150C Purlin Trestle

C Purlin Trestle

User Manual

Read in conjuction with
Kwiktech Build Guide and
Kwiktech Tips & Tricks

Designed by

kwiktech.

Engineered by

sbec. SCHMIDT BENTLEY ENGINEERING CONSULTING

Rating: 2 Tonne

Rev 1

This Manual is designed to be only
used with Kwiktech
produced products.

Construction using Kwiktech
products may require planning
approval. Always contact your Local
Council for the most up-to-date
rules and regulations for your area.

All dimensions are in millimeters
(mm)

General Arrangement

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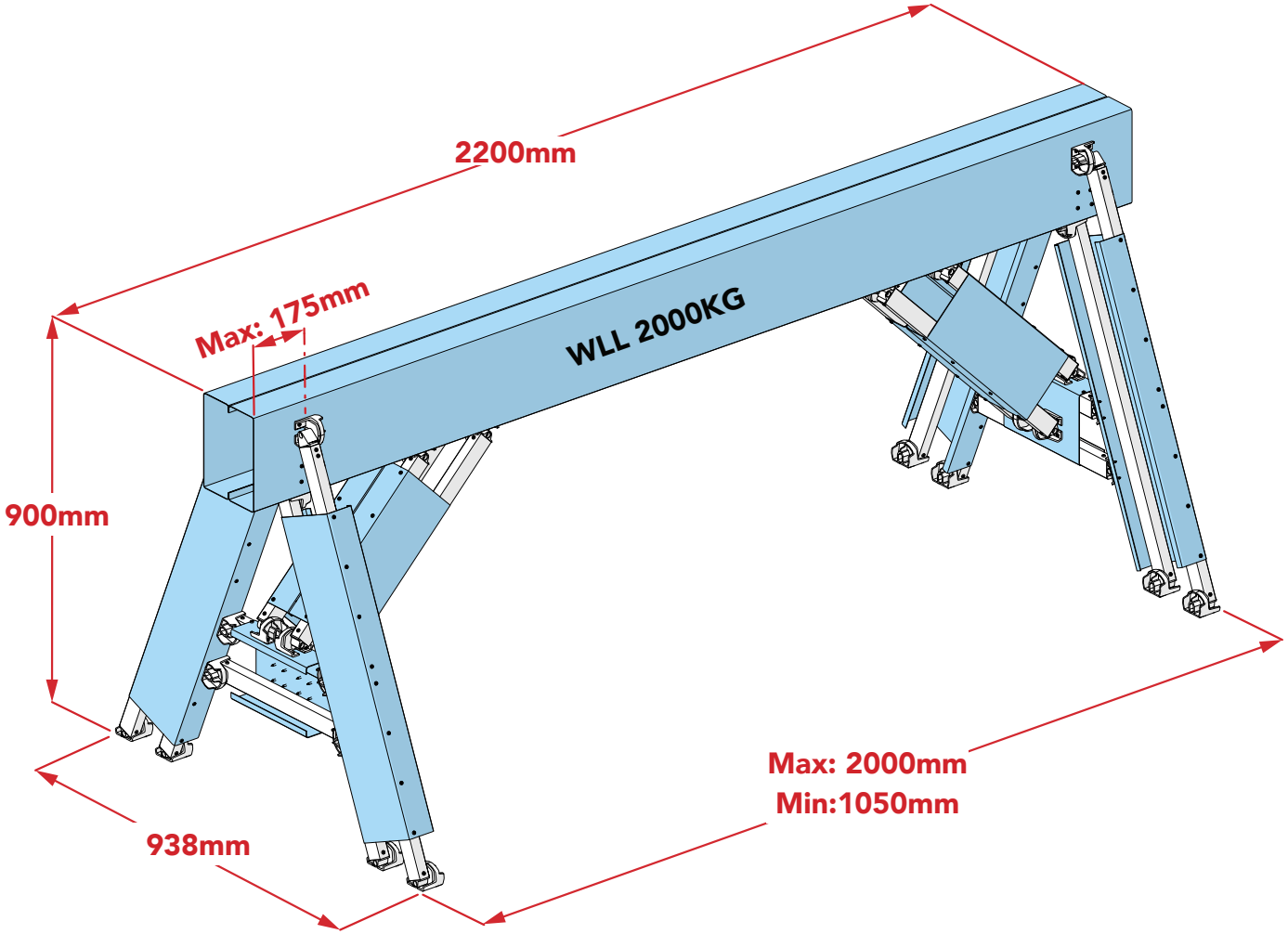

Materials List

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KWIKTECH KITS

ITEM	QUANTITY	RESELLER RPICE
Kwiktech DIY Square Kit (NOTE: Some items will not be used)	2	
Kwiktech DIY Creator Kit (NOTE: Some items will not be used)	1	

NON KWIKTECH ITEMS

ITEM	ITEM ID #	ASSEMBLY ID #	LENGTH	COLOUR	QUANTITY	RESELLER RPICE
C200-10 Purlin	1		2200*	Galv	2	
C150-10 Purlin	2	A B	654	Galv	4	
C150-10 Purlin	3	C D	353	Galv	4	
C150-10 Purlin	4	E	227	Galv	2	
RHS 38x25x1.2mm	5	A B	870	Galv	4	
RHS 38x25x1.2mm	6	C D	724	Galv	4	
RHS 38x25x1.2mm	7	A B	576	Galv	4	
RHS 38x25x1.2mm	8	C D	424	Galv	4	
RHS 38x25x1.2mm	9	E	390	Galv	2	
RHS 38x25x1.2mm	10	E	297	Galv	2	
SHS 65x65x2.0mm	11		199	Galv	4	
10G x 16 Self Drilling Wafer Head Screw	-	-	16	Galv	170	
					Sub-Total	
					GST	
					Shipping	
					Total Cost	

*Note: 1050mm to 2300mm

REQUIRED KWIKTECH ITEMS (INCLUDED IN KIT)

ITEM	QUANTITY	ITEM	QUANTITY
Post Connector (KT-P-001)	0	10G x 16 Self Drilling Wafer Head Screw	250
Universal Connector (KT-P-002)	40	M6 x 40 Socket Head Cap Screw - Zinc	40
Rail Inserts (KT-P-003)	32	M6 x 20 Hex Head Bolt - Galv	0
60° Rail Inserts (KT-P-004)	8	M6 Nut - Galv	0
Star Picket Guide (KT-P-005)	0	Kwiktech 2mm Displacement Plate	0
Post Cap (KT-P-006)	0	Right Angle Bracket - Zinc	3
Tension Strapping 0.8 x 30 x 85mm	0	Assembly Wedge - Rubber	0
Tension Strapping 0.8x 30 x 95mm	0	10G x 16 Self Drilling Small Head Flat Top Screw	0
Tension Strapping 0.8 x 30 x 135mm	0	Tension Strapping 0.8 x 30 x 250mm	0

HOLLOW METAL

ITEM	TOTAL LENGTH
Duragal C200-15 Purlin	4.6m
Duragal C150-10 Purlin	4.6m
Duragal 38x25x1.2mm	12m
Duragal 65x65x2.0mm	0.8m

