

	Date: 13/09/2021	Client: Tunny Scaffolding Ltd	Drawing Status: APPROVAL
	Prepared By: J Hollingworth	Project: Hough Hall, Moston, Mcr	Drawing No: BDS-7459-01 to 02
	Date: 13/09/2021	Drawing Title: Façade Retention & Access Scaffold	Revision: N/A Date: N/A Pages: N/A
	Checked By: Mike Brown		

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 TG20:13 - Page 119 - Table 5.9

Steel 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 TG20:13 - Page 121 - Table 5.10

Effective Length (L_E) Slenderness ratio - λ Safe axial load -P_c

1.0m	63.5	= 58.6kN
1.2m	76.5	= 51.9kN
1.4m	88.9	= 45.3kN
1.6m	101.7	= 39.2kN
1.8m	114.4	= 33.7kN
2.0m	127.1	= 29.1kN
2.2m	139.8	= 25.3kN
2.4m	152.5	= 22.0kN
2.6m	165.2	= 19.3kN
2.8m	177.9	= 17.1kN
3.0m	190.6	= 15.2kN
3.2m	203.3	= 13.6kN
3.4m	216.0	= 12.2kN
3.6m	228.7	= 11.0kN
3.8m	241.4	= 10.0kN
4.0m	254.1	= 9.10kN

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NASC TG20:13 - Page 129 - Table 5.14

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

Vertical intervals between lines of ties	Bay lengths						
	1.2m	1.5m	1.8m	2m	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	3.0
4m	3.2	3.2	3.2	3.2	3.2	3.2	3.2
6m	4.0	4.0	4.0	4.0	4.0	4.0	4.0

NASC TG20:13 - 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 TG20:13 - Page 167 - Table C.2

Effective Length (L_E)	Slenderness ratio - λ	Safe axial load - P_c
1.0m	64.2	= 48.9kN
1.2m	77	= 36.6kN
1.4m	89.9	= 27.9kN
1.6m	102.7	= 21.8kN
1.8m	115.5	= 17.5kN
2.0m	128.4	= 14.4kN
2.2m	141.2	= 12.0kN
2.4m	154.0	= 10.1kN
2.6m	166.9	= 8.70kN
2.8m	179.7	= 7.50kN
3.0m	192.5	= 6.60kN

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NASC TG20:13 - Page 135 - Table 5.15

Couplers

Right Angle Coupler (Double) Class "A"	SWL = 6.1kN	Slip
Right Angle Coupler (Double) Class "B"	SWL = 9.1kN	Slip
Band & plate (Double) coupler	SWL = 6.1kN	Slip
Right Angle Coupler (Double) Self Weight	SW = 1.25kg	
Swivel Coupler Class "A"	SWL = 6.1kN	Slip
Swivel Coupler Class "B"	SWL = 9.1kN	Slip
Swivel Coupler Self Weight	SW = 1.33kg	
Sleeve Coupler Class "A"	SWL = 3.6kN	Tension
Adjustable Screw Jack	SWL = 35kN	Compression (max 200mm extension)
Girder Coupler (must be used in pairs)	SWL = 10kN	"X" Axis
	SWL = 30kN	"Y" Axis
	SWL = 6.1kN	"Z" Axis
Girder Coupler Self Weight (each)	SW = 1.5kg	

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	= 0.3kN (laced & braced)
Moment Capacity	= 10.4kNm
Shear Capacity	= 18kN

*For further information refer to manufacturer

RMD Superslim Soldiers

Moment Capacity	= 38kNm
Shear Capacity	= 75kN

*For further information refer to manufacturer

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

Self Weight	= 0.14kN (laced & braced)
Moment Capacity	= 15.7kNm
Shear Capacity	= 13.9kN

*For further information refer to manufacturer

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

Self Weight	= 0.28kN (laced & braced)
Moment Capacity	= 42.9kNm
Shear Capacity	= 45.5kN

*For further information refer to manufacturer

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

Self Weight	= Varies TBC (laced & braced)
Moment Capacity	= 71.1kNm
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	= 255kNm
Shear Capacity	= 60kN

*For further information refer to manufacturer

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1300mm Asterix Beams* (Aluminium)

