



WOOD/ALUMINUM RAILING SYSTEM

Report Of:

- **2019 Alberta Building Code - Part 9**
- **2018 British Columbia Building Code - Part 9**
- **2020 National Building Code - Part 9**
- **2012 Ontario Building Code - Part 9**

WARNING

No representation or warranty is given that your particular application of these products complies with relevant building codes or that the fasteners provided or used are appropriate for your application.

Consult with professionals and local building officials before beginning work: (i) to ensure compliance with relevant building codes for your application and for your proposed use of fasteners; (ii) to ensure the integrity of the structural components in connection with which these products are to be used; (iii) to identify appropriate safety gear that is to be used during installation such as a safety harness when working above ground; (iv) to ensure that the work area is free from utilities, services and hazards; and (v) to clarify any instructions or warnings that may not be clear. Work in a safe manner wearing protective gear such as gloves, eyewear, headwear, footwear and clothing. When using tools comply with operation manuals and instructions. Metal and glass may have sharp edges and could fragment or splinter during or as a result of handling or cutting. Do not use these products in connection with any substance that is or may be harmful or corrosive to the products. Inspect and maintain these products and the structural components that they are used in connection with on a regular basis, using professionals when appropriate.

VERANDA™ WOOD/ALUMINUM RAILING SYSTEM
Engineering Review for Compliance with
Canadian Building Codes, Part 9 (1 and 2 Dwelling Units)

Prepared for:

Peak Products Manufacturing Inc.
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Prepared by:

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Original Report: December 21, 2018

Updated: August 17, 2022

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APPENDIX A: ASSEMBLY DRAWINGS

1. OVERVIEW

The Veranda™ Wood/Aluminum Railing system is intended to act as a protection against accidental falls along open-sided walking surfaces. The objectives were to complete an engineering review of the structural components based on Limit States Design, in accordance with applicable material standards and Part 9 (1 and 2 dwelling units) of the following Canadian building codes:

- Alberta Building Code 2019
- British Columbia Building Code 2018
- National Building Code of Canada 2020
- Ontario Building Code 2012 including updates to May 25, 2022

The following specified loads apply:

- Concentrated lateral load of 1 kN (applied at top of guard)
- Uniformly distributed lateral load of 0.50 kN/m (applied at top of guard)
- Uniformly distributed vertical load of 1.50 kN/m (applied at top of guard)
- Concentrated picket load of 0.5 kN (applied over max. 300 mm x 300 mm area)

In this report, the following structural components were evaluated:

A. Picket Elements

1. 19mm (3/4") diameter round pickets, aluminum alloy
2. 25.4mm (1") x 7.6mm (5/16") baroque pickets, aluminum alloy
3. 33.8mm (1-5/16") x 19mm (3/4") rectangular pickets, aluminum alloy

B. Rail Elements

1. Post 6"x6", 4"x4", 4"x4" V-Groove, 4"x4" with ball, S-P-F (Spruce Pine Fir) No. 1/No.2
2. Top rail 2" x 4" S-P-F No.1/No.2
3. Bottom rail 2" x 4" S-P-F No.1/No.2

C. Connectors

1. Self-tapping screw No.8 x 38mm (1½") and No.10 x 63mm (2½"), ASTM A510
2. Picket cap, engineered plastic
3. Top rail open ended clip, engineered plastic
4. Bottom rail 4-sided clip, engineered plastic

2. PICKET ELEMENTS

The primary picket elements are manufactured from aluminum alloy and include: round pickets, rectangular baroque pickets and rectangular pickets.

The evaluation was based on information and drawings provided by Peak Products Manufacturing Inc. (Peak) for the elements listed above.

2.1. ALUMINUM PICKET ELEMENTS

Our evaluation was based on the following information:

- Loads: Prescribed by the Canadian building codes. See Section 1.0, Overview.
- Resistance: Completed in accordance with CAN/CSA S157-05, Strength in Aluminum Design.
- Section properties: Determined from drawings provided by Peak. Calculations were completed in accordance with CAN/CSA S157-05.
- Fastener resistance: Completed in accordance with CAN/CSA O86-14, Engineering design in wood.
- Load configuration: Span and bearing lengths were provided by Peak.

3. RAIL ELEMENTS

3.1. General Rail Elements

The general rail elements include the top rail, bottom rail, and posts. An evaluation was completed based on the worst-case configuration for these elements.

- Loads: Prescribed by the Canadian building codes. See Section 1.0, Overview.
- Resistance: Completed in accordance with CAN/CSA O86-14, Engineering design in wood.
- Section properties: Determined from drawings provided by Peak. Calculations were completed in accordance with CAN/CSA O86-14.
- Fastener resistance: Completed in accordance with CAN/CSA O86-14, Engineering design in wood.

- Load configuration: Span and dimensions were provided by Peak. Posts were modeled as cantilevers, fixed at the base. The results from our engineering analysis show the maximum span that can be achieved, as calculated from the material and fastener resistances. The maximum span was also validated through structural testing.

4. CONNECTORS

4.1. General Connectors

The general connectors included self-tapping screws, picket cap, top rail open ended clip and bottom rail 4-sided clip, manufactured from engineered plastic. An evaluation was completed based on the worst-case configuration for these elements.

- Loads: Prescribed by the Canadian building codes. See Section 1.0, Overview.
- Resistance: Completed in accordance with CAN/CSA S157-05, Strength in Aluminum Design and CAN/CSA O86-14, Engineering design in wood.
- Section properties: Determined by drawings provided by Peak. Calculations were completed in accordance with CAN/CSA S157-05 and CAN/CSA O86-14, Engineering design in wood.
- Load configuration: Span and dimensions were provided by Peak.

5. LIMITATIONS

The use of this railing is limited to Part 9 buildings. Part 9 applies to buildings of 3 storeys or less in building height, having a building area not exceeding 600 m², and used for a few common occupancies limited to residential, business and personal services, mercantile, or medium- and low-hazard industrial occupancies. (This is a paraphrased version; refer to the building code for the full legal wording.)

6. RESULTS

A full set of calculation and results is presented in Berkeley Vadocz's engineering review package, including:

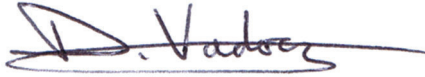
- Dimensioned drawing of each component, including extrusion drawings.
- Calculation sheets for the structural capacity of component listed in 1. Overview.

The above documents contain proprietary information and, as such, have not been included in this report.

7. CONCLUSION

The Veranda™ Wood/Aluminum Railing system meets the requirements within Part 9 (1 and 2 Dwelling Units) of the Alberta Building Code 2019, British Columbia Building Code 2018, National Building Code of Canada 2020, and Ontario Building Code 2012 including updates to May 25, 2022.

Sincerely,



David Vadocz, P.Eng.
Principal
RDH Building Science Inc.

