1		
No. Lifts with inside bds loaded	2	Total Load Combined:	7.27kN

No. Support Stds/Puncheons	1				
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result
7.27kN	2.0m	26.10kN	0.5m	22.50kN	PASSES
					PASSES

Ground Bearing Pressure (GBP)**Sole Pad Arrangements**

		Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement		0.225	0.450	0.10125
Increased Arrangement		0.450	0.450	0.2025
Tredda Plate		0.210	0.210	0.0441
Other				0
Imposed Load:	N/A			
GBP:	N/A			

Additional Comments If Required

750mm Beam - Support Towers**Double Width****CENTRE PUNCHEON**Allowance For Double Width: **YES**

Tube DL	0.033kN/m	Decks DL	0.23	Fittings	0.018	Length (m)	Width (m)	Quantity	Length (or) Area
Standard DL	0.047kN/m	(kN/m ²) (kN/m)	0.056	(kN)					
Toe Board DL	0.027kN/m								
Bracing DL	0.044kN/m								

Bay Size	1.50m	1.00m		
Standards (lift height)			1	2.00m
Ledgers			1	1.50m
Beam	kN/m		0	1.50m
Transom			1	1.00m
Guardrails			2	1.50m
Decked (Main Platform)			1	1.50
Decked (Inside Decks)			0	0.00
Toe Boards			1	1.50m
Ledger Bracing			0	2.40m
Façade Bracing			1	2.65m
Plan Bracing			0	2.15m
Fittings			0	N/A
Live Loads Applied				
		Total Number of Lifts:	3	
		Number of Boarded Lifts:	3	

(SWL) 100%	2.00kN /m ²	Total Dead Load Per Lift:	0.43kN
(SWL) Snow	0.50kN /m ²	Total Dead Load	2.33kN
(SWL) Inside bds	0.75kN /m ²		
Maximum No. Lifts at 100%	1	Total Live Load:	3.75kN
Snow	1		
No. Lifts with inside bds loaded	2	Total Load Combined:	6.08kN

No. Support Stds/Puncheons	1				
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result
13.35kN	2.0m	26.10kN	0.5m	22.50kN	PASSES
					PASSES

Ground Bearing Pressure (GBP)**Sole Pad Arrangements**

		Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement		0.225	0.450	0.10125
Increased Arrangement		0.450	0.450	0.2025
Tredda Plate		0.210	0.210	0.0441
Other				0
Imposed Load:	N/A			
GBP:	N/A			

Additional Comments If Required**Consider Total Load**

Load	+	Load	=	Result
7.27kN	+	6.08kN	=	13.35kN

750mm Beam - Support Towers**OUTSIDE STANDARD**Allowance For Double Width: **N/A**

Tube DL	0.033kN/m	Decks DL	0.23	Fittings	0.018	Length (m)	Width (m)	Quantity	Length (or) Area
Standard DL	0.047kN/m	(kN/m ²) (kN/m)	0.056	(kN)					
Toe Board DL	0.027kN/m								
Bracing DL	0.044kN/m								
Bay Size						1.50m	1.00m		
Standards (lift height)								1	2.00m
Ledgers								1	1.50m
Beam							kN/m	0	1.50m
Transom								1	0.50m
Guardrails								2	1.50m
Decked (Main Platform)								1	0.75
Decked (Inside Decks)								0	0.00
Toe Boards								1	1.50m
Ledger Bracing								0	2.40m
Façade Bracing								0	2.65m
Plan Bracing								0	2.15m
Fittings								0	N/A
Live Loads Applied								3	
								2	

Total Number of Lifts:

Number of Boarded Lifts:

(SWL) 100%	2.00kN /m ²	Total Dead Load Per Lift:	0.30kN
(SWL) Snow	0.50kN /m ²	Total Dead Load	1.24kN
(SWL) Inside bds	0.75kN /m ²		
Maximum No. Lifts at 100%	1	Total Live Load:	1.88kN
Snow	1		
No. Lifts with inside bds loaded	2	Total Load Combined:	3.12kN

No. Support Stds/Puncheons **1**

Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result
3.12kN	2.0m	26.10kN	0.5m	22.50kN	PASSES
					PASSES

Ground Bearing Pressure (GBP)**Sole Pad Arrangements**

	Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement	0.225	0.450	0.10125
Increased Arrangement	0.450	0.450	0.2025
Tredda Plate	0.210	0.210	0.0441
Other			0
Imposed Load:	3.12 kN		
GBP:	FALSE kN/m ²		

Additional Comments If Required

Consider Imposed Load From Protection Fan

Bay Length	Bay Width	Lift Heights	No. Lifts	No. Decked Lifts	Safe Working Load	Ledger Brace	Plan Brace
1.50m	1.50m	0.00m	0	2	0.75kN/m ²	N	N
Boarded lift Load:		3.62kN					
Un-Boarded lifts Load:		-0.30kN					
Bracing Load:		0.00kN					
Total Dead Load:		1.73kN					
Total Load:		3.33kN					

Coupler Capacities

Coupler Type Used - Class A:	6.1kN	No. of Primary Connections:	1
Coupler Type Used - Class B:	9.1kN	No. of Supplementary Connections:	0
Node loads in accordance with TG20:21, 5.9.2		Strength of Connection:	9.10kN

Load	/	Sin (°degrees)		=	3.77kN	<	9.10kN	PASSES
3.33kN	/	118						

Loads Imposed on to Ground

Support	Reaction		Additional Leg/Loads		Additional Leg/Loads		Total Load
1	3.33kN	+	8.01kN	+		=	11.34kN

No. Support Stds/Puncheons	1						
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result		
11.34kN	2.5m	18.00kN	0.4m	32.50kN	PASSES		
					PASSES		

Consider Capacity of Metrix Reinforced Transom & Ledgers

TABLE 5 – Capacity of Reinforced Transoms and Double Ledgers; Tubular Support					
Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p ^(*) central transom (kN/m ²)	allow. p ^(*) perimeter transom (kN/m ²)	allow. P (kN)
1.0 (Transom)	28.8	3.0	9.4	19.0	1 x 13.6
		2.5	11.3	22.8	
		2.0	14.2	28.6	
		1.5	19.0	38.2	
1.3 (Transom)	18.5	3.0	5.9	12.1	1 x 11.4
		2.5	7.2	14.6	
		2.0	9.0	18.3	
		1.5	12.1	24.4	

TABLE 5 – Capacity of Reinforced Transoms and Double Ledgers; Tubular Support (continued)					
Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p ^(*) central transom (kN/m ²)	allow. p ^(*) perimeter transom (kN/m ²)	allow. P (kN)
1.5 (Transom)	12.8	3.0	4.0	8.3	1 x 9.2
		2.5	4.9	10.0	
		2.0	6.2	12.6	
		1.5	8.3	16.8	
1.5 (Ledger)	24.7	3.0	8.0	16.2	1 x 15.3 2 x 15.1
		2.5	9.7	19.5	
		2.0	12.1	24.5	
		1.5	16.2	32.7	
2.0 (Ledger)	14.0	3.0	4.4	9.1	1 x 11.3 2 x 8.7
		2.5	5.4	11.0	
		2.0	6.8	13.8	
		1.5	9.1	18.4	
2.5 (Ledger)	8.4	3.0	2.6	5.4	1 x 8.1 2 x 6.6
		2.5	3.1	6.5	
		2.0	4.0	8.2	
		1.5	5.4	11.0	
3.0 (Ledger)	4.6	3.0	1.3	2.9	1 x 7.2 2 x 5.4
		2.5	1.6	3.5	
		2.0	2.1	4.4	
		1.5	2.9	5.9	

Consider Bay Width

2m

Consider Allowable UDL on Transom

Bay Length	*	(SWL)	+	Deck DL	)	+	Tube DL	
3.0m	*	(2.00kN/m ²)	+	0.25kN/m ²	)	+	0.043kN/m	= 6.79kN/m
Load	<	Allowable	Result					
6.79kN/m	<	14.0kN/m	PASSES					

Consider 1no. Allowable PL on Transom

2.0m

Max PL	<	Max PL	Result
13.35kN	<	11.30kN	FAILS

Consider Residual Load

Point Load	-	Max Allowable PL	=	Total
13.35kN/m	-	11.30kN		2.05kN/m

Consider Metrix Brace Capacity (Pull Back)

TABLE 1 – Capacity of Vertical Diagonal Brace							
Bay Length (m)	α (°)	Loading by Tension			Loading by Compression		
		All. N _v (kN)	All. Q (kN)	All. V (kN)	All. N _v (kN)	All. Q (kN)	All. V (kN)
Bay Height H = 2.0m							
3.0	35.1	+16.30	13.3	9.4	-5.12	4.2	2.9
2.5	40.5		12.4	10.6	-6.17	4.7	4.0
2.0	47.3		11.1	12.0	-7.62	5.2	5.6
1.5	56.1		9.1	13.5	-9.59	5.4	8.0
1.0	67.1		6.3	15.0	-12.32	4.8	11.4
0.7	74.8		4.3	15.8	-13.81	3.6	13.3

