Structural Steelwork (Cauntons)

Contents

Caunton Engineering
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Contents

Scope of Works

Certificates/Warranties/Guarantees

Cleaning and Maintenance Regimes

Data Sheets

Scope of Works

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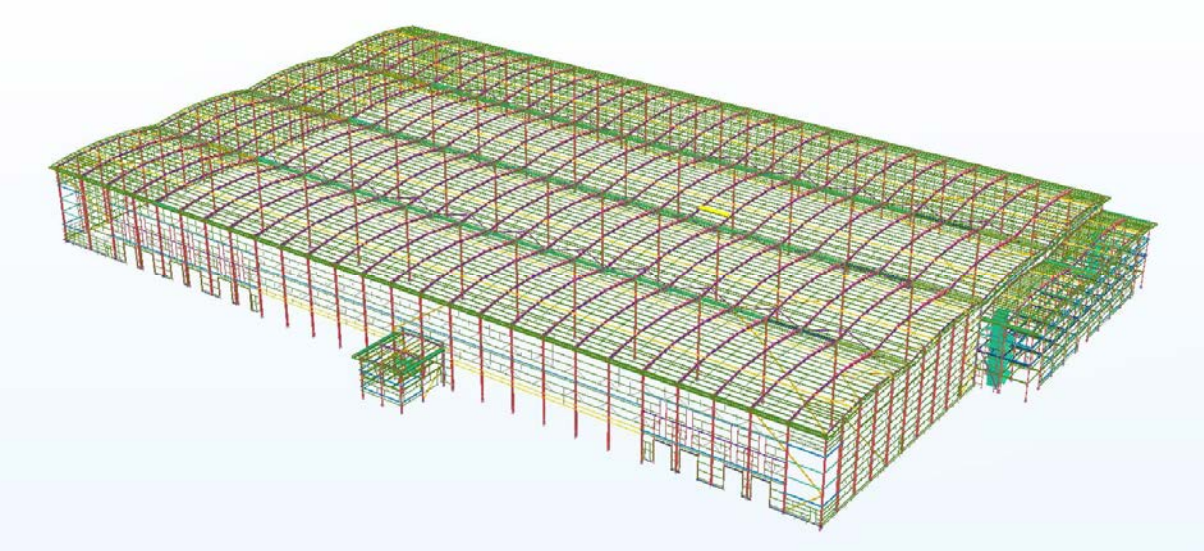
Scope of Works

Job Number/Title: 21009 – Calder Park, Wakefield

Description:
The structure consists of a warehouse with 1 hub offices to the south-east elevation and an external main office to the north-east gable.

The warehouse is a 4 span portal frame with a clear height of 18m to the underside of haunch and a curved roof with a 90m radius. The gables consist of light steel frames. The office floors consist of in-situ metal decking.



Caunton Engineering Address:

- Caunton House 2
  Coombe Road
  Moorgreen Industrial Park
  Nottingham
  NG16 3SU

Caunton Contact Details:

- Telephone: 01773 531111
  Facsimile: 01773 532020
  Email: sales@caunton.co.uk
  Web site:www.caunton.co.uk

Site Address:

- Calder Park
  Peel Avenue
  Durkar
  Wakefield
  West Yorkshire
  WF2 7UA

Certificates/Warranties/Guarantees

N/A

Cleaning and Maintenance Regimes

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Cleaning and Maintenance Regimes

This Maintenance and Cleaning Maintenance is to be followed for maintenance schedule for P21-024 Calder Park, Wakefield is to be followed from the PC date 30/08/2022 year on year to ensure all plant and equipment is kept within warranty.

Please keep a log of these inspections so that records can be checked should an issue arise.

Code; ✓ Blue – Recommended ✓ Red – To Maintain Warranty

Item	Daily	Weekly	Monthly	3 Months	6 Months	9 Months	Annually	5 Yearly	Certificates	Regime
All Steel							✓			No specific maintenance requirements other than an annual inspection of the applied surface treatment. A visual inspection of the painted components should be carried out every 12 months. If there are any signs of deterioration, the affected area should be rubbed down to bare metal and the edges “feathered”. Apply the below primer over the area to the same DFT specification. Hempadur Speed Dry ZP600 (two component epoxy) (colour GREY), to a nominal DFT of 75 microns. Primer manufactured by Hempadur UK Ltd If the primer has been over-coated after installation, apply further coats to the primer to match the original specification.
External Steel (Galvanized : DFT 85)							✓			A visual inspection of the components should be carried out every 12 months. The galvanized cold rolled items will lose their original shiny appearance and become dark grey with a matt finish over a period of time. This is quite normal and has no adverse effect on the performance of the protection system.

Compliance with this document does not ensure or imply compliance with current health and safety legislation. It is the responsibility of the premises controller at all times to ensure compliance with latest health and safety legislation.

Data Sheets

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21009 Calder Park, Wakefield: Data Sheets

Contents:

- CEL Modification & Dismantling Statement **Pages: 2**

❖ **CEL Design Calculations**

- S1: Introduction and QA **Pages: 3 to 15**
- S2: Loading Assessment **Pages: 16 to 35**
- S3.1: Cold Rolled – Purlins to Roof **Pages: 36 to 56**
- S3.2: Cold Rolled – Side Rails **Pages: 57 to 66**
- S4: Portal Frames **Pages: 67 to 184**
- S5: Valley Beams & Sway Bracing Steelwork **Pages: 185 to 198**
- S6: Main 3D Model **Pages: 199 to 231**
- S7.1: Foundation Loads **Pages: 232 to 242**
- S7.2: Foundation Loads – Temp Condition **Pages: 243 to 248**
- S8: Gable Posts **Pages: 249 to 263**

Modification & Dismantling Statement

Caunton Job No **21009**

Project **Calder Park, Wakefield**

Principal Contractor **Winvic Construction Limited**

This is an important document produced to meet the duty placed on Caunton Engineering by the Construction (Design and Management) Regulations 2015.

This information must be included in the Project H&S File by the CDM Coordinator and passed to the owner of the building on completion of the project. It is recommended the building owner ensures a copy is also issued to any tenant or occupier of the building for their information and safety.

The structural steel frame of this building was originally designed, manufactured and erected in 2022 by Caunton Engineering Limited, whose address is:

Moorgreen Industrial Park
Moorgreen
Nottingham
NG16 3QU

Telephone: 01773 531111
Facsimile: 01773 532020
Email: sales@caunton.co.uk
Web site: www.caunton.co.uk

If the owner or user of the building wishes to modify or demolish the structural steel frame in the future, details of the proposed modifications or dismantling works **must** be issued to either Caunton Engineering or a suitably qualified Chartered Structural Engineer for approval.

Under no circumstances should any structural steel frame components be modified, adapted or removed without prior written approval.

NOTE! - If the steel frame is altered without following the above procedure there could be very serious implications, including the risk of structural collapse, resulting in serious injury or death.

Structural Steelwork Calculations

Calder Park

Peel Avenue

Wakefield

WK4 3FL

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Caunton House, 2 Coombe Road
Moorgreen Industrial Park
Nottinghamshire, NG16 3SU
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Structural Steelwork Calculations

Calder Park
Peel Avenue
Wakefield
WK4 3FL

Main Contractor:	Winvic Construction Ltd Brampton House 19 Tenter Road Moulton Park Northampton NN3 6PZ
Consulting Engineer:	PRP Consulting Catherine House Harborough Road Brixworth Northampton NN6 9BX
Architect:	HTC Architects York Place Studio 8 Britannia Street Leeds LS1 2DZ
Principal Designer:	HTC Architects York Place Studio 8 Britannia Street Leeds LS1 2DZ

Caunton Engineering Ltd
Moorgreen Industrial Park
Nottingham
NG16 3QU

Project	Job Ref.
Calder Park, Wakefield	21009-CEL-XX-XX-CA-X-
Section	**Sheet no.**
Section 01 – Introduction & Index	0101. 1
Calc. by / **Date**	**Date.**
J Hutton / June 2021	C01

Calculation Index

Calc Sheet No's	Contents
0100.2	Design Statement
0100.4	Modification / Dismantling Statement
0100.5	Steelwork Designer Risk Assesment
0100.6	Building Regulations Part A3 Consequence Class
0100.7	Building Execution Class
0100.8	Environmental Category and Protection System
0100.9	Serviceability Limits
0100.10	Suspension of Services from Purlins
0100.11	Fire Strategy
Section 02	Loading Assessment
Section 03	Cold Rolled
Section 04	Portal Frames
Section 05	Valley Beams
Section 06	Main 3D Model
Section 07	Foundation Loads
Section 08	Gable Posts
Section 09	Not Used
Section 10	Connections
Verification:	By: CAMW Date:11-8-21

Design Statement

Brief Description of Structure:	The structure consists of a warehouse with 1 hub offices to the south-east elevation and an external main office to the north-east gable. The warehouse is a 4 span portal frame with a clear hight of 18m to the underside of haunch and a curved roof with a 90m radius. The gables consist of light steel frames. The office floors consist of in-situ metal decking.	
Reference Documents:	Specification: 2025C – Revision A Drawings: As listed in CEL quotation Caunton Quotation Ref: LF/SALES/E210060	
Caunton Design Responsibility:	Main Frame, Secondary Steel and Connection Design. Caunton Engineering are responsible for the design of the metal decking in the temporary and permanent conditions. We will also advise the minimum concrete strength, depth and reinforcement required for our composite beam design and to achieve the minimum fire resistance period. (These calculations are based on 60 minutes). The responsibility of the design of the slab including reinforcement requirements under concentrated loads, at openings or edges, and for anti-crack requirements is to be with others. All slab and reinforcement drawings and schedules, including sitework and day joints, are to be by others. All plant items are to be mounted on anti-vibration mounts where required. The supporting structure does not take into account any vibration induced loads. The corrosion and fire protection system is to the specification of the Structural Engineer.	
Designer who is Responsible for Overall Stability of the Structure:	Caunton Engineering are responsible for the stability of the steel frame only. Other specialist designers are responsible for stability of foundations, masonry, precast cores etc.	
Design Methods and Software Used:	The following programs have been used in the analysis and design of the proposed structure: Tekla Structural Designer Tekla TEDDS - Documents and General Design Tekla Portal Frame (Elastic-plastic portal frame analysis and design) Tekla / Master Series / IDEA-RS - Connection Design	
Permanent Stability:	Stability in the direction of the frames is provided by the portal action of the frames. Stability out of plane of the frames is provided via roof bracing transferring load to the vertical bracing in the elevations. Office floors act as diaphragms to transfer load to vertical bracing.	
Temporary Stability:	All columns are designed to freestand during erection, and bases must be designed to take account of the temporary moments resulting from this (forces supplied by Caunton).	
Design Codes (BS):	Steel Design: Composite Beams:	BS5950: Part 1: 2000 BS5950: Part 3: Section 3.1+A1:2010

	Imposed Loading: Wind Loading: Imposed Roof Loading: Materials:	BS6399: Part 1: 1996 BS6399: Part 2: 1997 BS6399: Part 3: 1988 BS EN 10025-1: 2004, BS EN 10025-2: 2019
Verification:	By: CAMW	Date: 11-8-21

Modification & Dismantling Statement

This is an important document produced to meet the duty placed on Caunton Engineering by the Construction (Design and Management) Regulations 2015.

This information must be included in the Project H&S File by the Principal Designer and passed to the owner of the building on completion of the project. It is recommended the building owner ensures a copy is also issued to any tenant or occupier of the building for their information and safety.

The structural steel frame for the above building was designed, manufactured and erected in 2021/2022 by:-

Caunton Engineering Ltd
Moorgreen Industrial Park
Nottingham
NG16 3QU

Tel: 01773 531111
Fax: 01773 532020
www.caunton.co.uk

In the event of the owner or user of the building wishing to either modify or demolish the structural steel frame, written proposals for the modifications / dismantling works must be issued to either Caunton Engineering or a qualified Structural Engineer for approval.

The point at which change requests need to be highlighted via written proposals is considered to be at the handover of the steel frame from Caunton Engineering to the Main Contractor. Issuing of drawings containing changes will not be considered after hand over.

Under no circumstances are any of the structural steelwork components to be adapted or removed without the written approval of either Caunton Engineering or a qualified Structural Engineer.

Un-authorised alteration of the frame could have very serious implications, including the risk of structural collapse, resulting in serious injury or death.

Steelwork Designer Risk Assessment

The design has been carried out in accordance with the requirements of CDM Regulations 2015, and foreseeable hazards have been eliminated or reduced where practicable.

Any risks noted below are those which the steelwork designer has identified as being residual risks associated with the construction, use, maintenance or demolition of the structural steel frame. This is not an exhaustive list of risks on this project and must be read in conjunction with all other risk assessments, drawings and method statements.

Residual Risk	Additional Information
⚠ Overloading of metal decking and floor beams during concrete pour.	Laser levelling and mass flood techniques are not to be used without the approval of Caunton Engineering Ltd. Our design assumes floors will be levelled using a constant depth method. Concrete must be poured evenly and heaping must be avoided, as this may overload and damage the decking.
⚠ Design of foundations to incorrect safety factors.	The loading on the structure has been assessed to British Standards, and the design of foundations should therefore use appropriate BS factors of safety. Use of Eurocodes for foundation design based on BS loadings may not be appropriate.
⚠ Distortion of cold rolled purlins due to incorrect fixing of services.	Clip fixings to the purlin flange should only be used for light loads. Please refer to details provided later in these calculations.
⚠ Overloading of cold rolled purlins with multiple services.	The purlins and roof structure are designed for a blanket uniform load plus any specific loads as defined in our loading document. It is the responsibility of the Main Contractor / Client and the various M&E / Services suppliers to ensure their installations are co-ordinated and the maximum specified service load is not exceeded.
⚠ Fixing of temporary roof edge protection to cold rolled eaves members.	Cold rolled eaves members must not be used to support temporary roof edge protection. The principal contractor and their roofing contractor are responsible for ensuring their temporary edge protection system is correctly designed and installed.
⚠ Erection of spliced members / assemblies	Where two or more members are intended to be bolted together before erection, bolted splices are designed to resist the forces arising during lifting and the Erection Method Statement must indicate the correct lifting and erection procedure.
⚠ Use of construction plant on suspended slabs	The slab may not be suitable for supporting loads from construction plant, and the Engineer responsible for the slab design should be consulted before allowing any plant on to suspended slabs.
⚠ Cutting service holes through suspended slabs	Holes larger than 300mm square in composite metal deck concrete slabs are not permitted unless authorised by a Structural Engineer, as this may compromise the structural performance of composite beams.
⚠ Cutting service holes through beams	Additional service holes larger than 80mm diameter should not be cut through beams without being checked by the Structural Engineer. Holes in beams will have a significant effect on both the beam strength and the required thickness of intumescent paint.

Design for Disproportionate Collapse to Part A3 of the Building Regulations 2010

Building Consequence Classes

Consequence Classes	Building Type and Occupancy
1	Houses not exceeding 4 storeys Agricultural buildings Buildings into which people rarely go, providing no part of the building is closer to another building, or area where people do go, than a distance of 1.5 time the building height.
2a Lower Risk Group	5 storey single occupancy houses Hotels not exceeding 4 storeys Flats, apartments and other residential buildings not exceeding 4 storeys **Offices not exceeding 4 storeys** **Industrial buildings not exceeding 3 storeys** Retailing premises not exceeding 3 storeys of less than 2000m^2 in each storey Single storey educational buildings All buildings not exceeding 2 storeys to which members of the public are admitted and which contain floor areas not exceeding 2000m^2 at each storey
2b Upper Risk Group	Hotels, flats, apartments and other residential buildings greater than 4 storeys but not exceeding 15 storeys Educational buildings greater than 1 storey but not exceeding 15 storeys Retailing premises greater than 3 storeys but not exceeding 15 storeys Hospitals not exceeding 3 storeys Offices greater than 4 storeys but not exceeding 15 storeys All buildings to which members of the public are admitted which contain floor areas exceeding 2000m2 but less than 5000m^2 at each storey Car parking not exceeding 6 storeys
3	All buildings defined above as Consequence Class 2a or 2b that exceed the limits on area and/or number of storeys Grandstands accommodating more than 5000 spectators Buildings containing hazardous substances and/or processes

Note 1: For buildings intended for more than one type of use the Consequence Class should be that pertaining to the most onerous type.

Note 2: In determining the number of storeys in a building, basement storeys may be excluded provided such basement storeys fulfil the robustness of Consequence Class 2b buildings.

Definition of Execution Class to BS EN 1090-2 / NA to EN1993-1-1:2005 + A1:2014

Consequence Class from page A5.

Service Category

Categories	Criteria
SC1	• Buildings and components designed for quasi static actions only (Example: Buildings) • Structures and components with their connections designed for seismic actions in regions with low seismic activity and in DCL[1] • Structures and components designed for fatigue actions from cranes (class S_0)[2].
SC2	• Structures and components designed for fatigue actions according to BS EN 1993. (Examples: Road and railway bridges, cranes (class S_1 to S_9)[2], structures susceptible to vibrations caused by wind, crowd or rotating machinery.) • Structures and components with their connections designed for seismic actions in regions with medium or high seismic activity and in DCM[1] and DCH[1].

Notes:

1.DCL, DCM, DCH: ductility classes according to BS EN 1998-1

2.For classification of fatigue actions from cranes, see BS EN 1991-3 and BS EN 13001-1

Production Category

Categories	Criteria
PC1	• Non welded components manufactured from any steel grade products • Welded components manufactured from steel grade products below S355
PC2	• Welded components manufactured from steel grade products from S355 and above • Components essential for structural integrity that are assembled by welding on construction site • Components with hot forming manufacturing or receiving thermic treatment during manufacturing • Components of CHS lattice girders requiring end profile cuts

Execution Class

Consequence classes		CC1		CC2		CC3	
Service categories		SC1	SC2	SC1	SC2	SC1	SC2
Production categories	PC1	EXC1	EXC2	EXC2	EXC3	EXC3[a]	EXC3[a]
	PC2	EXC2	EXC2	**EXC2**	EXC3	EXC3[a]	EXC4

[a] EXC4 should be applied to special structures or structures with extreme consequences of a structural failure as required by national provisions

The NSSS for Building Construction 5th Edition CE Marking Version has been written for the steelwork contractor to deliver the requirements of EXC2.

Environmental Category and Surface Protection

Internal Steelwork:

As defined in "Subcontract Preambles / Checklist" issued by Winvic the internal environment has been assessed as Atmospheric Corrosivity Category C1 – Very Low in accordance with BS EN ISO 12944-2:2017.

Internal structural steelwork to be shot-blasted to SA 2½ to BS EN ISO 8501-1:2007 (using carbon steel shot type F24) prior to fabrication. After fabrication (surface preparation BS EN ISO 8501-3:2007 grade P1) painted with one coat of high build two pack epoxy zinc phosphate primer (Hempadur Speed Dry ZP600) to 75 microns nominal D.F.T.

Columns below F.F.L. will be painted with one coat of high build two pack epoxy glass flake primer (Hempadur GF35870) to 250 microns nominal D.F.T.

Please note that BS EN ISO 12944 states thickness of applied paints can range from 80% to 300% of the nominal. In some circumstances localised high spots in excess of 300% will occur.

Durability (life to first major maintenance) up to 10 years (as defined in "Subcontract Preambles / Checklist" issued by Winvic), in an interior C1 environment may be achieved using the above surface treatment, but only when subject to regular inspection & minor maintenance being carried out by others as recommended by the paint manufacturer.

Cold rolled section will be in accordance with BS EN 10326:2004; S450 grade with standard pre-galvanised Z275 coating. No further surface protection will be provided to the cold rolled sections.

External Steelwork:

There is no external steelwork.

Serviceability Limits

Item	Relative to	Limit	Loads
Main Structure	Ground level	Height/150	Imposed Loads
Main Structure	Ground level	Height/150	Wind Loads
Main Structure	Ground level	Height/150	80% Imposed + Wind Loads
Main Structure	Ground level	Span/200	Imposed Loads
Main Structure	Ground level	Span/150	Total Loads
Roof beams / simple rafters	Member ends	Span/200	Imposed Loads
Roof beams / simple rafters	Member ends	Span/150	Total load
Floor beams	Member ends	Span/360	Imposed loads
Floor beams	Member ends	Span/150	Total Load
Floor beams	Member ends	4Hz	Dead+10% imposed
Metal Decking	Member ends	Min Span/180 or 20mm	Wet concrete
Metal Decking	Member ends	Min Span/350 or 20mm	Imposed Load
Metal Decking	Member ends	Span/250	Total Load
Intermediate cladding posts	Member ends	Height/250	Wind loads
Purlins	Member ends	Span/180	Total Load
Side rails	Member ends	Span/180	Wind loads
Door posts	Member ends	Height/250	Wind loads
Glazing restraint members for lateral loads	Member ends	Span/360	Wind Loads
Glazing restraint members for vertical loads	Member ends	Span/500	Glazing Loads

Suspension of services from HADLEY UltraZED™2 purlins

Building services may be suspended from **HADLEY** UltraZED™2 purlins providing certain design considerations are fulfilled. Many different types of service support clips and attachment methods are available and it is up to the designer and installer to ensure that the chosen method is fit for purpose. We also recommend seeking advice from our technical department and the clip manufacturer prior to installation.

Lightweight service loads

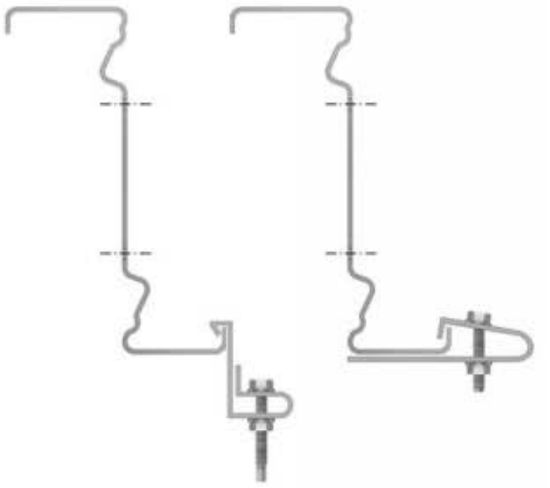
The recommendations shown apply to clips that attach to the lower purlin flange or lip and are for a roof pitch of 12° or less. They are limited by acceptable movement of the purlin flange and **in most instances will be considerably less than the maximum design load of the clip** - the guidelines shown below should **not** be exceeded.

Suspension of lightweight services from UltraZED™2 purlins Maximum applied loads to purlin lips/flange Maximum roof slope 12°

Purlin gauge mm	Maximum load per clip kg	Maximum load per/m run of purlin	Maximum load per purlin kg
1.2-1.5	10	15	25
1.6-1.8	15	25	35
2.0-2.3	25	35	45
2.5-3.0	30	40	50

Very light duty (e.g. strip light fittings)

Light duty (e.g. lightweight tiled ceilings)



WHENEVER POSSIBLE, SERVICE LOADS SHOULD BE APPLIED VIA THE SECTION WEB.

HADLEY Design Suite PRO Design Software may be used to design **HADLEY** UltraZED™2 purlins to carry service loads. To accurately determine purlin deflection **HADLEY Design Suite PRO** software has a facility to calculate point loads at any point along the purlin span.

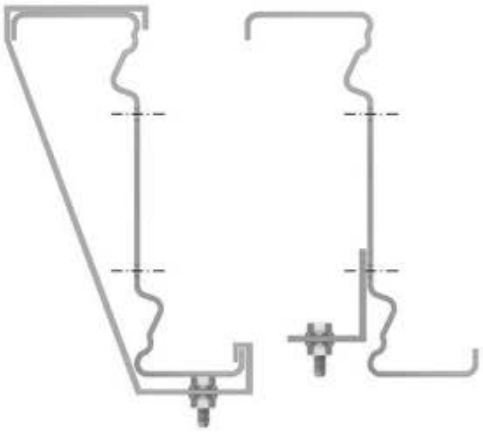
Detail for heavier service loads

When it is necessary to suspend heavier services or equipment from purlins; cleats bolted through standard gauge holes in the section web should be considered. Cleats fitted in this manner may also be used to attach channel support strut between purlins.

Where significant loads are suspended from purlins we recommend contacting our technical department.

Light/medium duty

Heavy duty (web fix)



CAUTION: In all circumstances, purlins should first be capable of supporting the service loading either with due design load allowance made by the design engineer or have proven sufficient surplus capacity.

Fire Strategy

No significant entries

Section 02

Loading Assessment

Rev	Date	Description
C01		Initial Issue

Contents

Contents 1
Site Location 3
Building Orientation 5
Dynamic Pressure by direction 6
External Pressure Coefficients 9
Warehouse Roof 9
Warehouse Sides 10
Hub Office Roof ..... **Error! Bookmark not defined.**
Hub Office Sides ..... **Error! Bookmark not defined.**
Overall wind load to the hub office for wind 0 and 180 (onto warehouse gable) 11
Internal Pressure Coefficients and size effect factor 13
Warehouse 13
Hub Offices 13
Gravity Loads 14
Main warehouse roof 14
Hub Office roof 14
Wall cladding 14
Main Office Floor loads 14

Core areas to the main office ..... **Error! Bookmark not defined.**

Hub Office Floor loads ..... **Error! Bookmark not defined.**

Core areas to the hub office. ..... **Error! Bookmark not defined.**

Impact loads 15

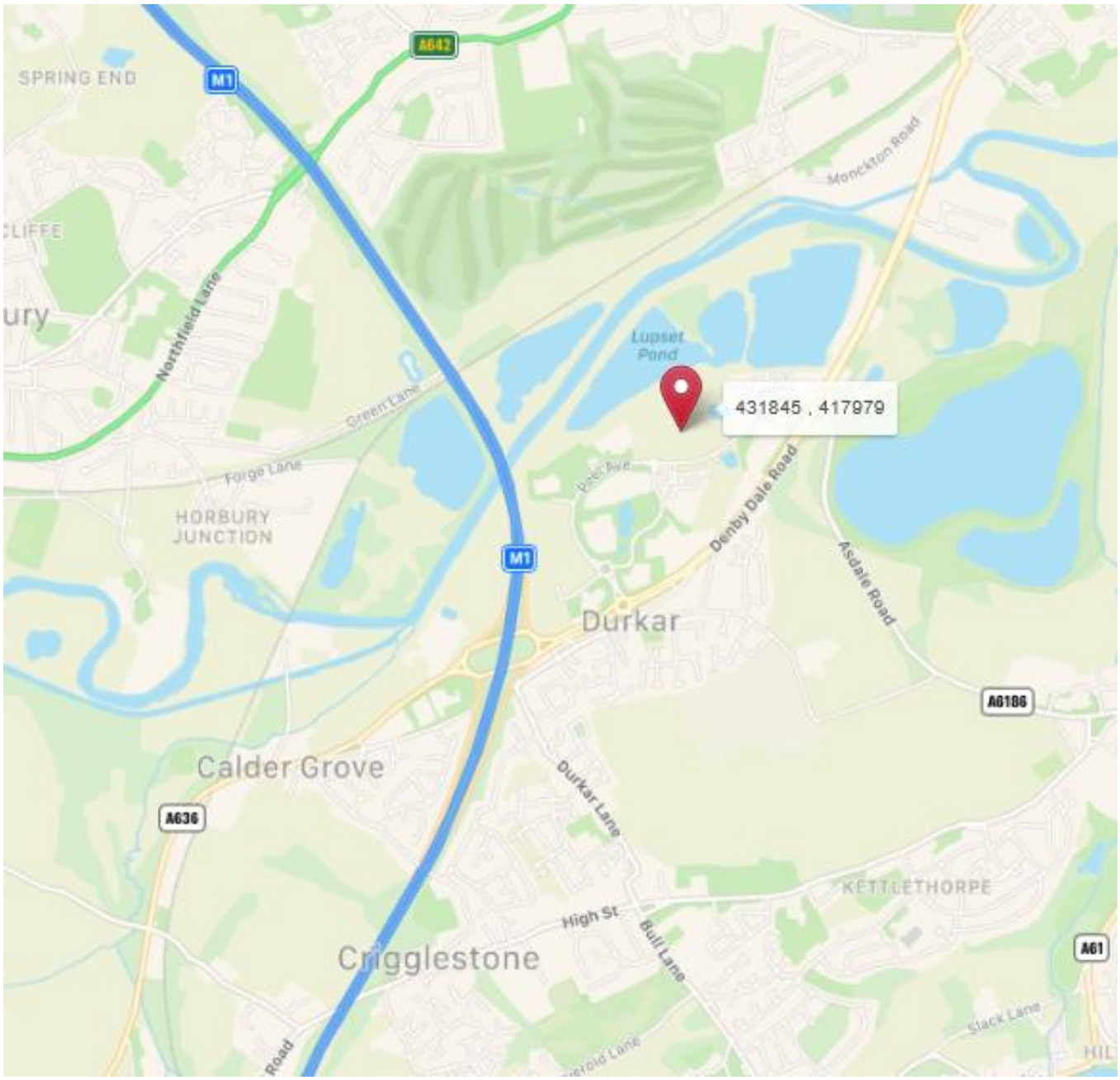
Snow Loads 16

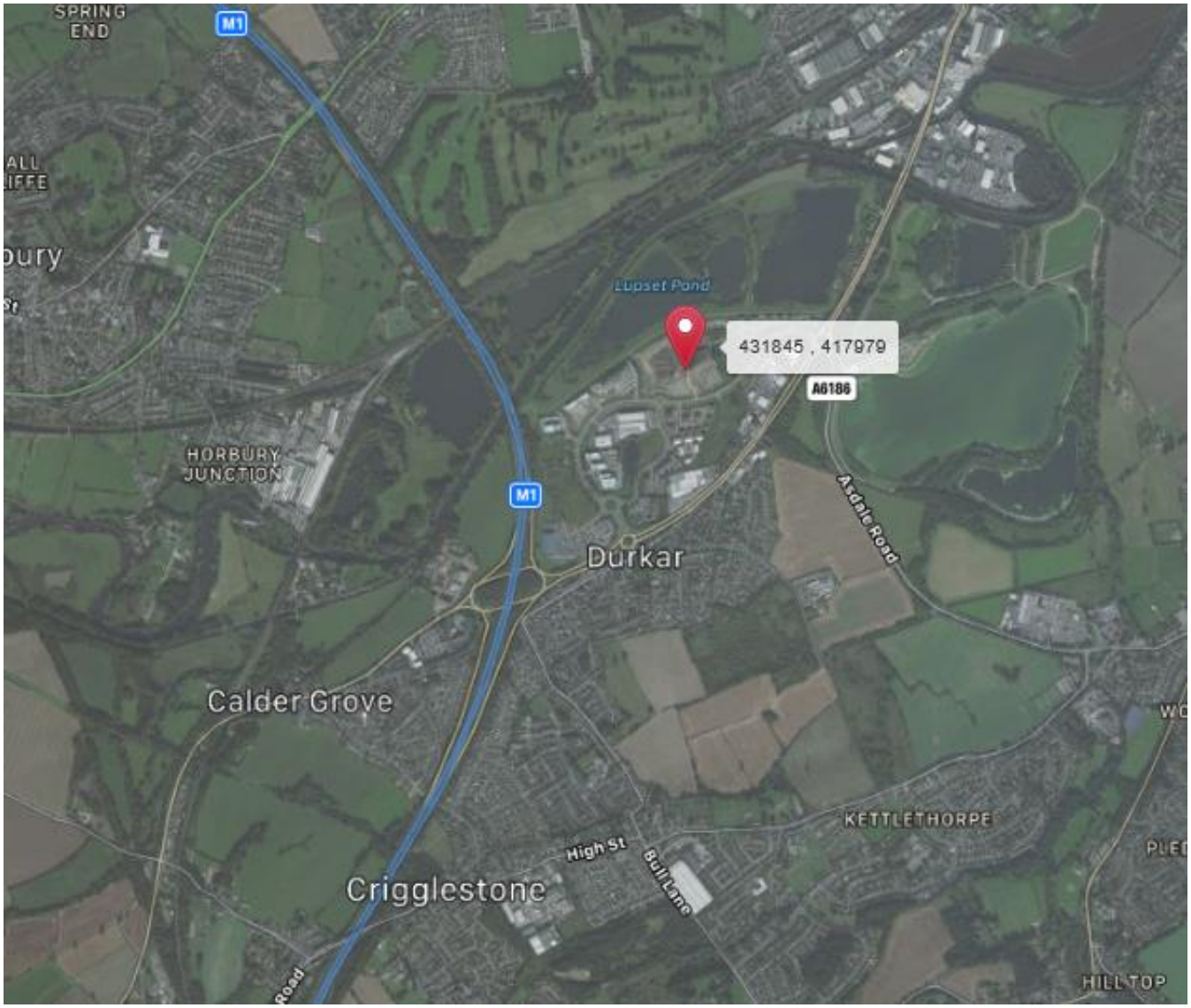
Drifted Snow 17

Main Warehouse Valleys 17

Hub Offices drift to main warehouse. 18

Site Location

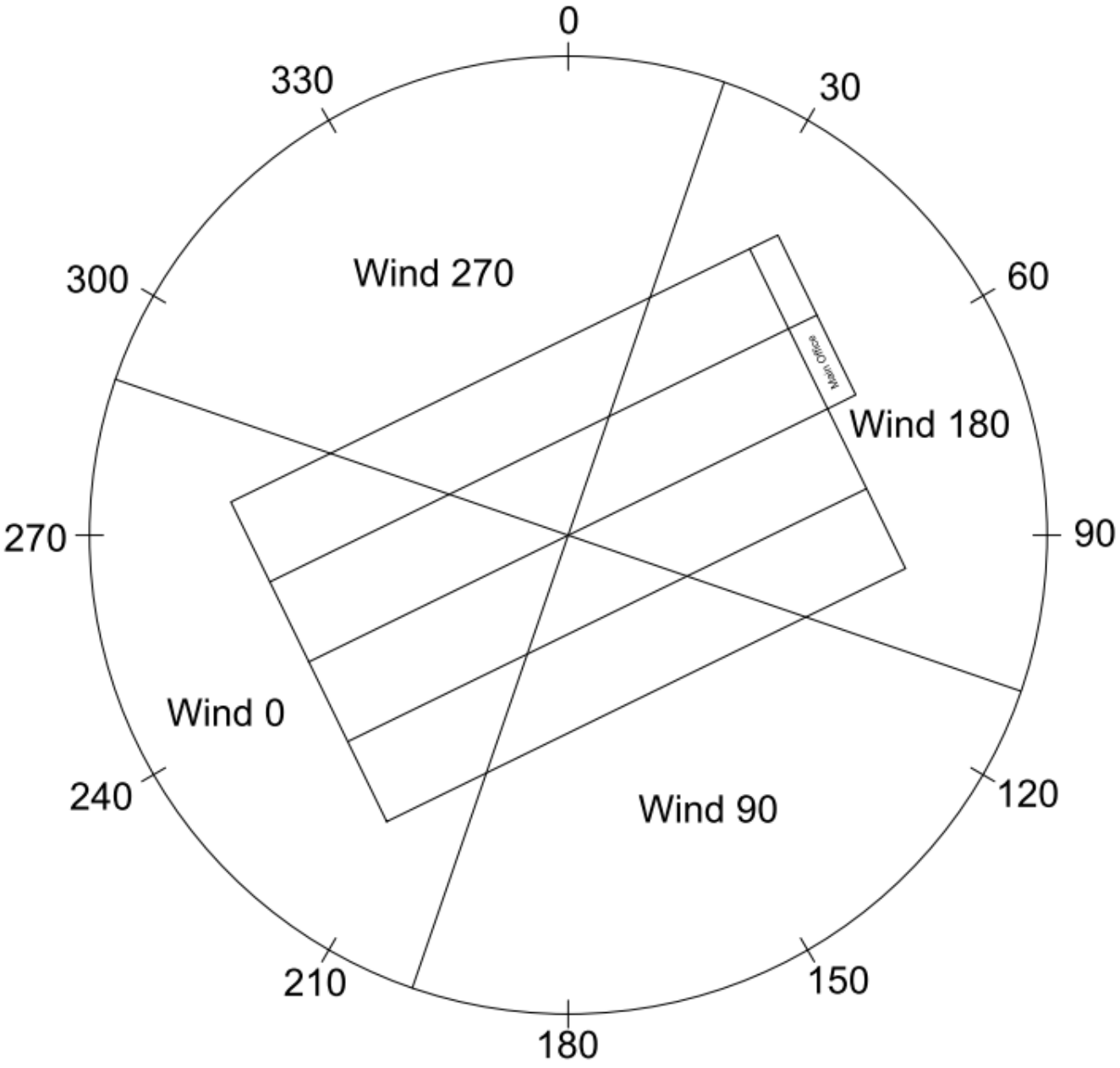




Nat Grid SE318179

Altitude 29m

Building Orientation



The building eaves is orientated at 244 degrees to North

Dynamic Pressure by direction

Wind Assessment Report

Design Standard - BS6399-2

Building Details 0

Roof Type : Flat with Sharp Eaves

Type: Enclosed Building

Roof Breadth:	130.00m			Int. Volume:	554595m³
Roof Length:	211.10m	Side Length:	211.10m	No. Bays:	One Bay
Roof Height:	20.95m	Side Height:	19.70m	Gable Faces:	Faces 2/4
Roof Diagonal:	5.00m	Side Diagonal:	5.00m	Gable Length:	130.00m
				Gable Height:	20.95m
				Gable Diagonal:	5.00m

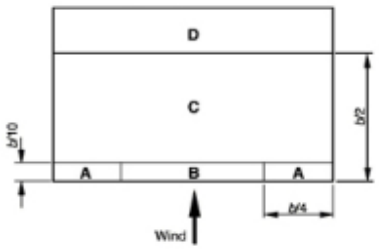
Frame One

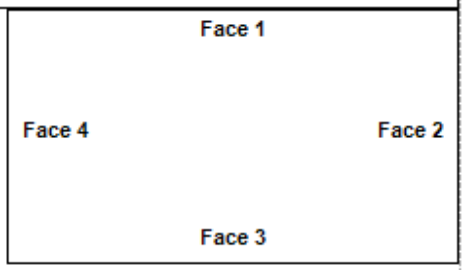
Funnel Effect:

Face 1:	0.00m
Face 2:	0.00m
Face 3:	0.00m
Face 4:	0.00m

Location Details

OS Grid Ref: SE318179 **Site Altitude:** 29m / Altitude **Orientation:** 244° **Wind Speed:** 23.00 m/s





Dynamic Pressure

Wind Direction	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Roof												
Effective Wind Speed (m/s)	32.410	30.333	30.469	30.748	30.333	33.241	33.668	38.643	41.551	41.137	37.812	34.072
Directional Factor	0.780	0.730	0.730	0.740	0.730	0.800	0.850	0.930	1.000	0.990	0.910	0.820
Site Wind Speed (m/s)	18.460	17.277	17.277	17.514	17.277	18.934	20.117	22.010	23.667	23.430	21.537	19.407
Dynamic Pressure (kN/m²)	0.644	0.564	0.569	0.580	0.564	0.677	0.695	0.915	1.058	1.037	0.876	0.712
Size Effect Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Altitude Factor	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029
Terr. Build. Factor	1.756	1.756	1.764	1.756	1.756	1.756	1.674	1.756	1.756	1.756	1.756	1.756
Side												
Effective Wind Speed (m/s)	32.141	30.081	30.216	30.493	30.081	32.966	33.179	38.323	41.207	40.796	37.498	33.790
Directional Factor	0.780	0.730	0.730	0.740	0.730	0.800	0.850	0.930	1.000	0.990	0.910	0.820
Site Wind Speed (m/s)	18.460	17.277	17.277	17.514	17.277	18.934	20.117	22.010	23.667	23.430	21.537	19.407
Dynamic Pressure (kN/m²)	0.633	0.555	0.560	0.570	0.555	0.666	0.675	0.900	1.041	1.020	0.862	0.700
Size Effect Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Altitude Factor	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029
Terr. Build. Factor	1.741	1.741	1.749	1.741	1.741	1.741	1.649	1.741	1.741	1.741	1.741	1.741
Gable												
Effective Wind Speed (m/s)	32.410	30.333	30.469	30.748	30.333	33.241	33.668	38.643	41.551	41.137	37.812	34.072
Directional Factor	0.780	0.730	0.730	0.740	0.730	0.800	0.850	0.930	1.000	0.990	0.910	0.820
Site Wind Speed (m/s)	18.460	17.277	17.277	17.514	17.277	18.934	20.117	22.010	23.667	23.430	21.537	19.407
Dynamic Pressure (kN/m²)	0.644	0.564	0.569	0.580	0.564	0.677	0.695	0.915	1.058	1.037	0.876	0.712
Size Effect Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Altitude Factor	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029	1.029
Terr. Build. Factor	1.756	1.756	1.764	1.756	1.756	1.756	1.674	1.756	1.756	1.756	1.756	1.756

External Pressure

	Face	Zone	Width	Depth	Dynamic Pressure	Size Factor	Cpe Pressure	Cpe Suction	External Applied Pressure	External Applied Suction
Gable	2	Windward	130.000	0.000	1.058	1.000	0.600	0.000	0.635	0.000
		Leeward	130.000	0.000	1.058	1.000	0.000	-0.500	0.000	-0.529
		A dir Face 1	7.880	0.000	0.695	1.000	0.000	-1.300	0.000	-0.903
		B dir Face 1	31.520	0.000	0.695	1.000	0.000	-0.800	0.000	-0.556
		C dir Face 1	90.600	0.000	0.695	1.000	0.000	-0.500	0.000	-0.347
		A dir Face 3	7.880	0.000	0.876	1.000	0.000	-1.300	0.000	-1.139
		B dir Face 3	31.520	0.000	0.876	1.000	0.000	-0.800	0.000	-0.701
		C dir Face 3	90.600	0.000	0.876	1.000	0.000	-0.500	0.000	-0.438
Gable	4	Windward	130.000	0.000	0.580	1.000	0.600	0.000	0.348	0.000
		Leeward	130.000	0.000	0.580	1.000	0.000	-0.500	0.000	-0.290
		A dir Face 1	7.880	0.000	0.695	1.000	0.000	-1.300	0.000	-0.903
		B dir Face 1	31.520	0.000	0.695	1.000	0.000	-0.800	0.000	-0.556
		C dir Face 1	90.600	0.000	0.695	1.000	0.000	-0.500	0.000	-0.347
		A dir Face 3	7.880	0.000	0.876	1.000	0.000	-1.300	0.000	-1.139
		B dir Face 3	31.520	0.000	0.876	1.000	0.000	-0.800	0.000	-0.701
		C dir Face 3	90.600	0.000	0.876	1.000	0.000	-0.500	0.000	-0.438
Side	1	Windward	211.100	0.000	0.675	1.000	0.600	0.000	0.405	0.000
		Leeward	211.100	0.000	0.675	1.000	0.000	-0.500	0.000	-0.337
		A dir Face 2	8.380	0.000	1.041	1.000	0.000	-1.300	0.000	-1.353
		B dir Face 2	33.520	0.000	1.041	1.000	0.000	-0.800	0.000	-0.833
		C dir Face 2	169.200	0.000	1.041	1.000	0.000	-0.500	0.000	-0.520
		A dir Face 4	8.380	0.000	0.570	1.000	0.000	-1.300	0.000	-0.741
		B dir Face 4	33.520	0.000	0.570	1.000	0.000	-0.800	0.000	-0.456
		C dir Face 4	169.200	0.000	0.570	1.000	0.000	-0.500	0.000	-0.285
Side	3	Windward	211.100	0.000	0.862	1.000	0.600	0.000	0.517	0.000
		Leeward	211.100	0.000	0.862	1.000	0.000	-0.500	0.000	-0.431
		A dir Face 2	8.380	0.000	1.041	1.000	0.000	-1.300	0.000	-1.353
		B dir Face 2	33.520	0.000	1.041	1.000	0.000	-0.800	0.000	-0.833
		C dir Face 2	169.200	0.000	1.041	1.000	0.000	-0.500	0.000	-0.520
		A dir Face 4	8.380	0.000	0.570	1.000	0.000	-1.300	0.000	-0.741
		B dir Face 4	33.520	0.000	0.570	1.000	0.000	-0.800	0.000	-0.456
		C dir Face 4	169.200	0.000	0.570	1.000	0.000	-0.500	0.000	-0.285
Roof	1	A	10.475	4.190	0.695	1.000	0.000	-2.000	0.000	-1.390
		B	190.150	4.190	0.695	1.000	0.000	-1.400	0.000	-0.973
		C	211.100	16.760	0.695	1.000	0.000	-0.700	0.000	-0.486
		D	211.100	109.050	0.695	1.000	0.200	-0.200	0.139	-0.139
Roof	2	A	10.475	4.190	1.058	1.000	0.000	-2.000	0.000	-2.117
		B	109.050	4.190	1.058	1.000	0.000	-1.400	0.000	-1.482
		C	130.000	16.760	1.058	1.000	0.000	-0.700	0.000	-0.741
		D	130.000	190.150	1.058	1.000	0.200	-0.200	0.212	-0.212
Roof	3	A	10.475	4.190	0.876	1.000	0.000	-2.000	0.000	-1.753
		B	190.150	4.190	0.876	1.000	0.000	-1.400	0.000	-1.227
		C	211.100	16.760	0.876	1.000	0.000	-0.700	0.000	-0.613
		D	211.100	109.050	0.876	1.000	0.200	-0.200	0.175	-0.175
Roof	4	A	10.475	4.190	0.580	1.000	0.000	-2.000	0.000	-1.159
		B	109.050	4.190	0.580	1.000	0.000	-1.400	0.000	-0.811
		C	130.000	16.760	0.580	1.000	0.000	-0.700	0.000	-0.406
		D	130.000	190.150	0.580	1.000	0.200	-0.200	0.116	-0.116

Internal Pressure

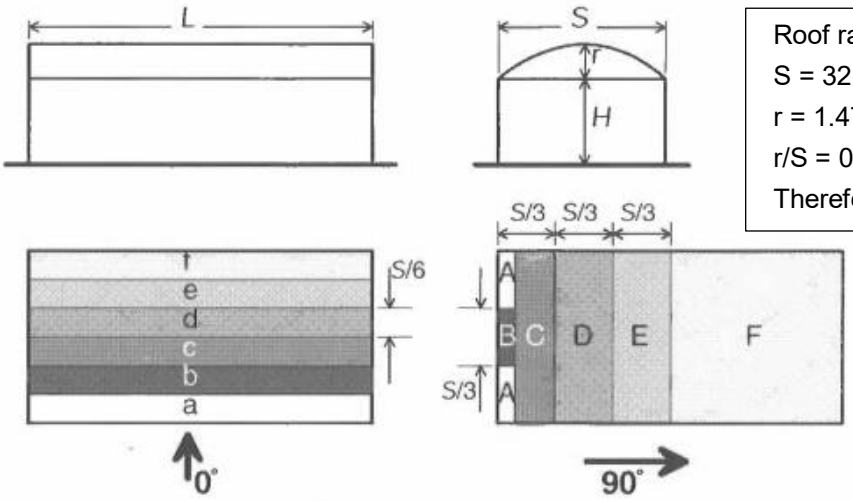
		Dynamic		Size	Cpi		Internal Applied	
	Face	Pressure	Diagonal	Factor	Pressure	Suction	Pressure	Suction
Roof	1	0.695	821.60	0.615	-0.30		-0.128	
		0.695	821.60	0.615		-0.30		-0.128
	2	1.058	821.60	0.615	-0.30		-0.195	
		1.058	821.60	0.615		-0.30		-0.195
	3	0.876	821.60	0.615	-0.30		-0.162	
		0.876	821.60	0.615		-0.30		-0.162
	4	0.580	821.60	0.615	-0.30		-0.107	
		0.580	821.60	0.615		-0.30		-0.107
Side	1	0.675	821.60	0.615	-0.30		-0.124	
		0.675	821.60	0.615		-0.30		-0.124
	2	1.058	821.60	0.615	-0.30		-0.195	
		1.058	821.60	0.615		-0.30		-0.195
	3	0.862	821.60	0.615	-0.30		-0.159	
		0.862	821.60	0.615		-0.30		-0.159
	4	0.580	821.60	0.615	-0.30		-0.107	
		0.580	821.60	0.615		-0.30		-0.107

External Pressure Coefficients

Warehouse and Office Roof

The main warehouse roof comprised a barrel vault "curved" roof.

Pressure coefficients will be taken from the guidance in "Wind loading – a practical guide" by NJ Cook.



Roof radius = 90.000m
S = 32.50m
r = 1.479m
r/S = 0.05 which is much less than 0.10
Therefore treat as a flat roof.

Fig. 54. Key for barrel-vault roofs

- The height of the eaves of the wall H. For arched buildings springing directly from the ground, $H = 0$.
- The rise of the barrel-vault r.

- The reference height H_r should be taken at the highest point of the roof, $H_r = H + r$.
- Divide the barrel-vault roof into the zones defined in **Fig. 54**. The dimensions of these zones are all based upon the span of the roof S. (The BS 6399-2 scaling length b is not needed.) Zones **a** to **f** in **Fig. 54** correspond to the orthogonal case $\theta = 0°$ while zones **A** to **F** correspond to $\theta = 90°$.
- Look up values of the external pressure coefficient from **Table 2**, depending on the roof rise ratio r/S and wall height ratio H/S. You may interpolate within the ranges in the table, $0{\cdot}1 < r/S < 0{\cdot}3$ and $0 < H/S < 0{\cdot}5$. Outside these ranges use the following.
  - If the rise ratio $r/S < 0{\cdot}1$, treat the roof as being flat.
  - If the rise ratio $r/S > 0{\cdot}3$ proceed as follows.
    - For the orthogonal case $\theta = 0°$ use the pressure coefficients for circular walls of buildings in *Table 7* in place of zones **a** to **f**.
    - For the orthogonal case $\theta = 90°$ use the pressure coefficients for zones **A** to **F** in **Table 2** for $r/S = 0{\cdot}3$.

Warehouse Sides

Pressure coefficients for suction zones to the warehouse sides (suction perpendicular to the wind direction) are taken directly from BS 6399-2:1997. No funnelling has been considered.

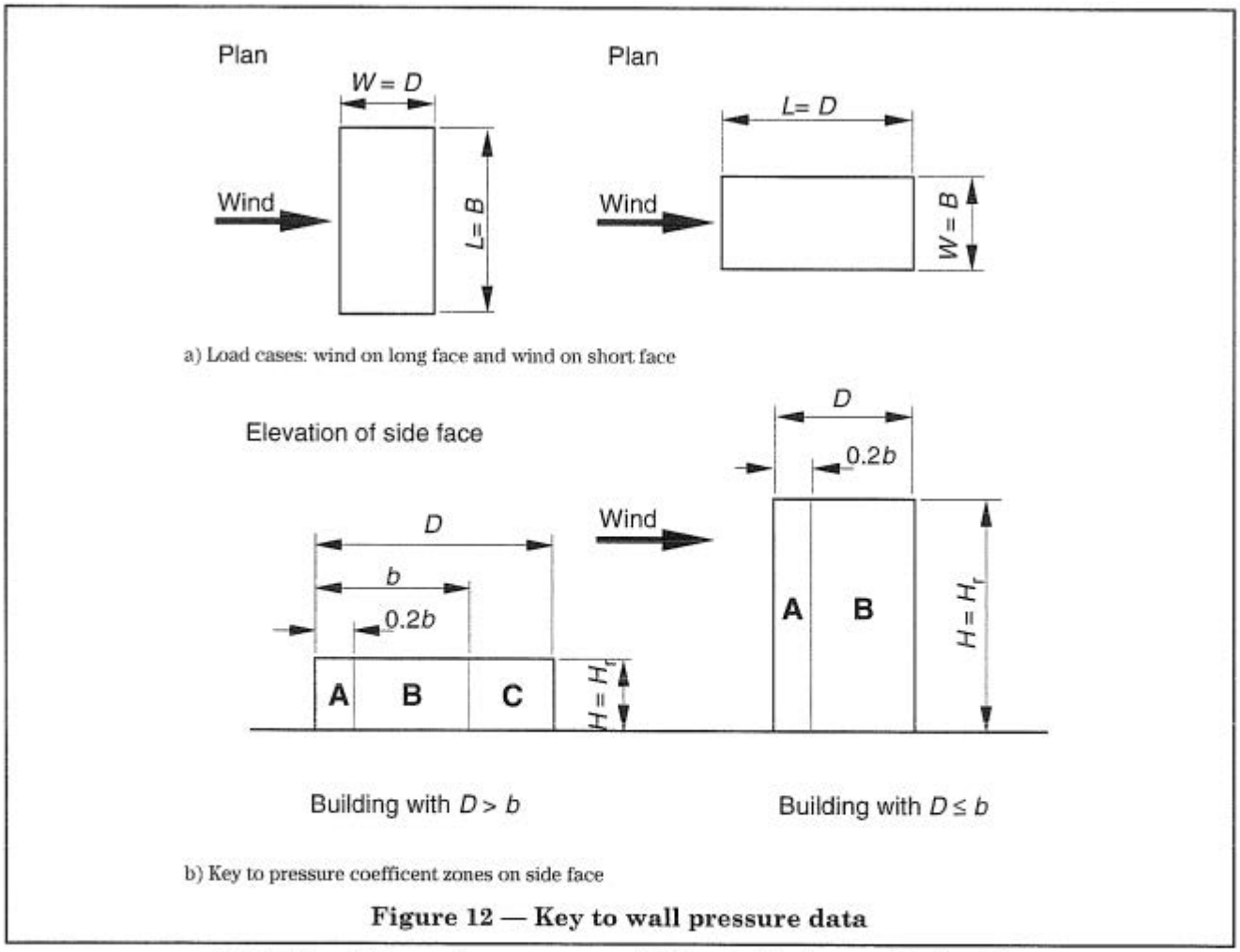


Figure 12 — Key to wall pressure data

Table 5 — External pressure coefficients C_{pe} for vertical walls

Vertical wall face	Span ratio of building		Vertical wall face		Exposure case	
	$D/H \leq 1$	$D/H \geq 4$			Isolated	Funnelling
Windward (front)	+0.85	+0.6	Side	Zone A	−1.3	−1.6
Leeward (rear)	−0.5	−0.5		Zone B	−0.8	−0.9
				Zone C	−0.5	−0.9

NOTE Interpolation may be used in the range $1 < D/H < 4$. See 2.4.1.4 for interpolation between isolated and funnelling.

Pressure coefficients for the Windward and Leeward faces have also been taken from BS 6399-2:1997 with a reduction taken for non-simultaneous action where appropriate as outlined below in the Overall Wind Load section.

Overall wind load for wind 0 and 180 (onto warehouse gable)

Overall Wind Loads to BS 6399-2: 1997 **Ref** Gable Wind

D = 211.1m (plan dimension parallel to the wind)
B = 130.0m (plan dimension perpendicular to the wind)
H = 20.2m
C_r = 0.06 Kb = 2.0

D/H = 10.45 B/D = 0.62

Table 5 - External pressure coefficients C_{pe}:

Wind direction →

Cpe leading = 0.6 | D | Cpe trailing = -0.50

Overall C_p = 1.1

Clause 2.1.3.6 Overall Loads:

$P = 0.85(\Sigma P_{front} - \Sigma P_{rear})(1+C_r)$ = 0.989

Calculate reduction factor for Table 5 values:

$\frac{0.989}{1.100}$ =0.899

Apply Reduced Table 5 values to frame:

Wind direction →

Cpe leading = 0.540 | D | Cpe trailing = -0.450

Overall C_p = 0.989 (Use for frame design)

Table 5a - Net pressure coefficients for overall load:

$\Sigma P_{front} - \Sigma P_{rear}$ = 0.95

Calculate reduction factor for serviceability:

$\frac{0.954}{1.100}$ =0.867 (Apply to horizontal deflections due to wind)

NOTE:
Reduced values are for overall loads only, and should not be used for the design of individual components.

Overall wind load for wind 90 and 270 (onto warehouse sides)

Overall Wind Loads to BS 6399-2: 1997 **Ref** Side Wind

D =	130	m (plan dimension parallel to the wind)
B =	211.1	m (plan dimension perpendicular to the wind)
H =	20.2	m
Kb =	2.0	
C_r =	0.06	
D/H =	6.44	B/D = 1.62

Table 5 - External pressure coefficients C_{pe}:

Overall C_p = 1.1

Clause 2.1.3.6 Overall Loads:

$$P = 0.85(\Sigma P_{front} - \Sigma P_{rear})(1+C_r) = 0.989$$

Calculate reduction factor for Table 5 values:

$$\frac{0.989}{1.100} = 0.899$$

Apply Reduced Table 5 values to frame:

Overall C_p = 0.989 (Use for frame design)

Table 5a - Net pressure coefficients for overall load:

$$\Sigma P_{front} - \Sigma P_{rear} = 0.80$$

Calculate reduction factor for serviceability:

$$\frac{0.800}{1.100} = 0.727$$ (Apply to horizontal deflections due to wind)

NOTE:
Reduced values are for overall loads only, and should not be used for the design of individual components.

Internal Pressure Coefficients and size effect factor

Warehouse

The building complies with part L of the building regulations, therefore C_{pi} = -0.3 for the warehouse.

The building is 20m high and at the edge of town. Line A will be used from BS6399:Pt 2 Figure 4.

Volume 211.1 x 130 x 20.2 = 554595 m^3

$\therefore$ Diagonal Dimension, a_i=10 x $\sqrt[3]{554595}$ = 822m $\Rightarrow$ **C_{ai} = 0.615**

Office

The building complies with part L of the building regulations, therefore C_{pi} = -0.3 for the office.

Volume 3.000 x 3.000 x 3.000 = 27 m^3 (conservative assuming some subdivision)

$\therefore$ Diagonal Dimension, a_i=10 x $\sqrt[3]{27}$ = 30m $\Rightarrow$ **C_{ai} = 0.873**

Gravity Loads

Main warehouse roof

Cladding	0.14 kN/m^2
Purlins	0.04 kN/m^2
Services	0.25 kN/m^2 (with no allowance for PV Cells)
Imposed	0.60 kN/m^2
Uniform snow	See later
Drift snow	See later
Sprinklers	No specific allowance made for sprinklers – deemed to be included in the general service loading if required.

Office roof

Cladding	0.14 kN/m^2
Purlins	0.04 kN/m^2
Services	0.25 kN/m^2 (with no allowance for PV Cells)
Ceilings	0.15 kN/m^2
Imposed	0.60 kN/m^2
Uniform snow	See later
Drift snow	See later
Sprinklers	No specific allowance made for sprinklers – deemed to be included in the general service loading if required.

Wall cladding

Not to exceed 14 kg/m^2

Main Office Floor loads

150mm overall NWC slab on Kingspan MD60 deck	As designed
Ceilings	0.15 kN/m^2
Services	0.25 kN/m^2
Raised Access Floor	0.50 kN/m^2

75mm Screed on 125mm insulation	1.80 kN/m^2	In lieu of RA floor
Office Imposed Load	4.00 kN/m^2	
Partitions	1.00 kN/m^2	
Stair Imposed	4.00 kN/m^2	
Stair services	0.25 kN/m^2	
Stair Dead	As supplier drawings	
Designated Plant Area	7.50 kN/m^2	

Impact loads

We do not include for any impact loads from vehicles or forklifts etc.

Snow Loads

Site Location SE318179

Basic snow load $s_b = 0.60$ kN/m^2

Altitude A = 29 m

$s_{alt} = 0.10\ s_b + 0.09 = 0.15$

Site snow load $s_o = 0.10\ s_b + s_{alt}((A-100)/100) = 0.494$ kN/m^2

For uniform snow $\mu = 0.80$ max slope of curved roof < 30°

Uniform snow load = 0.80 x 0.494 = 0.395 kN/m^2

So

for Dead + Imposed load combinations use imposed load of 0.600 kN/m^2

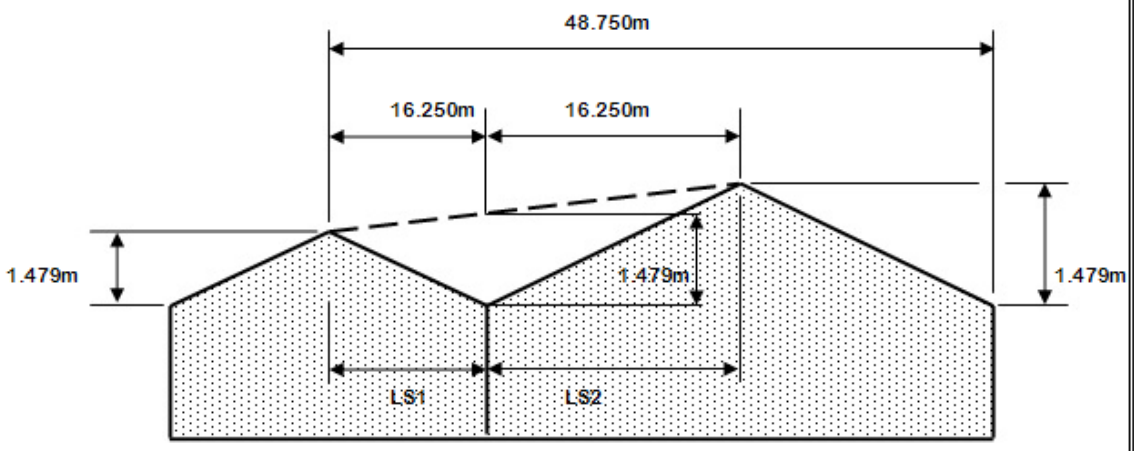
for Dead + Imposed + Wind combinations use Uniform Snow load of 0.395 kN/m^2

As roof pitch < 15° asymmetric snow does not apply

Drifted Snow

Main Warehouse Valleys

Valleys of Multi-Span Roof	
Snow SB	0.600 kN/m²
Site Altitude	29m
Site snow load 'So' (kN/m²)	0.494 kN/m²

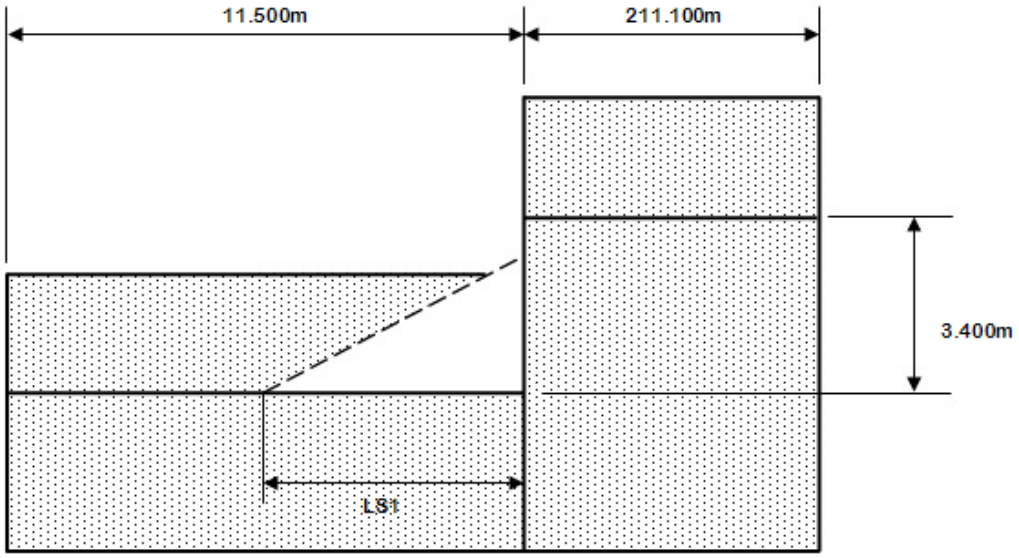


	Shape Co-Efficient	Drift load 'Sd'	Drift Length
LS1	3.000	1.481 kN/m²	16.250m
LS2	3.000	1.481 kN/m²	16.250m

Snow loading according to BS.6399. Incorporating Amendment No. 1 and Amendment No. 2

Main Office drift to main warehouse.

Abrupt changes in Roof height	
Snow SB	0.600 kN/m²
Site Altitude	29m
Site snow load 'So' (kN/m²)	0.494 kN/m²

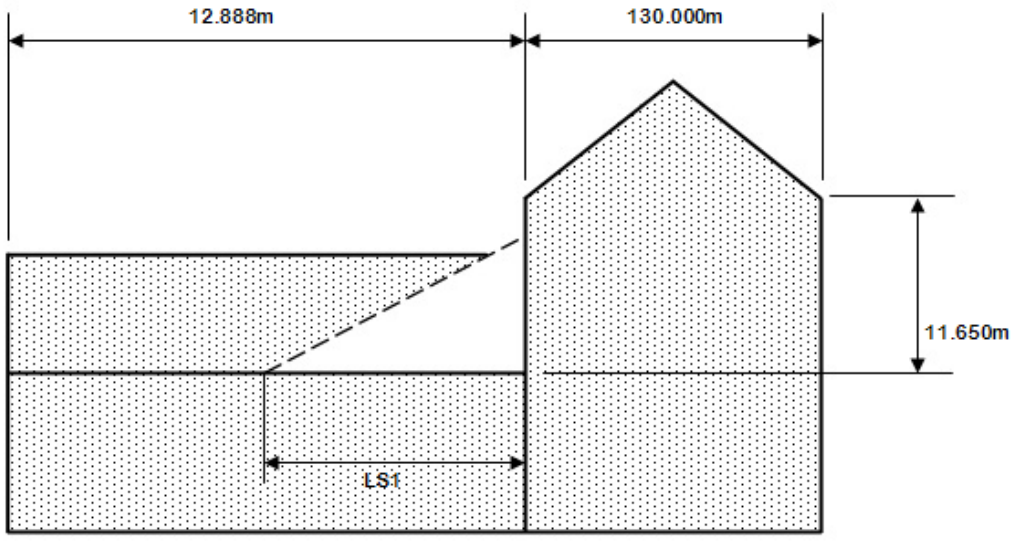


	Shape Co-Efficient	Drift load 'Sd'	Drift Length
LS1	8.000	3.948 kN/m²	11.500m

Snow loading according to BS.6399. Incorporating Amendment No. 1 and Amendment No. 2

Hub Office drift to main warehouse.

Abrupt changes in roof height	
Snow SB	0.600 kN/m²
Site Altitude	29m
Site snow load 'So' (kN/m²)	0.494 kN/m²



	Shape Co-Efficient	Drift load 'Sd'	Drift Length
LS1	8.000	3.948 kN/m²	12.888m

Snow loading according to BS.6399. Incorporating Amendment No. 1 and Amendment No. 2

Siphonic pipes to roof

The siphonic pipes are hung directly from the roof purlins, therefore the purlins need to be designed for a potential increase in load to account for the siphonic.

