General Notes

G01	The Design and Details shown in these Drawings are applicable to this Project only.
G02	These Drawings shall be read in conjunction with all Architectural Drawings, other Consultants' Drawings, Specifications and such other Written Instructions as may be issued during the course of the Project. Any discrepancy shall be referred to the Engineer before proceeding with the work.
G03	All Materials and Workmanship shall be in accordance with the relevant and current SAA Codes and Authorities Except where varied by the Project Specifications.
G04	The Structure must be maintained in a stable condition and no part must be overloaded during construction. Temporary bracing must be designed and provided by the contractor(s) to keep the building works and excavations stable at all times.
G05	The Issuer of these Designs reserves the right to alter Specifications and Designs as it may see fit without prior notification or penalty.
G06	The Structure has not been designed for snow loads.
G07	Connections may require on-site drilling by the contractor(s).

Foundation Notes

F01	Foundations have been designed assuming an allowable bearing capacity of 100 kPa.
F02	The Owner is advised to obtain a Geotechnical Report and/or Site Foundation Report to confirm F01 above.
F03	Footings shall be located centrally under walls and columns unless noted otherwise.
F04	All Footings to be founded a minimum of 400 mm into Natural Ground. Do not Found Footings in uncontrolled fill.
F05	Engineer to be contacted if Foundation Conditions vary from F01 above.

Steelwork Notes

S01	All Workmanship and Materials shall be in accordance with AS 4100, AS/NZ 4600 and AS 1554 except where varied by the Project documentation.
S02	Bolting Categories are identified on the Structural Drawings as follows: 4.6/S Commercial Bolts of Grade 4.6 to AS 1111 Snug Tightened 8.8/S High Strength Structural Bolts of Grade 8.8 to AS 1252 Snug Tightened
S03	Unless noted otherwise, all M16 fasteners shall be Category 8.8/S. Standard Fixings for C100, C150, C200 and C250 Sections are M12 bolts. Standard Fixings for C300 and C350 Sections are M16 bolts. No Connection shall have less than 2 bolts.
S04	All metal cladding should comply with AS/NZS 4680 G550, AZ150 (550 MPa minimum yield stress, 150 g/m2 minimum coating mass).
S05	Steelwork intended to be concrete encased shall be unpainted. Encasing concrete shall be Grade N25 unless noted otherwise providing a cover adequate to suit fire rating or exposure conditions. Concrete Encasement shall be centrally reinforced with 5 mm wire to AS 4671 or 6 mm Structural Grade Bars to AS 4671 at 150 mm pitch.
S06	Unless noted otherwise, all steel shall comply with the relevant Australian Standard.

Steel Grades

300 PLUS	Universal Beams & Columns, Parallel Flange Channels, Large Angles to AS/NZS3679.1
250	Flats, Small Angles, Taper Flange Beams & Columns to AS/NZS3679.1
300	Welded Sections to AS/NZS3679.2
250	Hot Rolled Plates, Floor Plates & Slabs to AS/NZS3678
250	Hollow Sections to AS1163. Circular Sections less than 165mm Outside Diameter. Sections other than the above
G450-G550	Cold Form AS4600. Unless noted otherwise, all purlins, plates & brackets are G450.
G500	Slab mesh and deformed reinforcement bars.
G2070	AS2841. Galvanized Steel Wire Strand. Unless noted otherwise, all Cable Bracing is G2070.

Australian Standard™ & Australian/New Zealand Standard™ Adopted

AS 1111.1	ISO Metric Hexagon Bolts and Screws – Product Grade C Part 1: Bolts
AS/NZS 1163	Cold-formed Structural Steel Hollow Sections
AS/NZS 1170.0	Structural Design Actions - Part 0: General Principles
AS/NZS 1170.1	Structural Design Actions - Part 1: Permanent, Imposed & Other Actions
AS/NZS 1170.2	Structural Design Actions - Part 2: Structural Design, Wind Actions
AS/NZS 1170.4	Structural Design Actions - Part 4: Earthquake Actions in Australia
AS 1252	Structural Assemblies
AS/NZS 1554	Structural Steel Welding
AS 4100	Steel Structures
AS/NZS 4600	Cold-formed Steel Structures
AS/NZS 4671	Steel Reinforcing Materials
AS/NZS 4680	Hot-dip Galvanized (Zinc) Coatings on Fabricated Ferrous Articles

Region & Site Details

This is a freestanding roof only structure. It is assumed that cars, goods or materials stored under the roof block less than 50 percentage of the cross section exposed to the wind.

Suitable for Regions A1-5 & B1. TC2.5 without Shielding: Terrain with some trees or isolated obstructions, terrain in developing outer urban areas with scattered houses, or large acreage developments with more than two and less than 10 buildings per hectare. The site is not on the slope or crest of a hill, ridge or escarpment.

$V_{design} = V_R \times M_c \times M_d \times (M_{z,Cat} \times M_s \times M_t)$

$V_{design} = 57 \times 1 \times 0.95 \times (0.87 \times 1 \times 1) = 47.11$ m/s

Foundations have been designed assuming an allowable bearing capacity of 100 kPa, undrained cohesion $C_u = 50$ kPa. Concrete Strength = 25 MPa.

Design Notes & Structural Members

Dimensions	7000 x 12000 x 2400
Building Class	10a
Design Wind Speed	47.11 m/s
Columns C	See Post & Footing Layout
Rafters R	See Rafter Layout
Purlins P	TH6110 G550
Fascia Beam FB	See Fascia Beam Layout
Footings	Cast In
All Brackets	3.0 mm G450
Technical Data	Page 25

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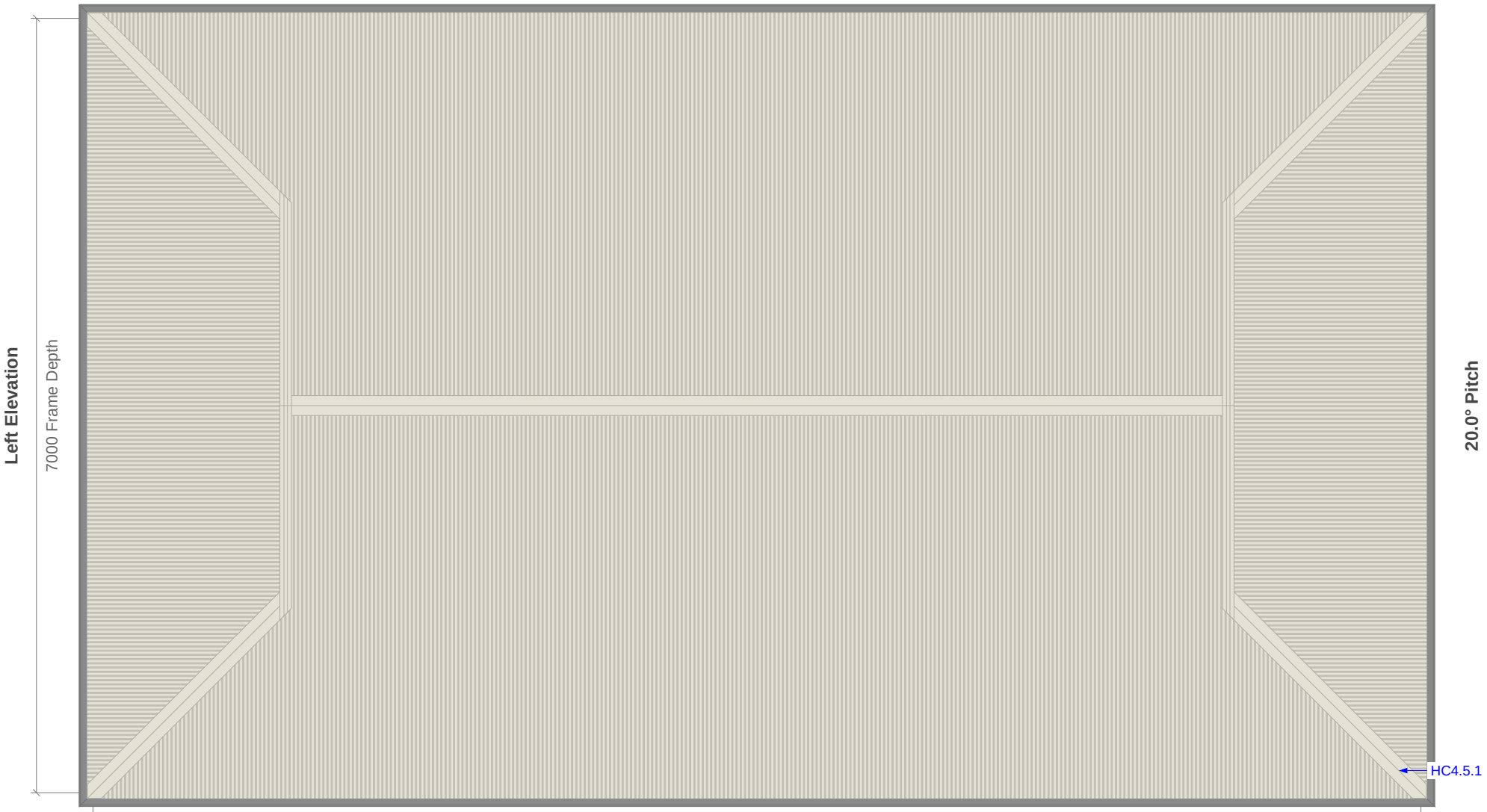
CLIENT: Example Customer	DRAWN BY: dm3 Solutions				
ADDRESS: Example Street, Suburb VIC 3333	DRAWN DATE: 2022-09-28	ISSUE: 1	SIZE: A4	SCALE: NTS	DRAWING NUMBER: 1 of 26

Roof View



Note: Roof structure is light foot trafficable for maintenance purposes.

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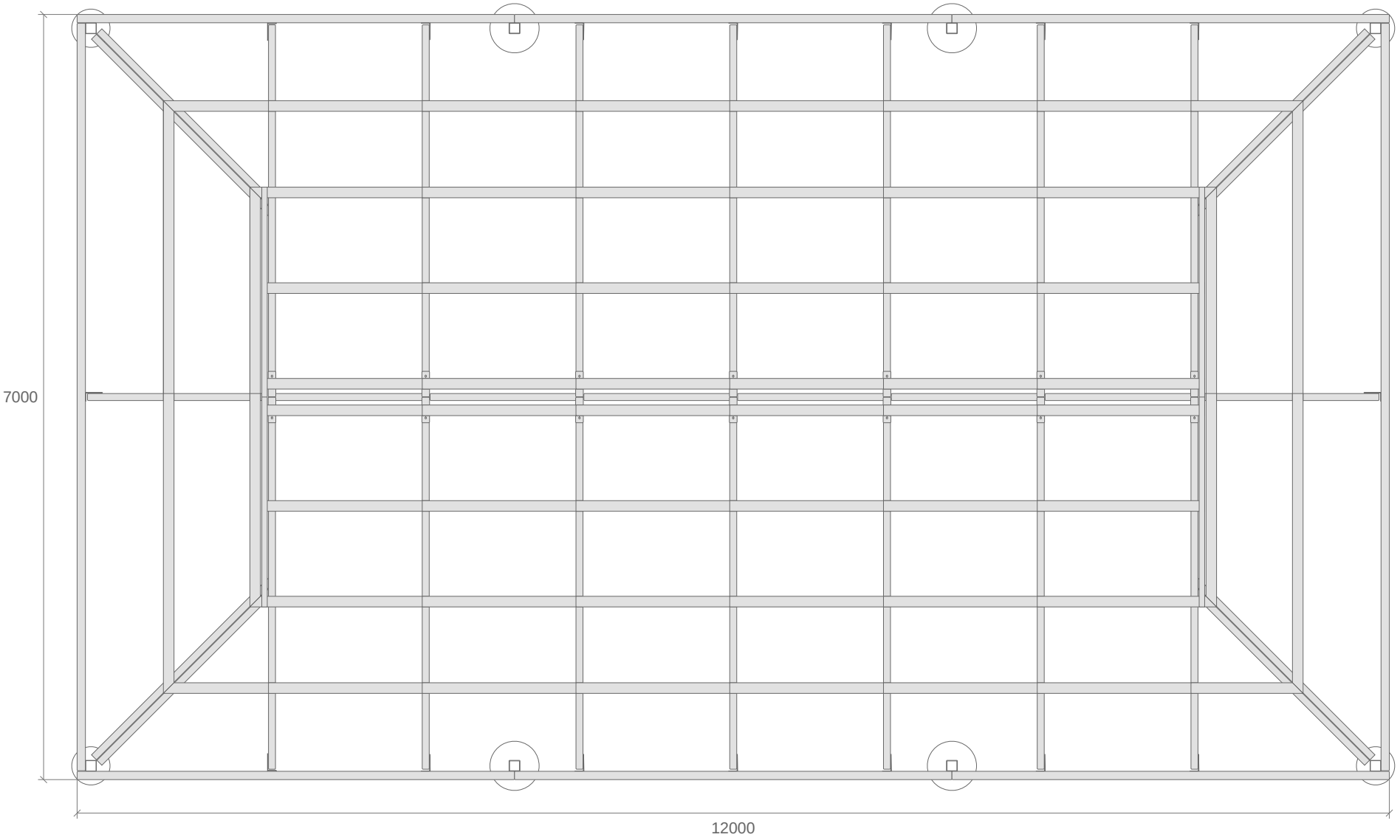
Plan View