FOR INFORMATION ONLY

Member Locations

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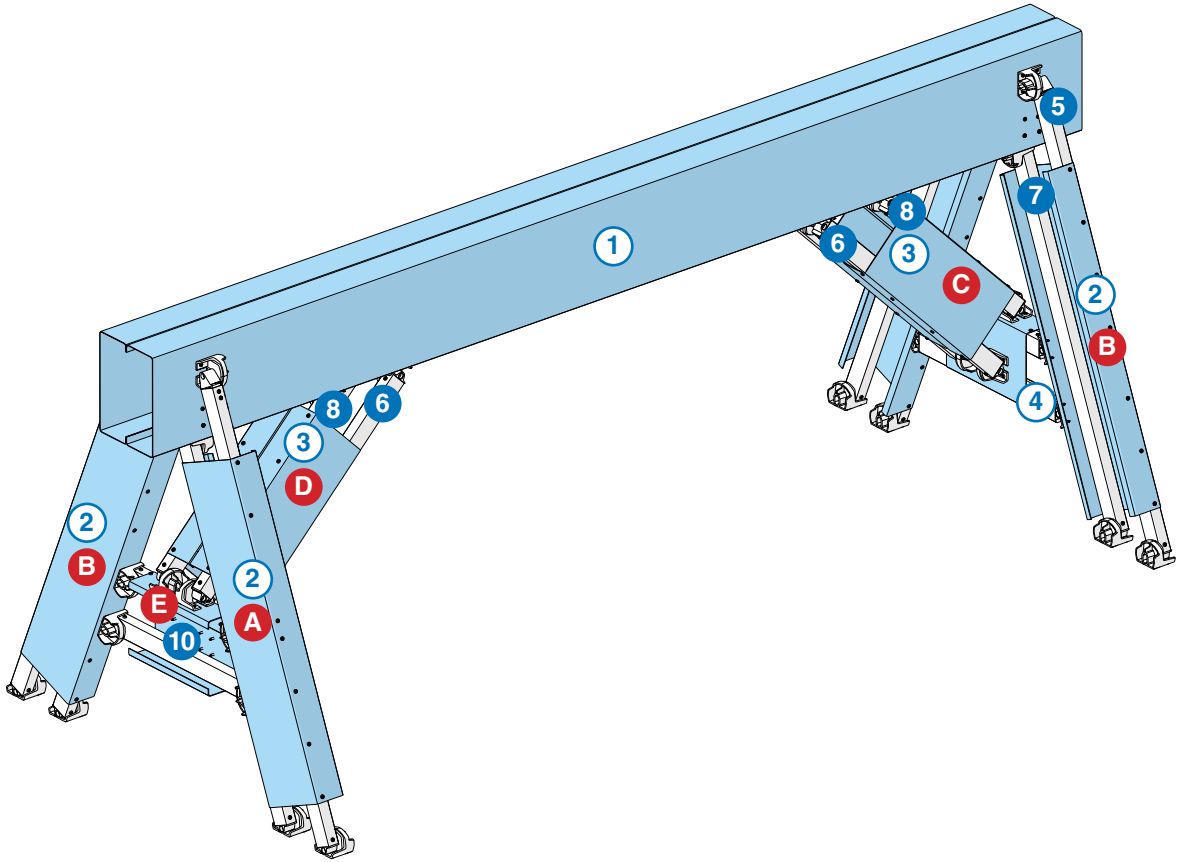

NOTE: Some member ID's hidden for clarity.

Rail Assembly

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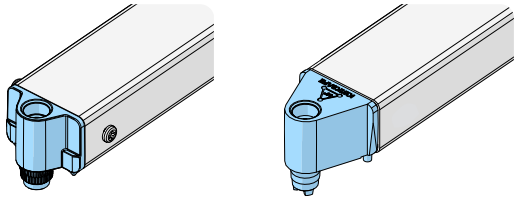
Rail Setup

Refer to build guide for assembly details.

All members have a Standard insert unless otherwise noted.

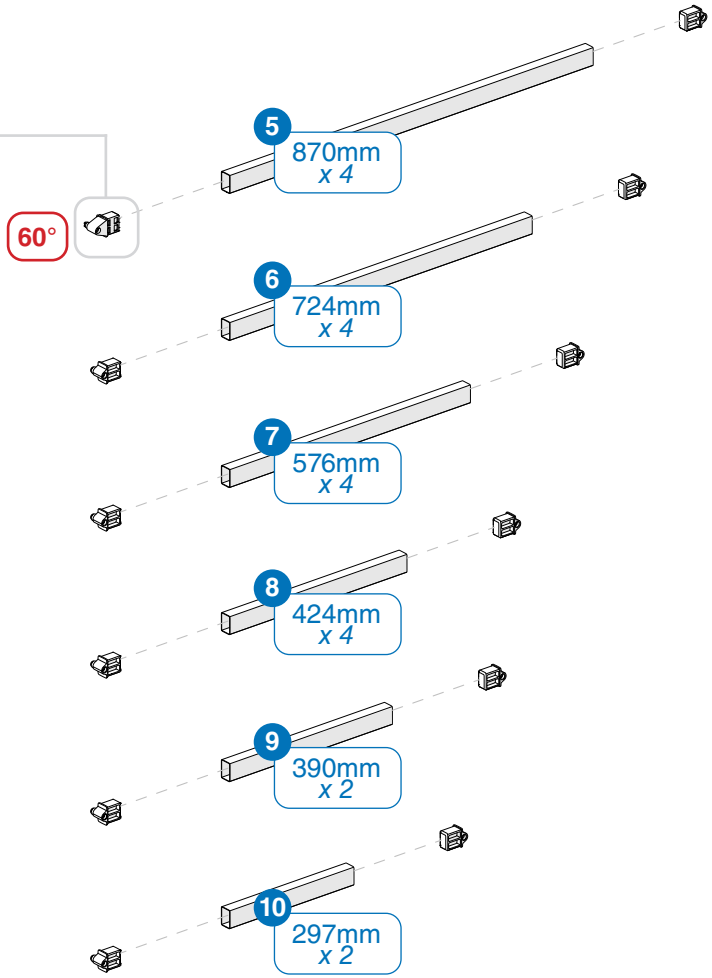
Mark item ID on each member.

RAIL INSERT TYPES



Standard 60˚

Note: Keep the 60˚ connector loose until assembled. When assembled, fix in place with x2 screws on the exterior side.



Extra Strong Rail Assembly

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Rail Setup

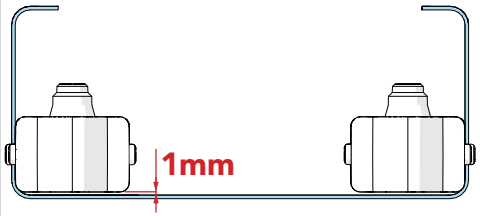
Refer to build guide for assembly details.

Mark assembly ID on each member.

Use of C Clamp recommended for Rail to C Purlin Fixing

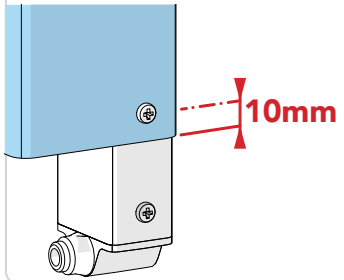
MEMBER ORIENTATION

38x25 flush with the side & 1mm off the internal face of the C Purlin.



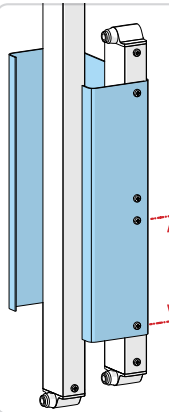
ENDS FIXING DETAIL

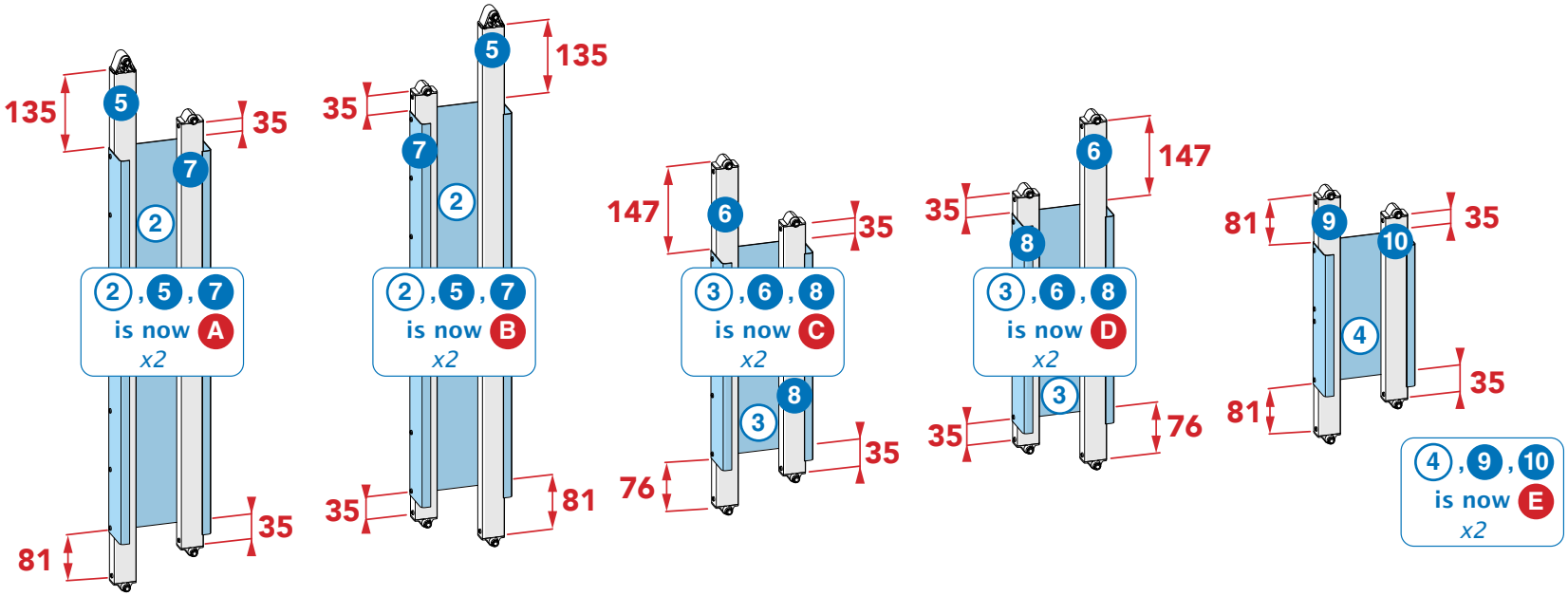
Screw 10mm from end of the C Purlin.