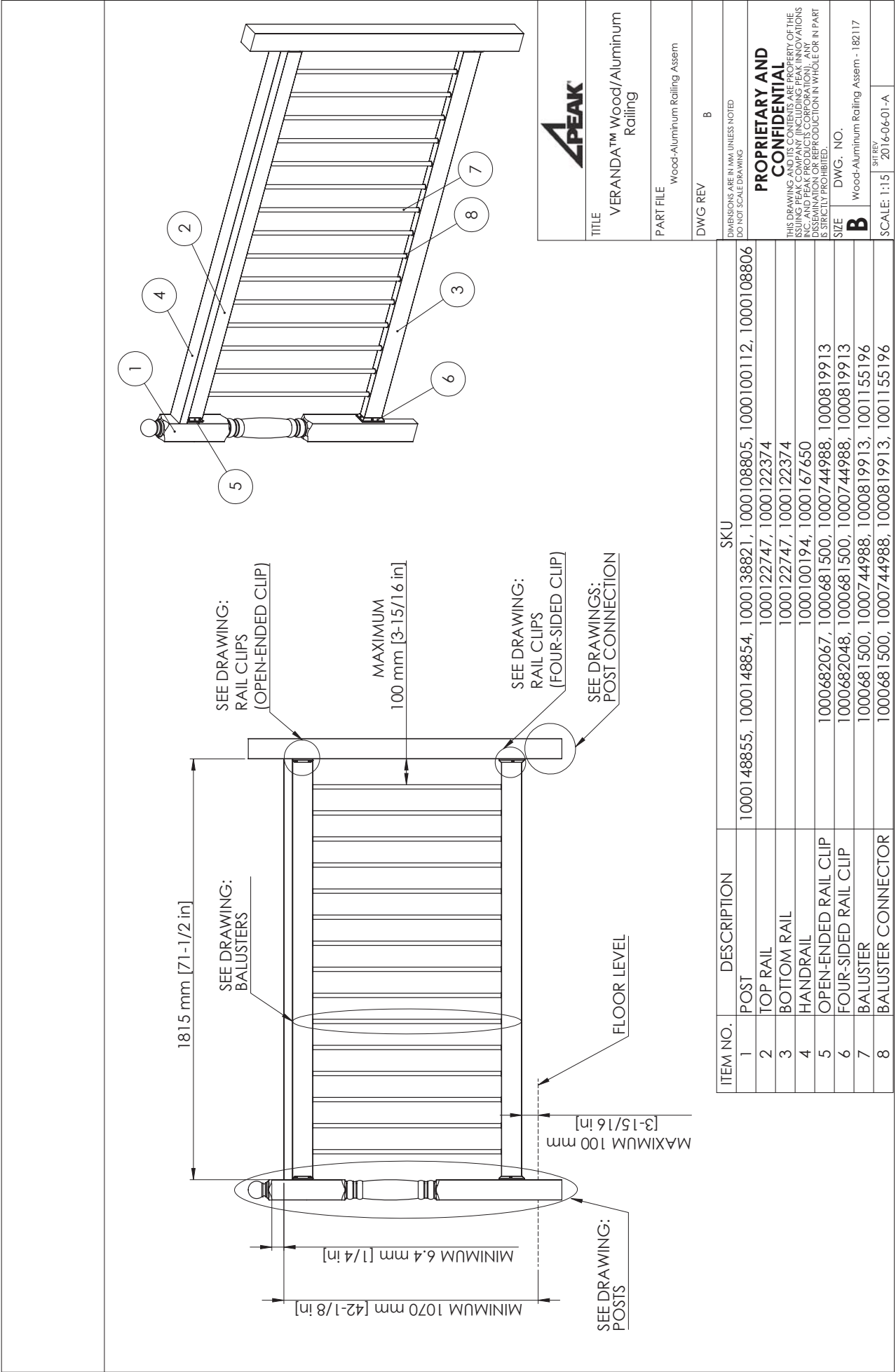


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APPENDIX A

ASSEMBLY DRAWINGS



TITLE
VERANDA™ Wood/Aluminum
Railing

PART FILE
Wood-Aluminum Railing Assem

DWG REV
B

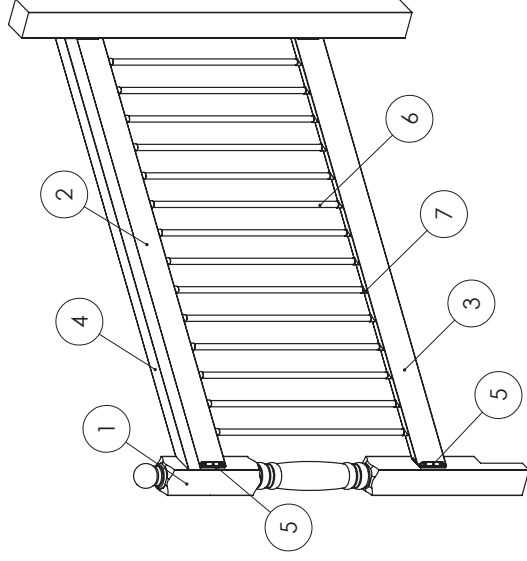
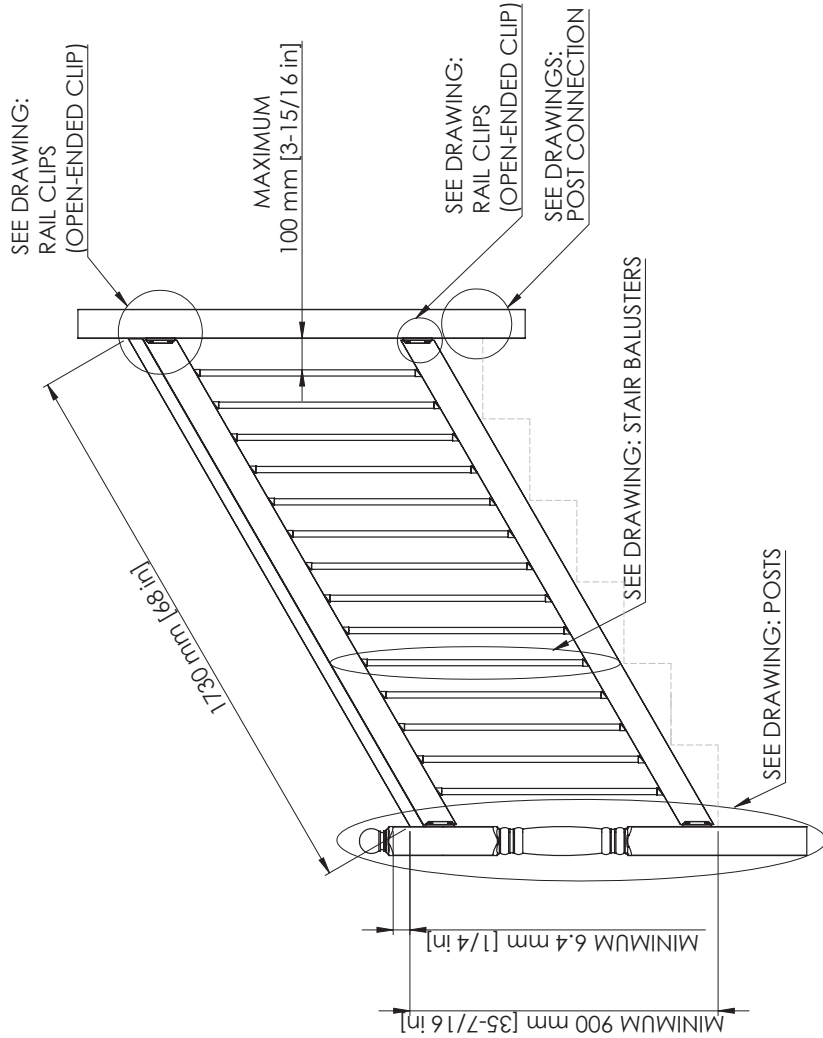
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SIZE
B DWG. NO.
Wood-Aluminum Railing Assem - 182117

