Prime Scaffold and Structural Designs Limited

DESIGN CALCULATIONS

Date:	11/08/2022
Client:	SC Property
Title:	Access Scaffold
Site:	59 Elm Avenue
Calculation No.	10553-1
Drawing No:	10553-1A
Prepared By:	D. Rogerson
Checked By:	C. Elliot

Silver Circle Property

Prime Scaffold and Structural Designs Limited

Tel: 0207 403 2994
Web: www.psd.uk.com

CONTENTS PAGE

Page:

Design Drawings:

10553-1A

Super Stress Analysis:

NA

Appendix:

A *Wind Data*

Date:	11/08/2022	Calculation No.	10553-1
Client:	SC Property	Drawing No:	10553-1A
Title:	Access Scaffold	Prepared By:	D. Rogerson
Site:	59 Elm Avenue	Checked By:	C. Elliot

Prime Scaffold and Structural Designs Limited
Tel: 0207 403 2994
Web: www.psd.uk.com

DESIGN LOAD INFORMATION SHEET

Scaffold Tube

Tube' refers to Type 4 steel galvanised scaffold tube conforming to BSEN39 with a minimum yield stress of 235N/mm2, an outside diameter of 48.3mm with a wall thickness of 4.0mm.

Self weight	4.37kg/m	*(As NASC TG20:21, Guide to good practice for scaffolding with tube and fittings, Table 5.9)*
Moment Capacity	1.12kN.m	

Axial Load

Effective Length (Le) (M)	Safe Axial Load (Pc) (kN)
1.20	51.90
1.40	45.30
1.60	39.20
1.80	33.70
2.00	29.10
2.20	25.30
2.40	22.00
2.60	19.30
2.80	17.10
3.00	15.20
3.20	13.60

(As NASC TG20:21, Guide to good practice for scaffolding with tube and fittings, Table 5.10)

All Tubes used in this design considered 'As New Tube'

Couplers

Type	SWL (kN)	Self weight (Kg)
Right Angle (Class A)	6.1	1.2
Right Angle (Class B)	9.1	1.2
Swivel Coupler (Class A)	6.1	1.2
Swivel Coupler (Class B)	9.1	1.2
Sleeve (Class A)	3.6 (Tension)	
Sleeve (Class B)	5.5 (Tension)	

(As NASC TG20:21, Guide to good practice for scaffolding with tube and fittings, Table 5.15)

Scaffold Boards

225 x 38mm timber scaffold boards (38-1.2m)

(As NASC TG20:21 Guide to good practice for scaffolding with tube and fittings, Table 5.8)

Moment Capacity	0.475kN.m	*(Load Applied acts on an individual board)*
	0.61kN.m	*(Load Applied is spread uniformly across min of 4 boards)*

Lattice Beams

Ladder Beam	*Restraints @ 1.2m Centres*	
Moment Capacity	12.5kN.m	
Shear Capacity	12.5kN	
Steel Unit Beam	*Restraints @ 1.2m Centres*	
Moment Capacity	27.7kN.m	
Shear Capacity	15.6kN	
Hakitec 750 Aluminium Beam	*Restraints @ 1.0m Centres*	
Moment Capacity	41.3kN.m	
Shear Capacity	30.6kN	
Selfweight	7.5Kg/m	
Dessa 780 Aluminium Beam	*Restraints @ 1.0m Centres*	
Moment Capacity	38.84kN.m	
Shear Capacity	23.71kN	
Selfweight	8.17Kg/m	
Dessa 790 Aluminium Beam	*Restraints @ 1.0m Centres*	
Moment Capacity	41.92kN.m	
Shear Capacity	23.71kN	
Selfweight	6.78kg/m	
Dessa 1300 Aluminium Beam	*Restraints @ 1.0m Centres*	
Moment Capacity	102.61kN.m	
Shear Capacity	42.1kN	
Selfweight	13.33Kg/m	
ASP/UBIX 780 Aluminium Beam	*Restraints @ 1.0m Centres*	
Moment Capacity	36.5kN.m	
Shear Capacity	30.7kN	
Selfweight	6.5Kg/m	
Apollo 750 X Beam Aluminium	*Restraints @ 1.0m Centres*	
Moment Capacity	37.0kN.m	Minimum values
Shear Capacity	35.0kN	Minimum values
Selfweight	6.7Kg/m	
Layher 750 Aluminium Beam	*Restraints @ 1.0m Centres*	
Moment Capacity	36.8kN.m	V' Arrangement
Shear Capacity	17.0kN	
Selfweight	6.5Kg/m	
Layher 450 Aluminium Beam	*Restraints @ 1.0m Centres*	
Moment Capacity	13.94kN.m	
Shear Capacity	12.32kN	
Selfweight	5.1Kg/m	