FIXING DETAIL

Screws from C Purlin into 38x25. 100mm spacing until screws meet in the middle.





Universal Connector Locations

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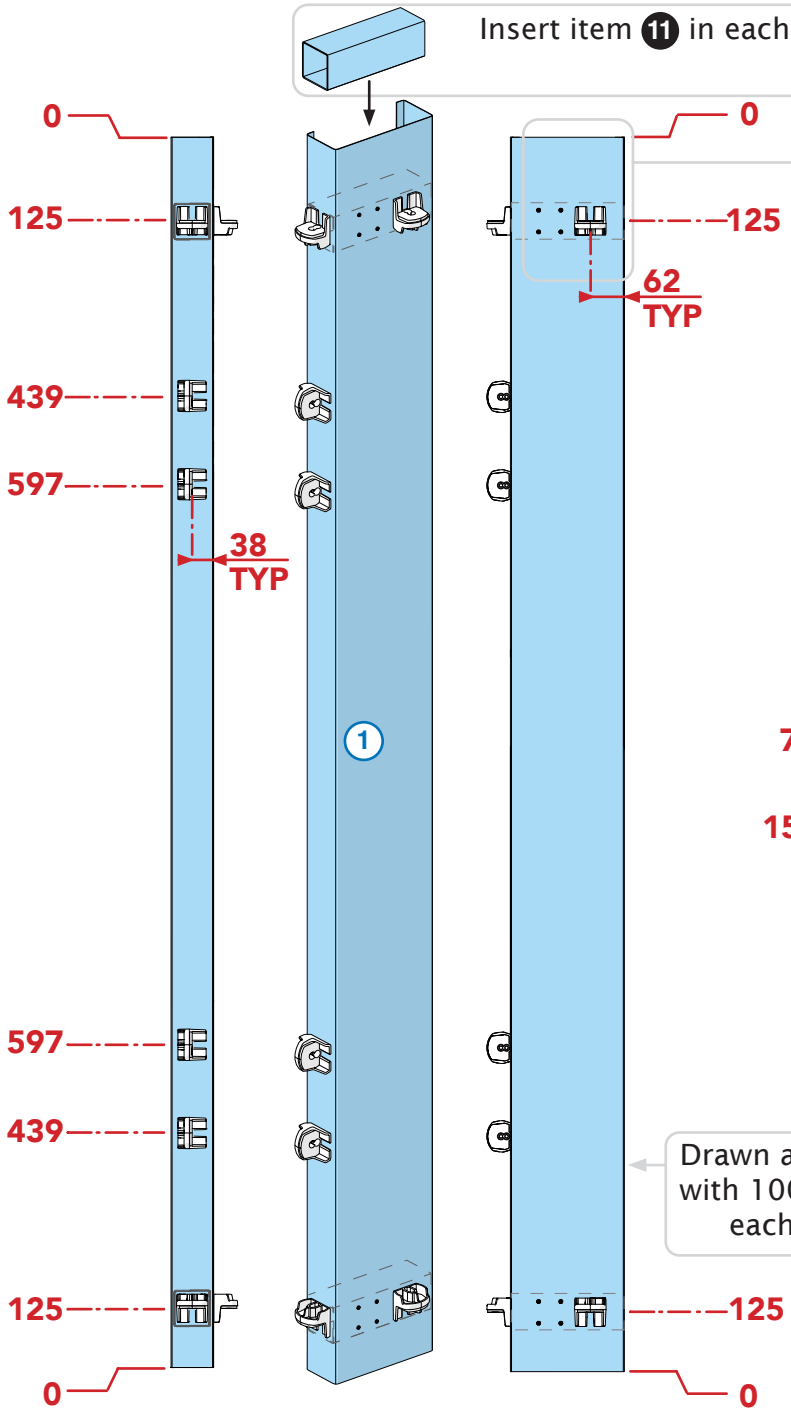
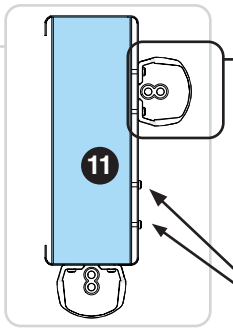


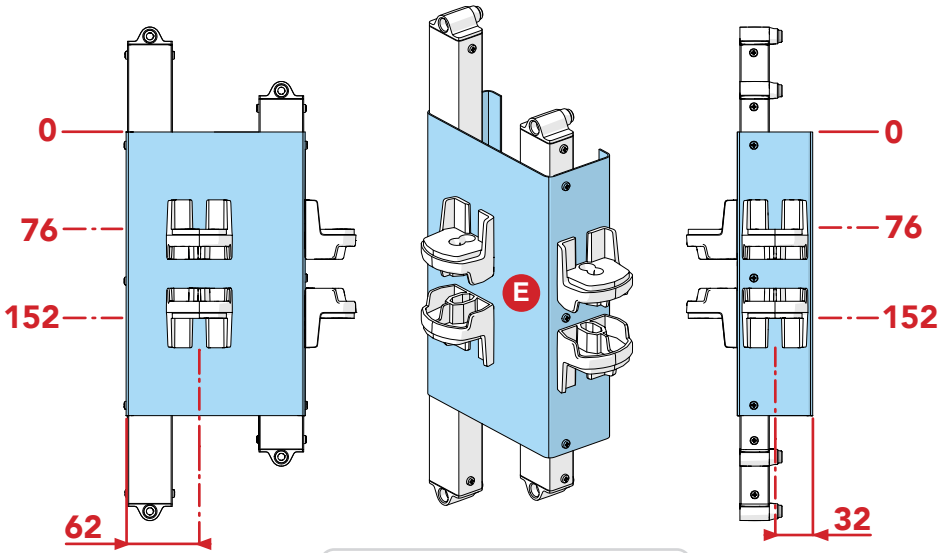
Top Beam
C200 Purlin
x 2

Drawn as 2200mm long with 100mm protruding each end of legs.



Mark Universal Connector holes on (1) & pre-drill 4 x Ø3.5mm holes. Fix Universal Connector through both members.

Before screw fixing, predrill x4 Pilot Holes Ø3.5mm through both members



Note: Remove screws as required for Universal Connectors to sit flat

Bottom Bracing
C150 Purlin
x 2

Universal Connector Locations

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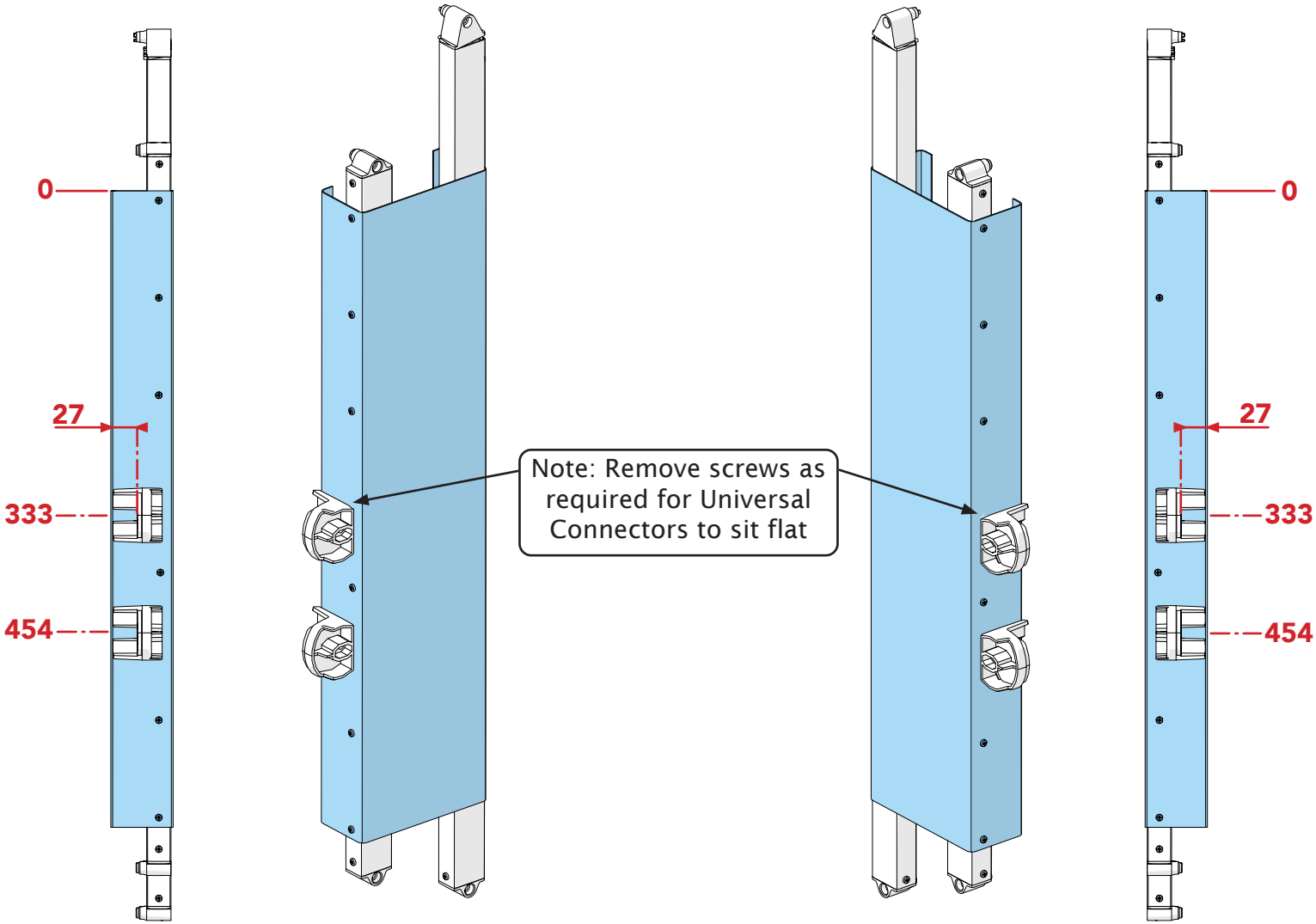