SCALE: 1:15
SHEET NO. 1
2016-06-01-A

ITEM NO.	DESCRIPTION	SKU
1	POST	1000148855, 1000148854, 1000138821, 1000108805, 1000100112, 1000108806
2	TOP RAIL	1000122747, 1000122374
3	BOTTOM RAIL	1000122747, 1000122374
4	HANDRAIL	1000100194, 1000167650
5	OPEN-ENDED RAIL CLIP	1000682067, 1000681500, 1000744988, 1000819913
6	FOUR-SIDED RAIL CLIP	1000682048, 1000681500, 1000744988, 1000819913
7	BALUSTER	1000681500, 1000744988, 1000819913, 1001155196
8	BALUSTER CONNECTOR	1000681500, 1000744988, 1000819913, 1001155196



TITLE
VERANDA™ Wood/Aluminum
Stair Railing

PART FILE
Wood-Aluminum Stair Railing Assem

DWG REV
A

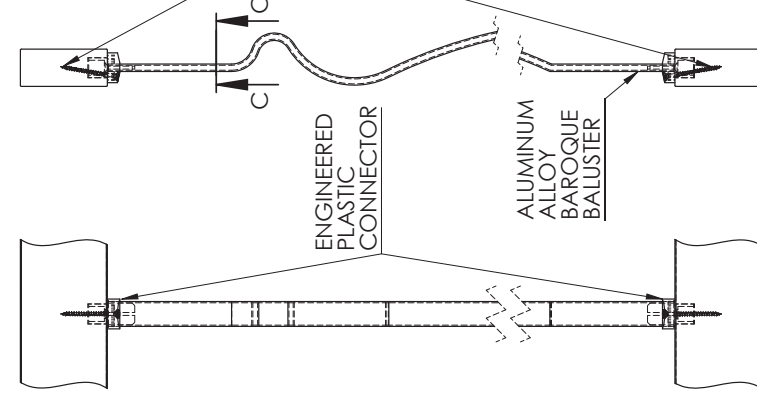
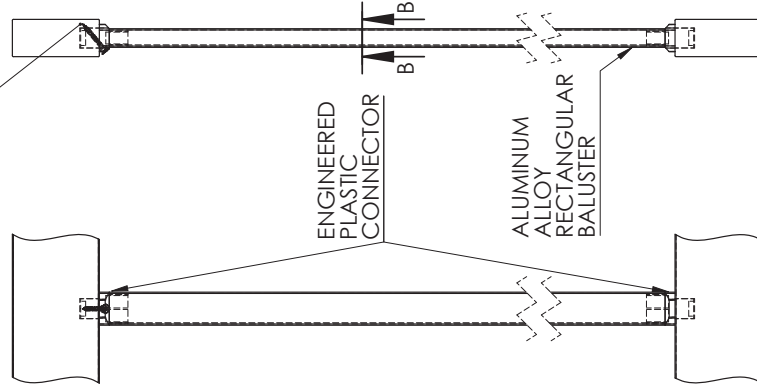
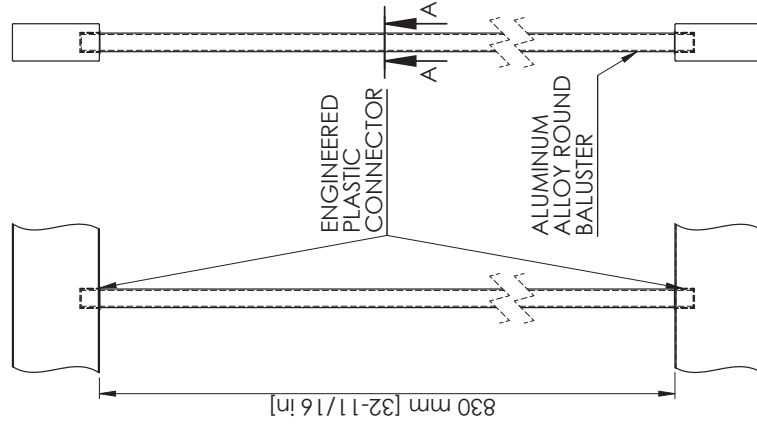
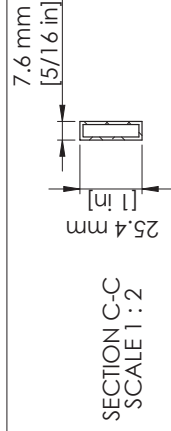
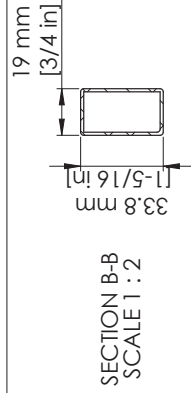
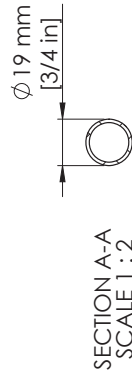
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SIZE
DWG. NO.
B Wood-Aluminum Stair Railing Assem

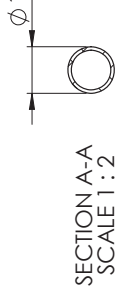
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SHEET REV
2016-06-01-A

ITEM NO.	DESCRIPTION	SKU
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2	TOP RAIL	1000122747, 1000122374
3	BOTTOM RAIL	1000122747, 1000122374
4	HANDRAIL	1000100194, 1000167650
5	OPEN-ENDED RAIL CLIP	1000682067, 1000681500, 1000744988, 1000819913
6	STAIR BALUSTER	1000681548, 1000744987, 1000819746
7	STAIR BALUSTER CONNECTOR	1000681548, 1000744987, 1000819746



#8 x 63.5 mm [2-1/2 in]
SELF-TAPPING SCREW

	TITLE	VERANDA™ Balusters
	PART FILE	Standard Pickets Assem
	DWG REV	B
	DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
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SIZE	DWG. NO.	Standard Pickets Assem - 181217
B		
SCALE: 1:5		SHT REV 2016-06-01-A