Consider Bay Length 1.0m

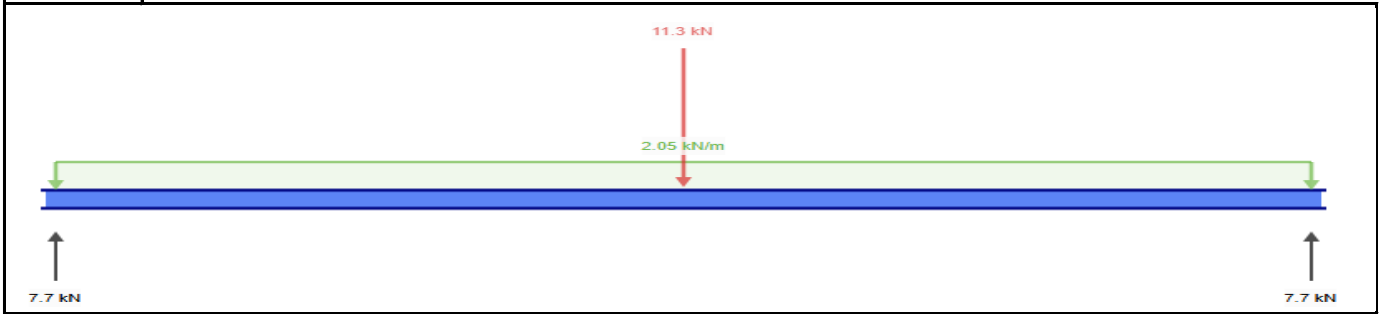
Consider Load Through Angle

Load	/	Sin (°degrees)		
3.33kN	/	63	=	3.73kN
WC Load	/	No.Pullbacks	=	Result
3.73kN	/	2	=	1.87kN
Load	<	Allowable		
1.87kN	<	16.30kN	PASSES	

Item: **Loadings and Reactions on Reinforced Transom**

Point Loads	Location	UDL kN/m
11.30kN	@ 1.00m	2.05

Reaction



Maximum Reactions

Support	Reaction
1	7.70kN
2	7.70kN

Loads Imposed on to Ground

Support	Reaction		Additional Leg/Loads		Additional Leg/Loads		Total Load
1	7.70kN	+	11.34kN	+		=	19.04kN
2	7.70kN	+	3.12kN	+		=	10.82kN

No. Support Stds/Puncheons	3						
Axial Load	Buckling Length		Allowable	Length of Thread	Allowable	Result	
6.35kN	2.5m		18.00kN	0.4m	32.50kN	PASSES	
No. Support Stds/Puncheons	2						
Axial Load	Buckling Length		Allowable	Length of Thread	Allowable	Result	
5.41kN	2.5m		18.00kN	0.4m	32.50kN	PASSES	

Ground Bearing Pressure (GBP)

		Sole Pad Arrangements		
		Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement	y	0.225	0.450	0.10125
Increased Arrangement		0.450	0.450	0.2025
Tredda Plate		0.210	0.210	0.0441
Other				0

Imposed Load:	6.35 kN
GBP:	31.34 kN/m ²

INSIDE PUNCHEON

Allowance For Double Width: N/A

Tube DL	0.033kN/m	Decks DL	0.23	Fittings	0.018	Length (m)	Width (m)	Quantity	Length (or) Area
Standard DL	0.047kN/m	(kN/m ²) (kN/m)	0.056	(kN)					
Toe Board DL	0.027kN/m								
Bracing DL	0.044kN/m								
Bay Size						2.00m	1.00m		
Standards (lift height)								1	2.00m
Ledgers								1	2.00m
Beam						kN/m		0	2.00m
Transom								1	0.50m
Guardrails								0	2.00m
Decked (Main Platform)								1	1.00
Decked (Inside Decks)								2	0.90
Toe Boards								0	2.00m
Ledger Bracing								0	2.40m
Façade Bracing								0	2.90m
Plan Bracing								0	2.40m
Fittings								0	N/A
Live Loads Applied								15	
								14	

(SWL) 100%	2.00kN /m ²	Total Dead Load Per Lift:	0.18kN
(SWL) Snow	0.50kN /m ²	Total Dead Load	6.28kN
(SWL) Inside bds	0.75kN /m ²		
Maximum No. Lifts at 100%	1	Total Live Load:	3.85kN
Snow	1		
No. Lifts with inside bds loaded	2	Total Load Combined:	10.13kN

No. Support Stds/Puncheons	1					
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result	
10.13kN	2.0m	26.10kN	0.5m	22.50kN	PASSES	
					PASSES	

Ground Bearing Pressure (GBP)

Sole Pad Arrangements			
	Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement	0.225	0.450	0.10125
Increased Arrangement	0.450	0.450	0.2025
Tredda Plate	0.210	0.210	0.0441
Other			0
Imposed Load:	N/A		
GBP:	N/A		

Additional Comments If Required

750mm Beam - Puncheon Loads**Single Width****CENTRE PUNCHEON**Allowance For Double Width: **N/A**

Tube DL	0.033kN/m	Decks DL	0.23	Fittings	0.018	Length (m)	Width (m)	Quantity	Length (or) Area
Standard DL	0.047kN/m	(kN/m ²) (kN/m)	0.056	(kN)					
Toe Board DL	0.027kN/m								
Bracing DL	0.044kN/m								

Bay Size	2.00m	1.00m		
Standards (lift height)			1	2.00m
Ledgers			1	2.00m
Beam	kN/m		0	2.00m
Transom			1	0.50m
Guardrails			2	2.00m
Decked (Main Platform)			1	1.00
Decked (Inside Decks)			0	0.00
Toe Boards			1	2.00m
Ledger Bracing			0	2.40m
Façade Bracing			1	2.90m
Plan Bracing			0	2.40m
Fittings			0	N/A
Live Loads Applied			Total Number of Lifts:	12
			Number of Boarded Lifts:	11

(SWL) 100%	0.00kN /m ²	Total Dead Load Per Lift:	0.49kN
(SWL) Snow	0.50kN /m ²	Total Dead Load	8.41kN
(SWL) Inside bds	0.00kN /m ²		
Maximum No. Lifts at 100%	1	Total Live Load:	0.50kN
Snow	1		
No. Lifts with inside bds loaded	2	Total Load Combined:	8.91kN

No. Support Stds/Puncheons	1				
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result
8.91kN	2.0m	26.10kN	0.5m	22.50kN	PASSES
					PASSES

Ground Bearing Pressure (GBP)**Sole Pad Arrangements**

		Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement		0.225	0.450	0.10125
Increased Arrangement		0.450	0.450	0.2025
Tredda Plate		0.210	0.210	0.0441
Other				0
Imposed Load:	N/A			
GBP:	N/A			

Additional Comments If Required

750mm Beam - Puncheon Loads**Double Width****CENTRE PUNCHEON**Allowance For Double Width: **YES**

Tube DL	0.033kN/m	Decks DL	0.23	Fittings	0.018	Length (m)	Width (m)	Quantity	Length (or) Area
Standard DL	0.047kN/m	(kN/m ²) (kN/m)	0.056	(kN)					
Toe Board DL	0.027kN/m								
Bracing DL	0.044kN/m								

Bay Size	2.00m	1.00m		
Standards (lift height)			1	2.00m
Ledgers			1	2.00m
Beam	kN/m		0	2.00m
Transom			1	1.00m
Guardrails			2	2.00m
Decked (Main Platform)			1	2.00
Decked (Inside Decks)			0	0.00
Toe Boards			1	2.00m
Ledger Bracing			0	2.40m
Façade Bracing			1	2.90m
Plan Bracing			0	2.40m
Fittings			0	N/A
Live Loads Applied				
		Total Number of Lifts:	3	
		Number of Boarded Lifts:	3	

(SWL) 100%	2.00kN /m ²	Total Dead Load Per Lift:	0.51kN
(SWL) Snow	0.50kN /m ²	Total Dead Load	2.90kN
(SWL) Inside bds	0.75kN /m ²		
Maximum No. Lifts at 100%	1	Total Live Load:	5.00kN
Snow	1		
No. Lifts with inside bds loaded	2	Total Load Combined:	7.90kN

No. Support Stds/Puncheons	1				
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result
16.81kN	2.0m	26.10kN	0.5m	22.50kN	PASSES
					PASSES

Ground Bearing Pressure (GBP)**Sole Pad Arrangements**

		Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement		0.225	0.450	0.10125
Increased Arrangement		0.450	0.450	0.2025
Tredda Plate		0.210	0.210	0.0441
Other				0
Imposed Load:	N/A			
GBP:	N/A			

Additional Comments If Required**Consider Total Load**

Load	+	Load	=	Result
8.91kN	+	7.90kN	=	16.81kN

750mm Beam - Puncheon Loads**OUTSIDE PUNCHEON**Allowance For Double Width: **N/A**

Tube DL	0.033kN/m	Decks DL	0.23	Fittings	0.018	Length (m)	Width (m)	Quantity	Length (or) Area
Standard DL	0.047kN/m	(kN/m ²) (kN/m)	0.056	(kN)					
Toe Board DL	0.027kN/m								
Bracing DL	0.044kN/m								
Bay Size						2.00m	1.00m		
Standards (lift height)								1	2.00m
Ledgers								1	2.00m
Beam						kN/m		0	2.00m
Transom								1	0.50m
Guardrails								2	2.00m
Decked (Main Platform)								1	1.00
Decked (Inside Decks)								0	0.00
Toe Boards								1	2.00m
Ledger Bracing								0	2.40m
Façade Bracing								0	2.90m
Plan Bracing								0	2.40m
Fittings								0	N/A
Live Loads Applied								3	
								3	

Total Number of Lifts:

Number of Boarded Lifts:

(SWL) 100%	2.00kN /m ²	Total Dead Load Per Lift:	0.36kN
(SWL) Snow	0.50kN /m ²	Total Dead Load	1.78kN
(SWL) Inside bds	0.75kN /m ²		
Maximum No. Lifts at 100%	1	Total Live Load:	2.50kN
Snow	1		
No. Lifts with inside bds loaded	2	Total Load Combined:	4.28kN

No. Support Stds/Puncheons **1**

Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result
4.28kN	2.0m	26.10kN	0.5m	22.50kN	PASSES
					PASSES

Ground Bearing Pressure (GBP)**Sole Pad Arrangements**

		Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement		0.225	0.450	0.10125
Increased Arrangement		0.450	0.450	0.2025
Tredda Plate		0.210	0.210	0.0441
Other				0
Imposed Load:	N/A			
GBP:	N/A			