Angled Legs A
C150 Purlin
x 2

Angled Legs B
C150 Purlin
x 2

Assembly Steps

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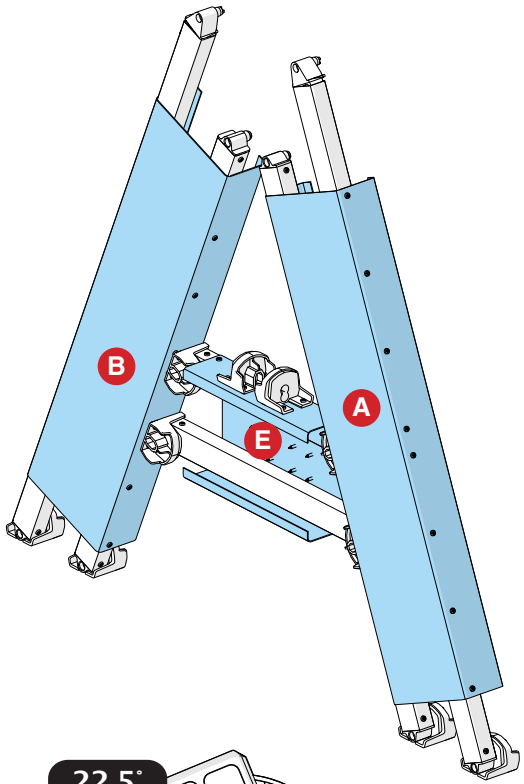
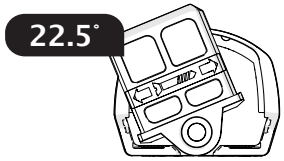
Step 1

Assemble both leg ends.

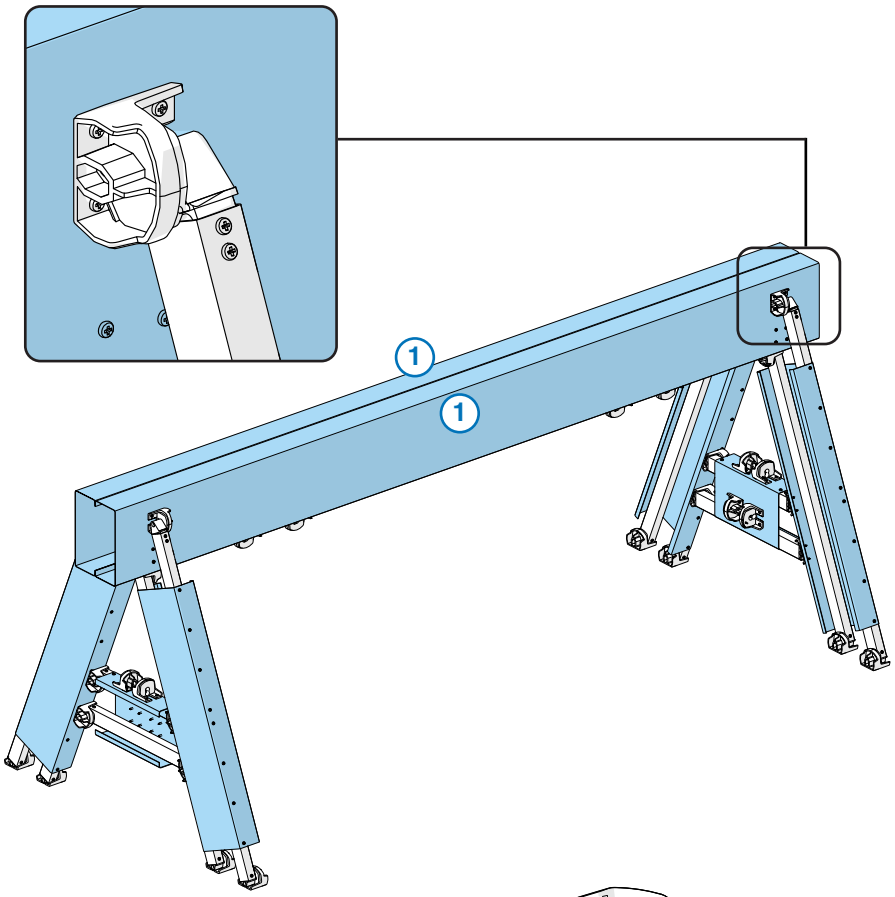




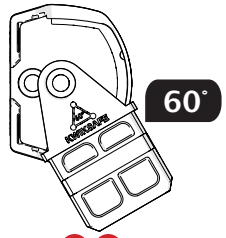
A B E

Step 2

Secure leg ends to C Purlins. Fix 60˚ Connectors in place with 2 screws.



A B



A B

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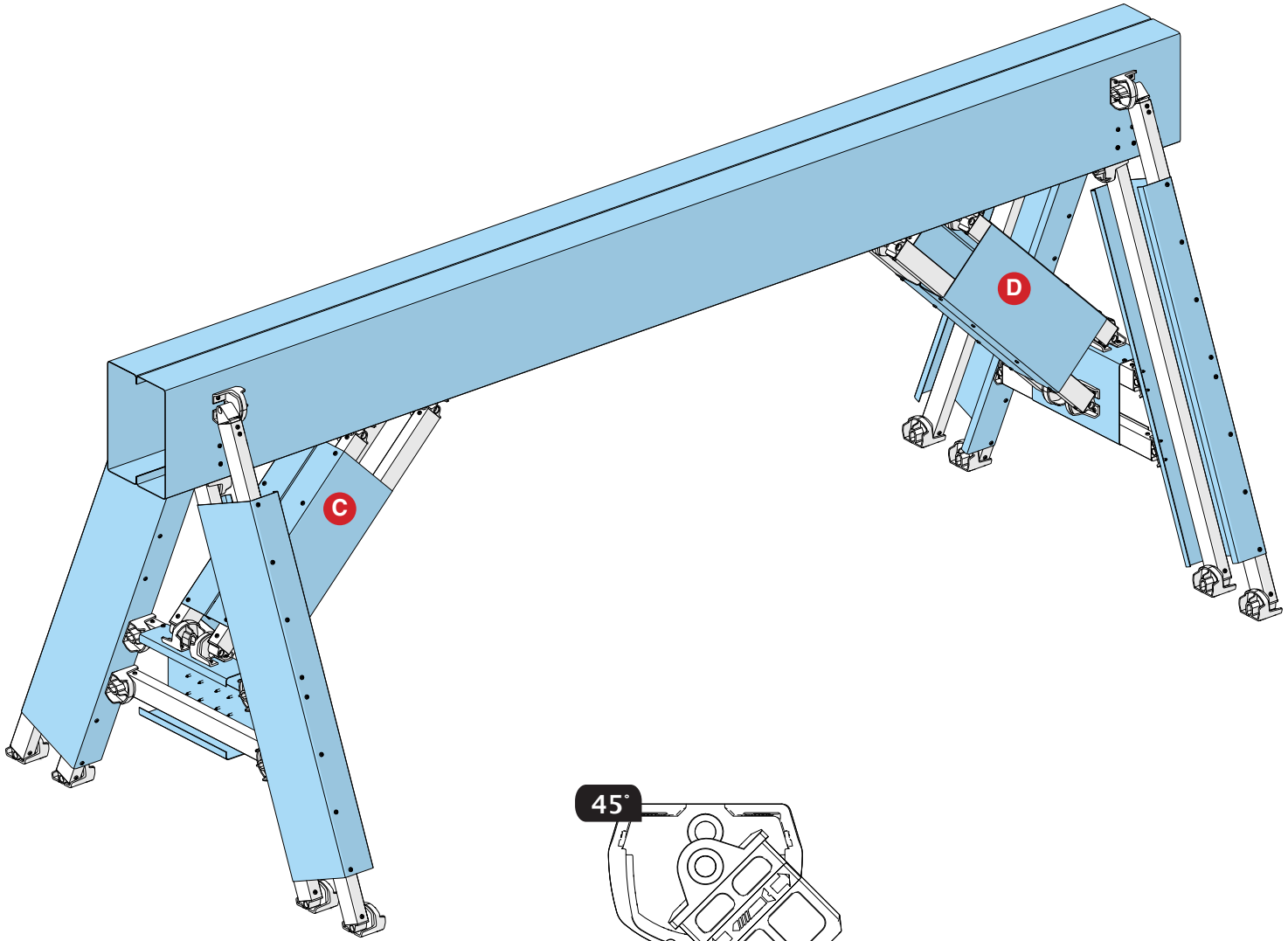
Step 3