FOR ALL BEAM TYPES - REFER TO MANUFACTURERS INFORMATION FOR MORE DETAILS

Date:	11/08/2022	Calculation No.	10553-1
Client:	SC Property	Drawing No:	10553-1A
Title:	Access Scaffold	Prepared By:	D. Rogerson
Site:	59 Elm Avenue	Checked By:	C. Elliot

Prime Scaffold and Structural Designs Limited
Tel: 0207 403 2994
Web: www.psd.uk.com

DESIGN RISK ASSESSMENT

Hazard Ref	Hazard Source	Risk Category	*Preventive/Control Measures* *(See latest revisions/issue for all standards noted)*	Residual Risk
1	Working at Height	HIGH RISK	*Scaffolders must comply with procedures in NASC guidance SG4: as a minimum precaution. Approved method statement to outline a safe method of erection and dismantling of scaffold. Consider collective fall prevention measures ahead of personal fall arrest equipment. Scaffold Contractor to provide approved RAMS as outlined in NASC guidance SG7:*	LOW RISK
2	Competence	HIGH RISK	*Only competent ,trained persons should erect scaffold materials, this falls under the scaffold contractors area of responsibility .*	LOW RISK
3	Manual Handling	HIGH RISK	*The working area to be segregated and the manual handling regulations should be adhered to at all times by scaffolders, including correct lifting & lifting aid procedures in NASC guidance SG6:*	LOW RISK
4	Erection/Dismantling /Altering	HIGH RISK	*Only competent ,trained persons should Erect, Dismantle & Alter scaffold materials in accordance with NASC guidance SG4:, this falls under the scaffold contractors area of responsibility . Scaffold Contractor to consider protection to public and others during the scaffold works, see NASC guidance SG34: and TG20: Operational Guide.*	LOW RISK
5	Electricity[man made/natural]	HIGH RISK	*Only trained/competent persons are to install, use & maintain electrical equipment. The installation of earthing is also to be carried out by suitably qualified persons.*	LOW RISK
6	Environmental Conditions	HIGH RISK	*The scaffold contractor should make his own site specific risk assessment with the client as whether the scaffold can be used during periods of inclement weather, [wind, rain & snow].*	LOW RISK
7	Fire Exposure	HIGH RISK	*Ensure all personnel at site are aware of evacuation procedures/routes off the scaffold, clearly sign the fire escape route, consider erection of emergency stair tower exit.*	LOW RISK
8	General Use/Loading	HIGH RISK	*The design drawings will clearly indicate the loading limitations of the specific scaffold which should be adhered to at all times, any deviation must be at the consent of the scaffold contractor and/or Prime Scaffold and Structural Designs Ltd. An external assessment to be carried out to approve existing structure/foundation suitability.*	LOW RISK
9	Materials	HIGH RISK	*All materials must be checked prior to installation and should meet the requirements of TG20:*	LOW RISK
10	Obstructions	HIGH RISK	*A min. width of 600mm should be maintained on the working platform, free of obstacles & in accordance with BS EN 12811-1. Ensure clear and safe access is provided for scaffold erection and dismantling.*	LOW RISK
11	Stability Issues	HIGH RISK	*Attention must be given to anchor & kentledge details shown on the design drawings. Inspection of these two areas must be detailed ensuring correct installation & testing in accordance with NASC document TG4.*	LOW RISK
12	Public	HIGH RISK	*Sites are to be securely fenced off & appropriately protected to best prohibit access by the public to site. Scaffold Contractor to provide approved RAMS as outlined in NASC guidance SG7:*	LOW RISK