Additional Comments If Required

Consider Imposed Load From Protection Fan

Bay Length	Bay Width	Lift Heights	No. Lifts	No. Decked Lifts	Safe Working Load	Ledger Brace	Plan Brace
2.00m	1.50m	0.00m	0	2	0.75kN/m ²	N	N
Boarded lift Load:		4.53kN					
Un-Boarded lifts Load:		-0.30kN					
Bracing Load:		0.00kN					
Total Dead Load:		2.10kN					
Total Load:		4.23kN					

Coupler Capacities

Coupler Type Used - Class A:	6.1kN	No. of Primary Connections:	1
Coupler Type Used - Class B:	9.1kN	No. of Supplementary Connections:	0
Node loads in accordance with TG20:21, 5.9.2		Strength of Connection:	9.10kN

Load	/	Sin (°degrees)					
4.23kN	/	118	=	4.79kN	<	9.10kN	PASSES

Loads Imposed on to Primary Beam

Support	Reaction		Additional Leg/Loads		Additional Leg/Loads		Total Load
1	4.23kN	+	10.13kN	+		=	14.36kN

No. Support Stds/Puncheons	1						
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result		
14.36kN	2.5m	18.00kN	0.4m	32.50kN	PASSES		
					PASSES		

Consider Capacity of Metrix Reinforced Transom & Ledgers

TABLE 5 – Capacity of Reinforced Transoms and Double Ledgers; Tubular Support					
Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p ^(*) central transom (kN/m ²)	allow. p ^(*) perimeter transom (kN/m ²)	allow. P (kN)
1.0 (Transom)	28.8	3.0	9.4	19.0	1 x 13.6
		2.5	11.3	22.8	
		2.0	14.2	28.6	
		1.5	19.0	38.2	
1.3 (Transom)	18.5	3.0	5.9	12.1	1 x 11.4
		2.5	7.2	14.6	
		2.0	9.0	18.3	
		1.5	12.1	24.4	

TABLE 5 – Capacity of Reinforced Transoms and Double Ledgers; Tubular Support (continued)					
Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p ^(*) central transom (kN/m ²)	allow. p ^(*) perimeter transom (kN/m ²)	allow. P (kN)
1.5 (Transom)	12.8	3.0	4.0	8.3	1 x 9.2
		2.5	4.9	10.0	
		2.0	6.2	12.6	
		1.5	8.3	16.8	
1.5 (Ledger)	24.7	3.0	8.0	16.2	1 x 15.3 2 x 15.1
		2.5	9.7	19.5	
		2.0	12.1	24.5	
		1.5	16.2	32.7	
2.0 (Ledger)	14.0	3.0	4.4	9.1	1 x 11.3 2 x 8.7
		2.5	5.4	11.0	
		2.0	6.8	13.8	
		1.5	9.1	18.4	
2.5 (Ledger)	8.4	3.0	2.6	5.4	1 x 8.1 2 x 6.6
		2.5	3.1	6.5	
		2.0	4.0	8.2	
		1.5	5.4	11.0	
3.0 (Ledger)	4.6	3.0	1.3	2.9	1 x 7.2 2 x 5.4
		2.5	1.6	3.5	
		2.0	2.1	4.4	
		1.5	2.9	5.9	

Consider Bay Width

2m

Consider Allowable UDL on Transom

Bay Length	*	(SWL)	+	Deck DL	)	+	Tube DL	
3.0m	*	(2.00kN/m ²)	+	0.25kN/m ²	)	+	0.043kN/m	= 6.79kN/m
Load	<	Allowable	Result					
6.79kN/m	<	14.0kN/m	PASSES					

Consider 1no. Allowable PL on Transom

2.0m

Max PL	<	Max PL	Result
16.81kN	<	11.30kN	FAILS

Consider Residual Load

Point Load	-	Max Allowable PL	=	Total
16.81kN/m	-	11.30kN		5.51kN/m

750mm Beam - Puncheon Loads**Consider Metrix Brace Capacity (Pull Back)**

TABLE 1 – Capacity of Vertical Diagonal Brace							
Bay Length (m)	α (°)	Loading by Tension			Loading by Compression		
		All. N _v (kN)	All. Q (kN)	All. V (kN)	All. N _v (kN)	All. Q (kN)	All. V (kN)
Bay Height H = 2.0m							
3.0	35.1	+16.30	13.3	9.4	-5.12	4.2	2.9
2.5	40.5		12.4	10.6	-6.17	4.7	4.0
2.0	47.3		11.1	12.0	-7.62	5.2	5.6
1.5	56.1		9.1	13.5	-9.59	5.4	8.0
1.0	67.1		6.3	15.0	-12.32	4.8	11.4
0.7	74.8		4.3	15.8	-13.81	3.6	13.3

Consider Bay Length

2.0m

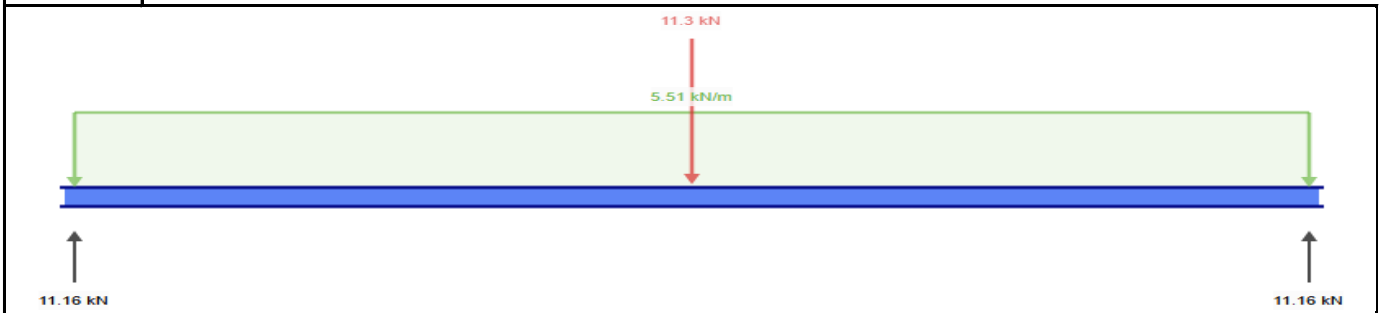
Consider Load Through Angle

Load	/	Sin (°degrees)		
44.06kN	/	63	=	49.45kN
WC Load	/	No.Pullbacks	=	Result
49.45kN	/	4	=	12.36kN
Load	<	Allowable		
12.36kN	<	16.30kN	PASSES	

Item: **Loadings and Reactions on Reinforced Transom**

Point Loads	Location	UDL kN/m
11.30kN	@ 1.00m	5.51

Reaction



Maximum Reactions

Support	Reaction
1	11.16kN
2	11.16kN

Loads Imposed on to Ground

Support	Reaction		Additional Leg/Loads		Additional Leg/Loads		Total Load
1	11.16kN	+	14.36kN	+		=	25.52kN
2	11.16kN	+	4.28kN	+		=	15.44kN

No. Support Stds/Puncheons	3						
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result		
8.51kN	2.5m	18.00kN	0.4m	32.50kN	PASSES		
No. Support Stds/Puncheons	2						
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result		
7.72kN	2.5m	18.00kN	0.4m	32.50kN	PASSES		

Ground Bearing Pressure (GBP)

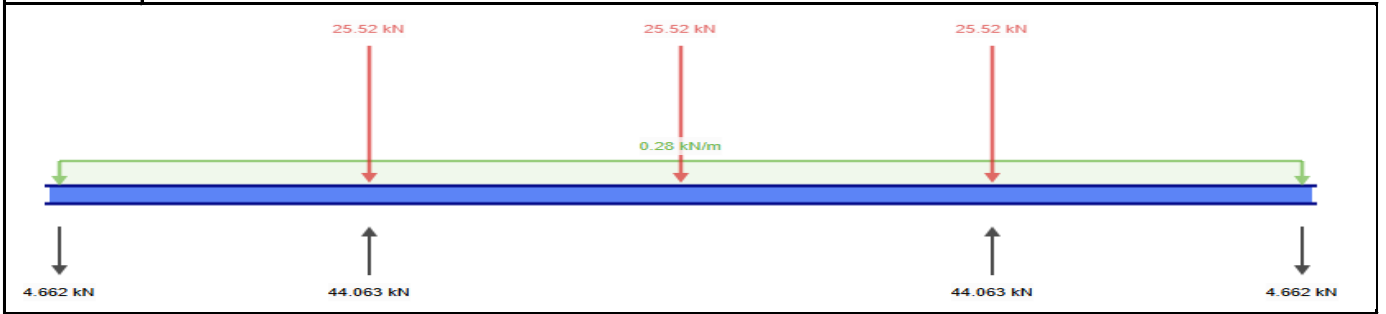
		Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement		0.225	0.450	0.10125
Increased Arrangement	y	0.450	0.450	0.2025
Tredda Plate		0.210	0.210	0.0441
Other				0

Imposed Load:	8.51 kN
GBP:	42.02 kN/m ²

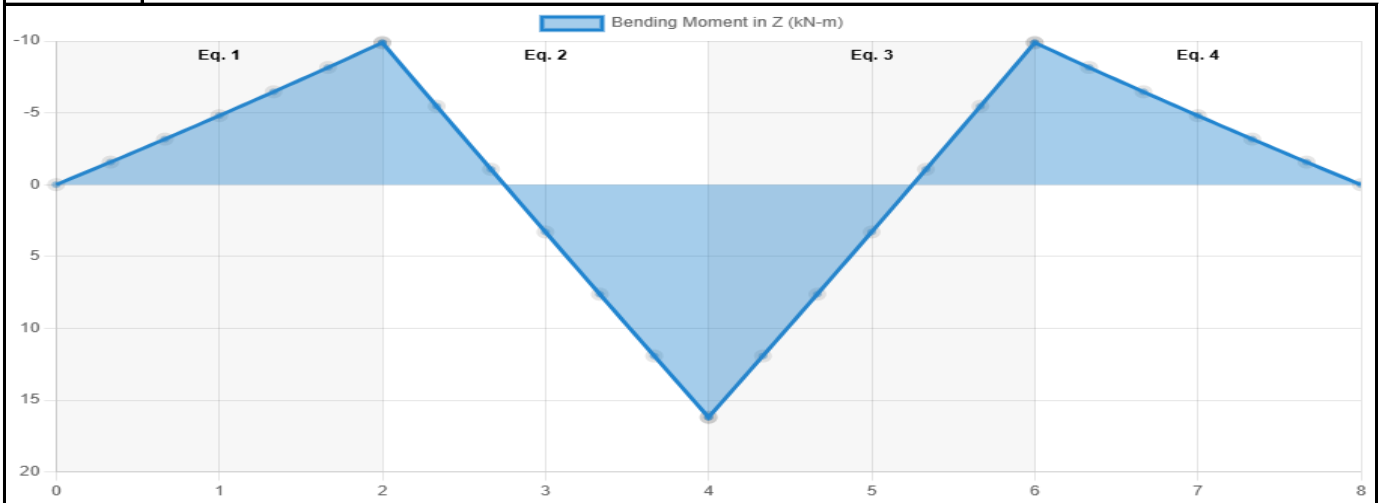
Item: **Loadings and Reactions on Double 750mm Apollo** Beams - **Inside Beam**