Eaves purlins

Primary pipe = 200dia., 31.48kg/m
Secondary pipe = 200dia., 31.48 kg/m

Primary support purlin, max cover width = 1400mm c/c
Therefore equivalent service load on purlin from pipe = 31.48*9.81/1400 = 0.221kN/m2

Secondary support purlin, max cover width = 1100mm c/c
Therefore equivalent service load on purlin from pipe = 0.281kN/m2

Valley purlin

Note, it is likely that combination of siphonic loading and snow drift will be critical so this must be checked

Primary pipe = 250dia., 49.14kg/m
Secondary pipe = 250dia., 49.14kg/m

Primary support purlin, max cover width = 1559mm c/c
Therefore equivalent service load on purlin from pipe = 49.14*9.81/1559 = 0.309kN/m2

Secondary support purlin, max cover width = 1200mm c/c
Therefore equivalent service load on purlin from pipe = 0.402kN/m2

Section 03 – Cold Rolled

Purlins to roofs

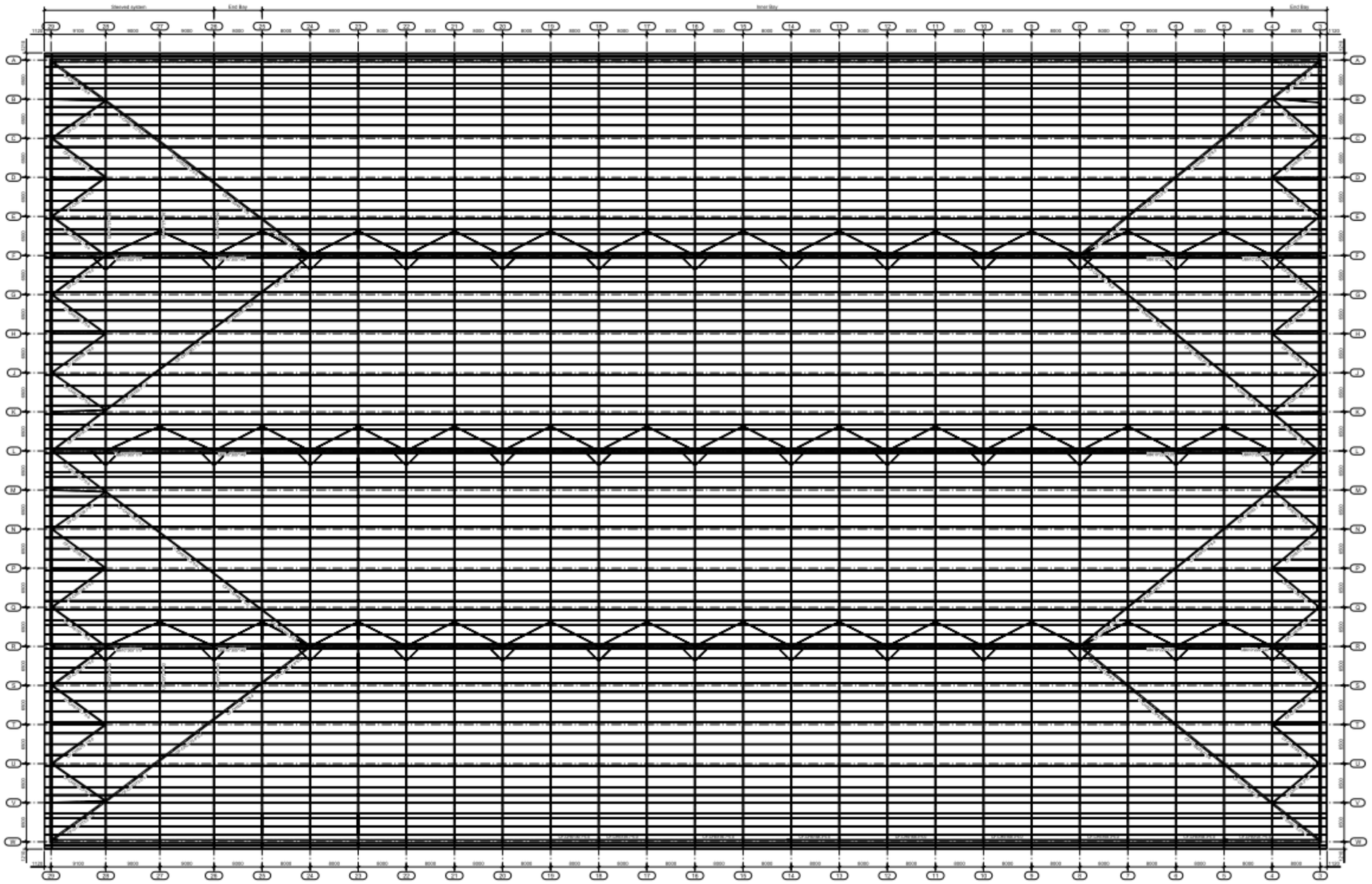
REV	Date	Notes
C01	January 2022	Construction Issue

Contents

Roof Layout 2
Loading 3
Calculations 4
Main Warehouse 4
Heavy End Bay System 4
8m Span 4
Valley Gutter Support 6
Eaves Condition 7
Wide Flange Purlin 8
8m Span Sleeved 8
9m Span Sleeved 9
Sleeved System for 9m Span 10
General Purlin 10
Valley Gutter Support Purlin 11
Siphonic Purlins 12
Primary pipe Eaves, 8m span 12
Secondary pipe Eaves, 8m span 13
Primary and Secondary Eaves, 9m Span 14
Primary pipe Valley, 8m span 15
Secondary pipe Valley, 8m span 17
Primary pipe Valley, 9m span 19

Caunton Engineering Ltd Moorgreen Industrial Park Moorgreen, Nottingham NG16 3QU	Project Calder Park, Wakefield		Job Ref. 21009-CEL-XX-XX-CA-X-
	Section Section 03 – Cold Rolled		Sheet no. 0301.2
	Calc. by J Hutton	Date January 2022	rev. C01

Roof Layout



Warehouse Roof Plan

Loading

Loading as document 21009-CEL-XX-XX-CA-X-0201

Calculations
Main Warehouse
Heavy End Bay System
8m Span

PURLIN SELECTION

Z PURLIN SYSTEM TYPE: SLEEVED H.E.B. METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.000 m	Dead Load : 0.140
Centres: 1.800 m	Service Load : 0.250
Def. Limit: Span/ 180	Super Load : 0.600
Roof Slope: 4.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition

Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

End span Section Pass

Inner span Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
End span	232.Z.20	5.87	1 Sags	0.939	0.747	0.934
Inner span	232.Z.15	4.44	1 Sags	0.609	0.848	0.645

PURLIN DESIGN ANALYSIS - SNOW ACROSS PURLIN CENTRES

System Type : **Sleeved H.E.B** Selected section End Span :**232.Z.20** Brace:1
Cladding : **METAL** Inner Span :**232.Z.15** Brace:1

Dimensions & limits		Design loads in kN/m²	
Span	8.000 m	Dead load	0.140
Centres	1.800 m	Service load	0.250
Roof Slope	4.0 deg	Imposed load	0.600

SNOW BUILD-UP INFORMATION

1st Purlin from End ' A '	0.000 m	Max. Snow (Sd)	1.463
1st Purlin from End ' B '	0.000 m		
Drift Length	16.250 m		
Slope Length	0.000 m		

Purlin Lines	Centres (m)	Dist.from End'A'	End span Section	Capacity Ratio	Inner span Section	Capacity Ratio	Pass or Fail
1	0.000	0.000	232.Z.20	0.494	232.Z.15	0.561	Pass
2	1.800	1.800	232.Z.20	0.881	232.Z.15	0.999	Pass
3	1.527	3.327	232.Z.20	0.803	232.Z.15	0.911	Pass
4	1.800	5.127	232.Z.20	0.792	232.Z.15	0.898	Pass
5	1.800	6.927	232.Z.20	0.707	232.Z.15	0.803	Pass
6	1.800	8.727	232.Z.20	0.623	232.Z.15	0.707	Pass
7	1.800	10.527	232.Z.20	0.539	232.Z.15	0.612	Pass
8	1.800	12.327	232.Z.20	0.455	232.Z.15	0.516	Pass
9	1.800	14.127	232.Z.20	0.371	232.Z.15	0.421	Pass
10	1.800	15.927	232.Z.20	0.301	232.Z.15	0.342	Pass
11	1.800	17.727	232.Z.20	0.272	232.Z.15	0.308	Pass
12	1.800	19.527	232.Z.20	0.270	232.Z.15	0.306	Pass
13	1.800	21.327	232.Z.20	0.270	232.Z.15	0.306	Pass

Valley Gutter Support

PURLIN SELECTION

Z PURLIN SYSTEM TYPE: SLEEVED H.E.B. METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.000 m	Dead Load : 0.140
Centres: 1.175 m	Service Load : 0.250
Def. Limit: Span/ 350	Super Load : 0.600
Roof Slope: 4.0 deg.	

STEPPED WIND UPLIFT LOADS

From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411
10.075	220.075	0.411
220.075	450.075	0.411

SELECTED PURLINS

End span Section **Pass**

Inner span Section **Pass**

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
End span	232.Z.25	7.27	1 Sags	0.993	0.364	0.114
Inner span	232.Z.15	4.44	1 Sags	0.785	0.553	0.189

Eaves Condition

PURLIN SELECTION

Z PURLIN SYSTEM TYPE: SLEEVED H.E.B. METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.000 m	Dead Load : 0.140
Centres: 1.400 m	Service Load : 0.250
Def. Limit: Span/ 180	Super Load : 0.600
Roof Slope: 0.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (2)-Eaves Condition					
Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	1.485	0.000	4.030	1.793
10.075	209.925	0.989	4.030	20.150	0.497
209.925	220.000	1.485	20.150	220.000	0.000

SELECTED PURLINS

End span Section Pass

Inner span Section Pass

	Section Reference	Weight in kg/m	Restraint		Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
End span	**232.Z.20**	**5.87**	**1**	**Sags**	**0.730**	**0.581**	**0.770**
Inner span	**232.Z.15**	**4.44**	**1**	**Sags**	**0.474**	**0.660**	**0.821**

Wide Flange Purlin

8m Span Sleeved

PURLIN SELECTION

Z PURLIN SYSTEM TYPE: SLEEVED METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.000 m	Dead Load : 0.140
Centres: 1.650 m	Service Load : 0.250
Def. Limit: Span/ 180	Super Load : 0.600
Roof Slope: 0.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition

Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

Spans 1+2 Section Pass

Elsewhere Section Pass

	Section Reference	Weight in kg/m	Restraint		Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
Spans 1+2	**232.Z.18**	**5.30**	**1**	**Sags**	**0.834**	**0.800**	**0.976**
Elsewhere	**232.Z.16**	**4.73**	**1**	**Sags**	**0.934**	**0.964**	**0.268**

9m Span Sleeved

PURLIN SELECTION

Z PURLIN SYSTEM TYPE: SLEEVED METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 9.000 m	Dead Load : 0.140
Centres: 1.650 m	Service Load : 0.250
Def. Limit: Span/ 180	Super Load : 0.600
Roof Slope: 0.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition

Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

Spans 1+2 Section Pass

Elsewhere Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
Spans 1+2	**262.Z.18**	**5.73**	**2 Sags**	**0.878**	**0.898**	**0.934**
Elsewhere	**262.Z.18**	**5.73**	**1 Sags**	**0.878**	**0.898**	**0.302**

Sleeved System for 9m Span

General Purlin

PURLIN SELECTION

Z PURLIN SYSTEM TYPE: SLEEVED METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.990 m	Dead Load : 0.140
Centres: 1.800 m	Service Load : 0.250
Def. Limit: Span/ 180	Super Load : 0.600
Roof Slope: 4.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition

Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

Spans 1+2 Section Pass

Elsewhere Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
Spans 1+2	**262.Z.20**	**6.34**	**2 Sags**	**0.863**	**0.834**	**0.870**
Elsewhere	**262.Z.18**	**5.73**	**1 Sags**	**0.955**	**0.977**	**0.329**

Valley Gutter Support Purlin

PURLIN SELECTION

Z PURLIN SYSTEM TYPE: SLEEVED METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.990 m	Dead Load : 0.140
Centres: 1.175 m	Service Load : 0.250
Def. Limit: Span/ 360	Super Load : 0.600
Roof Slope: 4.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition					
Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

Spans 1+2 Section Pass

Elsewhere Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
Spans 1+2	**262.Z.25**	**7.86**	**1 Sags**	**0.939**	**0.402**	**0.555**
Elsewhere	**262.Z.25**	**7.86**	**1 Sags**	**0.939**	**0.402**	**0.147**

Siphonic Purlins

Primary pipe Eaves, 8m span

Z PURLIN SYSTEM TYPE: SLEEVED H.E.B. METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.000 m	Dead Load : 0.180
Centres: 1.400 m	Service Load :0.471
Def. Limit: Span/ 180	Super Load :0.600
Roof Slope: 4.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition					
Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

End span Section Pass

Inner span Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
End span	**232.Z.20**	**5.87**	**1 Sags**	**0.923**	**0.722**	**0.711**
Inner span	**232.Z.15**	**4.44**	**1 Sags**	**0.599**	**0.820**	**0.483**

Secondary pipe Eaves, 8m span

Z PURLIN SYSTEM TYPE: SLEEVED H.E.B. METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.000 m	Dead Load : 0.180
Centres: 1.100 m	Service Load :0.531
Def. Limit: Span/ 180	Super Load :0.600
Roof Slope: 4.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition					
Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

End span Section Pass

Inner span Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
End span	**232.Z.20**	**5.87**	**1 Sags**	**0.760**	**0.593**	**0.559**
Inner span	**232.Z.15**	**4.44**	**1 Sags**	**0.493**	**0.673**	**0.379**

Primary and Secondary Eaves, 9m Span

Z PURLIN SYSTEM TYPE: SLEEVED

METAL CLADDING

Dimensions & Limits
Span: 8.990 m
Centres: 1.400 m
Def. Limit: Span/ 180
Roof Slope: 0.0 deg.

Design Loads in kN/m²
Dead Load : 0.140
Service Load :0.471
Super Load :0.600

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (2)-Eaves Condition					
Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	1.485	0.000	4.030	1.793
10.075	209.925	0.989	4.030	20.150	0.497
209.925	220.000	1.485	20.150	220.000	0.000

SELECTED PURLINS

Spans 1+2 Section Pass

Elsewhere Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
Spans 1+2	**262.Z.20**	**6.34**	**1 Sags**	**0.821**	**0.781**	**0.982**
Elsewhere	**262.Z.18**	**5.73**	**1 Sags**	**0.909**	**0.916**	**0.730**

Primary pipe Valley, 8m span

Z PURLIN SYSTEM TYPE: SLEEVED H.E.B. METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.000 m	Dead Load : 0.140
Centres: 1.559 m	Service Load :0.559
Def. Limit: Span/ 180	Super Load :0.600
Roof Slope: 4.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition					
Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

End span Section Pass

Inner span Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
End span	**232.Z.23**	**6.71**	**1 Sags**	**0.934**	**0.690**	**0.692**
Inner span	**232.Z.15**	**4.44**	**1 Sags**	**0.693**	**0.946**	**0.559**

PURLIN DESIGN ANALYSIS - SNOW ACROSS PURLIN CENTRES

System Type : **Sleeved H.E.B** Selected section End Span :**232.Z.23** Brace:1
Cladding : **METAL** Inner Span :**232.Z.15** Brace:1

Dimensions & limits		Design loads in kN/m²	
Span	8.000 m	Dead load	0.140
Centres	1.599 m	Service load	0.559
Roof Slope	4.0 deg	Imposed load	0.600

SNOW BUILD-UP INFORMATION

1st Purlin from End ' A '	0.000 m	Max. Snow (Sd)	1.463
1st Purlin from End ' B '	0.000 m		
Drift Length	16.250 m		
Slope Length	0.000 m		

Purlin Lines	Centres (m)	Dist.from End'A'	End span Section	Capacity Ratio	Inner span Section	Capacity Ratio	Pass or Fail
1	0.000	0.000	232.Z.23	0.444	232.Z.15	0.609	Pass
2	1.599	1.599	232.Z.23	0.730	232.Z.15	1.000	Pass
3	1.083	2.682	232.Z.23	0.684	232.Z.15	0.936	Pass
4	1.599	4.281	232.Z.23	0.730	232.Z.15	1.000	Pass
5	1.423	5.704	232.Z.23	0.678	232.Z.15	0.928	Pass
6	1.599	7.303	232.Z.23	0.665	232.Z.15	0.911	Pass
7	1.599	8.902	232.Z.23	0.610	232.Z.15	0.836	Pass
8	1.599	10.501	232.Z.23	0.555	232.Z.15	0.761	Pass
9	1.599	12.100	232.Z.23	0.500	232.Z.15	0.685	Pass
10	1.599	13.699	232.Z.23	0.445	232.Z.15	0.610	Pass
11	1.599	15.298	232.Z.23	0.396	232.Z.15	0.542	Pass
12	1.599	16.897	232.Z.23	0.365	232.Z.15	0.500	Pass
13	1.599	18.496	232.Z.23	0.356	232.Z.15	0.488	Pass
14	1.599	20.095	232.Z.23	0.356	232.Z.15	0.488	Pass

Secondary pipe Valley, 8m span

Z PURLIN SYSTEM TYPE: SLEEVED H.E.B. METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.000 m	Dead Load : 0.140
Centres: 1.200 m	Service Load :0.652
Def. Limit: Span/ 180	Super Load :0.600
Roof Slope: 0.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition					
Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

End span Section Pass

Inner span Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
End span	**232.Z.20**	**5.87**	**1 Sags**	**0.880**	**0.684**	**0.623**
Inner span	**232.Z.15**	**4.44**	**1 Sags**	**0.571**	**0.777**	**0.430**

PURLIN DESIGN ANALYSIS - SNOW ACROSS PURLIN CENTRES

System Type : **Sleeved H.E.B** Selected section End Span :**232.Z.20** Brace:1
Cladding : **METAL** Inner Span :**232.Z.15** Brace:1

Dimensions & limits		Design loads in kN/m²	
Span	8.000 m	Dead load	0.140
Centres	1.200 m	Service load	0.652
Roof Slope	4.0 deg	Imposed load	0.600

SNOW BUILD-UP INFORMATION

1st Purlin from End ' A '	0.000 m	Max. Snow (Sd)	1.463
1st Purlin from End ' B '	0.000 m		
Drift Length	16.250 m		
Slope Length	0.000 m		

Purlin Lines	Centres (m)	Dist.from End'A'	End span Section	Capacity Ratio	Inner span Section	Capacity Ratio	Pass or Fail
1	0.000	0.000	232.Z.20	0.427	232.Z.15	0.484	Pass
2	1.200	1.200	232.Z.20	0.836	232.Z.15	0.948	Pass
3	1.200	2.400	232.Z.20	0.798	232.Z.15	0.906	Pass
4	1.200	3.600	232.Z.20	0.761	232.Z.15	0.863	Pass
5	1.200	4.800	232.Z.20	0.724	232.Z.15	0.821	Pass
6	1.200	6.000	232.Z.20	0.686	232.Z.15	0.779	Pass
7	1.200	7.200	232.Z.20	0.649	232.Z.15	0.736	Pass
8	1.200	8.400	232.Z.20	0.611	232.Z.15	0.694	Pass
9	1.200	9.600	232.Z.20	0.574	232.Z.15	0.651	Pass
10	1.200	10.800	232.Z.20	0.537	232.Z.15	0.609	Pass
11	1.200	12.000	232.Z.20	0.499	232.Z.15	0.567	Pass
12	1.200	13.200	232.Z.20	0.462	232.Z.15	0.524	Pass
13	1.200	14.400	232.Z.20	0.425	232.Z.15	0.482	Pass
14	1.200	15.600	232.Z.20	0.389	232.Z.15	0.442	Pass
15	1.200	16.800	232.Z.20	0.369	232.Z.15	0.419	Pass
16	1.200	18.000	232.Z.20	0.366	232.Z.15	0.415	Pass
17	1.200	19.200	232.Z.20	0.366	232.Z.15	0.415	Pass

Primary pipe Valley, 9m span

Z PURLIN SYSTEM TYPE: SLEEVED METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 8.990 m	Dead Load : 0.140
Centres: 1.559 m	Service Load :0.559
Def. Limit: Span/ 180	Super Load :0.600
Roof Slope: 0.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (2)-Eaves Condition					
Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	1.485	0.000	4.030	1.793
10.075	209.925	0.989	4.030	20.150	0.497
209.925	220.000	1.485	20.150	220.000	0.000

SELECTED PURLINS

Spans 1+2 Section Pass

Elsewhere Section Pass

	Section Reference	Weight in kg/m	Restraint	Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
Spans 1+2	**262.Z.20**	**6.34**	**2 Sags**	**0.981**	**0.929**	**0.916**
Elsewhere	**262.Z.20**	**6.34**	**1 Sags**	**0.981**	**0.929**	**0.711**

Office

PURLIN SELECTION

Z PURLIN SYSTEM TYPE: SLEEVED METAL CLADDING

Dimensions & Limits	Design Loads in kN/m²
Span: 6.000 m	Dead Load : 0.140
Centres: 1.800 m	Service Load : 0.250
Def. Limit: Span/ 180	Super Load : 0.600
Roof Slope: 0.0 deg.	

Roof type: Flat-sharp eaves. (Purlins Parallel to long face)

STEPPED WIND UPLIFT LOADS- PURLIN ZONE- (1)-General Condition

Wind @ 0°			Wind @ 90°		
From (m)	To (m)	Loads (kN/m²)	From (m)	To (m)	Loads (kN/m²)
0.000	10.075	0.411	0.000	4.030	1.793
10.075	209.925	0.411	4.030	20.150	0.497
209.925	220.000	0.411	20.150	220.000	0.000

SELECTED PURLINS

Spans 1+2 Section Pass

Elsewhere Section Pass

	Section Reference	Weight in kg/m	Restraint		Load Capacity Ratios: Unfactored load for deflection	Ultimate gravity load	Ultimate wind uplift
Spans 1+2	**232.Z.15**	**4.44**	**1**	**Sags**	**0.496**	**0.652**	**0.994**
Elsewhere	**232.Z.15**	**4.44**	**0**	**Sags**	**0.496**	**0.652**	**0.696**

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Project	Job Ref.
Calder Park, Wakefield	21009-CEL-XX-XX-CA-X-
Section	**Sheet no.**
Section 03 – Cold Rolled	0301.21
Calc. by / **Date**	**rev.**
J Hutton / January 2022	C01

PURLIN ANALYSIS: SNOW ALONG SPAN

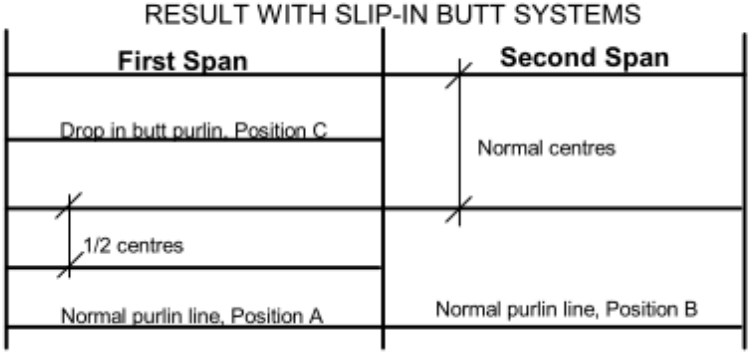
Z PURLIN SYSTEM TYPE: **SLEEVED METAL CLADDING**

Dimensions & Limits		Design Loads in kN/m²	
Span: 6.000	m	Dead Load : 0.140	
Centres: 1.800	m	Service Load : 0.250	
		Imposed Load : 0.600	

SNOW DRIFT INFORMATION

Drift Length: 11.500 m Max. Snow (Sd): 3.948 kN/m²

RESULT WITH SLIP-IN BUTT SYSTEMS



	Section Reference	Weight in kg/m	Load Capacity Ratio	Pass/Fail
Position A	232.Z.15	4.44	0.812	Pass
Position B	232.Z.15	4.44	0.782	Pass
Position C	232.Z.15	4.44	0.519	Pass

Section 03 – Cold Rolled

Side Rails

REV	Date	Notes
C01	January 2022	Construction Issue

Contents

Wall Layouts 2

Loading 5

Calculations 6

Main Warehouse 6

General Side Rail (internal bays) 6

End Bay Side Rail (Grid 3 End, Grid A) 7

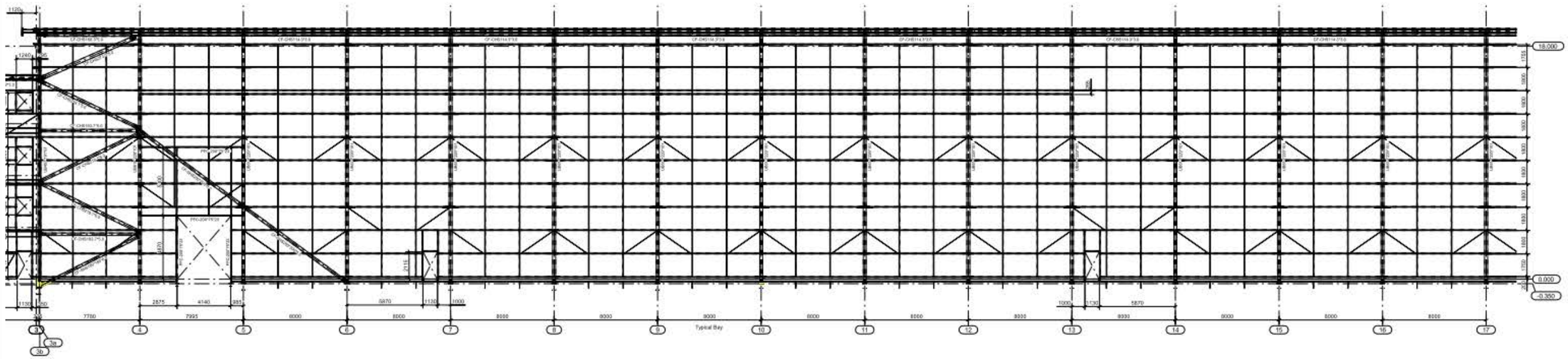
End Bay Side Rail (Grid 3 End, Grid W) 8

End Bay Side Rail (Grid 29 End) 9

Office 10

Caunton Engineering Ltd Moorgreen Industrial Park Moorgreen, Nottingham NG16 3QU	Project Calder Park, Wakefield		Job Ref. 21009-CEL-XX-XX-CA-X-
	Section Section 03 – Cold Rolled		Sheet no. 0302.2
	Calc. by J Hutton	Date January 2022	rev. C01

Wall Layouts

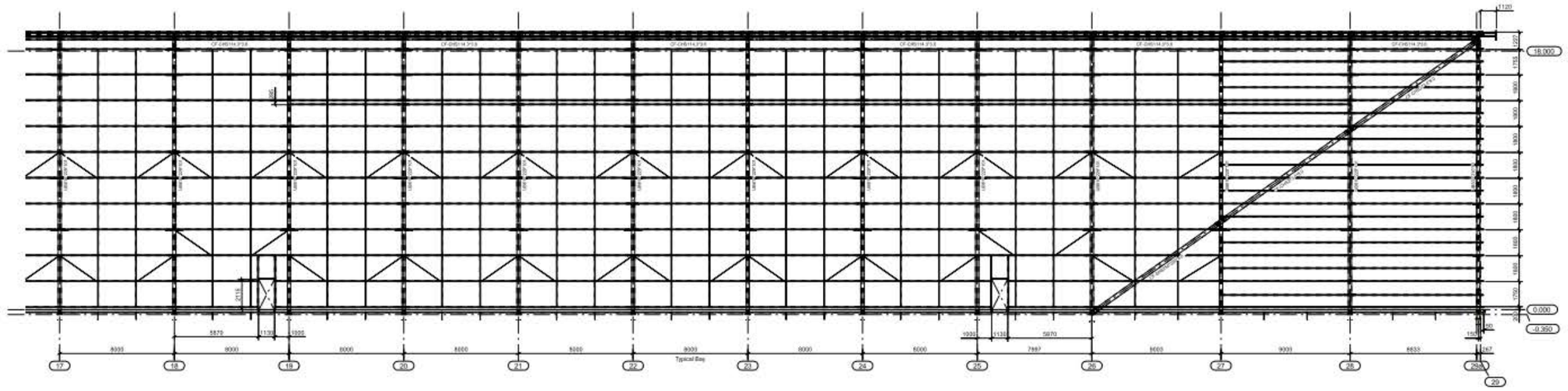


Elevation on Grid line A

Rail SPEC:

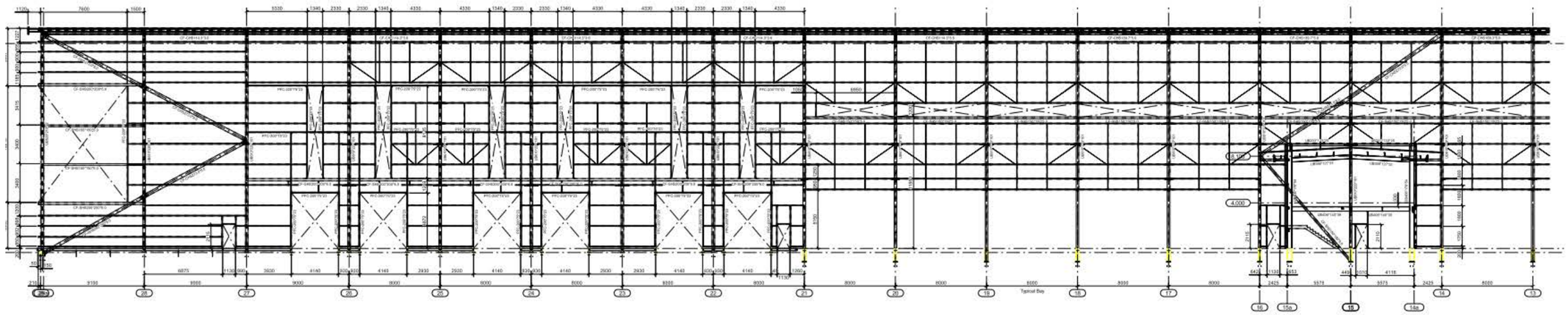
Mateac Sleeved system
OUS Rails 202C15
DTW = Diagonal tie wire
SRS = Side rail support
TS = Tubular Strut

Cleader angle 100x100 supplied by Caunton
fitted by others

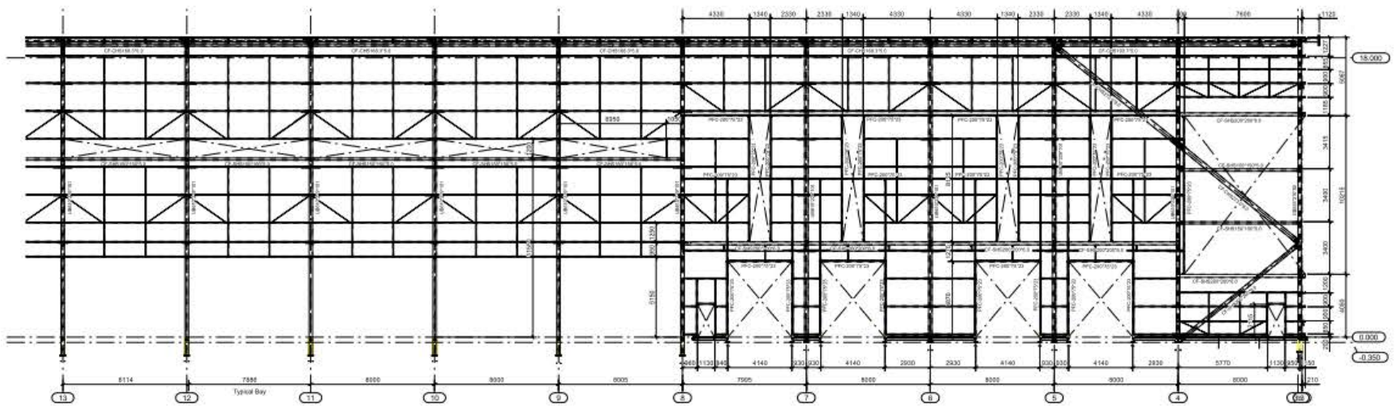


Elevation on Grid line A

Caunton Engineering Ltd Moorgreen Industrial Park Moorgreen, Nottingham NG16 3QU	Project Calder Park, Wakefield		Job Ref. 21009-CEL-XX-XX-CA-X-
	Section Section 03 – Cold Rolled		Sheet no. 0302.3
	Calc. by J Hutton	Date January 2022	rev. C01

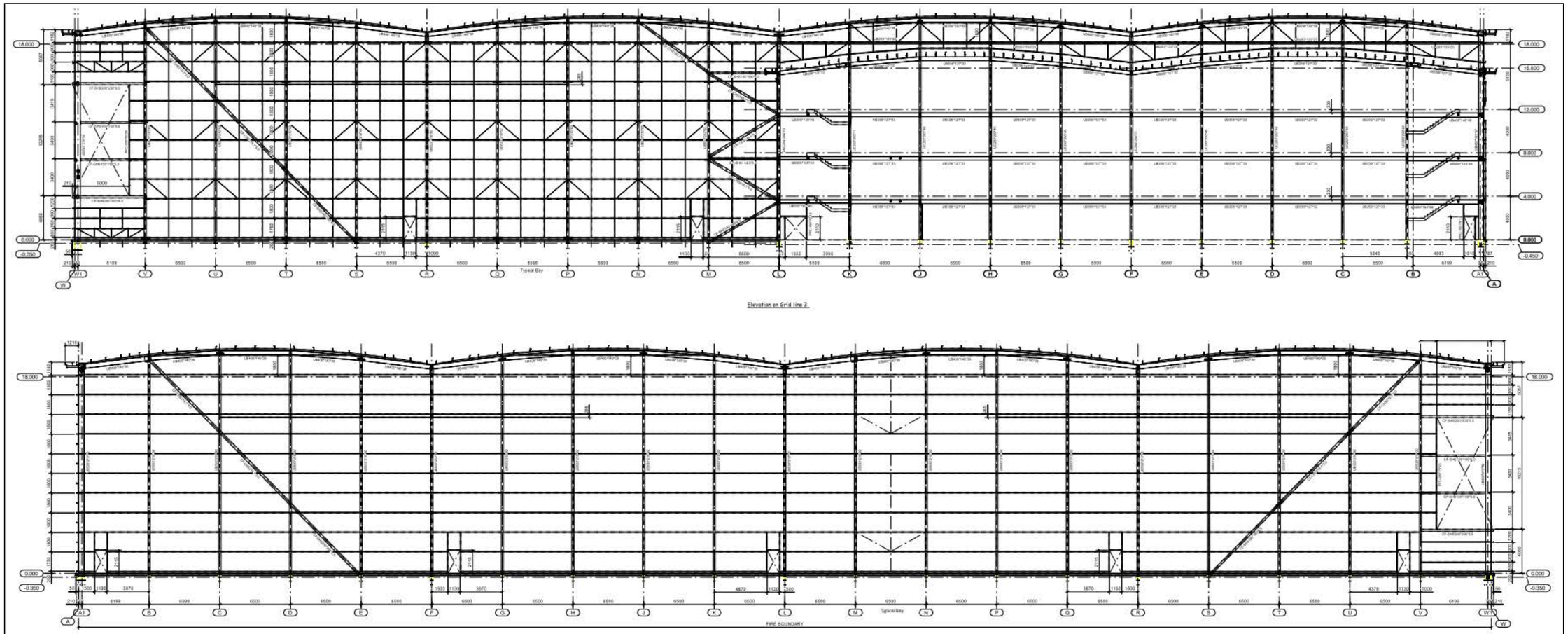


Elevation on Grid line W

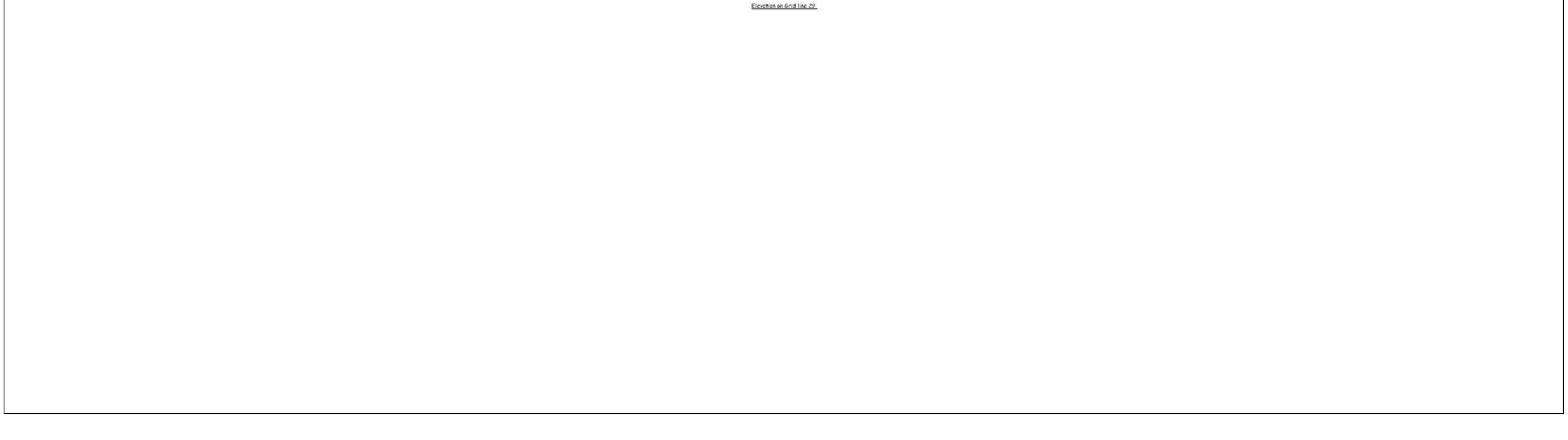


Elevation on Grid line W

caunton ENGINEERING Caunton Engineering Ltd Moorgreen Industrial Park Moorgreen, Nottingham NG16 3QU	Project Calder Park, Wakefield		Job Ref. 21009-CEL-XX-XX-CA-X-
	Section Section 03 – Cold Rolled		Sheet no. 0302.4
	Calc. by J Hutton	Date January 2022	rev. C01



Elevation on Grid line 3



Elevation on Grid line 29

Loading

Loading as document 21009-CEL-XX-XX-CA-X-0201

Calculations

Main Warehouse

General Side Rail (internal bays)

SIDE RAIL ENTERED DATA

SYSTEM TYPE : C Sleeved System

Dimensions & Limits

Span :	8.000 m
Centres :	1.800 m
Deflection Limit :	Span / 150(53mm)
No. of Supports:	2
Cladding :	Restraining
Reference Face:	Face 4 (Side)

Design Loads in kN/m²

Cladding Weight:	0.125
Wind Pressure:	0.529

Stepped Loads(Suction): Wind on Face 1

From (m)	To (m)	Load
0	8.060	1.072
8.060	40.300	0.582
Elsewhere		0.288

SELECTED SIDE RAILS

Position	Reference	Weight (kg/m)	Load Capacity Ratios: Deflection	Wind Pressure	Wind Suction	Pass / Fail
Span 1+2	262.C.16	5.11	0.887	0.466	0.966	Pass
Elsewhere	202.C.15	4.09	0.778	0.674	0.742	Pass

End Bay Side Rail (Grid 3 End, Grid A)

SIDE RAIL ENTERED DATA

SYSTEM TYPE : C Sleeved System

Dimensions & Limits

Span :	8.000 m
Centres :	1.800 m
Deflection Limit :	Span / 150(53mm)
No. of Supports:	2
Cladding :	Restraining
Reference Face:	Face 4 (Side)

Design Loads in kN/m²

Cladding Weight:	0.125
Wind Pressure:	0.529

Stepped Loads(Suction): Wind on Face 3

From (m)	To (m)	Load
0	8.060	0.587
8.060	40.300	0.319
Elsewhere		0.239

SELECTED SIDE RAILS

Position	Reference	Weight (kg/m)	Load Capacity Ratios: Deflection	Wind Pressure	Wind Suction	Pass / Fail
Span 1+2	202.C.15	4.09	0.953	0.674	0.763	Pass
Elsewhere	202.C.13	3.56	0.735	0.867	0.522	Pass

End Bay Side Rail (Grid 3 End, Grid W)

SIDE RAIL ENTERED DATA

SYSTEM TYPE : C Sleeved System

Dimensions & Limits

Span :	8.000 m
Centres :	0.900 m
Deflection Limit :	Span / 150(53mm)
No. of Supports:	2
Cladding :	Restraining
Reference Face:	Face 4 (Side)

Design Loads in kN/m²

Cladding Weight:	0.125
Wind Pressure:	0.529

Stepped Loads(Suction): Wind on Face 1

From (m)	To (m)	Load
0	8.060	1.072
8.060	40.300	0.582
Elsewhere		0.288

SELECTED SIDE RAILS

Position	Reference	Weight (kg/m)	Load Capacity Ratios: Deflection	Wind Pressure	Wind Suction	Pass / Fail
Span 1+2	202.C.15	4.09	0.875	0.330	0.685	Pass
Elsewhere	202.C.15	4.09	0.389	0.330	0.363	Pass

End Bay Side Rail (Grid 29 End)

SIDE RAIL ENTERED DATA

SYSTEM TYPE : C Sleeved System

Dimensions & Limits

Span :	8.999 m
Centres :	0.900 m
Deflection Limit :	Span / 150(60mm)
No. of Supports:	2
Cladding :	Restraining
Reference Face:	Face 4 (Side)

Design Loads in kN/m²

Cladding Weight:	0.125
Wind Pressure:	0.529

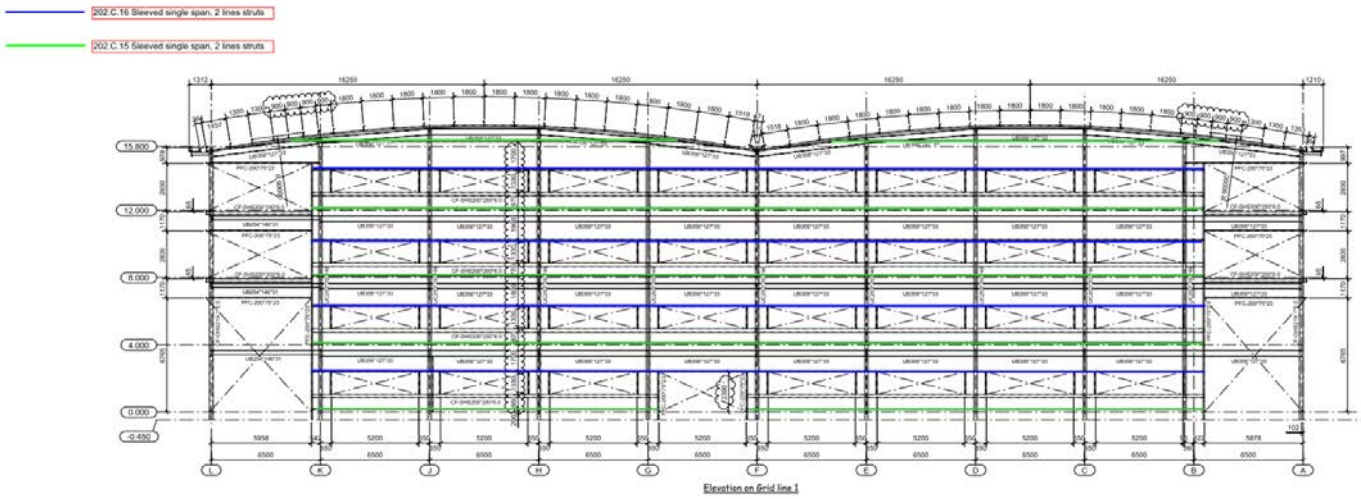
Stepped Loads(Suction): Wind on Face 1

From (m)	To (m)	Load
0	8.060	1.072
8.060	40.300	0.582
Elsewhere		0.288

SELECTED SIDE RAILS

Position	Reference	Weight (kg/m)	Load Capacity Ratios: Deflection	Wind Pressure	Wind Suction	Pass / Fail
Span 1+2	202.C.20	5.40	0.926	0.270	0.552	Pass
Elsewhere	202.C.13	3.56	0.624	0.538	0.592	Pass

Office


202.C.16 Sleeved single span, 2 lines struts
202.C.15 Sleeved single span, 2 lines struts
Elevation on Grid line 1

Portal Frames

REV	Date	Notes
C01	January 2022	Preliminary Issue

Contents

Introduction 2

Portal Frame design output 3

REFERENCE: Hit Frame - Docks Design 3

REFERENCE: Miss Frame - Docks Design 35

REFERENCE: Gridline 27 - Design 61

REFERENCE: Gridline 28/26 - Design 93

Typical Deflections 118

Introduction

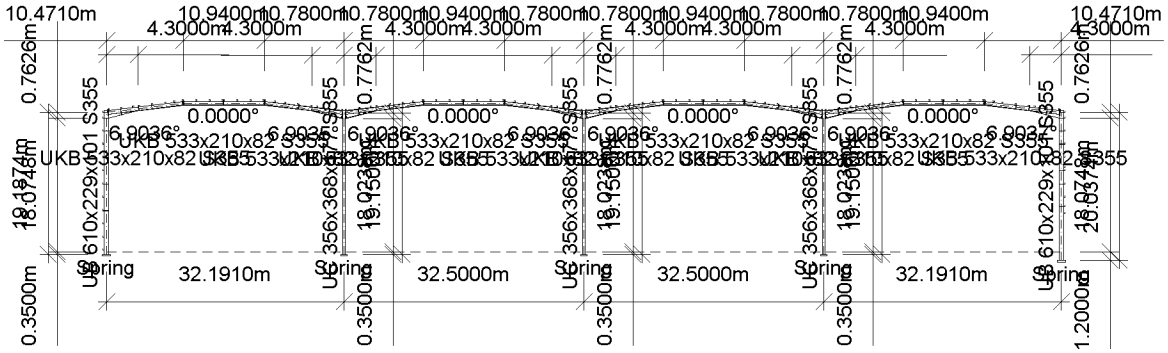
The Portal Frames are designed elasto-plastically as 2D frames in Tekla Portal Frame Designer.

The lateral loads from the miss frames are resisted by the hit frames. For each loadcase, loads are applied to the valley in opposite directions and adjusted until the valley deflections for the hit and miss frames are similar. For the Hit and miss frame areas the loads are equal and opposite.

Portal Frame design output

REFERENCE: Hit Frame - Docks Design

Frame Diagram



Member Restraints

Span 1 Lh Column

Position [m]	Type
0.0	Torsional
0.5500	O/S Flange
2.3000	O/S Flange
4.1000	O/S Flange
5.9000	Torsional
7.7000	O/S Flange
9.5000	Torsional
11.3000	O/S Flange
13.1000	Torsional
14.9000	O/S Flange
16.7000	Torsional
18.4248	Torsional
19.1874	Torsional

Span 1 Rh Column

Not restrained

Span 2 Rh Column

Not restrained

Span 3 Rh Column

Not restrained

Span 4 Rh Column

Position [m]	Type
0.0	Torsional
6.3500	O/S Flange
7.3000	Torsional
8.5500	O/S Flange
10.3500	Torsional
12.1500	Torsional
12.6000	O/S Flange
13.9500	O/S Flange
15.7500	Torsional
17.5500	Torsional
19.2748	Torsional
20.0374	Torsional

Span 1 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.2000	O/S Flange
10.4000	Torsional

Span 1 Flat Rafter

Position [m]	Type
0.0	Torsional
1.8000	O/S Flange
3.6000	O/S Flange
5.4000	Torsional
5.5400	O/S Flange
7.3400	O/S Flange
9.1400	O/S Flange
10.9400	Torsional

Span 1 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 2 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 2 Flat Rafter

Position [m]	Type
0.0	Torsional
1.8000	O/S Flange
3.6000	O/S Flange
5.4000	Torsional
5.5400	O/S Flange
7.3400	O/S Flange
9.1400	O/S Flange
10.9400	Torsional

Span 2 Rh Rafter

Position [m]	Type
0.3000	Torsional
2.1000	Torsional
3.6000	O/S Flange
4.4000	Torsional

Position [m]	Type
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 3 Lh Rafter

Position [m]	Type
0.3000	Torsional
2.1000	Torsional
3.6000	O/S Flange
4.3750	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 3 Flat Rafter

Position [m]	Type
0.0	Torsional
1.8000	O/S Flange
3.6000	O/S Flange
5.4000	Torsional
5.5400	O/S Flange
7.3400	O/S Flange
9.1400	O/S Flange
10.9400	Torsional

Span 3 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 4 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 4 Flat Rafter

Position [m]	Type
0.0	Torsional
1.8000	O/S Flange
3.6000	O/S Flange
5.4000	Torsional
5.5400	O/S Flange
7.3400	O/S Flange
9.1400	O/S Flange
10.9400	Torsional

Span 4 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.2000	O/S Flange
10.4000	Torsional

Loadcases

Frame Dead Load (Dead)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Sheeting	Span 1	Vert.	0.180	-	-	-	8.0000
Sheeting	Span 2	Vert.	0.180	-	-	-	8.0000
Sheeting	Span 3	Vert.	0.180	-	-	-	8.0000
Sheeting	Span 4	Vert.	0.180	-	-	-	8.0000

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	84.20	-	19.1500
Force	Span 2 Rh Column	Vert.	84.20	-	19.1500
Force	Span 3 Rh Column	Vert.	84.20	-	19.1500

Frame Service Load (Dead)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Span Area	Span 1	Vert.	0.250	-	-	-	8.0000
Span Area	Span 2	Vert.	0.250	-	-	-	8.0000
Span Area	Span 3	Vert.	0.250	-	-	-	8.0000
Span Area	Span 4	Vert.	0.250	-	-	-	8.0000

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	65.87	-	19.1500
Force	Span 2 Rh Column	Vert.	64.43	-	19.1500
Force	Span 3 Rh Column	Vert.	65.87	-	19.1500

Frame Imposed Load (Imposed)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Span Area	Span 1	Vert.	0.600	-	-	-	8.0000
Span Area	Span 2	Vert.	0.600	-	-	-	8.0000
Span Area	Span 3	Vert.	0.600	-	-	-	8.0000
Span Area	Span 4	Vert.	0.600	-	-	-	8.0000

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	157.63	-	19.1500
Force	Span 2 Rh Column	Vert.	154.64	-	19.1500
Force	Span 3 Rh Column	Vert.	157.63	-	19.1500

SWL+

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.2347	m

Building effective height, H_e	20.2347	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	270.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.875	-0.3000	0.5300	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.889	-0.3000	-1.4000	4.0765	13.2382	0.7530	0.6160	100.00
Span 1 Lh Rafter			-0.7000	6.4710				
Span 1 Flat Rafter	0.889	-0.3000	-0.7000	9.6342	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			0.2000	1.3058				
Span 1 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter			0.2000	6.7822				
Span 2 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			0.2000	6.8931				
Span 2 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter			0.2000	6.7822				
Span 3 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			0.2000	6.8931				
Span 3 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 4 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter			0.2000	6.7822				
Span 4 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			0.2000	6.8931				
Span 4 Rh Rafter	0.889	-0.3000	0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 4 Rh Column	0.875	-0.3000	-0.4420	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Horz.	4.45	-	19.1500
Force	Span 2 Rh Column	Horz.	4.45	-	19.1500
Force	Span 3 Rh Column	Horz.	4.45	-	19.1500
Force	Span 1 Rh Column	Vert.	53.33	-	19.1500
Force	Span 2 Rh Column	Vert.	84.07	-	19.1500
Force	Span 3 Rh Column	Vert.	73.71	-	19.1500

Snow Uniform (Snow)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Sheeting	Span 1	Vert.	0.395	-	-	-	8.0000
Sheeting	Span 2	Vert.	0.395	-	-	-	8.0000
Sheeting	Span 3	Vert.	0.395	-	-	-	8.0000
Sheeting	Span 4	Vert.	0.395	-	-	-	8.0000

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	107.29	-	19.1500
Force	Span 2 Rh Column	Vert.	101.48	-	19.1500
Force	Span 3 Rh Column	Vert.	107.29	-	19.1500

Stiffness (Dead)

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	10.00	-	0.0
Force	Span 3 Lh Rafter	Horz.	10.00	-	0.0
Force	Span 4 Lh Rafter	Horz.	10.00	-	0.0

SWL-

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	270.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m^2]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.875	-0.3000	0.5300	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.889	-0.3000	-1.4000	4.0504	13.2382	0.7530	0.6160	100.00
Span 1 Lh Rafter			-0.7000	6.4971				
Span 1 Flat Rafter	0.889	-0.3000	-0.7000	9.6342	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			-0.2000	1.3058				
Span 1 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter			-0.2000	6.8083				
Span 2 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			-0.2000	6.9190				
Span 2 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter			-0.2000	6.8083				
Span 3 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			-0.2000	6.9190				
Span 3 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter			-0.2000	6.8083				
Span 4 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			-0.2000	6.9190				
Span 4 Rh Rafter	0.889	-0.3000	-0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 4 Rh Column	0.875	-0.3000	-0.4420	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	-6.48	-	19.1500
Force	Span 2 Rh Column	Vert.	13.59	-	19.1500
Force	Span 3 Rh Column	Vert.	0.93	-	19.1500
Force	Span 2 Lh Rafter	Horz.	7.63	-	0.0
Force	Span 3 Lh Rafter	Horz.	7.63	-	0.0
Force	Span 4 Lh Rafter	Horz.	7.63	-	0.0

SWR+

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	129.3820	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	90.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.763	-0.3000	-0.4420	19.2874	20.8807	0.9129	0.6160	100.00
Span 1 Lh Rafter	0.776	-0.3000	0.2000	10.5475	13.2382	0.9411	0.6160	100.00
Span 1 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 1 Flat Rafter			0.2000	4.0210				
Span 1 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 1 Rh Rafter			0.2000	6.8083				
Span 2 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 2 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 2 Flat Rafter			0.2000	4.0210				
Span 2 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 2 Rh Rafter			0.2000	6.8083				
Span 3 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 3 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 3 Flat Rafter			0.2000	4.0210				
Span 3 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 3 Rh Rafter			0.2000	6.8083				
Span 4 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 4 Flat Rafter	0.776	-0.3000	0.2000	1.3058	13.5530	0.9396	0.6160	100.00
Span 4 Flat Rafter			-0.7000	9.6342				
Span 4 Rh Rafter	0.776	-0.3000	-0.7000	4.0504	13.2382	0.9411	0.6160	100.00
Span 4 Rh Rafter			-1.4000	6.4971				
Span 4 Rh Column	0.776	-0.3000	0.5300	20.4874	21.9939	0.9097	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	69.53	-	19.1500
Force	Span 2 Rh Column	Vert.	84.63	-	19.1500
Force	Span 3 Rh Column	Vert.	43.04	-	19.1500
Force	Span 2 Lh Rafter	Horz.	-3.36	-	0.0
Force	Span 3 Lh Rafter	Horz.	-3.36	-	0.0
Force	Span 4 Lh Rafter	Horz.	-3.36	-	0.0

SWR-

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	90.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m^2]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.763	-0.3000	-0.4420	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.776	-0.3000	-0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 1 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			-0.2000	4.0210				
Span 1 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 1 Rh Rafter			-0.2000	6.8083				
Span 2 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			-0.2000	4.0210				
Span 2 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 2 Rh Rafter			-0.2000	6.8083				
Span 3 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			-0.2000	4.0210				
Span 3 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 3 Rh Rafter			-0.2000	6.8083				
Span 4 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Flat Rafter	0.776	-0.3000	-0.2000	1.3058	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			-0.7000	9.6342				
Span 4 Rh Rafter	0.776	-0.3000	-0.7000	4.0504	13.2382	0.7530	0.6160	100.00
Span 4 Rh Rafter			-1.4000	6.4971				
Span 4 Rh Column	0.776	-0.3000	0.6000	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	-0.85	-	19.1500
Force	Span 2 Rh Column	Vert.	13.69	-	19.1500
Force	Span 3 Rh Column	Vert.	-9.94	-	19.1500
Force	Span 2 Lh Rafter	Horz.	-6.82	-	0.0
Force	Span 3 Lh Rafter	Horz.	-6.82	-	0.0
Force	Span 4 Lh Rafter	Horz.	-6.82	-	0.0

GW+

Frame is considered to be in Remote zone

Building Length	211.1000	m
Building Width	129.3820	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Lh Gap	38.3748	m
Rh Gap	40.0748	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	0.0	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m^2]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	1.056	-0.3000	-0.5000	19.1874	20.7884	0.7540	0.6160	100.00
Span 1 Lh Rafter	1.074	-0.3000	0.2000	10.5475	13.2382	0.7540	0.6160	100.00
Span 1 Flat Rafter	1.074	-0.3000	0.2000	10.9400	13.5530	0.7540	0.6160	100.00
Span 1 Rh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 2 Lh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 2 Flat Rafter	1.074	-0.3000	0.2000	10.9400	13.5530	0.7540	0.6160	100.00
Span 2 Rh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 3 Lh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 3 Flat Rafter	1.074	-0.3000	0.2000	10.9400	13.5530	0.7540	0.6160	100.00
Span 3 Rh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 4 Lh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 4 Flat Rafter	1.074	-0.3000	0.2000	10.9400	13.5530	0.7540	0.6160	100.00
Span 4 Rh Rafter	1.074	-0.3000	0.2000	10.5475	13.2382	0.7540	0.6160	100.00
Span 4 Rh Column	1.056	-0.3000	-0.5000	20.0374	21.5754	0.7540	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	101.94	-	19.1500
Force	Span 2 Rh Column	Vert.	88.28	-	19.1500
Force	Span 3 Rh Column	Vert.	100.84	-	19.1500

Snow Drift (Snow)

Area Loads

Load Type	Span Member	Direction	Load$_1$ [kN/m^2]	a [m]	Load$_2$ [kN/m^2]	b [m]	Centres [m]
Varying Area	Span 1 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	8.0000
Varying Area	Span 1 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 2 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 2 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	8.0000
Varying Area	Span 2 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	8.0000

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Varying Area	Span 2 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 3 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 3 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	8.0000
Varying Area	Span 3 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	8.0000
Varying Area	Span 3 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 4 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 4 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	8.0000

GW-

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	129.3820	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Lh Gap	38.3748	m
Rh Gap	40.0748	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	0.0	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	1.056	-0.3000	-0.8000	19.1874	20.7884	0.7540	0.6160	100.00
Span 1 Lh Rafter	1.074	-0.3000	-0.6000	10.5475	13.2382	0.7540	0.6160	100.00
Span 1 Flat Rafter	1.074	-0.3000	-0.3000	10.9400	13.5530	0.7540	0.6160	100.00
Span 1 Rh Rafter	1.074	-0.3000	-0.6000	10.8587	13.4875	0.7540	0.6160	100.00
Span 2 Lh Rafter	1.074	-0.3000	-0.6000	10.8587	13.4875	0.7540	0.6160	100.00
Span 2 Flat Rafter	1.074	-0.3000	-0.3000	10.9400	13.5530	0.7540	0.6160	100.00

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 2 Rh Rafter	1.074	-0.3000	-0.6000	10.8587	13.4875	0.7540	0.6160	100.00
Span 3 Lh Rafter	1.074	-0.3000	-0.6000	10.8587	13.4875	0.7540	0.6160	100.00
Span 3 Flat Rafter	1.074	-0.3000	-0.3000	10.9400	13.5530	0.7540	0.6160	100.00
Span 3 Rh Rafter	1.074	-0.3000	-0.6000	10.8587	13.4875	0.7540	0.6160	100.00
Span 4 Lh Rafter	1.074	-0.3000	-0.6000	10.8587	13.4875	0.7540	0.6160	100.00
Span 4 Flat Rafter	1.074	-0.3000	-0.3000	10.9400	13.5530	0.7540	0.6160	100.00
Span 4 Rh Rafter	1.074	-0.3000	-0.6000	10.5475	13.2382	0.7540	0.6160	100.00
Span 4 Rh Column	1.056	-0.3000	-0.8000	20.0374	21.5754	0.7540	0.6160	100.00

Combinations

Sw + Dead + Serv. + Imp.

Frame Imperfection on, left to right

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	0.0
Frame Dead Load	Dead	1.4000	0.0
Frame Service Load	Dead	1.4000	0.0
Frame Imposed Load	Imposed	1.6000	1.0000

D+S+I

Frame Imperfection on, right to left

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	0.0
Frame Dead Load	Dead	1.4000	0.0
Frame Service Load	Dead	1.4000	0.0
Frame Imposed Load	Imposed	1.6000	1.0000

D+S+SU+SWL+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
SWL+	Wind	1.2000	0.8000

D+SWL-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.0000	0.0
Frame Dead Load	Dead	1.0000	0.0
SWL-	Wind	1.4000	1.0000

Stiffness

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Stiffness	Dead	1.4000	1.0000

D+S+SU+SWR+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
SWR+	Wind	1.2000	0.8000

D+SWR-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.0000	0.0
Frame Dead Load	Dead	1.0000	0.0
SWR-	Wind	1.4000	1.0000

D+S+SU+GW+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
GW+	Wind	1.2000	0.8000

D+S+SDr

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	1.0000
Frame Dead Load	Dead	1.4000	1.0000
Frame Service Load	Dead	1.4000	1.0000
Snow Drift	Snow	1.0500	1.0000

SWL+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
SWL+	Wind	1.4000	1.0000

SWL-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
SWL-	Wind	1.4000	1.0000

SWR+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
SWR+	Wind	1.4000	1.0000

SWR-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
SWR-	Wind	1.4000	1.0000

Design Code: BS5950

Design Summary

Design Combination	Lambda p	Lambda r	Status
Sw + Dead + Serv. + Imp.	1.227	1.000	Pass
D+S+I	1.234	1.000	Pass
D+S+SU+SWL+	1.399	1.000	Pass
D+SWL-	4.505	1.000	Pass
D+S+SU+SWR+	1.408	1.000	Pass
D+SWR-	4.670	1.000	Pass
D+S+SU+GW+	1.339	1.000	Pass
D+S+SDr	2.315	1.000	Pass

Member Stability Status: Invalid

Design Cases

Sw + Dead + Serv. + Imp.

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.5	0.766
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.615
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.763
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.882
Span 1 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1144.2	0.104
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.775
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.563
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.692
Span 2 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1148.0	0.050
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.615
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.565
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.853
Span 3 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1144.2	0.048
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.807
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.756
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.582
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1018.4	0.835
Total Rafter					10684.23			
Total Column					14138.30			
Total Haunch					1521.86			
Total					26344.38			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.1398	1.1106	Formed	Span 1 Rh Rafter	4.3190	4.3190	
Event 2	1.1768	1.1467	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.1879	1.1575	Formed	Span 4 Rh Column	19.2750	19.2750	
Event 4	1.2517	1.2197	Formed	Span 1 Mono Rafter	5.4700	4.8119	
Event 5	1.2530	1.2210	Formed	Span 4 Mono Rafter	8.2050	7.4451	
Event 6	1.2587	1.2265	Formed	Span 4 Lh Rafter	4.2994	4.2994	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-39.451	1.550
10471.0	20105.2	1.728	343.614
15941.0	20105.2	1.614	384.727
21411.0	20105.2	1.500	265.700
32191.0	18800.0	32.877	4.078
32191.0	-350.0	0.0	0.001
32191.0	18800.0	32.877	4.078
42971.0	20105.2	50.134	148.701
48441.0	20105.2	50.031	213.280
53911.0	20105.2	49.927	158.940
64691.0	18800.0	68.435	3.909
64691.0	-350.0	0.0	0.001
64691.0	18800.0	68.435	3.909
75471.0	20105.2	88.064	168.072
80941.0	20105.2	87.961	213.036
86411.0	20105.2	87.858	139.136
97191.0	18800.0	103.939	4.078
97191.0	-350.0	0.0	0.001
97191.0	18800.0	103.939	4.078
107971.0	20105.2	136.576	275.933
113441.0	20105.2	136.463	386.297
118911.0	20105.2	136.350	336.267
129382.0	18837.0	176.625	1.659

Coord. X	Coord. Z	Delta X	Delta Y
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.631	Pass
Span 1 Mono Rafter	0.782	Pass
Span 1 Rh Rafter	0.905	Pass
Span 2 Lh Rafter	0.795	Pass
Span 2 Mono Rafter	0.578	Pass
Span 2 Rh Rafter	0.710	Pass
Span 3 Lh Rafter	0.631	Pass
Span 3 Mono Rafter	0.580	Pass
Span 3 Rh Rafter	0.875	Pass
Span 4 Lh Rafter	0.828	Pass
Span 4 Mono Rafter	0.775	Pass
Span 4 Rh Rafter	0.597	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.784	Pass
Span 1 Rh Column	0.129	Pass
Span 2 Rh Column	0.123	Pass
Span 3 Rh Column	0.129	Pass
Span 4 Rh Column	0.854	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.457	Pass
Span 1 Rh Rafter Rh Eaves	0.893	Pass
Span 2 Lh Rafter Lh Eaves	0.804	Pass
Span 2 Rh Rafter Rh Eaves	0.755	Pass
Span 3 Lh Rafter Lh Eaves	0.711	Pass
Span 3 Rh Rafter Rh Eaves	0.849	Pass
Span 4 Lh Rafter Lh Eaves	0.849	Pass
Span 4 Rh Rafter Rh Eaves	0.499	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-34.0/175.9	111.6	na	89.6	-10.1/175.6
Span 2	Pass	-10.1/175.6	50.0	na	55.8	2.1/175.6
Span 3	Pass	2.1/175.6	56.0	na	49.2	14.2/175.6
Span 4	Pass	14.2/175.6	91.4	na	113.7	38.6/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.2299		
Second order failure load factor λ_f	1.2265		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass

Member	Status
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Pass

D+S+I

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.4	0.841
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.572
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.747
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.808
Span 1 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1144.3	0.038
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.839
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.566
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.625
Span 2 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1148.0	0.038
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.682
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.563
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.788
Span 3 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1144.2	0.093
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.879
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.769
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.6	0.622
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1018.5	0.764
Total Rafter					10684.23			
Total Column					14138.30			
Total Haunch					1521.86			
Total					26344.38			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.1372	1.1136	Formed	Span 4 Lh Rafter	4.2994	4.2994	
Event 2	1.1833	1.1588	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 3	1.1874	1.1629	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 4	1.2443	1.2185	Formed	Span 4 Mono Rafter	8.2050	7.5005	
Event 5	1.2574	1.2314	Formed	Span 1 Mono Rafter	5.4700	4.8589	
Event 6	1.2605	1.2345	Formed	Span 4 Rh Column	19.2750	19.2750	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-158.940	1.578
10471.0	20105.2	-119.661	328.021
15941.0	20105.2	-119.779	377.460
21411.0	20105.2	-119.896	269.086
32191.0	18800.0	-88.108	4.054
32191.0	-350.0	0.0	0.001
32191.0	18800.0	-88.108	4.054
42971.0	20105.2	-71.798	140.878
48441.0	20105.2	-71.903	213.187
53911.0	20105.2	-72.007	166.966
64691.0	18800.0	-52.523	3.890

Coord. X	Coord. Z	Delta X	Delta Y
64691.0	-350.0	0.0	0.001
64691.0	18800.0	-52.523	3.890
75471.0	20105.2	-34.040	158.567
80941.0	20105.2	-34.140	211.265
86411.0	20105.2	-34.240	145.816
97191.0	18800.0	-17.340	4.060
97191.0	-350.0	0.0	0.001
97191.0	18800.0	-17.340	4.060
107971.0	20105.2	14.482	269.113
113441.0	20105.2	14.374	388.511
118911.0	20105.2	14.267	347.062
129382.0	18837.0	55.869	1.616
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.584	Pass
Span 1 Mono Rafter	0.763	Pass
Span 1 Rh Rafter	0.825	Pass
Span 2 Lh Rafter	0.857	Pass
Span 2 Mono Rafter	0.578	Pass
Span 2 Rh Rafter	0.638	Pass
Span 3 Lh Rafter	0.697	Pass
Span 3 Mono Rafter	0.574	Pass
Span 3 Rh Rafter	0.805	Pass
Span 4 Lh Rafter	0.897	Pass
Span 4 Mono Rafter	0.785	Pass
Span 4 Rh Rafter	0.635	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.856	Pass
Span 1 Rh Column	0.128	Pass
Span 2 Rh Column	0.123	Pass
Span 3 Rh Column	0.128	Pass
Span 4 Rh Column	0.778	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.502	Pass
Span 1 Rh Rafter Rh Eaves	0.845	Pass
Span 2 Lh Rafter Lh Eaves	0.837	Pass
Span 2 Rh Rafter Rh Eaves	0.713	Pass
Span 3 Lh Rafter Lh Eaves	0.746	Pass
Span 3 Rh Rafter Rh Eaves	0.808	Pass
Span 4 Lh Rafter Lh Eaves	0.888	Pass
Span 4 Rh Rafter Rh Eaves	0.453	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-34.0/175.9	111.6	na	89.6	-10.1/175.6
Span 2	Pass	-10.1/175.6	50.0	na	55.8	2.1/175.6
Span 3	Pass	2.1/175.6	56.0	na	49.2	14.2/175.6
Span 4	Pass	14.2/175.6	91.4	na	113.7	38.6/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.2298		
Second order failure load factor λ_f	1.2345		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				

Member	Status	Member	Status	Member	Status
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Pass

D+S+SU+SWL+

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.3	0.267
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.224
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.300
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.587
Span 1 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1162.2	0.079
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.446
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.526
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.703
Span 2 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1158.1	0.185
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.480
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.479
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.799
Span 3 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1156.6	0.123
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.634
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.658
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.487
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1019.2	0.784
Total Rafter					10684.23			
Total Column					14138.30			
Total Haunch					1521.86			
Total					26344.38			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.2570	1.2213	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 2	1.2697	1.2336	Formed	Span 4 Rh Column	19.2750	19.2750	
Event 3	1.3731	1.3340	Formed	Span 2 Rh Rafter	4.3197	4.3197	
Event 4	1.3894	1.3499	Formed	Span 4 Mono Rafter	8.2050	7.3467	
Event 5	1.4403	1.3993	Formed	Span 4 Lh Rafter	4.2994	4.2994	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	119.571	0.606
10471.0	20105.2	133.357	116.795

Coord. X	Coord. Z	Delta X	Delta Y
15941.0	20105.2	133.205	128.426
21411.0	20105.2	133.053	76.788
32191.0	18800.0	141.639	3.226
32191.0	-350.0	0.0	0.001
32191.0	18800.0	141.639	3.226
42971.0	20105.2	163.335	184.912
48441.0	20105.2	163.190	224.904
53911.0	20105.2	163.045	153.513
64691.0	18800.0	180.891	3.446
64691.0	-350.0	0.0	0.001
64691.0	18800.0	180.891	3.446
75471.0	20105.2	197.638	143.696
80941.0	20105.2	197.532	174.234
86411.0	20105.2	197.427	104.588
97191.0	18800.0	209.403	3.523
97191.0	-350.0	0.0	0.001
97191.0	18800.0	209.403	3.523
107971.0	20105.2	239.619	254.802
113441.0	20105.2	239.535	344.624
118911.0	20105.2	239.451	293.005
129382.0	18837.0	274.569	1.464
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.230	Pass
Span 1 Mono Rafter	0.309	Pass
Span 1 Rh Rafter	0.604	Pass
Span 2 Lh Rafter	0.459	Pass
Span 2 Mono Rafter	0.541	Pass
Span 2 Rh Rafter	0.724	Pass
Span 3 Lh Rafter	0.494	Pass
Span 3 Mono Rafter	0.493	Pass
Span 3 Rh Rafter	0.822	Pass
Span 4 Lh Rafter	0.652	Pass
Span 4 Mono Rafter	0.678	Pass
Span 4 Rh Rafter	0.501	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.274	Pass
Span 1 Rh Column	0.102	Pass
Span 2 Rh Column	0.185	Pass
Span 3 Rh Column	0.123	Pass
Span 4 Rh Column	0.804	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.192	Pass
Span 1 Rh Rafter Rh Eaves	0.610	Pass
Span 2 Lh Rafter Lh Eaves	0.572	Pass
Span 2 Rh Rafter Rh Eaves	0.722	Pass
Span 3 Lh Rafter Lh Eaves	0.584	Pass
Span 3 Rh Rafter Rh Eaves	0.775	Pass
Span 4 Lh Rafter Lh Eaves	0.700	Pass
Span 4 Rh Rafter Rh Eaves	0.464	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	57.3/175.9	-7.6	na	-11.8	54.5/175.6
Span 2	Pass	54.5/175.6	80.0	na	59.5	70.6/175.6
Span 3	Pass	70.6/175.6	52.3	na	35.2	80.6/175.6
Span 4	Pass	80.6/175.6	95.4	na	106.3	104.6/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.7251		
Second order failure load factor λ_f	1.3993		
Pass			

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Pass

D+SWL-

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.210
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.074
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.106
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.124
Span 1 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1190.7	0.147
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.169
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.169
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.293
Span 2 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1189.5	0.241
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.115
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.121
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.297
Span 3 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1189.9	0.201
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.136
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.157
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.173
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1021.6	0.294
Total Rafter					10684.23			
Total Column					14138.30			
Total Haunch					1521.86			
Total					26344.38			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	3.3776	3.2676	Formed	Span 3 Rh Rafter	4.3197	4.3197	