Self Weight	= Varies TBC (laced & braced)
Moment Capacity	= 102.2kNm Laced at 1m c/c
Moment Capacity	= 77.7kNm Laced at 1.5m c/c
Shear Capacity	= 42.1kN (Top & Bottom chords connected)
Shear Capacity	= 32.6kN (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

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

Self Weight	= 0.28kN (laced & braced)
Moment Capacity	= 36.5kNm
Shear Capacity	= 30.7kN

*For further information refer to manufacturer

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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 permissible stress 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.
TG9:17		Guide to the design & construction of temporary roofs & buildings.
TG12:10		Tying down of scaffold boards.
TG13:16		Non-standard boarded platforms.
TG16:14		Anchoring to the ground.
TG20:13		Technical guidance on the use of BS EN 12811-1.
SG4:15		Preventing falls in scaffolding.
SG5:11		Overhead power sources.
SG25:20		Access & egress from scaffolds.
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

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Job Description

Façade retention & access scaffold utilising tube & fitting with kentledge to restrain overturning.

Safe Working Load: Façade Retention with 1N^o lift at 2kN/m² working at any one time.
All inside boards rated at 0.75kN/m² unless otherwise stated in the below calculations.

Item – Façade Retention

Max Bay Length: 1.65m
Max Bay Width: 1.63m (7 boards)
Max Transom Spacing's: 1.2m
Max Leg Load: 14.53kN

Item – Ties (Tension)

Max Tie Load: N/A
Preliminary Test: N/A
Proof Test: N/A



BDS SCAFFOLD
DESIGN
SPECIALISTS

Date:
13/09/2021

Prepared By:
J Hollingworth

Date:
13/09/2021

Checked By:
Mike Brown

Client:
Tunny Scaffolding Ltd

Project:
Hough Hall, Moston, Mcr

Drawing Title:
Façade Retention & Access Scaffold

Drawing Status:
APPROVAL

Drawing No:
BDS-7459-01 to 02

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		Item: Façade Retention		Y			
Bay Lengths (m)	1.65	Consider the scaffold boards spanning		1.2 m			
Bay widths (m)	1.21	Dead load	Centres	Width	Load		
Transom C/C (m)	1.2	Boards	1.2 m	0.23 m	0.25 kN/m²		= 0.068 kN
No. Inside boards	0	Imposed load	1.2 m	0.23 m	2 kN/m²		= 0.540 kN
Boards Self-weight (kN/m²)	0.25	Bending moment	0.068 +	0.54 X	1.2	/8	= 0.091 kNm
Safe Working Load (kN/m²)	2	Allowable Bending Moment for Scaffold Boards = 0.48kNm					> 0.091 kNm
Transoms with no inside boards		Consider the transoms spanning		1.21 m			Therefore PASSES
		Dead load	Centres	Span	Load		
		Boards	1.2 m	1.21 m	0.25 kN/m²		= 0.363 kN
		Tube	1.21 m	X	0.043 kN/m²		= 0.052 kN
		Total	0.363 kN	+	0.052 kN		= 0.415 kN
		Imposed load	1.2 m	1.21 m	2 kN/m²		= 2.904 kN
		Non-cantilevered Transom BM as TG20:13 - section 5.11.1.1 - M = 0.125 X W X L (kNm)					
		Bending Moment	0.125	3.32 kN	1.21 m	= 0.502 kNm	
		Allowable Bending Moment for Scaffold tube = 1.12kNm					> 0.502 kNm
Transoms with inside boards		Consider the transoms spanning		0 m			Therefore PASSES
		Dead load	Centres	Span	Load		
		Boards	1.2 m	0 m	0.25 kN/m²		= 0.000 kN
		Tube	0 m	X	0.043 kN/m²		= 0.000 kN
		Total	0.000 kN	+	0.000 kN		= 0.000 kN
		Imposed load	1.2 m	0 m	0.75 kN/m²		= 0.000 kN
		Cantilevered Transom BM as TG20:13 - section 5.11.1.2 - M _c = 0.5 X W _c X L _c (kNm)					
		Bending Moment	0.5	0.00 kN	0.000 m	= 0.000 kNm	
		Allowable Bending Moment for Scaffold tube = 1.12kNm					> 0.000 kNm
Therefore PASSES							