Point Loads		Location	Point Loads		Location	Point Loads		Location
25.52kN	@	2.00m	25.52kN	@	4.00m	25.52kN	@	6.00m
Beam C/C (m)		SWL (kN/m ²)		Boards Sw (kN/m ²)		Beam Sw (kN/m)		UDL kN/m
1		0		0		0.28		0.28

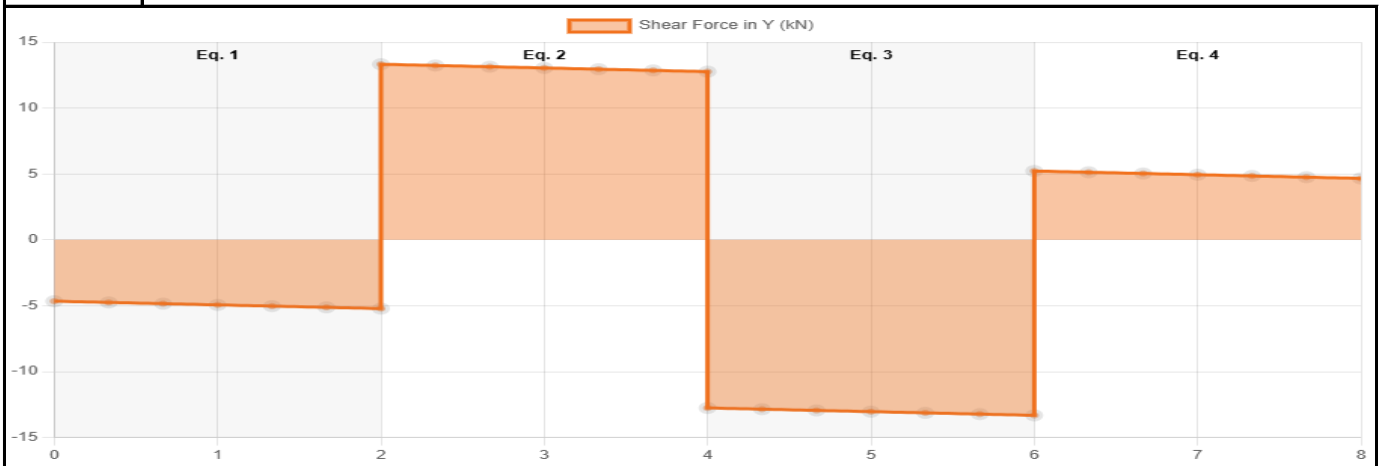
Reaction



BM



Shear



Coupler Capacities

Coupler Type Used - Class A: 6.1kN
Coupler Type Used - Class B: **Y** 9.1kN
Node loads in accordance with TG20:21, 5.9.2

No. of Primary Connections: **6**
No. of Supplementary Connections: **6**
Strength of Connection: **91.20kN**

Maximum Reactions

Support	Reaction	Node	Result
1	-4.66kN	91.20kN	PASSES
2	44.06kN	Through Pullback	
3	44.06kN	Through Pullback	
4	-4.66kN	91.20kN	PASSES

Maximum BM

Max BM	Allowable	Result
16.20kN	< 85.80 kNm	PASSES

Maximum Shear

Max Shear	Allowable	Result
13.32kN	< 91 kN	PASSES

Loads Imposed on to Ground

Support	Reaction		Additional Leg/Loads		Additional Leg/Loads	=	Total Load
1	-4.66kN	+		+		=	-4.66kN
2	44.06kN	+		+		=	44.06kN

No. Support Stds/Punchions	1 &	2					
Axial Load	Effective Length (Le)	Safe Axial Load (Pc)	Slenderness Ratio (λ)	Slenderness Max (λ)	Result		
-4.66kN	2.0 m	29.10kN	127.1	271	PASSES		

Ground Bearing Pressure (GBP)

		Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement		0.225	0.450	0.10125
Increased Arrangement	Y	0.450	0.450	0.2025
Tredda Plate		0.210	0.210	0.0441
Other				0

Imposed Load: -4.66 kN
GBP: **-23.02** kN/m²

Additional Comments If Required

Consider Metrix Brace Capacity (Pull Back)

TABLE 1 – Capacity of Vertical Diagonal Brace							
Bay Length (m)	α (°)	Loading by Tension			Loading by Compression		
		All. N _v (kN)	All. Q (kN)	All. V (kN)	All. N _v (kN)	All. Q (kN)	All. V (kN)
Bay Height H = 2.0m							
3.0	35.1	+16.30	13.3	9.4	-5.12	4.2	2.9
2.5	40.5		12.4	10.6	-6.17	4.7	4.0
2.0	47.3		11.1	12.0	-7.62	5.2	5.6
1.5	56.1		9.1	13.5	-9.59	5.4	8.0
1.0	67.1		6.3	15.0	-12.32	4.8	11.4
0.7	74.8		4.3	15.8	-13.81	3.6	13.3

Consider Bay Length 2.0m

Consider Load Through Angle

Load	/	Sin (°degrees)		
44.06kN	/	45	=	62.31kN
WC Load	/	No. Braces	=	Result
62.31kN	/	4	=	15.58kN
Load	<	Allowable		
15.58kN	<	16.30kN	PASSES	

Loads Imposed on to Primary Beam

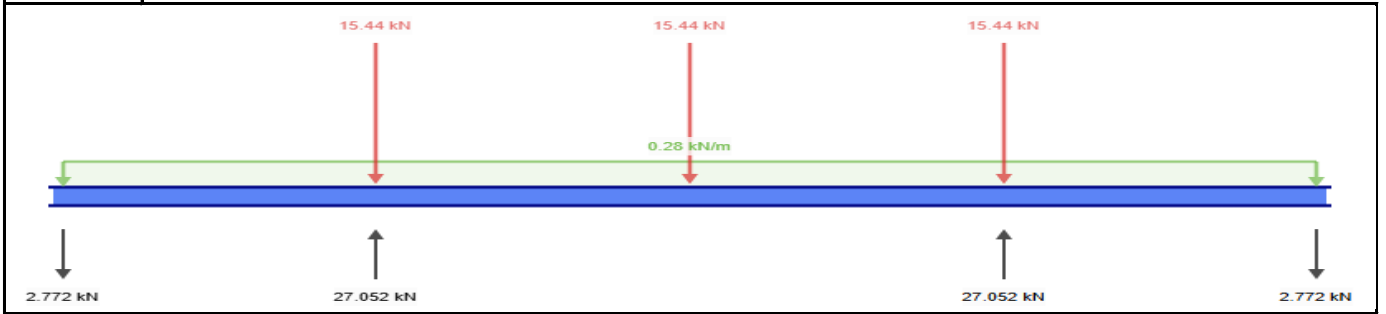
Support	Reaction		Additional Leg/Loads		Additional Leg/Loads		Total Load
1	44.06kN	+	19.04kN	+		=	63.10kN

No. Support Stds/Puncheons 4

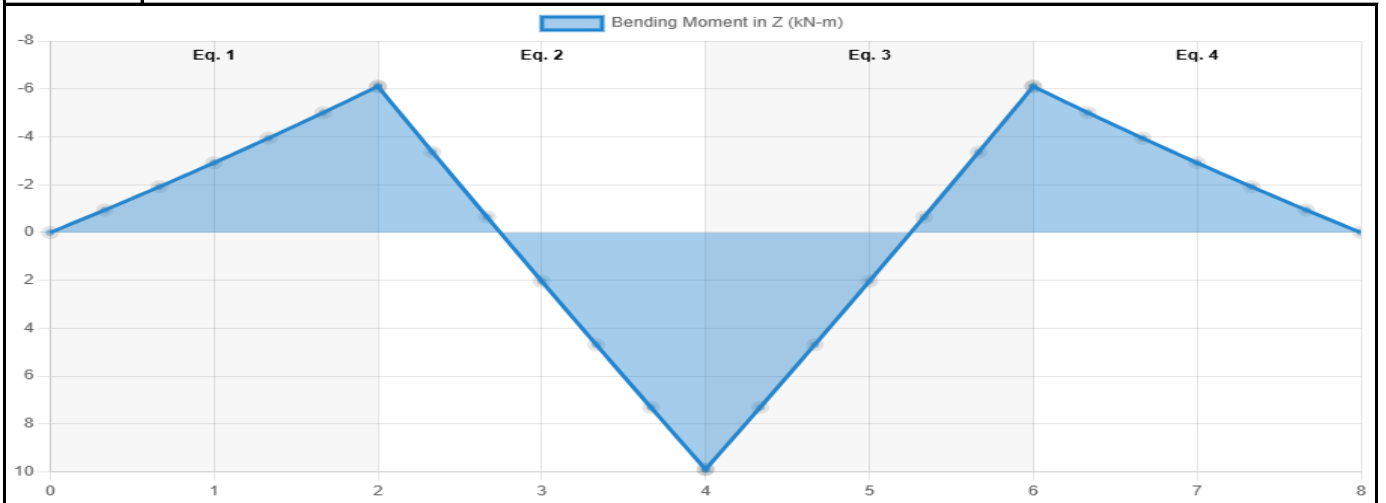
Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result
15.78kN	2.5m	18.00kN	0.4m	32.50kN	PASSES
					PASSES