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 2	3.3810	3.2710	Formed	Span 4 Rh Column	19.2750	19.2750	
Event 3	3.4135	3.3024	Formed	Span 2 Rh Rafter	4.3197	4.3197	
Event 4	4.2122	4.0751	Formed	Span 2 Rh Column	18.3740	18.3740	
Event 5	4.2198	4.0824	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 6	4.4629	4.3177	Formed	Span 4 Mono Rafter	5.4700	4.8180	
Event 7	4.4850	4.3390	Formed	Span 2 Rh Column	0.0	0.0	
Event 8	4.5630	4.4145	Formed	Span 3 Rh Column	0.0	0.0	
Event 9	4.5908	4.4413	Formed	Span 2 Mono Rafter	2.7350	2.0042	
Event 10	4.6075	4.4575	Formed	Span 1 Rh Column	0.0	0.0	
Event 11	4.6563	4.5047	Formed	Span 1 Rh Rafter	4.3190	4.3190	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	267.146	-0.228
10471.0	20105.2	259.774	-59.694
15941.0	20105.2	259.673	-77.999
21411.0	20105.2	259.571	-72.745
32191.0	18800.0	250.503	0.644
32191.0	-350.0	0.0	0.0
32191.0	18800.0	250.503	0.644
42971.0	20105.2	259.771	78.438
48441.0	20105.2	259.687	67.598
53911.0	20105.2	259.603	28.946
64691.0	18800.0	262.828	0.893
64691.0	-350.0	0.0	0.0
64691.0	18800.0	262.828	0.893
75471.0	20105.2	267.708	41.814
80941.0	20105.2	267.668	32.882
86411.0	20105.2	267.629	3.457
97191.0	18800.0	267.856	0.823
97191.0	-350.0	0.0	0.0
97191.0	18800.0	267.856	0.823
107971.0	20105.2	276.963	76.164
113441.0	20105.2	276.960	82.212
118911.0	20105.2	276.958	55.522
129382.0	18837.0	283.605	0.439
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.077	Pass
Span 1 Mono Rafter	0.110	Pass
Span 1 Rh Rafter	0.128	Pass
Span 2 Lh Rafter	0.174	Pass
Span 2 Mono Rafter	0.174	Pass
Span 2 Rh Rafter	0.302	Pass
Span 3 Lh Rafter	0.119	Pass
Span 3 Mono Rafter	0.125	Pass
Span 3 Rh Rafter	0.307	Pass
Span 4 Lh Rafter	0.140	Pass
Span 4 Mono Rafter	0.162	Pass
Span 4 Rh Rafter	0.179	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.365	Pass
Span 1 Rh Column	0.152	Pass
Span 2 Rh Column	0.248	Pass
Span 3 Rh Column	0.208	Pass

Member	U.R.	Status
Span 4 Rh Column	0.304	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.106	Pass
Span 1 Rh Rafter Rh Eaves	0.117	Pass
Span 2 Lh Rafter Lh Eaves	0.099	Pass
Span 2 Rh Rafter Rh Eaves	0.274	Pass
Span 3 Lh Rafter Lh Eaves	0.058	Pass
Span 3 Rh Rafter Rh Eaves	0.274	Pass
Span 4 Lh Rafter Lh Eaves	0.085	Pass
Span 4 Rh Rafter Rh Eaves	0.173	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	126.2/175.9	-81.0	na	-76.1	107.0/175.6
Span 2	Pass	107.0/175.6	33.0	na	2.7	111.1/175.6
Span 3	Pass	111.1/175.6	7.8	na	-11.4	110.5/175.6
Span 4	Pass	110.5/175.6	19.8	na	4.3	113.5/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	12.3704		
Second order failure load factor λ_f	4.5047		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Invalid
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Pass

D+S+SU+SWR+

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1019.2	0.785
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.478
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.649
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.632
Span 1 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1157.3	0.111
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.779
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.475

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.494
Span 2 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1158.1	0.175
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.701
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.534
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.420
Span 3 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1164.1	0.054
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.516
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.217
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.106
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1021.5	0.177
Total Rafter					10684.23			
Total Column					14138.30			
Total Haunch					1521.86			
Total					26344.38			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.2709	1.2341	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 2	1.2790	1.2421	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 3	1.3746	1.3348	Formed	Span 3 Lh Rafter	4.2994	4.2994	
Event 4	1.4014	1.3609	Formed	Span 1 Mono Rafter	5.4700	4.9482	
Event 5	1.4502	1.4083	Formed	Span 1 Rh Rafter	4.3190	4.3190	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-255.514	1.390
10471.0	20105.2	-221.140	286.726
15941.0	20105.2	-221.222	337.746
21411.0	20105.2	-221.303	249.341
32191.0	18800.0	-191.750	3.486
32191.0	-350.0	0.0	0.001
32191.0	18800.0	-191.750	3.486
42971.0	20105.2	-179.688	105.064
48441.0	20105.2	-179.790	172.365
53911.0	20105.2	-179.891	140.254
64691.0	18800.0	-163.563	3.447
64691.0	-350.0	0.0	0.001
64691.0	18800.0	-163.563	3.447
75471.0	20105.2	-144.889	160.193
80941.0	20105.2	-145.030	234.074
86411.0	20105.2	-145.171	194.738
97191.0	18800.0	-122.271	3.119
97191.0	-350.0	0.0	0.001
97191.0	18800.0	-122.271	3.119
107971.0	20105.2	-117.742	42.842
113441.0	20105.2	-117.881	75.822
118911.0	20105.2	-118.019	62.909
129382.0	18837.0	-110.730	0.513
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.492	Pass
Span 1 Mono Rafter	0.668	Pass
Span 1 Rh Rafter	0.651	Pass
Span 2 Lh Rafter	0.802	Pass
Span 2 Mono Rafter	0.489	Pass
Span 2 Rh Rafter	0.508	Pass
Span 3 Lh Rafter	0.722	Pass
Span 3 Mono Rafter	0.550	Pass
Span 3 Rh Rafter	0.432	Pass

Member	U.R.	Status
Span 4 Lh Rafter	0.531	Pass
Span 4 Mono Rafter	0.223	Pass
Span 4 Rh Rafter	0.109	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.806	Pass
Span 1 Rh Column	0.111	Pass
Span 2 Rh Column	0.175	Pass
Span 3 Rh Column	0.099	Pass
Span 4 Rh Column	0.182	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.465	Pass
Span 1 Rh Rafter Rh Eaves	0.697	Pass
Span 2 Lh Rafter Lh Eaves	0.759	Pass
Span 2 Rh Rafter Rh Eaves	0.590	Pass
Span 3 Lh Rafter Lh Eaves	0.721	Pass
Span 3 Rh Rafter Rh Eaves	0.556	Pass
Span 4 Lh Rafter Lh Eaves	0.554	Pass
Span 4 Rh Rafter Rh Eaves	0.137	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-98.2/175.9	103.6	na	93.1	-74.8/175.6
Span 2	Pass	-74.8/175.6	35.0	na	50.3	-65.1/175.6
Span 3	Pass	-65.1/175.6	63.1	na	86.0	-47.7/175.6
Span 4	Pass	-47.7/175.6	-33.4	na	-41.8	-57.3/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.7743		
Second order failure load factor λ_f	1.4083		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Pass

D+SWR-

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.6	0.292
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.178
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.148
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.128
Span 1 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1190.0	0.187
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.277
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.114
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.107
Span 2 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1189.6	0.225
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.282
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.169
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.170
Span 3 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1190.8	0.129
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.087
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.147
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.147
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1021.9	0.376
Total Rafter					10684.23			
Total Column					14138.30			
Total Haunch					1521.86			
Total					26344.38			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	3.4061	3.2858	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 2	3.5270	3.4024	Formed	Span 3 Lh Rafter	4.2994	4.2994	
Event 3	3.5449	3.4197	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 4	4.0789	3.9348	Formed	Span 4 Rh Column	19.2750	19.2750	
Event 5	4.3690	4.2147	Formed	Span 2 Rh Column	18.3740	18.3740	
Event 6	4.6113	4.4485	Formed	Span 1 Mono Rafter	8.2050	7.4796	
Event 7	4.6453	4.4812	Formed	Span 2 Rh Column	0.0	0.0	
Event 8	4.6616	4.4970	Formed	Span 3 Mono Rafter	10.9400	10.3440	
Event 9	4.7121	4.5457	Formed	Span 1 Rh Column	0.0	0.0	
Event 10	4.7908	4.6217	Formed	Span 3 Rh Column	0.0	0.0	Pass
Event 11	4.8410	4.6700	Formed	Span 4 Mono Rafter	10.9400	9.8497	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-262.428	0.414
10471.0	20105.2	-256.610	48.734
15941.0	20105.2	-256.620	74.664
21411.0	20105.2	-256.631	69.998
32191.0	18800.0	-248.281	0.804
32191.0	-350.0	0.0	0.0
32191.0	18800.0	-248.281	0.804
42971.0	20105.2	-247.877	4.934
48441.0	20105.2	-247.923	32.286
53911.0	20105.2	-247.969	39.586
64691.0	18800.0	-243.370	0.894
64691.0	-350.0	0.0	0.0
64691.0	18800.0	-243.370	0.894
75471.0	20105.2	-239.794	31.843
80941.0	20105.2	-239.883	70.414
86411.0	20105.2	-239.972	80.768
97191.0	18800.0	-230.421	0.605
97191.0	-350.0	0.0	0.0

Coord. X	Coord. Z	Delta X	Delta Y
97191.0	18800.0	-230.421	0.605
107971.0	20105.2	-241.074	-85.917
113441.0	20105.2	-241.175	-102.059
118911.0	20105.2	-241.276	-88.537
129382.0	18837.0	-252.147	-0.207
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.185	Pass
Span 1 Mono Rafter	0.153	Pass
Span 1 Rh Rafter	0.133	Pass
Span 2 Lh Rafter	0.287	Pass
Span 2 Mono Rafter	0.119	Pass
Span 2 Rh Rafter	0.111	Pass
Span 3 Lh Rafter	0.293	Pass
Span 3 Mono Rafter	0.175	Pass
Span 3 Rh Rafter	0.176	Pass
Span 4 Lh Rafter	0.090	Pass
Span 4 Mono Rafter	0.152	Pass
Span 4 Rh Rafter	0.152	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.303	Pass
Span 1 Rh Column	0.194	Pass
Span 2 Rh Column	0.233	Pass
Span 3 Rh Column	0.133	Pass
Span 4 Rh Column	0.390	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.175	Pass
Span 1 Rh Rafter Rh Eaves	0.083	Pass
Span 2 Lh Rafter Lh Eaves	0.257	Pass
Span 2 Rh Rafter Rh Eaves	0.063	Pass
Span 3 Lh Rafter Lh Eaves	0.267	Pass
Span 3 Rh Rafter Rh Eaves	0.104	Pass
Span 4 Lh Rafter Lh Eaves	0.083	Pass
Span 4 Rh Rafter Rh Eaves	0.117	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-104.9/175.9	0.6	na	16.5	-102.8/175.6
Span 2	Pass	-102.8/175.6	-11.0	na	6.5	-103.5/175.6
Span 3	Pass	-103.5/175.6	4.1	na	34.4	-99.1/175.6
Span 4	Pass	-99.1/175.6	-84.8	na	-99.7	-121.6/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	12.5676		
Second order failure load factor λ_f	4.6700		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass

Member	Status
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Pass

D+S+SU+GW+

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1019.1	0.718
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.576
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.711
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.795
Span 1 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1151.7	0.073
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.751
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.517
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.606
Span 2 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1156.7	0.010
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.594
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.517
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.768
Span 3 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1151.7	0.059
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.792
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.719
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.585
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1019.1	0.715
Total Rafter					10684.23			
Total Column					14138.30			
Total Haunch					1521.86			
Total					26344.38			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.2621	1.2423	Formed	Span 4 Lh Rafter	4.2994	4.2994	
Event 2	1.2644	1.2446	Formed	Span 1 Rh Rafter	4.3190	4.3190	
Event 3	1.3433	1.3223	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 4	1.3575	1.3362	Formed	Span 4 Mono Rafter	8.2050	7.4964	
Event 5	1.3603	1.3390	Formed	Span 4 Rh Column	19.2750	19.2750	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-90.907	1.389
10471.0	20105.2	-52.326	321.192
15941.0	20105.2	-52.390	360.711
21411.0	20105.2	-52.454	252.047
32191.0	18800.0	-22.580	3.716
32191.0	-350.0	0.0	0.001
32191.0	18800.0	-22.580	3.716
42971.0	20105.2	-7.377	130.500

Coord. X	Coord. Z	Delta X	Delta Y
48441.0	20105.2	-7.427	193.322
53911.0	20105.2	-7.477	148.101
64691.0	18800.0	9.880	3.472
64691.0	-350.0	0.0	0.001
64691.0	18800.0	9.880	3.472
75471.0	20105.2	27.319	148.637
80941.0	20105.2	27.271	192.076
86411.0	20105.2	27.224	127.718
97191.0	18800.0	42.080	3.715
97191.0	-350.0	0.0	0.001
97191.0	18800.0	42.080	3.715
107971.0	20105.2	72.719	258.144
113441.0	20105.2	72.663	368.096
118911.0	20105.2	72.606	327.932
129382.0	18837.0	112.009	1.454
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.585	Pass
Span 1 Mono Rafter	0.722	Pass
Span 1 Rh Rafter	0.807	Pass
Span 2 Lh Rafter	0.763	Pass
Span 2 Mono Rafter	0.525	Pass
Span 2 Rh Rafter	0.616	Pass
Span 3 Lh Rafter	0.603	Pass
Span 3 Mono Rafter	0.525	Pass
Span 3 Rh Rafter	0.780	Pass
Span 4 Lh Rafter	0.804	Pass
Span 4 Mono Rafter	0.731	Pass
Span 4 Rh Rafter	0.594	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.727	Pass
Span 1 Rh Column	0.117	Pass
Span 2 Rh Column	0.109	Pass
Span 3 Rh Column	0.117	Pass
Span 4 Rh Column	0.724	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.413	Pass
Span 1 Rh Rafter Rh Eaves	0.802	Pass
Span 2 Lh Rafter Lh Eaves	0.751	Pass
Span 2 Rh Rafter Rh Eaves	0.667	Pass
Span 3 Lh Rafter Lh Eaves	0.660	Pass
Span 3 Rh Rafter Rh Eaves	0.760	Pass
Span 4 Lh Rafter Lh Eaves	0.801	Pass
Span 4 Rh Rafter Rh Eaves	0.410	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-35.7/175.9	123.7	na	97.1	-9.3/175.6
Span 2	Pass	-9.3/175.6	50.7	na	57.3	3.3/175.6
Span 3	Pass	3.3/175.6	57.6	na	49.5	15.8/175.6
Span 4	Pass	15.8/175.6	99.9	na	126.9	42.9/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.4517		
Second order failure load factor λ_f	1.3390		
Pass			

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Pass

D+S+SDr

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1020.9	0.400
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.272
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.383
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.502
Span 1 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1170.5	0.011
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.509
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.370
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.471
Span 2 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1170.9	0.004
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.466
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.370
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.516
Span 3 Rh Column	UC 356x368x177	S355	19.1500	177.02	3389.99	1192.1	1170.4	0.016
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.501
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.387
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.277
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1020.9	0.398
Total Rafter					10684.23			
Total Column					14138.30			
Total Haunch					1521.86			
Total					26344.38			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.9490	1.8940	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 2	1.9636	1.9082	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 3	2.0288	1.9716	Formed	Span 4 Lh Rafter	4.2994	4.2994	
Event 4	2.0313	1.9740	Formed	Span 1 Rh Rafter	4.3190	4.3190	
Event 5	2.0863	2.0275	Formed	Span 2 Rh Rafter	4.3197	4.3197	
Event 6	2.0983	2.0391	Formed	Span 3 Lh Rafter	4.2994	4.2994	
Event 7	2.3311	2.2654	Formed	Span 3 Mono Rafter	5.4700	5.4285	

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 8	2.3311	2.2654	Reversed	Span 4 Lh Rafter	4.2994	4.2994	
Event 9	2.3316	2.2659	Formed	Span 2 Mono Rafter	5.4700	5.4700	
Event 10	2.3333	2.2675	Formed	Span 4 Rh Column	19.2750	19.2750	
Event 11	2.3338	2.2680	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 12	2.3361	2.2702	Formed	Span 2 Rh Rafter	4.3197	4.3197	Pass
Event 13	2.3400	2.2741	Formed	Span 4 Mono Rafter	5.4700	5.2770	Pass
Event 14	2.3426	2.2765	Formed	Span 1 Mono Rafter	8.2050	7.0367	Pass
Event 15	2.3820	2.3148	Formed	Span 4 Lh Rafter	4.2994	4.2994	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-60.706	0.790
10471.0	20105.2	-40.542	168.325
15941.0	20105.2	-40.600	198.118
21411.0	20105.2	-40.658	144.525
32191.0	18800.0	-23.655	2.715
32191.0	-350.0	0.0	0.001
32191.0	18800.0	-23.655	2.715
42971.0	20105.2	-10.098	116.015
48441.0	20105.2	-10.159	158.423
53911.0	20105.2	-10.219	120.754
64691.0	18800.0	3.908	2.683
64691.0	-350.0	0.0	0.001
64691.0	18800.0	3.908	2.683
75471.0	20105.2	18.065	120.906
80941.0	20105.2	18.005	157.859
86411.0	20105.2	17.946	114.847
97191.0	18800.0	31.354	2.717
97191.0	-350.0	0.0	0.001
97191.0	18800.0	31.354	2.717
107971.0	20105.2	48.687	147.139
113441.0	20105.2	48.632	201.373
118911.0	20105.2	48.577	171.371
129382.0	18837.0	69.109	0.829
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.280	Pass
Span 1 Mono Rafter	0.394	Pass
Span 1 Rh Rafter	0.517	Pass
Span 2 Lh Rafter	0.524	Pass
Span 2 Mono Rafter	0.381	Pass
Span 2 Rh Rafter	0.485	Pass
Span 3 Lh Rafter	0.480	Pass
Span 3 Mono Rafter	0.380	Pass
Span 3 Rh Rafter	0.531	Pass
Span 4 Lh Rafter	0.516	Pass
Span 4 Mono Rafter	0.398	Pass
Span 4 Rh Rafter	0.285	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.411	Pass
Span 1 Rh Column	0.087	Pass

Member	U.R.	Status
Span 2 Rh Column	0.086	Pass
Span 3 Rh Column	0.087	Pass
Span 4 Rh Column	0.409	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.242	Pass
Span 1 Rh Rafter Rh Eaves	0.609	Pass
Span 2 Lh Rafter Lh Eaves	0.611	Pass
Span 2 Rh Rafter Rh Eaves	0.589	Pass
Span 3 Lh Rafter Lh Eaves	0.586	Pass
Span 3 Rh Rafter Rh Eaves	0.615	Pass
Span 4 Lh Rafter Lh Eaves	0.609	Pass
Span 4 Rh Rafter Rh Eaves	0.240	Pass

Serviceability

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	3.4265		
Second order failure load factor λ_f	2.3148		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

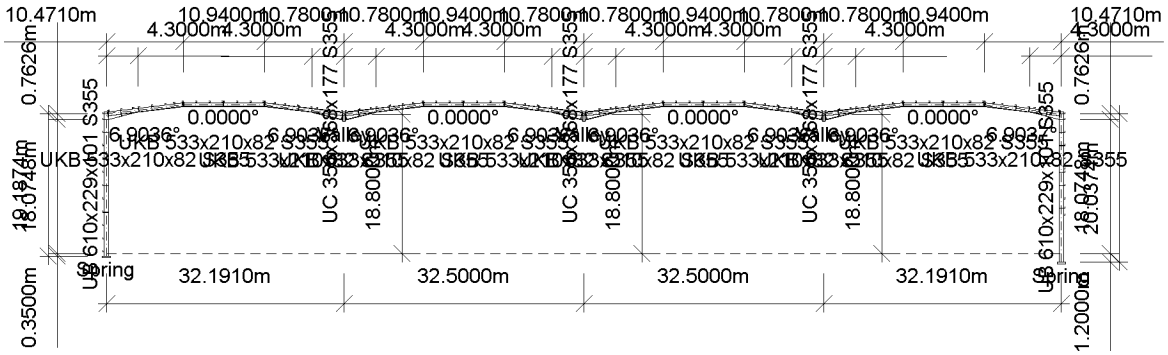
Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Pass

REFERENCE: Miss Frame - Docks Design

Frame Diagram



Member Restraints

Span 1 Lh Column

Position [m]	Type
0.0	Torsional
0.5500	O/S Flange
2.3000	O/S Flange
4.1000	O/S Flange
5.9000	Torsional
7.7000	O/S Flange
9.5000	Torsional
11.3000	O/S Flange
13.1000	Torsional
14.9000	O/S Flange
16.7000	Torsional
18.4248	Torsional
19.1874	Torsional

Span 1 Rh Column

Not restrained

Span 2 Rh Column

Not restrained

Span 3 Rh Column

Not restrained

Span 4 Rh Column

Position [m]	Type
0.0	Torsional
6.3500	O/S Flange
7.3000	Torsional
8.5500	O/S Flange
10.3500	Torsional
12.1500	Torsional
12.6000	O/S Flange
13.9500	O/S Flange
15.7500	Torsional
17.5500	Torsional
19.2748	Torsional
20.0374	Torsional

Span 1 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional

Position [m]	Type
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.2000	O/S Flange
10.4000	Torsional

Span 1 Flat Rafter

Position [m]	Type
0.0	Torsional
1.8000	O/S Flange
3.6000	O/S Flange
5.4000	Torsional
5.5400	O/S Flange
7.3400	O/S Flange
9.1400	O/S Flange
10.9400	Torsional

Span 1 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 2 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 2 Flat Rafter

Position [m]	Type
0.0	Torsional
1.8000	O/S Flange
3.6000	O/S Flange
5.4000	Torsional
5.5400	O/S Flange
7.3400	O/S Flange
9.1400	O/S Flange
10.9400	Torsional

Span 2 Rh Rafter

Position [m]	Type
0.3000	Torsional
2.1000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Position [m]	Type
10.8000	Torsional

Span 3 Lh Rafter

Position [m]	Type
0.3000	Torsional
2.1000	Torsional
3.6000	O/S Flange
4.3750	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 3 Flat Rafter

Position [m]	Type
0.0	Torsional
1.8000	O/S Flange
3.6000	O/S Flange
5.4000	Torsional
5.5400	O/S Flange
7.3400	O/S Flange
9.1400	O/S Flange
10.9400	Torsional

Span 3 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 4 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 4 Flat Rafter

Position [m]	Type
0.0	Torsional
1.8000	O/S Flange
3.6000	O/S Flange
5.4000	Torsional
5.5400	O/S Flange
7.3400	O/S Flange
9.1400	O/S Flange
10.9400	Torsional

Span 4 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.2000	O/S Flange
10.4000	Torsional

Loadcases

Frame Dead Load (Dead)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Sheeting	Span 1	Vert.	0.180	-	-	-	8.0000
Sheeting	Span 2	Vert.	0.180	-	-	-	8.0000
Sheeting	Span 3	Vert.	0.180	-	-	-	8.0000
Sheeting	Span 4	Vert.	0.180	-	-	-	8.0000

Frame Service Load (Dead)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Span Area	Span 1	Vert.	0.250	-	-	-	8.0000
Span Area	Span 2	Vert.	0.250	-	-	-	8.0000
Span Area	Span 3	Vert.	0.250	-	-	-	8.0000
Span Area	Span 4	Vert.	0.250	-	-	-	8.0000

Frame Imposed Load (Imposed)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Span Area	Span 1	Vert.	0.600	-	-	-	8.0000
Span Area	Span 2	Vert.	0.600	-	-	-	8.0000
Span Area	Span 3	Vert.	0.600	-	-	-	8.0000
Span Area	Span 4	Vert.	0.600	-	-	-	8.0000

SWL+

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.2347	m
Building effective height, H_e	20.2347	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	270.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.875	-0.3000	0.5300	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.889	-0.3000	-1.4000	4.0765	13.2382	0.7530	0.6160	100.00
Span 1 Lh Rafter			-0.7000	6.4710				
Span 1 Flat Rafter	0.889	-0.3000	-0.7000	9.6342	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			0.2000	1.3058				
Span 1 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter			0.2000	6.7822				
Span 2 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			0.2000	6.8931				
Span 2 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter			0.2000	6.7822				
Span 3 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			0.2000	6.8931				
Span 3 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter			0.2000	6.7822				
Span 4 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			0.2000	6.8931				
Span 4 Rh Rafter	0.889	-0.3000	0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 4 Rh Column	0.875	-0.3000	-0.4420	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	-4.45	-	0.0
Force	Span 3 Lh Rafter	Horz.	-4.45	-	0.0
Force	Span 4 Lh Rafter	Horz.	-4.45	-	0.0

Snow Uniform (Snow)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Sheeting	Span 1	Vert.	0.395	-	-	-	8.0000
Sheeting	Span 2	Vert.	0.395	-	-	-	8.0000
Sheeting	Span 3	Vert.	0.395	-	-	-	8.0000
Sheeting	Span 4	Vert.	0.395	-	-	-	8.0000

Stiffness (Dead)

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	10.00	-	0.0
Force	Span 3 Lh Rafter	Horz.	10.00	-	0.0
Force	Span 4 Lh Rafter	Horz.	10.00	-	0.0

SWL-

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	270.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m^2]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.875	-0.3000	0.5300	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.889	-0.3000	-1.4000	4.0504	13.2382	0.7530	0.6160	100.00
Span 1 Lh Rafter			-0.7000	6.4971				
Span 1 Flat Rafter	0.889	-0.3000	-0.7000	9.6342	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			-0.2000	1.3058				
Span 1 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter			-0.2000	6.8083				
Span 2 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			-0.2000	6.9190				
Span 2 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter			-0.2000	6.8083				
Span 3 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			-0.2000	6.9190				
Span 3 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter			-0.2000	6.8083				
Span 4 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			-0.2000	6.9190				
Span 4 Rh Rafter	0.889	-0.3000	-0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 4 Rh Column	0.875	-0.3000	-0.4420	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	-7.63	-	0.0
Force	Span 3 Lh Rafter	Horz.	-7.63	-	0.0
Force	Span 4 Lh Rafter	Horz.	-7.63	-	0.0

SWR+

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	129.3820	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	90.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.763	-0.3000	-0.4420	19.2874	20.8807	0.9129	0.6160	100.00
Span 1 Lh Rafter	0.776	-0.3000	0.2000	10.5475	13.2382	0.9411	0.6160	100.00
Span 1 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 1 Flat Rafter			0.2000	4.0210				
Span 1 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 1 Rh Rafter			0.2000	6.8083				
Span 2 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 2 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 2 Flat Rafter			0.2000	4.0210				
Span 2 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 2 Rh Rafter			0.2000	6.8083				
Span 3 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 3 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 3 Flat Rafter			0.2000	4.0210				
Span 3 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 3 Rh Rafter			0.2000	6.8083				
Span 4 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 4 Flat Rafter	0.776	-0.3000	0.2000	1.3058	13.5530	0.9396	0.6160	100.00
Span 4 Flat Rafter			-0.7000	9.6342				
Span 4 Rh Rafter	0.776	-0.3000	-0.7000	4.0504	13.2382	0.9411	0.6160	100.00
Span 4 Rh Rafter			-1.4000	6.4971				
Span 4 Rh Column	0.776	-0.3000	0.5300	20.4874	21.9939	0.9097	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	3.36	-	0.0
Force	Span 3 Lh Rafter	Horz.	3.36	-	0.0
Force	Span 4 Lh Rafter	Horz.	3.36	-	0.0

SWR-

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	

Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	90.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.763	-0.3000	-0.4420	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.776	-0.3000	-0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 1 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			-0.2000	4.0210				
Span 1 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 1 Rh Rafter			-0.2000	6.8083				
Span 2 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			-0.2000	4.0210				
Span 2 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 2 Rh Rafter			-0.2000	6.8083				
Span 3 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			-0.2000	4.0210				
Span 3 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 3 Rh Rafter			-0.2000	6.8083				
Span 4 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Flat Rafter	0.776	-0.3000	-0.2000	1.3058	13.5530	0.7530	0.6160	100.00

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 4 Flat Rafter			-0.7000	9.6342				
Span 4 Rh Rafter	0.776	-0.3000	-0.7000	4.0504	13.2382	0.7530	0.6160	100.00
Span 4 Rh Rafter			-1.4000	6.4971				
Span 4 Rh Column	0.776	-0.3000	0.6000	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	6.82	-	0.0
Force	Span 3 Lh Rafter	Horz.	6.82	-	0.0
Force	Span 4 Lh Rafter	Horz.	6.82	-	0.0

GW+

Frame is considered to be in Remote zone

Building Length	211.1000	m
Building Width	129.3820	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Lh Gap	38.3748	m
Rh Gap	40.0748	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	0.0	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	1.056	-0.3000	-0.5000	19.1874	20.7884	0.7540	0.6160	100.00
Span 1 Lh Rafter	1.074	-0.3000	0.2000	10.5475	13.2382	0.7540	0.6160	100.00
Span 1 Flat Rafter	1.074	-0.3000	0.2000	10.9400	13.5530	0.7540	0.6160	100.00

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Rh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 2 Lh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 2 Flat Rafter	1.074	-0.3000	0.2000	10.9400	13.5530	0.7540	0.6160	100.00
Span 2 Rh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 3 Lh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 3 Flat Rafter	1.074	-0.3000	0.2000	10.9400	13.5530	0.7540	0.6160	100.00
Span 3 Rh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 4 Lh Rafter	1.074	-0.3000	0.2000	10.8587	13.4875	0.7540	0.6160	100.00
Span 4 Flat Rafter	1.074	-0.3000	0.2000	10.9400	13.5530	0.7540	0.6160	100.00
Span 4 Rh Rafter	1.074	-0.3000	0.2000	10.5475	13.2382	0.7540	0.6160	100.00
Span 4 Rh Column	1.056	-0.3000	-0.5000	20.0374	21.5754	0.7540	0.6160	100.00

Snow Drift (Snow)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Varying Area	Span 1 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	8.0000
Varying Area	Span 1 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 2 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 2 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	8.0000
Varying Area	Span 2 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	8.0000
Varying Area	Span 2 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 3 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 3 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	8.0000
Varying Area	Span 3 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	8.0000
Varying Area	Span 3 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 4 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	8.0000
Varying Area	Span 4 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	8.0000

Combinations

Sw + Dead + Serv. + Imp.

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	0.0
Frame Dead Load	Dead	1.4000	0.0
Frame Service Load	Dead	1.4000	0.0
Frame Imposed Load	Imposed	1.6000	1.0000

D+S+SU+SWL+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
SWL+	Wind	1.2000	0.8000

D+SWL-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.0000	0.0
Frame Dead Load	Dead	1.0000	0.0
SWL-	Wind	1.4000	1.0000

Stiffness

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Stiffness	Dead	1.4000	1.0000

D+S+SU+SWR+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
SWR+	Wind	1.2000	0.8000

D+SWR-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.0000	0.0
Frame Dead Load	Dead	1.0000	0.0
SWR-	Wind	1.4000	1.0000

D+S+SU+GW+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
GW+	Wind	1.2000	0.8000

D+S+SDr

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	1.0000
Frame Dead Load	Dead	1.4000	1.0000
Frame Service Load	Dead	1.4000	1.0000
Snow Drift	Snow	1.0500	1.0000

SWL+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
SWL+	Wind	1.4000	1.0000

SWL-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
SWL-	Wind	1.4000	1.0000

SWR+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
SWR+	Wind	1.4000	1.0000

SWR-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
SWR-	Wind	1.4000	1.0000

Design Code: BS5950

Design Summary

Design Combination	Lambda p	Lambda r	Status
Sw + Dead + Serv. + Imp.	1.179	1.000	Pass
D+S+SU+SWL+	1.362	1.000	Pass
D+SWL-	3.278	1.000	Pass
D+S+SU+SWR+	1.362	1.000	Pass
D+SWR-	3.186	1.000	Pass
D+S+SU+GW+	1.291	1.000	Pass
D+S+SDr	2.301	1.000	Pass

Member Stability Status: Invalid

Design Cases

Sw + Dead + Serv. + Imp.

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.4	0.795
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.615
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.780
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.808
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.866
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.548
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.628
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.626
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.555
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.852
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.801
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.760
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.586
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1018.4	0.832
Total Rafter					10684.23			
Total Column					3968.32			
Total Haunch					1522.05			
Total					16174.60			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.1549	1.0812	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 2	1.1827	1.1072	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.1905	1.1145	Formed	Span 4 Rh Column	19.2750	19.2750	
Event 4	1.2214	1.1434	Formed	Span 1 Mono Rafter	5.4700	4.8693	
Event 5	1.2398	1.1606	Formed	Span 4 Lh Rafter	4.2994	4.2994	Pass
Event 6	1.2398	1.1606	Reversed	Span 3 Rh Rafter	4.3197	4.3197	Pass
Event 7	1.2436	1.1642	Formed	Span 3 Mono Rafter	5.4700	4.8140	Pass
Event 8	1.2596	1.1792	Formed	Span 4 Mono Rafter	8.2050	7.4614	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-51.283	1.637
10471.0	20105.2	-6.792	371.160
15941.0	20105.2	-6.912	422.454
21411.0	20105.2	-7.031	301.401
32191.0	18800.0	29.152	0.0
42971.0	20105.2	44.089	125.750
48441.0	20105.2	43.970	200.707
53911.0	20105.2	43.850	156.149
64691.0	18800.0	62.465	0.0

Coord. X	Coord. Z	Delta X	Delta Y
75471.0	20105.2	81.832	162.271
80941.0	20105.2	81.713	208.570
86411.0	20105.2	81.593	133.516
97191.0	18800.0	97.454	0.0
107971.0	20105.2	132.084	288.439
113441.0	20105.2	131.965	404.440
118911.0	20105.2	131.845	352.459
129382.0	18837.0	174.059	1.727
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.657	Pass
Span 1 Mono Rafter	0.834	Pass
Span 1 Rh Rafter	0.862	Pass
Span 2 Lh Rafter	0.924	Pass
Span 2 Mono Rafter	0.585	Pass
Span 2 Rh Rafter	0.670	Pass
Span 3 Lh Rafter	0.668	Pass
Span 3 Mono Rafter	0.593	Pass
Span 3 Rh Rafter	0.910	Pass
Span 4 Lh Rafter	0.855	Pass
Span 4 Mono Rafter	0.811	Pass
Span 4 Rh Rafter	0.626	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.847	Pass
Span 4 Rh Column	0.886	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.495	Pass
Span 1 Rh Rafter Rh Eaves	0.888	Pass
Span 2 Lh Rafter Lh Eaves	0.889	Pass
Span 2 Rh Rafter Rh Eaves	0.745	Pass
Span 3 Lh Rafter Lh Eaves	0.745	Pass
Span 3 Rh Rafter Rh Eaves	0.882	Pass
Span 4 Lh Rafter Lh Eaves	0.881	Pass
Span 4 Rh Rafter Rh Eaves	0.518	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-22.5/175.9	117.1	na	95.8	2.9/172.4
Span 2	Pass	2.9/172.4	42.6	na	51.9	14.1/172.4
Span 3	Pass	14.1/172.4	53.2	na	44.3	25.6/172.4
Span 4	Pass	25.6/172.4	93.0	na	113.0	50.2/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.9405		
Second order failure load factor λ_f	1.1792		

Pass

In Plane Stability

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass

Member	Status
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 4 Rh Column	Pass

D+S+SU+SWL+ Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.4	0.177
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.311
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.362
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.616
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.547
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.536
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.593
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.609
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.471
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.673
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.640
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.595
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.6	0.405
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1019.1	0.865
Total Rafter					10684.23			
Total Column					3968.32			
Total Haunch					1522.05			
Total					16174.60			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.1531	1.0932	Formed	Span 4 Rh Column	19.2750	19.2750	
Event 2	1.3636	1.2928	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.4136	1.3401	Formed	Span 4 Mono Rafter	8.2050	7.4121	
Event 4	1.4229	1.3490	Formed	Span 1 Rh Rafter	4.3190	4.3190	Pass
Event 5	1.4362	1.3616	Formed	Span 2 Mono Rafter	8.2050	7.3071	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	353.750	0.586
10471.0	20105.2	374.193	171.569
15941.0	20105.2	374.052	180.183
21411.0	20105.2	373.911	111.459
32191.0	18800.0	387.099	0.0
42971.0	20105.2	408.997	183.135
48441.0	20105.2	408.871	238.943
53911.0	20105.2	408.744	177.381
64691.0	18800.0	429.933	0.0
75471.0	20105.2	444.821	125.039
80941.0	20105.2	444.709	171.986
86411.0	20105.2	444.597	117.043
97191.0	18800.0	458.502	0.0
107971.0	20105.2	484.137	213.634
113441.0	20105.2	484.039	293.577

Coord. X	Coord. Z	Delta X	Delta Y
118911.0	20105.2	483.941	242.780
129382.0	18837.0	512.941	1.524
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.328	Pass
Span 1 Mono Rafter	0.382	Pass
Span 1 Rh Rafter	0.649	Pass
Span 2 Lh Rafter	0.577	Pass
Span 2 Mono Rafter	0.565	Pass
Span 2 Rh Rafter	0.626	Pass
Span 3 Lh Rafter	0.642	Pass
Span 3 Mono Rafter	0.497	Pass
Span 3 Rh Rafter	0.710	Pass
Span 4 Lh Rafter	0.675	Pass
Span 4 Mono Rafter	0.628	Pass
Span 4 Rh Rafter	0.427	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.187	Pass
Span 4 Rh Column	0.910	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.132	Pass
Span 1 Rh Rafter Rh Eaves	0.650	Pass
Span 2 Lh Rafter Lh Eaves	0.648	Pass
Span 2 Rh Rafter Rh Eaves	0.676	Pass
Span 3 Lh Rafter Lh Eaves	0.676	Pass
Span 3 Rh Rafter Rh Eaves	0.714	Pass
Span 4 Lh Rafter Lh Eaves	0.713	Pass
Span 4 Rh Rafter Rh Eaves	0.529	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	77.8/175.9	-9.4	na	-21.2	73.8/172.4
Span 2	Pass	73.8/172.4	98.7	na	85.4	95.7/172.4
Span 3	Pass	95.7/172.4	31.6	na	31.4	103.1/172.4
Span 4	Pass	103.1/172.4	86.2	na	98.1	125.1/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	4.5007		
Second order failure load factor λ_f	1.3616		

Pass

In Plane Stability

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Invalid
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 4 Rh Column	Pass

D+SWL-Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.275
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.144
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.051
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.098
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.106
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.136
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.156
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.158
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.114
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.096
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.103
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.080
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.236
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1021.6	0.334
Total Rafter					10684.23			
Total Column					3968.32			
Total Haunch					1522.05			
Total					16174.60			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	2.9789	2.9688	Formed	Span 4 Rh Column	19.2750	19.2750	
Event 2	3.2893	3.2782	Formed	Span 1 Lh Column	18.4250	18.4250	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	438.439	-0.235
10471.0	20105.2	437.446	-7.207
15941.0	20105.2	437.357	-21.497
21411.0	20105.2	437.267	-26.243
32191.0	18800.0	433.927	0.0
42971.0	20105.2	441.038	59.700
48441.0	20105.2	440.975	66.431
53911.0	20105.2	440.913	45.419
64691.0	18800.0	446.287	0.0
75471.0	20105.2	449.880	30.289
80941.0	20105.2	449.845	45.765
86411.0	20105.2	449.810	37.830
97191.0	18800.0	454.317	0.0
107971.0	20105.2	455.441	9.486
113441.0	20105.2	455.433	8.705
118911.0	20105.2	455.425	-6.799
129382.0	18837.0	454.517	0.421
129382.0	-1200.0	0.0	0.0

Strength Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.144	Pass
Span 1 Mono Rafter	0.051	Pass
Span 1 Rh Rafter	0.098	Pass

Member	U.R.	Status
Span 2 Lh Rafter	0.107	Pass
Span 2 Mono Rafter	0.136	Pass
Span 2 Rh Rafter	0.157	Pass
Span 3 Lh Rafter	0.159	Pass
Span 3 Mono Rafter	0.114	Pass
Span 3 Rh Rafter	0.096	Pass
Span 4 Lh Rafter	0.104	Pass
Span 4 Mono Rafter	0.080	Pass
Span 4 Rh Rafter	0.237	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.394	Pass
Span 4 Rh Column	0.335	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.141	Pass
Span 1 Rh Rafter Rh Eaves	0.095	Pass
Span 2 Lh Rafter Lh Eaves	0.090	Pass
Span 2 Rh Rafter Rh Eaves	0.159	Pass
Span 3 Lh Rafter Lh Eaves	0.157	Pass
Span 3 Rh Rafter Rh Eaves	0.121	Pass
Span 4 Lh Rafter Lh Eaves	0.120	Pass
Span 4 Rh Rafter Rh Eaves	0.212	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	133.9/175.9	-78.8	na	-74.3	115.1/172.4
Span 2	Pass	115.1/172.4	42.3	na	26.4	123.3/172.4
Span 3	Pass	123.3/172.4	-7.5	na	-1.7	122.1/172.4
Span 4	Pass	122.1/172.4	-1.1	na	-8.7	121.0/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	30.5654		
Second order failure load factor λ_f	3.2782		

Pass

In Plane Stability

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 4 Rh Column	Pass

D+S+SU+SWR+

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1019.1	0.866
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.6	0.400

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.592
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.628
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.663
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.460
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.630
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.604
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.562
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.477
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.580
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.252
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.6	0.179
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1021.5	0.188
Total Rafter					10684.23			
Total Column					3968.32			
Total Haunch					1522.05			
Total					16174.60			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.1519	1.0895	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 2	1.3706	1.2964	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 3	1.4186	1.3417	Formed	Span 1 Mono Rafter	5.4700	4.9014	
Event 4	1.4329	1.3552	Formed	Span 4 Lh Rafter	4.2994	4.2994	Pass
Event 5	1.4403	1.3623	Formed	Span 3 Mono Rafter	5.4700	5.0748	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-471.670	1.452
10471.0	20105.2	-442.795	241.611
15941.0	20105.2	-442.891	293.274
21411.0	20105.2	-442.986	214.551
32191.0	18800.0	-417.248	0.0
42971.0	20105.2	-404.042	111.073
48441.0	20105.2	-404.148	162.976
53911.0	20105.2	-404.254	115.309
64691.0	18800.0	-390.546	0.0
75471.0	20105.2	-367.084	195.947
80941.0	20105.2	-367.201	265.756
86411.0	20105.2	-367.318	212.015
97191.0	18800.0	-341.914	0.0
107971.0	20105.2	-335.330	56.581
113441.0	20105.2	-335.458	105.681
118911.0	20105.2	-335.586	100.127
129382.0	18837.0	-323.763	0.483
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.422	Pass
Span 1 Mono Rafter	0.626	Pass
Span 1 Rh Rafter	0.663	Pass
Span 2 Lh Rafter	0.700	Pass
Span 2 Mono Rafter	0.486	Pass
Span 2 Rh Rafter	0.666	Pass
Span 3 Lh Rafter	0.639	Pass
Span 3 Mono Rafter	0.594	Pass
Span 3 Rh Rafter	0.505	Pass

Member	U.R.	Status
Span 4 Lh Rafter	0.613	Pass
Span 4 Mono Rafter	0.267	Pass
Span 4 Rh Rafter	0.189	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.913	Pass
Span 4 Rh Column	0.199	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.530	Pass
Span 1 Rh Rafter Rh Eaves	0.705	Pass
Span 2 Lh Rafter Lh Eaves	0.706	Pass
Span 2 Rh Rafter Rh Eaves	0.686	Pass
Span 3 Lh Rafter Lh Eaves	0.686	Pass
Span 3 Rh Rafter Rh Eaves	0.610	Pass
Span 4 Lh Rafter Lh Eaves	0.613	Pass
Span 4 Rh Rafter Rh Eaves	0.076	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-114.2/175.9	97.6	na	86.7	-92.2/172.4
Span 2	Pass	-92.2/172.4	27.6	na	25.7	-86.0/172.4
Span 3	Pass	-86.0/172.4	96.0	na	115.2	-60.7/172.4
Span 4	Pass	-60.7/172.4	-53.0	na	-50.3	-73.5/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	4.7547		
Second order failure load factor λ_f	1.3623		

Pass

In Plane Stability

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Invalid

Columns

Member	Status
Span 1 Lh Column	Fail
Span 4 Rh Column	Pass

D+SWR-

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.6	0.334
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.243
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.074
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.094
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.086
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.109
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.165

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.159
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.146
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.123
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.077
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.086
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.112
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1021.9	0.416
Total Rafter					10684.23			
Total Column					3968.32			
Total Haunch					1522.05			
Total					16174.60			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	2.9750	2.9681	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 2	3.1935	3.1861	Formed	Span 4 Rh Column	19.2750	19.2750	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-422.800	0.398
10471.0	20105.2	-424.280	-11.468
15941.0	20105.2	-424.296	4.242
21411.0	20105.2	-424.312	6.695
32191.0	18800.0	-423.541	0.0
42971.0	20105.2	-419.262	36.010
48441.0	20105.2	-419.303	42.387
53911.0	20105.2	-419.343	26.492
64691.0	18800.0	-416.223	0.0
75471.0	20105.2	-410.095	51.655
80941.0	20105.2	-410.160	75.630
86411.0	20105.2	-410.225	69.976
97191.0	18800.0	-401.873	0.0
107971.0	20105.2	-407.966	-49.027
113441.0	20105.2	-408.056	-55.208
118911.0	20105.2	-408.145	-43.453
129382.0	18837.0	-413.531	-0.217
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.244	Pass
Span 1 Mono Rafter	0.075	Pass
Span 1 Rh Rafter	0.094	Pass
Span 2 Lh Rafter	0.086	Pass
Span 2 Mono Rafter	0.110	Pass
Span 2 Rh Rafter	0.166	Pass
Span 3 Lh Rafter	0.159	Pass
Span 3 Mono Rafter	0.147	Pass
Span 3 Rh Rafter	0.124	Pass
Span 4 Lh Rafter	0.077	Pass
Span 4 Mono Rafter	0.086	Pass
Span 4 Rh Rafter	0.112	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.335	Pass
Span 4 Rh Column	0.417	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.218	Pass
Span 1 Rh Rafter Rh Eaves	0.112	Pass
Span 2 Lh Rafter Lh Eaves	0.114	Pass
Span 2 Rh Rafter Rh Eaves	0.159	Pass
Span 3 Lh Rafter Lh Eaves	0.161	Pass
Span 3 Rh Rafter Rh Eaves	0.073	Pass
Span 4 Lh Rafter Lh Eaves	0.076	Pass
Span 4 Rh Rafter Rh Eaves	0.150	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-115.4/175.9	-12.3	na	-3.4	-117.3/172.4
Span 2	Pass	-117.3/172.4	-2.5	na	-9.5	-118.8/172.4
Span 3	Pass	-118.8/172.4	29.7	na	48.0	-109.5/172.4
Span 4	Pass	-109.5/172.4	-87.1	na	-99.4	-132.3/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	28.4287		
Second order failure load factor λ_f	3.1861		

Pass

In Plane Stability

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 4 Rh Column	Pass

D+S+SU+GW+

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1019.1	0.705
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.603
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.741
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.756
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.816
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.499
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.573
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.570
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.509
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.798
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.747
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.713
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.564
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1019.1	0.753

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Total Rafter					10684.23			
Total Column					3968.32			
Total Haunch					1522.05			
Total					16174.60			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.2255	1.1628	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 2	1.2638	1.1992	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.3011	1.2346	Formed	Span 4 Rh Column	19.2750	19.2750	
Event 4	1.3104	1.2434	Formed	Span 1 Mono Rafter	5.4700	4.8244	
Event 5	1.3299	1.2619	Formed	Span 4 Lh Rafter	4.2994	4.2994	Pass
Event 6	1.3299	1.2619	Reversed	Span 3 Rh Rafter	4.3197	4.3197	Pass
Event 7	1.3350	1.2667	Formed	Span 3 Mono Rafter	5.4700	4.7701	Pass
Event 8	1.3603	1.2908	Formed	Span 4 Mono Rafter	8.2050	7.4898	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-28.513	1.445
10471.0	20105.2	14.481	357.716
15941.0	20105.2	14.417	403.023
21411.0	20105.2	14.353	287.209
32191.0	18800.0	48.931	0.0
42971.0	20105.2	61.886	108.448
48441.0	20105.2	61.822	177.400
53911.0	20105.2	61.757	139.074
64691.0	18800.0	78.418	0.0
75471.0	20105.2	96.053	147.038
80941.0	20105.2	95.989	187.586
86411.0	20105.2	95.925	118.470
97191.0	18800.0	110.077	0.0
107971.0	20105.2	142.644	270.461
113441.0	20105.2	142.579	379.695
118911.0	20105.2	142.515	333.463
129382.0	18837.0	182.562	1.530
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.635	Pass
Span 1 Mono Rafter	0.781	Pass
Span 1 Rh Rafter	0.796	Pass
Span 2 Lh Rafter	0.859	Pass
Span 2 Mono Rafter	0.526	Pass
Span 2 Rh Rafter	0.603	Pass
Span 3 Lh Rafter	0.601	Pass
Span 3 Mono Rafter	0.536	Pass
Span 3 Rh Rafter	0.841	Pass
Span 4 Lh Rafter	0.787	Pass
Span 4 Mono Rafter	0.752	Pass
Span 4 Rh Rafter	0.594	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.741	Pass
Span 4 Rh Column	0.791	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.420	Pass
Span 1 Rh Rafter Rh Eaves	0.813	Pass
Span 2 Lh Rafter Lh Eaves	0.814	Pass
Span 2 Rh Rafter Rh Eaves	0.669	Pass
Span 3 Lh Rafter Lh Eaves	0.669	Pass
Span 3 Rh Rafter Rh Eaves	0.805	Pass
Span 4 Lh Rafter Lh Eaves	0.804	Pass
Span 4 Rh Rafter Rh Eaves	0.450	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-17.7/175.9	131.9	na	106.1	10.9/172.4
Span 2	Pass	10.9/172.4	41.0	na	52.3	22.1/172.4
Span 3	Pass	22.1/172.4	54.5	na	43.8	33.8/172.4
Span 4	Pass	33.8/172.4	101.5	na	125.3	61.1/183.7

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	3.3468		
Second order failure load factor λ_f	1.2908		

Pass

In Plane Stability

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 4 Rh Column	Pass

D+S+SDr

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1020.9	0.388
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.282
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.389
Span 1 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.509
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.514
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.369
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.472
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.471
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.373
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.507
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.505
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.379
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.268
Span 4 Rh Column	UB 610x229x101	S355	20.0374	101.17	2027.15	1021.9	1020.9	0.405

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Total Rafter					10684.23			
Total Column					3968.32			
Total Haunch					1522.05			
Total					16174.60			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.9459	1.9359	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 2	1.9813	1.9712	Formed	Span 4 Lh Rafter	4.2994	4.2994	
Event 3	2.0782	2.0676	Formed	Span 3 Lh Rafter	4.2994	4.2994	
Event 4	2.3036	2.2918	Formed	Span 1 Rh Rafter	4.3190	4.3190	
Event 5	2.3036	2.2918	Reversed	Span 2 Lh Rafter	4.2994	4.2994	
Event 6	2.3131	2.3013	Formed	Span 3 Mono Rafter	8.2050	6.8880	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-34.956	0.767
10471.0	20105.2	-14.722	168.827
15941.0	20105.2	-14.777	196.828
21411.0	20105.2	-14.832	142.213
32191.0	18800.0	2.226	0.0
42971.0	20105.2	15.339	109.547
48441.0	20105.2	15.284	151.115
53911.0	20105.2	15.229	114.620
64691.0	18800.0	28.949	0.0
75471.0	20105.2	43.016	117.411
80941.0	20105.2	42.961	154.727
86411.0	20105.2	42.906	113.131
97191.0	18800.0	56.444	0.0
107971.0	20105.2	72.789	136.239
113441.0	20105.2	72.734	188.542
118911.0	20105.2	72.679	160.233
129382.0	18837.0	91.865	0.811
129382.0	-1200.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.284	Pass
Span 1 Mono Rafter	0.390	Pass
Span 1 Rh Rafter	0.511	Pass
Span 2 Lh Rafter	0.516	Pass
Span 2 Mono Rafter	0.371	Pass
Span 2 Rh Rafter	0.474	Pass
Span 3 Lh Rafter	0.473	Pass
Span 3 Mono Rafter	0.375	Pass
Span 3 Rh Rafter	0.510	Pass
Span 4 Lh Rafter	0.508	Pass
Span 4 Mono Rafter	0.381	Pass
Span 4 Rh Rafter	0.269	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.389	Pass
Span 4 Rh Column	0.407	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.228	Pass
Span 1 Rh Rafter Rh Eaves	0.599	Pass
Span 2 Lh Rafter Lh Eaves	0.600	Pass
Span 2 Rh Rafter Rh Eaves	0.576	Pass

Member	U.R.	Status
Span 3 Lh Rafter Lh Eaves	0.576	Pass
Span 3 Rh Rafter Rh Eaves	0.596	Pass
Span 4 Lh Rafter Lh Eaves	0.596	Pass
Span 4 Rh Rafter Rh Eaves	0.239	Pass

Serviceability

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	5.8729		
Second order failure load factor λ_f	2.3013		

Pass

In Plane Stability

Member Stability

Rafters

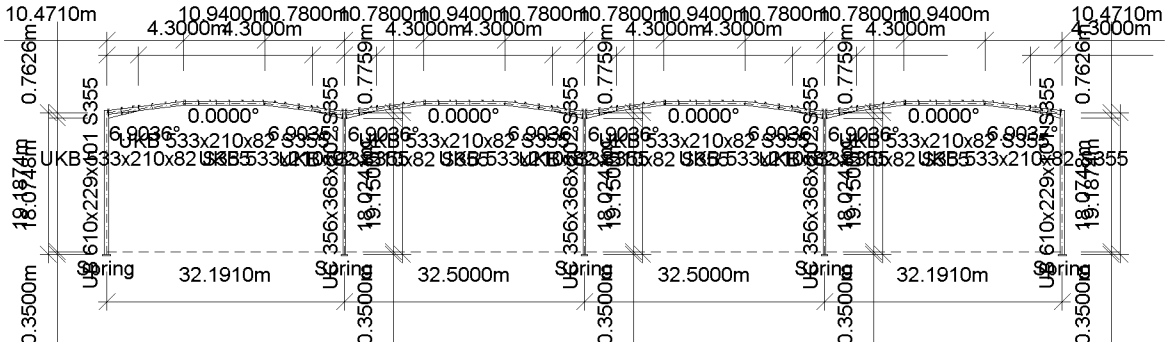
Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Pass
Span 4 Rh Column	Pass

REFERENCE: Gridline 27 - Design

Frame Diagram



Member Restraints

Span 1 Lh Column

Not restrained

Span 1 Rh Column

Not restrained

Span 2 Rh Column

Not restrained

Span 3 Rh Column

Not restrained

Span 4 Rh Column

Not restrained

Span 1 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 1 Flat Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 1 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 2 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 2 Flat Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 2 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 3 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 3 Flat Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 3 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 4 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 4 Flat Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 4 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Loadcases

Frame Dead Load (Dead)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Sheeting	Span 1	Vert.	0.180	-	-	-	9.0000
Sheeting	Span 2	Vert.	0.180	-	-	-	9.0000
Sheeting	Span 3	Vert.	0.180	-	-	-	9.0000
Sheeting	Span 4	Vert.	0.180	-	-	-	9.0000

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	97.54	-	19.1500
Force	Span 2 Rh Column	Vert.	97.54	-	19.1500
Force	Span 3 Rh Column	Vert.	97.54	-	19.1500

Frame Service Load (Dead)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Span Area	Span 1	Vert.	0.250	-	-	-	9.0000
Span Area	Span 2	Vert.	0.250	-	-	-	9.0000
Span Area	Span 3	Vert.	0.250	-	-	-	9.0000
Span Area	Span 4	Vert.	0.250	-	-	-	9.0000

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	88.24	-	19.1500
Force	Span 2 Rh Column	Vert.	88.24	-	19.1500
Force	Span 3 Rh Column	Vert.	88.24	-	19.1500

Frame Imposed Load (Imposed)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Span Area	Span 1	Vert.	0.600	-	-	-	9.0000
Span Area	Span 2	Vert.	0.600	-	-	-	9.0000
Span Area	Span 3	Vert.	0.600	-	-	-	9.0000
Span Area	Span 4	Vert.	0.600	-	-	-	9.0000

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	211.79	-	19.1500
Force	Span 2 Rh Column	Vert.	211.79	-	19.1500
Force	Span 3 Rh Column	Vert.	211.79	-	19.1500

SWL+

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.2347	m
Building effective height, H_e	20.2347	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	270.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.875	-0.3000	0.5300	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.889	-0.3000	-1.4000	4.0765	13.2382	0.7530	0.6160	100.00
Span 1 Lh Rafter			-0.7000	6.4710				
Span 1 Flat Rafter	0.889	-0.3000	-0.7000	9.6342	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			0.2000	1.3058				
Span 1 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter			0.2000	6.7822				
Span 2 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			0.2000	6.8931				
Span 2 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter			0.2000	6.7822				
Span 3 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			0.2000	6.8931				
Span 3 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter			0.2000	6.7822				
Span 4 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			0.2000	6.8931				
Span 4 Rh Rafter	0.889	-0.3000	0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 4 Rh Column	0.875	-0.3000	-0.4420	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Horz.	4.97	-	19.1500
Force	Span 2 Rh Column	Horz.	5.20	-	19.1500
Force	Span 3 Rh Column	Horz.	5.11	-	19.1500
Force	Span 1 Rh Column	Vert.	58.59	-	19.1500
Force	Span 2 Rh Column	Vert.	95.72	-	19.1500
Force	Span 3 Rh Column	Vert.	82.35	-	19.1500

Snow Uniform (Snow)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Sheeting	Span 1	Vert.	0.395	-	-	-	9.0000
Sheeting	Span 2	Vert.	0.395	-	-	-	9.0000
Sheeting	Span 3	Vert.	0.395	-	-	-	9.0000
Sheeting	Span 4	Vert.	0.395	-	-	-	9.0000

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Vert.	107.29	-	19.1500
Force	Span 2 Rh Column	Vert.	101.48	-	19.1500
Force	Span 3 Rh Column	Vert.	107.29	-	19.1500

Stiffness (Dead)

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	10.00	-	0.0
Force	Span 3 Lh Rafter	Horz.	10.00	-	0.0
Force	Span 4 Lh Rafter	Horz.	10.00	-	0.0

SWL-

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	270.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.875	-0.3000	0.5300	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.889	-0.3000	-1.4000	4.0504	13.2382	0.7530	0.6160	100.00
Span 1 Lh Rafter			-0.7000	6.4971				
Span 1 Flat Rafter	0.889	-0.3000	-0.7000	9.6342	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			-0.2000	1.3058				
Span 1 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter			-0.2000	6.8083				
Span 2 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			-0.2000	6.9190				
Span 2 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 3 Lh Rafter			-0.2000	6.8083				
Span 3 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			-0.2000	6.9190				
Span 3 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter			-0.2000	6.8083				
Span 4 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			-0.2000	6.9190				
Span 4 Rh Rafter	0.889	-0.3000	-0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 4 Rh Column	0.875	-0.3000	-0.4420	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Horz.	8.53	-	19.1500
Force	Span 2 Rh Column	Horz.	8.65	-	19.1500
Force	Span 3 Rh Column	Horz.	8.62	-	19.1500
Force	Span 1 Rh Column	Vert.	-8.29	-	19.1500
Force	Span 2 Rh Column	Vert.	15.70	-	19.1500
Force	Span 3 Rh Column	Vert.	0.64	-	19.1500

SWR+

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	129.3820	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	90.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.763	-0.3000	-0.4420	19.2874	20.8807	0.9129	0.6160	100.00
Span 1 Lh Rafter	0.776	-0.3000	0.2000	10.5475	13.2382	0.9411	0.6160	100.00
Span 1 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 1 Flat Rafter			0.2000	4.0210				
Span 1 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 1 Rh Rafter			0.2000	6.8083				
Span 2 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 2 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 2 Flat Rafter			0.2000	4.0210				
Span 2 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 2 Rh Rafter			0.2000	6.8083				
Span 3 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 3 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 3 Flat Rafter			0.2000	4.0210				
Span 3 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 3 Rh Rafter			0.2000	6.8083				
Span 4 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 4 Flat Rafter	0.776	-0.3000	0.2000	1.3058	13.5530	0.9396	0.6160	100.00
Span 4 Flat Rafter			-0.7000	9.6342				
Span 4 Rh Rafter	0.776	-0.3000	-0.7000	4.0504	13.2382	0.9411	0.6160	100.00
Span 4 Rh Rafter			-1.4000	6.4971				
Span 4 Rh Column	0.776	-0.3000	0.5300	20.4874	21.9939	0.9097	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Horz.	-3.55	-	19.1500
Force	Span 2 Rh Column	Horz.	-3.68	-	19.1500
Force	Span 3 Rh Column	Horz.	-3.38	-	19.1500
Force	Span 1 Rh Column	Vert.	78.87	-	19.1500
Force	Span 2 Rh Column	Vert.	95.65	-	19.1500
Force	Span 3 Rh Column	Vert.	47.90	-	19.1500

SWR-

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	90.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.763	-0.3000	-0.4420	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.776	-0.3000	-0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 1 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			-0.2000	4.0210				
Span 1 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 1 Rh Rafter			-0.2000	6.8083				
Span 2 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			-0.2000	4.0210				
Span 2 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 2 Rh Rafter			-0.2000	6.8083				
Span 3 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			-0.2000	4.0210				
Span 3 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 3 Rh Rafter			-0.2000	6.8083				
Span 4 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Flat Rafter	0.776	-0.3000	-0.2000	1.3058	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			-0.7000	9.6342				
Span 4 Rh Rafter	0.776	-0.3000	-0.7000	4.0504	13.2382	0.7530	0.6160	100.00
Span 4 Rh Rafter			-1.4000	6.4971				
Span 4 Rh Column	0.776	-0.3000	0.6000	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Rh Column	Horz.	-7.19	-	19.1500
Force	Span 2 Rh Column	Horz.	-7.23	-	19.1500

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 3 Rh Column	Horz.	-7.09	-	19.1500
Force	Span 1 Rh Column	Vert.	-0.32	-	19.1500
Force	Span 2 Rh Column	Vert.	15.17	-	19.1500
Force	Span 3 Rh Column	Vert.	-11.23	-	19.1500

GW+

Frame is considered to be in Remote zone

Building Length	211.1000	m
Building Width	129.3820	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Lh Gap	38.3748	m
Rh Gap	38.3748	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	0.0	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	1.056	-0.3000	-0.5000	19.1874	21.1933	0.7540	0.6160	100.00
Span 1 Lh Rafter	1.074	-0.3000	0.2000	10.5475	13.8654	0.7540	0.6160	100.00
Span 1 Flat Rafter	1.074	-0.3000	0.2000	10.9400	14.1663	0.7540	0.6160	100.00
Span 1 Rh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 2 Lh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 2 Flat Rafter	1.074	-0.3000	0.2000	10.9400	14.1663	0.7540	0.6160	100.00
Span 2 Rh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 3 Lh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 3 Flat Rafter	1.074	-0.3000	0.2000	10.9400	14.1663	0.7540	0.6160	100.00
Span 3 Rh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 4 Lh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 4 Flat Rafter	1.074	-0.3000	0.2000	10.9400	14.1663	0.7540	0.6160	100.00
Span 4 Rh Rafter	1.074	-0.3000	0.2000	10.5475	13.8654	0.7540	0.6160	100.00
Span 4 Rh Column	1.056	-0.3000	-0.5000	19.1874	21.1933	0.7540	0.6160	100.00

Snow Drift (Snow)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Varying Area	Span 1 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	9.0000
Varying Area	Span 1 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 2 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 2 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	9.0000
Varying Area	Span 2 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	9.0000
Varying Area	Span 2 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 3 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 3 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	9.0000
Varying Area	Span 3 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	9.0000
Varying Area	Span 3 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 4 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 4 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	9.0000

Combinations

Sw + Dead + Serv. + Imp.

Frame Imperfection on, left to right

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	0.0
Frame Dead Load	Dead	1.4000	0.0
Frame Service Load	Dead	1.4000	0.0
Frame Imposed Load	Imposed	1.6000	1.0000

D+S+I

Frame Imperfection on, right to left

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	0.0
Frame Dead Load	Dead	1.4000	0.0
Frame Service Load	Dead	1.4000	0.0
Frame Imposed Load	Imposed	1.6000	1.0000

D+S+SU+SWL+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
SWL+	Wind	1.2000	0.8000

D+SWL-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.0000	0.0
Frame Dead Load	Dead	1.0000	0.0
SWL-	Wind	1.4000	1.0000

Stiffness

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Stiffness	Dead	1.4000	1.0000

D+S+SU+SWR+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
SWR+	Wind	1.2000	0.8000

D+SWR-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.0000	0.0
Frame Dead Load	Dead	1.0000	0.0
SWR-	Wind	1.4000	1.0000

D+S+SU+GW+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
GW+	Wind	1.2000	0.8000

D+S+SDr

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	1.0000
Frame Dead Load	Dead	1.4000	1.0000
Snow Drift	Snow	1.0500	1.0000
Frame Service Load	Dead	1.4000	1.0000

Design Code: BS5950

Design Summary

Design Combination	Lambda p	Lambda r	Status
Sw + Dead + Serv. + Imp.	1.106	1.000	Pass
D+S+I	1.105	1.000	Pass
D+S+SU+SWL+	1.248	1.000	Pass
D+SWL-	4.297	1.000	Pass
Stiffness	12.361	1.000	Pass
D+S+SU+SWR+	1.295	1.000	Pass
D+SWR-	4.456	1.000	Pass
D+S+SU+GW+	1.207	1.000	Pass
D+S+SDr	2.082	1.000	Pass

Member Stability Status: Invalid

Design Cases

Sw + Dead + Serv. + Imp.

