



WOOD / ALUMINUM RAILING SYSTEM

Report Of:

- **2023 Alberta Building Code - Part 9**
- **2024 British Columbia Building Code - Part 9**
- **2020 National Building Code - Part 9**
- **2024 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.
www.peakproducts.com

Prepared by:

RDH Building Science Inc.
#400-4333 Still Creek Drive
Burnaby, BC V5C 6S6

Original Report: December 21, 2018

Updated: April 22, 2024

TABLE OF CONTENTS

1. OVERVIEW	2
2. PICKET ELEMENTS	3
3. RAIL ELEMENTS	3
4. CONNECTORS	4
5. RESULTS	4
6. CONCLUSION	5

APPENDIX A: ASSEMBLY DRAWINGS

BC PTP # 1003380



PERMIT TO PRACTICE RDH BUILDING SCIENCE INC.	
RM SIGNATURE:	<u>D. J. VADOCZ</u>
RM APEGA ID #:	116145
DATE:	2024-04-25
PERMIT NUMBER: P012367 The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	

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 2023
- British Columbia Building Code 2024
- National Building Code of Canada 2020
- Ontario Building Code 2024

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)
- Specified live load of 0.1 kN (applied to two adjacent vertical elements within a guard)

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 S157-17, Strength design in aluminum.
- Section properties: Determined from drawings provided by Peak. Calculations were completed in accordance with CAN/CSA S157-17.
- Fastener resistance: Completed in accordance with CAN/CSA O86-19, 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 O86-19, Engineering design in wood.
- Section properties: Determined from drawings provided by Peak. Calculations were completed in accordance with CAN/CSA O86-19.
- Fastener resistance: Completed in accordance with CAN/CSA O86-19, 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 with galvanized steel reinforcement. 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 S157-17, Strength design in aluminum, CAN/CSA O86-19, Engineering design in wood, and CSA S16:19, Design of steel structures.
- Section properties: Determined by drawings provided by Peak. Calculations were completed in accordance with CAN/CSA S157-17 and CAN/CSA O86-19, 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.)

This railing is not to be used as a guard for exterior stairs and landings that are more than 10m above the adjacent ground level in Ontario as per Article 9.8.8.3. of the Ontario Building Code 2024.

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.

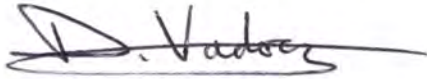
The above documents contain proprietary information and, as such, have not been included in this report.

7. CONCLUSION

The Veranda™ Wood/Aluminum Railing system meets the requirements within Part 9 (1 and 2 Dwelling Units) of the Alberta Building Code 2023, British Columbia Building Code 2024, National Building Code of Canada 2020, and Ontario Building Code 2024.

Sincerely,

BC PTP # 1003380

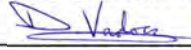


David Vadocz, P.Eng.
Principal
RDH Building Science Inc.