Item:		Loadings and Reactions on Double 750mm Apollo				Beams -	Outside Beam
Point Loads		Location	Point Loads	Location	Point Loads		Location
15.44kN	@	2.00m	15.44kN	@	4.00m	15.44kN	@ 6.00m
Beam C/C (m)		SWL (kN/m ²)	Boards Sw (kN/m ²)	Beam Sw (kN/m)	UDL kN/m		
1		0	0	0.28	0.28		

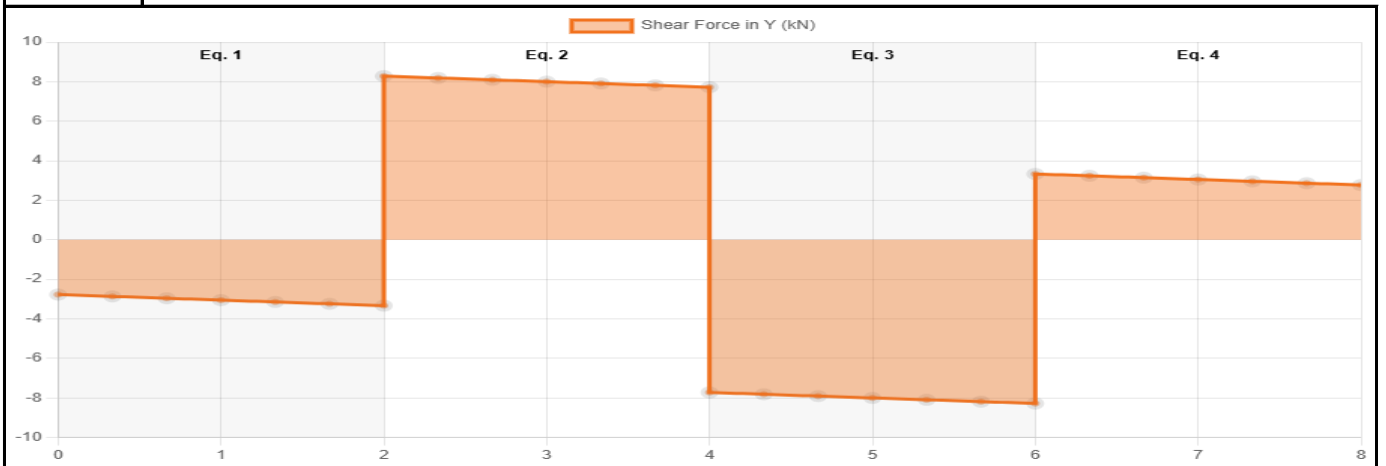
Reaction



BM



Shear



Coupler Capacities

Coupler Type Used - Class A: 6.1kN
Coupler Type Used - Class B: **Y** 9.1kN
Node loads in accordance with TG20:21, 5.9.2

No. of Primary Connections: **6**
No. of Supplementary Connections: **6**
Strength of Connection: **91.20kN**

Maximum Reactions

Support	Reaction	Node	Result
1	-2.77kN	91.20kN	PASSES
2	27.05kN	91.20kN	PASSES
3	27.05kN	91.20kN	PASSES
4	-2.77kN	91.20kN	PASSES

Maximum BM

Max BM	Allowable	Result
9.90kN	< 85.80 kNm	PASSES

Maximum Shear

Max Shear	Allowable	Result
8.28kN	< 91 kN	PASSES

Loads Imposed on to Ground

Support	Reaction		Additional Leg/Loads		Additional Leg/Loads	=	Total Load
1	-2.77kN	+	7.70kN	+		=	4.93kN
2	27.05kN	+		+		=	27.05kN

No. Support Stds/Punchions	1 &	2					
Axial Load	Effective Length (Le)	Safe Axial Load (Pc)	Slenderness Ratio (λ)	Slenderness Max (λ)	Result		
4.93kN	2.0 m	29.10kN	127.1	271	PASSES		

Ground Bearing Pressure (GBP)

		Pad Width (m)	Pad Length (m)	Pad Area (sqm)
Typical Arrangement		0.225	0.450	0.10125
Increased Arrangement	Y	0.450	0.450	0.2025
Tredda Plate		0.210	0.210	0.0441
Other				0

Imposed Load: 4.93 kN
GBP: **24.34** kN/m²

Additional Comments If Required

Consider Metrix Brace Capacity (Pull Back)

TABLE 1 – Capacity of Vertical Diagonal Brace							
Bay Length (m)	α (°)	Loading by Tension			Loading by Compression		
		All. N _v (kN)	All. Q (kN)	All. V (kN)	All. N _v (kN)	All. Q (kN)	All. V (kN)
Bay Height H = 2.0m							
3.0	35.1	+16.30	13.3	9.4	-5.12	4.2	2.9
2.5	40.5		12.4	10.6	-6.17	4.7	4.0
2.0	47.3		11.1	12.0	-7.62	5.2	5.6
1.5	56.1		9.1	13.5	-9.59	5.4	8.0
1.0	67.1		6.3	15.0	-12.32	4.8	11.4
0.7	74.8		4.3	15.8	-13.81	3.6	13.3

Consider Bay Length 2.0m

Consider Load Through Angle

Load	/	Sin (°degrees)		
27.05kN	/	45	=	38.26kN
WC Load	/	No. Braces	=	Result
38.26kN	/	3	=	12.75kN
Load	<	Allowable		
12.75kN	<	16.30kN	PASSES	

Loads Imposed on to Primary Beam

Support	Reaction		Additional Leg/Loads		Additional Leg/Loads		Total Load
1	27.05kN	+	10.82kN	+		=	37.87kN

No. Support Stds/Puncheons 4

Axial Load	Buckling Length	Allowable	Length of Thread	Allowable	Result
9.47kN	2.5m	18.00kN	0.4m	32.50kN	PASSES
					PASSES

Consider Wind Loads On Scaffold

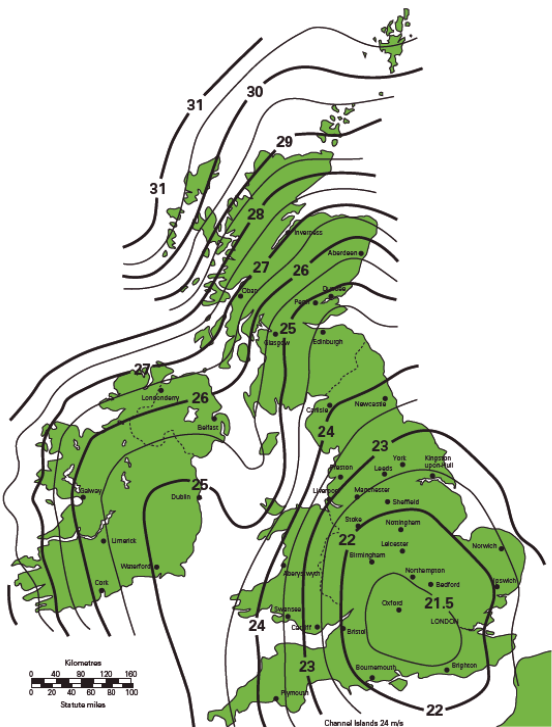


Figure E.1 – Wind speed, V_{map} (m/s)

Table E1: Combined exposure factor, C_c

Height $Z = h_{qis}^{**}$ (m)	Site in country or adjacent to sea				Site in town, more than 2 km from the edge of the town		
	Closest distance to the shoreline (km)				Distance to shoreline (km)		
	≤ 0.1	2	10	≥ 100	≥ 2	10	≥ 100
≤ 2	1.90	1.60	1.50	1.40	1.07	1.01	0.94
3	2.15	1.84	1.73	1.62	1.32	1.25	1.17
4	2.31	2.03	1.90	1.78	1.54	1.44	1.35
5	2.43	2.18	2.05	1.90	1.72	1.62	1.50
10	2.82	2.65	2.50	2.32	2.33	2.20	2.04
15	3.07	3.02	2.85	2.67	2.81	2.65	2.48
20	3.20	3.05	2.98	2.78	2.90	2.83	2.64
30	3.42	3.43	3.27	3.04	3.40	3.24	3.01
50	3.68	3.68	3.62	3.39	3.68	3.62	3.39
100	3.98	3.98	3.98	3.80	3.98	3.98	3.80

Notes: (1) Interpolation may be used in this table
(2) Based on Figure NA.7 and Figure NA.8 in the NA to BS EN 1991-1-4

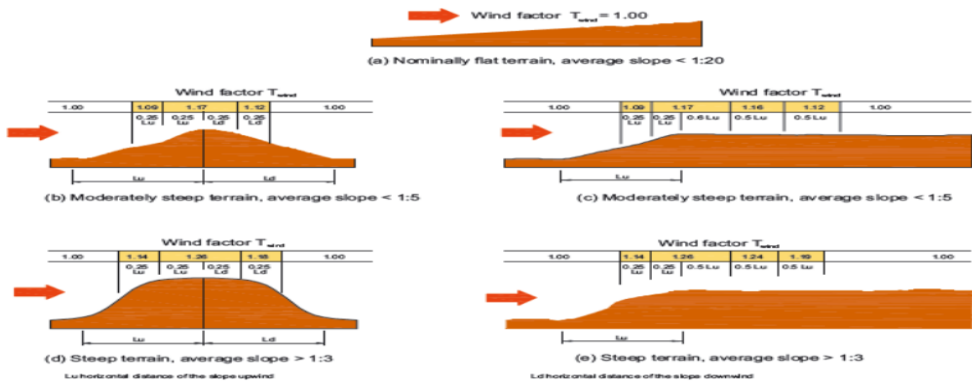


Figure E.2 – Topography factor, T_{wind}



Figure E.3 – Displacement height

Table NA.1 Directional factor c_{dir}

Direction	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
c_{dir}	0,78	0,73	0,73	0,74	0,73	0,80	0,85	0,93	1,00	0,99	0,91	0,82

NOTE 1 Interpolation may be used within Table NA.1.