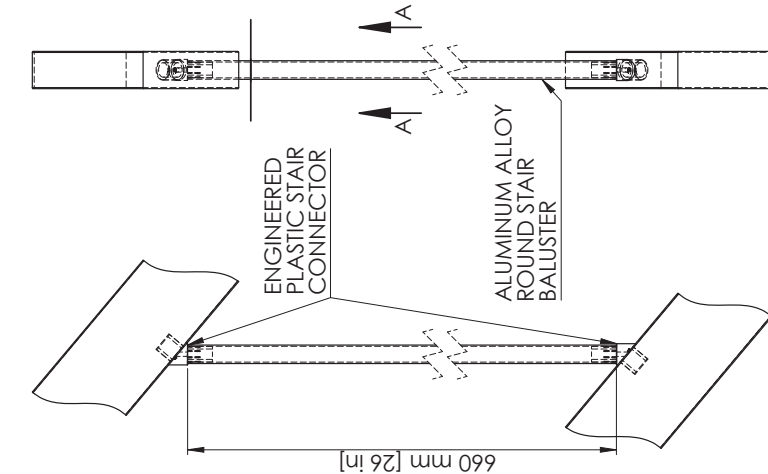
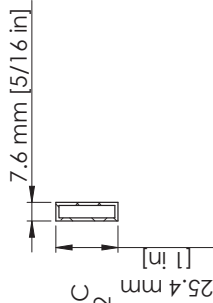
Ø 19 mm [3/4 in]

SECTION A-A
SCALE 1 : 2

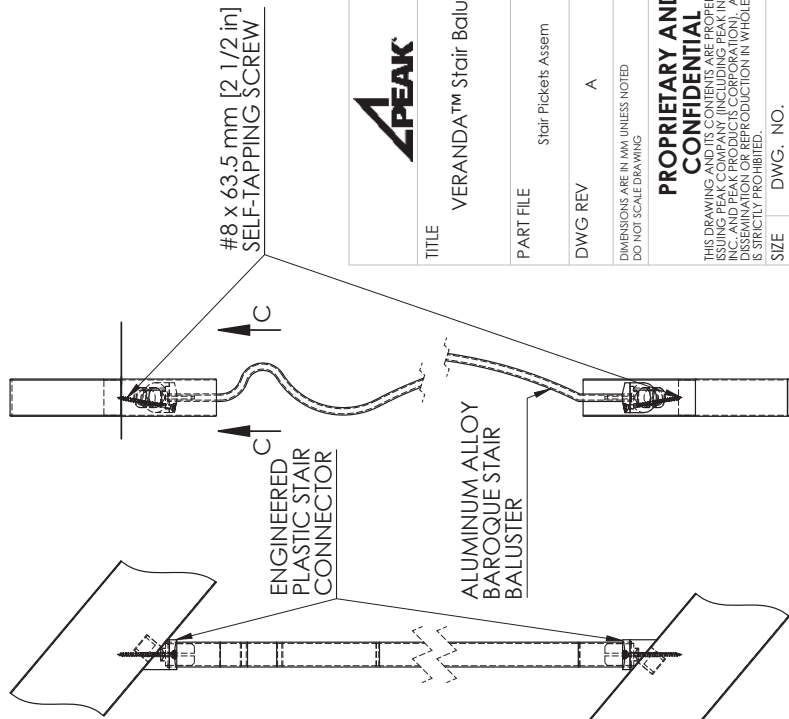
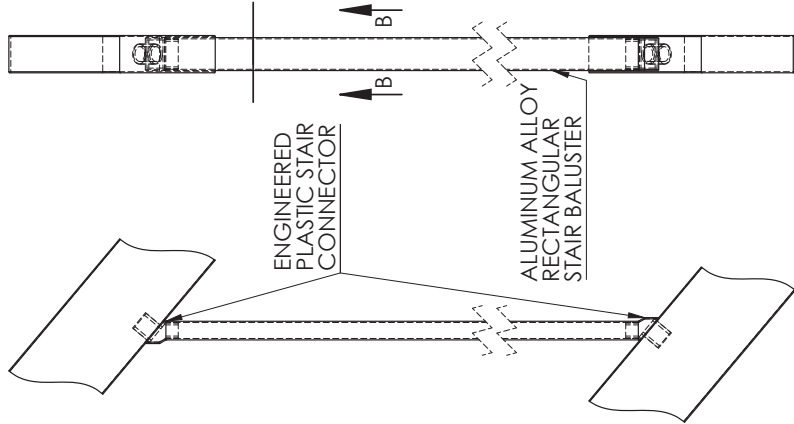


33.8 mm [1-5/16 in]

SECTION B-B
SCALE 1 : 2



660 mm [26 in]

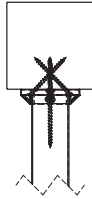


TITLE	VERANDA™ Stair Balusters
PART FILE	Stair Pickets Assem
DWG REV	A
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SIZE	DWG. NO.
B	Stair Pickets Assem
SCALE: 1:5	SHT REV 2016-06-01-A

ROUND STAIR BALUSTER | SKU: 100068 | 548

RECTANGULAR STAIR BALUSTER | SKU: 1000744987

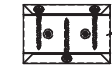
BAROQUE STAIR BALUSTER | SKU: 1000819746



2 - #10 x 63.5 mm [2-1/2 in]
SELF-TAPPING SCREW



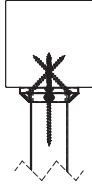
3 - #10 x 63.5 mm [2-1/2 in]
SELF-TAPPING SCREW