Secure Trestle legs with underside diagonal bracing.



Blueprint Dimensions

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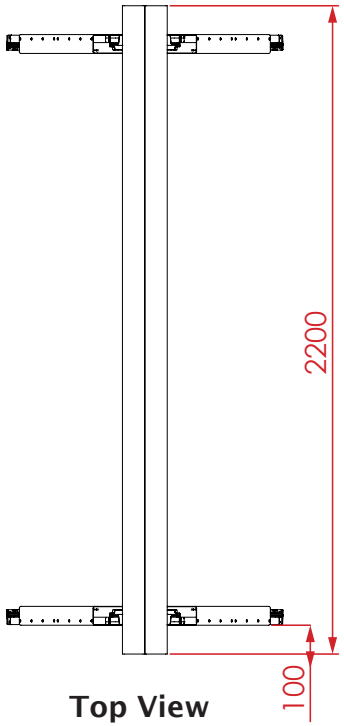
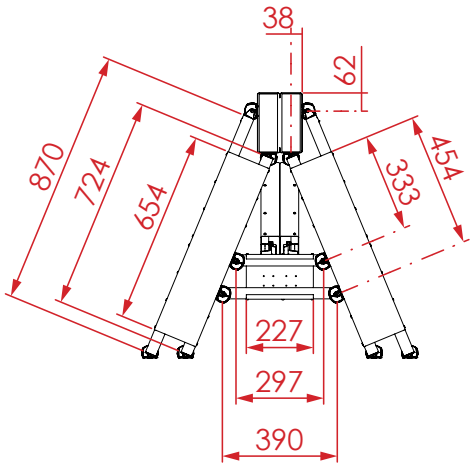
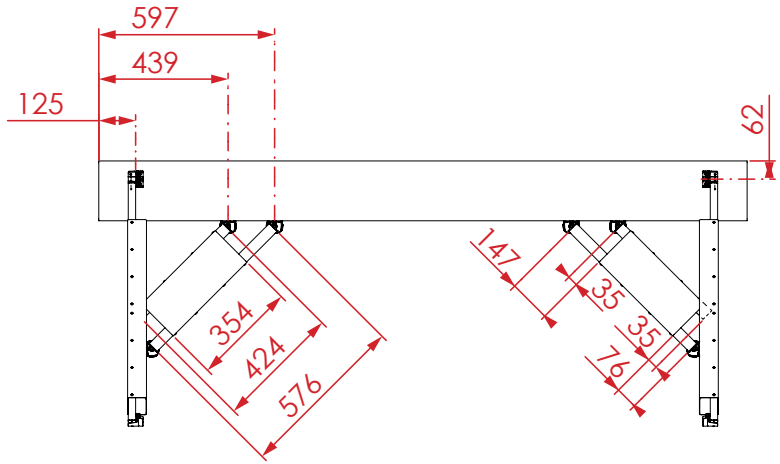


Top View



End View



Side View

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STRUCTURAL CALCULATION PACKAGE

Project: Proposed 2m Trestle
Address: N/A
Job No: SBEC 2101-08
Revision: B
By: SB

0407 904 944 | 0411 754 849
sbec.net.au
admin@sbec.net.au
ABN: 11 635 378 497

SCHMIDT BENTLEY ENGINEERING CONSULTING

Job # :	SBEC 2101-08		
Page # :			
Designed:	SB	**Date:**	14/01/2021
Checked:		**Date:**	

ENGINEERING CALCULATION PACKAGE

Project:	Proposed 2m Trestle
Address:	N/A
Job No:	SBEC 2101-08
Revision:	A

Design Information

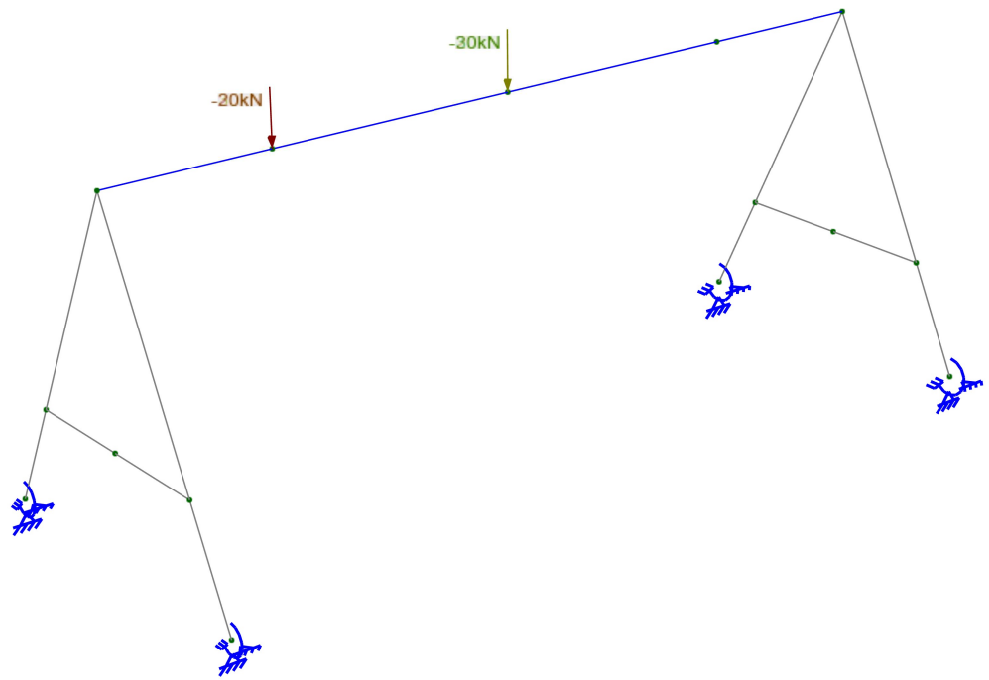
SBEC have been engaged to provide structural engineering for the proposed trestle.