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Continuous transoms e.g. birdcage	Consider the transoms spanning		1.21 m			
	Dead load	Centres	Span	Load		
	Boards	1.2 m	1.21 m	0.25 kN/m ²	=	0.363 kN
	Tube	1.21 m	X	0.043 kN/m ²	=	0.05203 kN
	Total	0.363 kN	+	0.052 kN	=	0.415 kN
	Imposed load	1.2 m	1.21 m	2 kN/m ²	=	2.904 kN
	Continuous Transom BM as TG20:13 - section 5.11.1.3 - $M = 0.086 \times W \times L$ (kNm)					
	Bending Moment	0.086	3.32 kN	1.21 m	=	0.345 kNm
	Allowable Bending Moment for Scaffold tube = 1.12kNm				>	0.345 kNm
	Therefore PASSES					

Simply supported ledger	Consider the ledger spanning		1.65 m			
	Transom point load		3.32 kN			
	Simply supported ledger as TG20:13 - section 5.12.1.1 - $M = 0.25 \times P \times L$ (kNm)					
	Bending Moment	0.25	3.32 kN	1.65 m	=	1.369 kNm
	Allowable Bending Moment for Scaffold tube = 1.12kNm				>	1.369 kNm

Continuous Ledger	Consider the ledger spanning		1.65 m			N/A
	Transom point load		3.32 kN			
	Continuously supported ledger as TG20:13 - section 5.12.1.2 - $M = 0.167 \times P \times L$ (kNm)					
	Bending Moment	0.167	3.32 kN	1.65 m	=	0.915 kNm
	Allowable Bending Moment for Scaffold tube = 1.12kNm				>	0.915 kNm

Part continuous Ledger (end bay)	Consider the ledger spanning		1.65 m			Therefore PASSES
	Transom point load		3.32 kN			
	Part continuous supported ledger as TG20:13 - section 5.12.1.2 - $M = 0.172 \times P \times L$ (kNm)					
	Bending Moment	0.172	3.32 kN	1.65 m	=	0.942 kNm
	Allowable Bending Moment for Scaffold tube = 1.12kNm				>	0.942 kNm
	Therefore PASSES					

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STANDARDS (INC. LIVE LOAD)

Leg Load Calculation (Section C-C)

<u>Calculate Axial Load in Standards.</u>			<u>Handrails</u>			<u>Live Load:</u>			
Lift Heights:	1.35	m.	No. of Lifts with o/s Guardrails	7	1	No. Lifts @	2	kN/m2	
Max.No. of Lifts:	4	No.	No. of Lifts with I/s Guardrails	0	0	No. Lifts @	0	kN/m2	
Max.No. of Boarded Lifts:	3	No.	No. of Guardrails per Lift.	1	0	No. Lifts @	0	kN/m2	
Max.No. of Inside Boards:	0.5	No.				<u>Additional. Load</u>			
Scaffold Bay Size:	2	m.			Ins. Leg		Outs. Leg		
Width of Scaffold:	1.63	m.			0	kN.	0	kN	
			Inside Leg	Outside Leg	B/cage leg	Max. Leg Load.	IND IS.Leg	IND OS.Leg	
No. Lifts requiring double Standards			0	0	13.287	kN.	6.643	kN.	7.086

Leg Load Calculation (Section D-D)

<u>Calculate Axial Load in Standards.</u>			<u>Handrails</u>			<u>Live Load:</u>			
Lift Heights:	1.35	m.	No. of Lifts with o/s Guardrails	7	1	No. Lifts @	2	kN/m2	
Max.No. of Lifts:	4	No.	No. of Lifts with I/s Guardrails	0	0	No. Lifts @	0	kN/m2	
Max.No. of Boarded Lifts:	3	No.	No. of Guardrails per Lift.	1	0	No. Lifts @	0	kN/m2	
Max.No. of Inside Boards:	0.5	No.				<u>Additional. Load</u>			
Scaffold Bay Size:	2	m.			Ins. Leg		Outs. Leg		
Width of Scaffold:	0.73	m.			0	kN.	0	kN	
			Inside Leg	Outside Leg	B/cage leg	<u>Max. Leg Load.</u>			
						IND IS.Leg		IND OS.Leg	
No. Lifts requiring double Standards			0	0	7.848	kN.	3.924	kN.	4.366