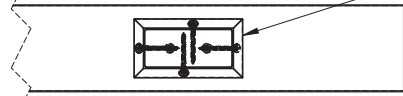
ENGINEERED PLASTIC
OPEN-ENDED CLIP

OPEN-ENDED CLIP

SKU: 1000682067, 1000681500,
1000744988, 1000819913



2 - #10 x 63.5 mm [2-1/2 in]
SELF-TAPPING SCREW



3 - #10 x 63.5 mm [2-1/2 in]
SELF-TAPPING SCREW



ENGINEERED PLASTIC
FOUR-SIDED CLIP

FOUR-SIDED CLIP

SKU: 1000682048, 1000681500,
1000744988, 1000819913



TITLE

VERANDA™ Rail Clips

PART FILE

Wood-Aluminum Railing Assem

DWG REV

A

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SIZE

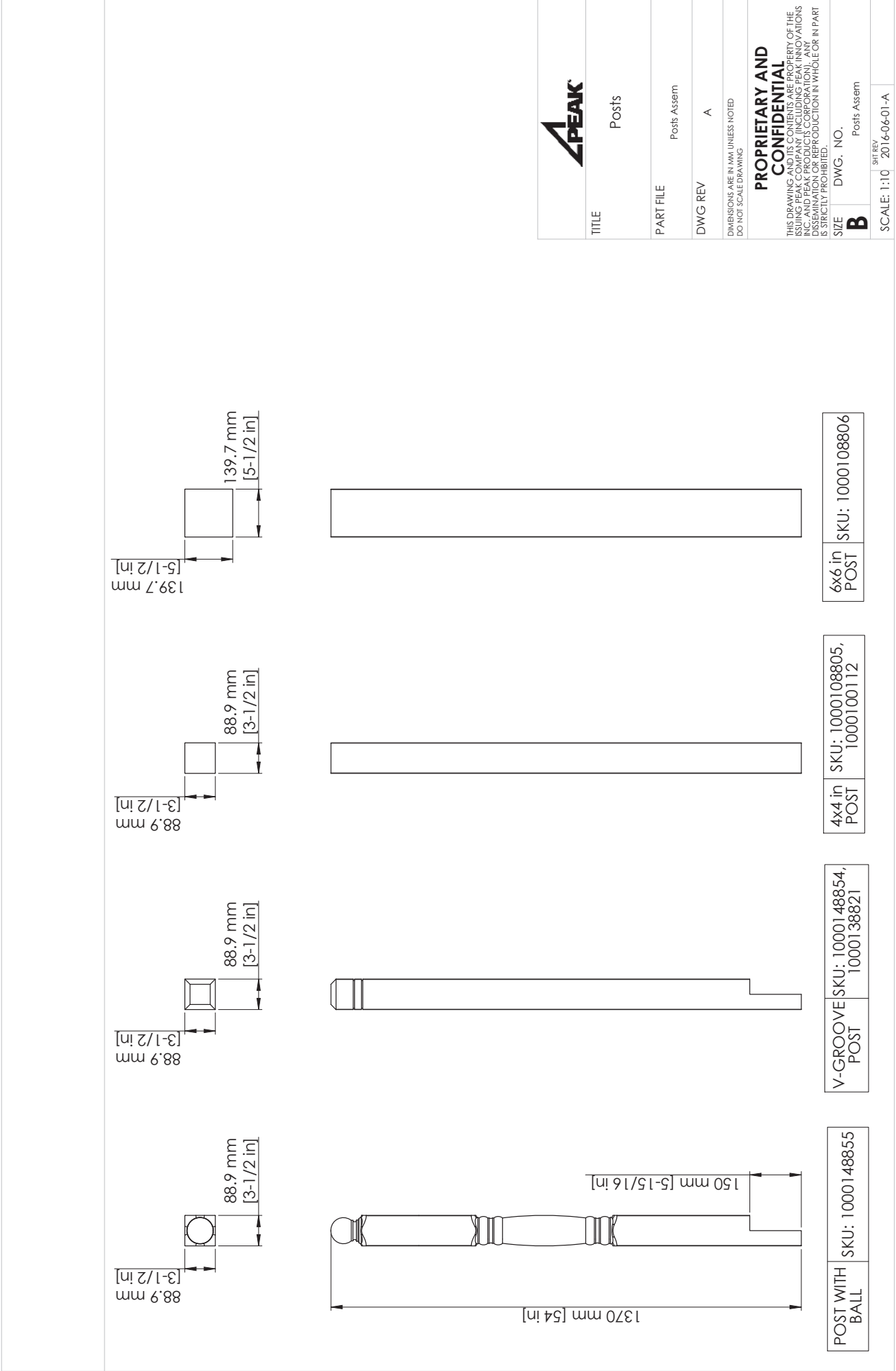
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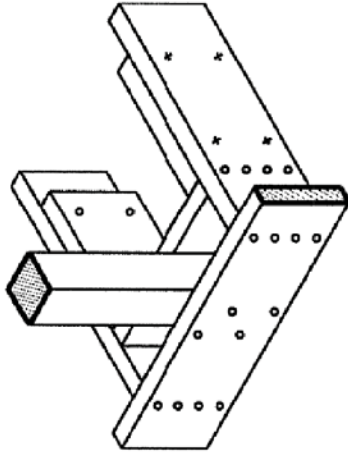
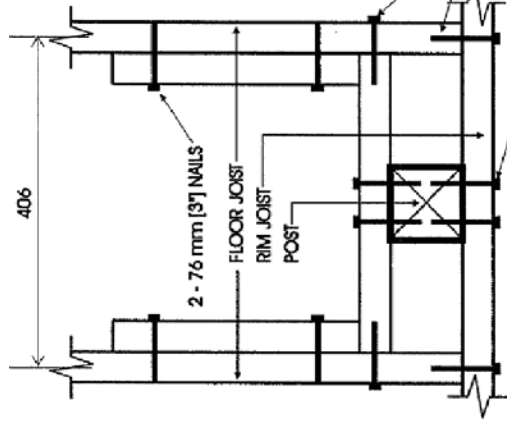
B

Brackets and Connectors

SHEET

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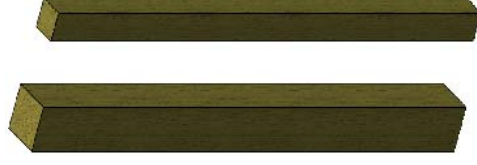


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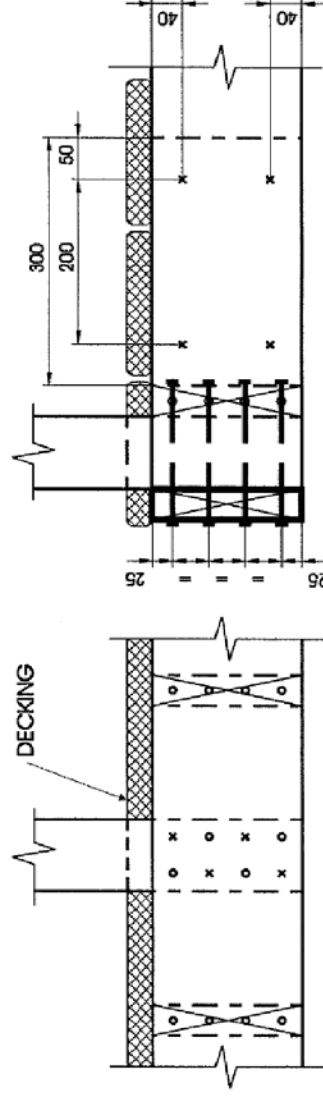
PLAN