Date:	11/08/2022	Calculation No.	10553-1
Client:	SC Property	Drawing No:	10553-1A
Title:	Access Scaffold	Prepared By:	D. Rogerson
Site:	59 Elm Avenue	Checked By:	C. Elliot

Prime Scaffold and Structural Designs Limited
Tel: 0207 403 2994
Web: www.psd.uk.com

13	Welfare/First Aid	HIGH RISK	*All aspects of Health & Safety should be addressed by the main contractor in accordance with the Health & Safety Act. Site should always have first aiders & kit on site at all times.*	LOW RISK
14	LUL running Railway	HIGH RISK	*Scaffold is located within the boundary of the proposed new build scaffold. The end of the boundary adjoins to the LUL line between Eastcote and Ruislip manor. The scaffold is located circa 30m from the running line and therefore is not within the fall radius of the scaffold.*	LOW RISK

The Following symbol is used on Design Drawings to identify where residual risks remain in the scaffold design.

HIGH RISK	MEDIUM RISK	LOW RISK
ACTION TO BE TAKEN TO MITIGATE RISK	RISK TO BE NOTED WITHIN DESIGN	NO ACTION REQUIRED

1 General Information:

Tube and fitting scaffold is to be installed to the new proposed construction at Elm Avenue, Ruislip.
The scaffold is to be installed for access and construction of the property.
Scaffold is to be installed within the site boundary line at all times.
No netting or sheeting is required.
Beam work is to be installed forming access over the single story section of the new build.
Ladder access is to be installed between all boarded levels.

2 Loading Considerations:

Maximum 2no working levels at any one time on access scaffold.

1 No. working level @ 2.0kN/m²
1 No. working level @ 1.0kN/m²

Wind loads will be assessed on the scaffold in accordance with BSEN1991-1-4.

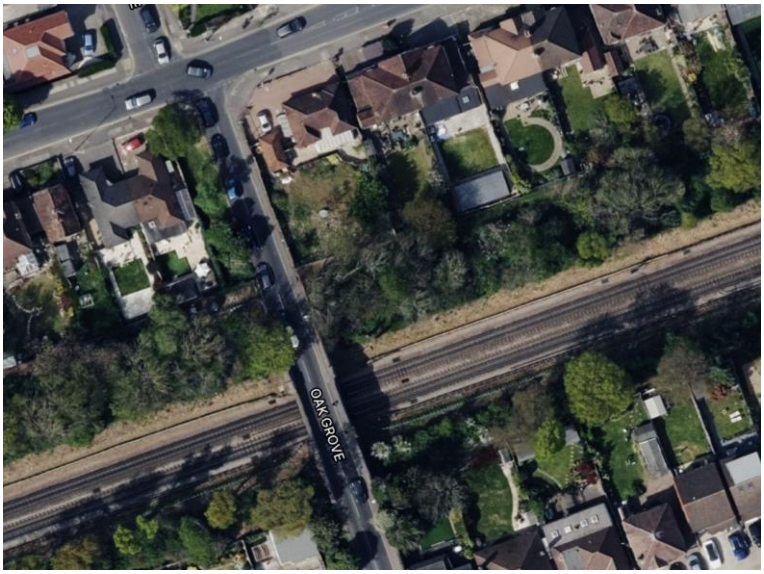
No snow loadings are to be allowed for or checked on the scaffold.

Live load to loading bay - 10.0kN/m2 to one No. platform

Combined selfweights and live loads will be checked in the supporting scaffold components.

3 Location:

Scaffold locations = Elm Avenue, Ruislip
Grid ref = TQ108875



4 Access Scaffold

4+2 scaffold with transoms provided at 1.2m centres.

Max imposed load	=	2.0kN/m²	[Load Class 3]
Max bay length provided	=	2.0m	
Scaffold designation	=	3_4_2	

From TG20:21,

Allowable bay length for 3-4-2	=	2.1m	

2.1m	≥	2.0m	OK

Therefor scaffold configuration is satisfied

5 Stability

Scaffold to be tied to the existing structure.