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1017.8	0.851
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.676
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.836
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.5	0.889
Span 1 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1309.7	0.117

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.879
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.625
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.765
Span 2 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1313.7	0.044
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.691
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.632
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.938
Span 3 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1310.1	0.046
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.899
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.832
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.636
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1017.6	0.939
Total Rafter					10792.38			
Total Column					15482.51			
Total Haunch					1520.59			
Total					27795.48			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.0620	1.0389	Formed	Span 4 Rh Column	18.4250	18.4250	
Event 2	1.0683	1.0451	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.1164	1.0922	Formed	Span 1 Rh Rafter	4.3189	4.3189	
Event 4	1.1199	1.0957	Formed	Span 4 Lh Rafter	4.2994	4.2994	
Event 5	1.1310	1.1065	Formed	Span 4 Mono Rafter	8.2050	7.4602	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-55.670	1.703
10471.0	20105.2	-10.884	373.760
15941.0	20105.2	-11.010	417.596
21411.0	20105.2	-11.136	287.323
32191.0	18800.0	22.829	4.310
32191.0	-350.0	0.0	0.001
32191.0	18800.0	22.829	4.310
42971.0	20105.2	41.463	160.525
48441.0	20105.2	41.350	233.164
53911.0	20105.2	41.237	174.560
64691.0	18800.0	61.578	4.175
64691.0	-350.0	0.0	0.001
64691.0	18800.0	61.578	4.175
75471.0	20105.2	83.502	187.572
80941.0	20105.2	83.384	238.795
86411.0	20105.2	83.267	157.540
97191.0	18800.0	101.512	4.310
97191.0	-350.0	0.0	0.001
97191.0	18800.0	101.512	4.310
107971.0	20105.2	136.951	299.644
113441.0	20105.2	136.818	420.384
118911.0	20105.2	136.686	365.200
129382.0	18837.0	180.414	1.750
129382.0	-350.0	0.0	0.0

Strength Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.691	Pass
Span 1 Mono Rafter	0.854	Pass
Span 1 Rh Rafter	0.908	Pass
Span 2 Lh Rafter	0.898	Pass
Span 2 Mono Rafter	0.638	Pass
Span 2 Rh Rafter	0.781	Pass
Span 3 Lh Rafter	0.706	Pass

Member	U.R.	Status
Span 3 Mono Rafter	0.646	Pass
Span 3 Rh Rafter	0.959	Pass
Span 4 Lh Rafter	0.919	Pass
Span 4 Mono Rafter	0.850	Pass
Span 4 Rh Rafter	0.650	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.866	Pass
Span 1 Rh Column	0.135	Pass
Span 2 Rh Column	0.131	Pass
Span 3 Rh Column	0.135	Pass
Span 4 Rh Column	0.956	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.506	Pass
Span 1 Rh Rafter Rh Eaves	0.941	Pass
Span 2 Lh Rafter Lh Eaves	0.900	Pass
Span 2 Rh Rafter Rh Eaves	0.834	Pass
Span 3 Lh Rafter Lh Eaves	0.792	Pass
Span 3 Rh Rafter Rh Eaves	0.936	Pass
Span 4 Lh Rafter Lh Eaves	0.941	Pass
Span 4 Rh Rafter Rh Eaves	0.561	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-40.9/175.9	123.1	na	98.2	-14.7/175.6
Span 2	Pass	-14.7/175.6	54.8	na	62.5	-1.1/175.6
Span 3	Pass	-1.1/175.6	63.1	na	56.4	12.7/175.6
Span 4	Pass	12.7/175.6	100.5	na	125.2	39.4/175.9

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.0837		
Second order failure load factor λ_f	1.1065		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Not Checked

D+S+I

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1017.7	0.937
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.631
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.822
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.4	0.808
Span 1 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1309.7	0.047
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.957
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.628
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.683
Span 2 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1313.7	0.053
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.773
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.629
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.860
Span 3 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1310.0	0.107
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.987
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.848
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.684
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1017.8	0.855
Total Rafter					10792.38			
Total Column					15482.51			
Total Haunch					1520.59			
Total					27795.48			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.0129	0.9885	Formed	Span 4 Lh Rafter	4.2994	4.2994	
Event 2	1.0436	1.0185	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 3	1.0579	1.0325	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 4	1.1214	1.0944	Formed	Span 4 Mono Rafter	8.2050	7.4897	
Event 5	1.1321	1.1049	Formed	Span 1 Mono Rafter	5.4700	4.8435	
Event 6	1.1326	1.1054	Formed	Span 4 Rh Column	18.4250	18.4250	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-190.093	1.749
10471.0	20105.2	-146.884	360.895
15941.0	20105.2	-147.016	415.167
21411.0	20105.2	-147.147	295.605
32191.0	18800.0	-112.184	4.317
32191.0	-350.0	0.0	0.001
32191.0	18800.0	-112.184	4.317
42971.0	20105.2	-94.587	152.016
48441.0	20105.2	-94.703	234.655
53911.0	20105.2	-94.819	185.558
64691.0	18800.0	-73.148	4.186
64691.0	-350.0	0.0	0.001
64691.0	18800.0	-73.148	4.186
75471.0	20105.2	-52.360	178.203
80941.0	20105.2	-52.476	239.927
86411.0	20105.2	-52.592	168.687
97191.0	18800.0	-32.991	4.320
97191.0	-350.0	0.0	0.001
97191.0	18800.0	-32.991	4.320
107971.0	20105.2	1.877	294.877
113441.0	20105.2	1.750	427.947
118911.0	20105.2	1.624	382.211
129382.0	18837.0	47.432	1.716
129382.0	-350.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.645	Pass
Span 1 Mono Rafter	0.842	Pass
Span 1 Rh Rafter	0.827	Pass
Span 2 Lh Rafter	0.980	Pass
Span 2 Mono Rafter	0.643	Pass
Span 2 Rh Rafter	0.700	Pass
Span 3 Lh Rafter	0.794	Pass
Span 3 Mono Rafter	0.646	Pass
Span 3 Rh Rafter	0.875	Pass
Span 4 Lh Rafter	0.999	Pass
Span 4 Mono Rafter	0.873	Pass
Span 4 Rh Rafter	0.702	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.957	Pass
Span 1 Rh Column	0.136	Pass
Span 2 Rh Column	0.131	Pass
Span 3 Rh Column	0.135	Pass
Span 4 Rh Column	0.875	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.561	Pass
Span 1 Rh Rafter Rh Eaves	0.892	Pass
Span 2 Lh Rafter Lh Eaves	0.948	Pass
Span 2 Rh Rafter Rh Eaves	0.788	Pass
Span 3 Lh Rafter Lh Eaves	0.843	Pass
Span 3 Rh Rafter Rh Eaves	0.889	Pass
Span 4 Lh Rafter Lh Eaves	0.989	Pass
Span 4 Rh Rafter Rh Eaves	0.511	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-40.9/175.9	123.1	na	98.2	-14.7/175.6
Span 2	Pass	-14.7/175.6	54.8	na	62.5	-1.1/175.6
Span 3	Pass	-1.1/175.6	63.1	na	56.4	12.7/175.6
Span 4	Pass	12.7/175.6	100.5	na	125.2	39.4/175.9

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.0837		
Second order failure load factor λ_f	1.1054		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass

Member	Status
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Not Checked

D+S+SU+SWL+ Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.2	0.303
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.4	0.234
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.5	0.319
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.4	0.578
Span 1 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1337.2	0.073
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.515
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.5	0.580
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.3	0.777
Span 2 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1332.3	0.172
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.537
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.537
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.879
Span 3 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1331.1	0.120
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.707
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.725
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.6	0.531
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.6	0.880
Total Rafter					10792.38			
Total Column					15482.51			
Total Haunch					1520.59			
Total					27795.48			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.1331	1.0927	Formed	Span 4 Rh Column	18.4250	18.4250	
Event 2	1.1400	1.0993	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.2406	1.1963	Formed	Span 2 Rh Rafter	4.3197	4.3197	
Event 4	1.2549	1.2101	Formed	Span 4 Mono Rafter	8.2050	7.3626	
Event 5	1.2946	1.2484	Formed	Span 4 Lh Rafter	4.2994	4.2994	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	110.403	0.664
10471.0	20105.2	124.896	123.015
15941.0	20105.2	124.724	136.541
21411.0	20105.2	124.551	82.307
32191.0	18800.0	133.798	3.219
32191.0	-350.0	0.0	0.001
32191.0	18800.0	133.798	3.219
42971.0	20105.2	157.364	200.711
48441.0	20105.2	157.198	246.441
53911.0	20105.2	157.031	168.500
64691.0	18800.0	176.644	3.464
64691.0	-350.0	0.0	0.001
64691.0	18800.0	176.644	3.464
75471.0	20105.2	195.675	162.903
80941.0	20105.2	195.550	198.330
86411.0	20105.2	195.425	120.642

Coord. X	Coord. Z	Delta X	Delta Y
97191.0	18800.0	209.304	3.521
97191.0	-350.0	0.0	0.001
97191.0	18800.0	209.304	3.521
107971.0	20105.2	242.447	279.294
113441.0	20105.2	242.345	378.604
118911.0	20105.2	242.242	321.184
129382.0	18837.0	280.725	1.562
129382.0	-350.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.243	Pass
Span 1 Mono Rafter	0.331	Pass
Span 1 Rh Rafter	0.599	Pass
Span 2 Lh Rafter	0.533	Pass
Span 2 Mono Rafter	0.601	Pass
Span 2 Rh Rafter	0.805	Pass
Span 3 Lh Rafter	0.556	Pass
Span 3 Mono Rafter	0.556	Pass
Span 3 Rh Rafter	0.911	Pass
Span 4 Lh Rafter	0.733	Pass
Span 4 Mono Rafter	0.751	Pass
Span 4 Rh Rafter	0.551	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.314	Pass
Span 1 Rh Column	0.101	Pass
Span 2 Rh Column	0.173	Pass
Span 3 Rh Column	0.121	Pass
Span 4 Rh Column	0.909	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.219	Pass
Span 1 Rh Rafter Rh Eaves	0.641	Pass
Span 2 Lh Rafter Lh Eaves	0.651	Pass
Span 2 Rh Rafter Rh Eaves	0.805	Pass
Span 3 Lh Rafter Lh Eaves	0.657	Pass
Span 3 Rh Rafter Rh Eaves	0.862	Pass
Span 4 Lh Rafter Lh Eaves	0.785	Pass
Span 4 Rh Rafter Rh Eaves	0.527	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	56.4/175.9	-10.1	na	-13.1	53.0/175.6
Span 2	Pass	53.0/175.6	86.7	na	64.9	70.6/175.6
Span 3	Pass	70.6/175.6	59.5	na	40.8	82.1/175.6
Span 4	Pass	82.1/175.6	104.6	na	116.3	108.4/175.9

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.7034		
Second order failure load factor λ_f	1.2484		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Not Checked

D+SWL-

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.226
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.100
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.130
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.7	0.110
Span 1 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1368.7	0.145
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.182
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.181
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.320
Span 2 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1367.5	0.232
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.127
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.133
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.324
Span 3 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1367.9	0.194
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.148
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.169
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.194
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.6	0.323
Total Rafter					10792.38			
Total Column					15482.51			
Total Haunch					1520.59			
Total					27795.48			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	3.0729	2.9502	Formed	Span 4 Rh Column	18.4250	18.4250	
Event 2	3.0875	2.9643	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	3.1171	2.9927	Formed	Span 2 Rh Rafter	4.3197	4.3197	
Event 4	3.8894	3.7341	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 5	4.1435	3.9780	Formed	Span 4 Mono Rafter	5.4700	4.8449	
Event 6	4.2877	4.1165	Formed	Span 2 Rh Column	0.0	0.0	
Event 7	4.3012	4.1295	Formed	Span 2 Mono Rafter	2.7350	2.0415	
Event 8	4.3097	4.1376	Formed	Span 2 Rh Column	18.3740	18.3740	
Event 9	4.3874	4.2123	Formed	Span 3 Rh Column	0.0	0.0	Pass
Event 10	4.4225	4.2459	Formed	Span 1 Rh Column	0.0	0.0	Pass

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 11	4.4426	4.2652	Formed	Span 4 Mono Rafter	5.4700	5.4700	Pass
Event 12	4.4426	4.2652	Reversed	Span 4 Mono Rafter	5.4700	4.8449	Pass
Event 13	4.4485	4.2708	Formed	Span 3 Mono Rafter	2.7350	2.3592	Pass
Event 14	4.4485	4.2708	Reversed	Span 2 Rh Column	0.0	0.0	Pass
Event 15	4.4485	4.2708	Formed	Span 2 Rh Column	0.0	0.0	Pass
Event 16	4.4762	4.2975	Formed	Span 1 Rh Rafter	4.3189	4.3189	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	273.584	-0.273
10471.0	20105.2	264.341	-74.978
15941.0	20105.2	264.224	-94.191
21411.0	20105.2	264.108	-84.092
32191.0	18800.0	253.661	0.637
32191.0	-350.0	0.0	0.0
32191.0	18800.0	253.661	0.637
42971.0	20105.2	263.595	84.137
48441.0	20105.2	263.497	71.682
53911.0	20105.2	263.399	29.430
64691.0	18800.0	266.657	0.894
64691.0	-350.0	0.0	0.0
64691.0	18800.0	266.657	0.894
75471.0	20105.2	272.140	46.922
80941.0	20105.2	272.092	36.713
86411.0	20105.2	272.045	3.974
97191.0	18800.0	272.318	0.819
97191.0	-350.0	0.0	0.0
97191.0	18800.0	272.318	0.819
107971.0	20105.2	282.174	82.397
113441.0	20105.2	282.168	88.200
118911.0	20105.2	282.162	58.655
129382.0	18837.0	289.180	0.452
129382.0	-350.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.104	Pass
Span 1 Mono Rafter	0.136	Pass
Span 1 Rh Rafter	0.115	Pass
Span 2 Lh Rafter	0.189	Pass
Span 2 Mono Rafter	0.189	Pass
Span 2 Rh Rafter	0.333	Pass
Span 3 Lh Rafter	0.133	Pass
Span 3 Mono Rafter	0.139	Pass
Span 3 Rh Rafter	0.338	Pass
Span 4 Lh Rafter	0.154	Pass
Span 4 Mono Rafter	0.176	Pass
Span 4 Rh Rafter	0.202	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.408	Pass
Span 1 Rh Column	0.151	Pass
Span 2 Rh Column	0.242	Pass
Span 3 Rh Column	0.202	Pass
Span 4 Rh Column	0.337	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.113	Pass
Span 1 Rh Rafter Rh Eaves	0.107	Pass
Span 2 Lh Rafter Lh Eaves	0.111	Pass
Span 2 Rh Rafter Rh Eaves	0.303	Pass
Span 3 Lh Rafter Lh Eaves	0.060	Pass
Span 3 Rh Rafter Rh Eaves	0.301	Pass
Span 4 Lh Rafter Lh Eaves	0.090	Pass
Span 4 Rh Rafter Rh Eaves	0.192	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	131.0/175.9	-92.4	na	-84.3	109.4/175.6
Span 2	Pass	109.4/175.6	35.4	na	1.8	113.6/175.6
Span 3	Pass	113.6/175.6	9.3	na	-12.5	113.1/175.6
Span 4	Pass	113.1/175.6	21.7	na	4.2	116.3/175.9

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	12.3898		
Second order failure load factor λ_f	4.2975		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Invalid
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Invalid
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Invalid
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Invalid
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Not Checked

Stiffness

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.063
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.069
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.036
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.8	0.062
Span 1 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1370.2	0.088
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.057
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.028
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.061
Span 2 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1370.3	0.083
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.062

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.028
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.059
Span 3 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1370.3	0.086
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.067
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.037
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.069
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.062
Total Rafter					10792.38			
Total Column					15482.51			
Total Haunch					1520.59			
Total					27795.48			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	10.6256	-	Formed	Span 1 Rh Column	18.3740	18.3740	
Event 2	10.7788	-	Formed	Span 3 Rh Column	18.3740	18.3740	
Event 3	11.1292	-	Formed	Span 2 Rh Column	18.3740	18.3740	
Event 4	12.0424	-	Formed	Span 1 Rh Column	0.0	0.0	
Event 5	12.0524	-	Formed	Span 3 Rh Column	0.0	0.0	
Event 6	12.1009	-	Formed	Span 2 Rh Column	0.0	0.0	
Event 7	12.2652	-	Formed	Span 1 Lh Rafter	4.2995	4.2995	
Event 8	12.2673	-	Formed	Span 4 Rh Rafter	4.3203	4.3203	
Event 9	12.3442	-	Formed	Span 4 Lh Rafter	4.2994	4.2994	Pass
Event 10	12.3611	-	Formed	Span 1 Rh Rafter	4.3189	4.3189	Pass

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.069	Pass
Span 1 Mono Rafter	0.036	Pass
Span 1 Rh Rafter	0.062	Pass
Span 2 Lh Rafter	0.057	Pass
Span 2 Mono Rafter	0.028	Pass
Span 2 Rh Rafter	0.061	Pass
Span 3 Lh Rafter	0.062	Pass
Span 3 Mono Rafter	0.028	Pass
Span 3 Rh Rafter	0.059	Pass
Span 4 Lh Rafter	0.067	Pass
Span 4 Mono Rafter	0.037	Pass
Span 4 Rh Rafter	0.069	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.063	Pass
Span 1 Rh Column	0.088	Pass
Span 2 Rh Column	0.083	Pass
Span 3 Rh Column	0.086	Pass
Span 4 Rh Column	0.062	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.057	Pass
Span 1 Rh Rafter Rh Eaves	0.052	Pass
Span 2 Lh Rafter Lh Eaves	0.047	Pass
Span 2 Rh Rafter Rh Eaves	0.050	Pass
Span 3 Lh Rafter Lh Eaves	0.051	Pass
Span 3 Rh Rafter Rh Eaves	0.048	Pass

Member	U.R.	Status
Span 4 Lh Rafter Lh Eaves	0.056	Pass
Span 4 Rh Rafter Rh Eaves	0.056	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	44.7/175.9	5.2	na	-3.4	45.0/175.6
Span 2	Pass	45.0/175.6	4.0	na	-4.3	45.0/175.6
Span 3	Pass	45.0/175.6	4.3	na	-4.2	45.0/175.6
Span 4	Pass	45.0/175.6	3.4	na	-5.4	44.7/175.9

Frame Stability

None

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Invalid
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Invalid
Span 2 Rh Rafter	Invalid
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Invalid
Span 3 Rh Rafter	Invalid
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Invalid

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Not Checked

D+S+SU+SWR+ Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.7	0.860
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.6	0.537
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.719
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.6	0.643
Span 1 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1331.5	0.109
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.880
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.529
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.544
Span 2 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1332.5	0.173
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.781
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.593
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.476
Span 3 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1339.3	0.051
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.566
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.243
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.118
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.4	0.202
Total Rafter					10792.38			
Total Column					15482.51			
Total Haunch					1520.59			
Total					27795.48			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.1358	1.0953	Formed	Span 2 Lh Rafter	4.2994	4.2994	

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 2	1.1550	1.1139	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 3	1.2339	1.1900	Formed	Span 3 Lh Rafter	4.2994	4.2994	
Event 4	1.2669	1.2218	Formed	Span 1 Mono Rafter	5.4700	4.9158	
Event 5	1.3431	1.2953	Formed	Span 1 Rh Rafter	4.3189	4.3189	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-270.080	1.540
10471.0	20105.2	-231.610	320.847
15941.0	20105.2	-231.698	375.475
21411.0	20105.2	-231.787	274.914
32191.0	18800.0	-199.138	3.490
32191.0	-350.0	0.0	0.001
32191.0	18800.0	-199.138	3.490
42971.0	20105.2	-185.829	115.541
48441.0	20105.2	-185.939	192.078
53911.0	20105.2	-186.048	157.173
64691.0	18800.0	-167.692	3.458
64691.0	-350.0	0.0	0.001
64691.0	18800.0	-167.692	3.458
75471.0	20105.2	-146.966	177.412
80941.0	20105.2	-147.122	259.498
86411.0	20105.2	-147.277	215.122
97191.0	18800.0	-121.941	3.118
97191.0	-350.0	0.0	0.001
97191.0	18800.0	-121.941	3.118
107971.0	20105.2	-116.499	50.602
113441.0	20105.2	-116.650	87.303
118911.0	20105.2	-116.801	72.154
129382.0	18837.0	-108.419	0.530
129382.0	-350.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.557	Pass
Span 1 Mono Rafter	0.746	Pass
Span 1 Rh Rafter	0.667	Pass
Span 2 Lh Rafter	0.912	Pass
Span 2 Mono Rafter	0.548	Pass
Span 2 Rh Rafter	0.564	Pass
Span 3 Lh Rafter	0.810	Pass
Span 3 Mono Rafter	0.614	Pass
Span 3 Rh Rafter	0.494	Pass
Span 4 Lh Rafter	0.587	Pass
Span 4 Mono Rafter	0.252	Pass
Span 4 Rh Rafter	0.122	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.889	Pass
Span 1 Rh Column	0.110	Pass
Span 2 Rh Column	0.175	Pass
Span 3 Rh Column	0.098	Pass
Span 4 Rh Column	0.209	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.512	Pass
Span 1 Rh Rafter Rh Eaves	0.746	Pass
Span 2 Lh Rafter Lh Eaves	0.860	Pass
Span 2 Rh Rafter Rh Eaves	0.658	Pass
Span 3 Lh Rafter Lh Eaves	0.808	Pass
Span 3 Rh Rafter Rh Eaves	0.628	Pass

Member	U.R.	Status
Span 4 Lh Rafter Lh Eaves	0.617	Pass
Span 4 Rh Rafter Rh Eaves	0.150	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-102.2/175.9	116.4	na	102.3	-76.2/175.6
Span 2	Pass	-76.2/175.6	39.3	na	56.9	-65.1/175.6
Span 3	Pass	-65.1/175.6	69.1	na	93.4	-46.2/175.6
Span 4	Pass	-46.2/175.6	-33.2	na	-42.6	-55.8/175.9

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.7569		
Second order failure load factor λ_f	1.2953		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Not Checked

D+SWR-Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.6	0.303
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.176
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.166
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.8	0.124
Span 1 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1367.9	0.169
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.302
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.125
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.117
Span 2 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1367.5	0.210
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.304
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.180
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.179
Span 3 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1368.9	0.120
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.090
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.162
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.162
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.402

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Total Rafter					10792.38			
Total Column					15482.51			
Total Haunch					1520.59			
Total					27795.48			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	3.2759	3.1624	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 2	3.2908	3.1769	Formed	Span 3 Lh Rafter	4.2994	4.2994	
Event 3	3.3004	3.1861	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 4	3.6683	3.5413	Formed	Span 4 Rh Column	18.4250	18.4250	
Event 5	4.2734	4.1255	Formed	Span 1 Mono Rafter	8.2050	7.4390	
Event 6	4.3574	4.2065	Formed	Span 3 Mono Rafter	10.9400	10.2923	
Event 7	4.4943	4.3387	Formed	Span 2 Rh Column	0.0	0.0	
Event 8	4.5346	4.3776	Formed	Span 2 Rh Column	18.3740	18.3740	Pass
Event 9	4.5485	4.3910	Formed	Span 2 Mono Rafter	10.9400	9.9427	Pass
Event 10	4.5485	4.3910	Reversed	Span 4 Rh Column	18.4250	18.4250	Pass
Event 11	4.5485	4.3910	Formed	Span 4 Rh Column	18.4250	18.4250	Pass
Event 12	4.5485	4.3910	Formed	Span 2 Rh Column	0.0	0.0	Pass
Event 13	4.5562	4.3985	Formed	Span 4 Rh Rafter	119.0125	119.0125	Pass
Event 14	4.5731	4.4147	Formed	Span 1 Mono Rafter	5.4700	5.4700	Pass
Event 15	4.5731	4.4147	Reversed	Span 1 Mono Rafter	8.2050	7.4390	Pass
Event 16	4.5799	4.4213	Formed	Span 1 Rh Column	0.0	0.0	Pass
Event 17	4.6162	4.4563	Formed	Span 3 Rh Column	0.0	0.0	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-256.496	0.438
10471.0	20105.2	-249.449	58.879
15941.0	20105.2	-249.457	85.819
21411.0	20105.2	-249.465	77.767
32191.0	18800.0	-240.170	0.804
32191.0	-350.0	0.0	0.0
32191.0	18800.0	-240.170	0.804
42971.0	20105.2	-239.701	5.487
48441.0	20105.2	-239.747	35.260
53911.0	20105.2	-239.792	43.140
64691.0	18800.0	-234.763	0.882
64691.0	-350.0	0.0	0.0
64691.0	18800.0	-234.763	0.882
75471.0	20105.2	-230.992	33.520
80941.0	20105.2	-231.085	74.454
86411.0	20105.2	-231.178	85.158
97191.0	18800.0	-221.103	0.601
97191.0	-350.0	0.0	0.0
97191.0	18800.0	-221.103	0.601
107971.0	20105.2	-232.431	-91.451
113441.0	20105.2	-232.535	-109.828
118911.0	20105.2	-232.640	-95.683
129382.0	18837.0	-244.378	-0.245
129382.0	-350.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.183	Pass
Span 1 Mono Rafter	0.172	Pass
Span 1 Rh Rafter	0.128	Pass
Span 2 Lh Rafter	0.312	Pass
Span 2 Mono Rafter	0.129	Pass
Span 2 Rh Rafter	0.121	Pass
Span 3 Lh Rafter	0.314	Pass
Span 3 Mono Rafter	0.186	Pass
Span 3 Rh Rafter	0.186	Pass
Span 4 Lh Rafter	0.094	Pass
Span 4 Mono Rafter	0.168	Pass
Span 4 Rh Rafter	0.168	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.314	Pass
Span 1 Rh Column	0.175	Pass
Span 2 Rh Column	0.217	Pass
Span 3 Rh Column	0.124	Pass
Span 4 Rh Column	0.416	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.180	Pass
Span 1 Rh Rafter Rh Eaves	0.090	Pass
Span 2 Lh Rafter Lh Eaves	0.280	Pass
Span 2 Rh Rafter Rh Eaves	0.069	Pass
Span 3 Lh Rafter Lh Eaves	0.286	Pass
Span 3 Rh Rafter Rh Eaves	0.105	Pass
Span 4 Lh Rafter Lh Eaves	0.080	Pass
Span 4 Rh Rafter Rh Eaves	0.134	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-101.8/175.9	4.0	na	19.0	-99.0/175.6
Span 2	Pass	-99.0/175.6	-10.9	na	7.6	-99.5/175.6
Span 3	Pass	-99.5/175.6	3.8	na	35.4	-95.0/175.6
Span 4	Pass	-95.0/175.6	-89.8	na	-106.6	-119.0/175.9

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	12.6090		
Second order failure load factor λ_f	4.4563		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Invalid
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Invalid
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Invalid

Member	Status
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Invalid

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Not Checked

D+S+SU+GW+ Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.6	0.800
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.634
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.780
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.7	0.798
Span 1 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1336.7	0.078
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.856
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.574
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.665
Span 2 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1340.1	0.006
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.672
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.578
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.838
Span 3 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1336.9	0.069
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.887
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.791
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.640
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.6	0.803
Total Rafter					10792.38			
Total Column					15482.51			
Total Haunch					1520.59			
Total					27795.48			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.1268	1.1127	Formed	Span 4 Lh Rafter	4.2994	4.2994	
Event 2	1.1656	1.1511	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 3	1.2216	1.2063	Formed	Span 4 Rh Column	18.4250	18.4250	
Event 4	1.2226	1.2073	Formed	Span 4 Mono Rafter	8.2050	7.4874	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-114.520	1.530
10471.0	20105.2	-72.455	350.229
15941.0	20105.2	-72.526	392.747
21411.0	20105.2	-72.596	273.562
32191.0	18800.0	-40.052	3.165
32191.0	-350.0	0.0	0.001
32191.0	18800.0	-40.052	3.165
42971.0	20105.2	-23.696	139.599
48441.0	20105.2	-23.751	210.864
53911.0	20105.2	-23.806	162.745
64691.0	18800.0	-4.633	3.004
64691.0	-350.0	0.0	0.001
64691.0	18800.0	-4.633	3.004
75471.0	20105.2	14.822	165.016
80941.0	20105.2	14.765	215.244
86411.0	20105.2	14.709	145.102
97191.0	18800.0	31.712	3.165

Coord. X	Coord. Z	Delta X	Delta Y
97191.0	-350.0	0.0	0.001
97191.0	18800.0	31.712	3.165
107971.0	20105.2	64.827	278.299
113441.0	20105.2	64.756	399.027
118911.0	20105.2	64.685	355.352
129382.0	18837.0	107.370	1.535
129382.0	-350.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.642	Pass
Span 1 Mono Rafter	0.790	Pass
Span 1 Rh Rafter	0.808	Pass
Span 2 Lh Rafter	0.867	Pass
Span 2 Mono Rafter	0.581	Pass
Span 2 Rh Rafter	0.673	Pass
Span 3 Lh Rafter	0.681	Pass
Span 3 Mono Rafter	0.585	Pass
Span 3 Rh Rafter	0.849	Pass
Span 4 Lh Rafter	0.898	Pass
Span 4 Mono Rafter	0.801	Pass
Span 4 Rh Rafter	0.648	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.807	Pass
Span 1 Rh Column	0.100	Pass
Span 2 Rh Column	0.094	Pass
Span 3 Rh Column	0.099	Pass
Span 4 Rh Column	0.811	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.459	Pass
Span 1 Rh Rafter Rh Eaves	0.844	Pass
Span 2 Lh Rafter Lh Eaves	0.844	Pass
Span 2 Rh Rafter Rh Eaves	0.734	Pass
Span 3 Lh Rafter Lh Eaves	0.739	Pass
Span 3 Rh Rafter Rh Eaves	0.834	Pass
Span 4 Lh Rafter Lh Eaves	0.891	Pass
Span 4 Rh Rafter Rh Eaves	0.461	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-44.1/175.9	136.3	na	106.1	-15.2/175.6
Span 2	Pass	-15.2/175.6	54.9	na	63.7	-1.2/175.6
Span 3	Pass	-1.2/175.6	64.4	na	56.6	13.1/175.6
Span 4	Pass	13.1/175.6	108.5	na	138.6	42.6/175.9

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	2.7621		
Second order failure load factor λ_f	1.2073		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass

Member	Status
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Not Checked

D+S+SDr Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1020.8	0.441
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.296
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.418
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.7	0.498
Span 1 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1344.9	0.015
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.578
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.408
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.516
Span 2 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1345.5	0.004
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.521
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.411
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.567
Span 3 Rh Column	UC 356x368x202	S355	19.1500	201.92	3866.73	1370.3	1345.1	0.014
Span 4 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.555
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.423
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.299
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1020.8	0.443
Total Rafter					10792.38			
Total Column					15482.51			
Total Haunch					1520.59			
Total					27795.48			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.7297	1.6691	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 2	1.7809	1.7185	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.8087	1.7453	Formed	Span 4 Lh Rafter	4.2994	4.2994	
Event 4	1.8685	1.8030	Formed	Span 3 Lh Rafter	4.2994	4.2994	
Event 5	1.9386	1.8707	Formed	Span 2 Rh Rafter	4.3197	4.3197	
Event 6	2.1001	2.0265	Formed	Span 2 Mono Rafter	5.4700	5.4278	
Event 7	2.1001	2.0265	Reversed	Span 4 Lh Rafter	4.2994	4.2994	
Event 8	2.1006	2.0270	Formed	Span 3 Mono Rafter	5.4700	5.4700	
Event 9	2.1009	2.0273	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 10	2.1058	2.0320	Formed	Span 3 Lh Rafter	4.2994	4.2994	Pass
Event 11	2.1064	2.0325	Formed	Span 4 Rh Column	18.4250	18.4250	Pass

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 12	2.1121	2.0381	Formed	Span 4 Mono Rafter	5.4700	5.2494	Pass
Event 13	2.1163	2.0421	Formed	Span 1 Mono Rafter	8.2050	7.0521	Pass
Event 14	2.1577	2.0821	Formed	Span 4 Lh Rafter	4.2994	4.2994	Pass

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-73.696	0.865
10471.0	20105.2	-51.658	183.992
15941.0	20105.2	-51.722	216.569
21411.0	20105.2	-51.787	157.678
32191.0	18800.0	-33.202	2.788
32191.0	-350.0	0.0	0.001
32191.0	18800.0	-33.202	2.788
42971.0	20105.2	-18.475	125.907
48441.0	20105.2	-18.542	174.156
53911.0	20105.2	-18.610	133.596
64691.0	18800.0	-2.956	2.765
64691.0	-350.0	0.0	0.001
64691.0	18800.0	-2.956	2.765
75471.0	20105.2	12.889	135.124
80941.0	20105.2	12.821	177.068
86411.0	20105.2	12.752	129.542
97191.0	18800.0	27.907	2.788
97191.0	-350.0	0.0	0.001
97191.0	18800.0	27.907	2.788
107971.0	20105.2	46.868	160.842
113441.0	20105.2	46.803	220.313
118911.0	20105.2	46.739	186.971
129382.0	18837.0	69.136	0.867
129382.0	-350.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.307	Pass
Span 1 Mono Rafter	0.433	Pass
Span 1 Rh Rafter	0.516	Pass
Span 2 Lh Rafter	0.599	Pass
Span 2 Mono Rafter	0.423	Pass
Span 2 Rh Rafter	0.535	Pass
Span 3 Lh Rafter	0.540	Pass
Span 3 Mono Rafter	0.425	Pass
Span 3 Rh Rafter	0.587	Pass
Span 4 Lh Rafter	0.575	Pass
Span 4 Mono Rafter	0.439	Pass
Span 4 Rh Rafter	0.310	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.457	Pass
Span 1 Rh Column	0.089	Pass
Span 2 Rh Column	0.088	Pass
Span 3 Rh Column	0.088	Pass
Span 4 Rh Column	0.458	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.269	Pass
Span 1 Rh Rafter Rh Eaves	0.643	Pass
Span 2 Lh Rafter Lh Eaves	0.691	Pass
Span 2 Rh Rafter Rh Eaves	0.655	Pass
Span 3 Lh Rafter Lh Eaves	0.658	Pass

Member	U.R.	Status
Span 3 Rh Rafter Rh Eaves	0.685	Pass
Span 4 Lh Rafter Lh Eaves	0.680	Pass
Span 4 Rh Rafter Rh Eaves	0.269	Pass

Serviceability

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	3.3270		
Second order failure load factor λ_f	2.0821		

Pass

In Plane Stability

Member	Status	Member	Status	Member	Status
Span 1 Rh Column	Pass				
Span 2 Rh Column	Pass				
Span 3 Rh Column	Pass				

Member Stability

Rafters

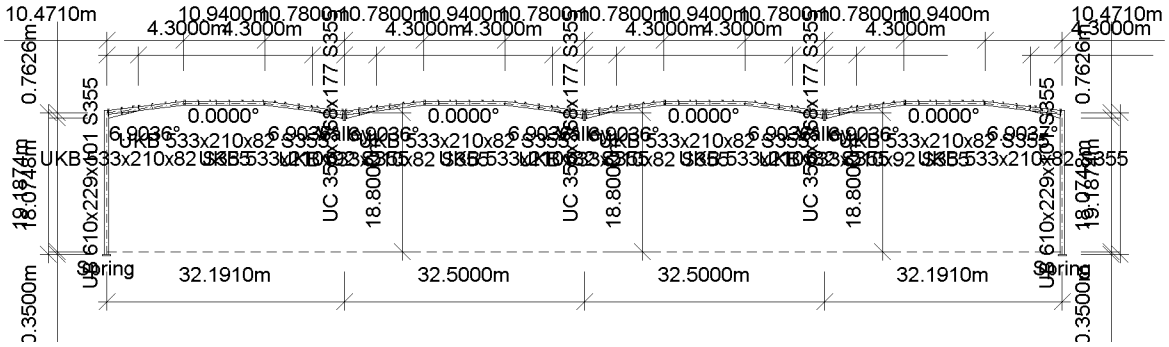
Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 1 Rh Column	Not Checked
Span 2 Rh Column	Not Checked
Span 3 Rh Column	Not Checked
Span 4 Rh Column	Not Checked

REFERENCE: Gridline 28/26 - Design

Frame Diagram



Member Restraints

Span 1 Lh Column

Not restrained

Span 1 Rh Column

Not restrained

Span 2 Rh Column

Not restrained

Span 3 Rh Column

Not restrained

Span 4 Rh Column

Not restrained

Span 1 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 1 Flat Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 1 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 2 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 2 Flat Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 2 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 3 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 3 Flat Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 3 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 4 Lh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Span 4 Flat Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange
10.8000	Torsional

Span 4 Rh Rafter

Position [m]	Type
0.2056	Torsional
2.0000	Torsional
3.6000	O/S Flange
4.4000	Torsional
6.2000	Torsional
8.0000	O/S Flange
9.4000	O/S Flange

Loadcases

Frame Dead Load (Dead)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Sheeting	Span 1	Vert.	0.180	-	-	-	9.0000
Sheeting	Span 2	Vert.	0.180	-	-	-	9.0000
Sheeting	Span 3	Vert.	0.180	-	-	-	9.0000
Sheeting	Span 4	Vert.	0.180	-	-	-	9.0000

Frame Service Load (Dead)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Span Area	Span 1	Vert.	0.250	-	-	-	9.0000
Span Area	Span 2	Vert.	0.250	-	-	-	9.0000
Span Area	Span 3	Vert.	0.250	-	-	-	9.0000
Span Area	Span 4	Vert.	0.250	-	-	-	9.0000

Frame Imposed Load (Imposed)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Span Area	Span 1	Vert.	0.600	-	-	-	9.0000
Span Area	Span 2	Vert.	0.600	-	-	-	9.0000
Span Area	Span 3	Vert.	0.600	-	-	-	9.0000
Span Area	Span 4	Vert.	0.600	-	-	-	9.0000

SWL+

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m

Building reference height, H_r	20.2347	m
Building effective height, H_e	20.2347	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	270.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9014	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m^2]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.875	-0.3000	0.5300	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.889	-0.3000	-1.4000	4.0765	13.2382	0.7530	0.6160	100.00
Span 1 Lh Rafter			-0.7000	6.4710				
Span 1 Flat Rafter	0.889	-0.3000	-0.7000	9.6342	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			0.2000	1.3058				
Span 1 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter			0.2000	6.7822				
Span 2 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			0.2000	6.8931				
Span 2 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter			0.2000	6.7822				
Span 3 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 3 Flat Rafter			0.2000	6.8931				
Span 3 Rh Rafter	0.889	-0.3000	0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter	0.889	-0.3000	0.2000	4.0765	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter			0.2000	6.7822				
Span 4 Flat Rafter	0.889	-0.3000	0.2000	4.0469	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			0.2000	6.8931				
Span 4 Rh Rafter	0.889	-0.3000	0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 4 Rh Column	0.875	-0.3000	-0.4420	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	-4.97	-	0.0
Force	Span 3 Lh Rafter	Horz.	-5.20	-	0.0
Force	Span 4 Lh Rafter	Horz.	-5.11	-	0.0

Snow Uniform (Snow)

Area Loads

Load Type	Span Member	Direction	Load$_1$ [kN/m²]	a [m]	Load$_2$ [kN/m²]	b [m]	Centres [m]
Sheeting	Span 1	Vert.	0.395	-	-	-	9.0000
Sheeting	Span 2	Vert.	0.395	-	-	-	9.0000
Sheeting	Span 3	Vert.	0.395	-	-	-	9.0000
Sheeting	Span 4	Vert.	0.395	-	-	-	9.0000

Stiffness (Dead)

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	10.00	-	0.0
Force	Span 3 Lh Rafter	Horz.	10.00	-	0.0
Force	Span 4 Lh Rafter	Horz.	10.00	-	0.0

SWL-

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	270.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.875	-0.3000	0.5300	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.889	-0.3000	-1.4000	4.0504	13.2382	0.7530	0.6160	100.00
Span 1 Lh Rafter			-0.7000	6.4971				
Span 1 Flat Rafter	0.889	-0.3000	-0.7000	9.6342	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			-0.2000	1.3058				
Span 1 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 2 Lh Rafter			-0.2000	6.8083				
Span 2 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			-0.2000	6.9190				
Span 2 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 3 Lh Rafter			-0.2000	6.8083				
Span 3 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			-0.2000	6.9190				
Span 3 Rh Rafter	0.889	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter	0.889	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 4 Lh Rafter			-0.2000	6.8083				
Span 4 Flat Rafter	0.889	-0.3000	-0.2000	4.0210	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			-0.2000	6.9190				
Span 4 Rh Rafter	0.889	-0.3000	-0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 4 Rh Column	0.875	-0.3000	-0.4420	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	-8.53	-	0.0
Force	Span 3 Lh Rafter	Horz.	-8.65	-	0.0
Force	Span 4 Lh Rafter	Horz.	-8.62	-	0.0

SWR+

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	129.3820	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	

Eaves Line orientation EON 0.0 °
Critical Wind Angle 90.0000 °

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.763	-0.3000	-0.4420	19.2874	20.8807	0.9129	0.6160	100.00
Span 1 Lh Rafter	0.776	-0.3000	0.2000	10.5475	13.2382	0.9411	0.6160	100.00
Span 1 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 1 Flat Rafter			0.2000	4.0210				
Span 1 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 1 Rh Rafter			0.2000	6.8083				
Span 2 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 2 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 2 Flat Rafter			0.2000	4.0210				
Span 2 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 2 Rh Rafter			0.2000	6.8083				
Span 3 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 3 Flat Rafter	0.776	-0.3000	0.2000	6.9190	13.5530	0.9396	0.6160	100.00
Span 3 Flat Rafter			0.2000	4.0210				
Span 3 Rh Rafter	0.776	-0.3000	0.2000	4.0504	13.4875	0.9399	0.6160	100.00
Span 3 Rh Rafter			0.2000	6.8083				
Span 4 Lh Rafter	0.776	-0.3000	0.2000	10.8587	13.4875	0.9399	0.6160	100.00
Span 4 Flat Rafter	0.776	-0.3000	0.2000	1.3058	13.5530	0.9396	0.6160	100.00
Span 4 Flat Rafter			-0.7000	9.6342				
Span 4 Rh Rafter	0.776	-0.3000	-0.7000	4.0504	13.2382	0.9411	0.6160	100.00
Span 4 Rh Rafter			-1.4000	6.4971				

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 4 Rh Column	0.776	-0.3000	0.5300	20.4874	21.9939	0.9097	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	3.55	-	0.0
Force	Span 3 Lh Rafter	Horz.	3.68	-	0.0
Force	Span 4 Lh Rafter	Horz.	3.38	-	0.0

SWR-

Frame is considered to be in Intermediate zone

Building Length	211.1000	m
Building Width	130.0000	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	90.0000	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	0.763	-0.3000	-0.4420	19.2874	20.8807	0.7530	0.6160	100.00
Span 1 Lh Rafter	0.776	-0.3000	-0.2000	10.5475	13.2382	0.7530	0.6160	100.00
Span 1 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 1 Flat Rafter			-0.2000	4.0210				
Span 1 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 1 Rh Rafter			-0.2000	6.8083				
Span 2 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 2 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 2 Flat Rafter			-0.2000	4.0210				
Span 2 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 2 Rh Rafter			-0.2000	6.8083				
Span 3 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 3 Flat Rafter	0.776	-0.3000	-0.2000	6.9190	13.5530	0.7530	0.6160	100.00
Span 3 Flat Rafter			-0.2000	4.0210				
Span 3 Rh Rafter	0.776	-0.3000	-0.2000	4.0504	13.4875	0.7530	0.6160	100.00
Span 3 Rh Rafter			-0.2000	6.8083				
Span 4 Lh Rafter	0.776	-0.3000	-0.2000	10.8587	13.4875	0.7530	0.6160	100.00
Span 4 Flat Rafter	0.776	-0.3000	-0.2000	1.3058	13.5530	0.7530	0.6160	100.00
Span 4 Flat Rafter			-0.7000	9.6342				
Span 4 Rh Rafter	0.776	-0.3000	-0.7000	4.0504	13.2382	0.7530	0.6160	100.00
Span 4 Rh Rafter			-1.4000	6.4971				
Span 4 Rh Column	0.776	-0.3000	0.6000	20.4874	21.9939	0.7530	0.6160	100.00

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 2 Lh Rafter	Horz.	7.19	-	0.0
Force	Span 3 Lh Rafter	Horz.	7.23	-	0.0
Force	Span 4 Lh Rafter	Horz.	7.09	-	0.0

GW+

Frame is considered to be in Remote zone

Building Length	211.1000	m
Building Width	129.3820	m
Building reference height, H_r	20.1052	m
Building effective height, H_e	20.1052	m
Lh Gap	38.3748	m
Rh Gap	38.3748	m
Altitude factor, Sa	1.1000	
Seasonal factor, Ss	1.0000	
Probability factor, Sp	1.0000	
Directional factor, Sd	1.0000	
Eaves Line orientation EON	0.0	°
Critical Wind Angle	0.0	°

Wind Speeds

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	1.9006	0.0	0.0
Span 1 Lh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Member	Sh	Sc	Tc	St	Tt	gt	Sb	Vs [m/s]	Ve [m/s]
Span 1 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 1 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 2 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 3 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Lh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Flat Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Rafter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Span 4 Rh Column	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Wind Loads

Member	qs [kN/m²]	Cpi	Cpe	L [m]	a [m]	Cae	Cai	%
Span 1 Lh Column	1.056	-0.3000	-0.5000	19.1874	21.1933	0.7540	0.6160	100.00
Span 1 Lh Rafter	1.074	-0.3000	0.2000	10.5475	13.8654	0.7540	0.6160	100.00
Span 1 Flat Rafter	1.074	-0.3000	0.2000	10.9400	14.1663	0.7540	0.6160	100.00
Span 1 Rh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 2 Lh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 2 Flat Rafter	1.074	-0.3000	0.2000	10.9400	14.1663	0.7540	0.6160	100.00
Span 2 Rh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 3 Lh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 3 Flat Rafter	1.074	-0.3000	0.2000	10.9400	14.1663	0.7540	0.6160	100.00
Span 3 Rh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 4 Lh Rafter	1.074	-0.3000	0.2000	10.8587	14.1036	0.7540	0.6160	100.00
Span 4 Flat Rafter	1.074	-0.3000	0.2000	10.9400	14.1663	0.7540	0.6160	100.00
Span 4 Rh Rafter	1.074	-0.3000	0.2000	10.5475	13.8654	0.7540	0.6160	100.00
Span 4 Rh Column	1.056	-0.3000	-0.5000	19.1874	21.1933	0.7540	0.6160	100.00

Snow Drift (Snow)

Area Loads

Load Type	Span Member	Direction	$Load_1$ [kN/m²]	a [m]	$Load_2$ [kN/m²]	b [m]	Centres [m]
Varying Area	Span 1 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	9.0000
Varying Area	Span 1 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 2 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 2 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	9.0000
Varying Area	Span 2 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	9.0000
Varying Area	Span 2 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 3 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 3 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	9.0000
Varying Area	Span 3 Flat Rafter	Vert.	0.0	5.4700	0.499	10.9400	9.0000
Varying Area	Span 3 Rh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 4 Lh Rafter	Vert.	1.481	0.0	0.499	10.7800	9.0000
Varying Area	Span 4 Flat Rafter	Vert.	0.499	0.0	0.0	5.4700	9.0000

Combinations

Sw + Dead + Serv. + Imp.

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	0.0
Frame Dead Load	Dead	1.4000	0.0
Frame Service Load	Dead	1.4000	0.0
Frame Imposed Load	Imposed	1.6000	1.0000

D+S+SU+SWL+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
SWL+	Wind	1.2000	0.8000

D+SWL-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.0000	0.0
Frame Dead Load	Dead	1.0000	0.0
SWL-	Wind	1.4000	1.0000

Stiffness

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Stiffness	Dead	1.4000	1.0000

D+S+SU+SWR+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
SWR+	Wind	1.2000	0.8000

D+SWR-

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.0000	0.0
Frame Dead Load	Dead	1.0000	0.0
SWR-	Wind	1.4000	1.0000

D+S+SU+GW+

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.2000	0.0
Frame Dead Load	Dead	1.2000	0.0
Frame Service Load	Dead	1.2000	0.0
Snow Uniform	Snow	1.2000	0.8000
GW+	Wind	1.2000	0.8000

D+S+SDr

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	1.0000
Frame Dead Load	Dead	1.4000	1.0000
Frame Service Load	Dead	1.4000	1.0000
Snow Drift	Snow	1.0500	1.0000

Design Code: BS5950

Design Summary

Design Combination	Lambda p	Lambda r	Status
Sw + Dead + Serv. + Imp.	1.131	1.000	Pass
D+S+SU+SWL+	1.293	1.000	Pass

Design Combination	Lambda p	Lambda r	Status
D+SWL-	3.040	1.000	Pass
Stiffness	10808.875	1.000	Fail
D+S+SU+SWR+	1.294	1.000	Pass
D+SWR-	2.939	1.000	Pass
D+S+SU+GW+	1.222	1.000	Pass
D+S+SDr	2.083	1.000	Pass

Member Stability Status: Invalid

Design Cases

Sw + Dead + Serv. + Imp.

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1017.7	0.910
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.5	0.659
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.847
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.4	0.798
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.978
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.610
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.687
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.687
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.610
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.978
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.4	0.798
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.846
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.6	0.659
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1017.7	0.910
Total Rafter					10900.53			
Total Column					3882.32			
Total Haunch					1522.05			
Total					16304.91			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.0217	-	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 2	1.0277	-	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.0761	-	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 4	1.0770	-	Formed	Span 4 Rh Column	18.4250	18.4250	
Event 5	1.0770	-	Reversed	Span 1 Lh Column	18.4250	18.4250	
Event 6	1.1105	-	Formed	Span 1 Mono Rafter	5.4700	4.9180	
Event 7	1.1297	-	Formed	Span 2 Mono Rafter	8.2050	7.4683	Pass
Event 8	1.1308	-	Formed	Span 4 Mono Rafter	8.2050	7.4564	Pass

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.659	Pass
Span 1 Mono Rafter	0.846	Pass
Span 1 Rh Rafter	0.798	Pass
Span 2 Lh Rafter	0.978	Pass
Span 2 Mono Rafter	0.609	Pass
Span 2 Rh Rafter	0.687	Pass
Span 3 Lh Rafter	0.687	Pass
Span 3 Mono Rafter	0.609	Pass
Span 3 Rh Rafter	0.978	Pass
Span 4 Lh Rafter	0.798	Pass
Span 4 Mono Rafter	0.846	Pass

Member	U.R.	Status
Span 4 Rh Rafter	0.659	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.907	Pass
Span 4 Rh Column	0.907	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.531	Pass
Span 1 Rh Rafter Rh Eaves	0.867	Pass
Span 2 Lh Rafter Lh Eaves	0.935	Pass
Span 2 Rh Rafter Rh Eaves	0.770	Pass
Span 3 Lh Rafter Lh Eaves	0.769	Pass
Span 3 Rh Rafter Rh Eaves	0.935	Pass
Span 4 Lh Rafter Lh Eaves	0.867	Pass
Span 4 Rh Rafter Rh Eaves	0.531	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-38.8/175.9	127.0	na	104.1	-11.3/172.4
Span 2	Pass	-11.3/172.4	46.7	na	58.2	1.1/172.4
Span 3	Pass	1.1/172.4	58.3	na	46.9	13.5/172.4
Span 4	Pass	13.5/172.4	103.7	na	126.6	41.0/175.9

Frame Stability

None

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 4 Rh Column	Not Checked

D+S+SU+SWL+

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.3	0.225
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.4	0.305
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.5	0.368
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.4	0.605
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.611
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.599
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.4	0.652
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.672
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.515
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.774
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.6	0.637
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.665
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.459

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.5	0.945
Total Rafter					10900.53			
Total Column					3882.32			
Total Haunch					1522.05			
Total					16304.91			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.0544	-	Formed	Span 4 Rh Column	18.4250	18.4250	
Event 2	1.2075	-	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.2680	-	Formed	Span 4 Mono Rafter	8.2050	7.4017	
Event 4	1.2928	-	Formed	Span 3 Mono Rafter	5.4700	4.7973	Pass

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.305	Pass
Span 1 Mono Rafter	0.368	Pass
Span 1 Rh Rafter	0.605	Pass
Span 2 Lh Rafter	0.611	Pass
Span 2 Mono Rafter	0.599	Pass
Span 2 Rh Rafter	0.651	Pass
Span 3 Lh Rafter	0.672	Pass
Span 3 Mono Rafter	0.515	Pass
Span 3 Rh Rafter	0.773	Pass
Span 4 Lh Rafter	0.637	Pass
Span 4 Mono Rafter	0.665	Pass
Span 4 Rh Rafter	0.459	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.225	Pass
Span 4 Rh Column	0.942	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.160	Pass
Span 1 Rh Rafter Rh Eaves	0.639	Pass
Span 2 Lh Rafter Lh Eaves	0.686	Pass
Span 2 Rh Rafter Rh Eaves	0.709	Pass
Span 3 Lh Rafter Lh Eaves	0.709	Pass
Span 3 Rh Rafter Rh Eaves	0.766	Pass
Span 4 Lh Rafter Lh Eaves	0.710	Pass
Span 4 Rh Rafter Rh Eaves	0.549	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	63.3/175.9	-17.6	na	-28.0	57.4/172.4
Span 2	Pass	57.4/172.4	110.8	na	96.4	82.1/172.4
Span 3	Pass	82.1/172.4	33.9	na	32.5	89.8/172.4
Span 4	Pass	89.8/172.4	96.5	na	110.6	114.6/175.9

Frame Stability

None

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass

Member	Status
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 4 Rh Column	Not Checked

D+SWL-Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.292
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.134
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.073
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.7	0.088
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.120
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.151
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.169
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.173
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.120
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.107
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.8	0.097
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.087
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.259
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.6	0.363
Total Rafter					10900.53			
Total Column					3882.32			
Total Haunch					1522.05			
Total					16304.91			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	2.7346	2.7264	Formed	Span 4 Rh Column	18.4250	18.4250	
Event 2	3.0494	3.0402	Formed	Span 1 Lh Column	18.4250	18.4250	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	441.074	-0.276
10471.0	20105.2	438.248	-22.199
15941.0	20105.2	438.145	-37.565
21411.0	20105.2	438.041	-38.003
32191.0	18800.0	433.273	0.0
42971.0	20105.2	441.383	68.117
48441.0	20105.2	441.310	75.250
53911.0	20105.2	441.237	51.626
64691.0	18800.0	447.344	0.0
75471.0	20105.2	450.954	30.541
80941.0	20105.2	450.912	46.842
86411.0	20105.2	450.870	38.471
97191.0	18800.0	455.442	0.0
107971.0	20105.2	456.721	10.797
113441.0	20105.2	456.710	9.603
118911.0	20105.2	456.699	-7.563
129382.0	18837.0	455.696	0.429

Coord. X	Coord. Z	Delta X	Delta Y
129382.0	-350.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.134	Pass
Span 1 Mono Rafter	0.073	Pass
Span 1 Rh Rafter	0.088	Pass
Span 2 Lh Rafter	0.121	Pass
Span 2 Mono Rafter	0.151	Pass
Span 2 Rh Rafter	0.169	Pass
Span 3 Lh Rafter	0.173	Pass
Span 3 Mono Rafter	0.121	Pass
Span 3 Rh Rafter	0.107	Pass
Span 4 Lh Rafter	0.097	Pass
Span 4 Mono Rafter	0.087	Pass
Span 4 Rh Rafter	0.259	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.431	Pass
Span 4 Rh Column	0.364	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.148	Pass
Span 1 Rh Rafter Rh Eaves	0.090	Pass
Span 2 Lh Rafter Lh Eaves	0.093	Pass
Span 2 Rh Rafter Rh Eaves	0.172	Pass
Span 3 Lh Rafter Lh Eaves	0.170	Pass
Span 3 Rh Rafter Rh Eaves	0.133	Pass
Span 4 Lh Rafter Lh Eaves	0.121	Pass
Span 4 Rh Rafter Rh Eaves	0.232	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	136.7/175.9	-92.0	na	-85.1	115.0/172.4
Span 2	Pass	115.0/172.4	48.6	na	30.2	124.4/172.4
Span 3	Pass	124.4/172.4	-8.8	na	-2.2	123.0/172.4
Span 4	Pass	123.0/172.4	-1.1	na	-9.5	121.8/175.9

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	28.5306		
Second order failure load factor λ_f	3.0402		

Pass

In Plane Stability

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Invalid
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Invalid
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Invalid

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 4 Rh Column	Not Checked

Stiffness Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.378
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.467
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.344
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.8	0.079
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.166
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.119
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.053
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.053
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.119
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.166
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.8	0.079
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.345
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.467
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.379
Total Rafter					10900.53			
Total Column					3882.32			
Total Haunch					1522.05			
Total					16304.91			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	2.1400	-	Formed	Span 1 Lh Rafter	4.2995	4.2995	
Event 2	2.1404	-	Formed	Span 4 Rh Rafter	4.3203	4.3203	
Event 3	2.3405	-	Formed	Span 3 Rh Rafter	4.3197	4.3197	Pass
Event 4	2.3411	-	Formed	Span 2 Lh Rafter	4.2994	4.2994	Pass
Event 5	2.9573	-	Formed	Span 2 Rh Rafter	4.3197	4.3197	Pass
Event 6	10808.7314	-	Formed	Span 3 Lh Rafter	4.2994	4.2994	Pass
Event 7	10808.7314	-	Reversed	Span 4 Rh Rafter	4.3203	4.3203	Pass
Event 8	10808.7314	-	Formed	Span 4 Rh Rafter	4.3203	4.3203	Pass
Event 9	10808.8750	-	Formed	Span 1 Lh Column	18.4250	18.4250	Pass

Strength Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.467	Pass
Span 1 Mono Rafter	0.344	Pass
Span 1 Rh Rafter	0.079	Pass
Span 2 Lh Rafter	0.166	Pass
Span 2 Mono Rafter	0.119	Pass
Span 2 Rh Rafter	0.053	Pass
Span 3 Lh Rafter	0.053	Pass
Span 3 Mono Rafter	0.119	Pass
Span 3 Rh Rafter	0.166	Pass
Span 4 Lh Rafter	0.079	Pass
Span 4 Mono Rafter	0.345	Pass
Span 4 Rh Rafter	0.467	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.378	Pass
Span 4 Rh Column	0.379	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.374	Pass
Span 1 Rh Rafter Rh Eaves	0.078	Pass
Span 2 Lh Rafter Lh Eaves	0.133	Pass
Span 2 Rh Rafter Rh Eaves	0.014	Pass
Span 3 Lh Rafter Lh Eaves	0.014	Pass
Span 3 Rh Rafter Rh Eaves	0.133	Pass
Span 4 Lh Rafter Lh Eaves	0.078	Pass
Span 4 Rh Rafter Rh Eaves	0.374	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Fail	349.7/175.9	94.2	na	65.9	369.3/172.4
Span 2	Fail	369.3/172.4	-37.9	na	-29.5	361.2/172.4
Span 3	Fail	361.2/172.4	29.5	na	37.9	369.3/172.4
Span 4	Fail	369.3/172.4	-65.7	na	-93.9	349.8/175.9

Frame Stability

None

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Invalid
Span 2 Mono Rafter	Invalid
Span 2 Rh Rafter	Invalid
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Invalid
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Invalid

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 4 Rh Column	Not Checked

D+S+SU+SWR+ Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.6	0.945
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.6	0.459
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.665
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.6	0.629
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.767
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.505
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.6	0.692
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.662
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.622
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.5	0.553
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.5	0.581
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.6	0.271
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.193
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.5	0.193
Total Rafter					10900.53			
Total Column					3882.32			
Total Haunch					1522.05			
Total					16304.91			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.0545	-	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 2	1.2101	-	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 3	1.2693	-	Formed	Span 1 Mono Rafter	5.4700	4.9081	
Event 4	1.2921	-	Formed	Span 3 Mono Rafter	5.4700	4.9300	Pass
Event 5	1.2937	-	Formed	Span 4 Lh Rafter	4.2991	4.2991	Pass

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.459	Pass
Span 1 Mono Rafter	0.665	Pass
Span 1 Rh Rafter	0.629	Pass
Span 2 Lh Rafter	0.766	Pass
Span 2 Mono Rafter	0.505	Pass
Span 2 Rh Rafter	0.692	Pass
Span 3 Lh Rafter	0.662	Pass
Span 3 Mono Rafter	0.622	Pass
Span 3 Rh Rafter	0.553	Pass
Span 4 Lh Rafter	0.581	Pass
Span 4 Mono Rafter	0.271	Pass
Span 4 Rh Rafter	0.193	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.942	Pass
Span 4 Rh Column	0.193	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.546	Pass
Span 1 Rh Rafter Rh Eaves	0.703	Pass
Span 2 Lh Rafter Lh Eaves	0.759	Pass
Span 2 Rh Rafter Rh Eaves	0.717	Pass
Span 3 Lh Rafter Lh Eaves	0.717	Pass
Span 3 Rh Rafter Rh Eaves	0.655	Pass
Span 4 Lh Rafter Lh Eaves	0.610	Pass
Span 4 Rh Rafter Rh Eaves	0.076	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-108.6/175.9	113.9	na	99.5	-83.0/172.4
Span 2	Pass	-83.0/172.4	27.9	na	27.5	-76.6/172.4
Span 3	Pass	-76.6/172.4	107.6	na	127.7	-48.4/172.4
Span 4	Pass	-48.4/172.4	-59.0	na	-56.6	-62.7/175.9

Frame Stability

None

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass

Member	Status
Span 4 Rh Rafter	Invalid

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 4 Rh Column	Not Checked

D+SWR-Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.6	0.348
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.244
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.089
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.8	0.094
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.106
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.115
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.8	0.178
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.169
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.159
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.133
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.7	0.076
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.7	0.099
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.131
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1021.9	0.448
Total Rafter					10900.53			
Total Column					3882.32			
Total Haunch					1522.05			
Total					16304.91			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	2.8591	2.8568	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 2	2.9409	2.9385	Formed	Span 4 Rh Column	18.4250	18.4250	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-422.928	0.420
10471.0	20105.2	-423.446	-3.518
15941.0	20105.2	-423.460	13.281
21411.0	20105.2	-423.474	13.522
32191.0	18800.0	-421.871	0.0
42971.0	20105.2	-417.734	34.836
48441.0	20105.2	-417.773	42.212
53911.0	20105.2	-417.813	26.247
64691.0	18800.0	-414.722	0.0
75471.0	20105.2	-407.931	57.146
80941.0	20105.2	-407.997	82.798
86411.0	20105.2	-408.062	76.051
97191.0	18800.0	-398.977	0.0
107971.0	20105.2	-405.627	-53.722
113441.0	20105.2	-405.717	-61.265
118911.0	20105.2	-405.808	-48.163
129382.0	18837.0	-411.733	-0.258
129382.0	-350.0	0.0	0.0

Strength Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.245	Pass

Member	U.R.	Status
Span 1 Mono Rafter	0.089	Pass
Span 1 Rh Rafter	0.094	Pass
Span 2 Lh Rafter	0.106	Pass
Span 2 Mono Rafter	0.115	Pass
Span 2 Rh Rafter	0.178	Pass
Span 3 Lh Rafter	0.170	Pass
Span 3 Mono Rafter	0.160	Pass
Span 3 Rh Rafter	0.133	Pass
Span 4 Lh Rafter	0.076	Pass
Span 4 Mono Rafter	0.099	Pass
Span 4 Rh Rafter	0.131	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.348	Pass
Span 4 Rh Column	0.449	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.220	Pass
Span 1 Rh Rafter Rh Eaves	0.119	Pass
Span 2 Lh Rafter Lh Eaves	0.130	Pass
Span 2 Rh Rafter Rh Eaves	0.171	Pass
Span 3 Lh Rafter Lh Eaves	0.172	Pass
Span 3 Rh Rafter Rh Eaves	0.082	Pass
Span 4 Lh Rafter Lh Eaves	0.079	Pass
Span 4 Rh Rafter Rh Eaves	0.172	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-108.8/175.9	-8.5	na	-0.5	-109.9/172.4
Span 2	Pass	-109.9/172.4	-3.9	na	-11.2	-111.8/172.4
Span 3	Pass	-111.8/172.4	33.7	na	53.6	-101.3/172.4
Span 4	Pass	-101.3/172.4	-95.1	na	-108.7	-126.2/175.9

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	30.4063		
Second order failure load factor λ_f	2.9385		

Pass

In Plane Stability

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Invalid
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Invalid
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Invalid

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 4 Rh Column	Not Checked

D+S+SU+GW+

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.5	0.817
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.639
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.798
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.7	0.745
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.918
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.557
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.627
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.627
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.557
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.918
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.7	0.745
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.798
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.639
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1018.5	0.817
Total Rafter					10900.53			
Total Column					3882.32			
Total Haunch					1522.05			
Total					16304.91			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.0887	-	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 2	1.0950	-	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.1830	-	Formed	Span 1 Lh Column	18.4250	18.4250	
Event 4	1.1840	-	Formed	Span 4 Rh Column	18.4250	18.4250	
Event 5	1.1840	-	Reversed	Span 1 Lh Column	18.4250	18.4250	
Event 6	1.1995	-	Formed	Span 1 Mono Rafter	5.4700	4.8927	
Event 7	1.2206	-	Formed	Span 2 Mono Rafter	8.2050	7.4956	Pass
Event 8	1.2217	-	Formed	Span 4 Mono Rafter	8.2050	7.4844	Pass

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.639	Pass
Span 1 Mono Rafter	0.798	Pass
Span 1 Rh Rafter	0.745	Pass
Span 2 Lh Rafter	0.918	Pass
Span 2 Mono Rafter	0.557	Pass
Span 2 Rh Rafter	0.627	Pass
Span 3 Lh Rafter	0.627	Pass
Span 3 Mono Rafter	0.557	Pass
Span 3 Rh Rafter	0.918	Pass
Span 4 Lh Rafter	0.745	Pass
Span 4 Mono Rafter	0.798	Pass
Span 4 Rh Rafter	0.639	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.815	Pass
Span 4 Rh Column	0.815	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.464	Pass
Span 1 Rh Rafter Rh Eaves	0.803	Pass

Member	U.R.	Status
Span 2 Lh Rafter Lh Eaves	0.866	Pass
Span 2 Rh Rafter Rh Eaves	0.701	Pass
Span 3 Lh Rafter Lh Eaves	0.701	Pass
Span 3 Rh Rafter Rh Eaves	0.866	Pass
Span 4 Lh Rafter Lh Eaves	0.803	Pass
Span 4 Rh Rafter Rh Eaves	0.464	Pass

Serviceability

Span	Status	Lh Eaves(H)	Lh Apex(V)	Apex(V)	Rh Apex(V)	Rh Eaves(H)
Span 1	Pass	-41.7/175.9	141.5	na	114.1	-11.0/172.4
Span 2	Pass	-11.0/172.4	45.6	na	59.1	1.5/172.4
Span 3	Pass	1.5/172.4	59.3	na	45.8	14.0/172.4
Span 4	Pass	14.0/172.4	113.7	na	140.9	44.6/175.9

Frame Stability

None

Member Stability

Rafters

Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

Member	Status
Span 1 Lh Column	Not Checked
Span 4 Rh Column	Not Checked

D+S+SDr

Sections

Member	Section	Grade	Length	Mass	Weight	Mp	Mpr	UR
Span 1 Lh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1020.8	0.439
Span 1 Lh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.7	0.298
Span 1 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.418
Span 1 Rh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.7	0.500
Span 1 Valley Column	UC 356x368x177	S355						
Span 2 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.580
Span 2 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.408
Span 2 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.516
Span 2 Valley Column	UC 356x368x177	S355						
Span 3 Lh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.516
Span 3 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.408
Span 3 Rh Rafter	UKB 533x210x82	S355	10.8587	82.18	892.39	730.8	730.7	0.580
Span 3 Valley Column	UC 356x368x177	S355						
Span 4 Lh Rafter	UKB 533x210x92	S355	10.8587	92.14	1000.54	837.8	837.7	0.500
Span 4 Flat Rafter	UKB 533x210x82	S355	10.9400	82.18	899.07	730.8	730.8	0.418
Span 4 Rh Rafter	UKB 533x210x82	S355	10.5475	82.18	866.81	730.8	730.8	0.298
Span 4 Rh Column	UB 610x229x101	S355	19.1874	101.17	1941.16	1021.9	1020.8	0.439
Total Rafter					10900.53			
Total Column					3882.32			
Total Haunch					1522.05			
Total					16304.91			

Hinge History

Hinge History

Event	Lambda 1st Order	Lambda 2nd Order	Status	Member	Distance(B)	Distance(A)	Status
Event 1	1.7228	1.7116	Formed	Span 2 Lh Rafter	4.2994	4.2994	
Event 2	1.7357	1.7245	Formed	Span 3 Rh Rafter	4.3197	4.3197	
Event 3	1.8925	1.8803	Formed	Span 3 Lh Rafter	4.2994	4.2994	
Event 4	2.0953	2.0817	Formed	Span 2 Mono Rafter	8.2050	6.8734	
Event 5	2.0953	2.0817	Reversed	Span 3 Rh Rafter	4.3197	4.3197	
Event 6	2.0961	2.0826	Formed	Span 3 Mono Rafter	5.4700	5.4700	
Event 7	2.0961	2.0826	Formed	Span 1 Lh Column	18.4250	18.4250	

ULS Plastic Deflections

Coord. X	Coord. Z	Delta X	Delta Y
0.0	-350.0	0.0	0.0
0.0	18837.0	-68.893	0.839
10471.0	20105.2	-47.517	178.457
15941.0	20105.2	-47.580	209.407
21411.0	20105.2	-47.642	151.425
32191.0	18800.0	-29.471	0.0
42971.0	20105.2	-15.178	119.452
48441.0	20105.2	-15.241	166.508
53911.0	20105.2	-15.303	127.236
64691.0	18800.0	-0.074	0.0
75471.0	20105.2	15.154	127.159
80941.0	20105.2	15.092	166.498
86411.0	20105.2	15.029	119.514
97191.0	18800.0	29.319	0.0
107971.0	20105.2	47.484	151.300
113441.0	20105.2	47.422	209.320
118911.0	20105.2	47.360	178.414
129382.0	18837.0	68.755	0.839
129382.0	-350.0	0.0	0.0

Strength

Rafters

Member	U.R.	Status
Span 1 Lh Rafter	0.300	Pass
Span 1 Mono Rafter	0.421	Pass
Span 1 Rh Rafter	0.503	Pass
Span 2 Lh Rafter	0.584	Pass
Span 2 Mono Rafter	0.411	Pass
Span 2 Rh Rafter	0.519	Pass
Span 3 Lh Rafter	0.519	Pass
Span 3 Mono Rafter	0.411	Pass
Span 3 Rh Rafter	0.584	Pass
Span 4 Lh Rafter	0.503	Pass
Span 4 Mono Rafter	0.421	Pass
Span 4 Rh Rafter	0.300	Pass

Columns

Member	U.R.	Status
Span 1 Lh Column	0.441	Pass
Span 4 Rh Column	0.441	Pass

Haunches

Member	U.R.	Status
Span 1 Lh Rafter Lh Eaves	0.259	Pass
Span 1 Rh Rafter Rh Eaves	0.624	Pass
Span 2 Lh Rafter Lh Eaves	0.673	Pass
Span 2 Rh Rafter Rh Eaves	0.636	Pass
Span 3 Lh Rafter Lh Eaves	0.636	Pass
Span 3 Rh Rafter Rh Eaves	0.673	Pass
Span 4 Lh Rafter Lh Eaves	0.624	Pass

Member	U.R.	Status
Span 4 Rh Rafter Rh Eaves	0.259	Pass

Serviceability

Frame Stability

SCI Publication P 292

Item	Value	Units	Clause Ref.
Elastic critical load factor λ_{crit}	5.5539		
Second order failure load factor λ_f	2.0826		

Pass

In Plane Stability

Member Stability

Rafters

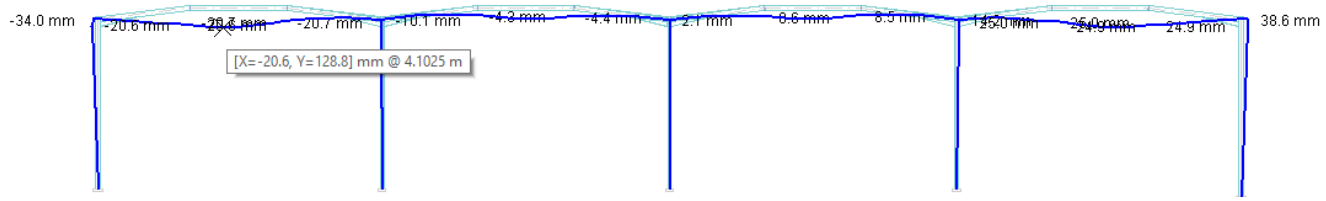
Member	Status
Span 1 Lh Rafter	Pass
Span 1 Mono Rafter	Pass
Span 1 Rh Rafter	Pass
Span 2 Lh Rafter	Pass
Span 2 Mono Rafter	Pass
Span 2 Rh Rafter	Pass
Span 3 Lh Rafter	Pass
Span 3 Mono Rafter	Pass
Span 3 Rh Rafter	Pass
Span 4 Lh Rafter	Pass
Span 4 Mono Rafter	Pass
Span 4 Rh Rafter	Pass

Columns

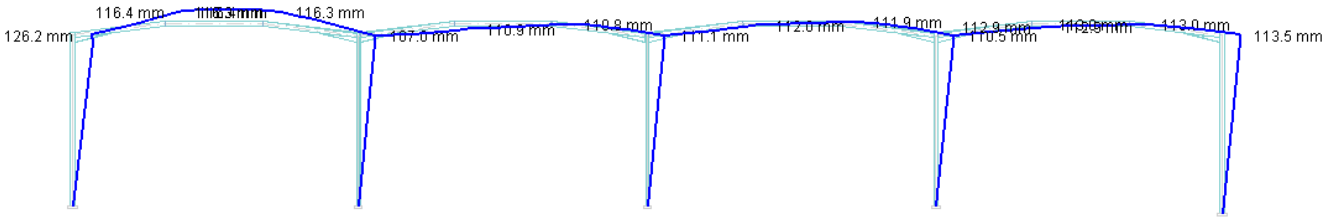
Member	Status
Span 1 Lh Column	Not Checked
Span 4 Rh Column	Not Checked

Typical Deflections

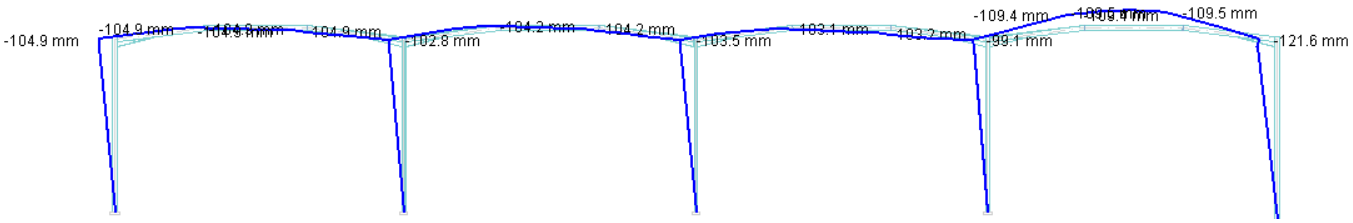
Hit D+S+I (roof imposed only)