4X4 in POST: 4 - 76 mm [3"] NAILS PER SIDE

6X6 in POST: 4 - 127 mm [5"] NAILS PER SIDE



4x4 in AND 6x6 in POSTS

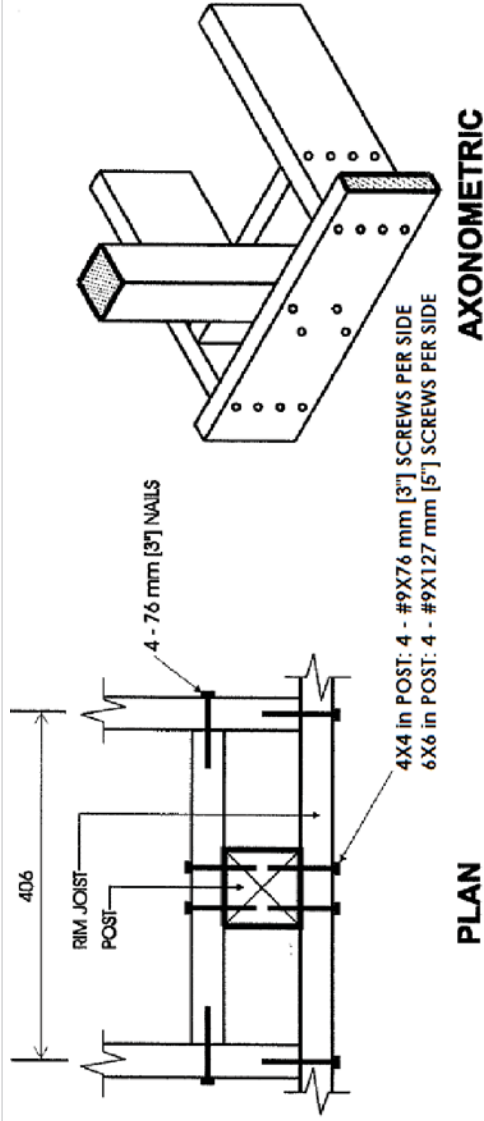


FRONT ELEVATION

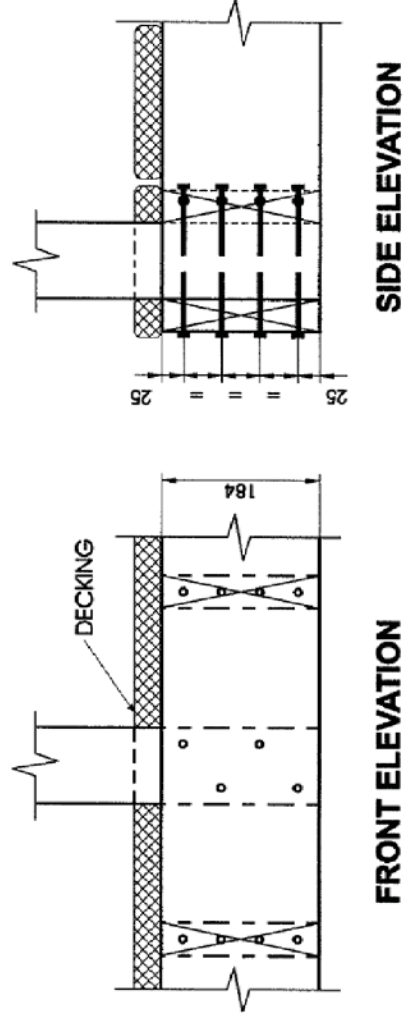
SIDE ELEVATION

METHOD 1: POST NAILED TO RIM JOIST

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PART FILE	
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DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
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SIZE	DWG. NO.
B	Post Connection - Option 1
SCALE:	SHEET REV 2016-06-01-A

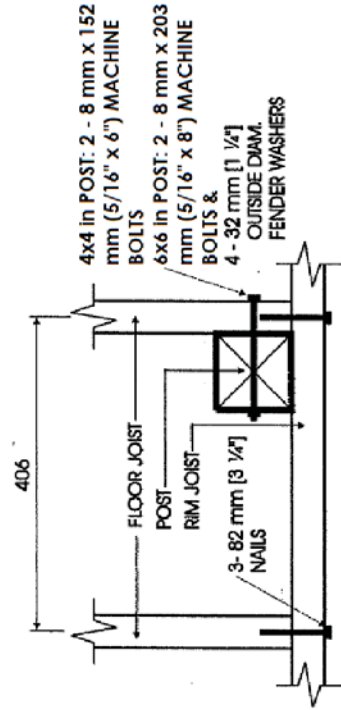


4x4 in AND 6x6 in POSTS

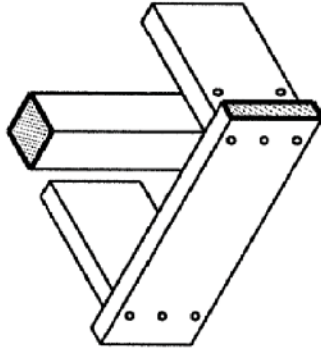


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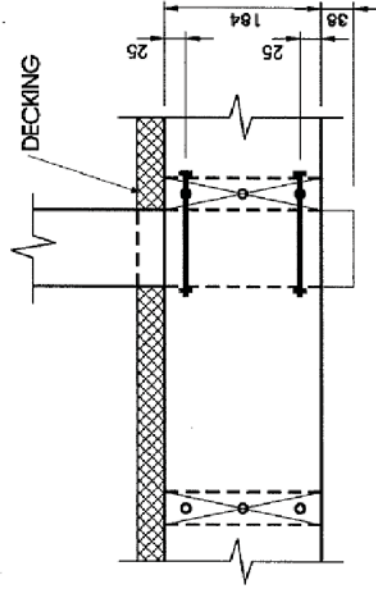
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B	Post Connection - Option 2
SCALE:	SHEET REV 2016-06-01-A



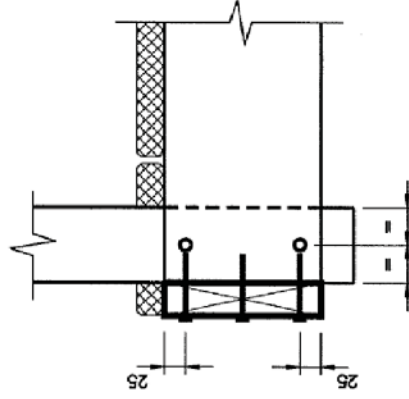
PLAN



AXONOMETRIC



FRONT ELEVATION



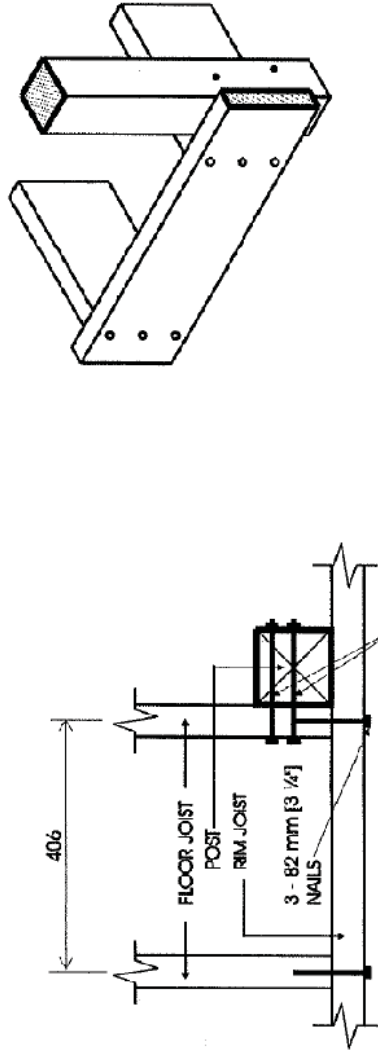
SIDE ELEVATION

METHOD 3: POST BOLTED TO FLOOR JOIST - 8 mm [5/16 in] BOLTS



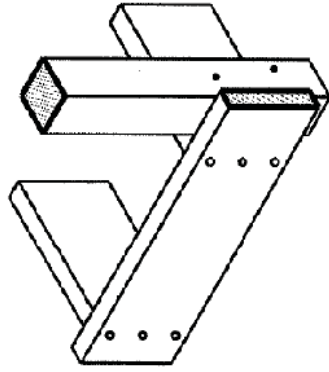
4x4 in AND 6x6 in POSTS

TITLE	Post Connection - Method 3
PART FILE	
DWG REV	A
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SIZE	DWG. NO.
B	Post Connection - Option 3
SCALE:	SHT REV 2016-06-01-A