NOTE 2 The directions are defined by angles from due North in a clockwise direction.

NOTE 3 Where the wind loading on a building is assessed only for orthogonal load cases, the maximum value of the factor for the directions that lie $\pm 45^\circ$ either side of the normal to the face of the building is to be used

NOTE 4 Conservatively, c_{dir} may be taken as 1,0 for all directions.

Consider Wind Loads On Scaffold**Netted****Wind Loads- as TG20, TG9:18 Appendix E, EN 12811 and NA to BS EN 1991-1-4:2005**

(Appendix E to be used with scaffolds < 100m high with no significant topo or < 50m with significant topo)

Distance from Shoreline	>10	in km	Cc	3.24	Table E 1 (combination)
Significant Topography	n	y or n	Vb.map	22.5	Fig E 1 App E
Altitude above sea- A	35	in m	Cdir	1	Table NA.1 page 4
Cprob- do not use twf if <1	1		Cseason	1	Table NA.2 page 6
			Twind	1	Fig E 3

1) Peak Wind Pressure $Q_p = 0.613 \cdot C_c \cdot S_{wind}^2$ Appendix E

2) $S_{wind} = T_{wind} \cdot V_{map} \cdot (1 + 0.001 \cdot A) \cdot C_{prob} \cdot C_{dir} \cdot C_{season}$ Appendix E

3) $S_{wind} = 23.29$

4) $Q_p = 1.08 \text{ kN/m}^2 \cdot 0.70 \text{ tw factor} = 0.75 \text{ kN/m}^2$

Wind Load Per Tie

(Cpe for sheeting- Cpe*1, for debris netting Cpe*0.5, for unsheeted Cpe *0.26)

Ae- Max Area acting on 1 tie =	20.00	in m ²	0.5
$Q_p =$	0.75	kN/m ²	
Cpe +ve=	1.2		ind-TG20 page 150, sign-7.4.3 EN 1991, net cpe 2walls- NA4
Cpe -ve	0.8		

1) Load = $Q_p \cdot A_e \cdot C_{pe} \cdot C_f$

2) Therefore max push in = 9.05 kN

3) Therefore max pull out = 6.03 kN

Max Tie Load (windward): 9.05kN < 18.20kN **PASSES****Coupler Capacities**

Coupler Type Used - Class A: 6.1kN

Coupler Type Used - Class B: Y 9.1kN

Node loads in accordance with TG20:21, 5.9.2

No. of Primary Connections: 2

No. of Supplementary Connections: 0

Strength of Connection: 18.20kN

Max Tie Load (leeward): 6.03kN < 18.20kN **PASSES**

Preliminary Load Test: 12.06kN

Proof Test Load: 7.54kN

Coupler Capacities

Coupler Type Used - Class A: 6.1kN

Coupler Type Used - Class B: Y 9.1kN

Node loads in accordance with TG20:21, 5.9.2

No. of Primary Connections: 2

No. of Supplementary Connections: 0

Strength of Connection: 18.20kN

Consider Wind Loads On Scaffold**Sheeted****Wind Loads- as TG20, TG9:18 Appendix E, EN 12811 and NA to BS EN 1991-1-4:2005**

(Appendix E to be used with scaffolds < 100m high with no significant topo or < 50m with significant topo)

Distance from Shoreline	>10	in km	Cc	1.62	Table E 1 (combination)
Significant Topography	n	y or n	Vb.map	22.5	Fig E 1 App E
Altitude above sea- A	66	in m	Cdir	1	Table NA.1 page 4
Cprob- do not use twf if <1	1		Cseason	1	Table NA.2 page 6
			Twind	1	Fig E 3

1) Peak Wind Pressure $Q_p = 0.613 \cdot C_c \cdot S_{wind}^2$ Appendix E

2) $S_{wind} = T_{wind} \cdot V_{map} \cdot (1 + 0.001 \cdot A) \cdot C_{prob} \cdot C_{dir} \cdot C_{season}$ Appendix E

3) $S_{wind} = 23.99$

4) $Q_p = 0.57 \text{ kN/m}^2 \cdot 0.70 \text{ tw factor} = 0.40 \text{ kN/m}^2$

Wind Load Per Tie

(Cpe for sheeting-Cpe*1, for debris netting Cpe*0.5, for unsheeted Cpe *0.26)

Ae- Max Area acting on 1 tie =	19.13	in m ²	1
$Q_p =$	0.40	kN/m ²	
Cpe +ve=	1.2		ind-TG20 page 150, sign-7.4.3 EN 1991, net cpe 2walls- NA4
Cpe -ve	0.8		

1) Load = $Q_p \cdot A_e \cdot C_{pe} \cdot C_f$

2) Therefore max push in = 9.18 kN

3) Therefore max pull out = 6.12 kN

Max Tie Load (windward): 9.18kN < 18.20kN **PASSES****Coupler Capacities**

Coupler Type Used - Class A: 6.1kN

Coupler Type Used - Class B: Y 9.1kN

Node loads in accordance with TG20:21, 5.9.2

No. of Primary Connections: 2

No. of Supplementary Connections: 0

Strength of Connection: 18.20kN

Max Tie Load (leeward): 6.12kN < 18.20kN **PASSES**

Preliminary Load Test: 12.24kN

Proof Test Load: 7.65kN

Coupler Capacities

Coupler Type Used - Class A: 6.1kN

Coupler Type Used - Class B: Y 9.1kN

Node loads in accordance with TG20:21, 5.9.2

No. of Primary Connections: 2

No. of Supplementary Connections: 0

Strength of Connection: 18.20kN

Consider Wind Loads On Scaffold**Hoist Location****Wind Loads- as TG20, TG9:18 Appendix E, EN 12811 and NA to BS EN 1991-1-4:2005**

(Appendix E to be used with scaffolds < 100m high with no significant topo or < 50m with significant topo)

Distance from Shoreline	>10	in km	Cc	1.62	Table E 1 (combination)
Significant Topography	n	y or n	Vb.map	22.5	Fig E 1 App E
Altitude above sea- A	66	in m	Cdir	1	Table NA.1 page 4
Cprob- do not use twf if <1	1		Cseason	1	Table NA.2 page 6
			Twind	1	Fig E 3

1) Peak Wind Pressure $Q_p = 0.613 \cdot C_c \cdot S_{wind}^2$ Appendix E

2) $S_{wind} = T_{wind} \cdot V_{map} \cdot (1 + 0.001 \cdot A) \cdot C_{prob} \cdot C_{dir} \cdot C_{season}$ Appendix E

3) $S_{wind} = 23.99$

4) $Q_p = 0.57 \text{ kN/m}^2 \cdot 0.70 \text{ tw factor} = 0.40 \text{ kN/m}^2$

Wind Load Per Tie

(Cpe for sheeting-Cpe*1, for debris netting Cpe*0.5, for unsheeted Cpe *0.26)

Ae- Max Area acting on 1 tie =	10.00	in m ²	1
$Q_p =$	0.40	kN/m ²	
Cpe +ve=	1.2		ind-TG20 page 150, sign-7.4.3 EN 1991, net cpe 2walls- NA4
Cpe -ve	0.8		

1) Load = $Q_p \cdot A_e \cdot C_{pe} \cdot C_f$

2) Therefore max push in = 4.80 kN

3) Therefore max pull out = 3.20 kN

Max Tie Load (windward): 4.80kN < 18.20kN **PASSES****Coupler Capacities**

Coupler Type Used - Class A:	6.1kN	No. of Primary Connections:	2
Coupler Type Used - Class B: Y	9.1kN	No. of Supplementary Connections:	0
Node loads in accordance with TG20:21, 5.9.2		Strength of Connection:	18.20kN