Dynamic pressure from wind	=	Metspec design suit used	*BSEN1991-1-4*
Location	=	59 Elm Avenue	
Grid reference	=	TQ108875	
Probability Factor	=	0.83	
Peak Velocity Pressure	=	0.272 kN/m²	*Appendix A*
Cpe (-Ve) parallel	=	1.2	
Cpe (+Ve) windward	=	0.8	
Cpe (-Ve) leeward	=	0.5	
CpNet	=	1.3	
Scaffold solidity	=	35% [Un lcadd]	
Design Wind Pressure	=	0.124 kN/m²	

Min pressure to be taken no to be less than 0.2kN/n2 as per TG20.

Tie Loads:
Scaffold Is to be tied to the new structure using Hook ties.

Max spacing of ties	=	3.6m x 4.0m	
	=	14.4 m2	

Max load per tie = 2.88 kN

Ties installed using class A couplers
SWL of couplers = 6.1 kN

6.10kN	>	2.88kN	OK

Pull testing of the anchors must be completed in accordance with NASC guidelines.

Min pull test to be achieved on site to be no less than
= 3.6 kN

6 Leg loads:

Scaffold Components

Tube(kg/m)=	4.37
Fittings(kg/fitt)=	1.50
Boards(kg/m^2)=	25.00

Scaffold Information per Lift

Main Boards (no)=	4.00
Inside Boards (no)=	2.00
Width of scaffold (m) =	1
Inside width (m) =	0.5
Bay Length (m)=	2.00
Lift Height (m)=	2.000
Effective Lift Height (m)=	2
Actual No of Lifts (no)=	4.00
Boarded Lifts (no)=	4.00
Working Lifts (no)=	2.00

	1st	2nd	3rd	4th	5th
Imposed Load on Main Run (kN/m^2)=	2.00	1			
Imposed Load on Inside Run (kN/m^2)=	0.75	0.75			

Inside Hand Rails (no)=	1.00
Inside Toe board(no)=	0.00
Outside Hand Rails (no)=	2.00
Section Bracing (no)=	1.00
Inner Sway Bracing (no)=	0.00
Outer Sway Bracing (no)=	1.00
Additional Inner Leg Load (kN)=	0.00
Additional Outer Leg Load (kN)=	0.00

	Main Frame				End Frame
	Tub.Fit.	Boards	Imposed	Total	Total
Total Inner Leg Load (kN)=	2.18	1.77	4.05	7.99	5.39
Total Outer Leg Load (kN)=	2.77	1.32	2.70	6.79	4.64

Allowable axial load in support = 29.1kN

29.1kN	>	7.99kN	OK

7 Beam work

450 alloy bridge beams are to be installed forming support over single story roof level.

Max axial load to beam work = 6.50kN

Beam Length 8.50 m
Moment of Inertia 4881.00 cm4
Elastic Modulus 70000 N/mm2

APPLIED LOADING

Point Loads

6.50 kN .... at 1.80 m
6.50 kN .... at 3.80 m
6.50 kN .... at 5.80 m
4.80 kN .... at 7.80 m

Distributed Loads

End1	End2		End1	End2
0.15	0.15 kN/m	.... at	0.000	8.500 m

REACTIONS (+ve Up) ... Non-Reversible !

11.68 kN .... at 0.50 m
13.89 kN .... at 8.00 m

MAXIMUM LOADS & DEFLECTIONS

Max. Reaction	13.89 kN	.... at	8.000 m
Max. Sag BM	24.48 kN.m	.... at	3.800 m
Max. Hog BM	0.02 kN.m	.... at	0.500 m
Max. Shear Force	13.82 kN	.... at	8.000 m
Max. Sag Deflection	40.51 mm	.... at	4.200 m
Max. Hog Deflection	8.70 mm	.... at	0.000 m

Layher 450 Aluminium Beam	*Restraints @ 1.0m Centres*	
Moment Capacity	13.94kN.m	OK
Shear Capacity	12.32kN	OK

Load transfer from beams into uprights = 13.89kN
Twin beams to be installed, load per beam = 6.95kN

2 No. couplers to be installed per beam = 12.2kN

12.2kN	>	6.95kN	OK

8 Structure Summary

Scaffold should be erected in accordance with TG20:21 and SG4:15.

Care must be taken to install correct number of uprights at indicated positions.

Care must be taken to install ties at indicated positions using load bearing couplers at all times.