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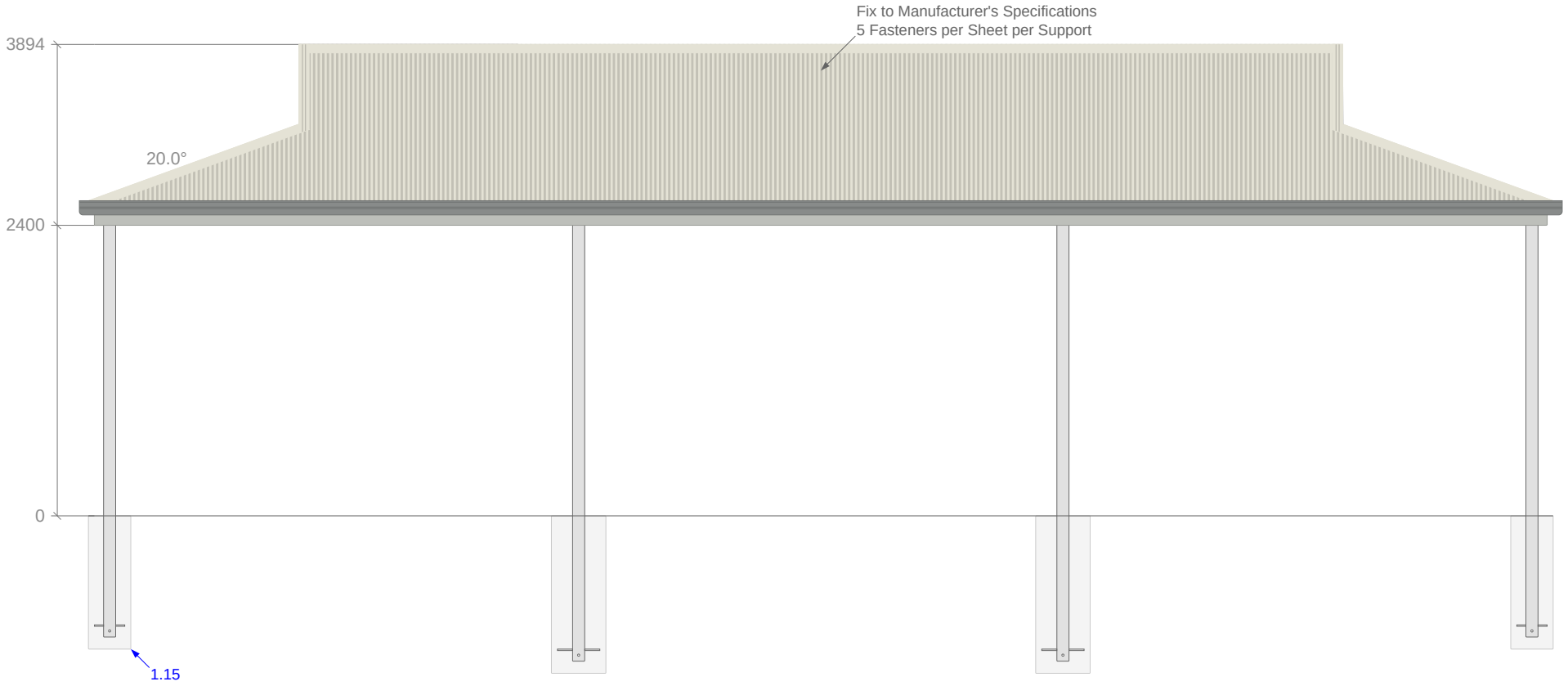
ADDRESS: Example Street, Suburb VIC 3333	DRAWN DATE: 2022-09-28	ISSUE: 1	SIZE: A4	SCALE: NTS	DRAWING NUMBER 3 of 26

Front View



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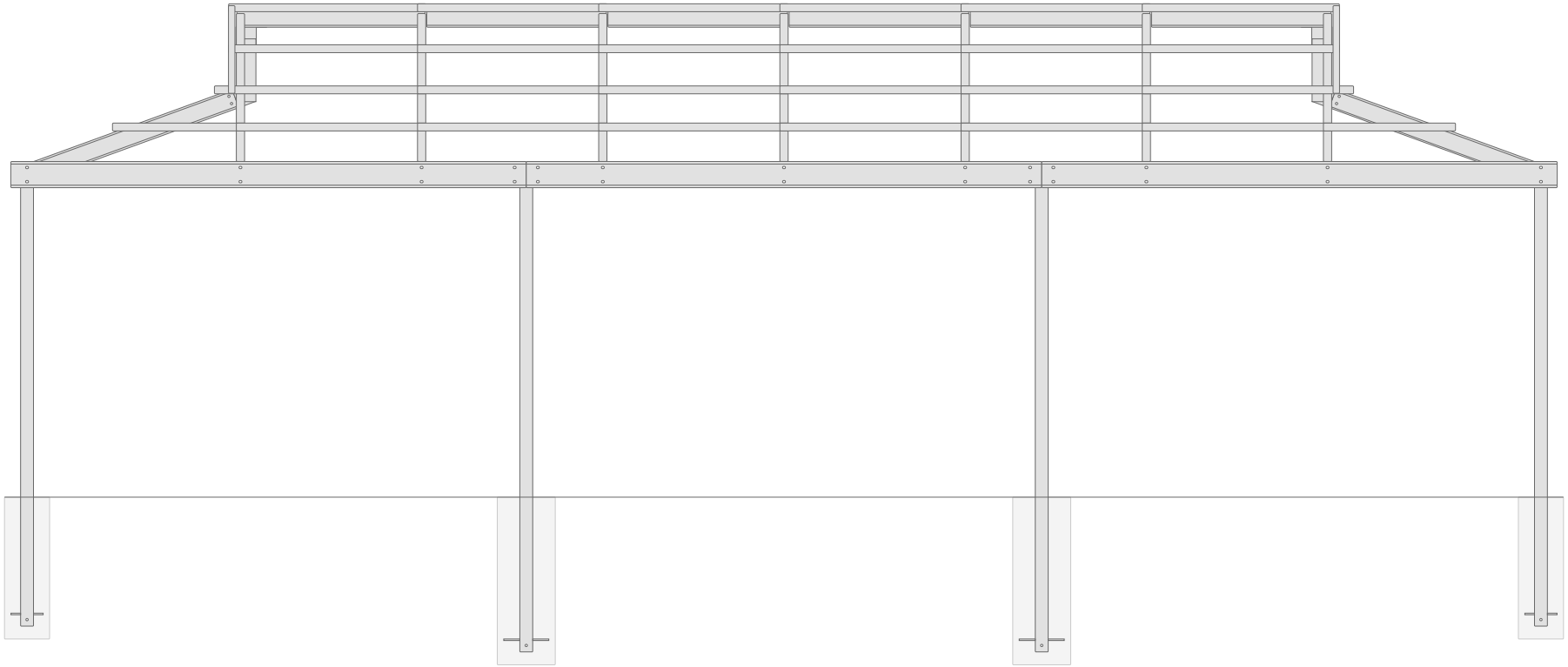
Front Elevation



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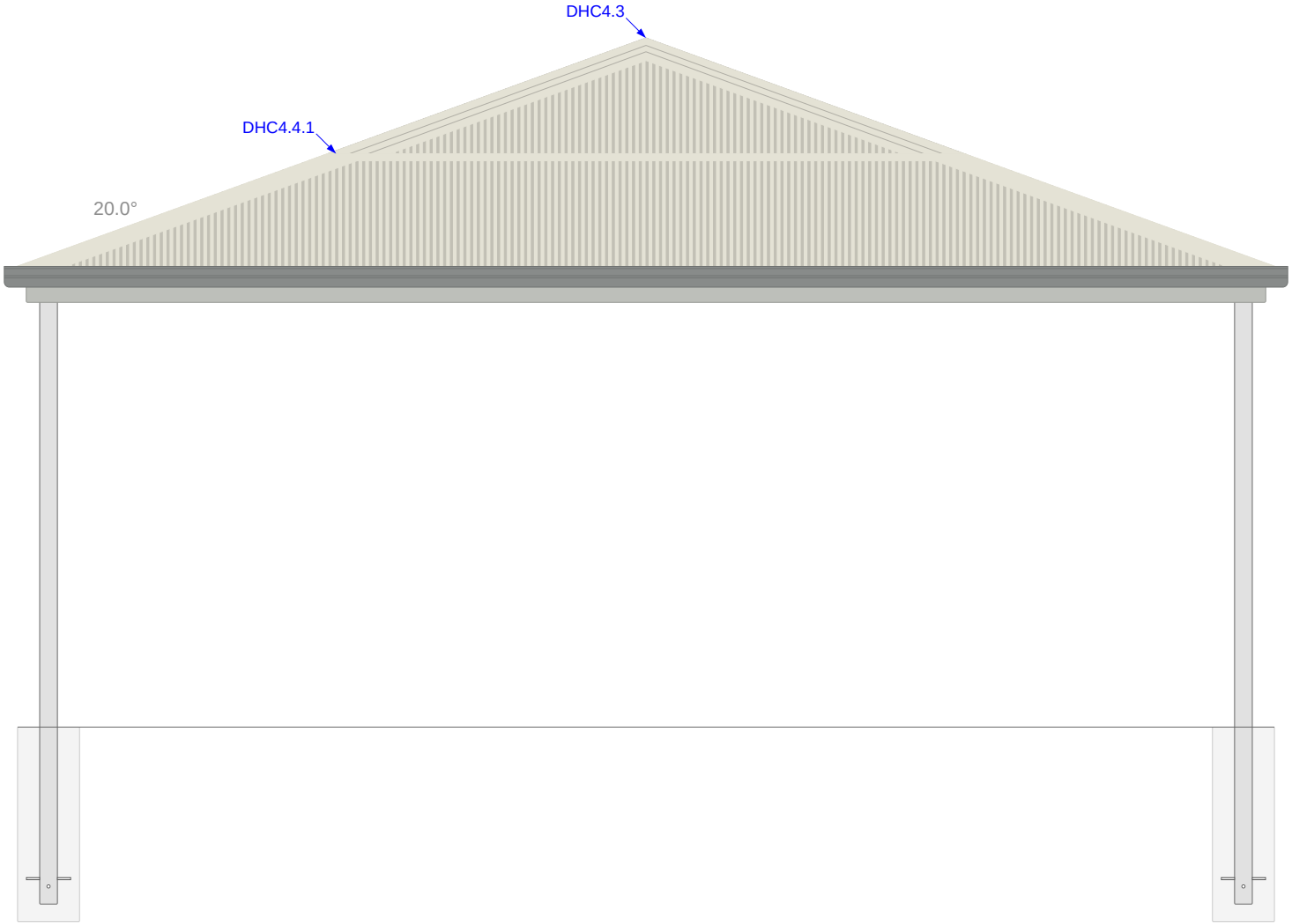
ADDRESS: Example Street, Suburb VIC 3333	DRAWN DATE: 2022-09-28	ISSUE: 1	SIZE: A4	SCALE: NTS	DRAWING NUMBER 5 of 26

Left View



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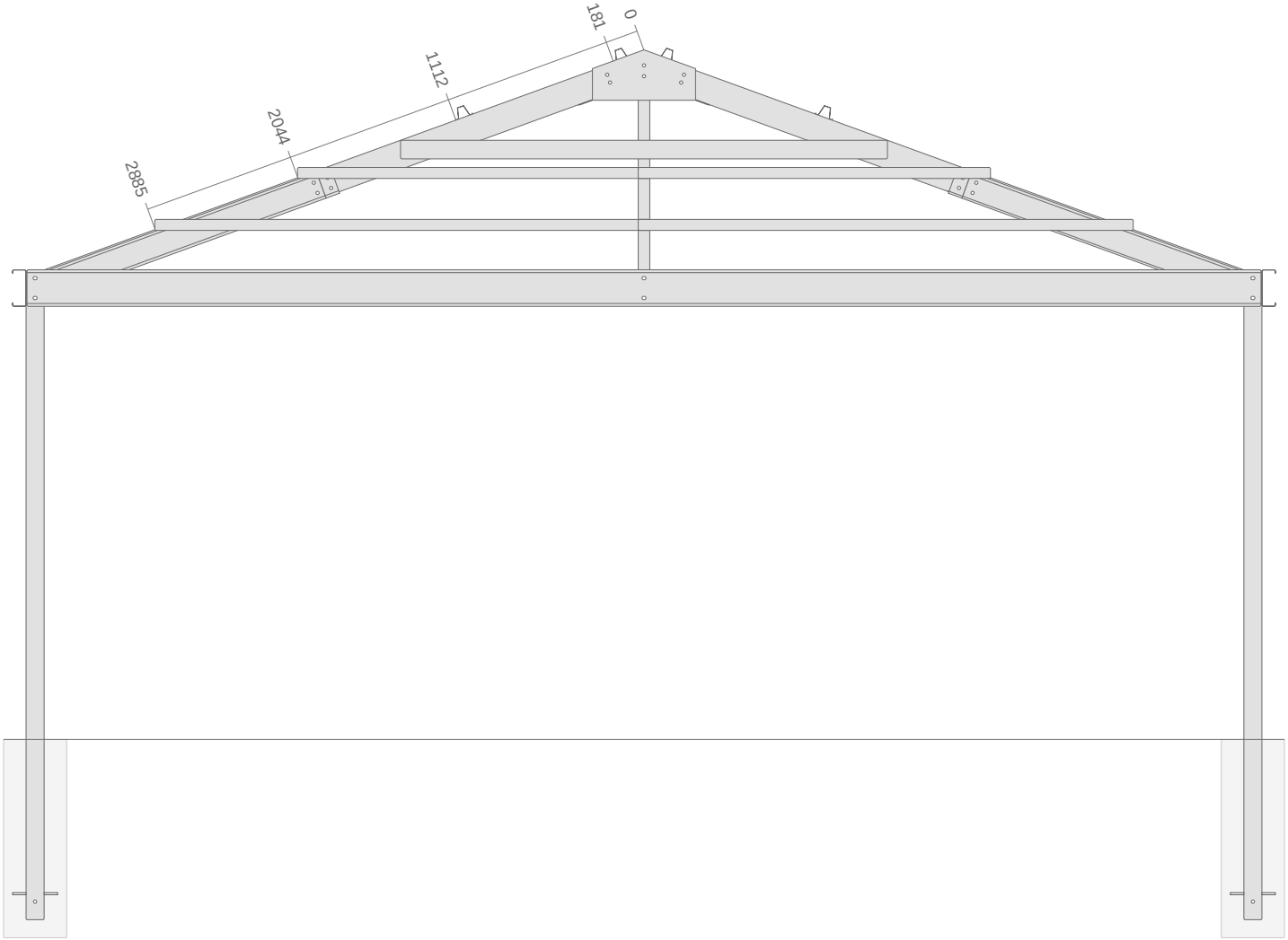
Left Elevation



Dutch Gable Infill Members: TH6110 Infill Girt @ 2698 mm & C15012 Mullion @ 487 mm