Reference Documents

a. AS/NZS 1170.0 - Structural design actions - General principles
b. AS/NZS 1170.1 - Structural design actions - Permanent, imposed and other actions
c. AS4100-1998 - Steel design

All load cases
1 LL
2 1.5LL
10 LL_1
11 1.5LL_1

20kN (2t) POINT LOADS

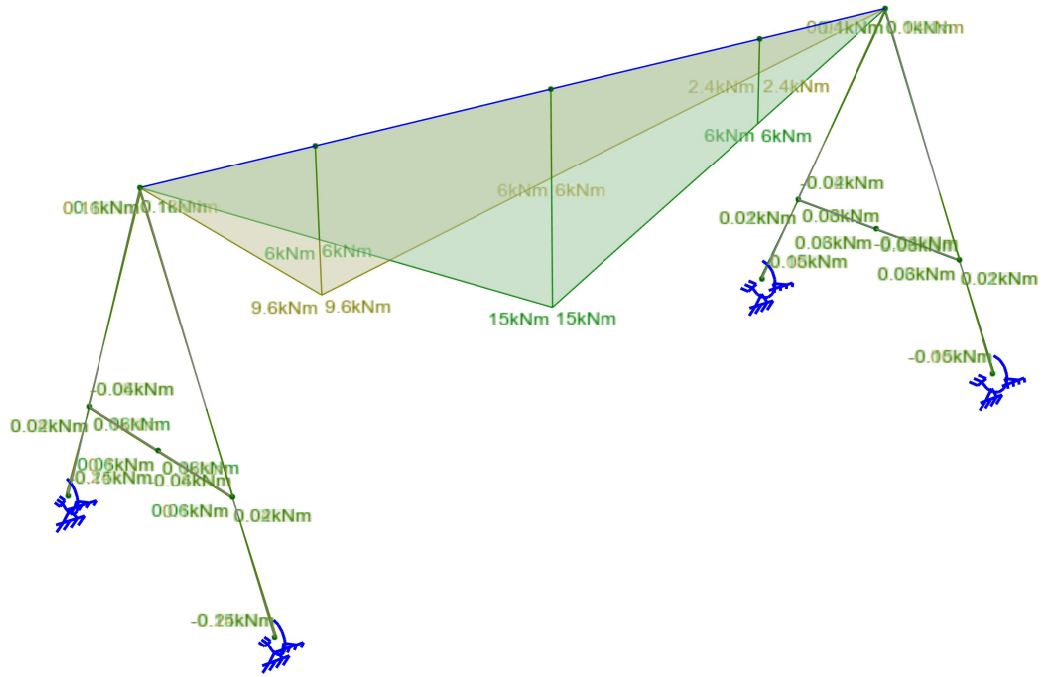


Viewpoint (-40,22), Loads

Materials:
1 STEEL

Sections:
1 S-C150-10
2 L-B2B-C20010

All combination load cases
2 1.5LL
11 1.5LL_1

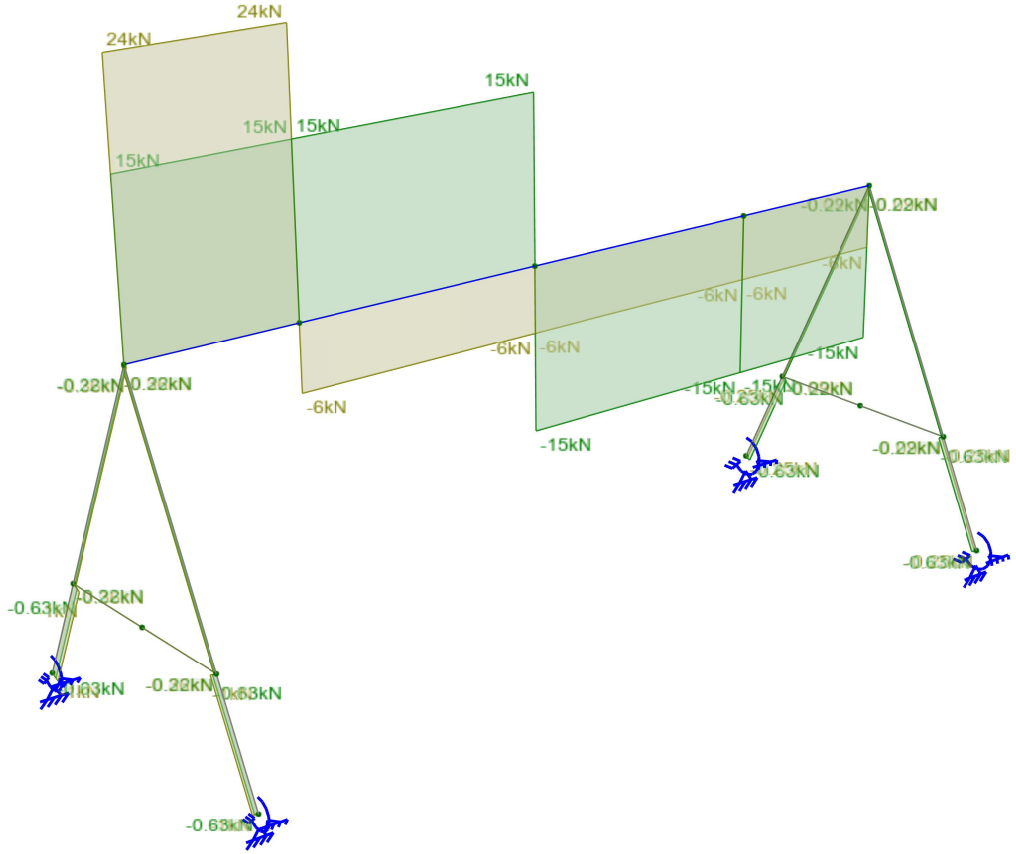


Viewpoint (-40,22), Moments

Materials:
1 STEEL

Sections:
1 S-C150-10
2 L-B2B-C20010

All combination load cases
2 1.5LL
11 1.5LL_1

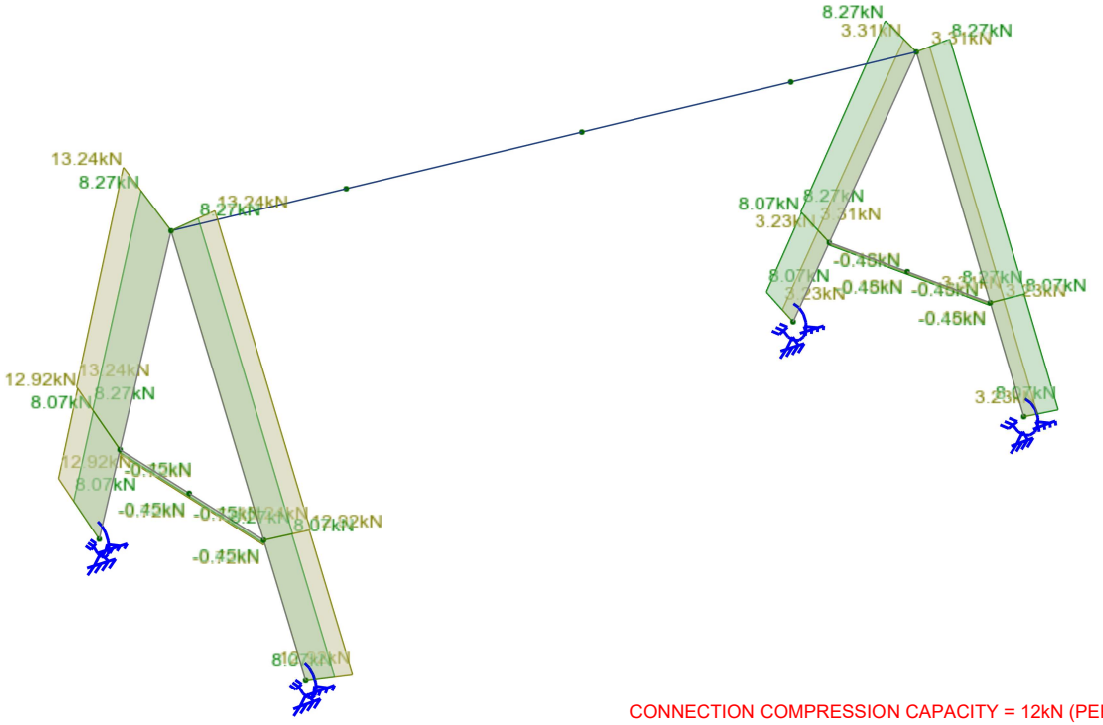


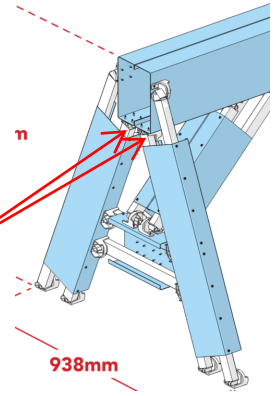
Viewpoint (-40,22), Shears

Materials:
1 STEEL

Sections:
1 S-C150-10
2 L-B2B-C20010

All combination load cases
2 1.5LL
11 1.5LL_1





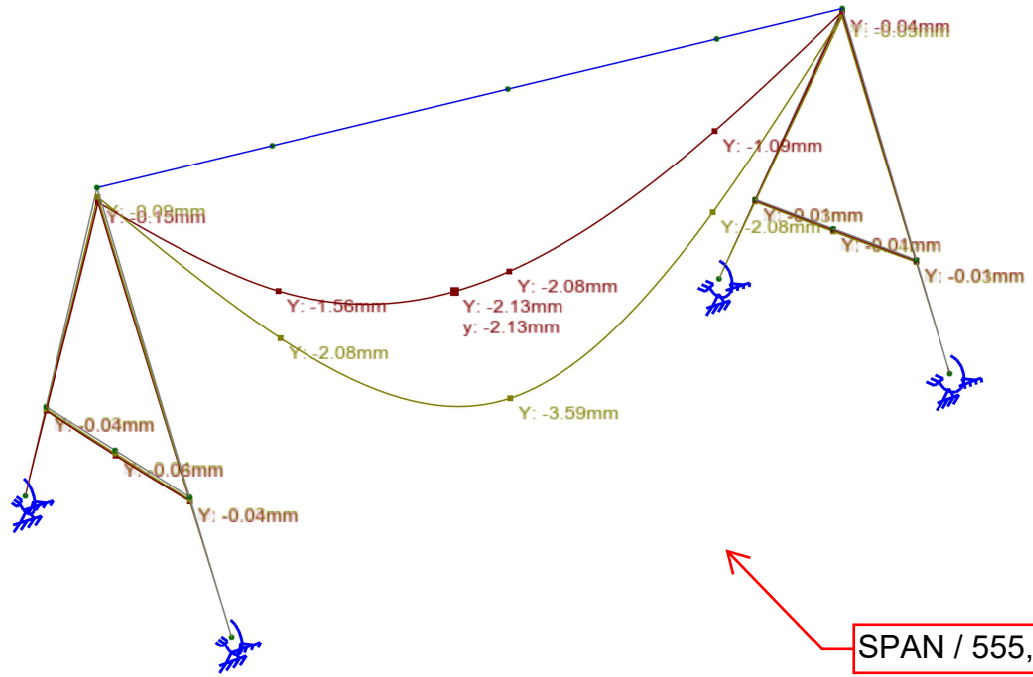
CONNECTION COMPRESSION CAPACITY = 12kN (PER CONN)

Viewpoint (-40,22), Axial forces

Materials:
1 STEEL

Sections:
1 S-C150-10
2 L-B2B-C20010

All primary load cases
1 LL
10 LL_1



SPAN / 555, OK.

Viewpoint (-40,22), Displacements

Materials:
1 STEEL

Sections:
1 S-C150-10
2 L-B2B-C20010

Title:
Job #:
Page:
Designer:
Date:

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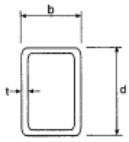

TABLE 6-3(3)(A)

RECTANGULAR HOLLOW SECTIONS
GRADE C350

RHS C350

DESIGN MEMBER CAPACITIES IN AXIAL COMPRESSION
buckling about x-axis

Designation d b t	Mass per m	Design Member Capacities in Axial Compression ϕN_c (kN) Effective Length (L_e) in metres													
mm mm mm	kg/m	0	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0	2.5	3.0	3.5	4.0	5.0
100 x 50 x 6.0 RHS	12.0	483	483	479	471	460	447	431	411	388	331	268	212	169	112
5.0 RHS	10.3	414	414	411	404	396	385	371	355	336	289	236	188	150	100
4.0 RHS	8.49	341	341	339	333	326	317	307	294	279	242	199	160	128	85.3
3.5 RHS	7.53	302	302	300	296	290	282	273	262	249	216	179	144	115	77.0
3.0 RHS	6.60	265	265	263	259	254	248	240	231	220	192	159	129	103	69.3
2.5 RHS	5.56	207	207	206	203	199	195	189	182	175	155	131	108	87.4	58.9
2.0 RHS	4.50	145	145	145	143	141	138	134	130	126	114	100	84.3	69.6	47.8
1.6 RHS	3.64	103	103	103	102	100	98.5	96.4	94.0	91.2	84.2	75.4	65.1	54.9	38.4