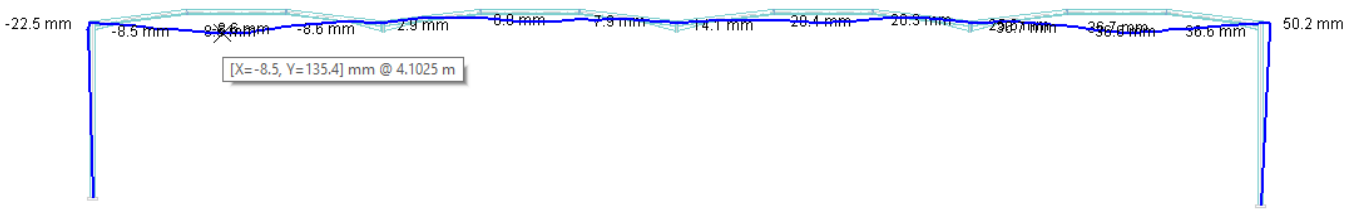
Hit D+W(L)



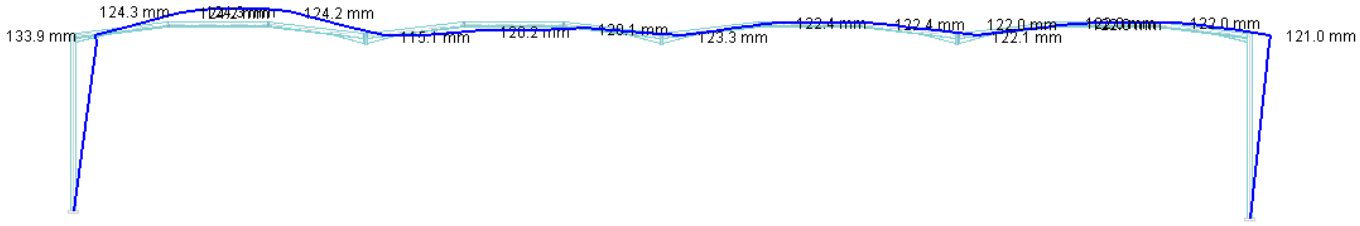
Hit D+W(R)



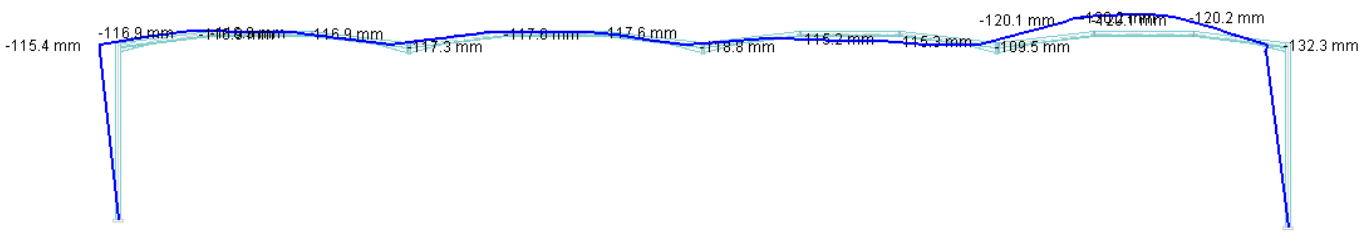
Miss D+S+I(roof imposed only)



Miss D+W(L)



Miss D+W(R)



Section 05
Valley Beams and Sway Bracing

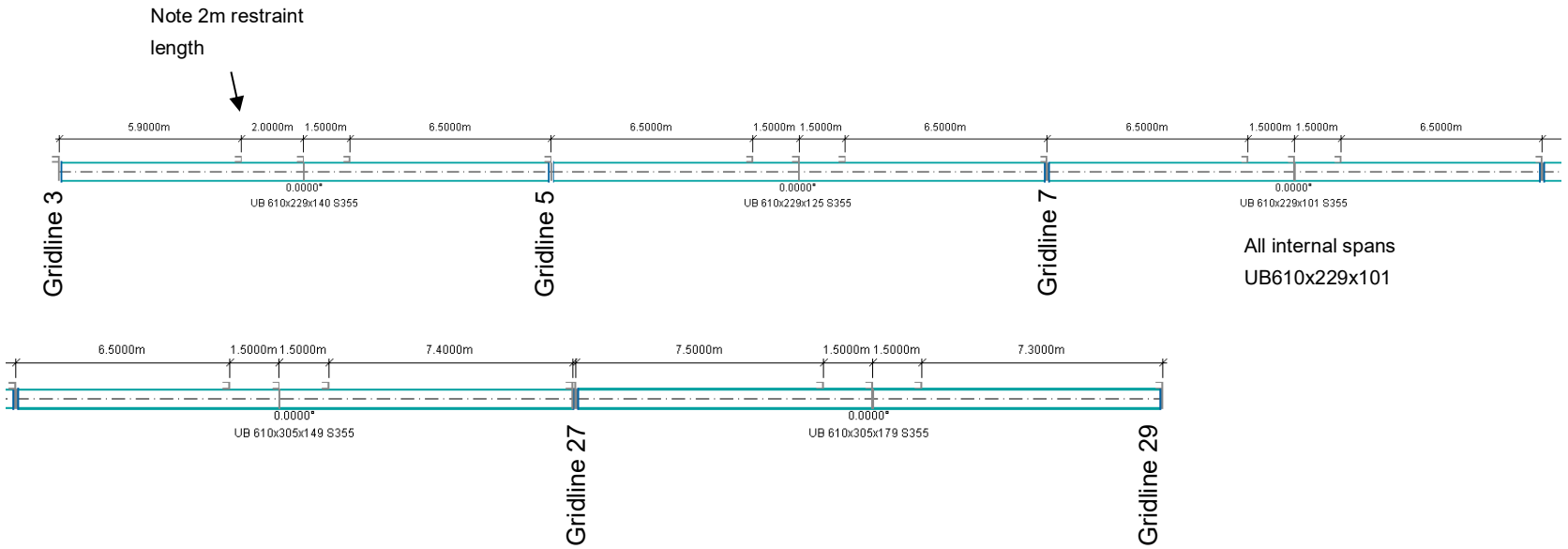
Rev	Date	Description
C01	June 2021	Initial Issue

Contents

Contents 1
Summary 2
Loading to Valley Beams 5
Restraint Design 6
Valley Sway Bracing design 8
Valley Beam Design 10
Valley Beam Deflections 14

Caunton Engineering Ltd Moorgreen Industrial Park Nottingham NG16 3QU	Project Calder Park, Wakefield		Document Number 21009-CEL-XX-XX-CA-X-0500	
	Section Valley Beam Design		Sheet no. 2	
	Calc. by JuH	Date June 2021		Rev. C01

Summary



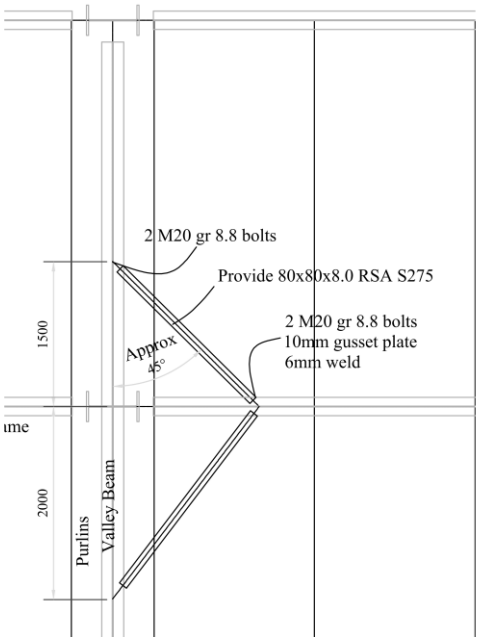
All beams to be S355 JR

Preset all valley saddles 15mm apart from grids 4 and 28 which should be preset 25mm

Valley beam restraints at miss frames

Side of the valley beam to suit erection department and syphonic supplier (if possible)

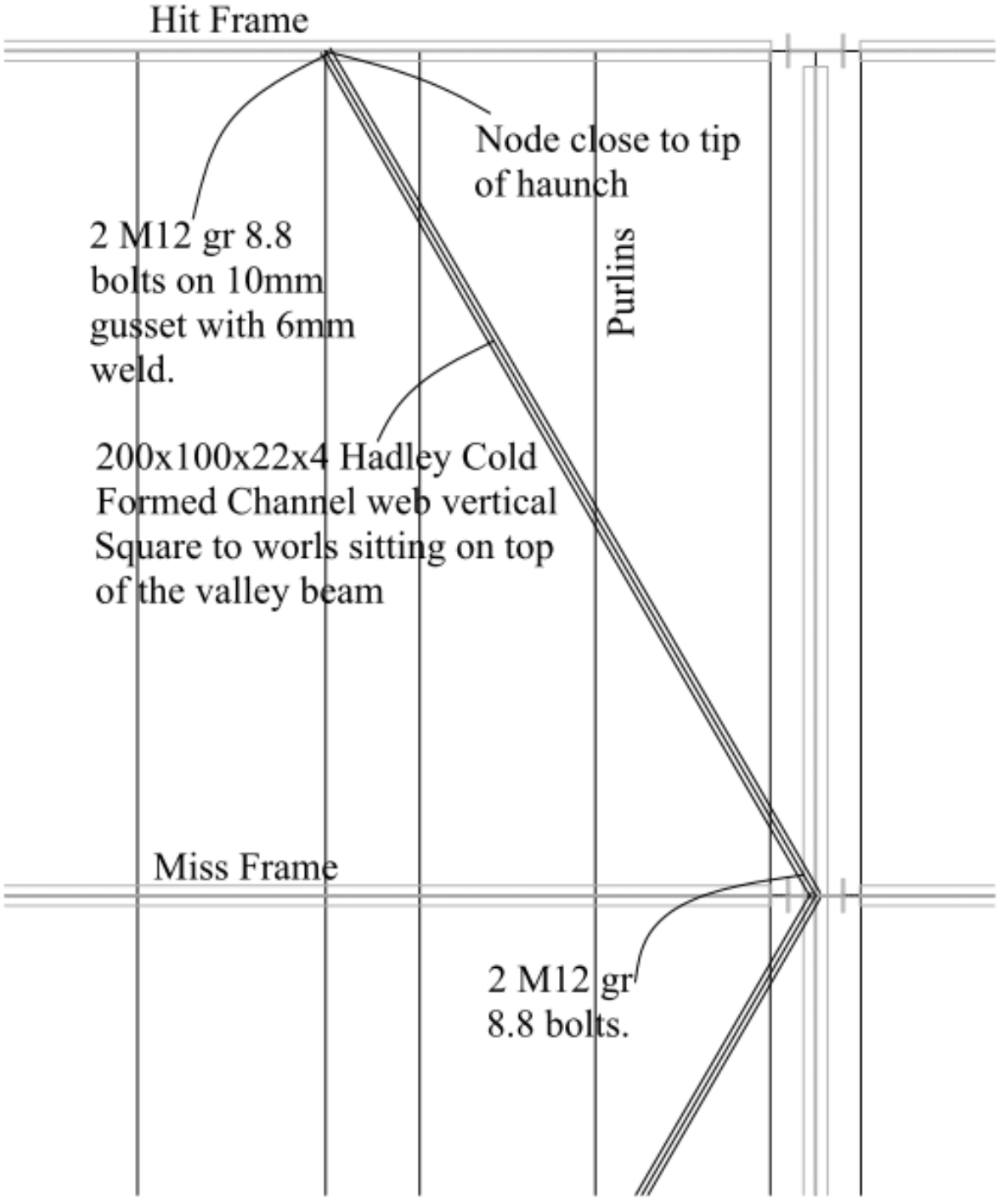
Opposite side to the valley beam sway bracing.



Valley Sway Bracing

Side of the valley beam to suit erection department and syphonic supplier (if possible)

Opposite side to the valley beam restraints.



DETAILER / PROJECT ENGINEER PRINT TO HERE. REST IS JUST CALCS

Loading to Valley Beams

From the portal frame analysis – reactions at the valleys

Typical Frame

Loadcase Unfactored	V1 kN	V2 kN	V3 kN
Portal Frame	26	20	26
Roof Dead	50	45	50
Roof Services	69	62	69
Roof Imposed	166	149	166
Uniform Snow	110	99	110
Drifted Snow	187	195	187
SWL Cpe pos	53	84	74
SWL Cpe neg	-6	14	1
SWR Cpe pos	70	85	43
SWR Cpe neg	-1	14	-10
GW Cpe pos	102	88	102

Load Combination Factored	V1 kN	V2 kN	V3 kN
1.4D+1.4S+1.6I	468	417	468
1.4D+1.4S+1.05SDr	399	383	399
1.2(D+S+US+SWL+)	369	372	394
1.0D+1.4SWL-	67	84	77
1.2(D+S+US+SWR+)	389	373	357
1.0D+1.4SWR-	74	84	62
1.2(D+S+US+GW+)	428	377	428

Gridline 28

Loadcase Unfactored	V1 kN	V2 kN	V3 kN
Portal Frame	29	23	29
Roof Dead	56	51	56
Roof Services	77	71	77
Roof Imposed	186	169	186
Uniform Snow	123	112	123
Drifted Snow	209	221	209
SWL Cpe pos	59	96	82
SWL Cpe neg	-8	16	1
SWR Cpe pos	79	96	48
SWR Cpe neg	0	15	-11
GW Cpe pos	114	100	114

Load Combination Factored	V1 kN	V2 kN	V3 kN
1.4D+1.4S+1.6I	525	474	525
1.4D+1.4S+1.05SDr	447	435	447
1.2(D+S+US+SWL+)	413	423	441
1.0D+1.4SWL-	73	96	86
1.2(D+S+US+SWR+)	437	423	400
1.0D+1.4SWR-	84	96	69
1.2(D+S+US+GW+)	479	429	479

Gridline 27

Loadcase Unfactored	V1 kN	V2 kN	V3 kN
Portal Frame	29	23	29
Roof Dead	53	48	53
Roof Services	73	67	73
Roof Imposed	176	160	176
Uniform Snow	116	106	116
Drifted Snow	198	208	198
SWL Cpe pos	55	90	78
SWL Cpe neg	-8	15	1
SWR Cpe pos	74	90	45
SWR Cpe neg	0	14	-11
GW Cpe pos	108	95	108

Load Combination Factored	V1 kN	V2 kN	V3 kN
1.4D+1.4S+1.6I	498	449	498
1.4D+1.4S+1.05SDr	425	412	425
1.2(D+S+US+SWL+)	392	401	419
1.0D+1.4SWL-	71	92	83
1.2(D+S+US+SWR+)	415	401	380
1.0D+1.4SWR-	81	92	67
1.2(D+S+US+GW+)	454	406	454

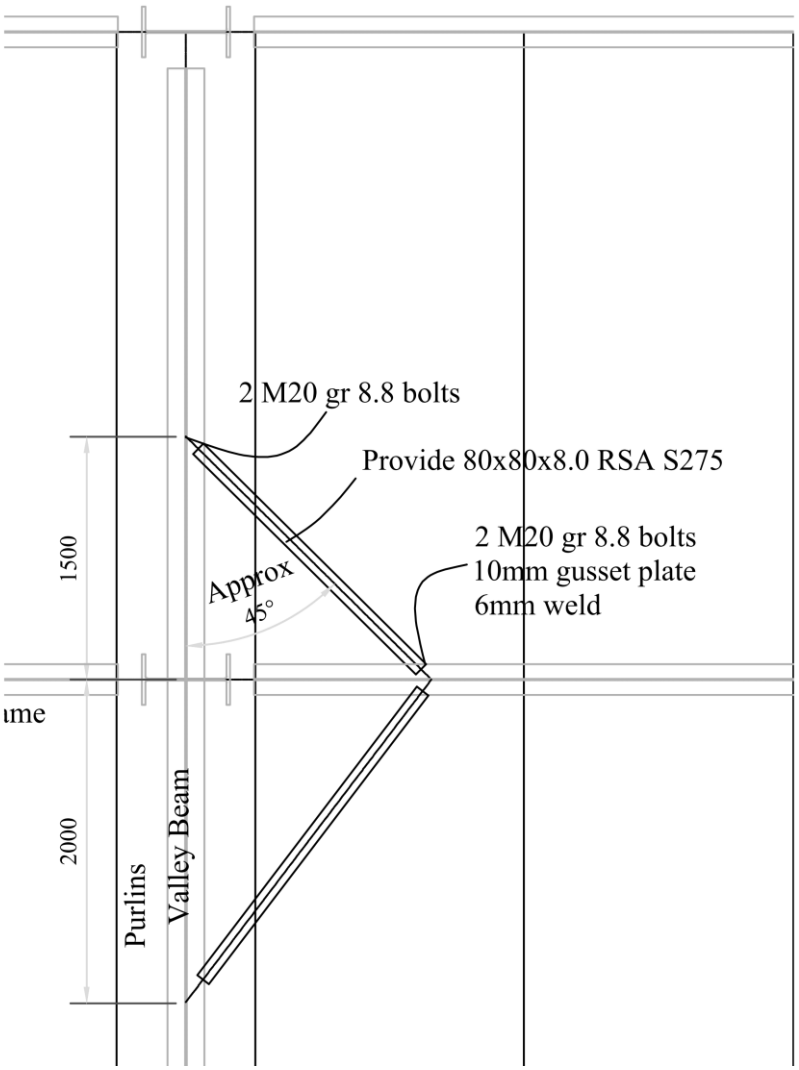
For the typical frames

Maximum reaction = 468 kN

Minimum reaction = 62 kN

By inspection no uplift loadcase is present so will therefore not be checked.

Restraint Design



Restraint Design – 610x305x179 UB S355

Assume a 610x305x179 fully stressed as the worst case.

Stress in the compression flange = 345 N/mm^2

Area of the compression flange = 307.1 x 23.6 = 7248 mm^2

Load in the compression flange = 0.345 x 7248 = 2500 kN

2.5% of this = 62.5 kN

Angle = 45° approx.

Therefore load in the restraint = 62.5 / sin 45° = 88.4 kN

L_E = 2.1m

Try 80x80x8.0 RSA S275 with 2 bolt connections in line.

STEEL ANGLE DESIGN (BS5950-1:2000)

TEDDS calculation version 1.0.04

Element definition

Element being designed	**610x305x179 Restraint**	Section	**RSA 80x80x8**
Steel grade	**S275**	Design strength (Table 9)	p_y = **275** N/mm^2

Design forces and moments

Shear force parallel to y axis	F_{vy} = **0.00** kN	Shear force parallel to x axis	F_{vx} = **0.00** kN
Axial force	F = **88.4 kN** **(Compression)**		
Max moment about x axis	M_x = **0.00** kNm	Max moment about y axis	M_y = **0.00** kNm

Section classification (Table 11)

The section is Class 3 (semi-compact) for axial compression

Design for compression

Segment lengths and end restraint factors (Table 22)

Seg length for x axis buckling	L_x = **2121** mm	End restraint factor	f_x = **1.00**
Seg length for y axis buckling	L_y = **2121** mm	End restraint factor	f_y = **1.00**
Seg length for v axis buckling	L_v = **2121** mm	End restraint factor	f_v = **1.00**

Compressive resistance

Compressive resistance P_c = **98.5** kN

PASS - The compressive resistance exceeds the applied compressive force

Provide 80x80x8.0 RSA S275 with 2 bolt connections in line

Restraint Design – 610x229x140 UB S355

Assume a 610x229x140 fully stressed as the worst case.
Stress in the compression flange = 345 N/mm^2
Area of the compression flange = 230.2 x 22.1 = 5087 mm^2
Load in the compression flange = 0.345 x 5087 = 1755 kN
2.5% of this = 43.9 kN
Angle = 45° approx.
Therefore load in the restraint = 43.9 / sin 37° = 72.9 kN
L_E = 2.5m

Try 80x80x8.0 RSA S275 with 2 bolt connections in line.

STEEL ANGLE DESIGN (BS5950-1:2000)

TEDDS calculation version 1.0.04

Element definition

Element being designed	**UB610x140x229 Restraint**	Section	**RSA 80x80x8**
Steel grade	**S275**	Design strength (Table 9)	p_y = **275** N/mm^2

Design forces and moments

Shear force parallel to y axis F_{vy} = **0.00** kN — Shear force parallel to x axis F_{vx} = **0.00** kN

Axial force F = **72.9 kN (Compression)**

Max moment about x axis M_x = **0.00** kNm — Max moment about y axis M_y = **0.00** kNm

Section classification (Table 11)

The section is Class 3 (semi-compact) for axial compression

Design for compression

Segment lengths and end restraint factors (Table 22)

Seg length for x axis buckling L_x = **2500** mm — End restraint factor f_x = **1.00**

Seg length for y axis buckling L_y = **2500** mm — End restraint factor f_y = **1.00**

Seg length for v axis buckling L_v = **2500** mm — End restraint factor f_v = **1.00**

Compressive resistance

Compressive resistance P_c = **75.1** kN

PASS - The compressive resistance exceeds the applied compressive force

Provide 80x80x8.0 RSA S275 with 2 bolt connections in line

Valley Sway bracing design

The sway bracing transfers lateral loads from the miss frame to the hit frame. From the portal frame analysis, the maximum lateral load to transfer is 7.65 kN unfactored

Factored load = 7.65 x 1.4 = 10.7 kN

Angle = $\tan^{-1}(4.3/8)$ = 28.3

F_c in a brace = 10.7 / sin 28.3° shared over 2 braces = 11.3 kN per brace

$L_E = (4.3^2+8^2)^{0.5}$ = 9.08 m Say 9.5m

	Section			
	S275		S355	
Length	200x75x18x4	200x100x22x4	200x75x18x4	200x100x22x4
3.000	159.7	222.6	171.7	238.2
3.500	127.7	188.1	134.4	197.9
4.000	103.1	160.9	107.2	167.5
4.500	84.4	139.9	87.1	144.5
5.000	70.2	123.5	72.0	127
5.500	59.2	110.7	60.5	113.5
6.000	50.5	100.5	51.5	102.7
6.500	43.6	90.5	44.3	92.3
7.000	38.0	79.3	38.6	80.7
7.500	33.4	70	33.8	71.1
8.000	29.5	62.2	29.9	63.1
8.500	26.3	55.7	26.7	56.4
9.000	23.6	50.1	23.9	50.7
9.500	21.3	45.3	21.5	45.8
10.000	19.3	41.1	19.5	41.6

Hadley 4mm Cold Formed Channels
ULS Axial Capacity Tables

Provide 200x100x22x4 Hadley 4mm cold formed channel

Check the sway bracing in the 9m bays

Max lateral load transfer is 8.65 kN

Factored load = 8.65 x 1.4 = 12.1 kN

Angle = $\tan^{-1}(4.3/9)$ = 25.5

F_c in a brace = 12.1 / sin 25.5° shared over 2 braces = 14.0 kN per brace

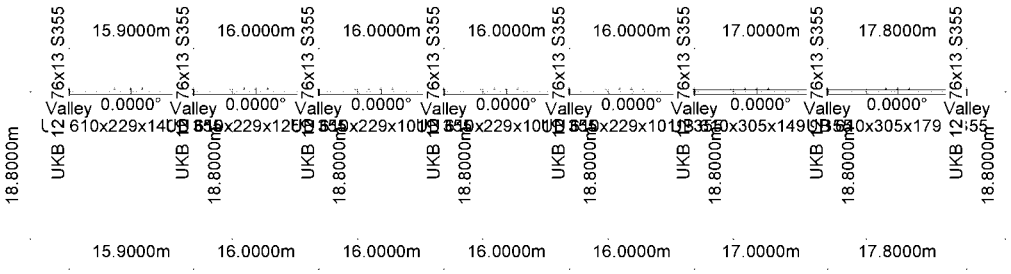
$L_E = (4.3^2+9^2)^{0.5}$ = 9.97 m Say 10m

Axial compression resistance = 41.1 kN

Valley Beam Design

REFERENCE: Valley Beams

Frame Diagram



Frame Details

No. Spans	7	
Effective Frame Centres	6.0000	m

Span Geometry

Span	Type	Axis	Lh Eaves [m]	Lh Apex [m]	Apex [m]	Rh Apex [m]	Rh Eaves [m]
Span 1	Monopitch	X	0.0	-	-	-	15.9000
		Z	18.8000	-	-	-	18.8000
Span 2	Monopitch	X	15.9000	-	-	-	31.9000
		Z	18.8000	-	-	-	18.8000
Span 3	Monopitch	X	31.9000	-	-	-	47.9000
		Z	18.8000	-	-	-	18.8000
Span 4	Monopitch	X	47.9000	-	-	-	63.9000
		Z	18.8000	-	-	-	18.8000
Span 5	Monopitch	X	63.9000	-	-	-	79.9000
		Z	18.8000	-	-	-	18.8000
Span 6	Monopitch	X	79.9000	-	-	-	96.9000
		Z	18.8000	-	-	-	18.8000
Span 7	Monopitch	X	96.9000	-	-	-	114.7000
		Z	18.8000	-	-	-	18.8000

Span 1 Mono Rafter

Position [m]	Type
0.0	Torsional
5.9000	O/S Flange
7.9000	Torsional
9.4000	O/S Flange
15.9000	Torsional

Span 2 Mono Rafter

Position [m]	Type
0.0	Torsional
6.5000	O/S Flange
8.0000	Torsional
9.5000	O/S Flange
16.0000	Torsional

Span 3 Mono Rafter

Position [m]	Type
0.0	Torsional
6.5000	O/S Flange
8.0000	Torsional
9.5000	O/S Flange
16.0000	Torsional

Span 4 Mono Rafter

Position [m]	Type
0.0	Torsional
6.5000	O/S Flange
8.0000	Torsional
9.5000	O/S Flange
16.0000	Torsional

Span 5 Mono Rafter

Position [m]	Type
0.0	Torsional
6.5000	O/S Flange
8.0000	Torsional
9.5000	O/S Flange
16.0000	Torsional

Span 6 Mono Rafter

Position [m]	Type
0.0	Torsional
6.5000	O/S Flange
8.0000	Torsional
9.5000	O/S Flange
16.9000	Torsional

Span 7 Mono Rafter

Position [m]	Type
0.0	Torsional
7.5000	O/S Flange
9.0000	Torsional
10.5000	O/S Flange
17.8000	Torsional

Loadcases

Frame Dead Load (Dead)

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Mono Rafter	Vert.	75.67	-	7.9000
Force	Span 2 Mono Rafter	Vert.	75.67	-	8.0000
Force	Span 3 Mono Rafter	Vert.	75.67	-	8.0000
Force	Span 4 Mono Rafter	Vert.	75.67	-	8.0000
Force	Span 5 Mono Rafter	Vert.	75.67	-	8.0000
Force	Span 6 Mono Rafter	Vert.	81.72	-	8.0000
Force	Span 7 Mono Rafter	Vert.	84.84	-	9.0000

Frame Service Load (Dead)

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Mono Rafter	Vert.	69.11	-	7.9000
Force	Span 2 Mono Rafter	Vert.	69.11	-	8.0000
Force	Span 3 Mono Rafter	Vert.	69.11	-	8.0000
Force	Span 4 Mono Rafter	Vert.	69.11	-	8.0000
Force	Span 5 Mono Rafter	Vert.	69.11	-	8.0000
Force	Span 6 Mono Rafter	Vert.	73.17	-	8.0000
Force	Span 7 Mono Rafter	Vert.	77.47	-	9.0000

Frame Imposed Load (Imposed)

Point Loads

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 1 Mono Rafter	Vert.	165.86	-	7.9000
Force	Span 2 Mono Rafter	Vert.	165.86	-	8.0000
Force	Span 3 Mono Rafter	Vert.	165.86	-	8.0000

Load Type	Span Member	Direction	F [kN]	M [kNm]	a [m]
Force	Span 4 Mono Rafter	Vert.	165.86	-	8.0000
Force	Span 5 Mono Rafter	Vert.	165.86	-	8.0000
Force	Span 6 Mono Rafter	Vert.	175.61	-	8.0000
Force	Span 7 Mono Rafter	Vert.	185.94	-	9.0000

Combinations

Sw + Dead + Serv. + Imp.

Frame Imperfection off

Loadcase	Type	Ultimate P.S.F.	Service P.S.F.
Self weight	Dead	1.4000	0.0
Frame Dead Load	Dead	1.4000	0.0
Frame Service Load	Dead	1.4000	0.0
Frame Imposed Load	Imposed	1.6000	1.0000

Design Wizard Options

Design Criteria

BS5950 Part1 : 2000

Maximum Hinge Rotation	6.0000	°
Percent Mp for Plasticity	99.00	%
Axial Load Factor	1.2500	

Design Code: BS5950

Design Summary

Design Combination	Lambda p	Lambda r	Status
Sw + Dead + Serv. + Imp.	1.066	1.000	Pass

Member Stability Status: Pass

Design Cases

Sw + Dead + Serv. + Imp.

Strength

Rafters

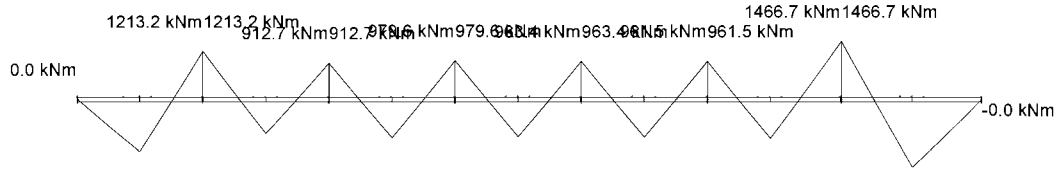
Member	U.R.	Status
Span 1 Mono Rafter	0.923	Pass
Span 2 Mono Rafter	0.957	Pass
Span 3 Mono Rafter	0.959	Pass
Span 4 Mono Rafter	0.959	Pass
Span 5 Mono Rafter	0.943	Pass
Span 6 Mono Rafter	0.925	Pass
Span 7 Mono Rafter	0.892	Pass

Member Stability

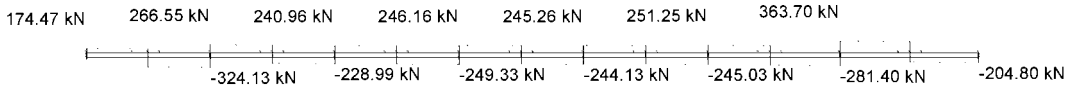
Rafters

Member	Status
Span 1 Mono Rafter	Pass
Span 2 Mono Rafter	Pass
Span 3 Mono Rafter	Pass
Span 4 Mono Rafter	Pass
Span 5 Mono Rafter	Pass
Span 6 Mono Rafter	Pass
Span 7 Mono Rafter	Pass

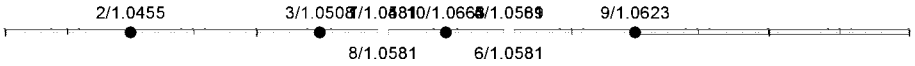
Bending Moment Diagram



Shear Force Diagram



Hinge History Diagram



Foundation Loads

Self weight

Span	M [kNm]	F [kN]	N [kN]
Span 1 Valley Column	0.0	0.0	8.67
Span 1 Valley Column	0.0	0.0	23.84
Span 2 Valley Column	0.0	0.0	16.86
Span 3 Valley Column	0.0	0.0	15.91
Span 4 Valley Column	0.0	0.0	15.69
Span 5 Valley Column	0.0	0.0	18.68
Span 6 Valley Column	0.0	0.0	32.96
Span 7 Valley Column	0.0	0.0	12.57

Frame Dead Load

Span	M [kNm]	F [kN]	N [kN]
Span 1 Valley Column	0.0	0.0	26.24
Span 1 Valley Column	0.0	0.0	90.10
Span 2 Valley Column	0.0	0.0	72.15
Span 3 Valley Column	0.0	0.0	76.54
Span 4 Valley Column	0.0	0.0	75.43
Span 5 Valley Column	0.0	0.0	76.74
Span 6 Valley Column	0.0	0.0	97.54
Span 7 Valley Column	0.0	0.0	30.17

Frame Service Load

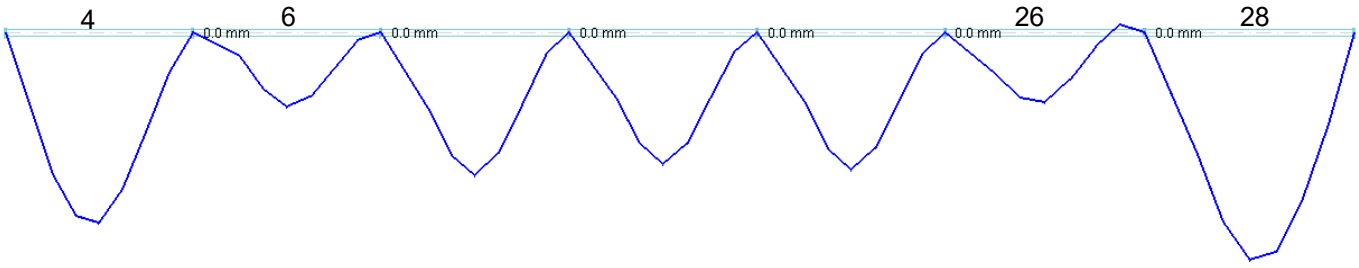
Span	M [kNm]	F [kN]	N [kN]
Span 1 Valley Column	0.0	0.0	23.97
Span 1 Valley Column	0.0	0.0	82.29
Span 2 Valley Column	0.0	0.0	65.91
Span 3 Valley Column	0.0	0.0	69.86
Span 4 Valley Column	0.0	0.0	69.05
Span 5 Valley Column	0.0	0.0	69.22

Span	M [kNm]	F [kN]	N [kN]
Span 6 Valley Column	0.0	0.0	88.24
Span 7 Valley Column	0.0	0.0	27.66

Frame Imposed Load

Span	M [kNm]	F [kN]	N [kN]
Span 1 Valley Column	0.0	0.0	57.52
Span 1 Valley Column	0.0	0.0	197.48
Span 2 Valley Column	0.0	0.0	158.17
Span 3 Valley Column	0.0	0.0	167.66
Span 4 Valley Column	0.0	0.0	165.72
Span 5 Valley Column	0.0	0.0	166.11
Span 6 Valley Column	0.0	0.0	211.79
Span 7 Valley Column	0.0	0.0	66.39

Valley Beam Deflections



Grid	4	6	General	26	28
Self-Weight+Dead	17.1	6.4	11.4	6.5	21.4
Services	13	5	10	5	16
Imposed	32.2	12.6	22.4	11.9	38.6

Imposed load deflection limit = span/360

16m Span limit = 16000/360 = 44.4 mm

18m Span limit = 18000/360 = 50.0 mm

Therefore OKAY

Preset all valley saddles 15mm apart from grids 4 and 28 which should be preset 25mm

Main 3D Model

REV	Date	Notes
C01	Jan 2022	Construction Issue

Contents

Introduction 2

View on whole structure. 2

Loading 3

Main Office 4

View on Main office members in this section 4

Member design summary 5

Example Composite Beam Design – Office 16

Example Non Composite Beam Design. Main Office 20

Example Column Design - Office. 21

Example Brace Design - Main Office 23

Bracing Model 24

Bracing members included in this section. 24

Bracing member design summary. 24

Hub Office 31

Members included in report 31

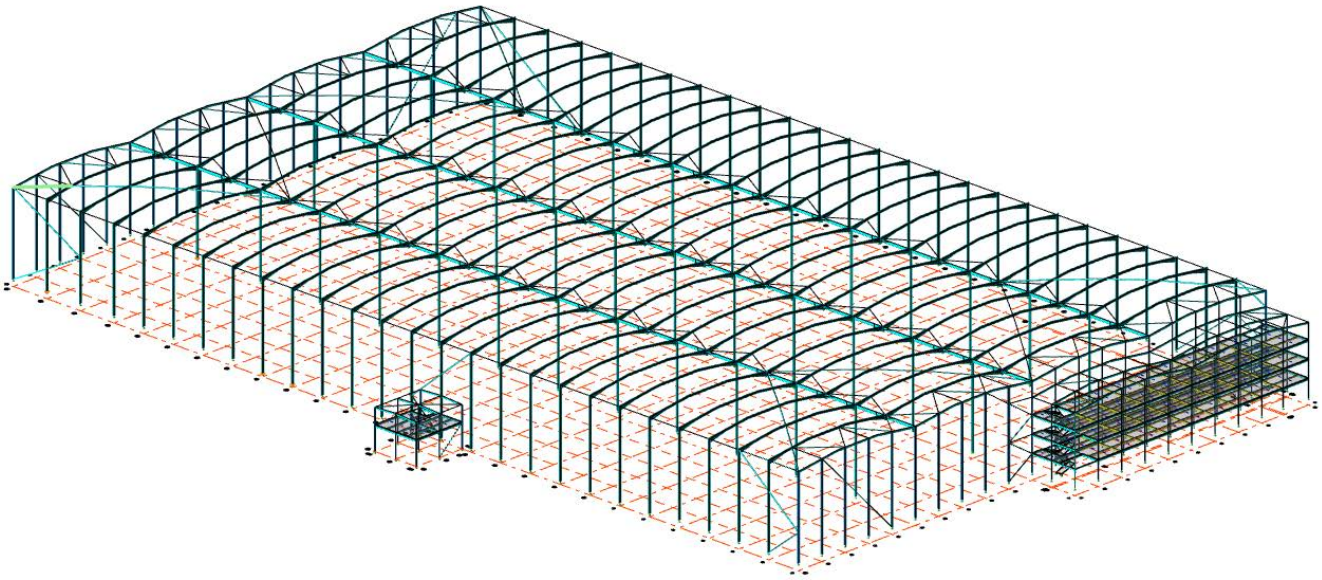
Hub Office Design summary 31

Introduction

The main steel sections are designed within the main 3D model environment.
Any exceptions to this are described in section 03 for the cold rolled, section 04 for the portal frames and section 09 for miscellaneous steel members.
Several models are analysed depending on the part of the structure being considered. Overall wind load scaling length are altered for these depending on the items being designed.

Full output for load application and member designs is not included for all members as this will run to many thousands of pages. A member utilization summary is included for all members. Examples are included for a member design output for a composite beam, a non-composite beam, a column and a bracing. If any further information is required please contact Caunton Engineering Design Department.

View on whole structure.

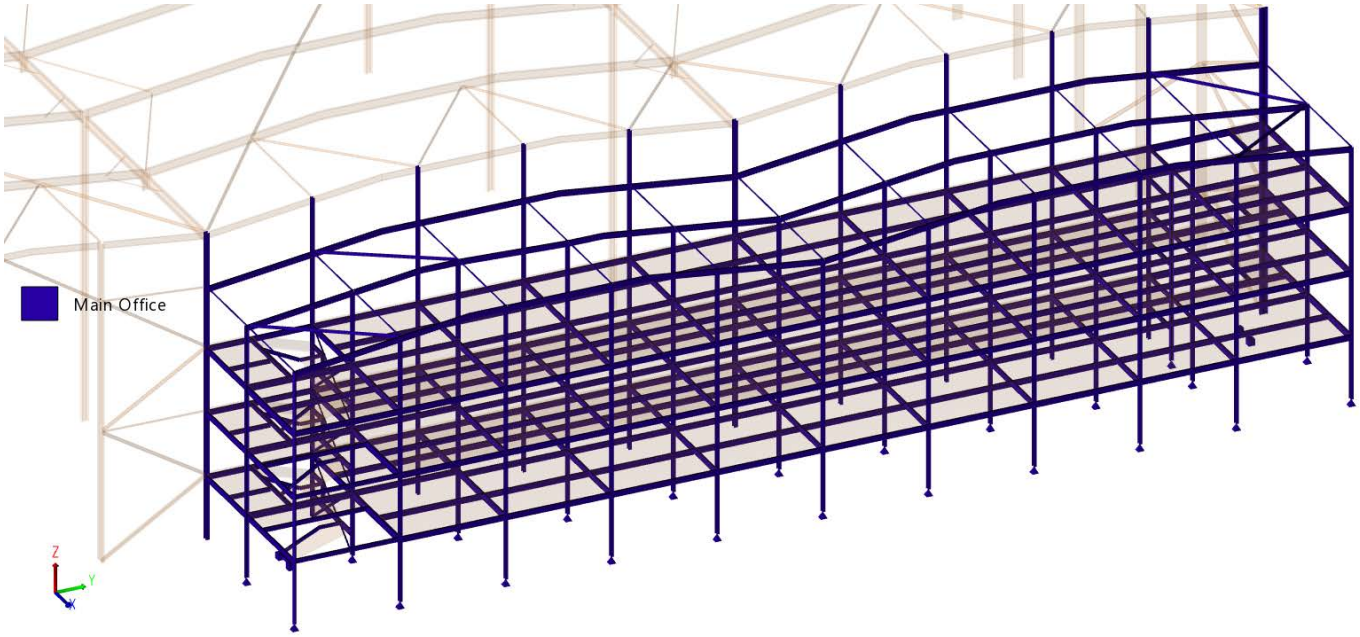


Loading

General loading information can be seen in document 0201

Main Office

View on Main office members in this section



Member design summary

Steel

Beam Design

Beam Design Summary

Static

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	No. Connectors	Camber	Utilization	Status
SB FRM 1/58/#7318-Base.1.0.1/1/#7318	SBR36	1	UKB 356x127x33	S355	3.746		0.0	0.148	Pass
SB OE/1/A-FRM 1/58/#7318	SBR37	1	UKB 356x127x33	S355	7.113		0.0	0.563	Pass
SB OE/3/L-FRM 3/K/#7167	SBR10	1	UKB 356x127x33	S355	6.547		0.0	0.619	Pass
SB FRM 3/K/#7167-Base.1.0.1/3/#7167	SBR32	1	UKB 356x127x33	S355	4.311		0.0	0.330	Pass
SB Base.1.0.1/C/1-Base.1.0.1/1/#7318	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.113	Pass
SB Base.1.0.1/D/1-Base.1.0.1/C/1	SBR10	1	UKB 356x127x33	S355	6.500		0.0	0.351	Pass
SB Base.1.0.1/D/1-Base.1.0.1/1/#7277	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.131	Pass
SB FRM 1/E/#7277-Base.1.0.1/1/#7277	SBR32	1	UKB 356x127x33	S355	4.311		0.0	0.210	Pass
SB OE/1/F-FRM 1/E/#7277	SBR10	1	UKB 356x127x33	S355	6.547		0.0	0.358	Pass
SB OE/1/F-FRM 1/G/#7236	SBR10	1	UKB 356x127x33	S355	6.547		0.0	0.358	Pass
SB FRM 1/G/#7236-Base.1.0.1/1/#7236	SBR32	1	UKB 356x127x33	S355	4.311		0.0	0.209	Pass
SB Base.1.0.1/H/1-Base.1.0.1/1/#7236	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.131	Pass
SB Base.1.0.1/J/1-Base.1.0.1/H/1	SBR10	1	UKB 356x127x33	S355	6.500		0.0	0.359	Pass
SB Base.1.0.1/J/1-Base.1.0.1/1/#7171	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.142	Pass
SB FRM 1/K/#7171-Base.1.0.1/1/#7171	SBR32	1	UKB 356x127x33	S355	4.311		0.0	0.219	Pass
SB OE/1/L-FRM 1/K/#7171	SBR10	1	UKB 356x127x33	S355	6.547		0.0	0.441	Pass
SB OE/2/A-FRM 2/58/#7317	SBR37	1	UKB 356x127x33	S355	7.113		0.0	0.842	Pass
SB FRM 2/58/#7317-FRM 2/%512	SBR36	1	UKB 356x127x33	S355	3.746		0.0	0.387	Pass
SB Base.1.0.1/C/2-FRM 2/%512	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.360	Pass
SB Base.1.0.1/D/2-Base.1.0.1/C/2	SBR10	1	UKB 356x127x33	S355	6.500		0.0	0.650	Pass
SB Base.1.0.1/D/2-FRM 2/%511	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.415	Pass
SB 3/K/#8052-3/J/#8053	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.717	Pass
SB 3/L/#8054-3/K/#8052	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.779	Pass
SB 1.1.1/B1/#7451-1.1.1/3/B1	SBR17	1	UKB 254x146x31	S355	3.000		0.0	0.447	Pass
SB 2/1/B1-2/2/B1	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/1/B1-3/2/B1	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/1/B1-1/2/B1	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2.1.1/B1/#7453-2.1.1/3/B1	SBR17	1	UKB 254x146x31	S355	3.000		0.0	0.447	Pass
SB Base.1.1/B1/#7449-Base.1.1/3/B1	SBR17	1	UKB 254x146x31	S355	3.000		0.0	0.447	Pass
SB 1/3/B1-1/B1/#7450	SBR17	1	UKB 254x146x31	S355	3.000		0.0	0.044	Pass
SB 1/B1/#7450-1/2/B1	SBR18	1	UKB 203x133x25	S355	2.750		0.0	0.045	Pass
SB 3/B1/#7454-3/2/B1	SBR18	1	UKB 203x133x25	S355	2.750		0.0	0.045	Pass
SB 2/B1/#7452-2/2/B1	SBR18	1	UKB 203x133x25	S355	2.750		0.0	0.045	Pass
SB 2/3/B1-2/B1/#7452	SBR17	1	UKB 254x146x31	S355	3.000		0.0	0.044	Pass
SB 3/3/B1-3/B1/#7454	SBR17	1	UKB 203x133x25	S355	3.000		0.0	0.053	Pass
SB OE/3/A-FRM 3/58/#7314	SBR37	1	UKB 356x127x33	S355	7.113		0.0	0.832	Pass
SB FRM 3/58/#7314-Base.1.0.1/3/#7314	SBR36	1	UKB 356x127x33	S355	3.746		0.0	0.294	Pass
SB Base.1.0.1/C/3-Base.1.0.1/3/#7314	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.275	Pass
SB Base.1.0.1/D/3-Base.1.0.1/C/3	SBR10	1	UKB 356x127x33	S355	6.500		0.0	0.640	Pass
SB Base.1.0.1/D/3-Base.1.0.1/3/#7273	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.318	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	No. Connectors	Camber	Utilization	Status
SB FRM 3/E/#7273-Base.1.0.1/3/#7273	SBR32	1	UKB 356x127x33	S355	4.311		0.0	0.353	Pass
SB OE/3/F-FRM 3/E/#7273	SBR10	1	UKB 356x127x33	S355	6.547		0.0	0.654	Pass
SB OE/3/F-FRM 3/G/#7232	SBR10	1	UKB 356x127x33	S355	6.547		0.0	0.654	Pass
SB FRM 3/G/#7232-Base.1.0.1/3/#7232	SBR32	1	UKB 356x127x33	S355	4.311		0.0	0.354	Pass
SB FRM 3/H/#6607-Base.1.0.1/3/#7232	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.320	Pass
SB FRM 3/J/#6606-FRM 3/H/#6607	SBR10	1	UKB 356x127x33	S355	6.500		0.0	0.624	Pass
SB FRM 3/J/#6606-Base.1.0.1/3/#7167	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.299	Pass
SB FRM 2/E/#7276-FRM 2/%511	SBR32	1	UKB 356x127x33	S355	4.311		0.0	0.464	Pass
SB OE/2/F-FRM 2/E/#7276	SBR10	1	UKB 356x127x33	S355	6.547		0.0	0.659	Pass
SB OE/2/F-FRM 2/G/#7235	SBR10	1	UKB 356x127x33	S355	6.547		0.0	0.659	Pass
SB FRM 2/G/#7235-FRM 2/%510	SBR32	1	UKB 356x127x33	S355	4.311		0.0	0.464	Pass
SB Base.1.0.1/H/2-FRM 2/%510	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.415	Pass
SB Base.1.0.1/J/AE-Base.1.0.1/H/2	SBR10	1	UKB 356x127x33	S355	6.519		0.0	0.660	Pass
SB OE/59/#7980-FRM 59/#7980/K	SBR10	1	UKB 356x127x33	S355	6.547		0.0	0.962	Pass
SB FRM 59/#7980/K-Base.1.0.1/59/#7980	SBR32	1	UKB 356x127x33	S355	4.311		0.0	0.477	Pass
SB Base.1.0.1/59/J-Base.1.0.1/59/#7980	SBR33	1	UKB 356x127x33	S355	2.220		0.0	0.428	Pass
SB 1/3/L-1/3/K	SBR15	1	UKB 305x165x40	S355	6.500		0.0	0.906	Pass
SB 3/3/L-3/3/K	SBR15	1	UKB 305x165x40	S355	6.500		0.0	0.843	Pass
SB 2/3/L-2/3/K	SBR15	1	UKB 305x165x40	S355	6.500		0.0	0.881	Pass
SB 1/3/K-1/K/AE	SBR40	1	UKB 356x127x39	S355	5.250		0.0	0.938	Pass
SB 3/3/K-3/K/AE	SBR48	1	UKB 356x127x39	S355	5.250		0.0	0.924	Pass
SB 2/3/K-2/K/AE	SBR47	1	UKB 356x127x39	S355	5.250		0.0	0.928	Pass
SB 1/3/#3916-1/%418	SBR40	1	UC 203x203x52	S355	5.250		0.0	0.755	Pass
SB 3/3/#3918-3/AE/#3919	SBR40	1	UC 203x203x46	S355	5.250		0.0	0.703	Pass
SB 2/3/#3920-2/AE/#3921	SBR40	1	UC 203x203x52	S355	5.250		0.0	0.754	Pass
SB 1/L/AE-1/L/1	SBR41	1	UKB 356x127x33	S355	6.250		0.0	0.819	Pass
SB 3/L/AE-3/L/1	SBR44	1	UB 406x140x46	S355	6.250		0.0	0.852	Pass
SB 2/L/AE-2/L/1	SBR41	1	UKB 356x127x33	S355	6.250		0.0	0.819	Pass
SB 1/K/AE-1/1/K	SBR41	1	UKB 406x178x54	S355	6.250		0.0	0.724	Pass
SB 3/K/AE-3/1/K	SBRC5	1	UKB 406x140x39	S355	6.250	25	0.0	0.931	Pass
SB 2/K/AE-2/1/K	SBR49	1	UKB 406x178x54	S355	6.250		0.0	0.724	Pass
SB 1/L/1-1/1/K	SBR15	1	UKB 254x146x31	S355	6.500		0.0	0.199	Pass
SB 3/L/1-3/1/K	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.701	Pass
SB 2/L/1-2/1/K	SBR15	1	UKB 254x146x31	S355	6.500		0.0	0.199	Pass
SB 1/3/L-1/L/AE	SBR40	1	UKB 356x127x33	S355	5.250		0.0	0.491	Pass
SB 3/3/L-3/L/AE	SBR43	1	UKB 356x127x33	S355	5.250		0.0	0.503	Pass
SB 2/3/L-2/L/AE	SBR46	1	UKB 356x127x33	S355	5.250		0.0	0.491	Pass
SB 1/L/#3922-1/K/#3923	SBR15	1	UKB 254x146x31	S355	6.500		0.0	0.885	Pass
SB 2/L/#3926-2/K/#3927	SBR15	1	UKB 254x146x31	S355	6.500		0.0	0.885	Pass
SB 1/1/J-1/J/AE	SBRC5	1	UKB 406x140x39	S355	6.250	25	0.0	0.969	Pass
SB 3/1/J-3/J/AE	SBRC5	1	UKB 406x140x39	S355	6.250	25	0.0	0.922	Pass
SB 2/1/J-2/J/AE	SBRC5	1	UKB 406x140x39	S355	6.250	25	0.0	0.969	Pass
SB 1/J/AE-1/3/J	SBRC6	1	UKB 406x140x39	S355	5.250	21	0.0	0.999	Pass
SB 3/J/AE-3/3/J	SBRC6	1	UKB 356x127x33	S355	5.250	21	0.0	0.999	Pass
SB 2/J/AE-2/3/J	SBRC6	1	UKB 356x127x39	S355	5.250	21	0.0	0.842	Pass
SB 1/3/K-1/3/J	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.764	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	No. Connectors	Camber	Utilization	Status
SB 3/3/K-3/3/J	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.764	Pass
SB 2/3/K-2/3/J	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.764	Pass
SB 1/1/K-1/1/J	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/1/K-3/1/J	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.701	Pass
SB 2/1/K-2/1/J	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/K/#3928-1/J/#3929	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.665	Pass
SB 3/K/#3930-3/J/#3931	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.665	Pass
SB 2/K/#3932-2/J/#3933	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.665	Pass
SB 1/K/#3934-1/J/#3935	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.732	Pass
SB 2/K/#3938-2/J/#3939	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.732	Pass
SB 1/2/H-1/3/H	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/2/H-3/3/H	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/2/H-2/3/H	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/1/H-1/2/H	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/1/H-3/2/H	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/1/H-2/2/H	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/J/#3935-1/H/#3940	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/J/#3941-3/H/#3942	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/J/#3943-2/H/#3944	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/2/J-1/2/H	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/2/J-3/2/H	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/2/J-2/2/H	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/J/#3929-1/H/#3945	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/J/#3946-3/H/#3947	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/J/#3948-2/H/#3949	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/1/J-1/1/H	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/1/J-3/1/H	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/1/J-2/1/H	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/3/J-1/3/H	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/3/J-3/3/H	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/3/J-2/3/H	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/2/G-1/3/G	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/2/G-3/3/G	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/2/G-2/3/G	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/1/G-1/2/G	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/1/G-3/2/G	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/1/G-2/2/G	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/H/#3940-1/G/#3950	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/H/#3951-3/G/#3952	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/H/#3953-2/G/#3954	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/2/H-1/2/G	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/2/H-3/2/G	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/2/H-2/2/G	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/H/#3945-1/G/#3955	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/H/#3956-3/G/#3957	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/H/#3958-2/G/#3959	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	No. Connectors	Camber	Utilization	Status
SB 1/1/H-1/1/G	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/1/H-3/1/G	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/1/H-2/1/G	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/3/H-1/3/G	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/3/H-3/3/G	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/3/H-2/3/G	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/F/2-1/3/F	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/F/2-3/3/F	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/F/2-2/3/F	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/F/1-1/F/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/F/1-3/F/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/F/1-2/F/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/G/#3950-1/F/#3960	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/G/#3961-3/F/#3962	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/G/#3963-2/F/#3964	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/2/G-1/F/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/2/G-3/F/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/2/G-2/F/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/G/#3955-1/F/#3965	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/G/#3966-3/F/#3967	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/G/#3968-2/F/#3969	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/1/G-1/F/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/1/G-3/F/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/1/G-2/F/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/3/G-1/3/F	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/3/G-3/3/F	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/3/G-2/3/F	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/E/2-1/3/E	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/E/2-3/3/E	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/E/2-2/3/E	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/E/1-1/E/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/E/1-3/E/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/E/1-2/E/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/F/#3960-1/E/#3970	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/F/#3971-3/E/#3972	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/F/#3973-2/E/#3974	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/F/2-1/E/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/F/2-3/E/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/F/2-2/E/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/F/#3965-1/E/#3975	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/F/#3976-3/E/#3977	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/F/#3978-2/E/#3979	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/F/1-1/E/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/F/1-3/E/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/F/1-2/E/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/3/F-1/3/E	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	No. Connectors	Camber	Utilization	Status
SB 3/3/F-3/3/E	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/3/F-2/3/E	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/D/2-1/3/D	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/D/2-3/3/D	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/D/2-2/3/D	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/D/1-1/D/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 3/D/1-3/D/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 2/D/1-2/D/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.870	Pass
SB 1/E/#3970-1/D/#3980	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/E/#3981-3/D/#3982	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/E/#3983-2/D/#3984	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/E/2-1/D/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/E/2-3/D/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/E/2-2/D/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/E/#3975-1/D/#3985	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/E/#3986-3/D/#3987	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/E/#3988-2/D/#3989	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/E/1-1/D/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/E/1-3/D/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/E/1-2/D/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/3/E-1/3/D	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/3/E-3/3/D	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/3/E-2/3/D	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/C/2-1/3/C	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.815	Pass
SB 3/C/2-3/3/C	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.815	Pass
SB 2/C/2-2/3/C	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.815	Pass
SB 1/C/1-1/C/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.832	Pass
SB 3/C/1-3/C/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.832	Pass
SB 2/C/1-2/C/2	SBRC1	1	UKB 356x127x39	S355	5.750	25	0.0	0.832	Pass
SB 1/D/#3980-1/C/#3990	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/D/#3991-3/C/#3992	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/D/#3993-2/C/#3994	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/D/2-1/C/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/D/2-3/C/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/D/2-2/C/2	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/D/#3985-1/C/#3995	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 3/D/#3996-3/C/#3997	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 2/D/#3998-2/C/#3999	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.661	Pass
SB 1/D/1-1/C/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/D/1-3/C/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/D/1-2/C/1	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/3/D-1/3/C	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 3/3/D-3/3/C	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 2/3/D-2/3/C	SBR15	1	UKB 356x127x33	S355	6.500		0.0	0.674	Pass
SB 1/C/#3990-1/%760	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.889	Pass
SB 3/C/#4001-3/%762	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.889	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	No. Connectors	Camber	Utilization	Status
SB 2/C/#4003-2/%761	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.889	Pass
SB 1/C/2-1/2/B1	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.870	Pass
SB 3/C/2-3/2/B1	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.870	Pass
SB 2/C/2-2/2/B1	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.870	Pass
SB 1/C/1-1/1/B1	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.564	Pass
SB 3/C/1-3/1/B1	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.564	Pass
SB 2/C/1-2/1/B1	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.564	Pass
SB 1/3/C-1/3/B1	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.575	Pass
SB 3/3/C-3/3/B1	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.575	Pass
SB 2/3/C-2/3/B1	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.575	Pass
SB 1/C/#4042-1/B1/#7450	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.889	Pass
SB 3/C/#4043-3/B1/#7454	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.889	Pass
SB 2/C/#4044-2/B1/#7452	SBR34	1	UKB 356x127x33	S355	5.939		0.0	0.889	Pass
SB 1/3/B1-1/3/A	SBR35	1	UB 406x140x46	S355	7.061		0.0	0.841	Pass
SB 3/3/B1-3/3/A	SBR35	1	UB 406x140x46	S355	7.061		0.0	0.708	Pass
SB 2/3/B1-2/3/A	SBR35	1	UB 406x140x46	S355	7.061		0.0	0.868	Pass
SB 1/B1/#7450-1/A/AB	SBR35	1	UKB 406x140x39	S355	7.061		0.0	0.899	Pass
SB 3/B1/#7454-3/A/AB	SBR35	1	UKB 356x127x33	S355	7.061		0.0	0.973	Pass
SB 2/B1/#7452-2/A/AB	SBR35	1	UKB 406x140x39	S355	7.061		0.0	0.899	Pass
SB 1/3/A-1/A/2	SBR16	1	UKB 406x140x39	S355	5.750		0.0	0.839	Pass
SB 3/3/A-3/A/2	SBR16	1	UKB 406x140x39	S355	5.750		0.0	0.834	Pass
SB 2/3/A-2/A/2	SBR16	1	UKB 406x140x39	S355	5.750		0.0	0.839	Pass
SB 1/A/2-1/A/1	SBR16	1	UKB 406x140x39	S355	5.750		0.0	0.898	Pass
SB 3/A/2-3/A/1	SBR16	1	UKB 406x140x39	S355	5.750		0.0	0.898	Pass
SB 2/A/2-2/A/1	SBR16	1	UKB 406x140x39	S355	5.750		0.0	0.898	Pass
SB 1/1/B1-1/A/1	SBR35	1	UKB 356x127x33	S355	7.061		0.0	0.794	Pass
SB 3/1/B1-3/A/1	SBR35	1	UKB 356x127x33	S355	7.061		0.0	0.794	Pass
SB 2/1/B1-2/A/1	SBR35	1	UKB 356x127x33	S355	7.061		0.0	0.794	Pass
SB 1/2/B1-1/A/2	SBRC4	1	UKB 356x127x33	S355	7.061	21	0.0	0.820	Pass
SB 3/2/B1-3/A/2	SBRC4	1	UKB 356x127x33	S355	7.061	21	0.0	0.820	Pass
SB 2/2/B1-2/A/2	SBRC4	1	UKB 356x127x33	S355	7.061	21	0.0	0.820	Pass
SB 1/%760-1/A/#4045	SBRC4	1	UKB 356x127x33	S355	7.061	21	0.0	0.838	Pass
SB 3/%762-3/A/#4047	SBRC4	1	UKB 356x127x33	S355	7.061	21	0.0	0.838	Pass
SB 2/%761-2/A/#4049	SBRC4	1	UKB 356x127x33	S355	7.061	21	0.0	0.838	Pass
SB 1/3/#4050-1/AB/#4051	SBR17	1	UC 203x203x46	S355	3.000		0.0	0.311	Pass
SB 3/3/#4052-3/AB/#4053	SBR17	1	UC 203x203x46	S355	3.000		0.0	0.225	Pass
SB 2/3/#4054-2/AB/#4055	SBR17	1	UC 203x203x46	S355	3.000		0.0	0.311	Pass
SB 1/L/#4056-1/%388	SBR19	1	UKB 254x146x31	S355	2.700		0.0	0.263	Pass
SB 3/L/#4057-3/%389	SBR19	1	UKB 254x146x31	S355	2.700		0.0	0.263	Pass
SB 2/L/#4058-2/%390	SBR19	1	UKB 254x146x31	S355	2.700		0.0	0.263	Pass
SB FRM 3/K/#4233-Base.1/K/AE	SBR42	1	UKB 305x165x40	S355	5.250		0.0	0.645	Pass
SB Base.2/K/3-/%391	SBR21	1	UKB 254x146x31	S355	1.400		0.0	0.070	Pass
SB 1.1/K/3-1.1/K/AE	SBR42	1	UKB 305x165x40	S355	5.250		0.0	0.597	Pass
SB 1.2/K/3-/%409	SBR21	1	UKB 254x146x31	S355	1.400		0.0	0.070	Pass
SB 2.1/K/3-2.1/K/AE	SBR42	1	UKB 305x165x40	S355	5.250		0.0	0.591	Pass
SB 2.2/K/3-/%421	SBR21	1	UKB 254x146x31	S355	1.400		0.0	0.070	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	No. Connectors	Camber	Utilization	Status
SB 2/L/AE-2/K/AE	SBR15	1	UKB 406x140x39	S355	6.500		0.0	0.970	Pass
SB 1/L/AE-1/K/AE	SBR15	1	UKB 406x140x39	S355	6.500		0.0	0.971	Pass
SB 3/L/AE-3/K/AE	SBR15	1	UKB 406x140x39	S355	6.500		0.0	0.863	Pass
SB 1/K/AE-1/J/AE	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.722	Pass
SB 3/K/AE-3/J/AE	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.660	Pass
SB 2/K/AE-2/J/AE	SBRC2	1	UKB 356x127x33	S355	6.500	38	0.0	0.722	Pass

Column Design

Column Design Summary

Static

Member Reference	Group Ref.	Stack	Section	Grade	Length [m]	Utilization	Status
SC 1/B1	SCR7	1	UC 203x203x46	S355	4.020	0.817	Pass
SC 1/B1	SCR7	2	UC 203x203x46	S355	4.000	0.597	Pass
SC 1/B1	SCR7	3	UC 203x203x46	S355	4.000	0.378	Pass
SC 1/B1	SCR7	4	UC 203x203x46	S355	4.585	0.193	Pass
SC B1/#7448	SCR16	1	UKC 203x203x46	S355	2.100	0.455	Pass
SC B1/#7448	SCR16	2	UKC 203x203x46	S355	1.920	0.455	Pass
SC B1/#7448	SCR16	3	UKC 203x203x46	S355	2.080	0.308	Pass
SC B1/#7448	SCR16	4	UKC 203x203x46	S355	1.920	0.305	Pass
SC B1/#7448	SCR16	5	UKC 203x203x46	S355	2.080	0.188	Pass
SC B1/#7448	SCR16	6	UKC 203x203x46	S355	1.920	0.188	Pass
SC 3/L	SCR9	1	UC 254x254x73	S355	4.020	0.481	Pass
SC 3/L	SCR9	2	UC 254x254x73	S355	4.000	0.358	Pass
SC 3/L	SCR9	3	UC 254x254x73	S355	4.000	0.358	Pass
SC 3/L	SCR9	4	UC 254x254x73	S355	3.730	0.284	Pass
SC 3/L	SCR9	5	UC 254x254x73	S355	3.400	0.201	Pass
SC 3/K	SCR18	1	UC 203x203x46	S355	1.483	0.778	Pass
SC 3/K	SCR18	2	UC 203x203x46	S355	1.333	0.778	Pass
SC 3/K	SCR18	3	UC 203x203x46	S355	1.204	0.742	Pass
SC 3/K	SCR18	4	UC 203x203x46	S355	1.463	0.634	Pass
SC 3/K	SCR18	5	UC 203x203x46	S355	1.333	0.634	Pass
SC 3/K	SCR18	6	UC 203x203x46	S355	1.204	0.506	Pass
SC 3/K	SCR18	7	UC 203x203x46	S355	1.463	0.380	Pass
SC 3/K	SCR18	8	UC 203x203x46	S355	1.333	0.380	Pass
SC 3/K	SCR18	9	UC 203x203x46	S355	1.204	0.380	Pass
SC 3/K	SCR18	10	UC 203x203x46	S355	4.517	0.380	Pass
SC 3/K	SCR18	11	UC 203x203x46	S355	3.400	0.380	Pass
SC 3/J	SCR42	1	UC 203x203x46	S355	4.020	0.889	Pass
SC 3/J	SCR42	2	UC 203x203x46	S355	4.000	0.661	Pass
SC 3/J	SCR42	3	UC 203x203x46	S355	4.000	0.491	Pass
SC 3/J	SCR42	4	UC 203x203x46	S355	5.035	0.312	Pass
SC 3/J	SCR42	5	UC 203x203x46	S355	3.400	0.278	Pass
SC 3/F	SCR8	1	UC 254x254x73	S355	4.020	0.465	Pass
SC 3/F	SCR8	2	UC 254x254x73	S355	4.000	0.344	Pass
SC 3/F	SCR8	3	UC 254x254x73	S355	4.000	0.260	Pass

Member Reference	Group Ref.	Stack	Section	Grade	Length [m]	Utilization	Status
SC 3/F	SCR8	4	UC 254x254x73	S355	3.730	0.260	Pass
SC 3/F	SCR8	5	UC 254x254x73	S355	3.400	0.260	Pass
SC 3/A	SCR35	1	UB 457x191x67	S355	4.020	0.836	Pass
SC 3/A	SCR35	2	UB 457x191x67	S355	4.000	0.836	Pass
SC 3/A	SCR35	3	UB 457x191x67	S355	4.000	0.751	Pass
SC 3/A	SCR35	4	UB 457x191x67	S355	7.130	0.751	Pass
SC 3/G	SCR36	1	UC 203x203x46	S355	4.020	0.768	Pass
SC 3/G	SCR36	2	UC 203x203x46	S355	4.000	0.662	Pass
SC 3/G	SCR36	3	UC 203x203x46	S355	4.000	0.436	Pass
SC 3/G	SCR36	4	UC 203x203x46	S355	4.517	0.356	Pass
SC 3/G	SCR36	5	UC 203x203x46	S355	3.400	0.356	Pass
SC 1/K	SCR7	1	UC 203x203x46	S355	4.020	0.650	Pass
SC 1/K	SCR7	2	UC 203x203x46	S355	4.000	0.507	Pass
SC 1/K	SCR7	3	UC 203x203x46	S355	4.000	0.411	Pass
SC 1/K	SCR7	4	UC 203x203x46	S355	4.517	0.241	Pass
SC 1/J	SCR12	1	UC 203x203x46	S355	4.020	0.913	Pass
SC 1/J	SCR12	2	UC 203x203x46	S355	4.000	0.665	Pass
SC 1/J	SCR12	3	UC 203x203x46	S355	4.000	0.422	Pass
SC 1/J	SCR12	4	UC 203x203x46	S355	5.035	0.203	Pass
SC 1/H	SCR12	1	UC 203x203x46	S355	4.020	0.817	Pass
SC 1/H	SCR12	2	UC 203x203x46	S355	4.000	0.594	Pass
SC 1/H	SCR12	3	UC 203x203x46	S355	4.000	0.395	Pass
SC 1/H	SCR12	4	UC 203x203x46	S355	5.035	0.176	Pass
SC 1/G	SCR7	1	UC 203x203x46	S355	4.020	0.816	Pass
SC 1/G	SCR7	2	UC 203x203x46	S355	4.000	0.595	Pass
SC 1/G	SCR7	3	UC 203x203x46	S355	4.000	0.387	Pass
SC 1/G	SCR7	4	UC 203x203x46	S355	4.517	0.183	Pass
SC 1/F	SCR38	1	UC 203x203x46	S355	4.020	0.817	Pass
SC 1/F	SCR38	2	UC 203x203x46	S355	4.000	0.597	Pass
SC 1/F	SCR38	3	UC 203x203x46	S355	4.000	0.375	Pass
SC 1/F	SCR38	4	UC 203x203x46	S355	3.730	0.219	Pass
SC 1/E	SCR7	1	UC 203x203x46	S355	4.020	0.817	Pass
SC 1/E	SCR7	2	UC 203x203x46	S355	4.000	0.598	Pass
SC 1/E	SCR7	3	UC 203x203x46	S355	4.000	0.407	Pass
SC 1/E	SCR7	4	UC 203x203x46	S355	4.517	0.182	Pass
SC 1/D	SCR12	1	UC 203x203x46	S355	4.020	0.817	Pass
SC 1/D	SCR12	2	UC 203x203x46	S355	4.000	0.598	Pass
SC 1/D	SCR12	3	UC 203x203x46	S355	4.000	0.427	Pass
SC 1/D	SCR12	4	UC 203x203x46	S355	5.035	0.195	Pass
SC 1/C	SCR12	1	UC 203x203x46	S355	4.020	0.783	Pass
SC 1/C	SCR12	2	UC 203x203x46	S355	4.000	0.574	Pass
SC 1/C	SCR12	3	UC 203x203x46	S355	4.000	0.409	Pass
SC 1/C	SCR12	4	UC 203x203x46	S355	5.035	0.192	Pass
SC A/1	SCR38	1	UC 203x203x46	S355	4.020	0.473	Pass
SC A/1	SCR38	2	UC 203x203x46	S355	4.000	0.352	Pass
SC A/1	SCR38	3	UC 203x203x46	S355	4.000	0.222	Pass