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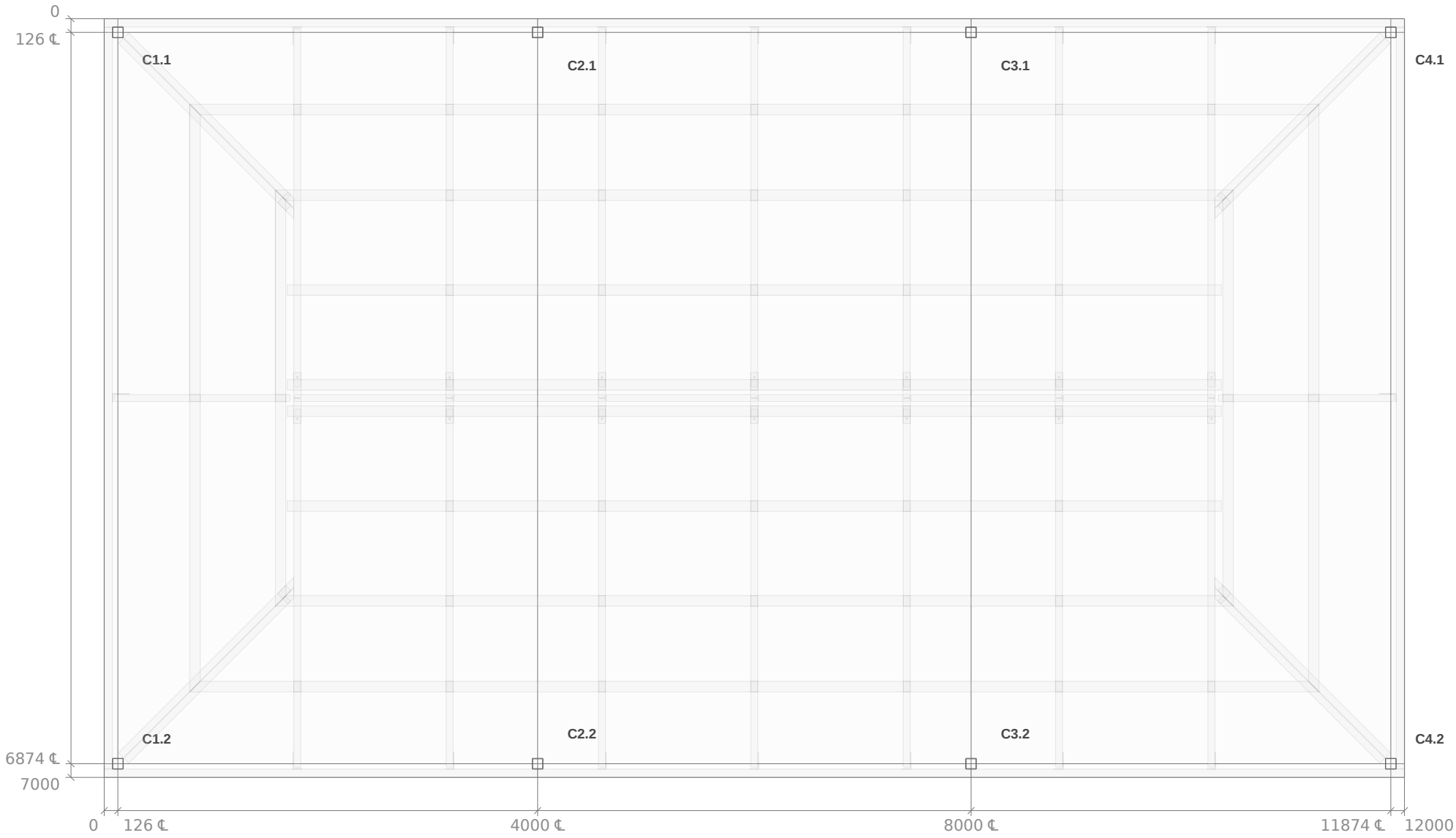

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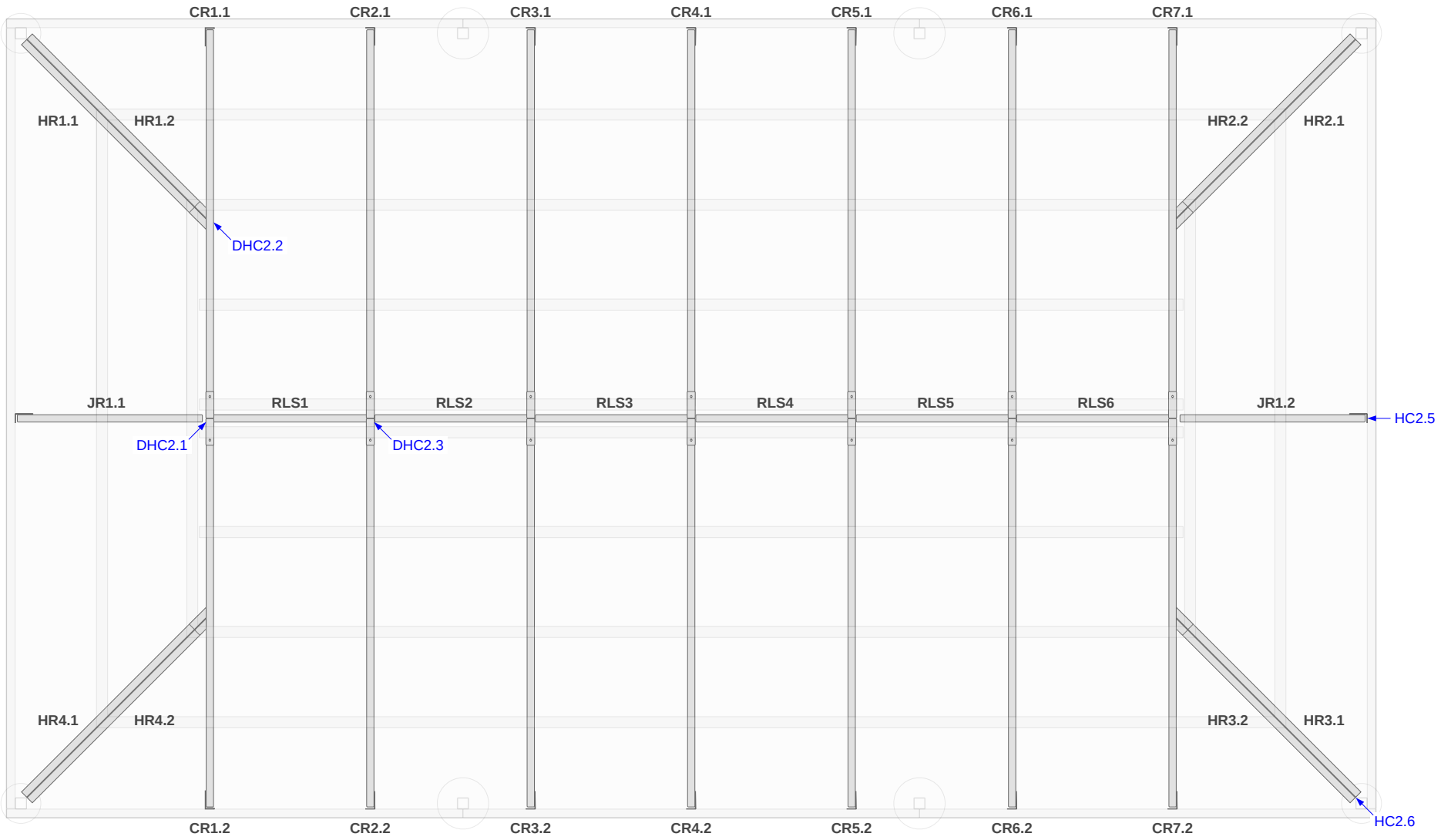
Rafter Layout



CR = Common Rafter · C15024 JR = Jack Rafter · C15012 Note: All Rafter to Fascia Connections
HR = Hip Rafter · C15012 RLS = Ridge Line Strut · C15012 Use Detail HC2.5 Above

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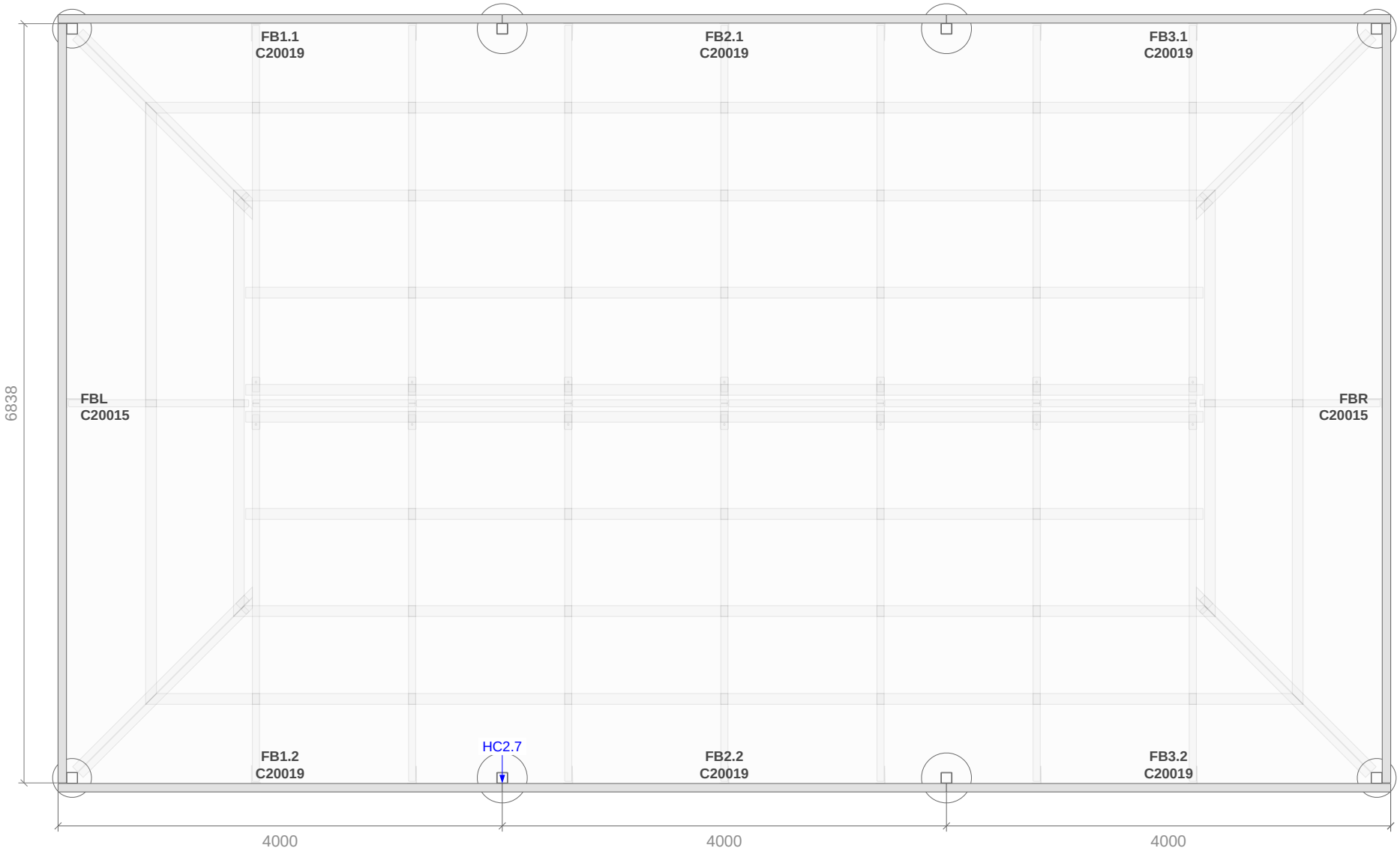

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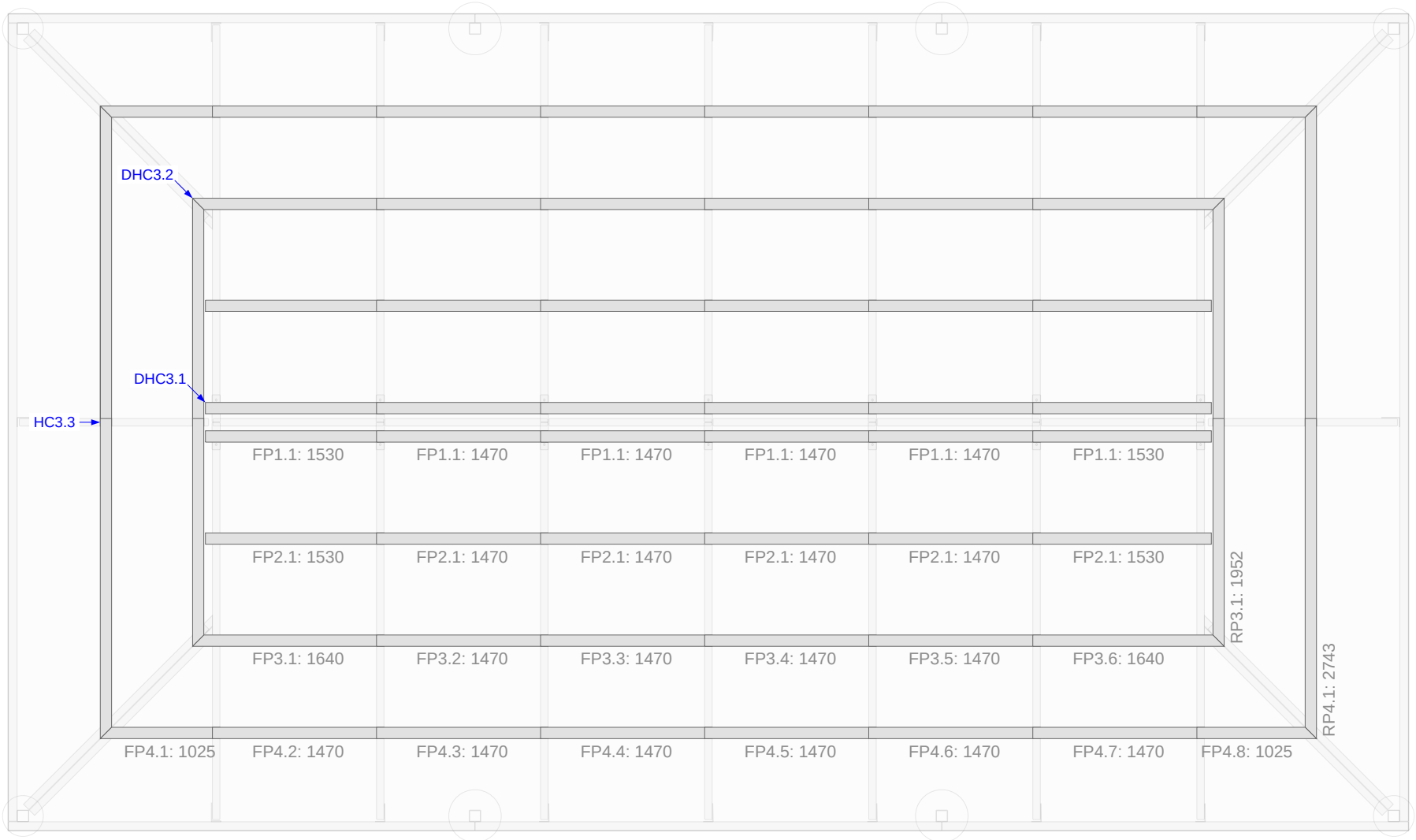