Leg Load Calculation (Section D-D)

<u>Calculate Axial Load in Standards.</u>			<u>Handrails</u>			<u>Live Load:</u>			
Lift Heights:	1.35	m.	No. of Lifts with o/s Guardrails	7	1	No. Lifts @	2	kN/m2	
Max.No. of Lifts:	4	No.	No. of Lifts with I/s Guardrails	0	0	No. Lifts @	0	kN/m2	
Max.No. of Boarded Lifts:	3	No.	No. of Guardrails per Lift.	1	0	No. Lifts @	0	kN/m2	
Max.No. of Inside Boards:	0	No.	<u>Additional. Load</u>						
Scaffold Bay Size:	2	m.				Ins. Leg	Outs. Leg		
Width of Scaffold:	1.21	m.				0	kN.	0	kN
			Inside Leg	Outside Leg	B/cage leg	<u>Max. Leg Load.</u>			
						IND IS.Leg		IND OS.Leg	
No. Lifts requiring double Standards			0	0	9.408	kN.	4.704	kN.	5.814

Leg Load Calculation (Section D-D)

<u>Calculate Axial Load in Standards.</u>			<u>Handrails</u>			<u>Live Load:</u>			
Lift Heights:	1.35	m.	No. of Lifts with o/s Guardrails	7	1	No. Lifts @	2	kN/m2	
Max.No. of Lifts:	4	No.	No. of Lifts with I/s Guardrails	0	0	No. Lifts @	0	kN/m2	
Max.No. of Boarded Lifts:	3	No.	No. of Guardrails per Lift.	1	0	No. Lifts @	0	kN/m2	
Max.No. of Inside Boards:	0.5	No.				<u>Additional. Load</u>			
Scaffold Bay Size:	2	m.			Ins. Leg		Outs. Leg		
Width of Scaffold:	1.63	m.			0	kN.	0	kN	
			Inside Leg	Outside Leg	B/cage leg	<u>Max. Leg Load.</u>			
						IND IS.Leg		IND OS.Leg	
No. Lifts requiring double Standards			0	0	13.287	kN.	6.643	kN.	7.086

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Leg Loads (Façade Retention 4no. Lifts – Exc. Kentledge)

Position	Axial Load	Effective Length (L_E)	Safe Axial Load (P_c)	Slenderness Ratio (λ)	Slenderness Ratio (λ) Max	Result
Inside =	6.64kN	2m	< 29.1kN	127.1	< 271	Therefore Passes
Central =	9.41kN	2m	< 29.1kN	127.1	< 271	Therefore Passes
Outside =	7.09kN	2m	< 29.1kN	127.1	< 271	Therefore Passes

Load Per Node (Façade Retention)

Inside Node

Board _{width}	*	Bay _{length}	*	(SWL + BDS _{SW})	+	T _{SW}	
0.37m	*	2m	*	(2kN/m ² + 0.25kN/m ²)	+	0.45kN	= 2.12kN
0.225m	*	2m	*	(0.75kN/m ² + 0.25kN/m ²)			= 0.45kN
2.12kN + 0.45kN = 2.57kN						< 15.2kN therefore Passes	

Centre Node

1.21m	*	2m	*	(2kN/m ² + 0.25kN/m ²)	+	0.9kN	= 6.35kN
6.35kN						< 15.2kN therefore Passes	

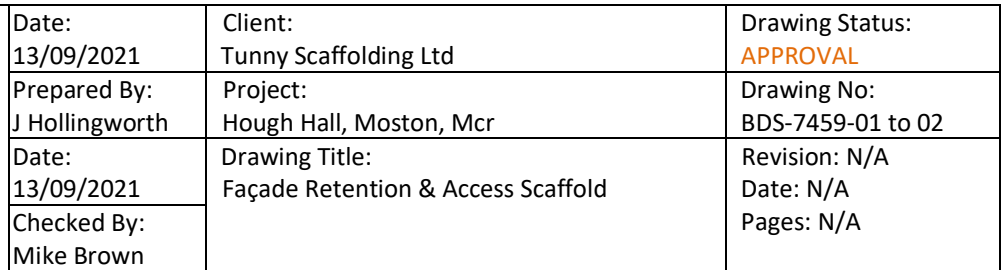
Outside node

0.84m	*	2m	*	(2kN/m ² + 0.25kN/m ²)	+	0.45kN	= 4.23kN
4.23kN						< 15.2kN therefore Passes	