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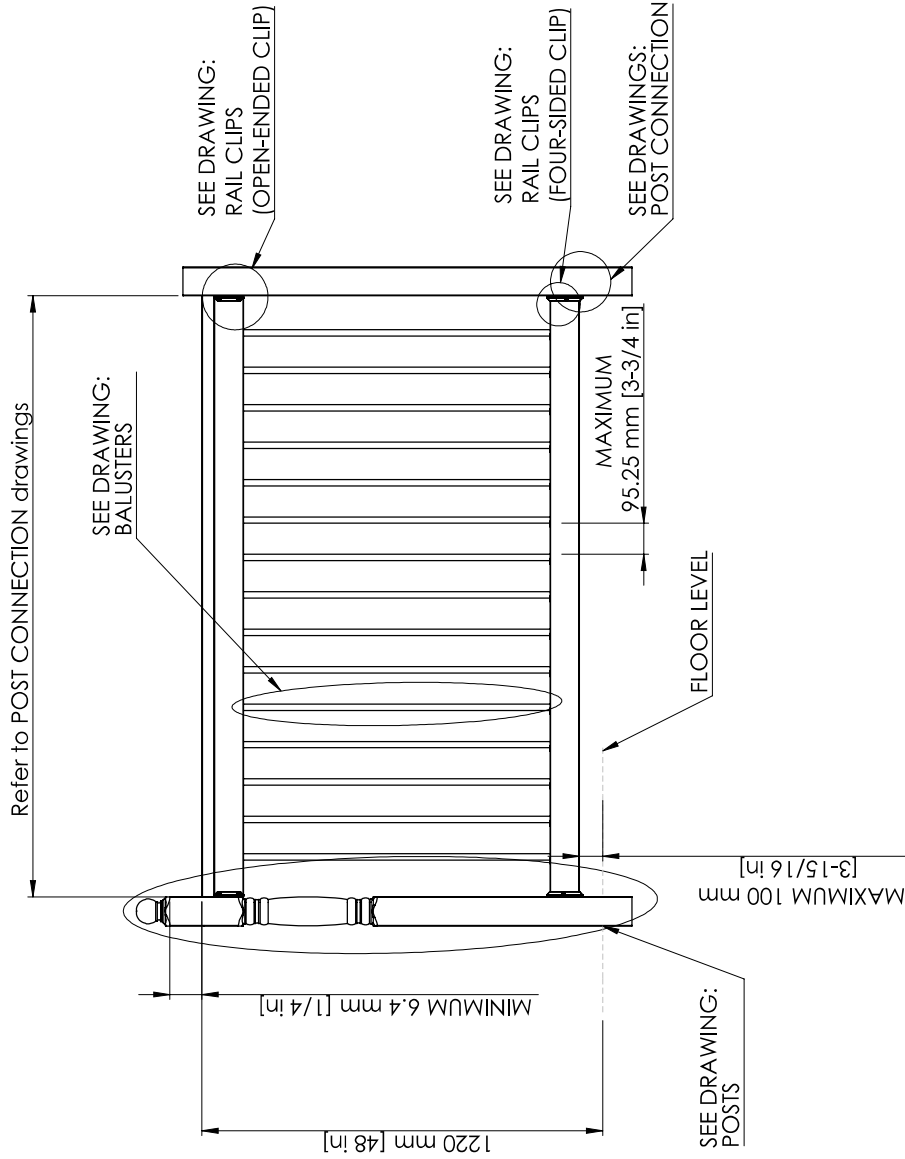
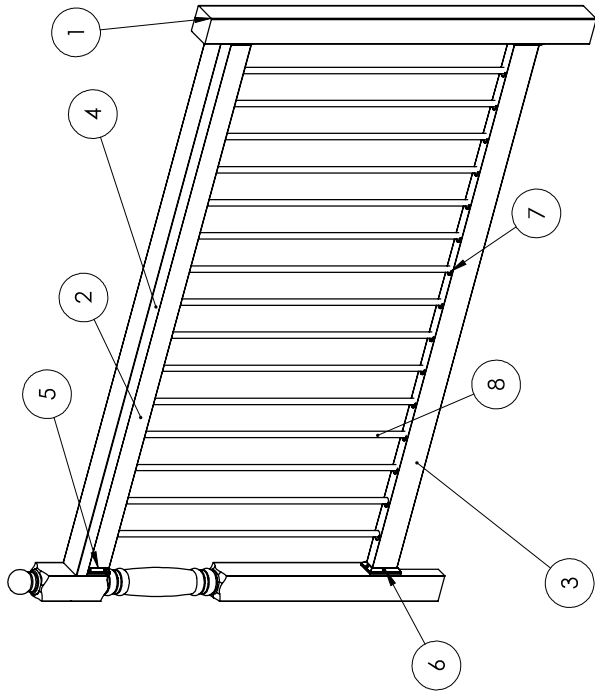
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DATE:	2024-04-25
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APPENDIX A

ASSEMBLY DRAWINGS



TITLE
VERANDA™ Wood/Aluminum
Railing 48 in.