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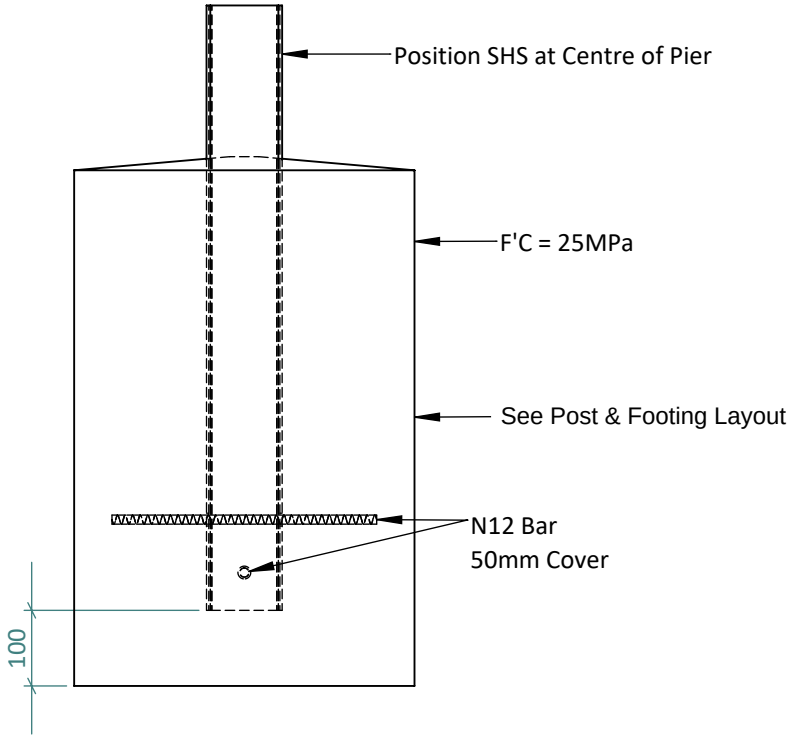
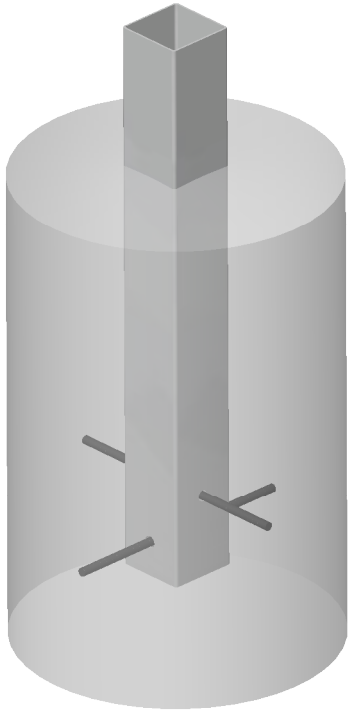
Video: Scan or Right-Click



ELEVATION



ISOMETRIC

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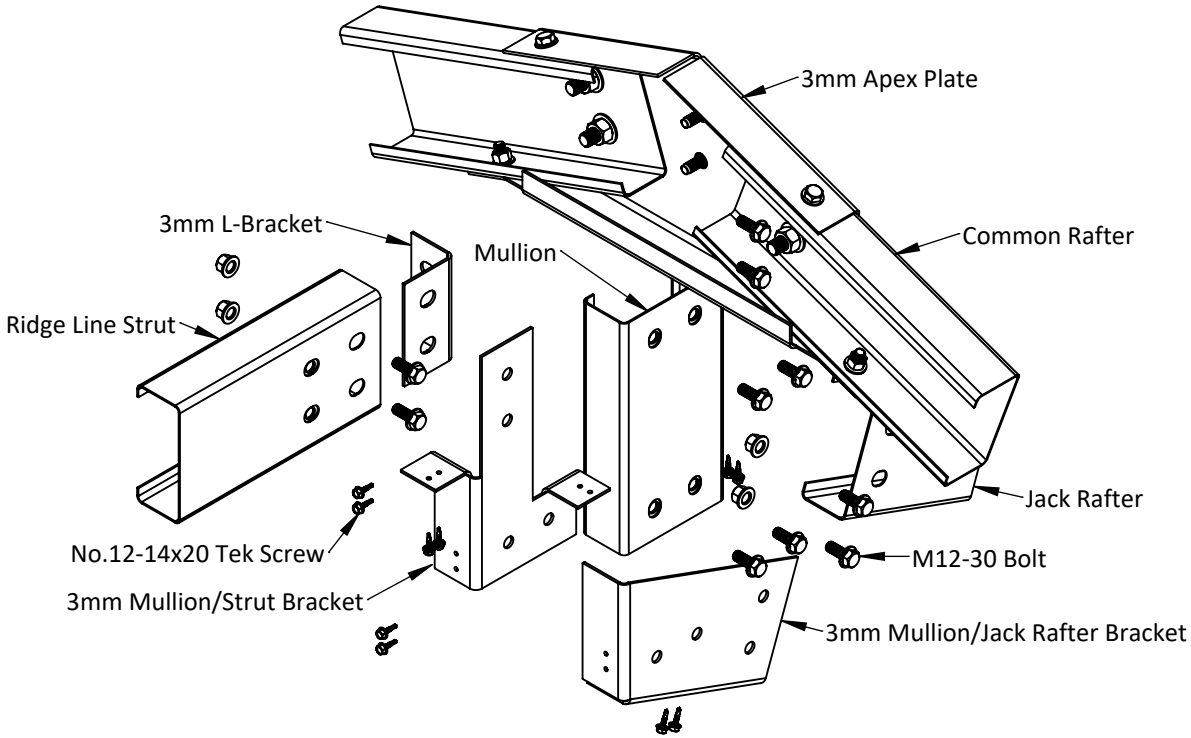
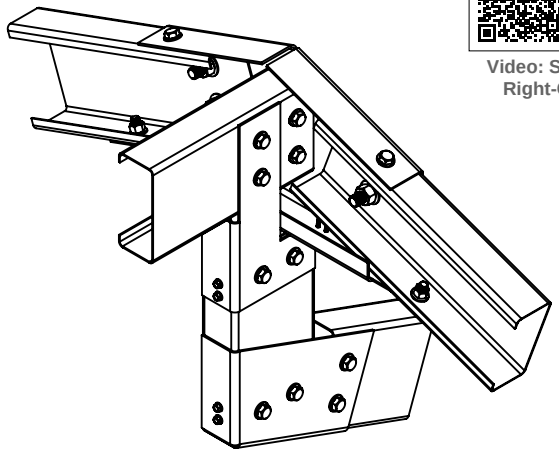
« Detail DHC2.1: Common Rafter Apex Connection Detail



EXPLODED VIEW

Video: Scan or Right-Click



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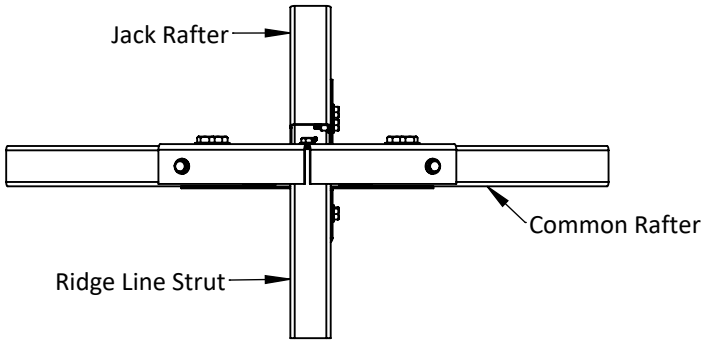
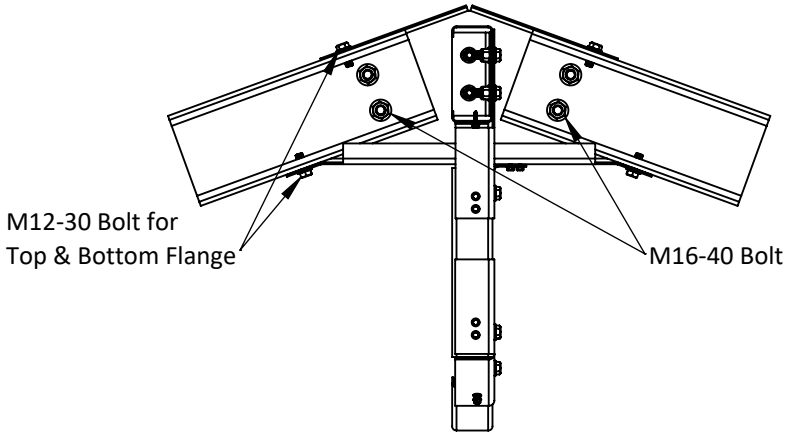


PLAN



ELEVATION

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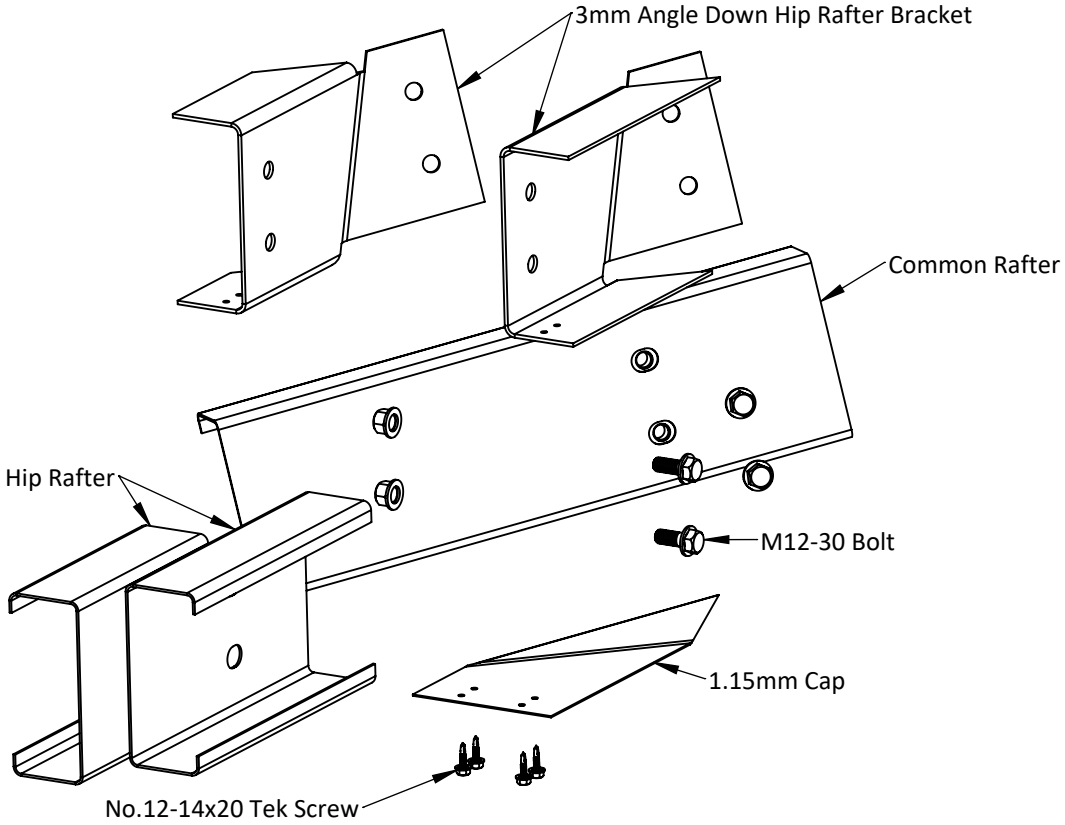
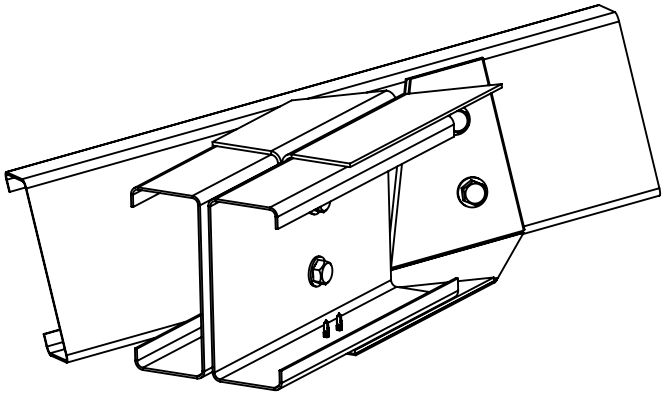
« Detail DHC2.2: Hip Rafters to Common Rafter Connection Detail

Video: Scan or Right-Click



EXPLODED VIEW



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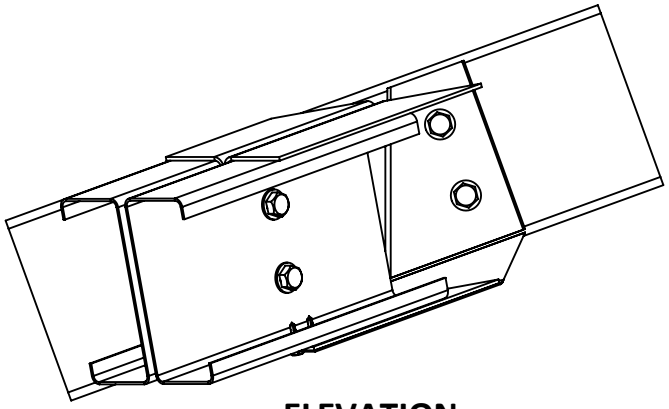
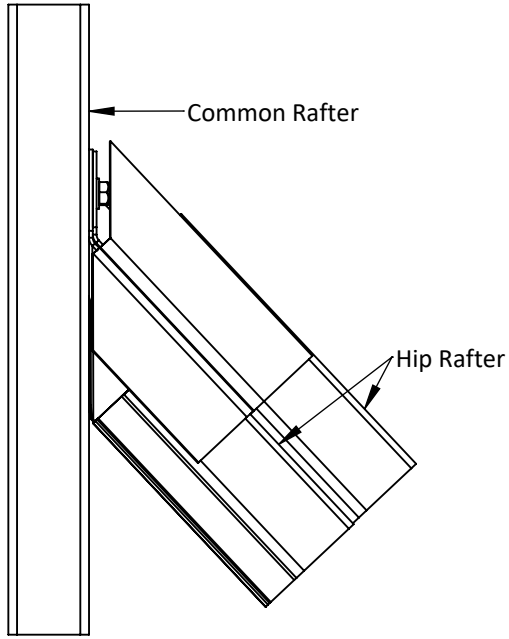


ELEVATION



PLAN

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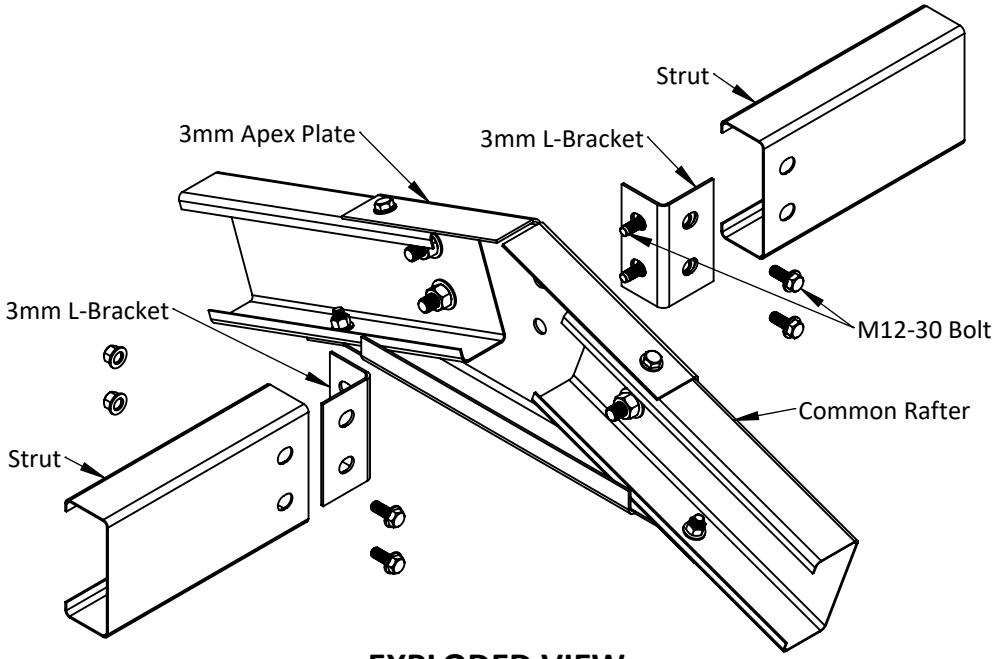
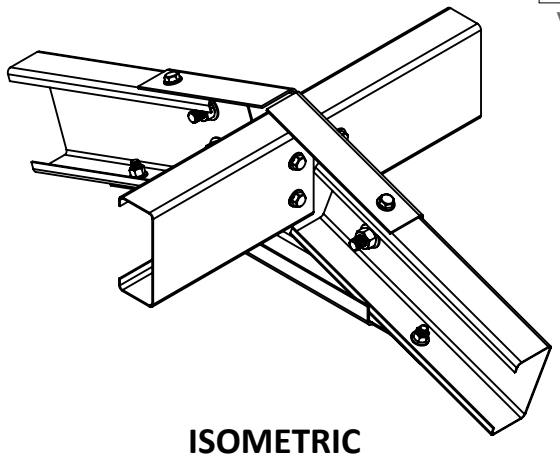
« Detail DHC2.3: Ridge Line Strut Apex Connection Detail