Max Tie Load (leeward): 3.20kN Therefore Use 3.5kN < 18.20kN **PASSES**

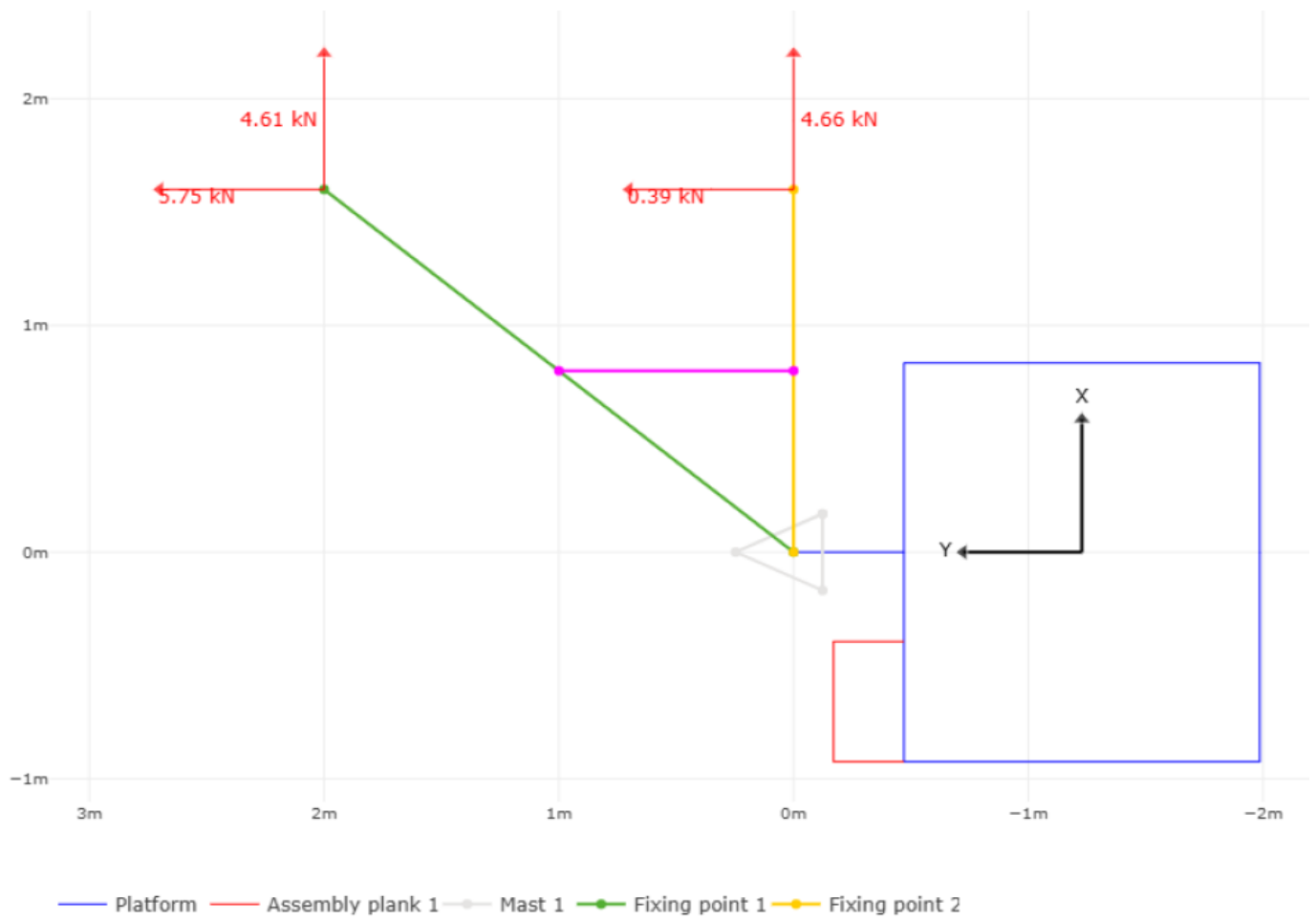
Preliminary Load Test: 7.00kN

Proof Test Load: 4.40kN

Coupler Capacities

Coupler Type Used - Class A:	6.1kN	No. of Primary Connections:	2
Coupler Type Used - Class B: Y	9.1kN	No. of Supplementary Connections:	0
Node loads in accordance with TG20:21, 5.9.2		Strength of Connection:	18.20kN

Consider Imposed Loads From Hoist



Max Shear Load:	5.75kN
Max Tension Load:	4.66kN

Max Tension Load:	4.66kN
-------------------	--------

Consider Shear Tie Supports (Band & Plate) (Shear)

Load	*	FOS	=	Total Load		
5.75kN	*	1.5	=	8.63kN		
Load	/	No. Plates	=	Total Load		Result
8.63kN	/	2	=	4.31kN	<	6.10kN PASSES
Load	/	No. Bolts	=	Total Load		Result
8.63kN	/	2	=	4.31kN	<	20.25kN PASSES

Max Tension Tie Load: 2.88kN

Preliminary Load Test: 5.75kN

Consider Shear Tie Supports (Band & Plate) (Tension)

Load	+	Wind (LW)	=	Total		
4.66kN	+	3.20kN	=	7.86kN		
Load	*	FOS	=	Total Load		
7.86kN	*	1.5	=	11.79kN		
Load	/	No. Plates	=	Total Load		Result
11.79kN	/	2	=	5.90kN	<	6.10kN PASSES
Load	/	No. Bolts	=	Total Load		Result
11.79kN	/	2	=	5.90kN	<	9.50kN PASSES

Max Tension Tie Load: 3.93kN

Preliminary Load Test: 7.86kN

Proof Test Load: 4.91kN

Shear Tie Capacity

Csbolt Diameter d0 / df	Drill Diameter d0	Embedment Depth hnom	Max Rec Tensile Load kN	Max Rec Shear Load kN	Min Concrete Thickness hmin	Design Spacing 'S'		Design Edge Distance 'C'	
						Tensile	Shear	Tensile	Shear
10/12	10	50	4.65	4.55	100	100	100	60	70
10/12	10	75	7.50	10.00	125	90	160	60	120
12/14	12	60	6.25	6.35	100	120	120	70	30
12/14	12	90	9.50	20.25	140	90	160	70	300
14/16	14	70	7.65	7.60	100	130	140	80	110
14/16	14	95	11.00	27.05	170	130	200	80	300
16/18	16	80	9.50	9.45	105	160	160	110	120
16/18	16	115	17.00	37.45	190	200	250	110	390

Consider Shear Tie Supports (Band & Plate) (Compression)

Load	+	Wind (LW)	=	Total		
4.66kN	+	4.80kN	=	9.46kN	<	27.30kN PASSES

Coupler Capacities

Coupler Type Used - Class A: 6.1kN

Coupler Type Used - Class B: **Y** 9.1kN

Node loads in accordance with TG20:21, 5.9.2

No. of Primary Connections: **3**No. of Supplementary Connections: **0**Strength of Connection: **27.30kN**

12mm Apollo Tie Specification**Apollo Scaffold Screw System****For most masonry substrates****Introduced into the UK by Apollo
in 1999 as a stocked product****Designer, purchaser and installer benefits**

Often offering higher tensile loads than expected. In place anchors quite often provide tensile performances greater than the traditional M16 insert usually due to the simplicity of the setting procedure. Expect performances of between 8-20+ kN into the range of suitable materials.

Can be used with tube and fittings as well as lightweight systems such as layer, cuploc and kwikstage. Small hole diameter of 14 mm that can be rapidly drilled using battery drills.

Ideal for fixing blind across a cavity where our training programme can show you how to achieve a correct setting 100% of the time: this means consistency in performance. An ideal system for being fixed across a cavity that is being constructed.

Correctly installed fixings can be achieved and visually recognised with every fix. Visual setting guide to enhance the quality and consistency of the installation.

Suitable for contracts that require the smallest possible area of tubing to be in contact with the structure. This can be achieved by using the Apollo internal Scaffold hook.

Can accept small short term shear loads that will return the screw to its original shape.

In applications where the screw will protrude over 120 mm from the wall additional consideration is recommended for the use of the Apollo external hook.



All screws are measured by their entire shank length. The amount of protrusion will be the shank length less the length of the selected plug plus 5 mm. All screws have a 23 mm diameter eye that allows the use of an Apollo scaffold hook or other proprietary connections. To install only a 14 mm drill bit is required, unless you are fixing blind across a cavity: for advice on this application contact technical services at Apollo.

Type	Drill bit Diameter mm	Shaft Protrusion using the stated plug lengths mm	
		70	100
ASS 12 X 90	14	15	na
ASS 12 X 120	14	45	15
ASS 12 X 160	14	85	55
ASS 12 X 190	14	115	85
ASS 12 X 230	14	155	125
ASS 12 X 300	14	225	195
ASS 12 X 350	14	275	245
ASS 12 x 400	14	325	295
ASS 12 x 450	14	375	345
ASS 12 x 500	14	425	395
ASS 12 x 550	14	475	445

Average tensile values when using the ASSS, Apollo scaffold screw system

Substrate	kN	Details of performances into the following materials are available from our technical services team;	
Concrete C15	12.5		
Concrete C25	10.5	Mortar joints	Slotted brick
Solid Brick	15	Sandstone	Perforated brick
Granite	19.5	Concrete block	Engineering brick
		Softwood	Timberstrand

10 kN = 1 tonne

Shear and compressive performances and installation method statements are available on request

E: sales@apollofix.co.uk

Alternative Tying Systems

Tel: 01527 521061 / 63999

Consider Capacity of Metrix Single Transom & Ledgers

TABLE 4 – Capacity of Single Transoms and Ledgers; Tubular Support

Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p ⁽¹⁾ central transom (kN/m ²)	allow. p ⁽¹⁾ perimeter transom (kN/m ²)	allow. P (kN)
0.7	24.4	3.0	7.9	16.0	7.4
		2.5	9.5	19.3	
		2.0	12.0	24.2	
		1.5	16.0	32.3	
1.0	13.5	3.0	4.3	8.8	6.1
		2.5	5.2	10.6	
		2.0	6.5	13.3	
		1.5	8.8	17.8	

TABLE 4 – Capacity of Single Transoms and Ledgers; Tubular Support (continued)

Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p ⁽¹⁾ central transom (kN/m ²)	allow. p ⁽¹⁾ perimeter transom (kN/m ²)	allow. P (kN)
1.3	8.2	3.0	2.5	5.2	4.7
		2.5	3.1	6.3	
		2.0	3.9	8.0	
		1.5	5.2	10.7	
1.5	5.6	3.0	1.6	3.5	3.8
		2.5	2.0	4.3	
		2.0	2.6	5.4	
		1.5	3.5	7.2	
2.0	3.3	3.0	0.9	2.0	2.9
		2.5	1.1	2.4	
		2.0	1.4	3.1	
		1.5	2.0	4.2	
2.5	2.1	3.0	0.5	1.2	2.4
		2.5	0.6	1.5	
		2.0	0.8	1.9	
		1.5	1.2	2.6	
3.0	1.5	3.0	0.3	0.8	2.0
		2.5	0.4	1.0	
		2.0	0.5	1.3	
		1.5	0.8	1.8	

Roof Founded

Consider Bay Width 1.5m

Consider Allowable UDL on Transom

Bay Length	*	(SWL)	+	Deck DL	)	+	Tube DL	
2.5m	*	(1.50kN/m ²	+	0.23kN/m ²	)	+	0.033kN/m	= 4.36kN/m
Load	<	Allowable		Result				
4.36kN/m	<	5.6kN/m		PASSES				