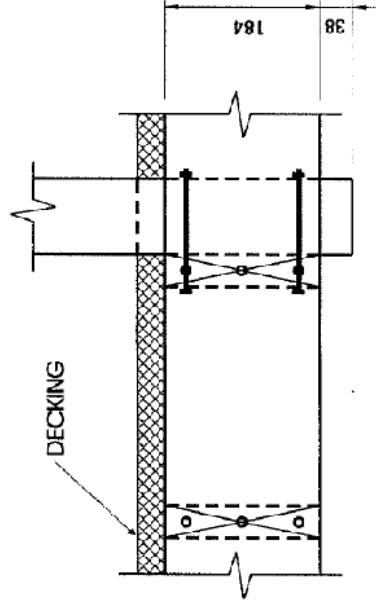


4x4 in POST: 2 - 9.5 mm x 152 mm
(3/8" x 6") MACHINE BOLTS
6x6 in POST: 2 - 9.5 mm x 203 mm
(3/8" x 8") MACHINE BOLTS &
4 - 38 mm [1 1/2"] FENDER WASHERS

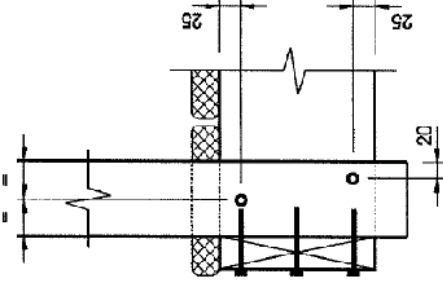
PLAN



AXONOMETRIC



FRONT ELEVATION



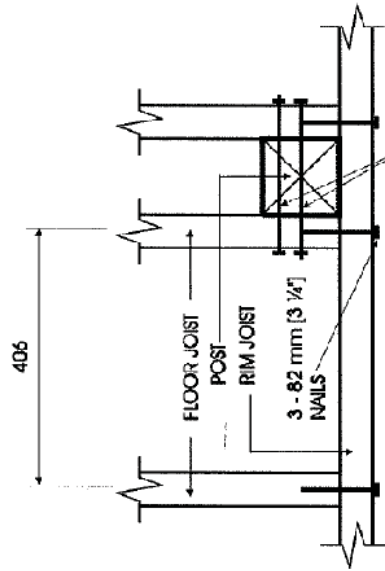
SIDE ELEVATION

4x4 in AND 6x6in POSTS



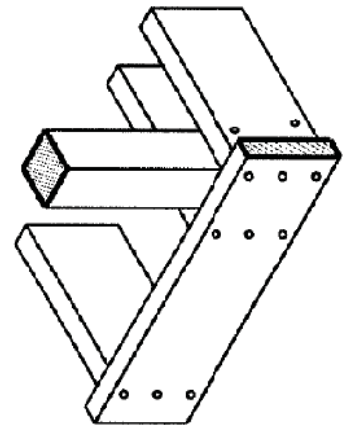
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PART FILE	
DWG REV	A
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SIZE	DWG. NO.
B	Post Connection - Option 4
SCALE:	SHT REV 2016-06-01-A

METHOD 4: POST BOLTED TO FLOOR JOIST - 9.5 mm [3/8 in] BOLTS

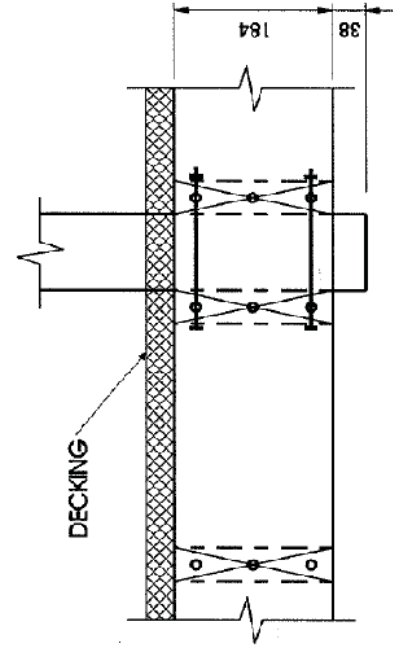


PLAN

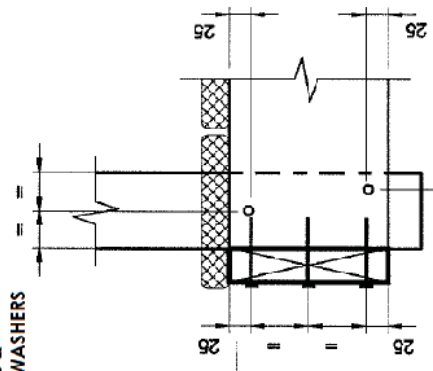
- 4x4 in POST: 2 - 9.5 mm x 203 mm (3/8" x 8") MACHINE BOLTS
- 6x6 in POST: 2 - 9.5 mm x 254 mm (3/8" x 10") MACHINE BOLTS &
- 4 - 38 mm [1 1/2"] FENDER WASHERS