Video: Scan or Right-Click



EXPLODED VIEW



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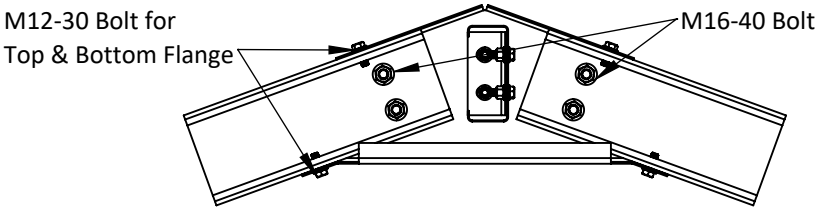

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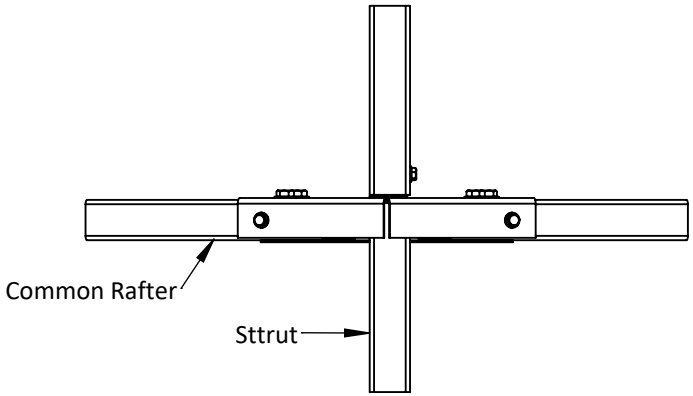

PLAN

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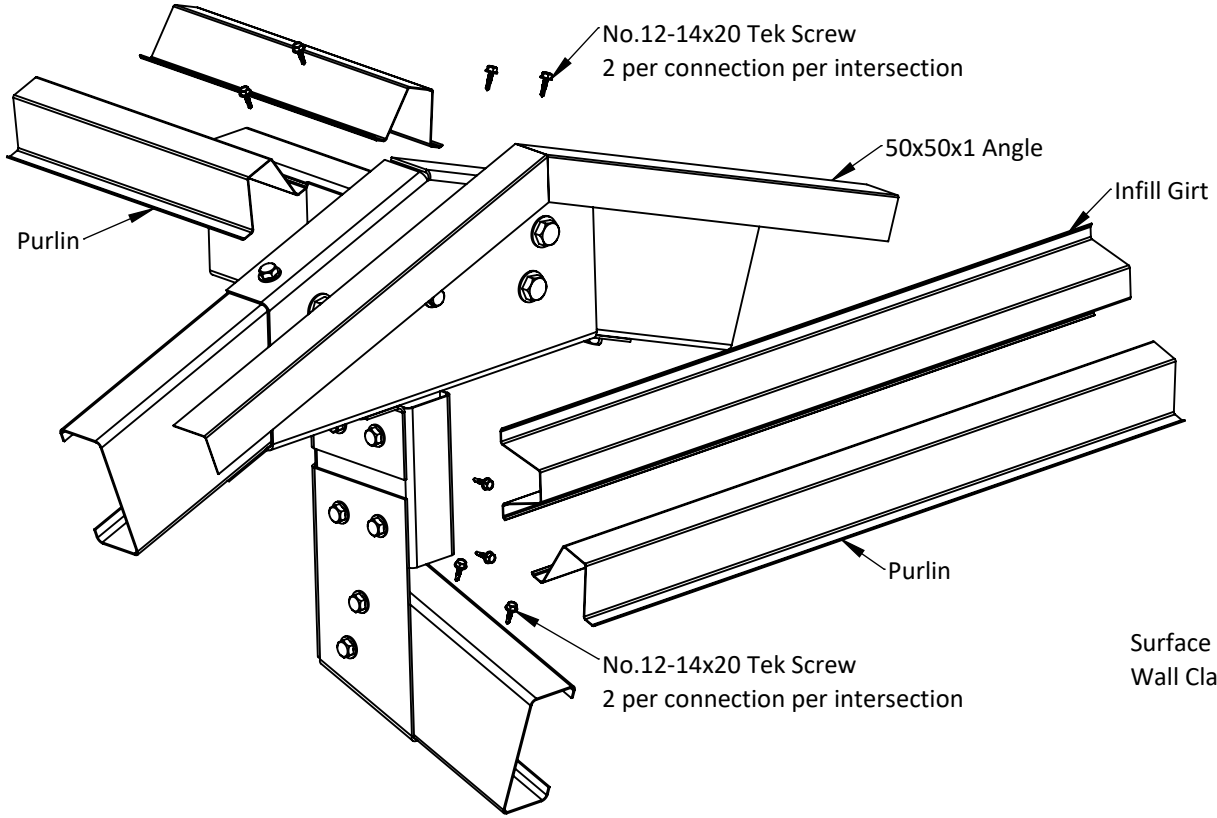
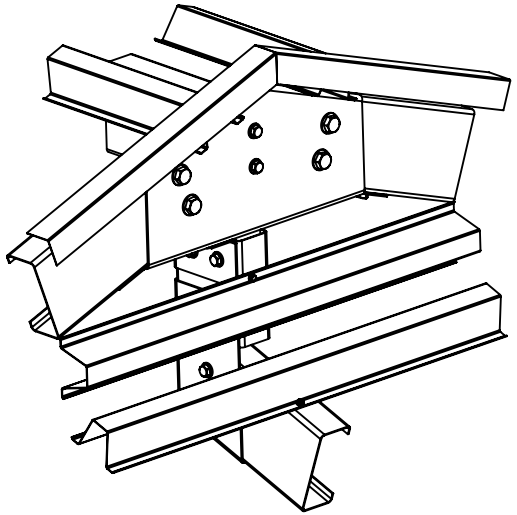
« Detail DHC3.1: Apex Purlin Connection Detail

Video: Scan or Right-Click



EXPLODED VIEW



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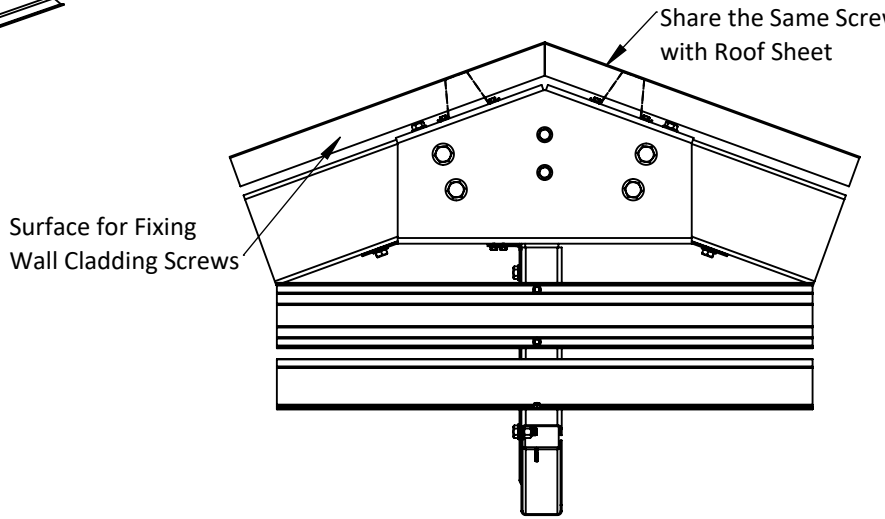

ELEVATION

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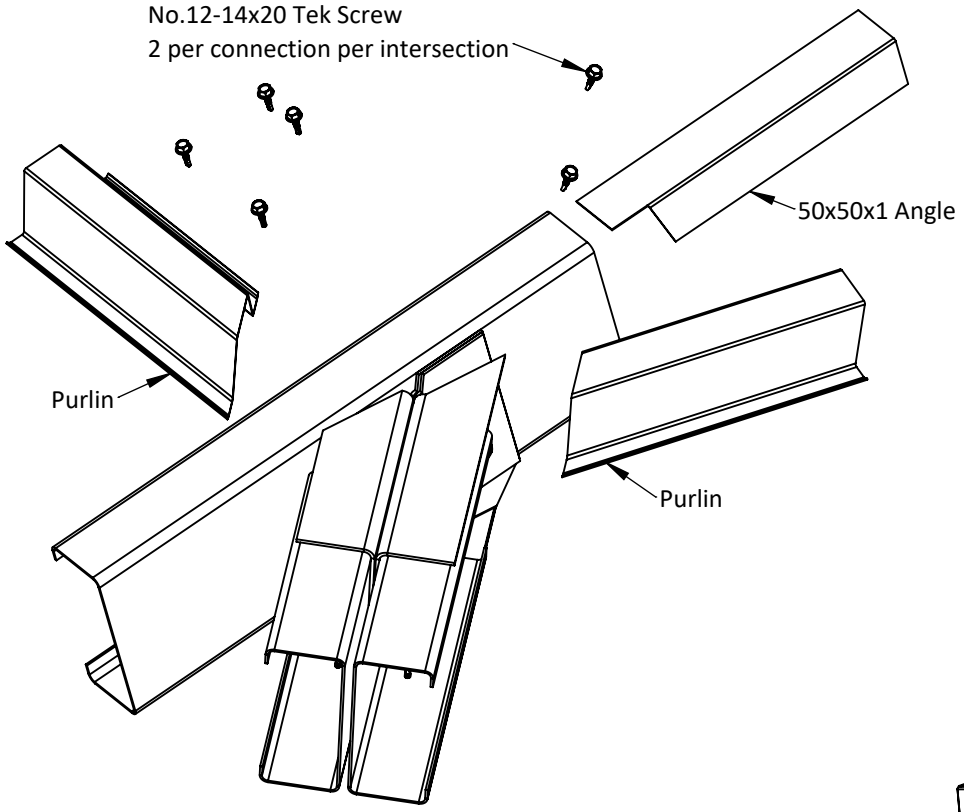
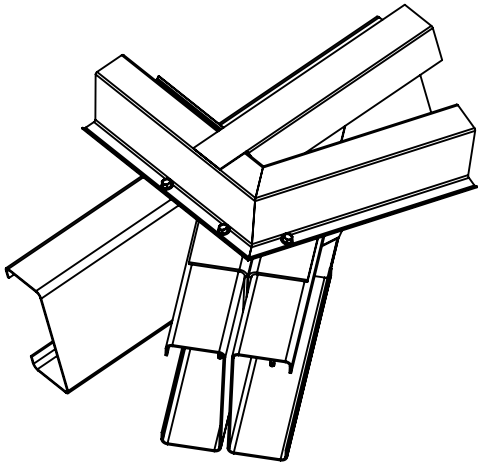
« Detail DHC3.2: Purlin Connection Detail

Video: Scan or Right-Click



EXPLODED VIEW



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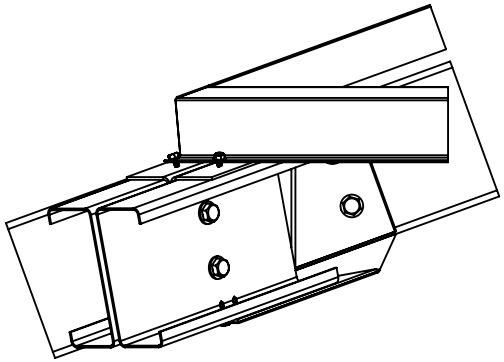

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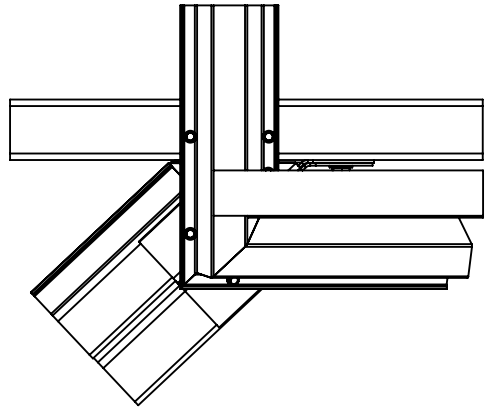