Independent

Consider Bay Width 1.0m

Consider Allowable UDL on Transom

Bay Length	*	(SWL)	+	Deck DL	)	+	Tube DL	
3.0m	*	(2.00kN/m ²	+	0.23kN/m ²	)	+	0.033kN/m	= 6.72kN/m
Load	<	Allowable		Result				
6.72kN/m	<	13.5kN/m		PASSES				

Consider Capacity of Metrix Reinforced Transom & Ledgers

TABLE 5 – Capacity of Reinforced Transoms and Double Ledgers; Tubular Support

Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p ^(*) central transom (kN/m ²)	allow. p ^(*) perimeter transom (kN/m ²)	allow. P (kN)
1.0 (Transom)	28.8	3.0	9.4	19.0	1 x 13.6
		2.5	11.3	22.8	
		2.0	14.2	28.6	
		1.5	19.0	38.2	
1.3 (Transom)	18.5	3.0	5.9	12.1	1 x 11.4
		2.5	7.2	14.6	
		2.0	9.0	18.3	
		1.5	12.1	24.4	

TABLE 5 – Capacity of Reinforced Transoms and Double Ledgers; Tubular Support (continued)

Transom Length (m)	allow. q (kN/m)	Deck Length (m)	allow. p ^(*) central transom (kN/m ²)	allow. p ^(*) perimeter transom (kN/m ²)	allow. P (kN)
1.5 (Transom)	12.8	3.0	4.0	8.3	1 x 9.2
		2.5	4.9	10.0	
		2.0	6.2	12.6	
		1.5	8.3	16.8	
1.5 (Ledger)	24.7	3.0	8.0	16.2	1 x 15.3 2 x 15.1
		2.5	9.7	19.5	
		2.0	12.1	24.5	
		1.5	16.2	32.7	
2.0 (Ledger)	14.0	3.0	4.4	9.1	1 x 11.3 2 x 8.7
		2.5	5.4	11.0	
		2.0	6.8	13.8	
		1.5	9.1	18.4	
2.5 (Ledger)	8.4	3.0	2.6	5.4	1 x 8.1 2 x 6.6
		2.5	3.1	6.5	
		2.0	4.0	8.2	
		1.5	5.4	11.0	
3.0 (Ledger)	4.6	3.0	1.3	2.9	1 x 7.2 2 x 5.4
		2.5	1.6	3.5	
		2.0	2.1	4.4	
		1.5	2.9	5.9	

Consider Bay Width 2m

Consider Allowable UDL on Transom

Bay Length	*	(SWL)	+	Deck DL	)	+	Tube DL	
2.5m	*	(2.00kN/m ²)	+	0.25kN/m ²	)	+	0.043kN/m	= 5.67kN/m
Load	<	Allowable	Result					
5.67kN/m	<	14.0kN/m	PASSES					

Consider Capacity of Metrix Decks

TABLE 7 – Capacity of Decks					
Type	Steel, 0.30m Wide	Steel, 0.20m Wide	Aluminium, 0.30m Wide	Aluminium, 0.60m Wide	Aluminium / Timber, 0.60m Wide
Length (m)	kN/m ²	kN/m ²	kN/m ²	kN/m ²	kN/m ²
3.0	6.0	6.0	3.0	2.0	2.0
2.5	6.0	6.0	3.0	4.5	4.5
2.0	6.0	6.0	3.0	-	4.5
1.5	6.0	6.0	-	-	4.5
1.3	6.0	6.0	-	-	-
1.0	6.0	6.0	-	-	-
0.7	6.0	6.0	-	-	-

Consider Deck Length

3.0m

Consider Deck Width

0.3m

S.W.L < Allowable Result

2.00kN/m² < 6kN/m² **PASSES****Consider Capacity of Hop Ups**

TABLE 9 – Capacity of Console Hop-Up Brackets			
Type	Uniformly Distributed Load	Point Load to Outer Wedge Head	Centre Point Load
	kN	kN	kN
0.22m Coupler	7.2	3.6	7.2
0.4m Lite	7.7	3.4	3.4
0.4m Reinforced	11.2	5.5	10.6
0.7m Reinforced	8.1	3.6	8.3
1.0m Reinforced	8.3	8.3	6.6

Consider Hop Up Size

0.70m

Consider Allowable UDL on Hop Up

Bay Length * (SWL) + Deck DL) + Tube DL = 3.04kN/m

3.0m * (0.75kN/m² + 0.25kN/m²) + 0.043kN/m = 3.04kN/m

Load < Allowable Result

3.04kN/m < 8.1kN/m **PASSES**

Consider Hop Up Size

1.00m

Consider Allowable UDL on Hop Up

Bay Length * (SWL) + Deck DL) + Tube DL = 6.79kN/m

3.0m * (2.00kN/m² + 0.25kN/m²) + 0.043kN/m = 6.79kN/m

Load < Allowable Result

6.79kN/m < 8.3kN/m **PASSES**

Consider Hop Up Size

1.00m

Consider Allowable Outer PL on Hop Up

Max PL < Max Allowable Result

5.00kN < 8.30kN **PASSES**

Consider Axial Load in Metrix Standards

TABLE 2 – Capacity of Standards					
Buckling Length (m)	1.0	1.5	2.0	2.5	3.0
Allowable Compression Load (kN)	60.0	39.5	26.1	18.0	13.1
Allowable Tension Load (kN)	43.0*				

Consider Effective Length (LE)

2.0m

WC Load < Allowable

25.97kN < 26.10kN **PASSES****Consider Metrix Screw Jack Capacity**

TABLE 3 – Capacity of Base Jacks / Swivel Base Jacks / U-Heads						
Length of Thread Visible (m)	0.1	0.2	0.3	0.4	0.5	0.6
Allowable Compression Load* (kN)	60.0	50.0	40.0	32.5	22.5	15.0

Consider Jack Extension

0.4m

WC Load < Allowable

25.97kN < 33kN **PASSES**

Consider Timber Pad Foundation

Timber Sole Pad Information	
Timber Grade:	C24
Bending Strength:	24N/mm ²
Shear Strength:	2.5N/mm ²
Modulus Elasticity (E):	10800mpa
Length (L):	1125mm
Width/Bredth (b):	450mm
Depth/Height (h):	114mm

Point Load Information	
Consider Point Load (P):	63.10kN
Conversion (P):	63102N

Consider Bearing Stress On Timber Under A Steel Base Plate

Area of Plate:	150mm	*	150mm	=	Result			
$\sigma_{Bearing} =$	63102N	/	22500mm ²	=	22500mm ²			
					2.80N/mm ²	<	24N/mm ²	Result
								PASSES

Consider Timber Section Properties

Area (A): $A = bh$

b	*	h	=	A
450mm	*	114mm	=	51300mm ²

Second Moment of Area (I): $I = \frac{bh^3}{12}$

b	*	h ³	/	12	=	I
450mm	*	114mm ³	/	12	=	55557900/mm ⁴

Section Modulus (Z): $z = \frac{I}{bh/2}$

b	*	h ²	/	6	=	Z
450mm	*	114mm ²	/	6	=	974700/mm ³

Consider Global Bending (Simply Supported, Mid-Point Load)

Bending Moment: $M_{max} = \frac{PL}{4}$

P	*	L	/	4	=	M_{max}
63102N	*	1125mm	/	4	=	17747297Nmm

Bending Stress: $\sigma_b = \frac{M_{max}}{z}$

Mmax	/	Z	=	σ_b		Capacity	Result
17747297N/mm	/	974700/mm ³	=	18.21N/mm ²	<	24N/mm ²	PASSES

Consider Global Shear (Reactions At Supports)

Reaction: $V = P/2$

P	/	2	=	V
63102N	/	2	=	31551N

Rectangular Section: $T_{max} = 1.5 \frac{V}{A}$

V	/	A	=	Result	
31551N	/	51300mm ²	=	0.62N/mm ²	
1.5	*	Result	=	T_{max}	Capacity
1.5	*	0.62N/mm ²	=	0.92N/mm ²	2.5N/mm2
				<	PASSES

Consider Deflection

Deflection: $\delta_{max} = \frac{PL^3}{48EI}$

P	*	L ³	=	Result
63102N	*	1125mm ³	=	89845690429688Nmm ³

48	*	E	*	I	=	Result
48	*	10800mpa	*	55557900/mm ⁴	=	28801215360000Nmm ²

Result	/	Result	=	δ_{max}
89845690429688Nmm ³	/	28801215360000Nmm ²	=	3.12mm

Allowable Deflection: $L/300$

L	/	300	=	Capacity	δ_{max}	Result
1125mm	/	300	=	3.75mm	3.12N/mm2	PASSES

Conclusion

	σ_b		Capacity	Result
Bending Stress:	18.21N/mm ²	<	24N/mm2	PASSES

	T_{max}		Capacity	Result
Global Shear:	0.92N/mm ²	<	2.5N/mm2	PASSES

	δ_{max}		Capacity	Result
Deflection:	3.12mm	<	3.75mm	PASSES

Project:	India House, Manchester
Drawing Number:	CO002-11385-1-Rev-M
Item:	External Access Scaffold
Category of Check (1, 2, or 3):	2

Description of Temporary Works:

External Access Scaffold

I certify for and on behalf of BDS Ltd, that in my opinion, the erection proposals and proposed temporary works details, specified in the schedule attached hereto relating to the construction of the above contract, are satisfactory for the proper discharge of responsibilities for the safe temporary works design elements of the works, and for their safe execution and removal (if applicable) in accordance with the drawings and specification, and without detriment to the related permanent Works.

Schedule of Drawings and Other Documents:

Drawing: Page 1 to 7
Supporting Calculations: Page 1 to 45
Check Certificate: Page 46

Drawn By: Hayden Allan
Company: Buckley Design Solutions

Signature:



Drawing Status:
CONSTRUCTION

Calculations By: Joe Rigby
Company: Buckley Design Solutions

Signature:



Checked By: Mike Brown
Company: Buckley Design Solutions

Signature:



Date:
22/05/2026