AXONOMETRIC



FRONT ELEVATION



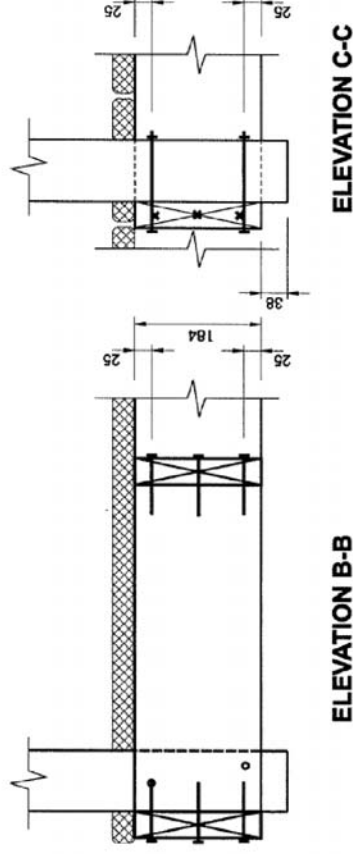
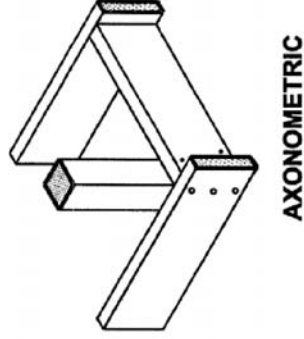
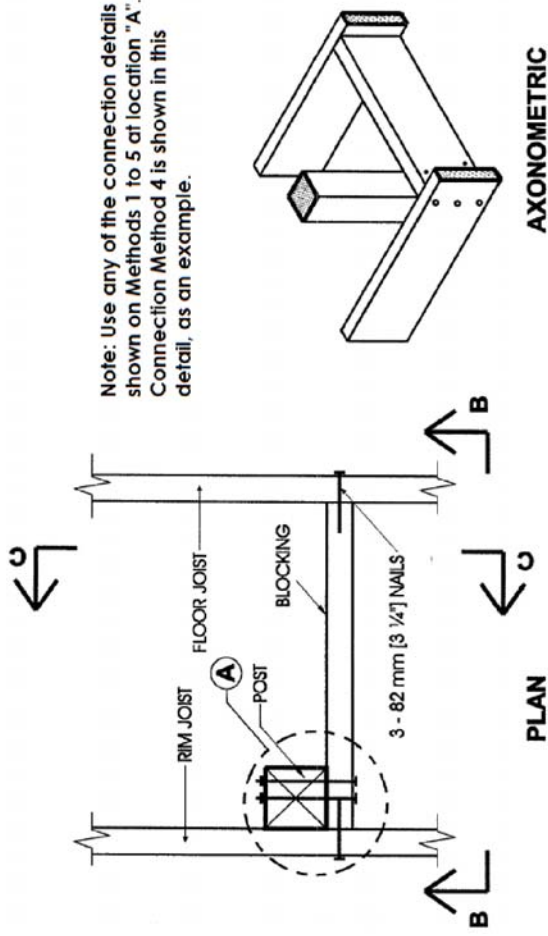
SIDE ELEVATION



4x4 in AND 6x6 in POSTS

TITLE	Post Connection - Method 5
PART FILE	
DWG REV	A
DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
PROPRIETARY AND CONFIDENTIAL THIS DRAWING AND ITS CONTENTS ARE PROPERTY OF THE SOUND PEAK CORPORATION. IT IS TO BE USED ONLY FOR THE PROJECT AND LOCATION SPECIFICALLY IDENTIFIED. NO DISSEMINATION OR REPRODUCTION IN WHOLE OR IN PART IS STRICTLY PROHIBITED.	
SIZE	DWG. NO.
B	Post Connection - Option 5
SCALE:	SHEET REV 2016-06-01-A

METHOD 5: POST BOLTED TO 2 FLOOR JOIST

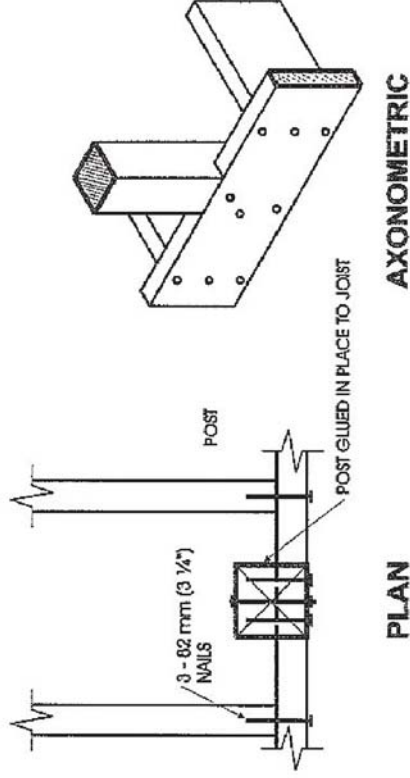


METHOD 6: POST FASTENED TO FLOOR, GUARD PARALLEL TO FLOOR JOISTS




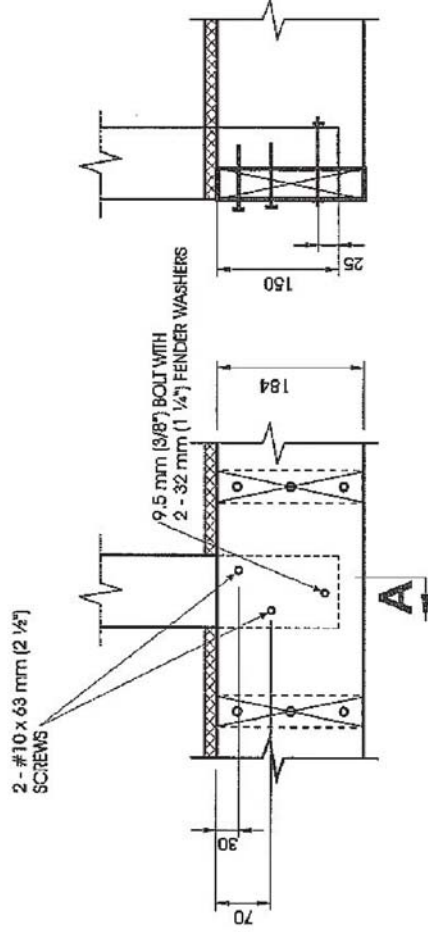
4x4 in AND 6x6 in POSTS

TITLE	Post Connection - Method 6
PART FILE	
DWG REV	A
DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
PROPRIETARY AND CONFIDENTIAL THIS DRAWING AND ITS CONTENTS ARE PROPERTY OF THE BOSCH POWER-TOOLS GROUP. IT IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. WITHOUT THE WRITTEN PERMISSION OF BOSCH POWER- TOOLS GROUP, ANY REPRODUCTION OR TRANSMISSION OF THIS DRAWING OR ITS CONTENTS IS STRICTLY PROHIBITED.	
SIZE	DWG. NO.
B	Post Connection - Option 6
SCALE:	SHT REV 2016-06-01-A



V-GROOVE POST AND POST WITH BALL

	
TITLE	Post Connection - Method 7
PART FILE	
DWG REV	A
DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
PROPRIETARY AND CONFIDENTIAL THIS DRAWING AND ITS CONTENTS ARE PROPERTY OF THE BUILDING PEAK GROUP. IT IS TO BE USED ONLY FOR THE PROJECT AND FOR THE BUILDING PEAK GROUP. NO DISSEMINATION OR REPRODUCTION IN WHOLE OR IN PART IS STRICTLY PROHIBITED.	
SIZE	DWG. NO.
B	Post Connection - Option 7
SCALE:	2016-06-01-A



METHOD 7: NOTCHED POST GLUED AND BOLTED TO RIM JOIST