PLAN

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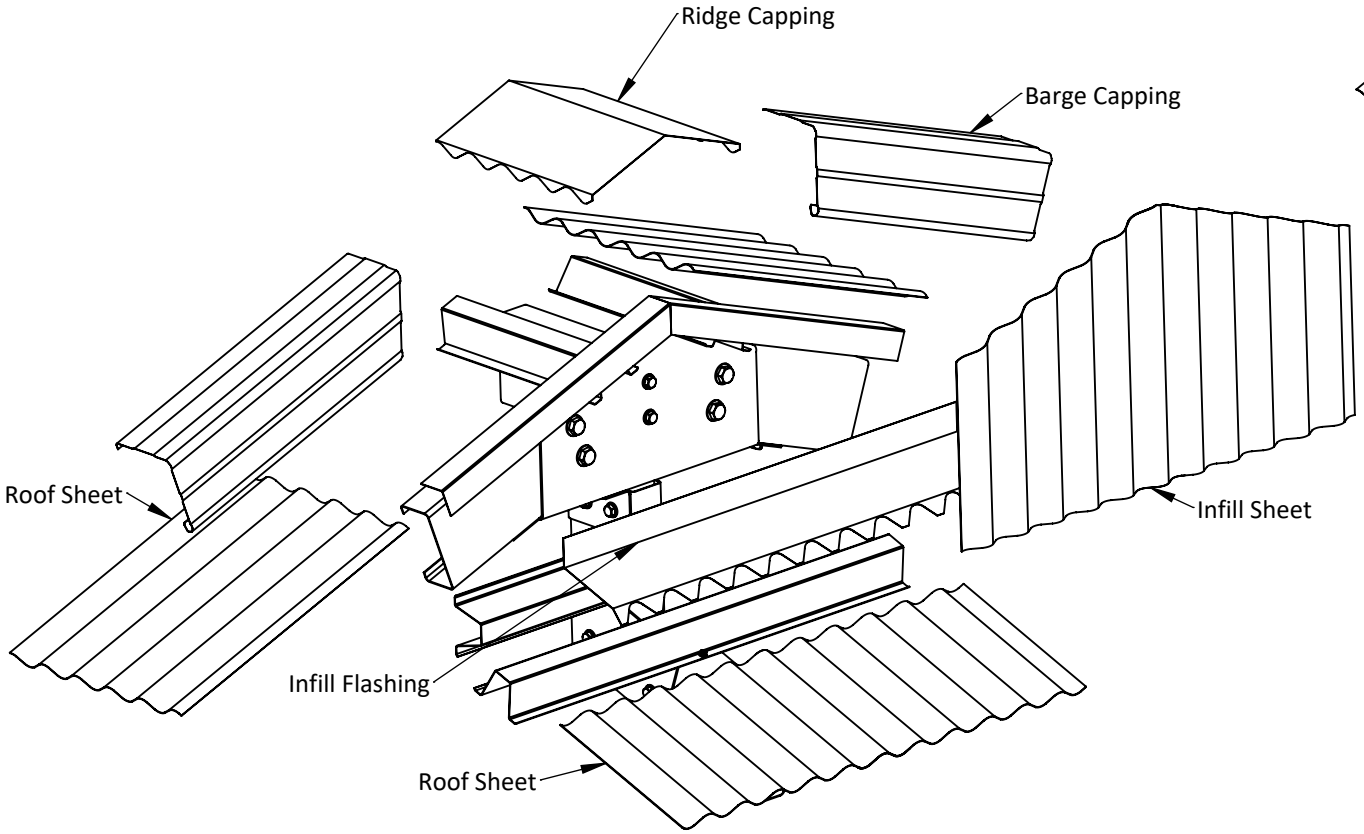
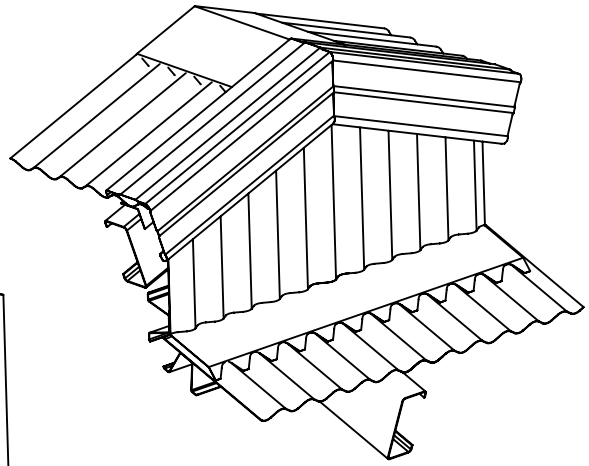
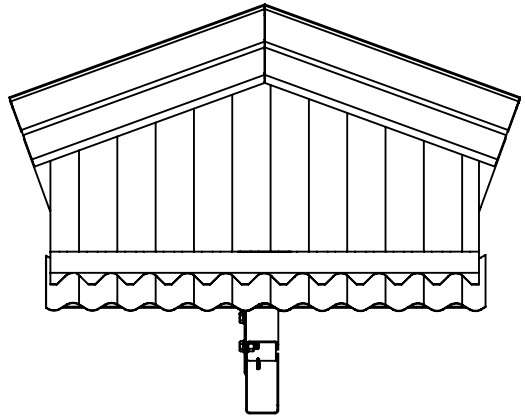
Video: Scan or Right-Click



EXPLODED VIEW



ISOMETRIC



ELEVATION

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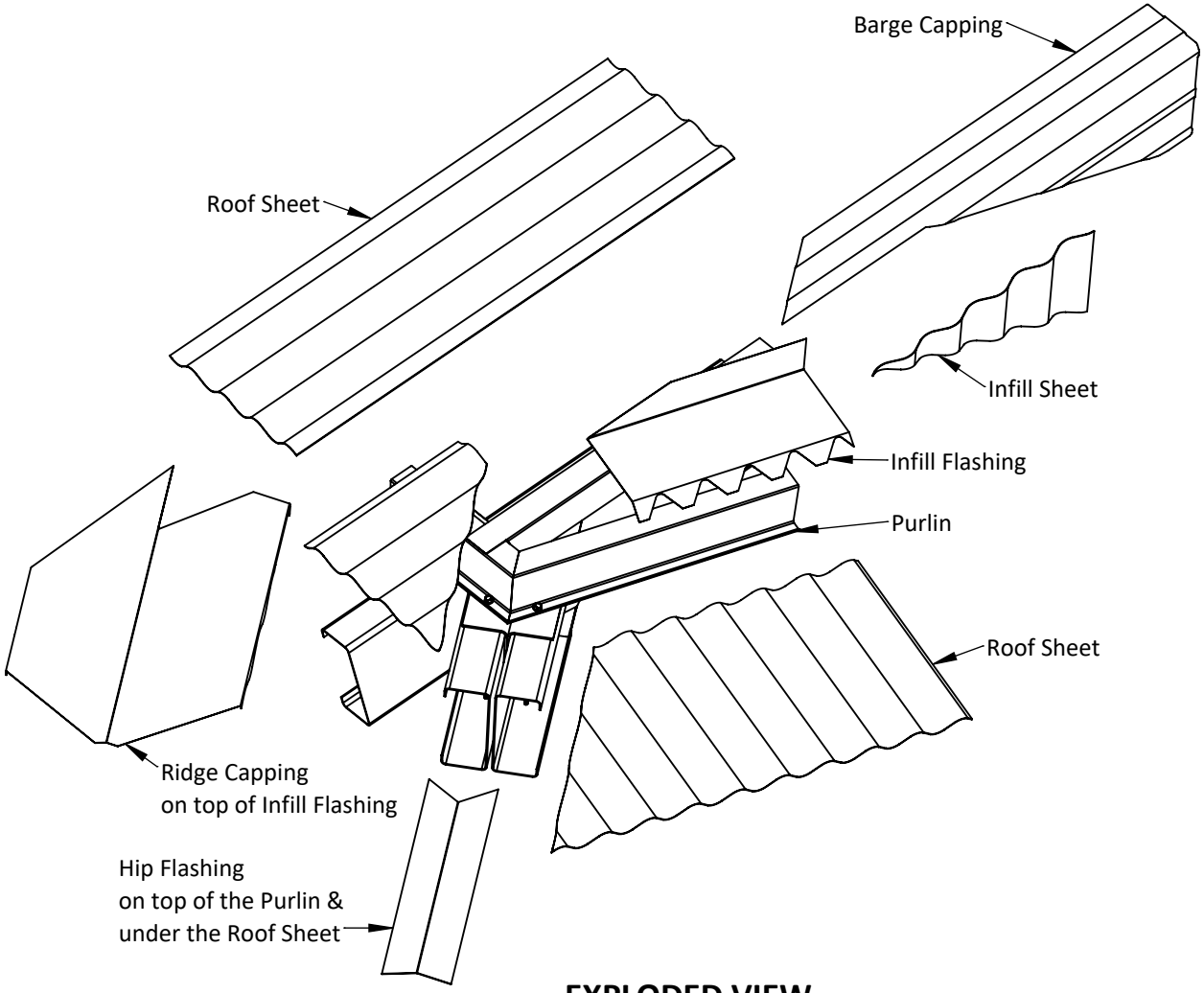
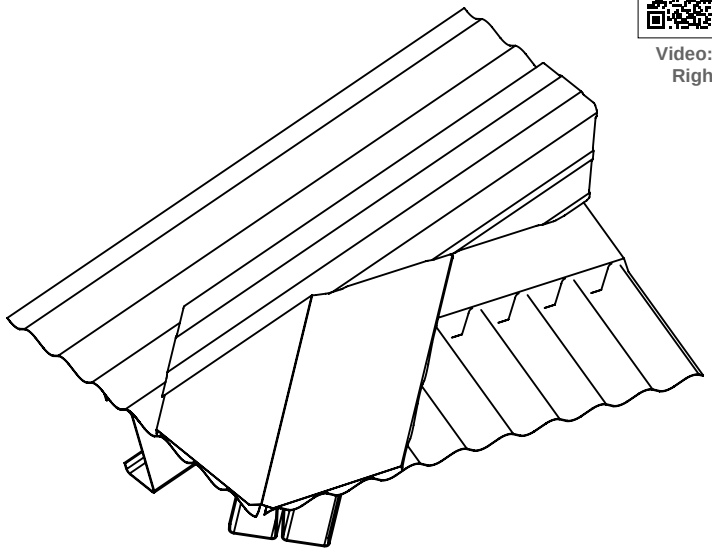
Video: Scan or Right-Click



EXPLODED VIEW



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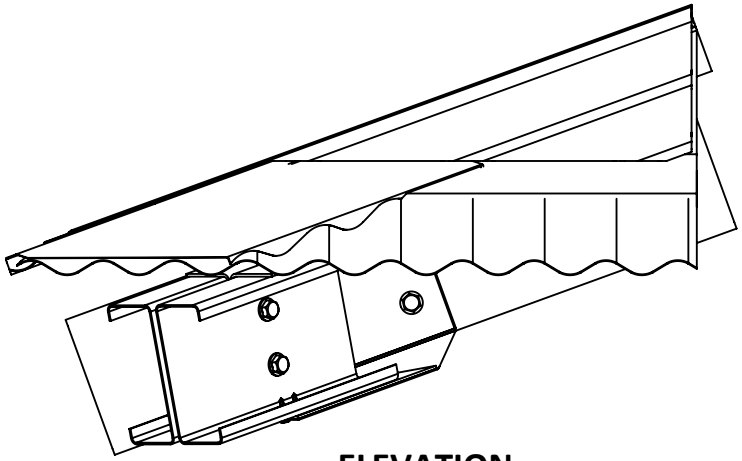

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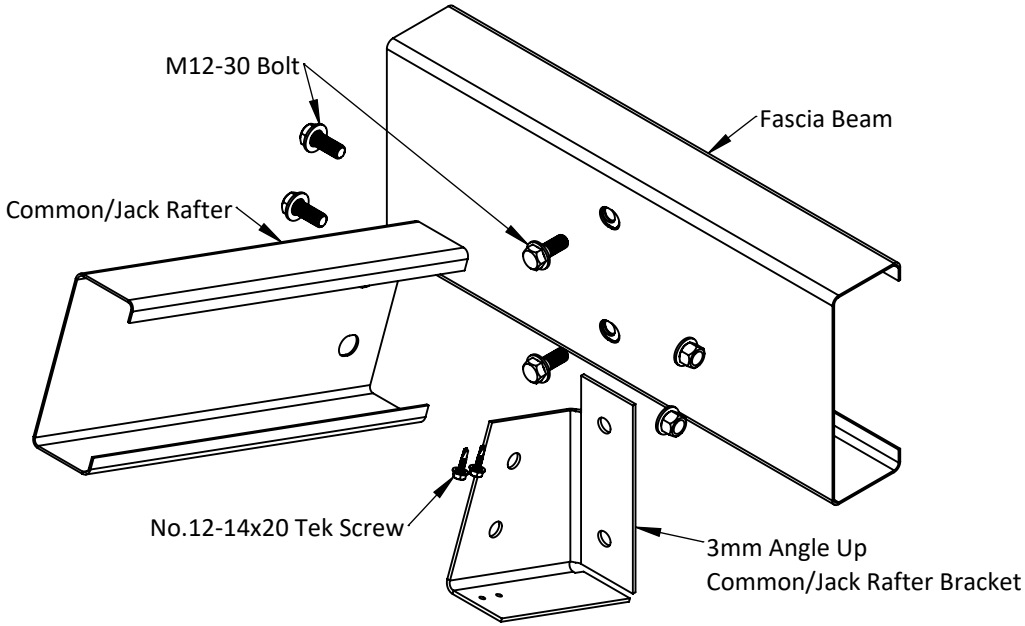
« Detail HC2.5: Common or Jack Rafter to Fascia Beam Connection Detail

Video: Scan or Right-Click



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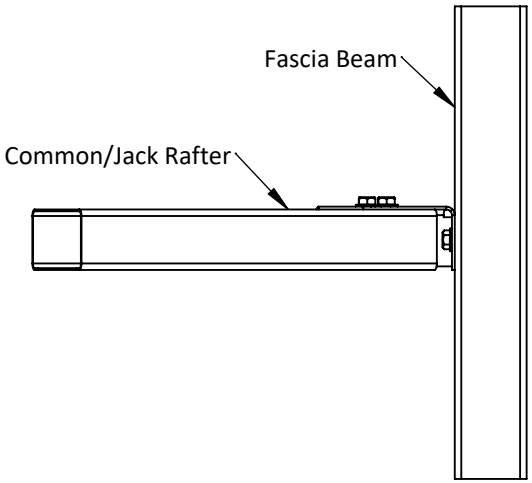
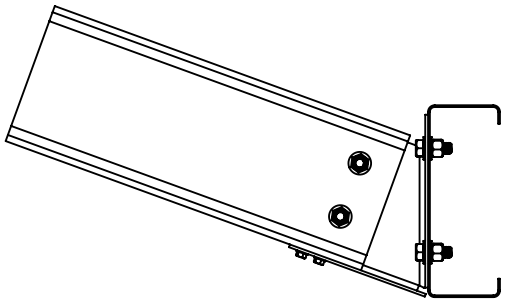


PLAN



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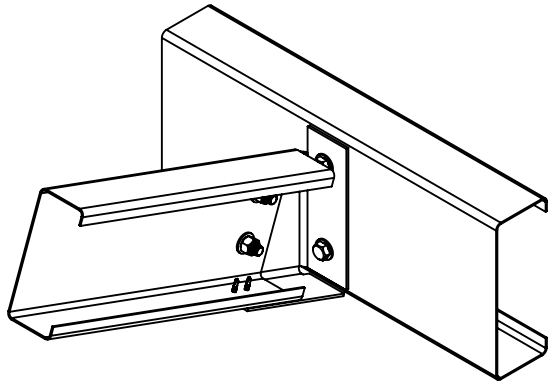