Member Reference	Group Ref.	Stack	Section	Grade	Length [m]	Utilization	Status
SC A/1	SCR38	4	UC 203x203x46	S355	3.730	0.222	Pass
SC 3/C	SCR42	1	UC 203x203x46	S355	4.020	0.856	Pass
SC 3/C	SCR42	2	UC 203x203x46	S355	4.000	0.638	Pass
SC 3/C	SCR42	3	UC 203x203x46	S355	4.000	0.411	Pass
SC 3/C	SCR42	4	UC 203x203x46	S355	5.035	0.390	Pass
SC 3/C	SCR42	5	UC 203x203x46	S355	3.400	0.286	Pass
SC 3/D	SCR42	1	UC 203x203x46	S355	4.020	0.898	Pass
SC 3/D	SCR42	2	UC 203x203x46	S355	4.000	0.672	Pass
SC 3/D	SCR42	3	UC 203x203x46	S355	4.000	0.432	Pass
SC 3/D	SCR42	4	UC 203x203x46	S355	5.035	0.400	Pass
SC 3/D	SCR42	5	UC 203x203x46	S355	3.400	0.295	Pass
SC 3/E	SCR10	1	UC 203x203x46	S355	4.020	0.893	Pass
SC 3/E	SCR10	2	UC 203x203x46	S355	4.000	0.662	Pass
SC 3/E	SCR10	3	UC 203x203x46	S355	4.000	0.430	Pass
SC 3/E	SCR10	4	UC 203x203x46	S355	4.517	0.337	Pass
SC 3/E	SCR10	5	UC 203x203x46	S355	3.400	0.312	Pass
SC 2/H	SCR13	1	UKC 203x203x52	S355	4.020	0.948	Pass
SC 2/H	SCR13	2	UKC 203x203x52	S355	4.000	0.879	Pass
SC 2/H	SCR13	3	UKC 203x203x52	S355	4.000	0.487	Pass
SC 2/H	SCR13	4	UKC 203x203x52	S355	5.035	0.127	Pass
SC 2/G	SCR11	1	UKC 203x203x52	S355	4.020	0.948	Pass
SC 2/G	SCR11	2	UKC 203x203x52	S355	4.000	0.879	Pass
SC 2/G	SCR11	3	UKC 203x203x52	S355	4.000	0.486	Pass
SC 2/G	SCR11	4	UKC 203x203x52	S355	4.517	0.109	Pass
SC 2/F	SCR6	1	UKC 203x203x52	S355	4.020	0.950	Pass
SC 2/F	SCR6	2	UKC 203x203x52	S355	4.000	0.879	Pass
SC 2/F	SCR6	3	UKC 203x203x52	S355	4.000	0.486	Pass
SC 2/F	SCR6	4	UKC 203x203x52	S355	3.730	0.111	Pass
SC 2/A	SCR5	1	UKC 203x203x46	S355	4.020	0.887	Pass
SC 2/A	SCR5	2	UKC 203x203x46	S355	4.000	0.640	Pass
SC 2/A	SCR5	3	UKC 203x203x46	S355	4.000	0.398	Pass
SC 2/A	SCR5	4	UKC 203x203x46	S355	3.730	0.208	Pass
SC 2/C	SCR13	1	UKC 203x203x52	S355	4.020	0.908	Pass
SC 2/C	SCR13	2	UKC 203x203x52	S355	4.000	0.842	Pass
SC 2/C	SCR13	3	UKC 203x203x52	S355	4.000	0.482	Pass
SC 2/C	SCR13	4	UKC 203x203x52	S355	5.035	0.138	Pass
SC 2/E	SCR11	1	UKC 203x203x52	S355	4.020	0.948	Pass
SC 2/E	SCR11	2	UKC 203x203x52	S355	4.000	0.879	Pass
SC 2/E	SCR11	3	UKC 203x203x52	S355	4.000	0.495	Pass
SC 2/E	SCR11	4	UKC 203x203x52	S355	4.517	0.118	Pass
SC 2/D	SCR13	1	UKC 203x203x52	S355	4.020	0.948	Pass
SC 2/D	SCR13	2	UKC 203x203x52	S355	4.000	0.880	Pass
SC 2/D	SCR13	3	UKC 203x203x52	S355	4.000	0.501	Pass
SC 2/D	SCR13	4	UKC 203x203x52	S355	5.035	0.143	Pass
SC 3/H	SCR15	1	UC 203x203x46	S355	4.020	0.907	Pass
SC 3/H	SCR15	2	UC 203x203x46	S355	4.000	0.676	Pass

Member Reference	Group Ref.	Stack	Section	Grade	Length [m]	Utilization	Status
SC 3/H	SCR15	3	UC 203x203x46	S355	4.000	0.482	Pass
SC 3/H	SCR15	4	UC 203x203x46	S355	5.035	0.311	Pass
SC 3/H	SCR15	5	UC 203x203x46	S355	3.400	0.285	Pass
SC 3/B1	SCR19	1	UC 203x203x46	S355	2.100	0.483	Pass
SC 3/B1	SCR19	2	UC 203x203x46	S355	1.920	0.483	Pass
SC 3/B1	SCR19	3	UC 203x203x46	S355	2.080	0.348	Pass
SC 3/B1	SCR19	4	UC 203x203x46	S355	1.920	0.348	Pass
SC 3/B1	SCR19	5	UC 203x203x46	S355	2.080	0.311	Pass
SC 3/B1	SCR19	6	UC 203x203x46	S355	1.920	0.311	Pass
SC 3/B1	SCR19	7	UC 203x203x46	S355	4.585	0.311	Pass
SC 3/B1	SCR19	8	UC 203x203x46	S355	3.400	0.281	Pass
SC 2/B1	SCR31	1	UKC 203x203x46	S355	4.020	0.910	Pass
SC 2/B1	SCR31	2	UKC 203x203x46	S355	4.000	0.863	Pass
SC 2/B1	SCR31	3	UKC 203x203x46	S355	4.000	0.534	Pass
SC 2/B1	SCR31	4	UKC 203x203x46	S355	4.585	0.226	Pass
SC %392	SCR17	1	UKC 203x203x46	S355	1.333	0.473	Pass
SC K/#4475	SCR17	1	UKC 203x203x46	S355	1.333	0.489	Pass
SC K/#4648	SCR17	1	UKC 203x203x46	S355	1.333	0.473	Pass
SC L/AE	SCR33	1	UC 203x203x46	S355	4.020	0.726	Pass
SC L/AE	SCR33	2	UC 203x203x46	S355	4.000	0.556	Pass
SC L/AE	SCR33	3	UC 203x203x46	S355	4.000	0.461	Pass
SC L/AE	SCR33	4	UC 203x203x46	S355	3.730	0.266	Pass
SC K/AE	SCR34	1	UC 203x203x52	S355	1.483	0.981	Pass
SC K/AE	SCR34	2	UC 203x203x52	S355	2.537	0.981	Pass
SC K/AE	SCR34	3	UC 203x203x52	S355	1.463	0.638	Pass
SC K/AE	SCR34	4	UC 203x203x52	S355	2.537	0.629	Pass
SC K/AE	SCR34	5	UC 203x203x52	S355	1.463	0.369	Pass
SC K/AE	SCR34	6	UC 203x203x52	S355	2.537	0.369	Pass
SC K/AE	SCR34	7	UC 203x203x52	S355	4.517	0.188	Pass
SC J/AE	SCR32	1	UC 203x203x71	S355	4.020	0.971	Pass
SC J/AE	SCR32	2	UC 203x203x71	S355	4.000	0.796	Pass
SC J/AE	SCR32	3	UC 203x203x71	S355	4.000	0.490	Pass
SC J/AE	SCR32	4	UC 203x203x71	S355	5.035	0.186	Pass

Brace Design

Brace Design Summary

Static

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
SBR 3/K/3-2/K/AE	SBrR2	1	Flat 15x180	S275	6.600	0.516	Pass
SBR 1/K/3-Base/K/AE	SBrR2	1	Flat 15x200	S275	6.612	0.813	Pass
SBR 1/K/AE-Base/K/3	SBrR2	1	Flat 15x200	S275	6.612	0.970	Pass
SBR 2/K/AE-1/K/3	SBrR2	1	Flat 15x180	S275	6.600	0.649	Pass
SBR 2/K/3-1/K/AE	SBrR2	1	Flat 15x180	S275	6.600	0.570	Pass
SBR 3/K/AE-2/K/3	SBrR2	1	Flat 15x180	S275	6.600	0.505	Pass

Cold Formed

Brace Design

Brace Design Summary

Static

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
CFBR IP 52/K/AE-IP 52/3/K	CFBr18	1	CF CHS 88.9x3.0	S355 J2H	5.250	0.224	Pass
CFBR IP 52/1/K-IP 52/K/AE	CFBr4	1	CF CHS 88.9x3.0	S355 J2H	6.250	0.034	Pass
CFBR IP 55/2/B1-IP 55/3/B1	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.025	Pass
CFBR IP 55/1/B1-IP 55/2/B1	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.025	Pass
CFBR OE/L/1-OE/L/AE	CFBr4	1	CF CHS 88.9x3.0	S355 J2H	6.250	0.026	Pass
CFBR OE/L/AE-OE/3/L	CFBr18	1	CF CHS 88.9x3.0	S355 J2H	5.250	0.292	Pass
CFBR IP 53/1/G-IP 53/2/G	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.028	Pass
CFBR IP 53/2/G-IP 53/3/G	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.167	Pass
CFBR FRM 1/J/#3401-Base.1.0.1/AE/J	CFBr4	1	CF CHS 88.9x3.0	S355 J2H	6.250	0.168	Pass
CFBR Base.1.0.1/AE/J-FRM 3/J/#3808	CFBr18	1	CF CHS 88.9x3.0	S355 J2H	5.250	0.209	Pass
CFBR FRM 1/H/#3402-FRM 2/H/#3315	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.130	Pass
CFBR FRM 2/H/#3315-FRM 3/H/#3412	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.173	Pass
CFBR IP 54/E/1-IP 54/E/2	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.026	Pass
CFBR IP 54/E/2-IP 54/3/E	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.026	Pass
CFBR OE/F/1-OE/F/2	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.030	Pass
CFBR OE/F/2-OE/3/F	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.247	Pass
CFBR Base.1.0.1/D/2-Base.1.0.1/3/D	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.029	Pass
CFBR Base.1.0.1/D/1-Base.1.0.1/D/2	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.138	Pass
CFBR Base.1.0.1/C/1-Base.1.0.1/C/2	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.135	Pass
CFBR Base.1.0.1/C/2-Base.1.0.1/3/C	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.027	Pass
CFBR OE/A/1-OE/A/2	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.032	Pass
CFBR OE/A/2-OE/3/A	CFBr3	1	CF CHS 88.9x3.0	S355 J2H	5.750	0.609	Pass
CFBR OE/A/2-IP 55/3/B1	CFBr1	1	CF CHS 193.7x5.0	S355 J2H	9.146	0.089	Pass
CFBR OE/A/2-IP 55/1/B1	CFBr1	1	CF CHS 193.7x5.0	S355 J2H	9.146	0.062	Pass
CFBR Base.1.0.1/J/AE-IP 52/3/K	CFBr1	1	CF CHS 193.7x5.0	S355 J2H	8.371	0.052	Pass
CFBR IP 52/1/K-IP 52/L/AE	CFBr1	1	CF CHS 193.7x5.0	S355 J2H	9.052	0.063	Pass

Example Composite Beam Design – Office

SB 1/2/H-1/2/G

St. 1 (1st Floor): SB 1/2/H-1/2/G - 1
UKB 356x127x33 S355 (38) []

Restraints

Source	Distance / Length [m]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0.000	•		•		•		•	
sub-beam	6.500	•	1.000		1.000		1.000		1.000
support	6.500	•		•		•		•	

Connectors\Layout

Name	Diameter	As welded height	Stud strength
BS5950 19 x 100	19	95	100000.0

Distance end 1 [m]	Distance end 2 [m]	Number of connectors in length	Number of connectors in group	Group spacing × rib
0.000	6.500	38	2	1

Decking

Manufacturer	Name	Gauge	Yield strength
KINGSPAN	MULTIDECK 60-V2	1 mm	350.0 N/mm^2

Slab

Overall depth	Effective Width	Concrete type	Minimum compressive strength, f_c'
150 mm	1.625 m	Normal	30.0 N/mm^2

Reinforcement

Transverse reinforcement	Reinforcement for crack control or fire requirements

Type	Area	Yield strength	Type	Area	Yield strength
	0 mm^2/m	500.0 N/mm^2	Type 2 A 252	252 mm^2/m	500.0 N/mm^2

Static

UKB 356x127x33(S355)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.436	✔ Pass
Composite Moment	2	205.2	344.4	kNm	0.596	✔ Pass
Connector Resistance	2	18	38		-	✔ Pass
Longitudinal Shear	-	108.4	334.2	kN/m	0.324	✔ Pass
Vertical Shear	2	126.3	446.0	kN	0.283	✔ Pass
Service Stress	7	198.8	355.0	N/mm^2	0.560	✔ Pass
Natural Frequency	2	8.8	4.0	Hz	0.454	✔ Pass
Deflection Self weight	2	0	-	mm	-	-
Deflection Slab	2	12	26	mm	0.455	✔ Pass
Deflection Dead	2	1	26	mm	0.057	✔ Pass
Deflection Imposed	2	8	18	mm	0.427	✔ Pass
Deflection Snow	-	No loads		mm	-	Not required
Deflection Total	2	21	33	mm	0.661	✔ Pass

Construction Stage

Summary UKB 356x127x33(S355)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Classification	1	Class 1 Plastic	-	-	-	✔ Pass
Shear Major	1	51.7	446.0	kN	0.116	✔ Pass
Shear Web Buckling	-	51.933	61.610		-	✔ Pass
Moment Major	1	84.1	192.7	kNm	0.436	✔ Pass
Buckling Lateral Torsional	1	No	Significant	Forces	-	Not required
Max. Self wt. deflection	1	0	-	mm	-	-
Deflection Dead	-	No loads		mm	-	Not required

SB 1/2/H-1/3/H

St. 1 (1st Floor): SB 1/2/H-1/3/H - 1
UKB 356x127x39 S355 (25) [Type 2 H 8 @ 250]

Restraints

Source	Distance / Length [m]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0.000	●		●		●		●	
sub-beam	2.875		1.000		1.000		1.000		1.000
member	2.875	●						●	
sub-beam	2.875		1.000		1.000		1.000		1.000
support	5.750	●		●		●		●	

Connectors\Layout

Name	Diameter	As welded height	Stud strength
BS5950 19 x 100	19	95	100000.0

Distance end 1 [m]	Distance end 2 [m]	Number of connectors in length	Number of connectors in group	Group spacing distance [mm]
0.000	5.750	23	1	250

Decking

Manufacturer	Name	Gauge	Yield strength
KINGSPAN	MULTIDECK 60-V2	1 mm	350.0 N/mm²

Slab

Overall depth	Effective Width	Concrete type	Minimum compressive strength, f_c'
150 mm	1.438 m	Normal	30.0 N/mm²

Reinforcement

Transverse reinforcement	Reinforcement for crack control or fire requirements

Type	Area	Yield strength	Type	Area	Yield strength
Type 2 H 8 @ 250	201 mm²/m	500.0 N/mm²	Type 2 A 252	252 mm²/m	500.0 N/mm²

Static

UKB 356x127x39(S355)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Construction Stage	1	-	-	-	0.787	✔ Pass
Composite Moment	7	365.2	420.0	kNm	0.870	✔ Pass
Connector Resistance	2	11	25		-	✔ Pass
Longitudinal Shear	-	160.0	231.5	kN/m	0.691	✔ Pass
Vertical Shear	7	-127.8	496.8	kN	0.257	✔ Pass
Service Stress	7	298.4	355.0	N/mm²	0.840	✔ Pass
Natural Frequency	2	8.7	4.0	Hz	0.462	✔ Pass
Deflection Self weight	2	1	-	mm	-	-
Deflection Slab	2	11	23	mm	0.470	✔ Pass
Deflection Dead	2	1	23	mm	0.062	✔ Pass
Deflection Imposed	2	7	16	mm	0.455	✔ Pass
Deflection Snow	-	No loads		mm	-	Not required
Deflection Total	7	20	29	mm	0.702	✔ Pass

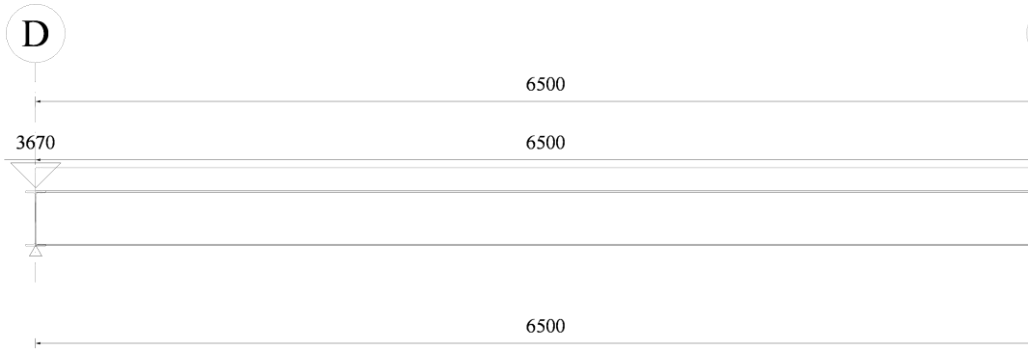
Construction Stage

Summary UKB 356x127x39(S355)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Classification	1	Class 1 Plastic	-	-	-	✔ Pass
Shear Major	1	-53.3	496.8	kN	0.107	✔ Pass
Shear Web Buckling	-	47.212	61.610		-	✔ Pass
Moment Major	1	150.9	233.8	kNm	0.646	✔ Pass
Buckling Lateral Torsional	1	150.9	191.8	kNm	0.787	✔ Pass
Max. Self wt. deflection	1	1	-	mm	-	-
Deflection Dead	-	No loads		mm	-	Not required

Example Non Composite Beam Design. Main Office

SB 1/D/1-1/C/1



St. 1 (1st Floor): SB 1/D/1-1/C/1 - 1
UKB 356x127x33 S355

Restraints

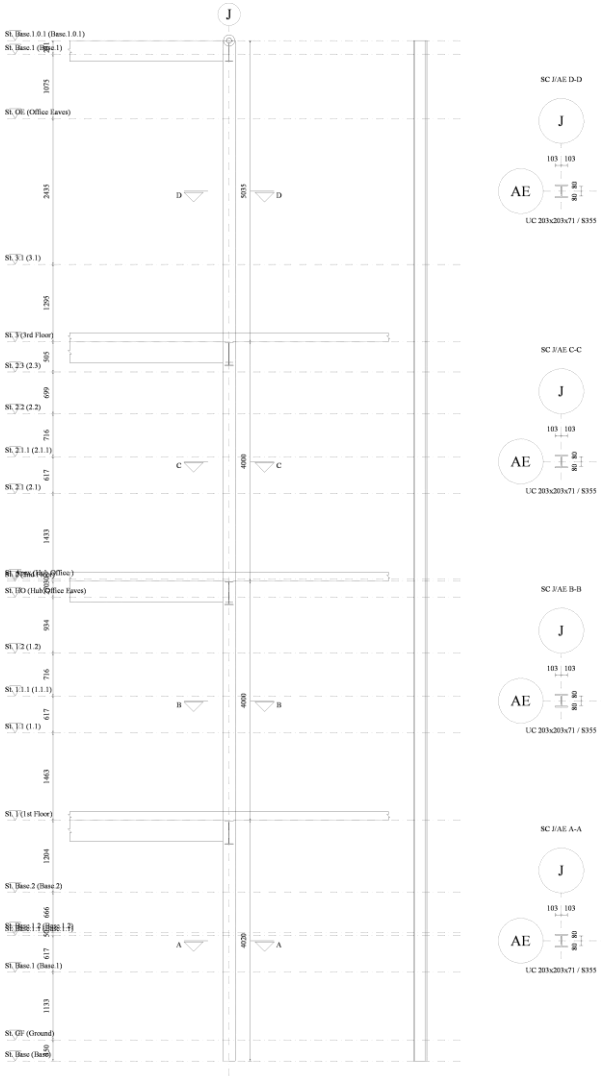
Source	Distance / Length [m]	LTB Top / Sub-Beam	LTB Top Factor	LTB Btm / Sub-Beam	LTB Btm Factor	Strut Major / Sub-Beam	Strut Major Factor	Strut Minor / Sub-Beam	Strut Minor Factor
support	0.000	●		●		●		●	
sub-beam	6.500	●	1.000		1.000		1.000		1.000
support	6.500	●		●		●		●	

Static

SummaryUKB 356x127x33(S355)

Design Condition	#	Design Value	Design Capacity	Units	U.R.	Status
Classification	1	Class 1 Plastic	-	-	-	✔ Pass
Shear Major	3	-63.9	446.0	kN	0.143	✔ Pass
Shear Minor	-	No Significant Forces				Not required
Shear Web Buckling		51.933	61.610			✔ Pass
Moment Major	3	103.8	192.7	kNm	0.538	✔ Pass
Moment Minor	-	No Significant Forces				Not required
Axial	11	-8.3	1495.7	kN	0.006	✔ Pass
Axial Bending Combined	15	-	-	-	0.428	✔ Pass
Buckling Lateral Torsional	-	No Significant Forces				Not required
Buckling Compression	10	5.3	124.1	kN	0.043	✔ Pass
Buckling Combined	10	-	-	-	0.132	✔ Pass
Natural Frequency	2	5.9	4.0	Hz	0.674	✔ Pass
Max. Self wt. deflection	1	0	-	mm	-	-
Deflection Slab	2	6	26	mm	0.227	✔ Pass
Deflection Dead	2	2	26	mm	0.070	✔ Pass
Deflection Imposed	2	10	18	mm	0.560	✔ Pass
Deflection Snow	-	No loads		mm	-	Not required
Deflection Wind	10	0	33	mm	0.000	✔ Pass
Deflection Total	2	18	33	mm	0.563	✔ Pass

Example Column Design - Office.



SC J/AE

SC J/AE

Lateral Restraints

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained/ Sub-stack continuous	Face C factor
5	floor	17.055	Yes		Yes	
	sub-beam	5.035	No	1.000	No	1.000
4	floor	12.020	Yes		Yes	
	sub-beam	4.000	No	1.000	No	1.000
3	floor	8.020	Yes		Yes	
	sub-beam	4.000	No	1.000	No	1.000
2	floor	4.020	Yes		Yes	

Level	Source	Distance / Length	Face A restrained / Sub-stack continuous	Face A factor	Face C restrained/ Sub-stack continuous	Face C factor
	sub-beam	4.020	No	0.850	No	0.850
1	floor	0.000	Yes		Yes	

Strut Restraints

Level	Source	Distance / Length	Major restrained / Sub-stack continuous	Major factor	Minor restrained / Sub-stack continuous	Minor factor
5	floor	17.055	Yes		Yes	
	sub-beam	5.035	No	1.000	No	1.000
4	floor	12.020	Yes		Yes	
	sub-beam	4.000	No	1.000	No	1.000
3	floor	8.020	Yes		Yes	
	sub-beam	4.000	No	1.000	No	1.000
2	floor	4.020	Yes		Yes	
	sub-beam	4.020	No	0.850	No	0.850
1	floor	0.000	Yes		Yes	

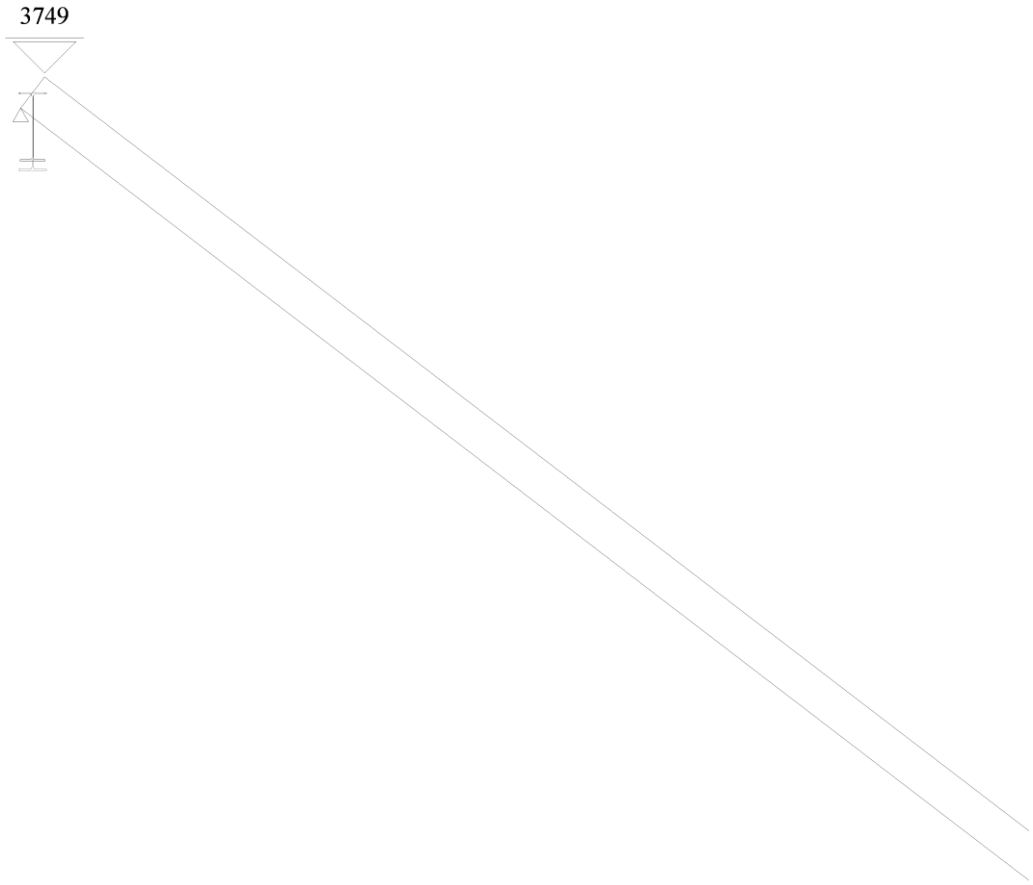
Static

Summary UC 203x203x71(S355)

Design Condition	Combination Name	Design Value	Design Capacity	Units	U.R.	Status
Classification	1	Class 1 Plastic	-	-	-	✓ Pass
Shear Major	8	7.8	446.7	kN	0.017	✓ Pass
Shear Minor	No	Significant	Forces	kN	-	Not required
Shear Web Buckling	-	16.080	62.496		-	✓ Pass
Moment Major	12	34.3	275.6	kNm	0.125	✓ Pass
Moment Minor	6	-9.3	127.2	kNm	0.073	✓ Pass
Axial	7	1694.3	3119.7	kN	0.543	✓ Pass
Axial Bending Combined	7	-	-	-	0.079	✓ Pass
Buckling Lateral Torsional	12	34.3	407.2	kNm	0.102	✓ Pass
Buckling Compression	7	1694.3	2065.7	kN	0.820	✓ Pass
Buckling Combined	7	-	-	-	0.971	✓ Pass

Example Brace Design - Main Office

SBR 1/K/AE-Base/K/3



FRM K: SBR 1/K/AE-Base/K/3 - 1
Flat 15x200 S275

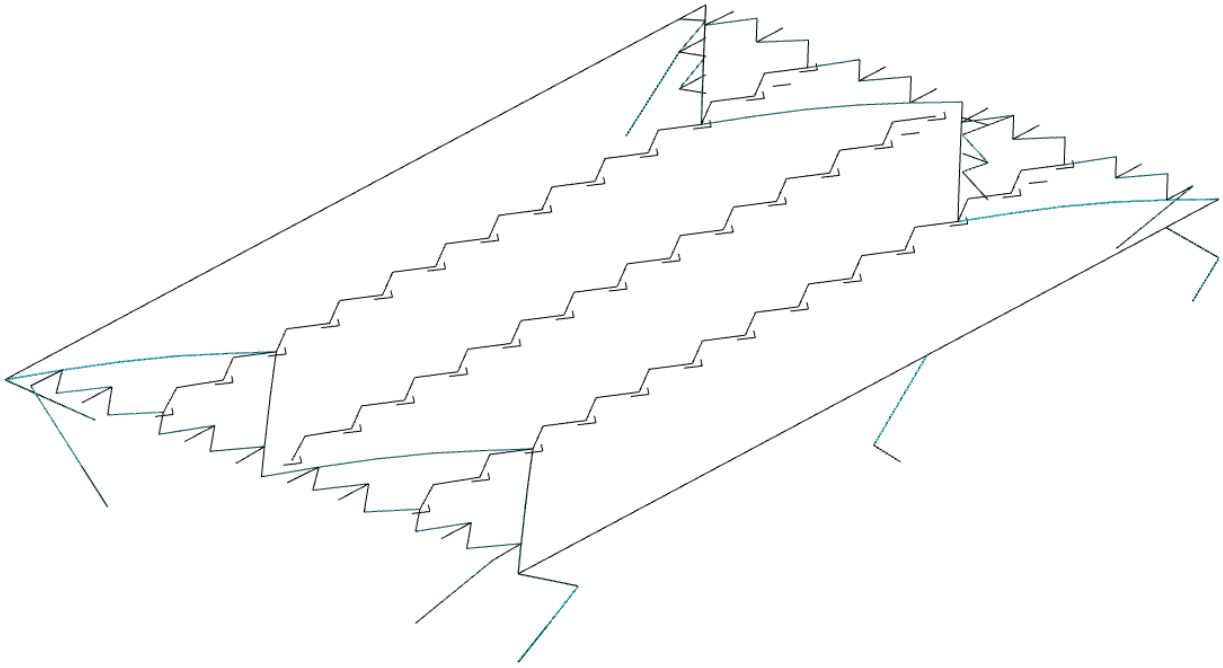
Static

Summary Flat 15x200(S275)

Design Condition	Combination Name	Design Value	Design Capacity	Units	U.R.	Status
Classification	1	Not Applicable	-	-	-	✔ Pass
Axial	9	-462.6	477.1	kN	0.970	✔ Pass
Buckling Compression	1	-	-	kN	-	Not required

Bracing Model.

Bracing members included in this section.



Bracing member design summary.

Steel

Brace Design

Brace Design Summary

Static

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
SBR E/W/29-E/W/28	SBrR7	1	CHS 114.3x3.2	S460	9.100	0.235	Pass
SBR E/W/28-E/W/27	SBrR7	1	CHS 114.3x3.2	S460	9.000	0.234	Pass
SBR E/W/27-E/W/26	SBrR7	1	CHS 114.3x3.2	S460	9.000	0.239	Pass
SBR E/W/26-E/W/25	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.217	Pass
SBR E/W/25-E/W/24	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.257	Pass
SBR E/W/24-E/W/23	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.322	Pass
SBR E/W/7-E/W/6	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.326	Pass
SBR E/W/6-E/W/5	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.314	Pass
SBR E/W/23-E/W/22	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.391	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
SBR E/W/22-E/W/21	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.458	Pass
SBR E/W/21-E/W/20	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.528	Pass
SBR E/W/20-E/W/19	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.596	Pass
SBR E/W/19-E/W/18	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.666	Pass
SBR E/W/18-E/W/17	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.734	Pass
SBR E/W/17-E/W/16	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.804	Pass
SBR E/W/16-E/W/15	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.858	Pass
SBR E/W/15-E/W/14	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.853	Pass
SBR E/W/14-E/W/13	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.560	Pass
SBR E/W/13-E/W/12	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.523	Pass
SBR E/W/12-E/W/11	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.487	Pass
SBR E/W/11-E/W/10	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.449	Pass
SBR E/W/10-E/W/9	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.413	Pass
SBR E/W/9-E/W/8	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.376	Pass
SBR E/W/8-E/W/7	SBrR5	1	CHS 114.3x3.2	S460	8.000	0.344	Pass

Cold Formed

Brace Design

Brace Design Summary

Static

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
CFBR FRM W/4/#8353-FRM W/3/#8354	CFBr6	1	CF CHS 273.0x8.0	S355 J2H	10.235	0.833	Pass
CFBR FRM 3/T/#9053-FRM 3/U/#9052	CFBr26	1	CF CHS 219.1x5.0	S355 J2H	9.296	0.554	Pass
CFBR FRM 29/D/#9349-Base/29/E	CFBr43	1	CF SHS 200x200x6.0	S355 J2H	9.296	0.556	Pass
CFBR FRM 29/B/#7070-FRM 29/C/#9350	CFBr14	1	CF CHS 219.1x5.0	S355 J2H	9.296	0.804	Pass
CFBR FRM 29/C/#9350-FRM 29/D/#9349	CFBr14	1	CF CHS 219.1x5.0	S355 J2H	9.296	0.805	Pass
CFBR FRM 29/#6783/V-FRM 29/U/#9228	CFBr14	1	CF CHS 219.1x5.0	S355 J2H	9.296	0.805	Pass
CFBR FRM 29/U/#9228-FRM 29/T/#9227	CFBr14	1	CF CHS 219.1x5.0	S355 J2H	9.296	0.805	Pass
CFBR Base/29/S-FRM 29/T/#9227	CFBr42	1	CF SHS 180x180x6.0	S355 J2H	9.296	0.744	Pass
CFBR 3/4/A-3/3/A	CFBr13	1	CF CHS 193.7x5.0	S355 J2H	8.000	0.323	Pass
CFBR OE/A/3-E/4/A	CFBr1	1	CF CHS 273.0x5.0	S355 J2H	8.693	0.873	Pass
CFBR 2/3/A-3/4/A	CFBr1	1	CF CHS 219.1x5.0	S355 J2H	8.944	0.533	Pass
CFBR Base/A/3-1/A/4	CFBr1	1	CF SHS 180x180x6.0	S355 J2H	8.953	0.580	Pass
CFBR 1/A/4-1/A/3	CFBr2	1	CF CHS 193.7x5.0	S355 J2H	8.000	0.157	Pass
CFBR IP 45/25/#8221-IP 45/24/R	CFBr7	1	CF CHS 244.5x5.0	S355 J2H	10.042	0.852	Pass
CFBR FRM 28/#6899/#8223-1.1.0.1/29/#8140	CFBr15	1	CF CHS 139.7x5.0	S355 J2H	10.977	0.836	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
CFBR IP 47/29/#8142-IP 47/28/#8222	CFBr1	1	CF CHS 139.7x5.0	S355 J2H	9.108	0.621	Pass
CFBR 2/3/A-1/A/4	CFBr1	1	CF CHS 219.1x6.0	S355 J2H	8.944	0.318	Pass
CFBR IP 47/29/L-IP 47/28/#8222	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.438	0.198	Pass
CFBR FRM W/4/#8353-E/5/W	CFBr40	1	CF CHS 273.0x8.0	S355 J2H	10.235	0.830	Pass
CFBR FRM 4/#6789/#8195-1.1.0.1/5/#8196	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.313	0.742	Pass
CFBR E/A/29-E/A/28	CFBr1	1	CF CHS 114.3x3.6	S355 J2H	9.100	0.589	Pass
CFBR E/A/28-E/A/27	CFBr1	1	CF CHS 114.3x3.6	S355 J2H	9.000	0.571	Pass
CFBR E/A/27-E/A/26	CFBr1	1	CF CHS 114.3x3.6	S355 J2H	9.000	0.547	Pass
CFBR E/A/26-E/A/25	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.408	Pass
CFBR E/A/25-E/A/24	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.374	Pass
CFBR E/A/24-E/A/23	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.339	Pass
CFBR E/W/5-E/W/4	CFBr2	1	CF CHS 193.7x5.0	S355 J2H	8.000	0.676	Pass
CFBR E/W/4-E/W/3	CFBr2	1	CF CHS 193.7x5.0	S355 J2H	8.000	0.676	Pass
CFBR E/A/7-E/A/6	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.604	Pass
CFBR E/A/6-E/A/5	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.660	Pass
CFBR E/A/5-E/A/4	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.691	Pass
CFBR E/A/4-E/A/3	CFBr2	1	CF CHS 168.3x5.0	S355 J2H	8.000	0.589	Pass
CFBR E/A/22-E/A/21	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.267	Pass
CFBR E/A/23-E/A/22	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.302	Pass
CFBR E/A/20-E/A/19	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.195	Pass
CFBR E/A/21-E/A/20	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.230	Pass
CFBR E/A/18-E/A/17	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.123	Pass
CFBR E/A/19-E/A/18	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.158	Pass
CFBR E/A/16-E/A/15	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.088	Pass
CFBR E/A/17-E/A/16	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.091	Pass
CFBR E/A/14-E/A/13	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.135	Pass
CFBR E/A/15-E/A/14	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.087	Pass
CFBR E/A/12-E/A/11	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.271	Pass
CFBR E/A/13-E/A/12	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.204	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
CFBR E/A/10-E/A/9	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.406	Pass
CFBR E/A/11-E/A/10	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.339	Pass
CFBR E/A/8-E/A/7	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.541	Pass
CFBR E/A/9-E/A/8	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.475	Pass
CFBR 1.1.0.1/26/#8219-FRM 25/#6823/#8220	CFBr7	1	CF CHS 244.5x5.0	S355 J2H	10.037	0.863	Pass
CFBR 1.1.0.1/27/#8218-1.1.0.1/26/#8219	CFBr15	1	CF CHS 273.0x5.0	S355 J2H	11.274	0.782	Pass
CFBR FRM 28/#6776/#8215-1.1.0.1/27/#8218	CFBr15	1	CF CHS 273.0x5.0	S355 J2H	11.272	0.786	Pass
CFBR IP 51/4/#8181-1.1.0.1/5/C	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.313	0.700	Pass
CFBR IP 51/3/A-IP 51/4/#8181	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.346	0.859	Pass
CFBR Base/W/4-FRM W/3/#8354	CFBr6	1	CF SHS 200x200x6.0	S355 J2H	10.235	0.660	Pass
CFBR FRM 3/T/#9053-Base/3/S	CFBr14	1	CF SHS 180x180x6.0	S355 J2H	9.296	0.512	Pass
CFBR 1.1.0.1/6/D-FRM 7/#7025/#8182	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.313	0.691	Pass
CFBR IP 50/7/#8183-IP 50/8/F	CFBr27	1	CF CHS 273.0x8.0	S355 J2H	10.346	0.687	Pass
CFBR IP 45/29/#8123-IP 45/28/R	CFBr15	1	CF CHS 219.1x5.0	S355 J2H	11.211	0.783	Pass
CFBR IP 44/3/V-IP 44/4/#8194	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.649	Pass
CFBR FRM W/28/#5954-FRM W/27/#5955	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.206	0.671	Pass
CFBR E/29/W-FRM W/28/#5954	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.294	0.678	Pass
CFBR 1.1.0.1/3/#7401-1.1.0.1/4/#7402	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.664	Pass
CFBR 1.1.0.1/4/#7402-1.1.0.1/3/U	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.308	0.706	Pass
CFBR FRM W/27/#5955-FRM W/28/#5956	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.206	0.565	Pass
CFBR FRM W/28/#5956-Base/W/29	CFBr12	1	CF SHS 250x250x8.0	S355 J2H	10.248	0.468	Pass
CFBR IP 46/25/#8229-IP 46/24/R	CFBr7	1	CF CHS 193.7x5.0	S355 J2H	10.042	0.501	Pass
CFBR 1.1.0.1/26/#8227-FRM 25/#6864/#8228	CFBr7	1	CF CHS 193.7x5.0	S355 J2H	10.037	0.472	Pass
CFBR 1.1.0.1/28/#8216-FRM 29/#6824/#8217	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.195	0.518	Pass
CFBR 1.1.0.1/28/#8216-1.1.0.1/29/#8120	CFBr15	1	CF CHS 219.1x5.0	S355 J2H	11.183	0.764	Pass
CFBR 1.1.0.1/29/#8126-1.1.0.1/28/#8216	CFBr1	1	CF CHS 139.7x5.0	S355 J2H	9.100	0.634	Pass
CFBR FRM 28/#6776/#8215-1.1.0.1/29/#8120	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	10.977	0.743	Pass
CFBR IP 44/29/V-IP 44/28/#8214	CFBr1	1	CF CHS 139.7x5.0	S355 J2H	9.108	0.621	Pass
CFBR IP 44/29/W-IP 44/28/#8214	CFBr15	1	CF CHS 273.0x8.0	S355 J2H	11.438	0.777	Pass

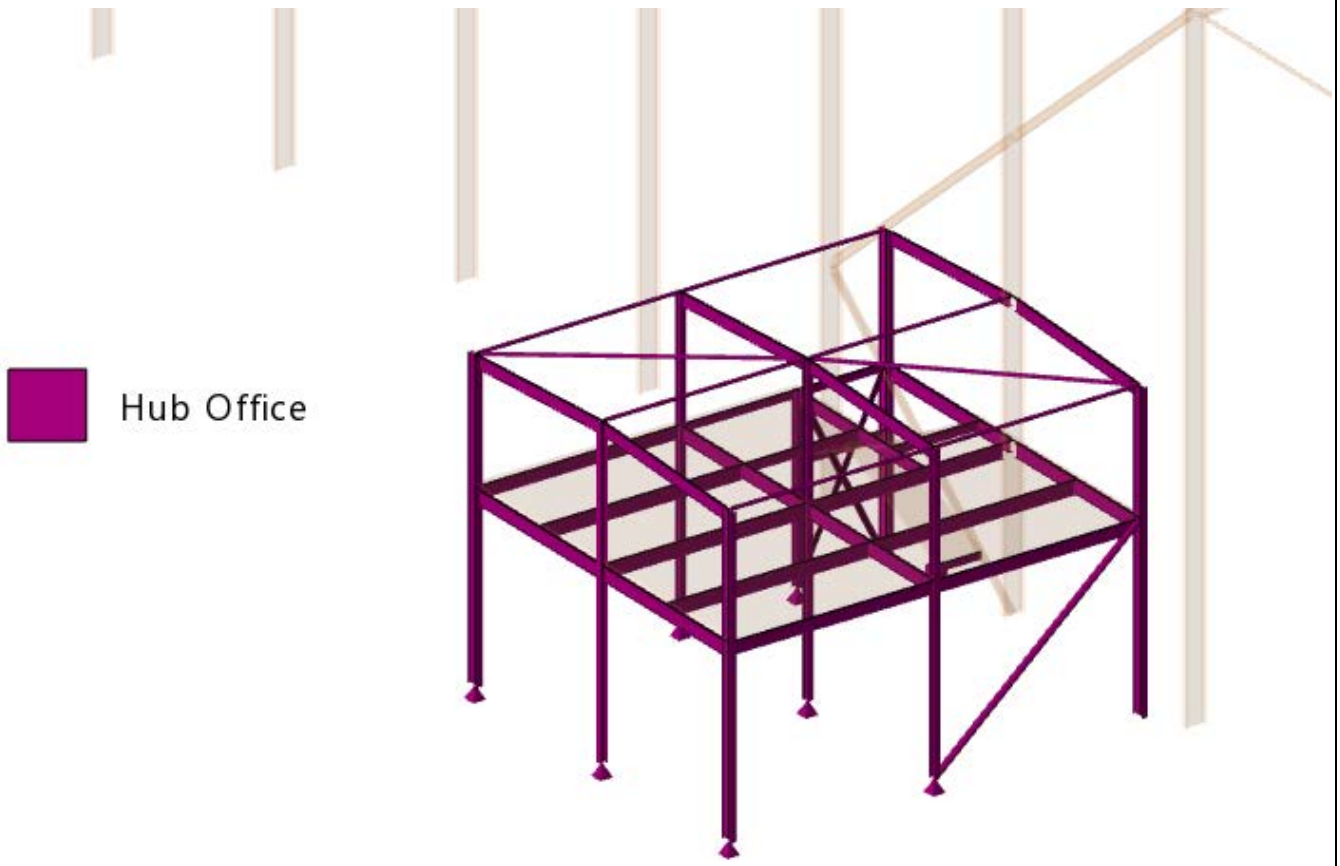
Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
CFBR 1.1.0.1/28/#8209-FRM 29/G/#6988	CFBr15	1	CF CHS 168.3x5.0	S355 J2H	11.195	0.740	Pass
CFBR IP 49/25/#8213-IP 49/24/F	CFBr7	1	CF CHS 193.7x5.0	S355 J2H	10.042	0.612	Pass
CFBR 1.1.0.1/26/#8211-FRM 25/#6987/#8212	CFBr7	1	CF CHS 193.7x5.0	S355 J2H	10.037	0.583	Pass
CFBR 1.1.0.1/27/#8210-1.1.0.1/26/#8211	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.274	0.696	Pass
CFBR 1.1.0.1/28/#8209-1.1.0.1/29/#8150	CFBr15	1	CF CHS 139.7x5.0	S355 J2H	11.183	0.309	Pass
CFBR FRM 28/#6940/#8208-1.1.0.1/27/#8210	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.272	0.688	Pass
CFBR IP 49/29/#8158-IP 49/28/F	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.211	0.993	Pass
CFBR 1.1.0.1/29/#8156-1.1.0.1/28/#8209	CFBr1	1	CF CHS 139.7x5.0	S355 J2H	9.100	0.634	Pass
CFBR FRM 28/#6940/#8208-1.1.0.1/29/#8150	CFBr15	1	CF CHS 139.7x5.0	S355 J2H	10.977	0.787	Pass
CFBR IP 48/29/#8147-IP 48/28/#8207	CFBr1	1	CF CHS 139.7x5.0	S355 J2H	9.108	0.621	Pass
CFBR IP 48/29/L-IP 48/28/#8207	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.438	0.408	Pass
CFBR IP 50/29/#8163-IP 50/28/F	CFBr15	1	CF CHS 219.1x5.0	S355 J2H	11.211	0.791	Pass
CFBR 1.1.0.1/28/#8206-FRM 29/E/#7029	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.195	0.607	Pass
CFBR 1.1.0.1/28/#8206-1.1.0.1/29/#8172	CFBr15	1	CF CHS 219.1x5.0	S355 J2H	11.183	0.759	Pass
CFBR 1.1.0.1/29/#8166-1.1.0.1/28/#8206	CFBr1	1	CF CHS 139.7x5.0	S355 J2H	9.100	0.634	Pass
CFBR 1.1.0.1/27/#8201-1.1.0.1/26/#8202	CFBr15	1	CF CHS 273.0x5.0	S355 J2H	11.274	0.700	Pass
CFBR FRM 28/#7063/#8200-1.1.0.1/C/29	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	10.977	0.724	Pass
CFBR IP 50/25/#8204-IP 50/24/F	CFBr7	1	CF CHS 244.5x5.0	S355 J2H	10.042	0.762	Pass
CFBR 1.1.0.1/26/#8202-FRM 25/#7028/#8203	CFBr7	1	CF CHS 244.5x5.0	S355 J2H	10.037	0.773	Pass
CFBR IP 51/29/B-IP 51/28/#8205	CFBr1	1	CF CHS 139.7x5.0	S355 J2H	9.108	0.621	Pass
CFBR FRM 28/#7063/#8200-1.1.0.1/27/#8201	CFBr15	1	CF CHS 273.0x5.0	S355 J2H	11.272	0.705	Pass
CFBR IP 51/29/A-FRM 28/#7063/#8200	CFBr30	1	CF CHS 273.0x8.0	S355 J2H	11.438	0.715	Pass
CFBR IP 48/3/K-IP 48/4/#8187	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.156	Pass
CFBR FRM 3/#6802/V-FRM 3/U/#9052	CFBr36	1	CF CHS 219.1x5.0	S355 J2H	9.296	0.553	Pass
CFBR IP 48/3/L-IP 48/4/#8187	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.346	0.266	Pass
CFBR FRM 4/#6953/#8186-1.1.0.1/3/J	CFBr12	1	CF CHS 139.7x5.0	S355 J2H	10.313	0.391	Pass
CFBR Base/3/#6643-1/3/L	CFBr2	1	CF SHS 180x180x6.0	S355 J2H	7.643	0.742	Pass
CFBR 2/3/L-FRM 3/%549	CFBr4	1	CF CHS 114.3x3.6	S355 J2H	6.500	0.682	Pass
CFBR FRM 3/%549-1/3/L	CFBr45	1	CF CHS 219.1x5.0	S355 J2H	7.658	0.494	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
CFBR FRM 3/%549-3/L/3	CFBr17	1	CF CHS 219.1x5.0	S355 J2H	7.607	0.437	Pass
CFBR FRM 3/%814-3/L/3	CFBr44	1	CF CHS 193.7x5.0	S355 J2H	7.748	0.613	Pass
CFBR FRM 3/%814-1.1.0.1/N/3	CFBr23	1	CF CHS 193.7x5.0	S355 J2H	7.748	0.212	Pass
CFBR OE/3/L-FRM 3/%814	CFBr22	1	CF CHS 114.3x3.6	S355 J2H	6.518	0.335	Pass
CFBR IP 51/4/#8181-1.1.0.1/C/3	CFBr12	1	CF CHS 168.3x5.0	S355 J2H	10.313	0.236	Pass
CFBR IP 49/3/G-IP 49/4/F	CFBr12	1	CF CHS 168.3x5.0	S355 J2H	10.338	0.235	Pass
CFBR IP 45/7/#8199-IP 45/8/R	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.346	0.727	Pass
CFBR 1.1.0.1/6/#8197-FRM 7/#6820/#8198	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.313	0.731	Pass
CFBR 1.1.0.1/5/#8196-1.1.0.1/6/#8197	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.308	0.736	Pass
CFBR FRM 4/#6953/#8186-1.1.0.1/5/J	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.313	0.295	Pass
CFBR 1.1.0.1/5/J-1.1.0.1/6/H	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.308	0.297	Pass
CFBR 1.1.0.1/5/C-1.1.0.1/6/D	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.308	0.695	Pass
CFBR IP 51/3/B1-IP 51/4/#8181	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.019	0.028	Pass
CFBR IP 50/3/E-IP 50/4/F	CFBr12	1	CF CHS 168.3x5.0	S355 J2H	10.338	0.898	Pass
CFBR 1.1.0.1/4/D-FRM 3/E/#7048	CFBr12	1	CF CHS 168.3x5.0	S355 J2H	10.321	0.272	Pass
CFBR 1.1.0.1/4/D-1.1.0.1/3/C	CFBr12	1	CF CHS 168.3x5.0	S355 J2H	10.308	0.953	Pass
CFBR 1.1.0.1/3/D-1.1.0.1/4/D	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.199	Pass
CFBR FRM A/5/#8836-Base/A/6	CFBr12	1	CF SHS 200x200x6.0	S355 J2H	10.006	0.523	Pass
CFBR 1.1.0.1/6/H-FRM 7/#6984/#8185	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.313	0.306	Pass
CFBR 1.1.0.1/4/H-FRM 3/G/#7007	CFBr12	1	CF CHS 139.7x5.0	S355 J2H	10.321	0.711	Pass
CFBR IP 49/7/#8184-IP 49/8/F	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.346	0.323	Pass
CFBR 3/4/A-FRM A/5/#8836	CFBr6	1	CF SHS 200x200x6.0	S355 J2H	10.006	0.523	Pass
CFBR OE/A/3-3/4/A	CFBr13	1	CF CHS 219.1x5.0	S355 J2H	8.827	0.499	Pass
CFBR E/29/A-FRM A/28/#9054	CFBr37	1	CF CHS 273.0x8.0	S355 J2H	11.143	0.871	Pass
CFBR FRM A/28/#9054-FRM A/27/#9055	CFBr15	1	CF CHS 273.0x8.0	S355 J2H	11.020	0.856	Pass
CFBR Base/A/26-FRM A/27/#9055	CFBr25	1	CF SHS 250x250x8.0	S355 J2H	11.020	0.706	Pass
CFBR E/14/W-FRM W/15/#8887	CFBr35	1	CF CHS 273.0x5.0	S355 J2H	10.414	0.128	Pass
CFBR FRM W/15/#8887-FRM W/16/#8885	CFBr6	1	CF CHS 273.0x5.0	S355 J2H	10.414	0.151	Pass
CFBR FRM W/16/#8885-DB/15/W	CFBr11	1	CF SHS 180x180x6.0	S355 J2H	10.414	0.478	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
CFBR 1.1.0.1/27/#8226-1.1.0.1/26/#8227	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.274	0.560	Pass
CFBR FRM 28/#6899/#8223-1.1.0.1/27/#8226	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.272	0.551	Pass
CFBR IP 46/29/#8131-IP 46/28/R	CFBr15	1	CF CHS 193.7x5.0	S355 J2H	11.211	0.973	Pass
CFBR 1.1.0.1/4/H-1.1.0.1/3/J	CFBr12	1	CF CHS 139.7x5.0	S355 J2H	10.308	0.216	Pass
CFBR 1.1.0.1/3/H-1.1.0.1/4/H	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.194	Pass
CFBR IP 44/3/W-IP 44/4/#8194	CFBr12	1	CF CHS 273.0x8.0	S355 J2H	10.346	0.930	Pass
CFBR FRM 4/#6789/#8195-1.1.0.1/3/U	CFBr12	1	CF CHS 168.3x5.0	S355 J2H	10.313	0.418	Pass
CFBR 1.1.0.1/28/#8224-FRM 29/#6865/#8225	CFBr15	1	CF CHS 168.3x5.0	S355 J2H	11.195	0.660	Pass
CFBR 1.1.0.1/28/#8224-1.1.0.1/29/#8140	CFBr15	1	CF CHS 139.7x5.0	S355 J2H	11.183	0.257	Pass
CFBR 1.1.0.1/29/#8134-1.1.0.1/28/#8224	CFBr1	1	CF CHS 139.7x5.0	S355 J2H	9.100	0.634	Pass
CFBR 1.1.0.1/4/#7402-FRM 3/#6843/#7404	CFBr12	1	CF CHS 168.3x5.0	S355 J2H	10.321	0.711	Pass
CFBR IP 45/3/#7405-IP 45/4/R	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.338	0.755	Pass
CFBR IP 46/7/#8193-IP 46/8/R	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.346	0.116	Pass
CFBR 1.1.0.1/6/#8191-FRM 7/#6861/#8192	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.313	0.120	Pass
CFBR 1.1.0.1/5/#7390-1.1.0.1/6/#8191	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.308	0.144	Pass
CFBR FRM 4/#6912/#8190-1.1.0.1/5/#7390	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.313	0.146	Pass
CFBR IP 47/3/L-IP 47/4/#8189	CFBr12	1	CF CHS 193.7x5.0	S355 J2H	10.346	0.354	Pass
CFBR FRM 4/#6912/#8190-1.1.0.1/3/N	CFBr12	1	CF CHS 139.7x5.0	S355 J2H	10.313	0.393	Pass
CFBR IP 47/3/#7394-IP 47/4/#8189	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.649	Pass
CFBR 1.1.0.1/3/#7393-1.1.0.1/4/#7389	CFBr2	1	CF CHS 114.3x3.6	S355 J2H	8.000	0.664	Pass
CFBR 1.1.0.1/4/#7389-1.1.0.1/3/N	CFBr12	1	CF CHS 139.7x5.0	S355 J2H	10.308	0.342	Pass
CFBR 1.1.0.1/4/#7389-FRM 3/#6884/#7392	CFBr12	1	CF CHS 139.7x5.0	S355 J2H	10.321	0.742	Pass
CFBR IP 46/3/#7391-IP 46/4/R	CFBr12	1	CF CHS 168.3x5.0	S355 J2H	10.338	0.752	Pass

Hub Office

Members included in report



Hub Office Design summary

Beam Design

Beam Design Summary

Static

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	No. Connectors	Camber	Utilization	Status
SB HO/54/15a-Apex/15/54	SBR23	1	UKB 356x127x33	S355	5.583		0.0	0.241	Pass
SB HO/54/14a-Apex/15/54	SBR23	1	UKB 356x127x33	S355	5.583		0.0	0.265	Pass
SB HO/55/14a-Apex/15/55	SBR23	1	UKB 356x127x33	S355	5.583		0.0	0.538	Pass
SB HO/55/15a-Apex/15/55	SBR27	1	UKB 356x127x33	S355	5.583		0.0	0.487	Pass
SB HO/14a/W-Apex/15/W	SBR20	1	UKB 356x127x33	S355	5.583		0.0	0.348	Pass
SB HO/15a/W-Apex/15/W	SBR20	1	UKB 356x127x33	S355	5.583		0.0	0.348	Pass
SB 1/15/W-1/W/15a	SBR38	1	UKB 406x140x39	S355	5.575		0.0	0.298	Pass
SB 1/15a/56-1/W/15a	SBR19	1	UKB 203x133x25	S355	2.750		0.0	0.151	Pass
SB 1/15a/56-1/55/15a	SBR24	1	UKB 203x133x25	S355	3.600		0.0	0.383	Pass

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	No. Connectors	Camber	Utilization	Status
SB 1/54/15a-1/55/15a	SBR15	1	UKB 356x127x33	S355	6.350		0.0	0.634	Pass
SB 1/15/54-1/15/55	SBR15	1	UKB 406x140x39	S355	6.350		0.0	0.741	Pass
SB 1/54/14a-1/55/14a	SBR15	1	UKB 356x127x33	S355	6.350		0.0	0.634	Pass
SB 1/55/14a-1/W/14a	SBR15	1	UKB 356x127x33	S355	6.350		0.0	0.634	Pass
SB 1/15/55-1/15/W	SBR15	1	UB 406x140x46	S355	6.350		0.0	0.902	Pass
SB 1/15a/56-1/15/56	SBR16	1	UKB 356x127x33	S355	5.575		0.0	0.881	Pass
SB 1/56/#5384-1/W/#5385	SBR19	1	UC 203x203x46	S355	2.750		0.0	0.226	Pass
SB 1/15/W-1/W/14a	SBR39	1	UKB 406x140x39	S355	5.575		0.0	0.474	Pass
SB 1/55/14a-1/15/55	SBR25	1	UKB 406x140x39	S355	5.575		0.0	0.767	Pass
SB 1/15/55-1/55/15a	SBR25	1	UKB 406x140x39	S355	5.575		0.0	0.695	Pass
SB 1/54/14a-1/15/54	SBR25	1	UKB 406x140x39	S355	5.575		0.0	0.393	Pass
SB 1/15/54-1/54/15a	SBR25	1	UKB 406x140x39	S355	5.575		0.0	0.370	Pass
SB 1/54/#5386-1/55/#5387	SBR15	1	UKB 406x140x39	S355	6.350		0.0	0.741	Pass
SB 1/55/#5387-1/56/#5388	SBR24	1	UKB 254x146x31	S355	3.600		0.0	0.437	Pass
SB 1/54/#5389-1/55/#5390	SBR15	1	UKB 406x140x39	S355	6.350		0.0	0.741	Pass
SB 1/55/#5390-1/W/#5391	SBR15	1	UKB 406x140x39	S355	6.350		0.0	0.741	Pass
SB Base.1.2/W/15a-Base.1.2/56/15a	SBR26	1	UKB 254x146x31	S355	2.750		0.0	0.323	Pass

Column Design

Column Design Summary

Static

Member Reference	Group Ref.	Stack	Section	Grade	Length [m]	Utilization	Status
SC 15a/56	SCR20	1	UKC 203x203x46	S355	3.650	0.349	Pass
SC 15a/56	SCR20	2	UKC 203x203x46	S355	1.870	0.349	Pass
SC W/15a	SCR25	1	UB 406x178x54	S355	3.650	0.231	Pass
SC W/15a	SCR25	2	UB 406x178x54	S355	1.870	0.231	Pass
SC W/15a	SCR25	3	UB 406x178x54	S355	3.730	0.177	Pass
SC 55/15a	SCR40	1	UC 203x203x52	S355	5.520	0.446	Pass
SC 55/15a	SCR40	2	UC 203x203x52	S355	3.730	0.229	Pass
SC 54/15a	SCR22	1	UB 406x178x54	S355	5.520	0.484	Pass
SC 54/15a	SCR22	2	UB 406x178x54	S355	3.730	0.290	Pass
SC W/14a	SCR22	1	UB 406x178x54	S355	5.520	0.584	Pass
SC W/14a	SCR22	2	UB 406x178x54	S355	3.730	0.182	Pass
SC 55/14a	SCR41	1	UC 203x203x52	S355	5.520	0.561	Pass
SC 55/14a	SCR41	2	UC 203x203x52	S355	3.730	0.314	Pass
SC 54/14a	SCR22	1	UB 406x178x54	S355	5.520	0.713	Pass
SC 54/14a	SCR22	2	UB 406x178x54	S355	3.730	0.212	Pass
SC 15/54	SCR24	1	UC 203x203x46	S355	5.520	0.585	Pass
SC 15/54	SCR24	2	UC 203x203x46	S355	4.030	0.442	Pass
SC 15/55	SCR23	1	UC 203x203x52	S355	5.520	0.837	Pass
SC 15/55	SCR23	2	UC 203x203x52	S355	4.030	0.169	Pass

Steel

Brace Design

Brace Design Summary

Static

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
SBR 1/15a/56--1.85/15a/W	SBrR4	1	Flat 10x200	S275	6.167	0.814	✔ Pass
SBR 1/15a/W--1.85/15a/56	SBrR4	1	Flat 10x200	S275	6.167	0.590	✔ Pass

Cold Formed

Brace Design

Brace Design Summary

Static

Member Reference	Group Ref.	Span	Section	Grade	Length [m]	Utilization	Status
CFBR HO/54/15a-HO/55/15a	CFBr4	1	CF CHS 114.3x3.6	S355 J2H	6.350	0.013	✔ Pass
CFBR HO/55/15a-HO/W/15a	CFBr4	1	CF CHS 114.3x3.6	S355 J2H	6.350	0.000	✔ Pass
CFBR HO/54/14a-HO/55/14a	CFBr4	1	CF CHS 114.3x3.6	S355 J2H	6.350	0.000	✔ Pass
CFBR HO/55/14a-HO/W/14a	CFBr4	1	CF CHS 114.3x3.6	S355 J2H	6.350	0.000	✔ Pass
CFBR HO/54/15a-Apex/15/55	CFBr1	1	CF CHS 114.3x3.6	S355 J2H	8.455	0.188	✔ Pass
CFBR Apex/15/55-HO/14a/W	CFBr1	1	CF CHS 114.3x3.6	S355 J2H	8.455	0.020	✔ Pass
CFBR Apex/15/55-Apex/15/W	CFBr4	1	CF CHS 114.3x3.6	S355 J2H	6.350	0.291	✔ Pass
CFBR Apex/15/54-Apex/15/55	CFBr4	1	CF CHS 114.3x3.6	S355 J2H	6.350	0.082	✔ Pass
CFBR 1/14a/W--1.85/14a/55	CFBr1	1	CF CHS 193.7x5.0	S355 J2H	8.414	0.656	✔ Pass

Section 7 - Foundation Loads

REV	Date	Notes
P01		Initial Issue
P02	16/07/21	Bracing forces and hub office forces added

NOTES:

1. All foundation loads are UNFACTORED.
2. Load has been notated as follows, U.N.O. – M as Major Axis MOMENT loads, F as SHEAR loads and N as AXIAL loads.
3. Self Weight / Dead Loads do NOT include for the weight of side cladding and rails.
4. All eaves bases have been designed as NOMINALLY PINNED and therefore transmit no moments into column bases at ULS. All valley column bases have been designed as NOMINALLY FIXED and therefore will transmit moments into the columns bases at ULS. No fire boundary conditions to the portals have been included at this time.
5. Wind directions are as follows: Wind on A is wind blowing onto Grid A, Wind on W is wind blowing on Grid W, Wind on 1 or 29 is wind blowing on to Grid 1 or 29.
6. A number of the portal eaves bases are part of the longitudinal bracing system. The forces experienced by these bases due to wind action on bracing can be found on page 8.
7. A portal base will pick up additional loads from the hub office. These loads can be found on page 9.
8. Note, the loads contained within this document are for the completed structure. Any loads experienced in the temporary state (including any temporary overturning moments) will be provided in a separate document.

REFERENCE: Typical Hit Frame

Design Code: BS5950

Foundation Loads

Self weight

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	2.63	30.88
Grid F Column	-0.5	-0.28	60.89
Grid L Column	-0.4	-0.05	58.98
Grid R Column	-0.2	0.21	60.95
Grid W Column	0.0	-2.50	31.72

Frame Dead Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	4.71	21.18
Grid F Column	-0.9	-0.50	133.59
Grid L Column	-0.7	-0.09	130.19
Grid R Column	-0.4	0.36	133.68
Grid W Column	0.0	-4.48	21.16

Frame Service Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	6.51	29.27
Grid F Column	-1.2	-0.69	134.15
Grid L Column	-1.0	-0.13	128.00
Grid R Column	-0.5	0.50	134.28
Grid W Column	0.0	-6.20	29.24

Frame Imposed Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	15.63	70.24
Grid F Column	-2.9	-1.66	321.50
Grid L Column	-2.4	-0.30	307.20
Grid R Column	-1.2	1.20	321.81
Grid W Column	0.0	-14.88	70.18

WIND ON A +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	-49.39	-50.01
Grid F Column	-71.8	-4.08	97.82
Grid L Column	-129.4	-16.51	165.32
Grid R Column	-116.9	-13.10	155.03
Grid W Column	0.0	-21.50	39.49

Snow Uniform

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	10.33	46.47
Grid F Column	-1.9	-1.10	215.69
Grid L Column	-1.6	-0.20	202.41
Grid R Column	-0.8	0.80	215.89
Grid W Column	0.0	-9.83	46.43

WIND ON A -

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	-51.17	-52.50
Grid F Column	-124.1	-11.83	-20.40
Grid L Column	-159.2	-19.74	24.63
Grid R Column	-151.5	-17.98	9.18
Grid W Column	0.0	-16.13	9.69

WIND ON W +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	24.30	38.44
Grid F Column	111.5	12.45	148.00
Grid L Column	126.3	16.35	165.04
Grid R Column	54.0	0.61	76.40
Grid W Column	0.0	55.09	-63.27

WIND ON W -

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	14.65	9.29
Grid F Column	141.8	16.89	5.71
Grid L Column	149.3	18.60	24.28
Grid R Column	109.9	9.72	-27.19
Grid W Column	0.0	51.61	-49.81

WIND ON 1 OR 29 +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	23.85	40.53
Grid F Column	-6.0	-1.81	202.31
Grid L Column	-3.5	-0.43	179.20
Grid R Column	-0.1	1.13	201.59
Grid W Column	0.0	-24.12	40.50

Snow Drift

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	2.64	6.02
Grid F Column	16.2	2.80	185.79
Grid L Column	-0.4	-0.06	194.09
Grid R Column	-16.9	-2.88	185.86
Grid W Column	0.0	-2.50	6.01

REFERENCE: Typical Miss Frame

Design Code: BS5950

Foundation Loads

Self weight

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	2.61	30.93
Grid W Column	0.0	-2.61	31.86

Frame Dead Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	4.66	21.25
Grid W Column	0.0	-4.66	21.41

Frame Service Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	6.45	29.37
Grid W Column	0.0	-6.45	29.59

Frame Imposed Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	15.48	70.48
Grid W Column	0.0	-15.48	71.01

WIND ON A +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	-53.73	-54.23
Grid W Column	0.0	-24.15	40.71

Snow Uniform

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	10.23	46.62
Grid W Column	0.0	-10.23	46.97

WIND ON A -

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	-53.63	-53.86
Grid W Column	0.0	-17.44	8.95

WIND ON W +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	28.27	40.82
Grid W Column	0.0	60.37	-69.14

WIND ON W -

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	16.38	8.98
Grid W Column	0.0	54.16	-51.68

WIND ON 1 OR 29 +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	23.51	40.61
Grid W Column	0.0	-24.89	41.44

Snow Drift

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	2.16	5.12
Grid W Column	0.0	-2.16	5.20

REFERENCE: Hit Frame - Gridline 27

Design Code: BS5950

Foundation Loads

Self weight

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	2.68	30.95
Grid F Column	-0.6	-0.41	66.66
Grid L Column	0.5	0.08	63.60
Grid R Column	0.4	0.29	65.58
Grid W Column	0.0	-2.63	30.88

Frame Dead Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	5.28	23.72
Grid F Column	-0.2	-0.58	153.29
Grid L Column	0.6	0.07	149.28
Grid R Column	0.5	0.54	153.11
Grid W Column	0.0	-5.31	23.83

Frame Service Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	7.30	32.78
Grid F Column	-0.3	-0.81	165.31
Grid L Column	0.8	0.10	159.75
Grid R Column	0.7	0.75	165.06
Grid W Column	0.0	-7.34	32.93

Frame Imposed Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	17.52	78.68
Grid F Column	-0.7	-1.95	396.76
Grid L Column	1.9	0.25	383.41
Grid R Column	1.6	1.79	396.15
Grid W Column	0.0	-17.61	79.03

WIND ON A +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	-55.04	-55.67
Grid F Column	-80.2	-3.83	108.29
Grid L Column	-149.7	-18.77	186.87
Grid R Column	-136.1	-14.94	173.74
Grid W Column	0.0	-24.36	44.54

Snow Uniform

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	11.57	52.05
Grid F Column	-0.5	-1.29	229.65
Grid L Column	1.2	0.16	215.01
Grid R Column	1.1	1.19	229.24
Grid W Column	0.0	-11.63	52.28

WIND ON A -

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	-56.95	-58.42
Grid F Column	-141.5	-12.82	-24.45
Grid L Column	-184.2	-22.44	27.96
Grid R Column	-175.4	-20.42	9.98
Grid W Column	0.0	-17.88	10.86

WIND ON W +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	26.63	42.47
Grid F Column	122.4	13.19	167.84
Grid L Column	139.5	17.80	185.47
Grid R Column	53.8	-0.76	86.15
Grid W Column	0.0	60.85	-71.16

WIND ON W -

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	15.70	9.75
Grid F Column	154.8	18.10	7.42
Grid L Column	162.8	19.94	26.71
Grid R Column	116.8	9.58	-30.04
Grid W Column	0.0	56.79	-55.93

WIND ON 1 OR 29 +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	26.85	45.43
Grid F Column	-3.3	-1.90	113.34
Grid L Column	1.3	0.17	102.34
Grid R Column	3.8	1.79	112.92
Grid W Column	0.0	-26.92	45.67

Snow Drift

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	2.95	6.73
Grid F Column	20.5	3.40	209.25
Grid L Column	0.6	0.08	218.11
Grid R Column	-20.2	-3.43	209.05
Grid W Column	0.0	-3.00	6.85

REFERENCE: Miss Frame - Gridline 28/26

Design Code: BS5950

Foundation Loads

Self weight

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	2.67	30.94
Grid W Column	0.0	-2.67	30.94

Frame Dead Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	5.31	23.82
Grid W Column	0.0	-5.31	23.82

Frame Service Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	7.34	32.92
Grid W Column	0.0	-7.34	32.92

Frame Imposed Load

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	17.62	79.00
Grid W Column	0.0	-17.62	79.00

WIND ON A +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	-59.38	-60.15
Grid W Column	0.0	-26.98	45.42

Snow Uniform

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	11.64	52.26
Grid W Column	0.0	-11.64	52.26

WIND ON A -

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	-59.51	-59.81
Grid W Column	0.0	-19.40	10.12

WIND ON W +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	30.10	44.39
Grid W Column	0.0	66.39	-77.49

WIND ON W -

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	17.41	9.32
Grid W Column	0.0	59.68	-58.07

WIND ON 1 OR 29 +

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	27.02	45.85
Grid W Column	0.0	-27.02	45.85

Snow Drift

Span	M [kNm]	F [kN]	N [kN]
Grid A Column	0.0	2.38	5.56
Grid W Column	0.0	-2.38	5.56

Portal Bases in Braced Bays

A number of the portal frame columns form part of the bracing system for wind loads applied perpendicular to the span of the portal frames (Wind 0 and Wind 180). The foundation reactions relating to these bracing forces are provided below. Note, these loads REPLACE any loadings for the general cases above (Wind on 1 OR 29).
All loads are unfactored.