Plan bracing to be installed to all beams as indicated on the drawing
All beams are installed with lacing tubes to top and bottom chords

Tie loads have been indicated on drawing / calcs. Main contractor to ensure structure is capable of withstanding loads imposed.

Leg loads have been indicated on drawing / calcs. Main contractor to ensure structure is capable of withstanding loads imposed.

Refer to design drawing 10553-1A for details.

END OF CALCULATIONS

Appendix A: Wind Data

/MetSPEC EURO/®
DESIGN SUITE

Metsec Plc
Purlin Division
Broadwell Road, Oldbury, West Midlands B69 4HF
Tel: 0121 601 6000 Fax: 0121 601 6111
Email: purlin@metsec.com
Website: http://www.metsec.com

Sheet No: of
Job No.:
Designer:
Date: 11/08/2022
Registered Details:-
PSD
Bromley Business Centre, 27 Hastings Road,
Bromley, BR2 8NA
Tel: 02084620014 Fax: 123456
Email: david.rogerson@psd.uk.com

Wind Assessment to BS EN 1991-1- 4

Data Entry:-

Site Altitude	55.000 m	Reference Height (Z)			Size Effect Dimension (b+h)		
$V_{b,map}$	21.500 m/s	Roof	7.200	m	Roof	0.000	m
Seasonal Factor (C,season)	1.000	Side Walls	7.200	m	Side Walls	0.000	m
Probability Factor (C,prob)	0.830	Gables	7.200	m	Gables	0.000	m
Site ID	*TQ108875*						

Dynamic Pressure Results

Wind Direction (deg)		0	30	60	90	120	150	180	210	240	270	300	330
Direction Factor 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
Orography Factor Co		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Effective Height (h-hdis) m	Roof	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
	Sides	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
	Gable	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
Altitude Factor C,alt	Roof	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055
	Sides	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055
	Gable	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055	1.055
Roughness Factor Cr	Roof	0.533	0.544	0.537	0.533	0.531	0.532	0.542	0.569	0.546	0.556	0.556	0.543
	Sides	0.533	0.544	0.537	0.533	0.531	0.532	0.542	0.569	0.546	0.556	0.556	0.543
	Gable	0.533	0.544	0.537	0.533	0.531	0.532	0.542	0.569	0.546	0.556	0.556	0.543
Exposure Factor Ce	Roof	1.188	1.243	1.208	1.184	1.169	1.181	1.237	1.369	1.254	1.304	1.304	1.238
	Sides	1.188	1.243	1.208	1.184	1.169	1.181	1.237	1.369	1.254	1.304	1.304	1.238
	Gable	1.188	1.243	1.208	1.184	1.169	1.181	1.237	1.369	1.254	1.304	1.304	1.238
Vb,0 (m/s)	Roof	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682
	Sides	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682
	Gable	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682	22.682
Vb (m/s)	Roof	14.685	13.743	13.743	13.932	13.743	15.061	16.003	17.509	18.826	18.638	17.132	15.438
	Sides	14.685	13.743	13.743	13.932	13.743	15.061	16.003	17.509	18.826	18.638	17.132	15.438
	Gable	14.685	13.743	13.743	13.932	13.743	15.061	16.003	17.509	18.826	18.638	17.132	15.438
Vm (m/s)	Roof	7.830	7.471	7.379	7.427	7.291	8.018	8.677	9.962	10.279	10.364	9.526	8.380
	Sides	7.830	7.471	7.379	7.427	7.291	8.018	8.677	9.962	10.279	10.364	9.526	8.380
	Gable	7.830	7.471	7.379	7.427	7.291	8.018	8.677	9.962	10.279	10.364	9.526	8.380
Turbulence Intensity Iv	Roof	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345
	Sides	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345
	Gable	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345
Peak Velocity Pressure qp (kN/m²)	Roof	0.156	0.142	0.138	0.140	0.135	0.163	0.191	0.252	0.268	0.272	0.230	0.178
	Sides	0.156	0.142	0.138	0.140	0.135	0.163	0.191	0.252	0.268	0.272	0.230	0.178
	Gable	0.156	0.142	0.138	0.140	0.135	0.163	0.191	0.252	0.268	0.272	0.230	0.178
Size Effect Factor Cs	Roof	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Sides	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Gable	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000