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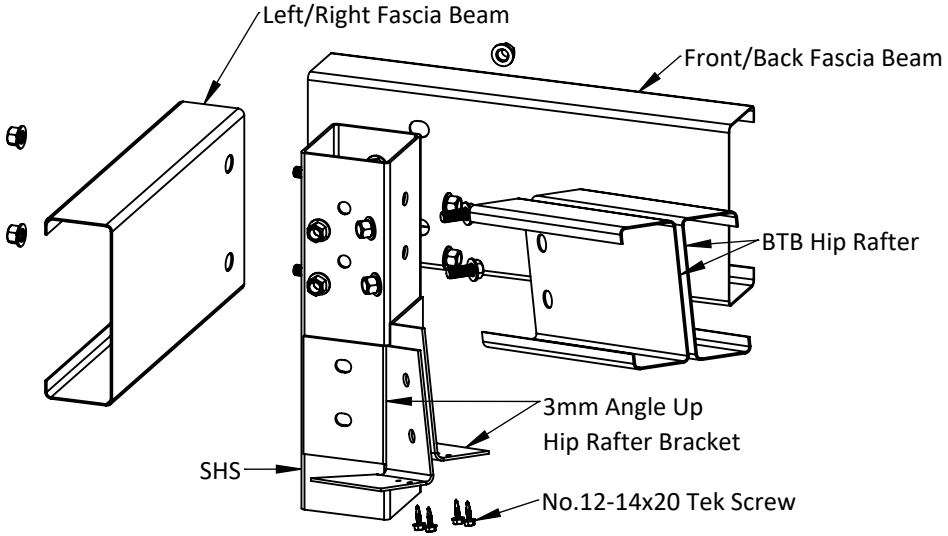
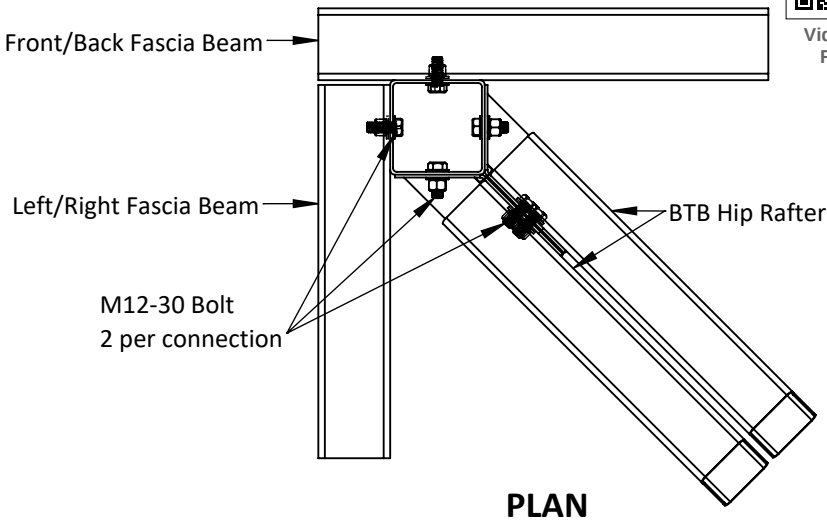
« Detail HC2.6: Hip Rafter to Post Connection Detail

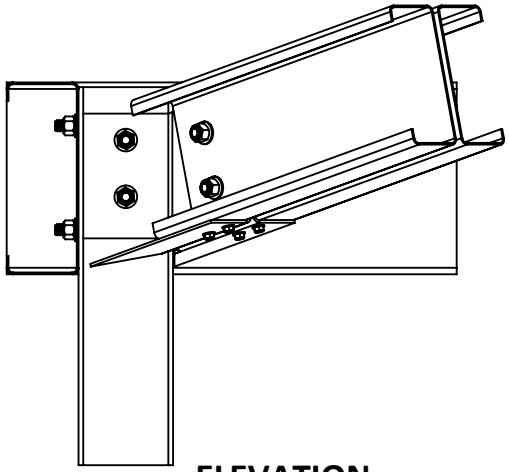
Video: Scan or Right-Click



EXPLODED VIEW



PLAN



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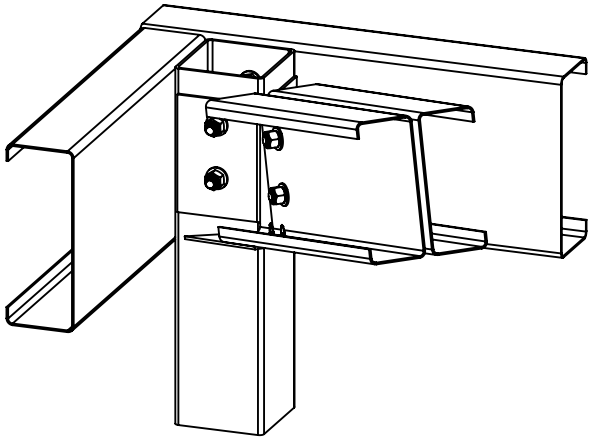

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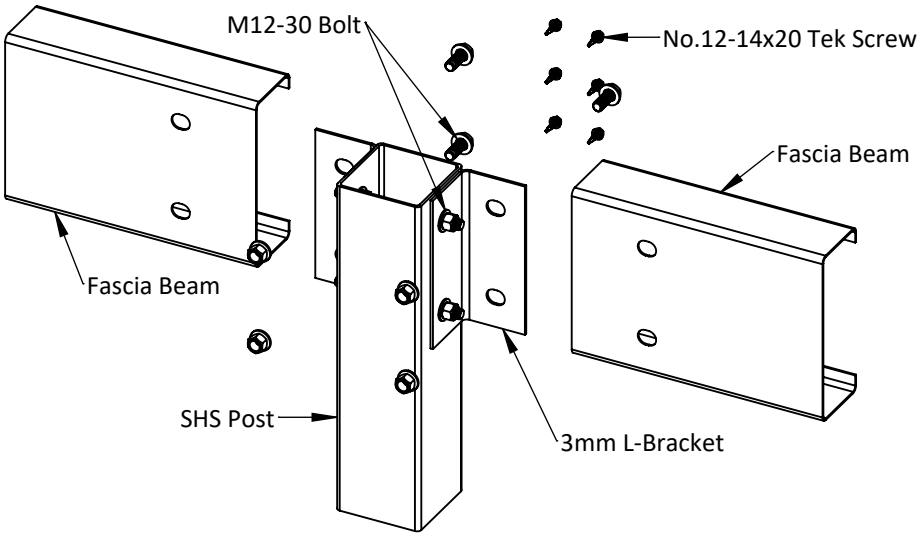
« Detail HC2.7: Fascia Beams to Post Connection Detail

Video: Scan or Right-Click



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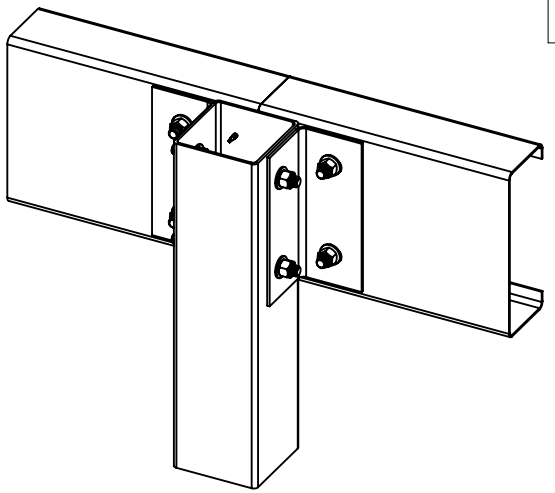

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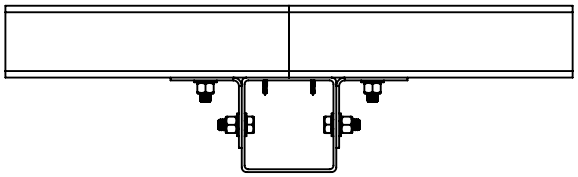
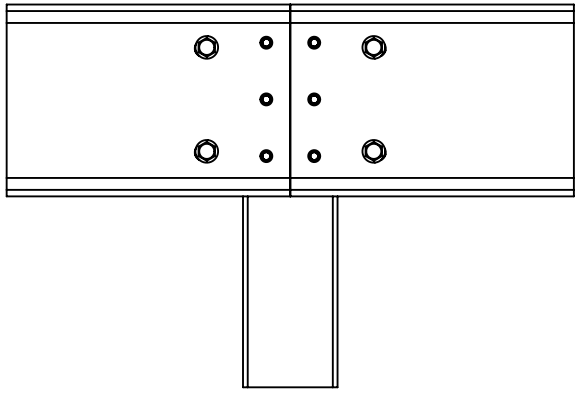


PLAN



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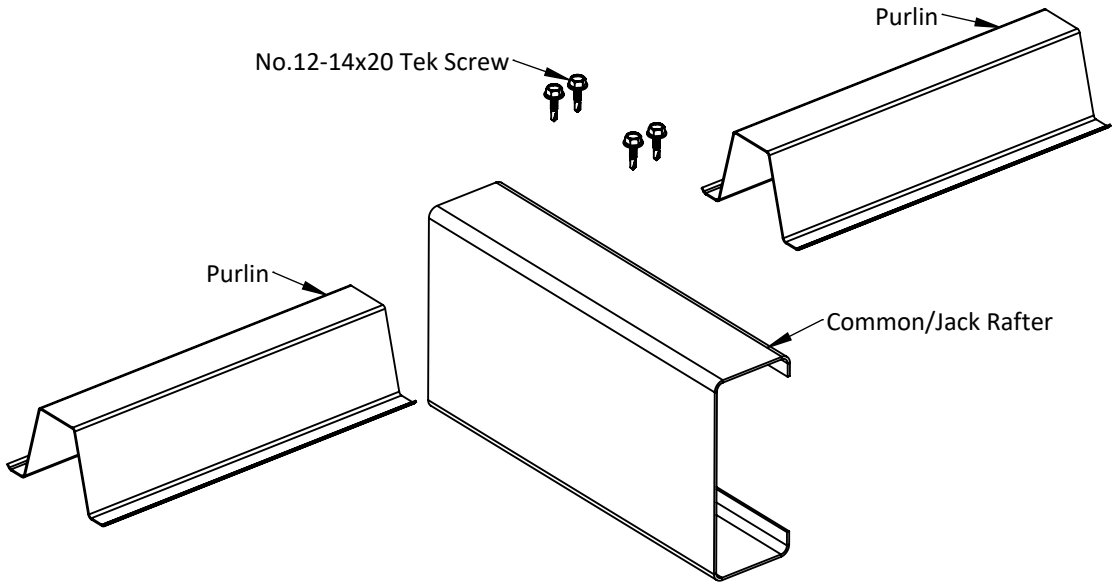
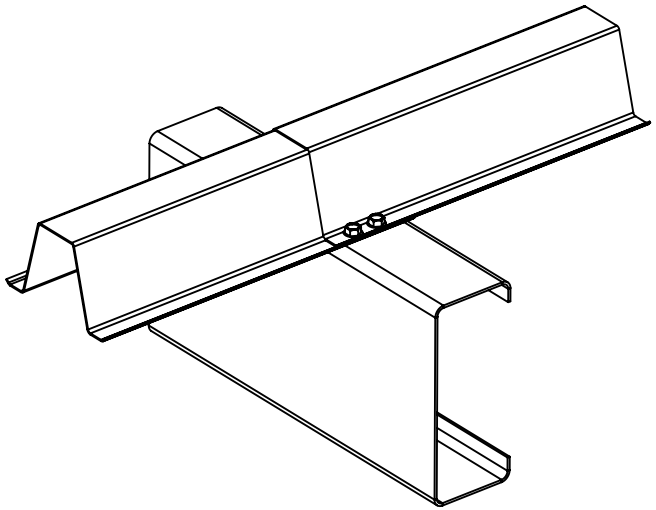
« Detail HC3.3: Lapped Purlin Connection Detail

Video: Scan or Right-Click



EXPLODED VIEW



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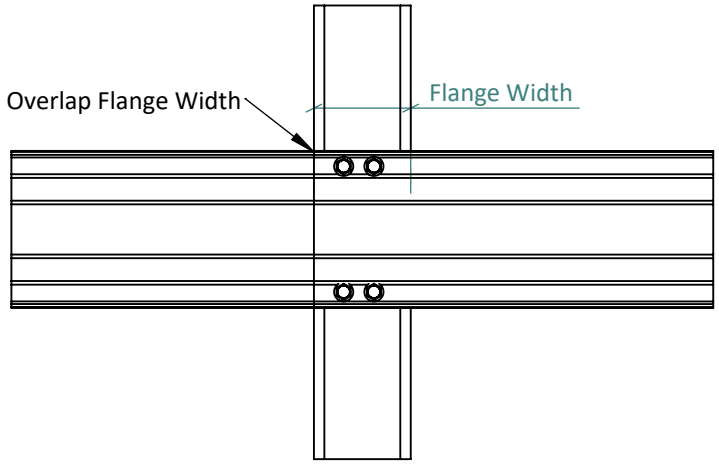

PLAN

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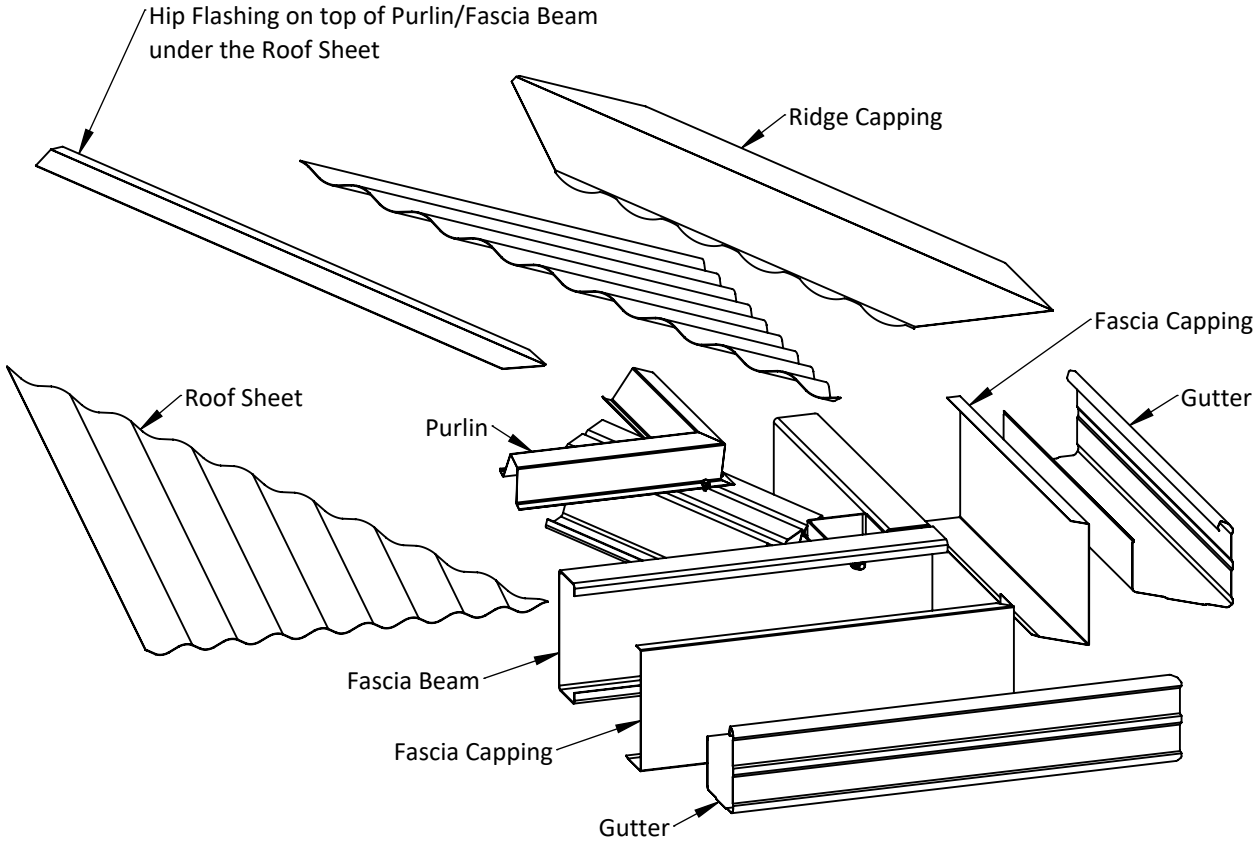
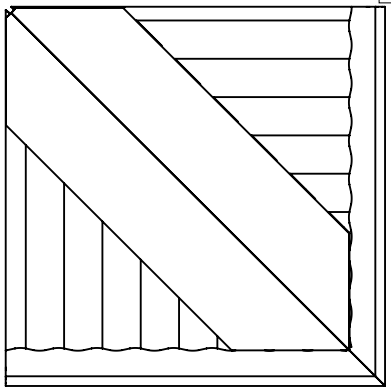
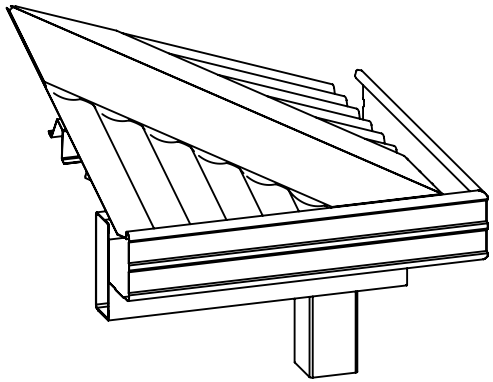