Support	Loadcase	F_{vert} [kN]	F_{major} [kN]	F_{minor} [kN]
4/A	35 Wind 0, -Cpe	-227.7	14.9	0.1
4/A	36 Wind 0, +Cpe	-234.5	23.4	0.1
4/A	39 Wind 180, -Cpe	88.7	17.8	-0.1
4/A	40 WInd 180, +Cpe	68.8	17.8	-0.1
6/A	35 Wind 0, -Cpe	-162.7	13.2	213.5
6/A	36 Wind 0, +Cpe	-143.5	22.3	241.3
6/A	39 Wind 180, -Cpe	105.4	18.4	-141.5
6/A	40 WInd 180, +Cpe	111.3	22.6	-124.4
26/A	35 Wind 0, -Cpe	275.5	38.0	380.7
26/A	36 Wind 0, +Cpe	286.5	47.2	338.5
26/A	39 Wind 180, -Cpe	-104.1	7.8	-146.0
26/A	40 WInd 180, +Cpe	-100.1	13.1	-173.3
27/W	35 Wind 0, -Cpe	358.1	30.6	0.0
27/W	36 Wind 0, +Cpe	322.2	33.1	0.0
27/W	39 Wind 180, -Cpe	-165.6	8.4	0.2
27/W	40 WInd 180, +Cpe	-170.7	13.8	0.2
W/16	35 Wind 0, -Cpe	-137.0	11.8	0.1
W/16	36 Wind 0, +Cpe	-99.5	20.7	0.1
W/16	39 Wind 180, -Cpe	76.1	6.4	-0.1
W/16	40 WInd 180, +Cpe	96.4	11.3	-0.1
W/15	35 Wind 0, -Cpe	78.1	-4.4	-88.8
W/15	36 Wind 0, +Cpe	120.8	-17.2	-90.7
W/15	39 Wind 180, -Cpe	-43.9	-3.1	47.4
W/15	40 WInd 180, +Cpe	-20.2	-10.1	46.2
W/14	35 Wind 0, -Cpe	63.0	11.7	-0.8
W/14	36 Wind 0, +Cpe	106.0	20.7	-0.8
W/14	39 Wind 180, -Cpe	-30.0	6.4	0.4
W/14	40 WInd 180, +Cpe	-6.5	11.3	0.4
5/W	35 Wind 0, -Cpe	-207.6	12.5	-1.2
5/W	36 Wind 0, +Cpe	-204.6	21.2	-1.2
5/W	39 Wind 180, -Cpe	97.1	13.8	0.0
5/W	40 WInd 180, +Cpe	79.3	14.0	0.0
4/W	35 Wind 0, -Cpe	-213.3	13.9	-259.2
4/W	36 Wind 0, +Cpe	-212.1	22.4	-304.4
4/W	39 Wind 180, -Cpe	102.8	19.3	163.8
4/W	40 WInd 180, +Cpe	83.0	19.2	139.7

Portal Frame picking up Hub Office

The portal frame at W/15 picks up vertical load from the hub office. The values of the foundation reactions from the hub office are provided below. Note, these loads are in ADDITION to any loads for the general case provided above (e.g. the Roof Dead load provided below is just the effect from the Hub Office)

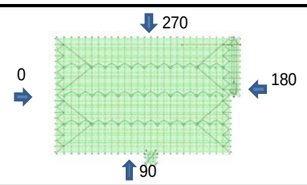
All loads are unfactored.

Support	Loadcase	F_{vert} [kN]
W/15	27 Self Weight	9
W/15	28 Roof Dead	3
W/15	29 Roof Service	4
W/15	30 Roof Imposed	10
W/15	31 Uniform Snow	6
W/15	32 Office Dead	53
W/15	33 Office Service	20
W/15	34 Office Imposed	81

Notes

All Loadcases are Unfactored
Refer to Column Map for Beam Locations
P03

Portal Columns are not included - See Design Sheets 21009-CEL-XX-XX-CA-X-0701 for those



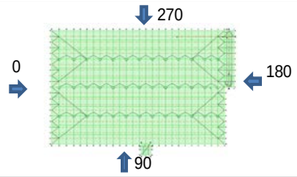
Column Ref	Grid Location		Axial Force (kN)																Major Axis Shear (kN)																Minor Axis Shear (kN)															
			Self Weight	Roof Dead	Roof Service	Roof Imposed	Uniform Snow	Office Dead	Office Service	Office Imposed	Wind 0, -Cpe	Wind 0, +Cpe	Wind 90, -Cpe	Wind 90, +Cpe	Wind 180, -Cpe	Wind 180, +Cpe	Wind 270, -Cpe	Wind 270, +Cpe	Self Weight	Roof Dead	Roof Service	Roof Imposed	Uniform Snow	Office Dead	Office Service	Office Imposed	Wind 0, -Cpe	Wind 0, +Cpe	Wind 90, -Cpe	Wind 90, +Cpe	Wind 180, -Cpe	Wind 180, +Cpe	Wind 270, -Cpe	Wind 270, +Cpe	Self Weight	Roof Dead	Roof Service	Roof Imposed	Uniform Snow	Office Dead	Office Service	Office Imposed	Wind 0, -Cpe	Wind 0, +Cpe	Wind 90, -Cpe	Wind 90, +Cpe	Wind 180, -Cpe	Wind 180, +Cpe	Wind 270, -Cpe	Wind 270, +Cpe
1/A	1	A	17	2	3	6	4	89	29	152	-4	-4		3	-7	-7	-13	-13										1	1	-2	-2	5	5									-2	-2	-1	-1	-2	-2	2	3
1/B1	1	B1	24	3	5	11	7	164	53	280	-7	-7		6	-13	-13	-11	-11									1	1	2	2	-3	-3	7	7																
1/C	1	C	22	3	4	11	7	157	51	268	-6	-7		6	-12	-12	-6	-6									1	1	2	2	-3	-3	5	5																
1/D	1	D	23	3	5	11	7	164	53	280	-7	-7		6	-13	-13		5									1	1	2	2	-3	-3	5	5																
1/E	1	E	23	3	5	11	7	164	53	280	-7	-7		6	-13	-13		7									1	1	2	2	-3	-3	5	5																
1/F	1	F	22	3	5	11	7	164	53	280	-7	-6	-1	5	-13	-13	-3	4									1	1	3	3	-3	-3	4	4																
1/G	1	G	23	3	5	11	7	164	53	280	-7	-7		6	-13	-13		7									1	1	4	4	-3	-3	3	3																
1/H	1	H	23	3	5	11	7	164	53	280	-7	-7	-1	4	-13	-13	1	7									1	1	4	4	-3	-3	3	3																
1/J	1	J	24	4	5	12	8	181	62	309	-7	-8	-7	-6	-13	-13		7									1	1	4	4	-3	-3	2	2																
1/K	1	K	24	4	5	12	8	125	49	214	-8	-8	-11	-11	-13	-13		7									1	1	6	6	-3	-3	2	2																
1/L	1	L	13	2	3	6	4	36	17	62	-4	-4	-12	-12	-7	-7		3											4	4	-1	-1	1	1									2	2	-2	-2	2	2	1	1
15/54	15	54	11	3	4	11	7	53	19	90	-5	-4	-11	-11	-3	-2		6									2	1	2	1	1		-2	-2									-2	-2			1	1		
15/55	15	55	16	7	10	23	15	112	40	186	-11	-9	-7	-4	-6	-5	2	13								-1	5	5			-3	-3														1	1		-1	-1
15a/56	15a	56	6					38	5	41	70	100	-164	-147	17	34	121	142									3	3	-1	-1			-2	-2														-81	-73		-1	-1
2/A	2	A	25	4	5	12	8	184	60	297	-12	-12		6	-7	-7	-26	-26									-3	-3	-2	-2	-3	-3	5	5																
2/B1	2	B1	24	7	9	23	15	242	80	414	-20	-20		11	-11	-11	-23	-23															1	1																
2/C	2	C	30	6	9	21	14	314	102	536	-18	-18		11	-11	-11	-15	-13															1	1																
2/D	2	D	30	7	9	22	15	328	107	561	-19	-19		11	-11	-11	-3	9															1	1																
2/E	2	E	30	7	9	23	15	328	107	561	-20	-20		11	-11	-11	-1	13															1	1																
2/F	2	F	30	7	9	23	15	328	107	561	-25	-25	-1	11	-11	-11		13															1	1																
2/G	2	G	30	7	9	23	15	328	107	561	-20	-20		11	-11	-11	-1	13																																	
2/H	2	H	30	7	9	22	15	328	107	561	-19	-19	-2	8	-11	-11	-1	13																																	
29/A	29	A	25	3	4	9	6				-291	-261	44	80	101	123	23	56									-36	-36	-9	-9	-5	-5	30	30									-21	-21	8	8	2	2	31	31
29/B	29	B	22	5	7	18	12				-202	-187	85	127	68	104	-148	-69									44	44	-16	-16	-4	-4	-57	-57																
29/C	29	C	26	5	7	18	12				-43	-41	-1	11	4	10	-6	-8									46	46	-17	-17	-4	-4	-38	-38																
29/D	29	D	25	5	7	18	12				-45	-44	-1	12	5	12	-4	1									46	46	-17	-17	-4	-4	-37	-37																
29/E	29	E	25	5	7	18	12				108	96	-78	-94	-56	-76	117	57									44	44	-16	-16	-4	-4	-36	-36									144	132	-75	-103	-58	-84	114	44
29/F	29	F	47	25	34	83	54				-63	-71	5	30	-9	7	-4	31									43	43	-15	-15	-4	-4	-34	-34																
29/G	29	G	23	5	7	18	12				-41	-41	-1	12	3	10	-1	12									44	44	-16	-16	-4	-4	-30	-30																
29/H	29	H	23	5	7	18	12				-51	-50		16	6	15		16									46	46	-17	-17	-4	-4	-19	-19																
29/J	29	J	25	5	7	18	12				-51	-50		17	7	15	2	19									46	46	-17	-17	-4	-4	-19	-19																
29/K	29	K	21	5	7	18	12				-42	-42		14	4	11	1	16									44	44	-16	-16	-4	-4	-18	-18																
29/L	29	L	49	23	32	78	51				-40	-49	3	25	-22	-9	-1	25									43	43	-15	-15	-4	-4	-18	-18																
29/M	29	M	21	5	7	18	12				-43	-42		12	5	12		15									44	44	-16	-16	-4	-4	-18	-18																
29/N	29	N	25	5	7	18	12				-52	-51	-1	14	8	17		19									46	46	-17	-17	-4	-4	-19	-19																
29/P	29	P	23	5	7	18	12				-52	-51	-2	12	8	17	-1	18									46	46	-17	-17	-4	-4	-19	-19																
29/Q	29	Q	23	5	7	18	12				-42	-41	-3	9	4	11	-2	14									44	44	-26	-26	-4	-4	-18	-18																
29/R	29	R	47	25	34	83	54				-59	-66	5	35	-16	1	8	38									43	43	-30	-30	-4	-4	-18	-18																
29/S	29	S	25	5	7	18	12				107	95	93	41	-55	-75	-115	-134									44	44	-31	-31	-4	-4	-18	-18									-145	-133	-93	-31	58	84	111	143
29/T	29	T	24	5	7	18	12				-46	-45	-6	-1	7	13	-2	13									46	46	-32	-32	-4	-4	-19	-19																
29/U	29	U	26	5	7	18	12				-44	-43	-8	-9	6	12	-2	11									46	46	-33	-33	-4	-4	-19	-19																
29/V	29	V	22	5	7	18	12				-203	-188	-122	-53	69	105	125	173									44	44	-49	-49	-4	-4	-18	-18																
29/W	29	W	27	3	4	9	6				-403	-357	-2	43	160	191	85	144									36	36	-24	-24	5	5	12	12									-386	-341	41	84	156	183	91	143
3/A	3	A	39	4	6	15	10	114	35	135	368	437	38	109	-239	-207	-50	7									-3	-3	-1	-1	-4	-4	6	6									-108	-125	-60	-76	125	118	-117	-130
3/B1	3	B1	26	8	11	27	18	128	18	131	-14	-3	-1	16	-24	-23	-36	-34															1	1																
3/C	3	C	28	8	11	26	17	157	51	268	-6	7	-1	17	-26	-24	-30	-25																																	
3/D	3	D	27	8	11	27	18	164	53	280	-6	9	-1	19	-28	-26	-22	-7																																	
3/E	3	E	29	8	11	27	18	164	53	280	-14	-1	-1	17	-25	-24	-9	11																																	
3/F	3	F	53	25	35	83	55	164	53	280	-64	-49	2	22	-31	-36	37	60													-1	-1	1	1																
3/G	3	G	28	8	11	27	18	164	53	280	-14		-1	18	-25	-25	-9	12																																	
3/H	3	H	27	8	11	27	18	164	53	280	-5	13	-1	21	-29	-28	-14	11																																	
3/J	3	J	28	8	11	26	17	153	83	261	-3	15	-6	12	-29	-28	-13	13																																	
3/K	3	K	39	8	11	26	17	192	69	220	-256	-235	-447	-431	393	390	-296	-271							-1	-1	101	99	277	276	-1	-1	181	180						-1											
3/L	3	L	56	22	31	73	48	81	38	105	67	130	254	260	-84	-80	-375	-250											1	1	-1	-1	1	1									1	1	-2	-2	1	1	1	1
3/M	3	M	26	5	7	16	10				-119	-151	-241	-227	27	19	367	288									7	7	16	16	-25	-25	18	18									-57	-75	-176	-171	13	9	253	210
3/N	3	N	22	5	7	16	10				9	19	-22	-1	-13	-13	29	31									7	7	17	17	-25	-25	19	19																
3/P	3	P	19	5	7	16	10				17	32	-2	12	-28	-27	-3	15									7	7	17	17	-25	-25	19	19																

Foundation Loads

Notes

All Loadcases are Unfactored
Refer to Column Map for Beam Locations
P03

Portal Columns are not included - See Design Sheets 21009-CEL-XX-XX-CA-X-0701 for those



Axial Force (kN)

Column Ref	Grid Location		Self Weight	Roof Dead	Roof Service	Roof Imposed	Uniform Snow	Office Dead	Office Service	Office Imposed	Wind 0, -Cpe	Wind 0, +Cpe	Wind 90, -Cpe	Wind 90, +Cpe	Wind 180, -Cpe	Wind 180, +Cpe	Wind 270, -Cpe	Wind 270, +Cpe
3/Q	3	Q	20	5	7	16	10				8	21	-3	8	-22	-21	-3	12
3/R	3	R	39	22	30	72	47				-33	-13	5	26	-28	-33	16	36
3/S	3	S	22	5	7	16	10				-48	-57	112	89	9	5	-127	-118
3/T	3	T	22	5	7	16	10				15	28	-4	2	-26	-25	-5	11
3/U	3	U	24	5	7	16	10				15	27	-6	-5	-25	-24	-5	9
3/V	3	V	20	5	7	16	10				70	103	-141	-104	-54	-49	134	151
3/W	3	W	25	2	3	8	5				408	484	-9	53	-259	-221	67	151
54/14a	54	14a	9	2	2	5	3	25	9	44	13	15	-7	-7	-9	-9		3
54/15a	54	15a	9	2	2	5	3	25	9	43	-19	-18	-5	-5	6	7	-1	2
55/14a	55	14a	12	3	4	10	6	48	17	83	23	42	-84	-75	7	16	58	73
55/15a	55	15a	9	3	4	10	6	38	14	64	-18	-18	-3	-3	6	7	-3	2
2/J	2	J	33	7	9	22	15	322	152	550	-20	-19	-13	-12	-11	-11	-1	13
2/K	2	K	41	7	9	23	15	330	154	469	224	217	417	415	-429	-426	288	299
2/L	2	L	26	3	5	11	7	137	81	207	-11	-11	-22	-22	-6	-6		6
B1/AB	B1	AB	16					203	40	263								
W/14a	W	14a	10	2	2	5	4	25	9	43	-6	-19	78	72	-26	-34	-59	-66
W/15a	W	15a	9	2	2	6	4	20	2	13	-85	-115	162	147	-12	-27	-120	-138

Major Axis Shear (kN)

Column Ref	Grid Location		Self Weight	Roof Dead	Roof Service	Roof Imposed	Uniform Snow	Office Dead	Office Service	Office Imposed	Wind 0, -Cpe	Wind 0, +Cpe	Wind 90, -Cpe	Wind 90, +Cpe	Wind 180, -Cpe	Wind 180, +Cpe	Wind 270, -Cpe	Wind 270, +Cpe
3/Q	3	Q									7	7	26	26	-25	-25	18	18
3/R	3	R									6	6	30	30	-24	-24	18	18
3/S	3	S									7	7	31	31	-25	-25	18	18
3/T	3	T									7	7	32	32	-25	-25	19	19
3/U	3	U									7	7	33	33	-25	-25	19	19
3/V	3	V									7	7	49	49	-25	-25	18	18
3/W	3	W									8	8	-21	-21	18	18	11	11
54/14a	54	14a						1		2	11	11			-6	-6	2	2
54/15a	54	15a						-1		-2	12	12	-3	-3	-6	-5		1
55/14a	55	14a						1		2	5	5	2	2	-4	-4	2	2
55/15a	55	15a						-1		-2	7	7	-1	-1	-3	-3	-2	-2
2/J	2	J																
2/K	2	K											1	1	-234	-233	1	1
2/L	2	L									3	3	-4	-4	3	3	2	2
B1/AB	B1	AB																
W/14a	W	14a						1		2	11	11	2	2	-7	-7	1	1
W/15a	W	15a									11	11	1	1	-7	-7	-1	-1

Minor Axis Shear (kN)

Column Ref	Grid Location		Self Weight	Roof Dead	Roof Service	Roof Imposed	Uniform Snow	Office Dead	Office Service	Office Imposed	Wind 0, -Cpe	Wind 0, +Cpe	Wind 90, -Cpe	Wind 90, +Cpe	Wind 180, -Cpe	Wind 180, +Cpe	Wind 270, -Cpe	Wind 270, +Cpe
3/Q	3	Q																
3/R	3	R																
3/S	3	S									55	75	-111	-79	-30	-25	121	125
3/T	3	T																
3/U	3	U																
3/V	3	V																
3/W	3	W											-1	-1	1	1		
54/14a	54	14a									1				1	1		
54/15a	54	15a									1	1						
55/14a	55	14a									17	33	-88	-79	20	29	65	76
55/15a	55	15a										-1	1	1			-1	-1
2/J	2	J																
2/K	2	K						-2		-1								
2/L	2	L																
B1/AB	B1	AB																
W/14a	W	14a															-1	-1
W/15a	W	15a									35	50			8	17	60	70

Fire base moments to Grid 29

Grid	M_{maj} [kNm]
Grid 29/A-G	83.8
Grid 29/H-J	90
Grid 29/K-M	83.8
Grid 29/N-P	90
Grid 29/Q-W	83.8

Section 07
Foundation Loads
Temporary condition

Rev	Date	Description
P01	19/07/21	Initial Issue
P02	08/08/21	Overturning moments updated, temporary brace load included

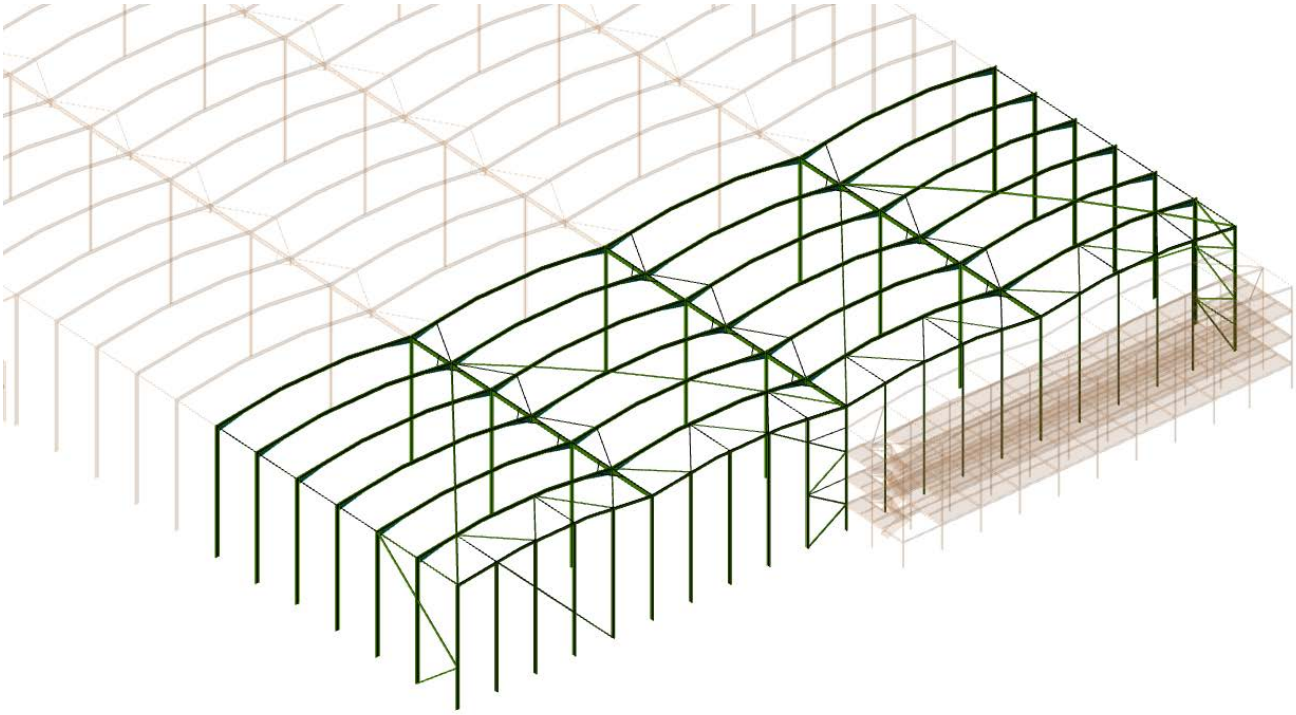
Contents

Erection Sequence 2
Temporary erection loads 3
Temporary Bracing Loads 4

Erection Sequence

Erection will commence on Gridline 3. Erection will then proceed from Grid 3 towards the gable end at Grid 29 As the portal valley columns on Grid 5 are erected, they will be tied in with the valley beam at the head. In addition to this, there will be temporary bracing installed on Grid L from the Gable Column on 3 to a base on 4

It has been considered that the section of the building from Grid 3 to 9 will form the stable “Hot Box” that the rest of the building takes temporary stability from until the full roof bracing system is installed from 3 to 8. Therefore this stability box is required to be designed for “Transient Case” wind loading to ensure the columns are stable prior to the bracing system being completed.



“Hot Box”, Grids 3 to 9

Temporary erection loads

The valley columns within the stability box area are required to be designed for an overturning moment from the "Transient Condition" wind load. In addtion to this the erection sequence requires that a number of gable and portal columns be erected before being tied in, to complete elements that will then give local stability to the structure (and therefore are required to resist the Transient Condition loads). These columns are identified in the table below.

As determined from BCSA Guide to Steel Erection in Windy Conditions (BCSA Publication No 39/05) the Site Wind Speed, V_s should be taken as a minimum of 18m/s when calculating the overturning moments to these columns.

Therefore using a S_b factor of 1.768, the effective wind speed, V_e = 31.8m/s

Therefore, q_s for the transient condition = $0.613 \times 31.8^2 = 0.621 kN/m^2$

Hot Box columns Grid 3-9

Transient Condition

q_s	0.621
C_p	2

Column	Section	Depth [mm]	Width [mm]	Length [m]	F_{major} [kN]	F_{minor} [kN]	M_{major} [kNm]	M_{minor} [kNm]
Valley Column	356x368x177	368.2	372.6	19.5	9.0	8.9	88.0	86.9
Portal Column 5/A, 5/W	610x229x101	602.6	227.60	19.6	5.5	14.7	54.4	144.1
Gable Column 3/W, 3/R, 3/L	533x210x82	528.3	208.80	20.8	5.4	13.6	56.1	141.9
Gable Column 3/F	254x254x73	254.1	254.60	19.5	6.2	6.2	60.1	60.0
Gable Column 3/A	457x191x67	453.4	189.90	19.6	4.6	11.0	45.3	108.2

All other columns are assumed to be tied back to a permanent bracing (or temporary bracing) system within the same working shift and can be considered as Working Condition to BSCA Publication No 39/05. They will not be left overnight unless specifically noted and erection will not proceed during windy conditions.

Therefore, the wind load for free standing columns can be assumed to be 0.200 kN/m^2

Note, any columns less than 10m tall are considered to not have significant temporary stability loads and have not been reported.

All other columns in "Working Condition"

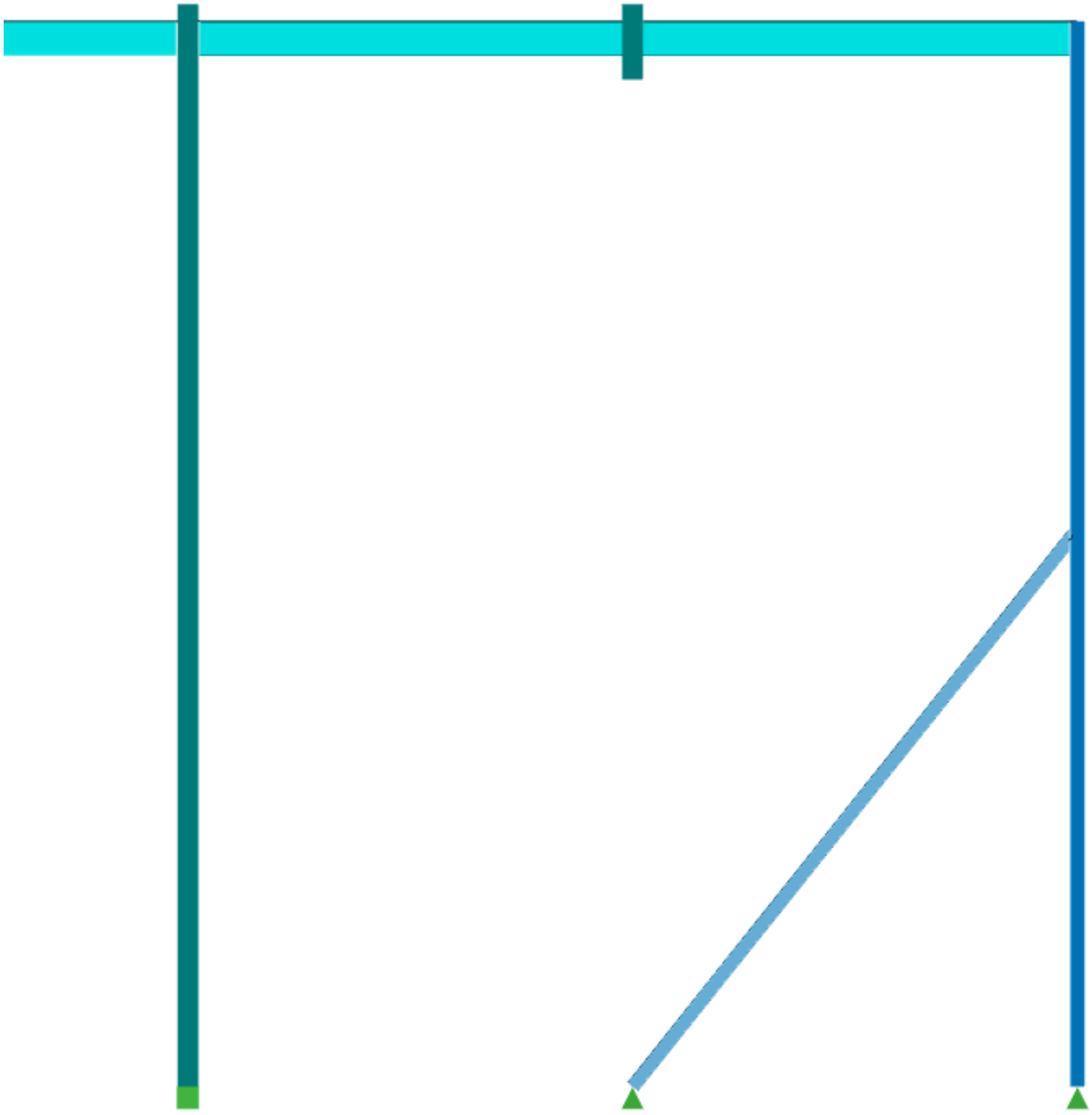
Working Condition

q_s	0.2
C_p	2

Column	Section	Depth [mm]	Width [mm]	Length [m]	F_{major} [kN]	F_{minor} [kN]	M_{major} [kNm]	M_{minor} [kNm]
Valley Column	356x368x177	368.2	372.6	19.5	2.9	2.9	28.3	28.0
Portal Column	610x229x101	602.6	227.60	19.6	1.8	4.7	17.5	46.4
Gable Column 29	533x210x92	533.1	209.30	20.80	1.7	4.4	18.1	46.1
Gable Column 3	533x210x82	528.3	208.80	20.8	1.7	4.4	18.1	45.7
Gable Column 3	254x254x73	254.1	254.60	19.5	2.0	2.0	19.4	19.3
Gable Column 3	203x203x46	203.2	203.60	20.8	1.7	1.7	17.5	17.5

Temporary Bracing Loads

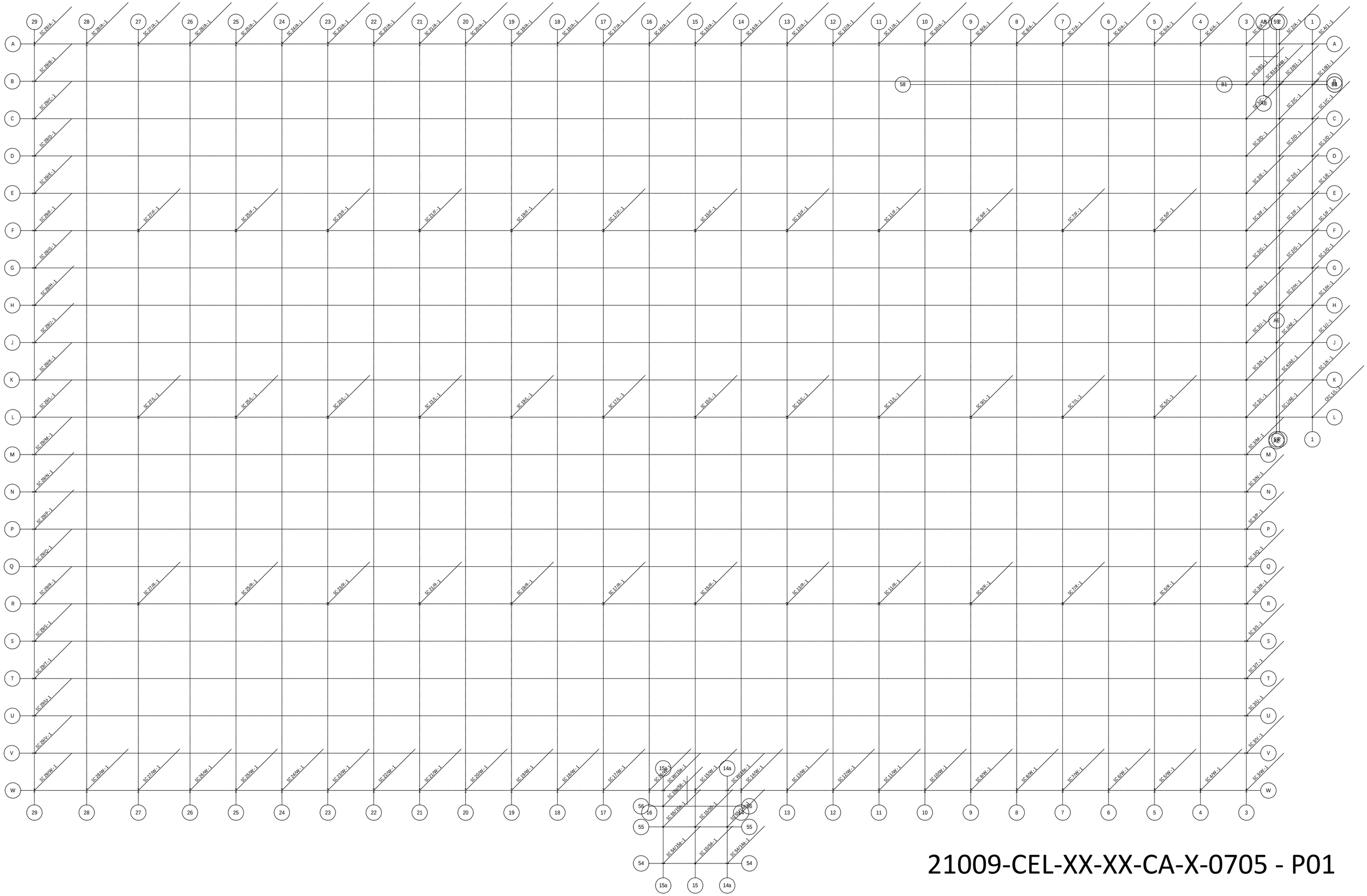
To ensure the “Hot Box” frame is stable, a temporary brace is required from the gable column at 3/L to a new base on 4/L. This brace can be removed once the hot box area has been fully completed.



The base reactions in the temporary state for this brace can be found below.

Base @ 4/L	Axial +/- [kN]	Shear +/- [kN]
Temporary Wind	60	48

Column Key for Foundation Loads



21009-CEL-XX-XX-CA-X-0705 - P01

Key for foundation loads - Note, this is not a coordinated GA and should not be taken as such

Section 08 – Gable Posts

REV	Date	Notes
C01		Initial Issue

Contents

Gable posts Summary 2
Loading 3
Axial loads 3
Wind Suction 3
Wind Pressure 3
Posts on Grid 3 3
Posts on Grid 29 3
Design 4
Grid 3 (Non-Valley) – Zone A/B 4
Grid 3 (Non-Valley) – Zone B 6
Grid 3 (Valley) 8
Grid 29 (Non-Valley) – Zone A/B 10
Grid 29 (Non-Valley) – Zone B 12
Grid 29 (Valley) – Zone B 14

Gable posts Summary

Grid		Section	Stays
3	M	533x210x82UB S355	Alternate Rails
3	N	533x210x82UB S355	Alternate Rails
3	P	533x210x82UB S355	Alternate Rails
3	Q	533x210x82UB S355	Alternate Rails
3	R	533x210x82UB S355	Alternate Rails
3	S	533x210x82UB S355	Alternate Rails
3	T	533x210x82UB S355	Alternate Rails
3	U	533x210x82UB S355	Alternate Rails
3	V	533x210x82UB S355	Alternate Rails
3	W	533x210x82UB S355	Alternate Rails
29	A	533x210x92UB S355	Alternate Rails
29	B	533x210x92UB S355	Alternate Rails
29	C	533x210x92UB S355	Alternate Rails
29	D	533x210x92UB S355	Alternate Rails
29	E	533x210x92UB S355	Alternate Rails
29	F	533x210x92UB S355	Alternate Rails
29	G	533x210x92UB S355	Alternate Rails
29	H	533x210x92UB S355	Alternate Rails
29	J	533x210x92UB S355	Alternate Rails
29	K	533x210x92UB S355	Alternate Rails
29	L	533x210x92UB S355	Alternate Rails
29	M	533x210x92UB S355	Alternate Rails
29	N	533x210x92UB S355	Alternate Rails
29	P	533x210x92UB S355	Alternate Rails
29	Q	533x210x92UB S355	Alternate Rails
29	R	533x210x92UB S355	Alternate Rails
29	S	533x210x92UB S355	Alternate Rails
29	T	533x210x92UB S355	Alternate Rails
29	U	533x210x92UB S355	Alternate Rails
29	V	533x210x92UB S355	Alternate Rails
29	W	533x210x92UB S355	Alternate Rails

Notes

The corner posts may change size to suit connection details at the roof level. TBC after final setting out done

Any columns supporting office floors will be a different section. See other details

Loading

Loading generally from section 02.
The axial loads applied to the top of the column are taken from the main 3D model

Axial loads

These have been extracted from the main 3D TSD model.

For the wind load cases, the maximum “down” value is reported as this give a worse case check.

Wind Suction

For posts on the Zone A/B interface (grid Aa and Ed) the critical wind direction for gridline 3 is W90 (q = 0.776kN/m^2) and W270 (q = 0.889kN/m^2) for gridline 29

The length of zone A = 8.024m,

$$C_{pe} = (-1.30 \times 8.024 + -0.80 \times 4.976) / 13 = -1.109$$

Wind Pressure

Posts on Grid 3

Wind pressure = 0.588 kN/m^2

Posts on Grid 29

Wind pressure = 1.074 kN/m^2

Design

Grid 3 (Non-Valley) – Zone A/B

Gable Post Design to BS5950 Pt 1 - 2000

Ref Gridline 3 - Non Valley

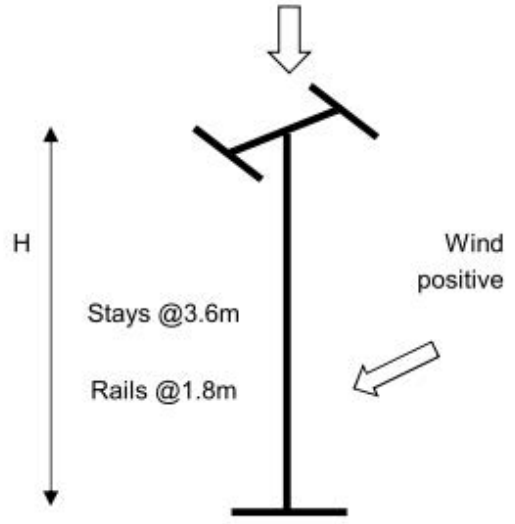
Loads from roof

Dead	13.40 kN
Service	10.50 kN
Imposed	25.10 kN
Gable Wind	-24.60 kN
Side Wind	27.70 kN

Post Height	19.94 m
Centres	6.50 m
Stays	3.60 m
Rails	1.80 m

Is Load Applied to Flange? No

Lex=	1.00	Lx=	19.94 m
Ley=	1.00	Ly=	1.80 m Gable wind
Ley=	1.00	Ly=	3.60 m Side wind



SLS base stiffness =20%

Wind loads

	Gable Wind	Side Wind	
q_s	0.588	0.776	kN/m2
C_{pe}	0.60	-1.11	
a_e	20.97	20.97	m
C_{ae}	0.90	0.90	
C_{pi}	-0.30	-0.30	
C_{ai}	0.62	0.62	
UDL	2.76	-4.07	kN/m unf

Δ Limit=	h/200	=99.69 mm
Cladding Load=	0.13 kN/m2	
Cladding Height =	17.20 m	

Try : 533 x 210 x 82 Kg/m UB

ref	52
grade	355
section	UB

SUMMARY OUTPUT

Load Factors

	Dead	Service	Imposed	GW	SW
Check 2	1.4	1.4	1.6	N/A	N/A
Check 3	1.2	1.2	1.2	1.2	N/A
Check 4	1.2	1.2	1.2	N/A	1.2
Check 5	1.0	N/A	N/A	1.4	N/A
Check 6	1.0	N/A	N/A	N/A	1.4

Provide 533 x 210 x 82 Kg/m UB S355

SECTION ADEQUATE

Critical Check 1 with Unity Factor of 0.8

FULL CALCULATIONS

1. Deflection

Critical UDL from Side wind UDL =		4.07	kN/m unf	
Inertia		47500	cm4	
Δ		79.84	mm	20 % base stiffness for deflection only
Δ Limit=	h/200	99.69	mm	
		0.80	PASS	

2. D+S+I

Fc	116	kN ult	**Pcx**	1989.18 kN
Mx	0.0	kNm ult	**Pcy**	2144.43 kN
Lex	19.937	m	**pyZx**	639.00 kNm
Ley	3.6	m	**Mb**	471.80 kNm
a. $F_c/P_c + m_xM_x/p_yZ_x$	0.06	PASS		
b. $F_c/P_{cy} + m_{LT}M_{LT}/M_b$	0.05	PASS		

3. D+S+I+GW

Fc	66	kN ult	**Pcx**	1989.18 kN
Mx	164.5	kNm ult	**Pcy**	3317.51 kN
Lex	19.937	m	**pyZx**	639.00 kNm
Ley	1.8	m	**Mb**	701.30 kNm
a. Fc/Pc + mxMx/pyZx	0.29	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.25	PASS		

4. D+S+I+SW

Fc	129	kN ult	**Pcx**	1989.18 kN
Mx	242.9	kNm ult	**Pcy**	2144.43 kN
Lex	19.937	m	**pyZx**	639.00 kNm
Ley	3.6	m	**Mb**	471.80 kNm
a. Fc/Pc + mxMx/pyZx	0.44	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.57	PASS		

5. D+GW

Fc	10	kN ult	**Pcx**	1989.18 kN
Mx	191.9	kNm ult	**Pcy**	3317.51 kN
Lex	19.937	m	**pyZx**	639.00 kNm
Ley	1.8	m	**Mb**	701.30 kNm
a. Fc/Pc + mxMx/pyZx	0.31	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.28	PASS		

6. D+SW

Fc	83	kN ult	**Pcx**	1989.18 kN
Mx	283.4	kNm ult	**Pcy**	2144.43 kN
Lex	19.937	m	**pyZx**	639.00 kNm
Ley	3.6	m	**Mb**	471.80 kNm
a. Fc/Pc + mxMx/pyZx	0.49	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.64	PASS		

Grid 3 (Non-Valley) – Zone B

Gable Post Design to BS5950 Pt 1 - 2000

Ref Gridline 3 - Non Valley

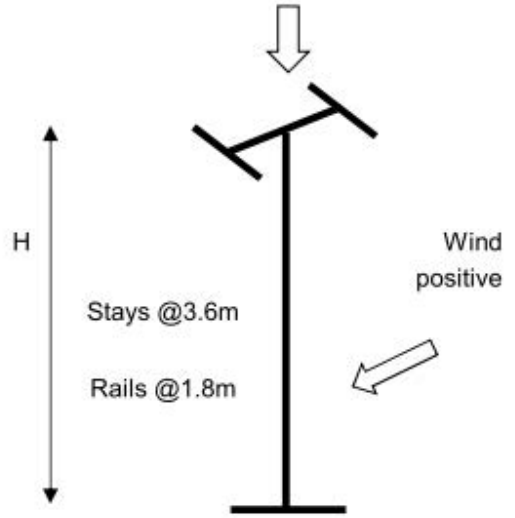
Loads from roof

Dead	13.40 kN
Service	10.50 kN
Imposed	25.10 kN
Gable Wind	-24.60 kN
Side Wind	27.70 kN

Post Height	20.46 m
Centres	6.50 m
Stays	3.60 m
Rails	1.80 m

Is Load Applied to Flange? No

Lex=	1.00	Lx=	20.46 m
Ley=	1.00	Ly=	1.80 m Gable wind
Ley=	1.00	Ly=	3.60 m Side wind



SLS base stiffness =20%

Wind loads

	Gable Wind	Side Wind	
q_s	0.588	0.776	kN/m2
C_{pe}	0.60	-0.80	
a_e	21.46	21.46	m
C_{ae}	0.90	0.90	
C_{pi}	-0.30	-0.30	
C_{ai}	0.62	0.62	
UDL	2.76	-2.68	kN/m unf

Δ Limit=	h/200	=102.28 mm
Cladding Load=	0.13 kN/m2	
Cladding Height =	17.20 m	

Try : 533 x 210 x 82 Kg/m UB

ref	52
grade	355
section	UB

SUMMARY OUTPUT

Load Factors

	Dead	Service	Imposed	GW	SW
Check 2	1.4	1.4	1.6	N/A	N/A
Check 3	1.2	1.2	1.2	1.2	N/A
Check 4	1.2	1.2	1.2	N/A	1.2
Check 5	1.0	N/A	N/A	1.4	N/A
Check 6	1.0	N/A	N/A	N/A	1.4

Provide 533 x 210 x 82 Kg/m UB S355

SECTION ADEQUATE

Critical Check 1 with Unity Factor of 0.59

FULL CALCULATIONS

1. Deflection

Critical UDL from Gable wind UDL =		2.76	kN/m unf	
	Inertia	47500	cm4	
	Δ	60.00	mm	20 % base stiffness for deflection only
Δ Limit=	h/200	102.28	mm	
		0.59	PASS	

2. D+S+I

Fc	117	kN ult	**Pcx**	1911.21 kN
Mx	0.0	kNm ult	**Pcy**	2144.43 kN
Lex	20.455	m	**pyZx**	639.00 kNm
Ley	3.6	m	**Mb**	471.80 kNm
a. $F_c/P_c + m_xM_x/p_yZ_x$	0.06	PASS		
b. $F_c/P_{cy} + m_{LT}M_{LT}/M_b$	0.05	PASS		

3. D+S+I+GW

Fc	67	kN ult	**Pcx**	1911.21 kN
Mx	173.1	kNm ult	**Pcy**	3317.51 kN
Lex	20.455	m	**pyZx**	639.00 kNm
Ley	1.8	m	**Mb**	701.30 kNm
a. Fc/Pc + mxMx/pyZx	0.31	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.27	PASS		

4. D+S+I+SW

Fc	129	kN ult	**Pcx**	1911.21 kN
Mx	168.2	kNm ult	**Pcy**	2144.43 kN
Lex	20.455	m	**pyZx**	639.00 kNm
Ley	3.6	m	**Mb**	471.80 kNm
a. Fc/Pc + mxMx/pyZx	0.33	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.42	PASS		

5. D+GW

Fc	10	kN ult	**Pcx**	1911.21 kN
Mx	202.0	kNm ult	**Pcy**	3317.51 kN
Lex	20.455	m	**pyZx**	639.00 kNm
Ley	1.8	m	**Mb**	701.30 kNm
a. Fc/Pc + mxMx/pyZx	0.32	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.29	PASS		

6. D+SW

Fc	83	kN ult	**Pcx**	1911.21 kN
Mx	196.2	kNm ult	**Pcy**	2144.43 kN
Lex	20.455	m	**pyZx**	639.00 kNm
Ley	3.6	m	**Mb**	471.80 kNm
a. Fc/Pc + mxMx/pyZx	0.35	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.45	PASS		

Caunton Engineering Ltd Moorgreen Industrial Park Nottingham NG16 3QU	Project Calder Park, Wakefield		Job Ref. 21009-CEL-XX-XX-CA-X-	
	Section Section 08 – Gable Posts		Sheet no. 0801.8	
	Calc. by JuH	Date June 2021		Rev. C01

Grid 3 (Valley)

Gable Post Design to BS5950 Pt 1 - 2000

Ref Gridline 3 - Valley

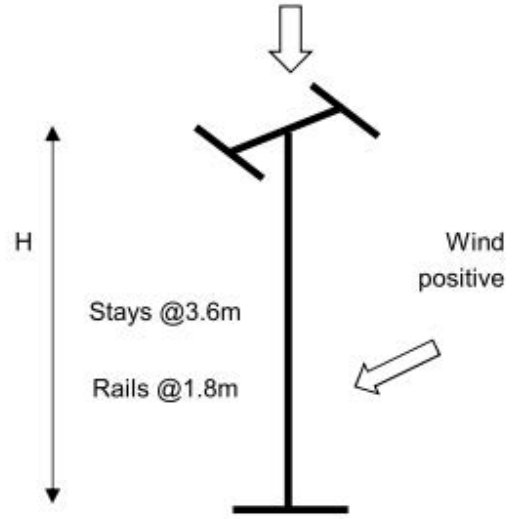
Loads from roof

Dead	48.31 kN
Service	34.47 kN
Imposed	82.62 kN
Gable Wind	-24.60 kN
Side Wind	27.70 kN

Post Height	19.15 m
Centres	6.50 m
Stays	3.60 m
Rails	1.80 m

Is Load Applied to Flange? Yes

Lex=	1.00	Lx=	19.15 m
Ley=	1.00	Ly=	1.80 m Gable wind
Ley=	1.00	Ly=	3.60 m Side wind



SLS base stiffness =20%

Wind loads

	Gable Wind	Side Wind	
q_s	0.588	0.776	kN/m2
C_{pe}	0.60	-0.80	
a_e	20.22	20.22	m
C_{ae}	0.90	0.90	
C_{pi}	-0.30	-0.30	
C_{ai}	0.62	0.62	
UDL	2.76	-2.68	kN/m unf

Δ Limit=	h/200	=95.75 mm
Cladding Load=	0.13 kN/m2	
Cladding Height =	17.20 m	

Try : 533 x 210 x 82 Kg/m UB

ref	52
grade	355
section	UB

SUMMARY OUTPUT

Load Factors

	Dead	Service	Imposed	GW	SW
Check 2	1.4	1.4	1.6	N/A	N/A
Check 3	1.2	1.2	1.2	1.2	N/A
Check 4	1.2	1.2	1.2	N/A	1.2
Check 5	1.0	N/A	N/A	1.4	N/A
Check 6	1.0	N/A	N/A	N/A	1.4

Provide 533 x 210 x 82 Kg/m UB S355

SECTION ADEQUATE

Critical Check 4b with Unity Factor of 0.62

FULL CALCULATIONS

1. Deflection

Critical UDL from Gable wind UDL =		2.76 kN/m unf	
Inertia		47500 cm4	
Δ		45.88 mm	20 % base stiffness for deflection only
Δ Limit=	h/200	95.75 mm	
		0.48 PASS	

2. D+S+I

Fc	290 kN ult		**Pcx**	2113.38 kN
Mx	90.3 kNm ult		**Pcy**	2144.43 kN
Lex	19.15 m		**pyZx**	639.00 kNm
Ley	3.6 m		**Mb**	471.80 kNm
a. $F_c/P_c + m_xM_x/p_yZ_x$	0.28 PASS			
b. $F_c/P_{cy} + m_{LT}M_{LT}/M_b$	0.33 PASS			

3. D+S+I+GW

Fc	205 kN ult		**Pcx**	2113.38 kN
Mx	151.8 kNm ult		**Pcy**	3317.51 kN
Lex	19.15 m		**pyZx**	639.00 kNm
Ley	1.8 m		**Mb**	701.30 kNm
a. Fc/Pc + mxMx/pyZx	0.33 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.28 PASS			

4. D+S+I+SW

Fc	268 kN ult		**Pcx**	2113.38 kN
Mx	231.8 kNm ult		**Pcy**	2144.43 kN
Lex	19.15 m		**pyZx**	639.00 kNm
Ley	3.6 m		**Mb**	471.80 kNm
a. Fc/Pc + mxMx/pyZx	0.49 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.62 PASS			

5. D+GW

Fc	44 kN ult		**Pcx**	2113.38 kN
Mx	177.0 kNm ult		**Pcy**	3317.51 kN
Lex	19.15 m		**pyZx**	639.00 kNm
Ley	1.8 m		**Mb**	701.30 kNm
a. Fc/Pc + mxMx/pyZx	0.30 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.27 PASS			

6. D+SW

Fc	117 kN ult		**Pcx**	2113.38 kN
Mx	203.7 kNm ult		**Pcy**	2144.43 kN
Lex	19.15 m		**pyZx**	639.00 kNm
Ley	3.6 m		**Mb**	471.80 kNm
a. Fc/Pc + mxMx/pyZx	0.37 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.49 PASS			

Grid 29 (Non-Valley) – Zone A/B

Gable Post Design to BS5950 Pt 1 - 2000

Ref Gridline 29 - Non Valley

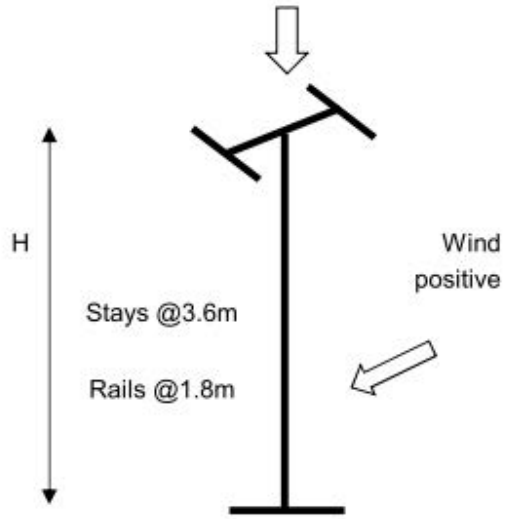
Loads from roof

Dead	13.40 kN
Service	10.50 kN
Imposed	25.10 kN
Gable Wind	-47.70 kN
Side Wind	27.70 kN

Post Height	19.94 m
Centres	6.50 m
Stays	3.60 m
Rails	1.80 m

Is Load Applied to Flange? No

Lex=	1.00	Lx=	19.94 m
Ley=	1.00	Ly=	1.80 m Gable wind
Ley=	1.00	Ly=	3.60 m Side wind



SLS base stiffness =20%

Wind loads

	Gable Wind	Side Wind	
q_s	1.074	0.889	kN/m2
C_{pe}	0.60	-1.11	
a_e	20.97	20.97	m
C_{ae}	0.89	0.89	
C_{pi}	-0.30	-0.30	
C_{ai}	0.62	0.62	
UDL	5.02	-4.64	kN/m unf

Δ Limit=	h/200	=99.69 mm
Cladding Load=	0.13 kN/m2	
Cladding Height =	17.20 m	

Try : 533 x 210 x 92 Kg/m UB

ref	53
grade	355
section	UB

SUMMARY OUTPUT

Load Factors

	Dead	Service	Imposed	GW	SW
Check 2	1.4	1.4	1.6	N/A	N/A
Check 3	1.2	1.2	1.2	1.2	N/A
Check 4	1.2	1.2	1.2	N/A	1.2
Check 5	1.0	N/A	N/A	1.4	N/A
Check 6	1.0	N/A	N/A	N/A	1.4

Provide 533 x 210 x 92 Kg/m UB S355

SECTION ADEQUATE

Critical Check 1 with Unity Factor of 0.85

FULL CALCULATIONS

1. Deflection

Critical UDL from Gable wind UDL =		5.02 kN/m unf	
	Inertia	55200 cm4	
	Δ	84.61 mm	20 % base stiffness for deflection only
Δ Limit=	h/200	99.69 mm	
		0.85 PASS	

2. D+S+I

Fc	119 kN ult		**Pcx**	2280.22 kN
Mx	0.0 kNm ult		**Pcy**	2474.66 kN
Lex	19.937 m		**pyZx**	734.85 kNm
Ley	3.6 m		**Mb**	555.27 kNm
a. $F_c/P_c + m_xM_x/p_yZ_x$	0.05 PASS			
b. $F_c/P_{cy} + m_{LT}M_{LT}/M_b$	0.05 PASS			

3. D+S+I+GW

Fc	41 kN ult		**Pcx**	2280.22 kN
Mx	299.2 kNm ult		**Pcy**	3722.23 kN
Lex	19.937 m		**pyZx**	734.85 kNm
Ley	1.8 m		**Mb**	808.52 kNm
a. Fc/Pc + mxMx/pyZx	0.42 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.38 PASS			

4. D+S+I+SW

Fc	131 kN ult		**Pcx**	2280.22 kN
Mx	276.4 kNm ult		**Pcy**	2474.66 kN
Lex	19.937 m		**pyZx**	734.85 kNm
Ley	3.6 m		**Mb**	555.27 kNm
a. Fc/Pc + mxMx/pyZx	0.43 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.55 PASS			

5. D+GW

Fc	-21 kN ult		**Pcx**	2280.22 kN
Mx	349.0 kNm ult		**Pcy**	3722.23 kN
Lex	19.937 m		**pyZx**	734.85 kNm
Ley	1.8 m		**Mb**	808.52 kNm
a. Ft/Pt + Mx/Mcx	0.42 PASS			
b. Mx/Mb	0.43 PASS			

6. D+SW

Fc	85 kN ult		**Pcx**	2280.22 kN
Mx	322.4 kNm ult		**Pcy**	2474.66 kN
Lex	19.937 m		**pyZx**	734.85 kNm
Ley	3.6 m		**Mb**	555.27 kNm
a. Fc/Pc + mxMx/pyZx	0.48 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.61 PASS			

Caunton Engineering Ltd Moorgreen Industrial Park Nottingham NG16 3QU	Project Calder Park, Wakefield		Job Ref. 21009-CEL-XX-XX-CA-X-	
	Section Section 08 – Gable Posts		Sheet no. 0801.12	
	Calc. by JuH	Date June 2021		Rev. C01

Grid 29 (Non-Valley) – Zone B

Gable Post Design to BS5950 Pt 1 - 2000

Ref Gridline 29 - Non Valley

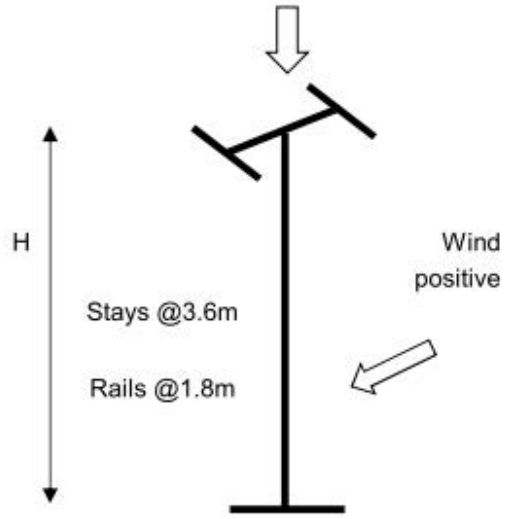
Loads from roof

Dead	13.40 kN
Service	10.50 kN
Imposed	25.10 kN
Gable Wind	-47.70 kN
Side Wind	27.70 kN

Post Height	20.46 m
Centres	6.50 m
Stays	3.60 m
Rails	1.80 m

Is Load Applied to Flange? No

Lex=	1.00 Lx=	20.46 m	
Ley=	1.00 Ly=	1.80 m	Gable wind
Ley=	1.00 Ly=	3.60 m	Side wind



SLS base stiffness =20%

Wind loads

	Gable Wind	Side Wind	
q_s	1.074	0.889	kN/m2
C_{pe}	0.60	-0.80	
a_e	21.46	21.46	m
C_{ae}	0.89	0.89	
C_{pi}	-0.30	-0.30	
C_{ai}	0.62	0.62	
UDL	5.02	-3.05	kN/m unf

Δ Limit=	h/200	=102.28 mm
Cladding Load=	0.13 kN/m2	
Cladding Height =	17.20 m	

Try : 533 x 210 x 92 Kg/m UB

ref	53
grade	355
section	UB

SUMMARY OUTPUT

Load Factors

	Dead	Service	Imposed	GW	SW
Check 2	1.4	1.4	1.6	N/A	N/A
Check 3	1.2	1.2	1.2	1.2	N/A
Check 4	1.2	1.2	1.2	N/A	1.2
Check 5	1.0	N/A	N/A	1.4	N/A
Check 6	1.0	N/A	N/A	N/A	1.4

Provide 533 x 210 x 92 Kg/m UB S355

SECTION ADEQUATE

Critical Check 1 with Unity Factor of 0.92

FULL CALCULATIONS

1. Deflection

Critical UDL from Gable wind UDL =	5.02	kN/m unf	
Inertia	55200	cm4	
Δ	93.92	mm	20 % base stiffness for deflection only
Δ Limit= h/200	102.28	mm	
	0.92	PASS	

2. D+S+I

Fc	120	kN ult	**Pcx**	2192.54 kN
Mx	0.0	kNm ult	**Pcy**	2474.66 kN
Lex	20.455	m	**pyZx**	734.85 kNm
Ley	3.6	m	**Mb**	555.27 kNm
a. $F_c/P_c + m_xM_x/p_yZ_x$	0.05	PASS		
b. $F_c/P_{cy} + m_{LT}M_{LT}/M_b$	0.05	PASS		

3. D+S+I+GW

Fc	41	kN ult	**Pcx**	2192.54 kN
Mx	314.9	kNm ult	**Pcy**	3722.23 kN
Lex	20.455	m	**pyZx**	734.85 kNm
Ley	1.8	m	**Mb**	808.52 kNm
a. Fc/Pc + mxMx/pyZx	0.45	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.40	PASS		

4. D+S+I+SW

Fc	132	kN ult	**Pcx**	2192.54 kN
Mx	191.2	kNm ult	**Pcy**	2474.66 kN
Lex	20.455	m	**pyZx**	734.85 kNm
Ley	3.6	m	**Mb**	555.27 kNm
a. Fc/Pc + mxMx/pyZx	0.32	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.40	PASS		

5. D+GW

Fc	-20	kN ult	**Pcx**	2192.54 kN
Mx	367.4	kNm ult	**Pcy**	3722.23 kN
Lex	20.455	m	**pyZx**	734.85 kNm
Ley	1.8	m	**Mb**	808.52 kNm
a. Ft/Pt + Mx/Mcx	0.44	PASS		
b. Mx/Mb	0.45	PASS		

6. D+SW

Fc	85	kN ult	**Pcx**	2192.54 kN
Mx	223.1	kNm ult	**Pcy**	2474.66 kN
Lex	20.455	m	**pyZx**	734.85 kNm
Ley	3.6	m	**Mb**	555.27 kNm
a. Fc/Pc + mxMx/pyZx	0.34	PASS		
b. Fc/Pcy + mLTMLT/Mb	0.44	PASS		

Grid 29 (Valley) – Zone B

Gable Post Design to BS5950 Pt 1 - 2000

Ref Gridline 29 - Valley

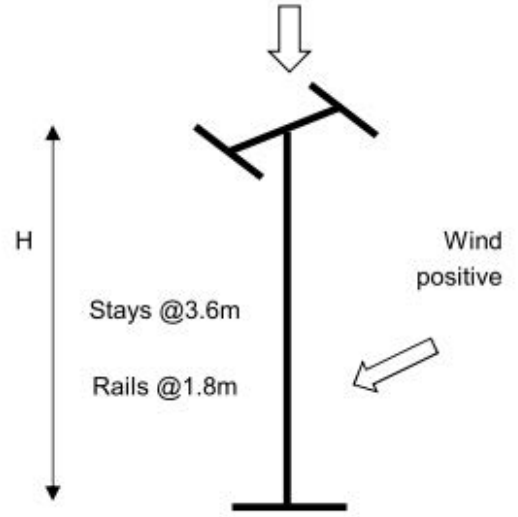
Loads from roof

Dead	56.14 kN
Service	38.16 kN
Imposed	91.49 kN
Gable Wind	-47.70 kN
Side Wind	27.70 kN

Post Height	19.15 m
Centres	6.50 m
Stays	3.60 m
Rails	1.80 m

Is Load Applied to Flange? Yes

Lex=	1.00	Lx=	19.15 m
Ley=	1.00	Ly=	1.80 m Gable wind
Ley=	1.00	Ly=	3.60 m Side wind



SLS base stiffness =20%

Wind loads

	Gable Wind	Side Wind	
q_s	1.074	0.889	kN/m2
C_{pe}	0.60	-0.80	
a_e	20.22	20.22	m
C_{ae}	0.90	0.90	
C_{pi}	-0.30	-0.30	
C_{ai}	0.62	0.62	
UDL	5.04	-3.07	kN/m unf

Δ Limit=	h/200	=95.75 mm
Cladding Load=	0.13 kN/m2	
Cladding Height =	17.20 m	

Try : 533 x 210 x 92 Kg/m UB

ref	53
grade	355
section	UB

SUMMARY OUTPUT

Load Factors

	Dead	Service	Imposed	GW	SW
Check 2	1.4	1.4	1.6	N/A	N/A
Check 3	1.2	1.2	1.2	1.2	N/A
Check 4	1.2	1.2	1.2	N/A	1.2
Check 5	1.0	N/A	N/A	1.4	N/A
Check 6	1.0	N/A	N/A	N/A	1.4

Provide 533 x 210 x 92 Kg/m UB S355

SECTION ADEQUATE

Critical Check 1 with Unity Factor of 0.75

Caunton Engineering Ltd Moorgreen Industrial Park Nottingham NG16 3QU	Project Calder Park, Wakefield		Job Ref. 21009-CEL-XX-XX-CA-X-	
	Section Section 08 – Gable Posts		Sheet no. 0801.15	
	Calc. by JuH	Date June 2021		Rev. C01

FULL CALCULATIONS

1. Deflection

Critical UDL from Gable wind UDL =		5.04 kN/m unf	
Inertia		55200 cm4	
Δ		72.12 mm	20 % base stiffness for deflection only
Δ Limit=	h/200	95.75 mm	
		0.75 PASS	

2. D+S+I

Fc	323 kN ult		**Pcx**	2419.27 kN
Mx	102.0 kNm ult		**Pcy**	2474.66 kN
Lex	19.15 m		**pyZx**	734.85 kNm
Ley	3.6 m		**Mb**	555.27 kNm
a. $F_c/P_c + m_xM_x/p_yZ_x$	0.27 PASS			
b. $F_c/P_{cy} + m_{LT}M_{LT}/M_b$	0.31 PASS			

3. D+S+I+GW

Fc	204 kN ult		**Pcx**	2419.27 kN
Mx	277.2 kNm ult		**Pcy**	3722.23 kN
Lex	19.15 m		**pyZx**	734.85 kNm
Ley	1.8 m		**Mb**	808.52 kNm
a. Fc/Pc + mxMx/pyZx	0.46 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.40 PASS			

4. D+S+I+SW

Fc	294 kN ult		**Pcx**	2419.27 kN
Mx	262.8 kNm ult		**Pcy**	2474.66 kN
Lex	19.15 m		**pyZx**	734.85 kNm
Ley	3.6 m		**Mb**	555.27 kNm
a. Fc/Pc + mxMx/pyZx	0.48 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.59 PASS			

5. D+GW

Fc	21 kN ult		**Pcx**	2419.27 kN
Mx	323.4 kNm ult		**Pcy**	3722.23 kN
Lex	19.15 m		**pyZx**	734.85 kNm
Ley	1.8 m		**Mb**	808.52 kNm
a. Fc/Pc + mxMx/pyZx	0.45 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.41 PASS			

6. D+SW

Fc	127 kN ult		**Pcx**	2419.27 kN
Mx	231.8 kNm ult		**Pcy**	2474.66 kN
Lex	19.15 m		**pyZx**	734.85 kNm
Ley	3.6 m		**Mb**	555.27 kNm
a. Fc/Pc + mxMx/pyZx	0.37 PASS			
b. Fc/Pcy + mLTMLT/Mb	0.47 PASS			

21009 Wakefield, Certificates & Material Test Inspections

MPI - Magnetic Particle Inspection:

- MPI 21009 Lot 02 **Pages: 2**
- MPI 21009 Lot 03 **Pages: 3**
- MPI 21009 Lot 04 **Pages: 4**
- MPI 21009 Lot 20 **Pages: 5**
- MPI 21009 Lot 22 **Pages: 6**
- MPI 21009 Lot 24 **Pages: 7**

DFT – Dry Film Thickness Reports:

- DFT 21009 Lot 05 **Pages: 8 to 9**
- DFT 21009 Lot 11 **Pages: 10 to 11**
- DFT 21009 Lot 14 **Pages: 12 to 13**
- DFT 21009 Lot 44 **Pages: 14 to 15**
- DFT 21009 Lot 53 **Pages: 16 to 17**
- DFT 21009 Lot 56 **Pages: 18 to 19**
- DFT 21009 Lot 58 **Pages: 20 to 21**

Blast Profiles:

- BP 21009 Lot 07 **Pages: 22**
- BP 21009 Lot 12 **Pages: 23**
- BP 21009 Lot 17 **Pages: 24**
- BP 21009 Lot 23 **Pages: 25**

Client / Project Details:- **Winvic Construction Ltd (Northampton Branch)** **Calder park** **Wakefield**	**Contract Number:-** 21009 **Date of Test:-** 2/12/2021 **Report No:- 21009 L2**	
	Lighting reading:- (Min 500 Lux) **Yoke Weight Test Date :-** 2/12/2021	
	Part Identification No. See Below **Drawing No:-** Various	
Location: Caunton Eng. Ltd Moor green	**Material:** Carbon Steel	**Dimensions:** See Drawings
Process/Component: MAGS/Structural Steelwork	**Surface Condition:-** As Welded	**Heat Treatment:-** Not Applicable

MAGNETIC PARTICLE INSPECTION			
Technique:	Magnetic Flow		
Equipment:	Electromagnetic Y-6 SN-JY1-1202/Y-6 SN-JY-7241/J-6-JY1-1879		
Equipment:	Electromagnetic Magaflux /Jay-Pac- SN-JS1-04 26		
Current:	110v AC		
Medium:	Black Ink to BS EN ISO 9934-2 2002 / Neoaqua B.C.W		
Batch No :	B2480	Use By Date:	28/04/2022
Background:	White contrast Paint to BS EN ISO 9934-2:2002.		
Batch No :	A161120	Use By Date:	16/05/22

Specification:-
BS EN ISO 17638:2016 / BS EN ISO 9934-1:2015.

Acceptance Criteria:-
BS EN ISO: 5817 Quality Level C. As in NSSS 7th edition
Caunton Work Procedure – MPI-1/Rev4 – (Where Access Permitting.)

Items Tested		
39 252 252 23 23 23		
Results. **Accept:-** PASS **Reject:-**		**PCN Level 2** **Approved Personnel :-** P.Kirkland.

Comments: No Relevant Indications Were Found At The Time Of Test.10% Minimum M.P.I. Carried Out On These Procedures: CWP-F6. CWP-F8. CWP-10, CWP-15.