Capacity of supplementary coupler = 9.1kN * 0.67 = 6.1kN
 (9.1kN * 1no fixing couplers) + (6.1kN * 1no check couplers) = **15.2kN**

5.9.2 Supplementary couplers

When it is intended to increase the safe working capacity of a joint by the use of supplementary couplers to back up the main coupler, the information required regarding the strength of the proposed arrangement may be obtained from the manufacturer or supplier based on tests carried out and interpreted in accordance with BS EN 74-1 and BS EN 12811-3. However, BS EN 12811-1 Annex C table C1 implies that the combined slip resistance of two class AA right angle couplers should be assumed as 1.5 × the slip resistance of a single coupler and the combined slip resistance of two class BB right angle couplers should be assumed as 1.67 × the slip resistance of a single coupler. Class AA and BB couplers are single class A and B couplers which have been tested as pairs in contact and found to satisfy the requirements of BS EN 74-1 table 8.



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Overturning (Leeward)

$(3.67\text{kN} * 3.69\text{m}) = 13.54\text{kNm}$

$13.54\text{kNm} * 1.5 \text{ (FOS)} = 20.31\text{kNm}$

Restoring Moment

$(2.93\text{kN} * 1.63\text{m}) = 4.78\text{kNm}$

Kentledge Requirement

$20.31\text{kNm} \text{ (OT)} - 4.78\text{kNm} \text{ (RM)} = 15.53\text{kNm}$

$15.53\text{kNm} / 1.63\text{m} = 9.53\text{kN}$

$9.53\text{kN} / 0.043\text{kN/m} = 221.63$

$221.63 / 1.65\text{m} \text{ (Bay Length)} = 134.32$ Therefore 135 Continuous Tube Required as Kentledge

$9.53\text{kN} / 0.00981 = 975\text{kg}$

Consider Overturning (Windward)

Overturning

$(5.51\text{kN} * 3.69\text{m}) = 20.33\text{kNm}$

$20.33\text{kNm} * 1.5 \text{ (FOS)} = 30.5\text{kNm}$

Restoring Moment

$(3.83\text{kN} * 1.63\text{m}) = 6.24\text{kNm}$

Kentledge Requirement

$30.5\text{kNm} \text{ (OT)} - 6.24\text{kNm} \text{ (RM)} = 24.26\text{kNm}$

$24.26\text{kNm} / 1.63\text{m} = 14.88\text{kN}$

$14.88\text{kN} / 0.043\text{kN/m} = 346.05$

$346.05 / 1.65\text{m} \text{ (Bay Length)} = 209.72$ Therefore 210 Continuous Tube Required as Kentledge

$14.88\text{kN} / 0.00981 = 1,520\text{kg}$

Leg Loads (Kentledge Imposed)

Position	Axial Load	Effective Length (L_E)	Safe Axial Load (P_c)	Slenderness Ratio (λ)	Slenderness Ratio (λ) Max	Result
Inside =	$6.64\text{kN} + (9.53\text{kN} / 2) = 11.41\text{kN}$					
	11.36kN	2m	< 29.1kN	127.1	< 271	Therefore Passes
Central =	$(9.53\text{kN} / 2) = 4.77\text{kN}$					
	4.97kN	2m	< 29.1kN	127.1	< 271	Therefore Passes
Central =	$(14.88\text{kN} / 2) = 7.44\text{kN}$					
	7.44kN	2m	< 29.1kN	127.1	< 271	Therefore Passes
Outside =	$7.09\text{kN} + (14.88\text{kN} / 2) = 14.53\text{kN}$					
	14.53kN	2m	< 29.1kN	127.1	< 271	Therefore Passes

	Date: 13/09/2021	Client: Tunny Scaffolding Ltd	Drawing Status: APPROVAL
	Prepared By: J Hollingworth	Project: Hough Hall, Moston, Mcr	Drawing No: BDS-7459-01 to 02
	Date: 13/09/2021	Drawing Title: Façade Retention & Access Scaffold	Revision: N/A Date: N/A Pages: N/A
	Checked By: Mike Brown		