EXPLODED VIEW

Video: Scan or Right-Click



PLAN



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Technical Data

Region	**B1** · Regional Wind Speed 57 m/s
Terrain Category	**2.5**
Shielding	**No**
V_{design}	**47.11 m/s**
Q_u	**1.332 kPa**
Inward Load	**0.826 kPa** · max(0.495, 0.826, 0.12)
Outward Load	**0.616 kPa** · max(0.31, 0.616)

Roof, Rafter & Post Area Calculations

Fascia to Apex	**3725 mm**
Dutch End Area	**9.775 m²**
Front Elevation Area	**34.921 m²**
Gable Infill Area	**1.115 m²**
Post RF Load Area	**5.820 m²** · RF = Raking Force
Int Post RF Load Area	**11.640 m²** · Int = Internal
Post Uplift Area	**7.449 m²**
Int Post Uplift Area	**14.898 m²**

Post Calculations

Base Connection	**Cast In**
Min Yield Stress	**450 MPa** · Min = Minimum
Uplift · End Post · Inward	**6.153 kN**
Outward	**4.589 kN**
Int Post · Inward	**12.306 kN**
Outward	**9.177 kN**
RF · Front End Post · Req	**4.596 kN** · Req = Required
Front Int Post · Req	**9.191 kN**
Dutch End Post · Req	**2.337 kN**
ØM · End Post · Req	**11.030 kNm**
ØM	**13.900 kNm · 100x100x3** Source: OneSteel® DuraGal® Hollow Sections
Int Post · ØM Req	**22.058 kNm**
ØM	**25.700 kNm · 100x100x5** Source: OneSteel® DuraGal® Hollow Sections

Hip Rafter · HR · Calculations

Details · Member	**C15012**
Min Yield Stress · Grade · I_x	**500 MPa · G500 · 1.29 x 10^6mm⁴**
Gov Span · Load Width	**2103 mm · 1750 mm** · Gov = Governing
Capacity · Inward Req	**1.446 kN/m**
Outward Req	**1.078 kN/m**
Member Capacity	**6.400 kN/m** · min(Inward, Outward) Source: Lysaght® & Stramit® Span Tables
ØM · Inward Req	**0.799 kNm**
Inward ØM	**5.310 kNm** · L_{ex} 2103 · L_{ey} 841 · L_{ez} 2103
Outward Req	**0.596 kNm**
Outward ØM	**5.310 kNm** · L_{ex} 2103 · L_{ey} 2103 · L_{ez} 2103
Deflection	**0.2 mm** · 7.0 mm Permitted

Ridge Line Strut · RLS · Calculations

Details · Member	**C15012**
Min Yield Stress · Grade · I_x	**500 MPa · G500 · 1.29 x 10^6mm⁴**
Gov Span	**1390 mm**
Compression Force	
RF Req	**1.485 kN**
Member L Compression	**40.123 kN** · L_{ex} 1390 · L_{ey} 1390 · L_{ez} 1390

Common Rafter · CR · Calculations

Details · Member	**C15024** with 1 row of Bridging
Min Yield Stress · Grade · I_x	**450 MPa · G450 · 2.54 x 10^6mm⁴**
Gov Span · Load Width	**6680 mm · 703 mm**
Capacity · Inward Req	**0.581 kN/m**
Outward Req	**0.433 kN/m**
Member Capacity	**7.520 kN/m** · min(Inward, Outward) Source: Lysaght® & Stramit® Span Tables
ØM · Inward Req	**10.264 kNm**
Inward ØM	**12.434 kNm** · L_{ex} 3395 · L_{ey} 931 · L_{ez} 1747
Outward Req	**7.650 kNm**
Outward ØM	**12.030 kNm** · L_{ex} 3395 · L_{ey} 1747 · L_{ez} 1747
Deflection	**11.5 mm** · 22.3 mm Permitted

Internal Common Rafter · ICR · Calculations

Details · Member	**C15024**
Min Yield Stress · Grade · I_x	**450 MPa · G450 · 2.54 x 10^6mm⁴**
Gov Span · Load Width	**6680 mm · 1406 mm**
Capacity · Inward Req	**1.161 kN/m**
Outward Req	**0.866 kN/m**
Member Capacity	**4.090 kN/m** · min(Inward, Outward) Source: Lysaght® & Stramit® Span Tables
ØM · Inward Req	**6.476 kNm**
Inward ØM	**12.241 kNm** · L_{ex} 3395 · L_{ey} 931 · L_{ez} 3395
Outward Req	**4.830 kNm**
Outward ØM	**5.497 kNm** · L_{ex} 3395 · L_{ey} 3395 · L_{ez} 3395
Deflection	**7.2 mm** · 22.3 Permitted

Jack Rafter · JR · Calculations

Details · Member	**C15012**
Min Yield Stress · Grade · I_x	**500 MPa · G500 · 1.29 x 10^6mm⁴**
Gov Span · Load Width	**1646 mm · 1750 mm**
Capacity · Inward Req	**1.446 kN/m**
Outward Req	**1.078 kN/m**
Member Capacity	**8.460 kN/m** · min(Inward, Outward) Source: Lysaght® & Stramit® Span Tables
ØM · Inward Req	**0.490 kNm**
Inward ØM	**5.310 kNm** · L_{ex} 1646 · L_{ey} 841 · L_{ez} 1646
Outward Req	**0.365 kNm**
Outward ØM	**5.310 kNm** · L_{ex} 1646 · L_{ey} 1646 · L_{ez} 1646
Deflection	**0.1 mm** · 5.5 Permitted

Governing Purlin Calculations

Dutch End Purlin	**TH6110**
Min Yield Stress · Grade · I_x	**550 MPa · G550 · 0.16 x 10^6mm⁴**
Gov Span · Load Width	**2630 mm · 841 mm**
Capacity · Inward Req	**1.042 kN/m**
Inward Capacity	**1.550 kN/m** · Single Span @ 3000mm Source: Lysaght® & Stramit® Span Tables
Outward Req	**0.777 kN/m**
Outward Capacity	**1.380 kN/m** · Single Span @ 3000 mm · Minimum Support Thickness of 1.2 mm BMT · 2 x No. 12 Tek Screws Source: Lysaght® & Stramit® Span Tables
Deflection	**1.7 mm** · 8.8 mm Permitted
Non-Dutch End Purlin	**TH6110**
Min Yield Stress · Grade · I_x	**550 MPa · G550 · 0.16 x 10^6mm⁴**
Gov Span · Load Width	**1376 mm · 931 mm**
Capacity · Inward Req	**1.154 kN/m**
Inward Capacity	**5.520 kN/m** · Single Span @ 1500mm Source: Lysaght® & Stramit® Span Tables
Outward Req	**0.860 kN/m**
Outward Capacity	**3.630 kN/m** · Single Span @ 1500 mm · Minimum Support Thickness of 1.2 mm BMT · 2 x No. 12 Tek Screws Source: Lysaght® & Stramit® Span Tables
Deflection	**0.1 mm** · 4.6 mm Permitted

Dutch End Fascia Beam Calculations

Member	**C20015**
Min Yield Stress · Grade · I_x	**450 MPa · G450 · 3.53 x 10^6mm⁴**
Gov Span	**6748 mm**
Concentrated Load	**One Point Load at 3374 mm**
Capacity · Inward Req	**0.399 kN/m**
Outward Req	**0.298 kN/m**
Member Capacity	**1.010 kN/m** · 1 row of Bridging · Span @ 6900 mm Source: Lysaght® and Stramit® Span Tables
ØM · Inward Req	**2.271 kNm**
Outward Req	**1.694 kNm**
ØM	**6.487 kNm** · L_{ex} 6748 · L_{ey} 3374 · L_{ez} 3374
Deflection	**2.6 mm** · 22.5 mm Permitted

Fascia Beam Calculations for FB1.1 & FB1.2

Details · Member	**C20019** with 2 rows of Bridging
Min Yield Stress · Grade · I_x	**450 MPa · G450 · 4.51 x 10^6mm⁴**
Gov Span	**3784 mm**
Concentrated Loads	**2 Point Loads at 1656 & 3062 mm**
Capacity · Inward Req	**3.004 kN/m**
Outward Req	**2.239 kN/m**
Member Capacity	**6.660 kN/m** · 2 rows of Bridging · Span @ 3900 mm Source: Lysaght® & Stramit® Span Tables
ØM · Inward Req	**5.377 kNm**
Outward Req	**4.008 kNm**
ØM	**14.823 kNm** · L_{ex} 3784 · L_{ey} 1656 · L_{ez} 1656
Deflection	**0.8 mm** · 12.6 mm Permitted

Fascia Beam Calculations for FB2.1 & FB2.2

Details · Member	**C20019** with 3 rows of Bridging
Min Yield Stress · Grade · I_x	**450 MPa · G450 · 4.51 x 10^6mm⁴**
Gov Span	**3820 mm**
Concentrated Loads	**3 Point Loads at 504, 1910 & 3316 mm**
Capacity · Inward Req	**3.102 kN/m**
Outward Req	**2.314 kN/m**
Member Capacity	**6.660 kN/m** · 3 rows of Bridging · Span @ 3900 mm Source: Lysaght® & Stramit® Span Tables
ØM · Inward Req	**5.658 kNm**

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Outward Req	**4.22 kNm**
ØM	**14.823 kNm** · L_{ex} 3820 · L_{ey} 1406 · L_{ez} 1406
Deflection	**1.1 mm** · 12.7 mm Permitted

Fascia Beam Calculations for FB3.1 & FB3.2

Details · Member	**C20019** with 2 rows of Bridging
Min Yield Stress · Grade · I_x	**450 MPa · G450 · 4.51 x 10^6mm^4**
Gov Span	**3784 mm**
Concentrated Loads	**2 Point Loads at 722 & 2128 mm**
Capacity · Inward Req	**4.477 kN/m**
Outward Req	**3.337 kN/m**
Member Capacity	**6.660 kN/m** · 2 rows of Bridging · Span @ 3900 mm Source: Lysaght® & Stramit® Span Tables
ØM · Inward Req	**8.013 kNm**
Outward Req	**5.973 kNm**
ØM	**14.823 kNm** · L_{ex} 3784 · L_{ey} 1656 · L_{ez} 1656
Deflection	**0.6 mm** · 12.6 mm Permitted

Cladding Details

Product	**BlueScope® Colorbond®**
Min Yield Stress · Grade	**550 MPa · G550**
Profile	**CustomOrb®**
BMT	**0.42 mm**

End Posts Bored Piers

ØM · M_u	**11.03 kNm**
Uplift · V_u	**4.589 kN**
Shear · H_u	**4.596 kN**
Dimensions	**350 mm diameter x 1100 mm deep**

Internal Posts Bored Piers

ØM · M_u	**22.058 kNm**
Uplift · V_u	**9.178 kN**
Shear · H_u	**9.191 kN**
Dimensions	**450 mm diameter x 1300 mm deep**

Connection Calculations

Connection Type	**Hip Rafter to Post**
Components	**2 x M12 4.6/S Bolts**
Capacity Req	**3.041 kN**
Capacity	**30.2 kN** · 2 x M12 4.6/S Shear Capacity
Connection Type	**Common Rafter to Fascia**
Components	**2 x M12 4.6/S Bolts**
Capacity Req	**5.577 kN**
Capacity	**30.2 kN** · 2 x M12 4.6/S Shear Capacity
Connection Type	**Internal Common Rafter to Fascia**
Components	**2 x M12 4.6/S Bolts**
Capacity Req	**3.878 kN**
Capacity	**30.2 kN** · 2 x M12 4.6/S Shear Capacity
Connection Type	**L/R Fascia Beam to Post**
Components	**2 x M12 4.6/S Bolts**
Capacity Req	**1.346 kN**
Capacity	**30.2 kN** · 2 x M12 4.6/S Shear Capacity
Connection Type	**FB1.1 & FB1.2 to Post**
Components	**2 x M12 4.6/S Bolts**
Capacity Req	**5.684 kN**
Capacity	**30.2 kN** · 2 x M12 4.6/S Shear Capacity
Connection Type	**FB2.1 & FB2.2 to Post**
Components	**2 x M12 4.6/S Bolts**
Capacity Req	**5.925 kN**
Capacity	**30.2 kN** · 2 x M12 4.6/S Shear Capacity
Connection Type	**FB3.1 & FB3.2 to Post**
Components	**2 x M12 4.6/S Bolts**
Capacity Req	**8.470 kN**
Capacity	**30.2 kN** · 2 x M12 4.6/S Shear Capacity
1 x M12 4.6/S Bolt	**Web Bearing Capacity**
	24.883 kN · 1.5 mm Gauge C-Section
	31.519 kN · 1.9 mm Gauge C-Section
	39.813 kN · 2.4 mm Gauge C-Section
	Plate Bearing Capacity
	49.766 kN · 3.0 mm Gauge Plate
1 x M16 8.8/S Bolt	**Web Bearing Capacity**
	53.084 kN · 2.4 mm Gauge C-Section
	66.355 kN · 3.0 mm Gauge C-Section
	Plate Bearing Capacity
	66.355 kN · 3.0 mm Gauge Plate
Plates	**Tear Out Capacities**
Minimum · Top Bolt	**51.840 kN**
Minimum · Bottom Bolt	**77.760 kN**

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PROJECT: Example 7000 x 12000 x 2400 Region B1 Dutch Gable Carport	PROJECT NUMBER: 6457				
CLIENT: Example Customer	DRAWN BY: dm3 Solutions				
ADDRESS: Example Street, Suburb VIC 3333	DRAWN DATE: 2022-09-28	ISSUE: 1	SIZE: A4	SCALE: NTS	DRAWING NUMBER 26 of 26