Q&E Manager: **(D Haddock)**	**M.P.I. Level 2 Inspector:** PCN PAUL KIRKLAND PCN No. 334125 www.bindt.org/PCN **(P Kirkland):**

MAGNETIC PARTICLE INSPECTION TEST REPORT

Client / Project Details:- **Winvic Construction Ltd (Northampton Branch)** **Calder park** **Wakefield**	**Contract Number:-** 21009 **Date of Test:-** 7/12/2021 **Report No:- 21009 L3**	
	Lighting reading:- (Min 500 Lux) **Yoke Weight Test Date :-** 7/12/2021	
	Part Identification No. See Below **Drawing No:-** Various	
Location: Caunton Eng. Ltd Moor green	**Material:** Carbon Steel	**Dimensions:** See Drawings
Process/Component: MAGS/Structural Steelwork	**Surface Condition:-** As Welded	**Heat Treatment:-** Not Applicable

MAGNETIC PARTICLE INSPECTION			
Technique:	Magnetic Flow		
Equipment:	Electromagnetic Y-6 SN-JY1-1202/Y-6 SN-JY-7241/J-6-JY1-1879		
Equipment:	Electromagnetic Magaflux /Jay-Pac- SN-JS1-04 26		
Current:	110v AC		
Medium:	Black Ink to BS EN ISO 9934-2 2002 / Neoaqua B.C.W		
Batch No :	B2480	Use By Date:	28/04/2022
Background:	White contrast Paint to BS EN ISO 9934-2:2002.		
Batch No :	A161120	Use By Date:	16/05/22

Specification:-
BS EN ISO 17638:2016 / BS EN ISO 9934-1:2015.

Acceptance Criteria:-
BS EN ISO: 5817 Quality Level C. As in NSSS 7th edition
Caunton Work Procedure – MPI-1/Rev4 – (Where Access Permitting.)

Items Tested		
20	35	
26	23	
251	37	
23	12	

Results. **Accept:-** PASS **Reject:-**	**PCN Level 2** **Approved Personnel :-** P.Kirkland.

Comments: No Relevant Indications Were Found At The Time Of Test.10% Minimum M.P.I. Carried Out On These Procedures: CWP-F6. CWP-F8. CWP-10, CWP-15.

Q&E Manager: **(D Haddock)**	**M.P.I. Level 2 Inspector:** **(P Kirkland):** PCN PAUL KIRKLAND PCN No. 334125 www.bindt.org/PCN

MAGNETIC PARTICLE INSPECTION TEST REPORT

Client / Project Details:- **Winvic Construction Ltd (Northampton Branch)** **Calder park** **Wakefield**	**Contract Number:-** 21009 **Date of Test:-** 08/12/2021 **Report No:- 21009 L4**	
	Lighting reading:- (Min 500 Lux) **Yoke Weight Test Date :-** 08/12/2021	
	Part Identification No. See Below **Drawing No:-** Various	
Location: Caunton Eng. Ltd Moor green	**Material:** Carbon Steel	**Dimensions:** See Drawings
Process/Component: MAGS/Structural Steelwork	**Surface Condition:-** As Welded	**Heat Treatment:-** Not Applicable

MAGNETIC PARTICLE INSPECTION			
Technique:	Magnetic Flow		
Equipment:	Electromagnetic Y-6 SN-JY1-1202/Y-6 SN-JY-7241/J-6-JY1-1879		
Equipment:	Electromagnetic Magaflux /Jay-Pac- SN-JS1-04 26		
Current:	110v AC		
Medium:	Black Ink to BS EN ISO 9934-2 2002 / Neoaqua B.C.W		
Batch No :	B2480	Use By Date:	28/04/2022
Background:	White contrast Paint to BS EN ISO 9934-2:2002.		
Batch No :	A161120	Use By Date:	16/05/22

Specification:-
BS EN ISO 17638:2016 / BS EN ISO 9934-1:2015.

Acceptance Criteria:-
BS EN ISO: 5817 Quality Level C. As in NSSS 7th edition
Caunton Work Procedure – MPI-1/Rev4 – (Where Access Permitting.)

Items Tested		
14	67	
14	23	
14	66	

Results. **Accept:-** PASS **Reject:-**	**PCN Level 2** **Approved Personnel :-** P.Kirkland.

Comments: No Relevant Indications Were Found At The Time Of Test.10% Minimum M.P.I. Carried Out On These Procedures: CWP-F6. CWP-F8. CWP-10, CWP-15.

Q&E Manager: **(D Haddock)**	**M.P.I. Level 2 Inspector:** **(P Kirkland):** PCN PAUL KIRKLAND PCN No. 334125 www.bindt.org/PCN

MAGNETIC PARTICLE INSPECTION TEST REPORT

Client / Project Details:- **Winvic Construction Ltd (Northampton Branch)** **Calder park** **Wakefield**	**Contract Number:-** 21009 **Date of Test:-** 14/12/2021 **Report No:- 21009 L20**	
	Lighting reading:- (Min 500 Lux) **Yoke Weight Test Date :-** 14/12/2021	
	Part Identification No. See Below **Drawing No:-** Various	
Location: Caunton Eng. Ltd Moor green	**Material:** Carbon Steel	**Dimensions:** See Drawings
Process/Component: MAGS/Structural Steelwork	**Surface Condition:-** As Welded	**Heat Treatment:-** Not Applicable

MAGNETIC PARTICLE INSPECTION			
Technique:	Magnetic Flow		
Equipment:	Electromagnetic Y-6 SN-JY1-1202/Y-6 SN-JY-7241/J-6-JY1-1879		
Equipment:	Electromagnetic Magaflux /Jay-Pac- SN-JS1-04 26		
Current:	110v AC		
Medium:	Black Ink to BS EN ISO 9934-2 2002 / Neoaqua B.C.W		
Batch No :	B2480	Use By Date:	28/04/2022
Background:	White contrast Paint to BS EN ISO 9934-2:2002.		
Batch No :	A161120	Use By Date:	16/05/22

Specification:-
BS EN ISO 17638:2016 / BS EN ISO 9934-1:2015.

Acceptance Criteria:-
BS EN ISO: 5817 Quality Level C. As in NSSS 7th edition
Caunton Work Procedure – MPI-1/Rev4 – (Where Access Permitting.)

Items Tested		
46 256 246 246		
Results. **Accept:-** PASS **Reject:-**		**PCN Level 2** **Approved Personnel :-** P.Kirkland.

Comments: No Relevant Indications Were Found At The Time Of Test.10% Minimum M.P.I. Carried Out On These Procedures: CWP-F6. CWP-F8. CWP-10, CWP-15.

Q&E Manager: **(D Haddock)**	**M.P.I. Level 2 Inspector:** PCN PAUL KIRKLAND PCN No. 334125 www.bindt.org/PCN **(P Kirkland):**

MAGNETIC PARTICLE INSPECTION TEST REPORT

caunton ENGINEERING

Client / Project Details:- **Winvic Construction Ltd (Northampton Branch)** **Calder park** **Wakefield**	**Contract Number:-** 21009 **Date of Test:-** 14/12/2021 **Report No:- 21009 L22**	
	Lighting reading:- (Min 500 Lux) **Yoke Weight Test Date :-** 14/12/2021	
	Part Identification No. See Below **Drawing No:-** Various	
Location: Caunton Eng. Ltd Moor green	**Material:** Carbon Steel	**Dimensions:** See Drawings
Process/Component: MAGS/Structural Steelwork	**Surface Condition:-** As Welded	**Heat Treatment:-** Not Applicable

MAGNETIC PARTICLE INSPECTION			
Technique:	Magnetic Flow		
Equipment:	Electromagnetic Y-6 SN-JY1-1202/Y-6 SN-JY-7241/J-6-JY1-1879		
Equipment:	Electromagnetic Magaflux /Jay-Pac- SN-JS1-04 26		
Current:	110v AC		
Medium:	Black Ink to BS EN ISO 9934-2 2002 / Neoaqua B.C.W		
Batch No :	B2480	Use By Date:	28/04/2022
Background:	White contrast Paint to BS EN ISO 9934-2:2002.		
Batch No :	A161120	Use By Date:	16/05/22

Specification:-
BS EN ISO 17638:2016 / BS EN ISO 9934-1:2015.

Acceptance Criteria:-
BS EN ISO: 5817 Quality Level C. As in NSSS 7th edition
Caunton Work Procedure – MPI-1/Rev4 – (Where Access Permitting.)

Items Tested		
71 257 257 256 246		
Results. **Accept:-** PASS **Reject:-**		**PCN Level 2** **Approved Personnel :-** P.Kirkland.

Comments: No Relevant Indications Were Found At The Time Of Test.10% Minimum M.P.I. Carried Out On These Procedures: CWP-F6. CWP-F8. CWP-10, CWP-15.

Q&E Manager: **(D Haddock)**	**M.P.I. Level 2 Inspector:** PCN PAUL KIRKLAND PCN No. 334125 www.bindt.org/PCN **(P Kirkland):**

MAGNETIC PARTICLE INSPECTION TEST REPORT

Client / Project Details:- **Winvic Construction Ltd (Northampton Branch)** **Calder park** **Wakefield**	**Contract Number:-** 21009 **Date of Test:-** 15/12/2021 **Report No:- 21009 L24**	
	Lighting reading:- (Min 500 Lux) **Yoke Weight Test Date :-** 15/12/2021	
	Part Identification No. See Below **Drawing No:-** Various	
Location: Caunton Eng. Ltd Moor green	**Material:** Carbon Steel	**Dimensions:** See Drawings
Process/Component: MAGS/Structural Steelwork	**Surface Condition:-** As Welded	**Heat Treatment:-** Not Applicable

MAGNETIC PARTICLE INSPECTION			
Technique:	Magnetic Flow		
Equipment:	Electromagnetic Y-6 SN-JY1-1202/Y-6 SN-JY-7241/J-6-JY1-1879		
Equipment:	Electromagnetic Magaflux /Jay-Pac- SN-JS1-04 26		
Current:	110v AC		
Medium:	Black Ink to BS EN ISO 9934-2 2002 / Neoaqua B.C.W		
Batch No :	B2480	Use By Date:	28/04/2022
Background:	White contrast Paint to BS EN ISO 9934-2:2002.		
Batch No :	A161120	Use By Date:	16/05/22

Specification:-
BS EN ISO 17638:2016 / BS EN ISO 9934-1:2015.

Acceptance Criteria:-
BS EN ISO: 5817 Quality Level C. As in NSSS 7th edition
Caunton Work Procedure – MPI-1/Rev4 – (Where Access Permitting.)

Items Tested **265** **266** **266** **264**		
Results. **Accept:-** PASS **Reject:-**		**PCN Level 2** **Approved Personnel :-** P.Kirkland.

Comments: No Relevant Indications Were Found At The Time Of Test.10% Minimum M.P.I. Carried Out On These Procedures: CWP-F6. CWP-F8. CWP-10, CWP-15.

Q&E Manager: **(D Haddock)**	**M.P.I. Level 2 Inspector:** PCN PAUL KIRKLAND PCN No. 334125 www.bindt.org/PCN **(P Kirkland):**

MAGNETIC PARTICLE INSPECTION TEST REPORT

Inspection Report - Climate

21009\
L5

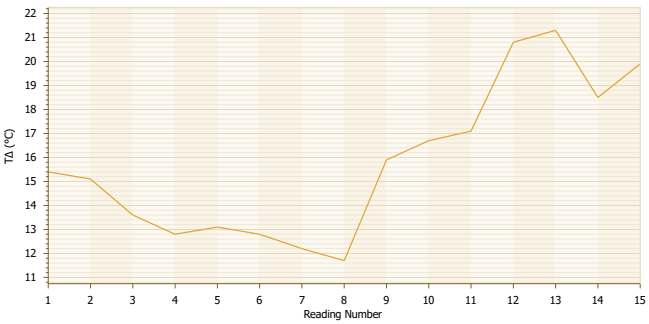
Individuals / Run Chart | **Td**

Project	
Name	21009

Gauge	
Type	Elcometer 319/3
PCB Serial #	UH12028-000
Serial #	UL05117
User ID	

Batch	
Name in Gauge	92
User ID	L5
Created Date	10/12/2021 11:36:36
Updated Date	10/12/2021 11:36:36
First Reading Date	10/12/2021 11:36:47
Last Reading Date	10/12/2021 11:41:57

Individuals / Run Chart | **TΔ**



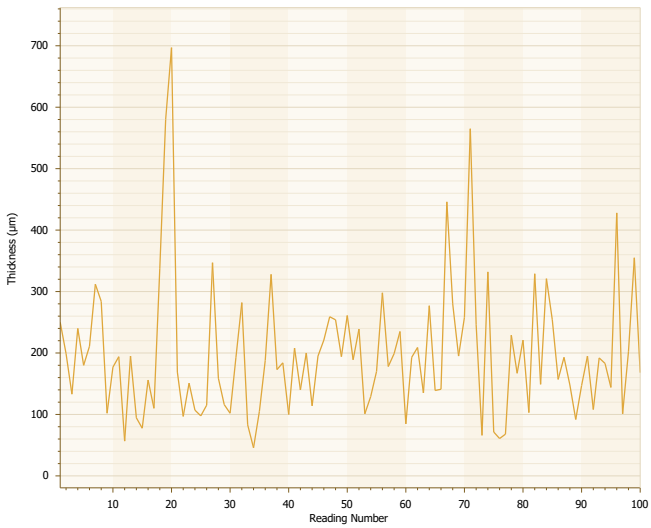
Statistics	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
# Readings	15	15	15	15	15	15	15	15
Mean	37.34 %	18.72 °C	17.67 °C	2.93 °C	15.79 °C	17.67 °C	11.11 °C	4.674 g/kg
Maximum	40.2 %	24.4 °C	19.2 °C	3.3 °C	21.3 °C	19.2 °C	12.0 °C	4.81 g/kg
Minimum	34.4 %	14.4 °C	16.1 °C	2.3 °C	11.7 °C	16.1 °C	10.1 °C	4.46 g/kg
Standard Deviation (σ)	1.77 %	3.44 °C	0.94 °C	0.30 °C	3.19 °C	0.94 °C	0.57 °C	0.097 g/kg
Mean + 3σ	42.64 %	29.04 °C	20.50 °C	3.82 °C	25.37 °C	20.50 °C	12.83 °C	4.964 g/kg
Mean - 3σ	32.04 %	8.39 °C	14.84 °C	2.04 °C	6.20 °C	14.84 °C	9.40 °C	4.384 g/kg
Coefficient of Variation	4.7%	18.4%	5.3%	10.2%	20.2%	5.3%	5.1%	2.1%

Limits	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
Low Limit					3.0 °C			
# Readings Below					0 (0.0%)			

Inspection Report - Dry Film Thickness

21009\
L5

Individuals / Run Chart



Project	
Name	21009

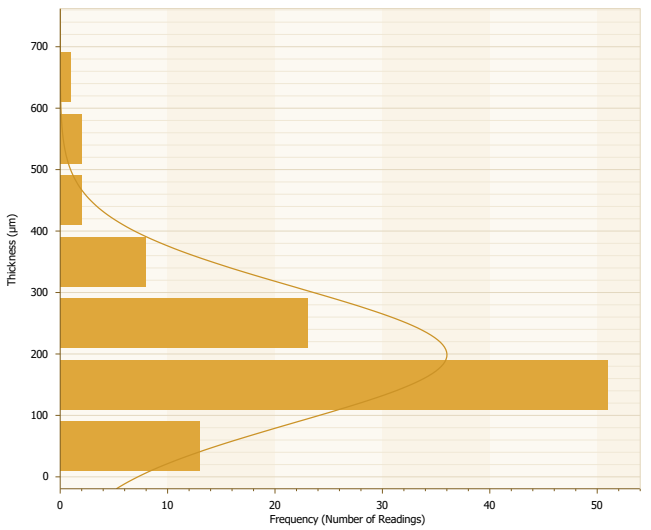
Gauge	
Type	Elcometer 456/4
Serial #	LE01982

Probe	
Type	F2
Serial #	LD00708

Calibration	
Calibration Method	Zero Offset
Type	F1
Date	07/12/2021 10:42
Thick Foil	125.0
Thin Foil	0.0
Offset	25.0 µm

Batch	
Type	Thickness
Name in Gauge	Batch 352
User ID	L5
Created Date	10/12/2021 10:39:22
Updated Date	10/12/2021 10:39:22
First Reading Date	10/12/2021 10:39:26
Last Reading Date	10/12/2021 10:42:28

Histogram



Statistics	
# Readings	100
Mean	198.66 µm
Maximum	697.0 µm
Minimum	45.7 µm
Standard Deviation (σ)	110.51 µm
Mean + 3σ	530.19 µm
Mean - 3σ	-132.88 µm
Coefficient of Variation	55.6%

Notes

***Paint spec* A :-** Hempadur Speed Dry ZP600 (two component epoxy) To Suit Top Coat Hempel UK Ltd **DFT - 75 WFT - 106**

Y :- Hempadur Multi-Strength GF 35870 (Gloss) Self Primed Finish Grey Hempel UK Ltd **DFT - 250 WFT - 286**

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

Zero off set- 25 microns allowance for the blast profile

Inspectors name - S. Haslam ***Team leader*** - C. Pligrim

Sprayers - P. Bearder, N. Cook, P. Judson, P. Umney, M. Davidson, D. White, M. Becher

Items - 9-45 x2-50-63-64-252-23-26-30-12-11

Any low readings have been addressed or are an isolated reading.

Inspection Report - Climate

21009\
L11

Individuals / Run Chart | **Td**

Project	
Name	21009

Gauge	
Type	Elcometer 319/3
PCB Serial #	UH12028-000
Serial #	UL05117
User ID	

Batch	
Name in Gauge	91
User ID	L11
Created Date	07/12/2021 11:31:47
Updated Date	07/12/2021 11:31:47
First Reading Date	07/12/2021 11:31:59
Last Reading Date	07/12/2021 11:36:42

Individuals / Run Chart | **TΔ**

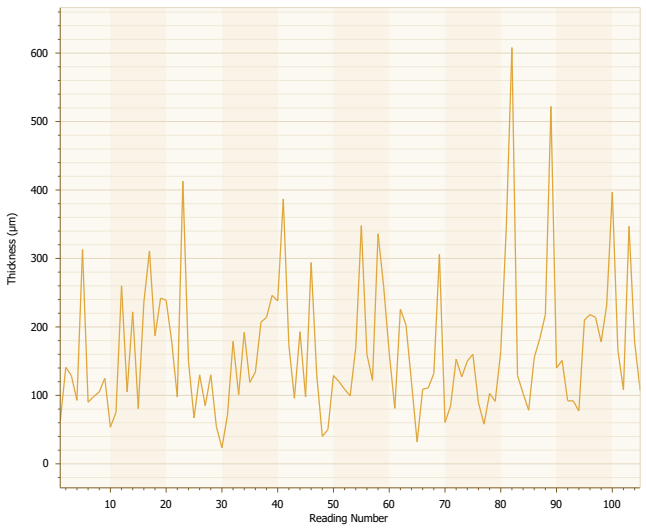
Statistics	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
# Readings	15	15	15	15	15	15	15	15
Mean	36.80 %	19.42 °C	17.58 °C	2.66 °C	16.77 °C	17.58 °C	11.01 °C	4.585 g/kg
Maximum	39.8 %	24.1 °C	19.1 °C	3.2 °C	21.3 °C	19.1 °C	12.0 °C	4.77 g/kg
Minimum	34.8 %	16.1 °C	16.6 °C	2.1 °C	13.1 °C	16.6 °C	10.4 °C	4.41 g/kg
Standard Deviation (σ)	1.44 %	2.75 °C	0.75 °C	0.32 °C	2.74 °C	0.75 °C	0.46 °C	0.102 g/kg
Mean + 3σ	41.12 %	27.67 °C	19.82 °C	3.61 °C	24.97 °C	19.82 °C	12.38 °C	4.892 g/kg
Mean - 3σ	32.48 %	11.18 °C	15.34 °C	1.71 °C	8.56 °C	15.34 °C	9.63 °C	4.279 g/kg
Coefficient of Variation	3.9%	14.2%	4.3%	12.0%	16.3%	4.3%	4.2%	2.2%

Limits	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
Low Limit					3.0 °C			
# Readings Below					0 (0.0%)			

Inspection Report - Dry Film Thickness

21009\
L11

Individuals / Run Chart



Project	
Name	21009

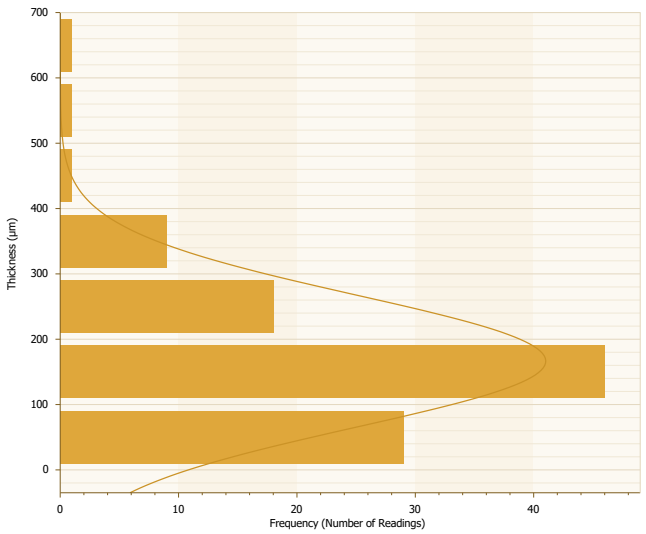
Gauge	
Type	Elcometer 456/4
Serial #	LE01982

Probe	
Type	F2
Serial #	LD00708

Calibration	
Calibration Method	Zero Offset
Type	F1
Date	07/12/2021 10:42
Thick Foil	125.0
Thin Foil	0.0
Offset	25.0 µm

Batch	
Type	Thickness
Name in Gauge	Batch 351
User ID	L11
Created Date	07/12/2021 10:40:16
Updated Date	07/12/2021 10:40:16
First Reading Date	07/12/2021 10:43:36
Last Reading Date	07/12/2021 10:46:27

Histogram



Statistics	
# Readings	105
Mean	166.50 µm
Maximum	608.0 µm
Minimum	23.4 µm
Standard Deviation (σ)	101.87 µm
Mean + 3σ	472.11 µm
Mean - 3σ	-139.11 µm
Coefficient of Variation	61.2%

Notes

***Paint spec* A :-** Hempadur Speed Dry ZP600 (two component epoxy) To Suit Top Coat Hempel UK Ltd **DFT - 75 WFT - 106**

Y :- Hempadur Multi-Strength GF 35870 (Gloss) Self Primed Finish Grey Hempel UK Ltd **DFT - 250 WFT - 286**

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

Zero off set- 25 microns allowance for the blast profile

Inspectors name - S. Haslam ***Team leader*** - C. Pligrim

Sprayers - P. Bearder, N. Cook, P. Judson, P. Umney, M. Davidson, D. White, M. Becher

Items - 124-227-186 x5-174-240-135-187-185-189

Any low readings have been addressed or are an isolated reading.

Inspection Report - Climate

21009\
L14

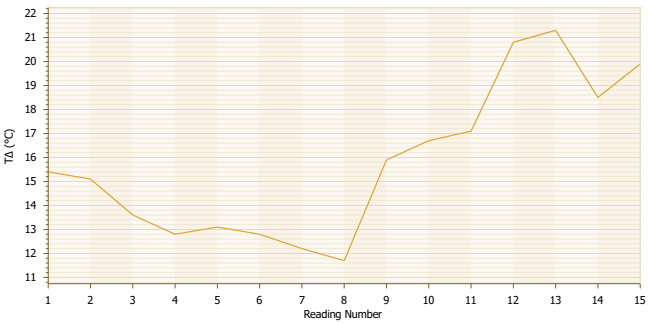
Individuals / Run Chart | **Td**

Project	
Name	21009

Gauge	
Type	Elcometer 319/3
PCB Serial #	UH12028-000
Serial #	UL05117
User ID	

Batch	
Name in Gauge	92
User ID	L14
Created Date	10/12/2021 11:36:36
Updated Date	10/12/2021 11:36:36
First Reading Date	10/12/2021 11:36:47
Last Reading Date	10/12/2021 11:41:57

Individuals / Run Chart | **TΔ**



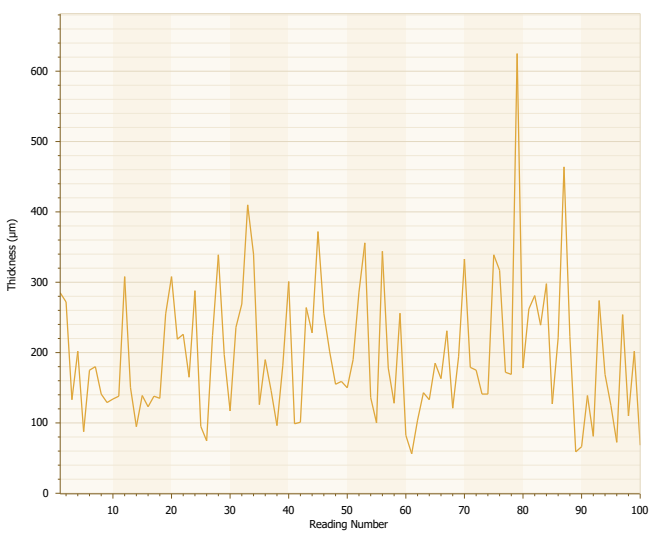
Statistics	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
# Readings	15	15	15	15	15	15	15	15
Mean	37.34 %	18.72 °C	17.67 °C	2.93 °C	15.79 °C	17.67 °C	11.11 °C	4.674 g/kg
Maximum	40.2 %	24.4 °C	19.2 °C	3.3 °C	21.3 °C	19.2 °C	12.0 °C	4.81 g/kg
Minimum	34.4 %	14.4 °C	16.1 °C	2.3 °C	11.7 °C	16.1 °C	10.1 °C	4.46 g/kg
Standard Deviation (σ)	1.77 %	3.44 °C	0.94 °C	0.30 °C	3.19 °C	0.94 °C	0.57 °C	0.097 g/kg
Mean + 3σ	42.64 %	29.04 °C	20.50 °C	3.82 °C	25.37 °C	20.50 °C	12.83 °C	4.964 g/kg
Mean - 3σ	32.04 %	8.39 °C	14.84 °C	2.04 °C	6.20 °C	14.84 °C	9.40 °C	4.384 g/kg
Coefficient of Variation	4.7%	18.4%	5.3%	10.2%	20.2%	5.3%	5.1%	2.1%

Limits	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
Low Limit					3.0 °C			
# Readings Below					0 (0.0%)			

Inspection Report - Dry Film Thickness

21009\
L14

Individuals / Run Chart



Project	
Name	21009

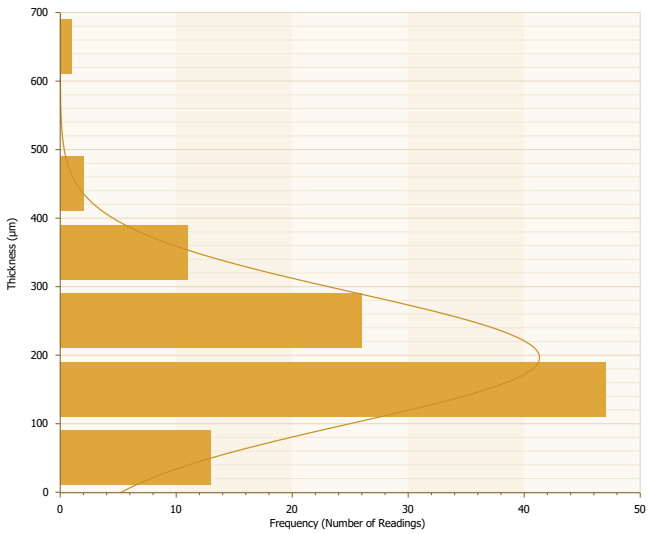
Gauge	
Type	Elcometer 456/4
Serial #	LE01982

Probe	
Type	F2
Serial #	LD00708

Calibration	
Calibration Method	Zero Offset
Type	F1
Date	07/12/2021 10:42
Thick Foil	125.0
Thin Foil	0.0
Offset	25.0 µm

Batch	
Type	Thickness
Name in Gauge	Batch 354
User ID	L14
Created Date	10/12/2021 10:53:52
Updated Date	10/12/2021 10:53:52
First Reading Date	10/12/2021 10:53:54
Last Reading Date	10/12/2021 10:57:00

Histogram



Statistics	
# Readings	100
Mean	196.43 µm
Maximum	625.0 µm
Minimum	56.1 µm
Standard Deviation (σ)	96.29 µm
Mean + 3σ	485.31 µm
Mean - 3σ	-92.45 µm
Coefficient of Variation	49.0%

Notes

***Paint spec* A :-** Hempadur Speed Dry ZP600 (two component epoxy) To Suit Top Coat Hempel UK Ltd **DFT - 75 WFT - 106**

Y :- Hempadur Multi-Strength GF 35870 (Gloss) Self Primed Finish Grey Hempel UK Ltd **DFT - 250 WFT - 286**

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

Zero off set- 25 microns allowance for the blast profile

Inspectors name - S. Haslam ***Team leader*** - C. Pligrim

Sprayers - P. Bearder, N. Cook, P. Judson, P. Umney, M. Davidson, D. White, M. Becher

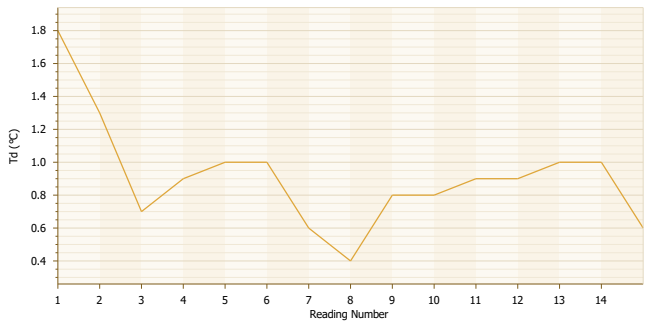
Items - 222-220-29-44-224-218-217-15-209-208-169-168-193

Any low readings have been addressed or are an isolated reading.

Inspection Report - Climate

21009\
L44

Individuals / Run Chart | **Td**

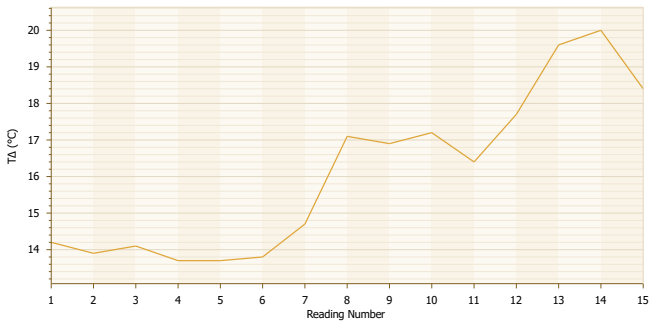


Project	
Name	21009

Gauge	
Type	Elcometer 319/3
PCB Serial #	UH12028-000
Serial #	UL05117
User ID	

Batch	
Name in Gauge	94
User ID	L44
Created Date	05/01/2022 11:39:02
Updated Date	05/01/2022 11:39:02
First Reading Date	05/01/2022 11:39:16
Last Reading Date	05/01/2022 11:44:18

Individuals / Run Chart | **TΔ**



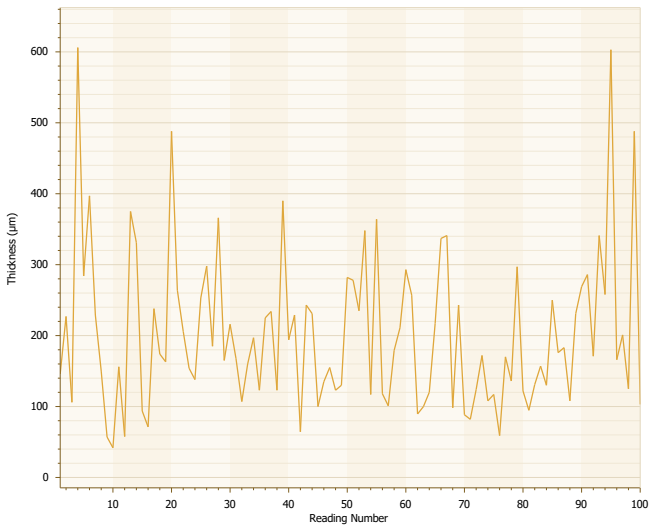
Statistics	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
# Readings	15	15	15	15	15	15	15	15
Mean	36.66 %	16.98 °C	15.66 °C	0.89 °C	16.09 °C	15.66 °C	9.56 °C	4.044 g/kg
Maximum	40.0 %	20.9 °C	18.4 °C	1.8 °C	20.0 °C	18.4 °C	11.3 °C	4.32 g/kg
Minimum	32.9 %	14.6 °C	13.8 °C	0.4 °C	13.7 °C	13.8 °C	8.3 °C	3.91 g/kg
Standard Deviation (σ)	1.97 %	2.16 °C	1.16 °C	0.33 °C	2.23 °C	1.16 °C	0.73 °C	0.098 g/kg
Mean + 3σ	42.56 %	23.46 °C	19.13 °C	1.88 °C	22.76 °C	19.13 °C	11.75 °C	4.337 g/kg
Mean - 3σ	30.75 %	10.50 °C	12.19 °C	-0.10 °C	9.41 °C	12.19 °C	7.37 °C	3.751 g/kg
Coefficient of Variation	5.4%	12.7%	7.4%	37.1%	13.9%	7.4%	7.6%	2.4%

Limits	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
Low Limit					3.0 °C			
# Readings Below					0 (0.0%)			

Inspection Report - Dry Film Thickness

21009\
L44

Individuals / Run Chart



Project	
Name	21009

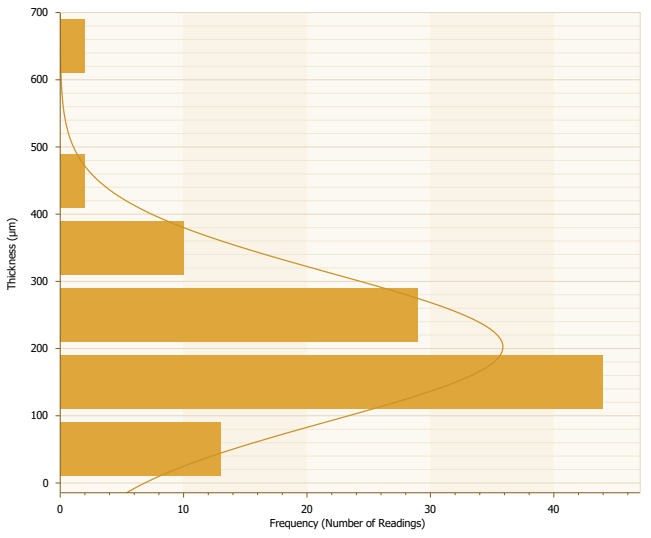
Gauge	
Type	Elcometer 456/4
Serial #	LE01982

Probe	
Type	F2
Serial #	LD00708

Calibration	
Calibration Method	Zero Offset
Type	F1
Date	16/06/2021 09:39
Thick Foil	126.0
Thin Foil	0.0
Offset	25.0 µm

Batch	
Type	Thickness
Name in Gauge	Batch 361
User ID	L44
Created Date	05/01/2022 10:57:15
Updated Date	05/01/2022 10:57:15
First Reading Date	05/01/2022 10:57:19
Last Reading Date	05/01/2022 11:00:06

Histogram



Statistics	
# Readings	100
Mean	202.44 µm
Maximum	606.0 µm
Minimum	41.8 µm
Standard Deviation (σ)	110.92 µm
Mean + 3σ	535.18 µm
Mean - 3σ	-130.31 µm
Coefficient of Variation	54.8%

Notes

***Paint spec* A :-** Hempadur Speed Dry ZP600 (two component epoxy) To Suit Top Coat Hempel UK Ltd **DFT - 75 WFT - 106**

Y :- Hempadur Multi-Strength GF 35870 (Gloss) Self Primed Finish Grey Hempel UK Ltd **DFT - 250 WFT - 286**

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

Zero off set- 25 microns allowance for the blast profile

Inspectors name - S. Haslam ***Team leader*** - C. Pligrim

Sprayers - P. Bearder, N. Cook, P. Judson, P. Umney, M. Davidson, D. White, M. Becher

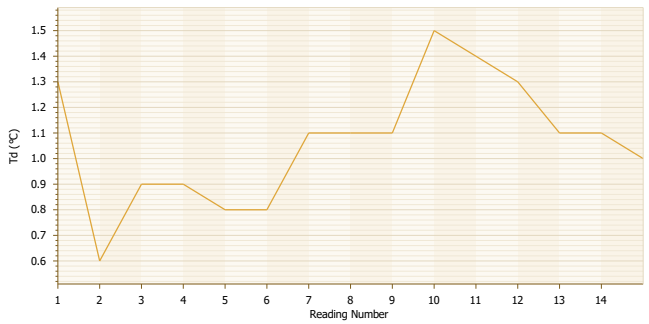
Items -682-621-633-673-618-601

Any low readings have been addressed or are an isolated reading.

Inspection Report - Climate

21009\
L53

Individuals / Run Chart | **Td**

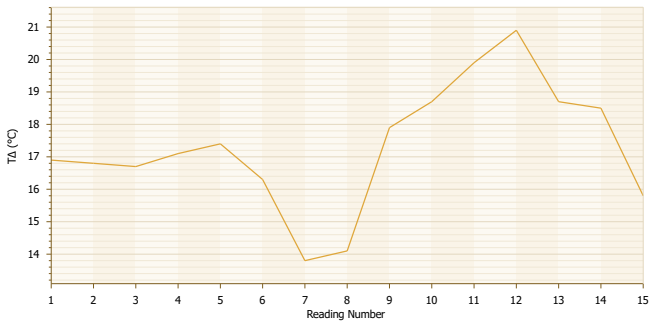


Project	
Name	21009

Gauge	
Type	Elcometer 319/3
PCB Serial #	UH12028-000
Serial #	UL05117
User ID	

Batch	
Name in Gauge	95
User ID	L53
Created Date	07/01/2022 11:59:51
Updated Date	07/01/2022 11:59:51
First Reading Date	07/01/2022 12:00:02
Last Reading Date	07/01/2022 12:05:28

Individuals / Run Chart | **TΔ**



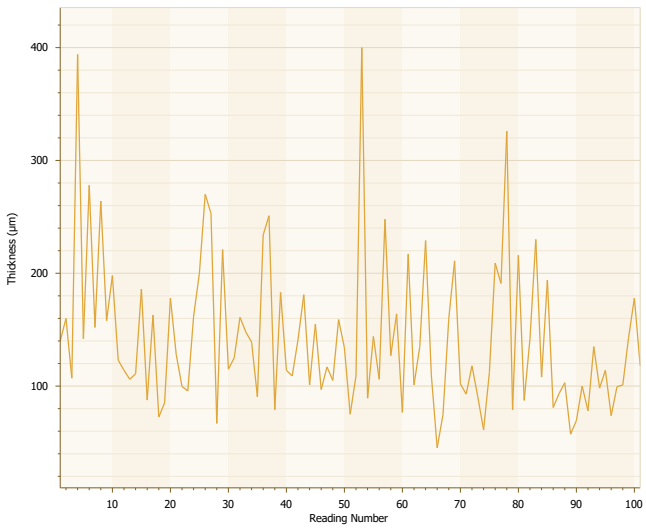
Statistics	RH	Ts	Ta	Td	TΔ	Tdb	Twb	SH
# Readings	15	15	15	15	15	15	15	15
Mean	35.77 %	18.36 °C	16.22 °C	1.06 °C	17.31 °C	16.22 °C	9.91 °C	4.093 g/kg
Maximum	37.8 %	22.3 °C	17.4 °C	1.5 °C	20.9 °C	17.4 °C	10.7 °C	4.21 g/kg
Minimum	33.6 %	14.9 °C	15.3 °C	0.6 °C	13.8 °C	15.3 °C	9.4 °C	3.96 g/kg
Standard Deviation (σ)	1.32 %	2.06 °C	0.65 °C	0.24 °C	1.93 °C	0.65 °C	0.40 °C	0.070 g/kg
Mean + 3σ	39.73 %	24.54 °C	18.17 °C	1.78 °C	23.10 °C	18.17 °C	11.12 °C	4.304 g/kg
Mean - 3σ	31.82 %	12.19 °C	14.27 °C	0.33 °C	11.52 °C	14.27 °C	8.71 °C	3.883 g/kg
Coefficient of Variation	3.7%	11.2%	4.0%	22.6%	11.1%	4.0%	4.0%	1.7%

Limits	RH	Ts	Ta	Td	TΔ	Tdb	Twb	SH
Low Limit					3.0 °C			
# Readings Below					0 (0.0%)			

Inspection Report - Dry Film Thickness

21009\
L53

Individuals / Run Chart



Project	
Name	21009

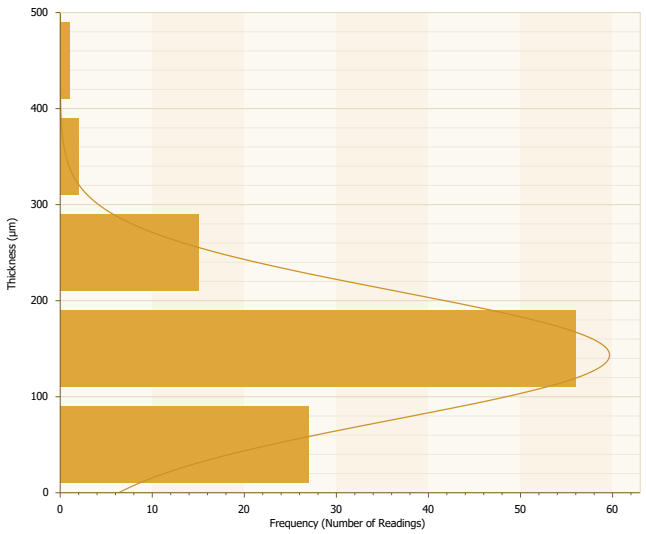
Gauge	
Type	Elcometer 456/4
Serial #	LE01982

Probe	
Type	F2
Serial #	LD00708

Calibration	
Calibration Method	Zero Offset
Type	F1
Date	16/06/2021 09:39
Thick Foil	126.0
Thin Foil	0.0
Offset	25.0 µm

Batch	
Type	Thickness
Name in Gauge	Batch 362
User ID	L53
Created Date	07/01/2022 11:12:27
Updated Date	07/01/2022 11:12:27
First Reading Date	07/01/2022 11:12:31
Last Reading Date	07/01/2022 11:15:43

Histogram



Statistics	
# Readings	101
Mean	143.33 µm
Maximum	400.0 µm
Minimum	45.3 µm
Standard Deviation (σ)	67.34 µm
Mean + 3σ	345.37 µm
Mean - 3σ	-58.70 µm
Coefficient of Variation	47.0%

Notes

***Paint spec* A :-** Hempadur Speed Dry ZP600 (two component epoxy) To Suit Top Coat Hempel UK Ltd **DFT - 75 WFT - 106**

Y :- Hempadur Multi-Strength GF 35870 (Gloss) Self Primed Finish Grey Hempel UK Ltd **DFT - 250 WFT - 286**

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

Zero off set- 25 microns allowance for the blast profile

Inspectors name - S. Haslam ***Team leader*** - C. Pligrim

Sprayers - P. Bearder, N. Cook, P. Judson, P. Umney, M. Davidson, D. White, M. Becher

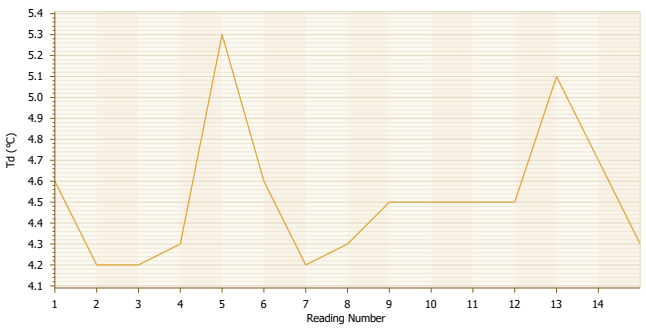
Items - 607 x2-591-606-605 x3-587-590-588-611-658

Any low readings have been addressed or are an isolated reading.

Inspection Report - Climate

21009\
L56

Individuals / Run Chart | **Td**

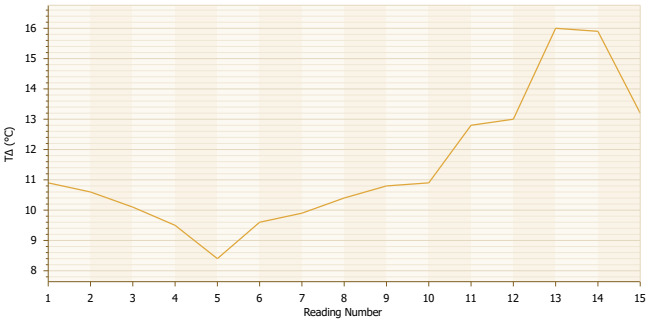


Project	
Name	21009

Gauge	
Type	Elcometer 319/3
PCB Serial #	UH12028-000
Serial #	UL05117
User ID	

Batch	
Name in Gauge	96
User ID	L56
Created Date	10/01/2022 11:49:49
Updated Date	10/01/2022 11:49:49
First Reading Date	10/01/2022 11:50:08
Last Reading Date	10/01/2022 11:54:16

Individuals / Run Chart | **TΔ**



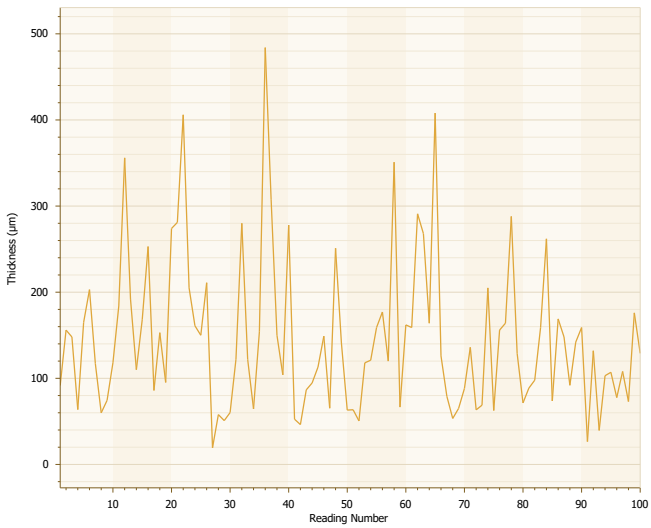
Statistics	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
# Readings	15	15	15	15	15	15	15	15
Mean	46.59 %	15.98 °C	15.94 °C	4.52 °C	11.46 °C	15.94 °C	10.58 °C	5.223 g/kg
Maximum	49.3 %	21.0 °C	17.8 °C	5.3 °C	16.0 °C	17.8 °C	11.6 °C	5.53 g/kg
Minimum	41.7 %	13.7 °C	15.2 °C	4.2 °C	8.4 °C	15.2 °C	10.1 °C	5.09 g/kg
Standard Deviation (σ)	2.01 %	2.33 °C	0.66 °C	0.32 °C	2.25 °C	0.66 °C	0.38 °C	0.118 g/kg
Mean + 3σ	52.62 %	22.98 °C	17.93 °C	5.48 °C	18.23 °C	17.93 °C	11.72 °C	5.578 g/kg
Mean - 3σ	40.56 %	8.99 °C	13.96 °C	3.56 °C	4.70 °C	13.96 °C	9.44 °C	4.869 g/kg
Coefficient of Variation	4.3%	14.6%	4.1%	7.1%	19.6%	4.1%	3.6%	2.3%

Limits	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
Low Limit					3.0 °C			
# Readings Below					0 (0.0%)			

Inspection Report - Dry Film Thickness

21009\
L56

Individuals / Run Chart



Project	
Name	21009

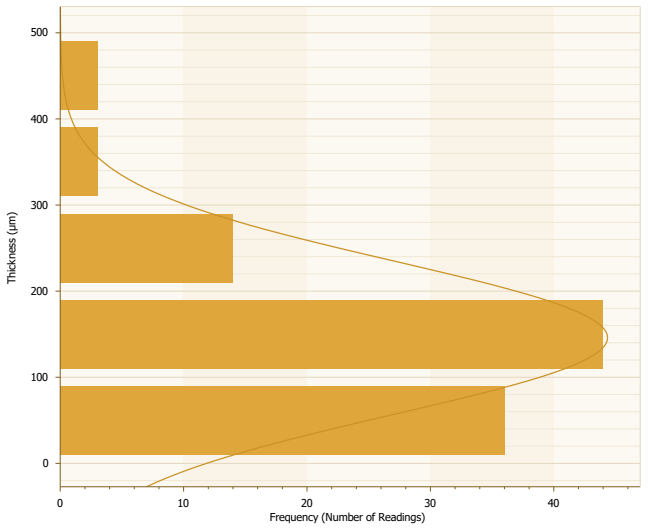
Gauge	
Type	Elcometer 456/4
Serial #	LE01982

Probe	
Type	F2
Serial #	LD00708

Calibration	
Calibration Method	Zero Offset
Type	F1
Date	16/06/2021 09:39
Thick Foil	126.0
Thin Foil	0.0
Offset	25.0 µm

Batch	
Type	Thickness
Name in Gauge	Batch 365
User ID	L56
Created Date	10/01/2022 11:02:46
Updated Date	10/01/2022 11:02:46
First Reading Date	10/01/2022 11:02:49
Last Reading Date	10/01/2022 11:07:14

Histogram



Statistics	
# Readings	100
Mean	145.96 µm
Maximum	484.0 µm
Minimum	19.3 µm
Standard Deviation (σ)	89.72 µm
Mean + 3σ	415.11 µm
Mean - 3σ	-123.18 µm
Coefficient of Variation	61.5%

Notes

***Paint spec* A :-** Hempadur Speed Dry ZP600 (two component epoxy) To Suit Top Coat Hempel UK Ltd **DFT - 75 WFT - 106**

Y :- Hempadur Multi-Strength GF 35870 (Gloss) Self Primed Finish Grey Hempel UK Ltd **DFT - 250 WFT - 286**

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

Zero off set- 25 microns allowance for the blast profile

Inspectors name - S. Haslam ***Team leader*** - C. Pligrim

Sprayers - P. Bearder, N. Cook, P. Judson, P. Umney, M. Davidson, D. White, M. Becher

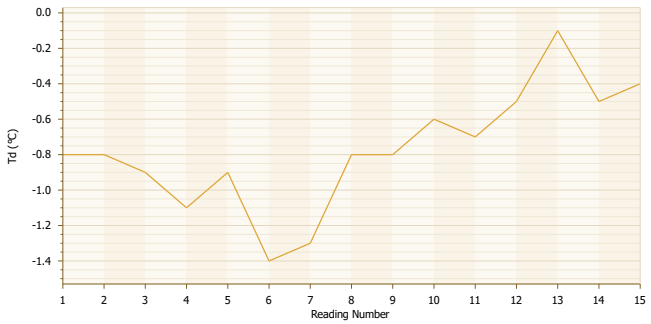
Items -789-774-775-777-764-779-776-773-778-A161

Any low readings have been addressed or are an isolated reading.

Inspection Report - Climate

21009\
L58

Individuals / Run Chart | **Td**

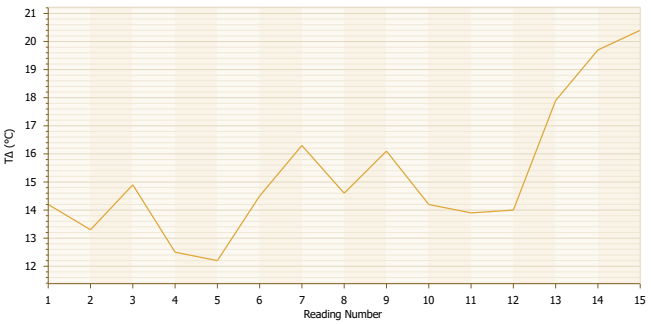


Project	
Name	21009

Gauge	
Type	Elcometer 319/3
PCB Serial #	UH12028-000
Serial #	UL05117
User ID	

Batch	
Name in Gauge	98
User ID	L58
Created Date	14/01/2022 09:41:25
Updated Date	14/01/2022 09:41:25
First Reading Date	14/01/2022 09:41:43
Last Reading Date	14/01/2022 09:47:59

Individuals / Run Chart | **TΔ**



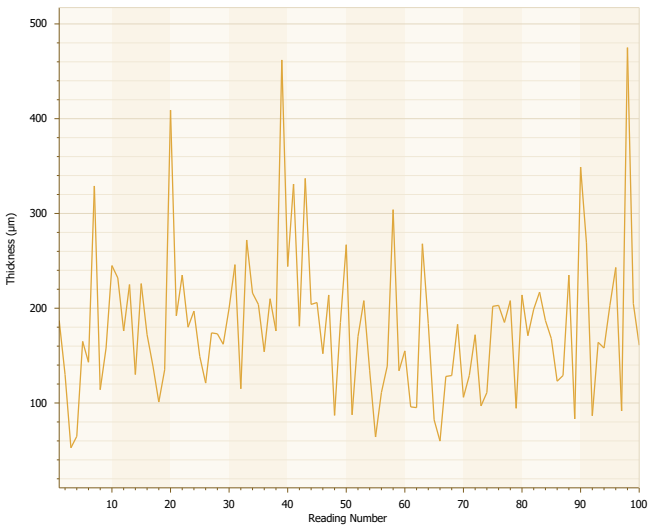
Statistics	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
# Readings	15	15	15	15	15	15	15	15
Mean	38.21 %	14.46 °C	13.25 °C	-0.77 °C	15.23 °C	13.25 °C	7.83 °C	3.613 g/kg
Maximum	41.1 %	19.9 °C	14.8 °C	-0.1 °C	20.4 °C	14.8 °C	8.8 °C	3.78 g/kg
Minimum	34.5 %	11.2 °C	11.6 °C	-1.4 °C	12.2 °C	11.6 °C	6.7 °C	3.45 g/kg
Standard Deviation (σ)	2.05 %	2.61 °C	1.03 °C	0.33 °C	2.43 °C	1.03 °C	0.67 °C	0.086 g/kg
Mean + 3σ	44.37 %	22.29 °C	16.35 °C	0.22 °C	22.52 °C	16.35 °C	9.85 °C	3.871 g/kg
Mean - 3σ	32.05 %	6.63 °C	10.15 °C	-1.76 °C	7.94 °C	10.15 °C	5.81 °C	3.354 g/kg
Coefficient of Variation	5.4%	18.0%	7.8%	-42.9%	16.0%	7.8%	8.6%	2.4%

Limits	**RH**	**Ts**	**Ta**	**Td**	**TΔ**	**Tdb**	**Twb**	**SH**
Low Limit					3.0 °C			
# Readings Below					0 (0.0%)			

Inspection Report - Dry Film Thickness

21009\
L58

Individuals / Run Chart



Project	
Name	21009

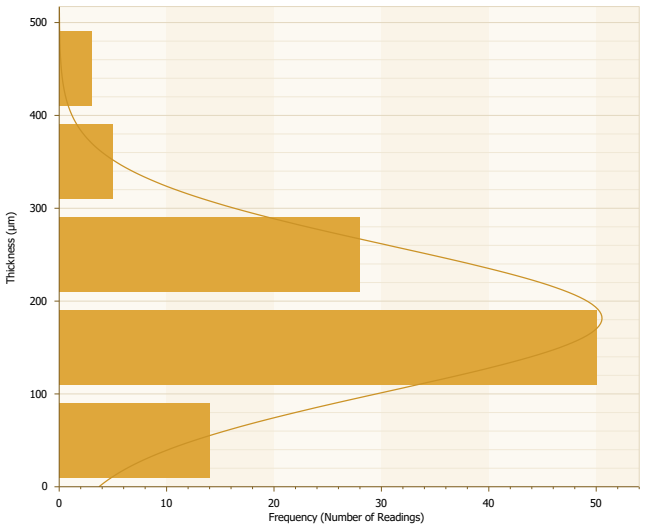
Gauge	
Type	Elcometer 456/4
Serial #	LE01982

Probe	
Type	F2
Serial #	LD00708

Calibration	
Calibration Method	Zero Offset
Type	F1
Date	16/06/2021 09:39
Thick Foil	126.0
Thin Foil	0.0
Offset	25.0 µm

Batch	
Type	Thickness
Name in Gauge	Batch 371
User ID	L58
Created Date	14/01/2022 09:00:14
Updated Date	14/01/2022 09:00:14
First Reading Date	14/01/2022 09:00:16
Last Reading Date	14/01/2022 09:03:01

Histogram



Statistics	
# Readings	100
Mean	181.50 µm
Maximum	475.0 µm
Minimum	52.7 µm
Standard Deviation (σ)	78.74 µm
Mean + 3σ	417.71 µm
Mean - 3σ	-54.72 µm
Coefficient of Variation	43.4%

Notes

***Paint spec* A :-** Hempadur Speed Dry ZP600 (two component epoxy) To Suit Top Coat Hempel UK Ltd **DFT - 75 WFT - 106**

Y :- Hempadur Multi-Strength GF 35870 (Gloss) Self Primed Finish Grey Hempel UK Ltd **DFT - 250 WFT - 286**

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

Zero off set- 25 microns allowance for the blast profile

Inspectors name - S. Haslam ***Team leader*** - C. Pligrim

Sprayers - P. Bearder, N. Cook, P. Judson, P. Umney, M. Davidson, D. White, M. Becher

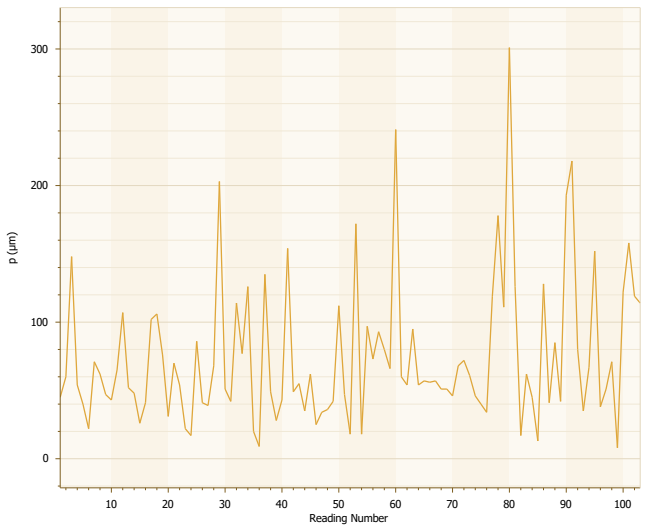
Items -733-712-728-A158-726-735-747-749-781-782-825-824

Any low readings have been addressed or are an isolated reading.

Inspection Report - Profile

21009\
L7

Individuals / Run Chart



Project	
Name	21009

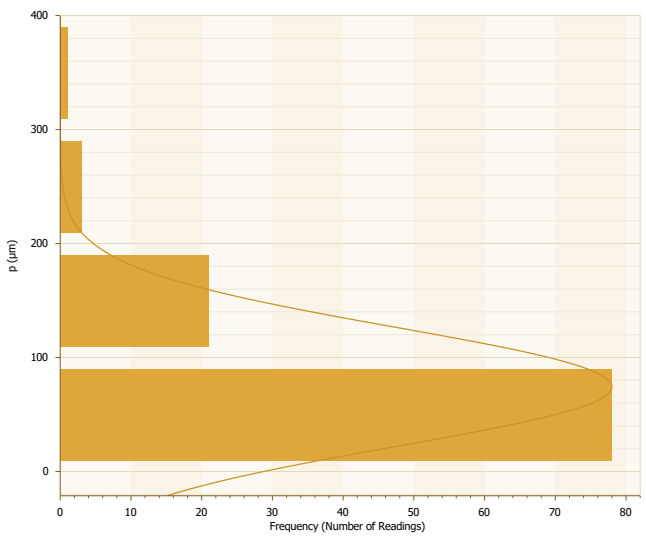
Gauge	
Type	Elcometer 224/2
Serial #	XB03543

Probe	
Type	P1
Serial #	WK00149

Calibration	
Calibration Method	Zero
Type	P1
Date	20/04/2021 07:49
Thick Foil	N/A
Thin Foil	0.0

Batch	
Type	p
Standard	Immediate
Name in Gauge	Batch 68
User ID	L7
Created Date	04/12/2021 09:02:23
Updated Date	04/12/2021 09:02:23
First Reading Date	04/12/2021 09:02:26
Last Reading Date	04/12/2021 09:08:33

Histogram



Statistics	
# Readings	103
Mean	74.22 µm
Maximum	301.0 µm
Minimum	8.0 µm
Standard Deviation (σ)	52.54 µm
Mean + 3σ	231.86 µm
Mean - 3σ	-83.41 µm
Coefficient of Variation	70.8%

Notes

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

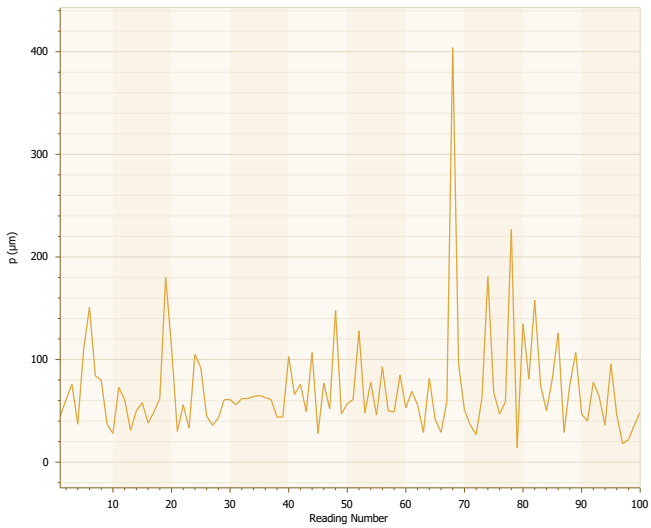
Inspectors name - S. Haslam

Various items on Lot 7

Inspection Report - Profile

21009\
L12

Individuals / Run Chart



Project	
Name	21009

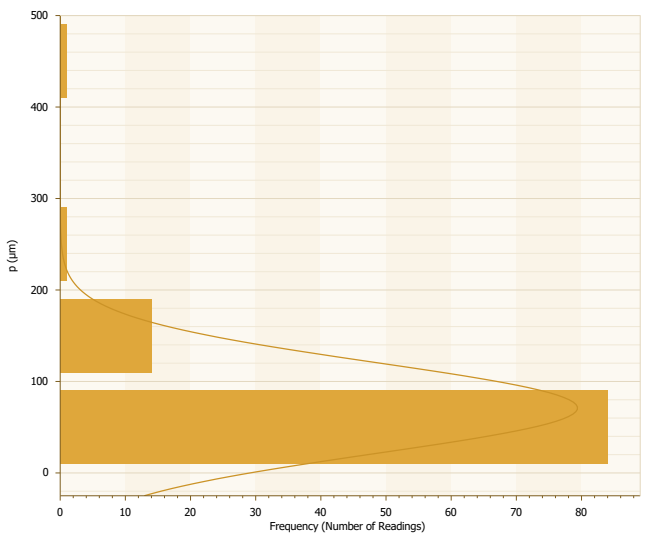
Gauge	
Type	Elcometer 224/2
Serial #	XB03543

Probe	
Type	P1
Serial #	WK00149

Calibration	
Calibration Method	Zero
Type	P1
Date	20/04/2021 07:49
Thick Foil	N/A
Thin Foil	0.0

Batch	
Type	p
Standard	Immediate
Name in Gauge	Batch 71
User ID	L12
Created Date	04/12/2021 09:33:02
Updated Date	04/12/2021 09:33:02
First Reading Date	04/12/2021 09:33:04
Last Reading Date	04/12/2021 09:40:37

Histogram



Statistics	
# Readings	100
Mean	70.96 µm
Maximum	404.0 µm
Minimum	14.0 µm
Standard Deviation (σ)	50.13 µm
Mean + 3σ	221.34 µm
Mean - 3σ	-79.42 µm
Coefficient of Variation	70.6%

Notes

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

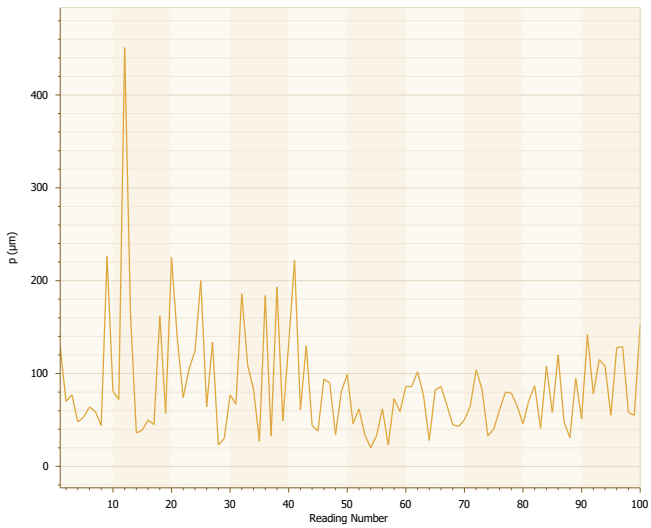
Inspectors name - S. Haslam

Various items on Lot 12

Inspection Report - Profile

21009\
L17

Individuals / Run Chart



Project	
Name	21009

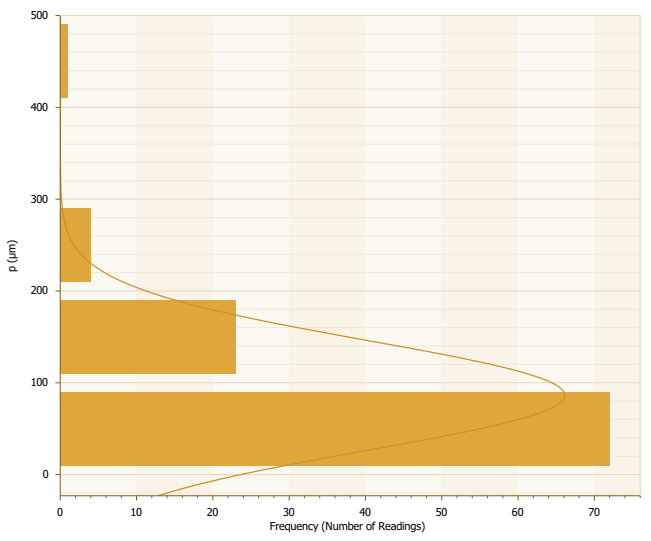
Gauge	
Type	Elcometer 224/2
Serial #	XB03543

Probe	
Type	P1
Serial #	WK00149

Calibration	
Calibration Method	Zero
Type	P1
Date	20/04/2021 07:49
Thick Foil	N/A
Thin Foil	0.0

Batch	
Type	p
Standard	Immediate
Name in Gauge	Batch 72
User ID	L17
Created Date	14/12/2021 06:43:14
Updated Date	14/12/2021 06:43:14
First Reading Date	14/12/2021 06:43:18
Last Reading Date	14/12/2021 06:49:22

Histogram



Statistics	
# Readings	100
Mean	86.26 µm
Maximum	451.0 µm
Minimum	20.0 µm
Standard Deviation (σ)	60.17 µm
Mean + 3σ	266.78 µm
Mean - 3σ	-94.26 µm
Coefficient of Variation	69.8%

Notes

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

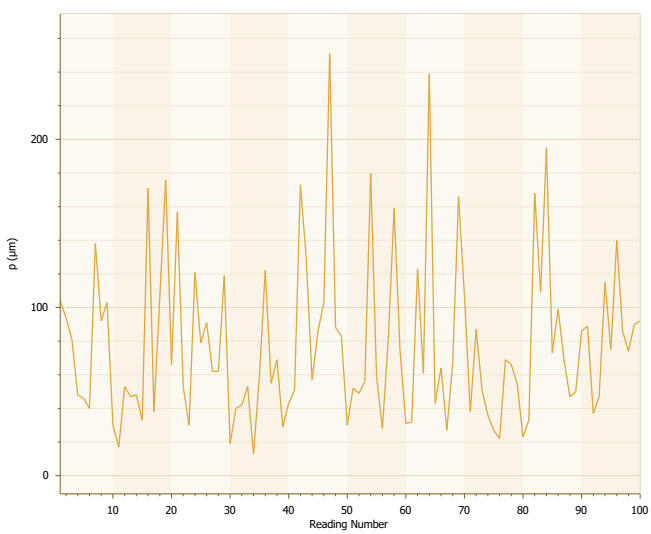
Inspectors name - S. Haslam

Various items on Lot 17

Inspection Report - Profile

21009\
L23

Individuals / Run Chart



Project	
Name	21009

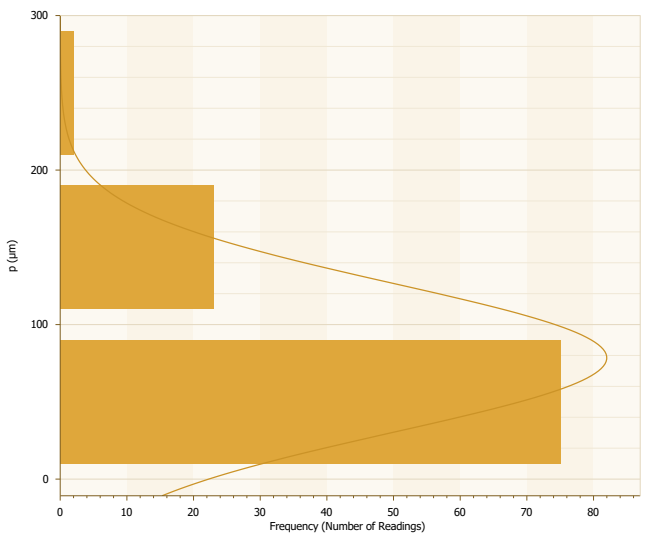
Gauge	
Type	Elcometer 224/2
Serial #	XB03543

Probe	
Type	P1
Serial #	WK00149

Calibration	
Calibration Method	Zero
Type	P1
Date	20/04/2021 07:49
Thick Foil	N/A
Thin Foil	0.0

Batch	
Type	p
Standard	Immediate
Name in Gauge	Batch 73
User ID	L23
Created Date	14/12/2021 06:50:57
Updated Date	14/12/2021 06:50:57
First Reading Date	14/12/2021 06:50:59
Last Reading Date	14/12/2021 06:56:54

Histogram



Statistics	
# Readings	100
Mean	78.47 µm
Maximum	251.0 µm
Minimum	13.0 µm
Standard Deviation (σ)	48.54 µm
Mean + 3σ	224.08 µm
Mean - 3σ	-67.14 µm
Coefficient of Variation	61.9%

Notes

Surface prep - SA2.5 (50 - 75 microns) BSEN . ISO - 8502-1

Inspectors name - S. Haslam

Various items on Lot 23