Ground Bearing Pressure

Foundation Type

Sole Pad	- Single Standard	y	0.225 m	X	0.450 m	=	0.10125	m ²
Sole Pad	- Double Standard		0.225 m	X	0.750 m	=	0.16875	m ²
Sole Pad	- Double Standard		0.450 m	X	0.450 m	=	0.2025	m ²
Tredda Plate	- Single Standard		0.210 m	X	0.210 m	=	0.0441	m ²

Standard Load = 14.53 kN

Ground Bearing Pressure = 143.51 kN/m²

Client to confirm that the ground is capable of supporting imposed standard loads from the scaffold

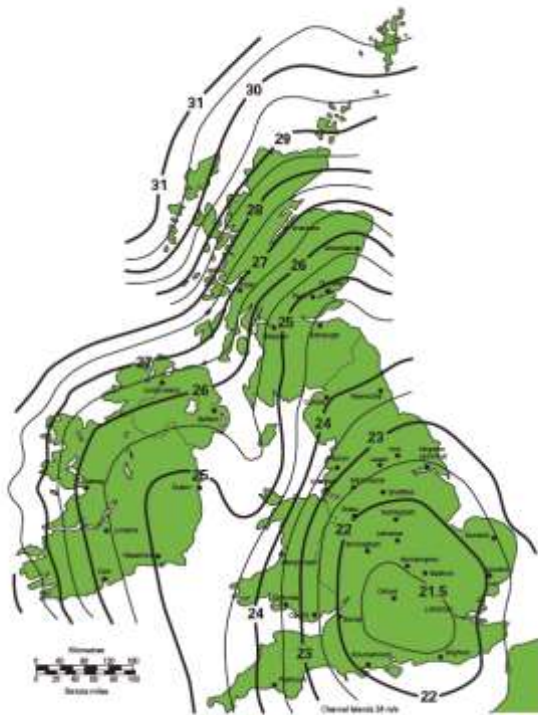


Figure E.1 - Wind speed, V_{ref} (m/s)

Table E1: Combined exposure factor, C_e

Height $Z - h_{eff}$ (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	2.61	2.65	2.48
20	3.20	3.05	2.96	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.

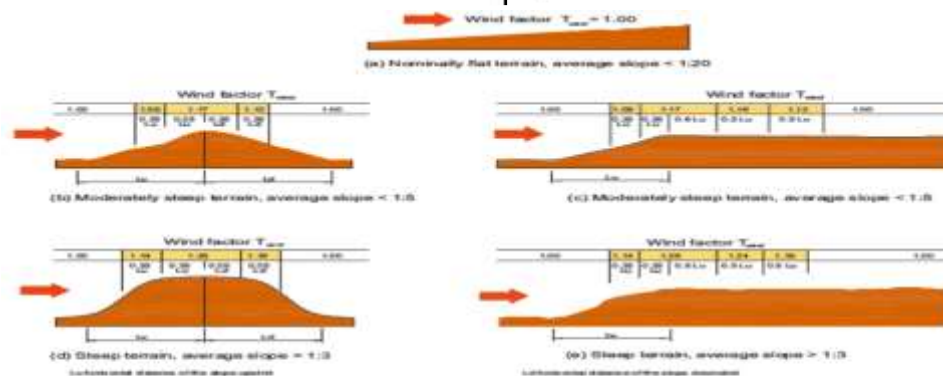


Figure E.2 - Topography factor, T_{ref}



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.

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Project	Hough Hall, Moston, Mcr
Drawing Reference No	BDS-7459-01 to 02
Item	Façade Retention & Access Scaffold
Revision (if applicable)	N/A
Category of Check (1, 2, or 3)	2

Description of Temporary Works:

Façade retention & access scaffold utilising tube & fitting with kentledge to restrain overturning.

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:

BDS-7459-01: Plan A-A, Elevation B-B
 BDS-7459-02: Section C-C, Section D-D
 Supporting Calculations: Page 1 to 14
 Check Certificate: Page 15 of Calculations Document

Designer's signature	
Name	J Hollingworth
Company	Buckley Design Solutions Ltd
Design checker's signature	
Name	Mike Brown
Company	Buckley Design Solutions Ltd
Date	13/09/2021