76 x 38 x 4.0 RHS	6.23	250	250	246	239	230	218	204	186	165	124	91.9	69.6	54.2	35.4
3.0 RHS	4.90	197	197	194	189	182	174	163	150	134	103	76.6	58.2	45.4	29.7
2.5 RHS	4.15	167	167	164	160	155	147	139	128	115	88.2	66.1	50.3	39.2	25.7
2.0 RHS	3.37	130	130	128	125	121	116	109	101	92.1	71.8	54.3	41.5	32.4	21.2
75 x 50 x 6.0 RHS	9.67	388	388	382	371	357	338	315	286	254	189	140	106	82.4	53.8
5.0 RHS	8.35	335	335	330	321	309	294	275	252	225	170	126	95.7	74.6	48.7
4.0 RHS	6.92	278	278	273	266	257	245	230	212	190	145	109	82.8	64.6	42.2
3.0 RHS	5.42	218	218	215	209	202	194	183	169	153	119	89.4	68.2	53.3	34.9
2.5 RHS	4.58	184	184	181	177	171	164	155	144	130	102	76.6	58.7	45.9	30.0
2.0 RHS	3.72	145	145	143	140	136	130	123	115	105	82.7	62.9	48.3	37.8	24.8
1.6 RHS	3.01	103	103	102	99.8	97.1	93.7	89.6	84.5	78.5	64.2	50.2	38.9	30.7	20.2
75 x 25 x 3.0 RHS	4.25	170	170	167	162	155	147	136	122	107	78.6	57.7	43.5	33.8	22.0
2.5 RHS	3.60	145	145	142	138	132	125	116	105	92.2	68.2	50.2	37.9	29.5	19.2
2.0 RHS	2.93	113	113	112	108	104	99.1	92.5	84.3	74.9	56.2	41.6	31.5	24.5	16.0
1.6 RHS	2.38	77.6	77.6	76.7	74.9	72.6	69.6	65.9	61.4	56.0	44.0	33.5	25.6	20.1	13.2
65 x 35 x 4.0 RHS	5.35	215	215	209	201	191	177	159	138	117.0	82.0	59.1	44.3	34.3	22.3
3.0 RHS	4.25	170	170	166	161	153	143	130	114	97.5	69.4	50.3	37.7	29.3	19.0
2.5 RHS	3.60	145	145	141	137	130	122	111	97.9	84.1	60.2	43.7	32.8	25.4	16.5
2.0 RHS	2.93	118	118	115	111	106	99.6	91.0	80.6	69.6	50.0	36.3	27.3	21.2	13.8
50 x 25 x 3.0 RHS	3.07	123	122	118	110	99.6	85.4	69.4	55.2	44.0	29.3	20.7	15.4	11.9	7.68
2.5 RHS	2.62	105	105	101	94.6	85.9	74.1	60.7	48.5	38.8	25.9	18.3	13.6	10.5	6.79
2.0 RHS	2.15	86.2	85.7	82.6	77.8	70.9	61.6	50.9	40.8	32.7	21.9	15.5	11.5	8.89	5.76
1.6 RHS	1.75	70.3	69.9	67.4	63.6	58.2	50.8	42.2	34.0	27.3	18.3	13.0	9.63	7.44	4.82
50 x 20 x 3.0 RHS	2.83	114	113	108	101	90.0	75.8	60.6	47.7	37.8	25.0	17.7	13.1	10.1	6.56
2.5 RHS	2.42	97.3	96.6	92.7	86.7	77.9	66.2	53.4	42.2	33.6	22.3	15.7	11.70	9.02	5.84
2.0 RHS	1.99	79.9	79.4	76.3	71.5	64.6	55.3	45.0	35.7	28.5	19.0	13.4	9.96	7.66	4.97
1.6 RHS	1.63	65.3	64.9	62.4	58.6	53.2	45.8	37.5	29.9	23.9	15.9	11.3	8.37	6.46	4.18
38 x 25 x 1.6 RHS	1.45	58.2	57.4	54.2	49.0	41.2	32.1	24.2	18.5	14.5	9.47	6.66	4.94	3.81	2.46

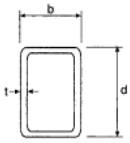

TABLE 6-3(3)(B)

RECTANGULAR HOLLOW SECTIONS
GRADE C350

RHS C350

DESIGN MEMBER CAPACITIES IN AXIAL COMPRESSION
buckling about y-axis

Designation d b t	Mass per m	Design Member Capacities in Axial Compression ϕN_c (kN) Effective Length (L_e) in metres													
mm mm mm	kg/m	0.0	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0	2.5	3.0	3.5	4.0	5.0
100 x 50 x 6.0 RHS	12.0	483	481	466	444	413	370	318	263	215	146	104	77.4	59.8	38.8
5.0 RHS	10.3	414	413	401	382	357	322	279	233	192	131	93.3	69.6	53.8	34.9
4.0 RHS	8.49	341	340	330	316	296	269	235	198	164	112	80.3	59.9	46.3	30.1
3.5 RHS	7.53	302	302	293	281	263	240	211	178	148	102	72.8	54.3	42	27.3
3.0 RHS	6.60	265	265	257	247	232	212	187	159	132	91.4	65.4	48.9	37.8	24.5
2.5 RHS	5.56	207	207	201	194	184	170	152	132	111	77.8	56.0	41.9	32.5	21.1
2.0 RHS	4.50	145	145	142	137	131	123	113	100	86.8	62.7	45.7	34.3	26.7	17.3
1.6 RHS	3.64	103	103	101	98.2	94.4	89.5	83.3	75.7	67.0	50.0	36.9	27.9	21.7	14.2
76 x 38 x 4.0 RHS	6.23	250	247	235	216	187	151	117	90.4	71.1	46.7	32.9	24.4	18.8	12.2
3.0 RHS	4.90	197	195	186	172	151	124	97.3	75.6	59.7	39.3	27.7	20.6	15.9	10.3
2.5 RHS	4.15	167	165	158	146	129	107	84.1	65.6	51.8	34.2	24.1	17.9	13.8	8.93
2.0 RHS	3.37	130	129	123	115	103	86.3	69.0	54.3	43.0	28.5	20.1	14.9	11.5	7.45
75 x 50 x 6.0 RHS	9.67	388	387	374	354	327	290	245	200	162	109	77.5	57.7	44.5	28.9
5.0 RHS	8.35	335	334	323	308	285	255	218	179	146	99.0	70.4	52.4	40.5	26.3
4.0 RHS	6.92	278	277	268	256	238	215	185	154	126	85.9	61.2	45.6	35.3	22.9
3.0 RHS	5.42	218	217	211	202	189	171	149	125	103	70.8	50.6	37.7	29.2	18.9
2.5 RHS	4.58	184	184	178	171	160	146	127	108	89.0	61.1	43.7	32.6	25.2	16.4
2.0 RHS	3.72	145	145	141	135	127	116	103	87.5	72.9	50.4	36.1	27.0	20.9	13.6
1.6 RHS	3.01	103	103	100	96.8	92	85.5	77.3	67.6	57.5	40.7	29.4	22.1	17.1	11.1
75 x 25 x 3.0 RHS	4.25	170	165	148	117	81.7	56.0	40.0	29.9	23.1	15.0	10.5	7.77	5.98	3.86
2.5 RHS	3.60	145	140	126	102	71.6	49.4	35.4	26.4	20.4	13.3	9.29	6.87	5.29	3.41
2.0 RHS	2.93	113	110	100	82.4	59.6	41.6	29.9	22.4	17.3	11.2	7.88	5.83	4.49	2.90
1.6 RHS	2.38	77.6	76.0	70.3	60.6	46.8	33.8	24.7	18.5	14.4	9.37	6.58	4.87	3.75	2.42
65 x 35 x 4.0 RHS	5.35	215	211	199	178	148	113	84.9	64.6	50.4	33.0	23.2	17.2	13.2	8.55
3.0 RHS	4.25	170	168	159	144	122	95.1	72.0	55.1	43.1	28.2	19.9	14.7	11.3	7.33
2.5 RHS	3.60	145	143	135	123	105	82.4	62.7	48.1	37.7	24.7	17.4	12.9	9.93	6.42
2.0 RHS	2.93	118	116	110	101	86.2	68.5	52.4	40.3	31.6	20.7	14.6	10.8	8.33	5.39
50 x 25 x 3.0 RHS	3.07	123	119	105	81.6	55.4	37.7	26.8	20.0	15.5	10.0	7.02	5.19	4.00	2.58
2.5 RHS	2.62	105	102	90.8	71.3	49.1	33.5	23.9	17.8	13.8	8.95	6.27	4.64	3.57	2.30
2.0 RHS	2.15	86.2	83.6	75.0	59.7	41.7	28.6	20.5	15.3	11.8	7.66	5.37	3.97	3.06	1.97
1.6 RHS	1.75	70.3	68.3	61.5	49.5	34.9	24.1	17.2	12.9	9.96	6.46	4.53	3.35	2.58	1.66
50 x 20 x 3.0 RHS	2.83	114	107	87.0	55.7	34.1	22.5	15.9	11.8	9.07	5.87	4.10	3.03	2.33	1.50
2.5 RHS	2.42	97.3	92.2	75.8	49.8	30.8	20.3	14.3	10.6	8.20	5.31	3.71	2.74	2.11	1.36
2.0 RHS	1.99	79.9	76.09	63.3	42.5	26.5	17.6	12.4	9.21	7.11	4.60	3.22	2.38	1.83	1.18
1.6 RHS	1.63	65.3	62.2	52.3	35.8	22.5	14.9	10.6	7.84	6.05	3.92	2.74	2.03	1.56	1.00
38 x 25 x 1.6 RHS	1.45	58.2	56.4	50.4	39.8	27.5	18.8	13.5	10.0	7.76	5.04	3.53	2.61	2.01	1.30

Title:
Job #:
Page:
Designer:
Date:

SCHMIDT BENTLEY ENGINEERING CONSULTING

Test Specifications

AS/NZS 1170.0-2002

CONNECTION TYPE	ID #	COMPRESSION NEWTONS	TENSION NEWTONS	TENSION WITH STRAP NEWTONS*
Universal Connector + Rail Insert - 0°	1	3000	2000	5600
Universal Connector + Displacement Plate + Rail Insert - 0°	2	11500	2000	5600 - Ref ID #1
Universal Connector Rotated 90° + Rail Insert - 0°	3	8500	2000 - Ref ID #1	Not Applicable
Universal Connector + Rail Insert - 11.25°	4	11000	2000 - Ref ID #1	5600 - Ref ID #1
Universal Connector + Rail Insert - 22.5°	5	12000	2000	5600
Universal Connector + Rail Insert - 45°	6	3800	2500	6000
Universal Connector + 60° Rail Insert - 60°	7	3800	3000	6000
Universal Connector + Rail Insert Load Test 1m span - 0°	8	10000	Not Applicable	Not Applicable
Post Connector + Rail Insert (4 Screws) - 0°	9	8500 - Ref ID #3	3500	Not Applicable
Post Connector + Rail Insert (4 Screws) - 22.5°	10	8000	3500	Not Applicable
Post Connector + Rail Insert (4 Screws) - 45°	11	3800	3500	Not Applicable
Star Picket Stopper	12	3500	Not Applicable	Not Applicable

* 1 Screw at each end of Galvanized 0.8mm x 30mm wide Strapping - 10gx16 Self Drilling Small Head Flat Top (Screw B)

SHEAR

Destructive 25mm Side	N/A	12000 Newtons	Failed through rail connector screws
Sample 1 – AS 1170	AS/NZS 1170	10000 Newtons	~9.6mm underload, ~3.3mm permanent
Sample 2 – AS 1170	AS/NZS 1170	10000 Newtons	~10.9mm underload, ~3.8mm permanent
Destructive 38mm Side	N/A	12000 Newtons	Failed through bracket connected to 50 x 50 post
Sample 1 – AS 1170	AS/NZS 1170	10000 Newtons	~5.9mm underload, ~1.1mm permanent
Sample 2 – AS 1170	AS/NZS 1170	10000 Newtons	~5.9mm underload, ~1.1mm permanent
Sample 3 – AS 1170	AS/NZS 1170	10000 Newtons	~6.4mm underload, ~1.5mm permanent

Title:
Job #:
Page:
Designer:
Date:

SCHMIDT BENTLEY ENGINEERING CONSULTING

Check | Design | Options | ID R1 | Memory Used: 1206012 | Exit

Section Lipped Channel — C-20015 | Design Code: AS/NZS 4600:2005 | Axis System: Principal (x-y)

Material G450 ☑ Use default material

Design Actions (First-Order)		Actual Lengths		Beam Eff. Lengths		Column Eff. Lengths	
N* (kN)	0	Lx (m)	2	Lebx (m)	2	Lecx (m)	2
Mx* (kN m)	7.5	Ly (m)	2	Leby (m)	2	Lecy (m)	2
My* (kN m)	0			Lebz (m)	2	Lecz (m)	2
Vx* (kN)	7.5	Tension Factors		Cb/CTF Factors (Mo)		Cm Factors (N+M)	
Vy* (kN)	0	kt	1	Clause 3.3.3.2		Clause 3.5.1	
Ry* (kN)	0	br (m)	0	Cbx	1	Cmx	1
				1/CTFy	1	Cmy	1

Bearing Parameters

Support Condition | Loading Type | Actual bearing length (m): 0.145

Check ID: R1
CHECK: Lipped Channel - C-20015 - G450
Minimum Capacity/Action Ratio (ØRu/S*) = 1.123 (SAFE)
Member capacity (distortional buckling) in bending about x-axis (Mbx)
(AS/NZS 4600:2005, Clause 3.3.3.3)

Print Results | Draw Section | Full Details | Close

SINGLE C20015, OK
THEREFORE, DOUBLE OK.
M* = 15kNm
V* = 15kN