PART FILE
Wood-Aluminum Railing Assem

DWG REV
D

DIMENSIONS ARE IN MM UNLESS NOTED
DO NOT SCALE DRAWING

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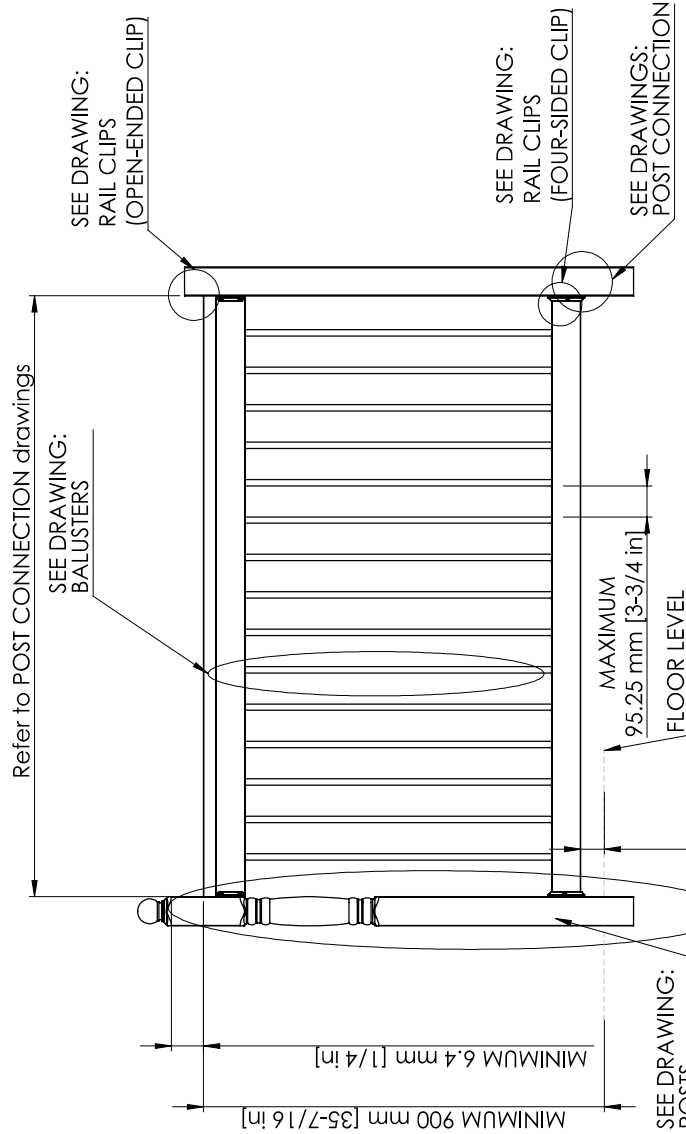
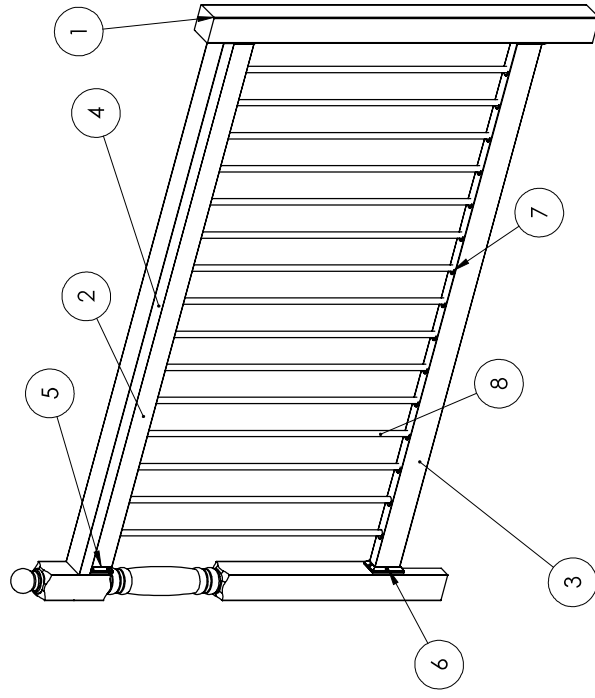
SIZE
DWG. NO.

B Wood-Aluminum Railing Assem - 48 in

SCALE: 1:15 SHEET 5/15

2016-06-01-A

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3	BOTTOM RAIL	1000122747, 1000122374
4	HANDRAIL	1000100194, 1000167650
5	OPEN-ENDED RAIL CLIP	1001843332, 1000682067
6	FOUR-SIDED CLIP	1001843332, 1000682048
7	BALUSTER CONNECTOR	1001843332
8	BALUSTER	1001843332



TITLE
VERANDA™ Wood/Aluminum
Railing 36 in. Round

PART FILE
Wood-Aluminum Railing Assem

DWG REV
D

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**PROPRIETARY AND
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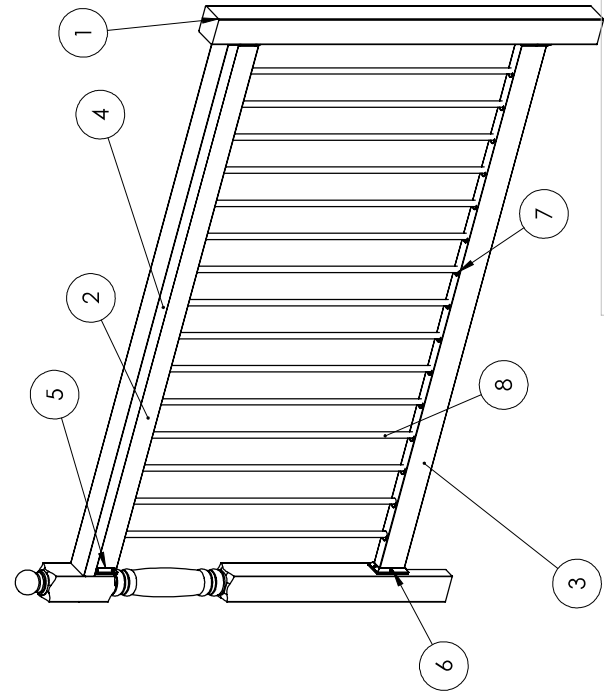
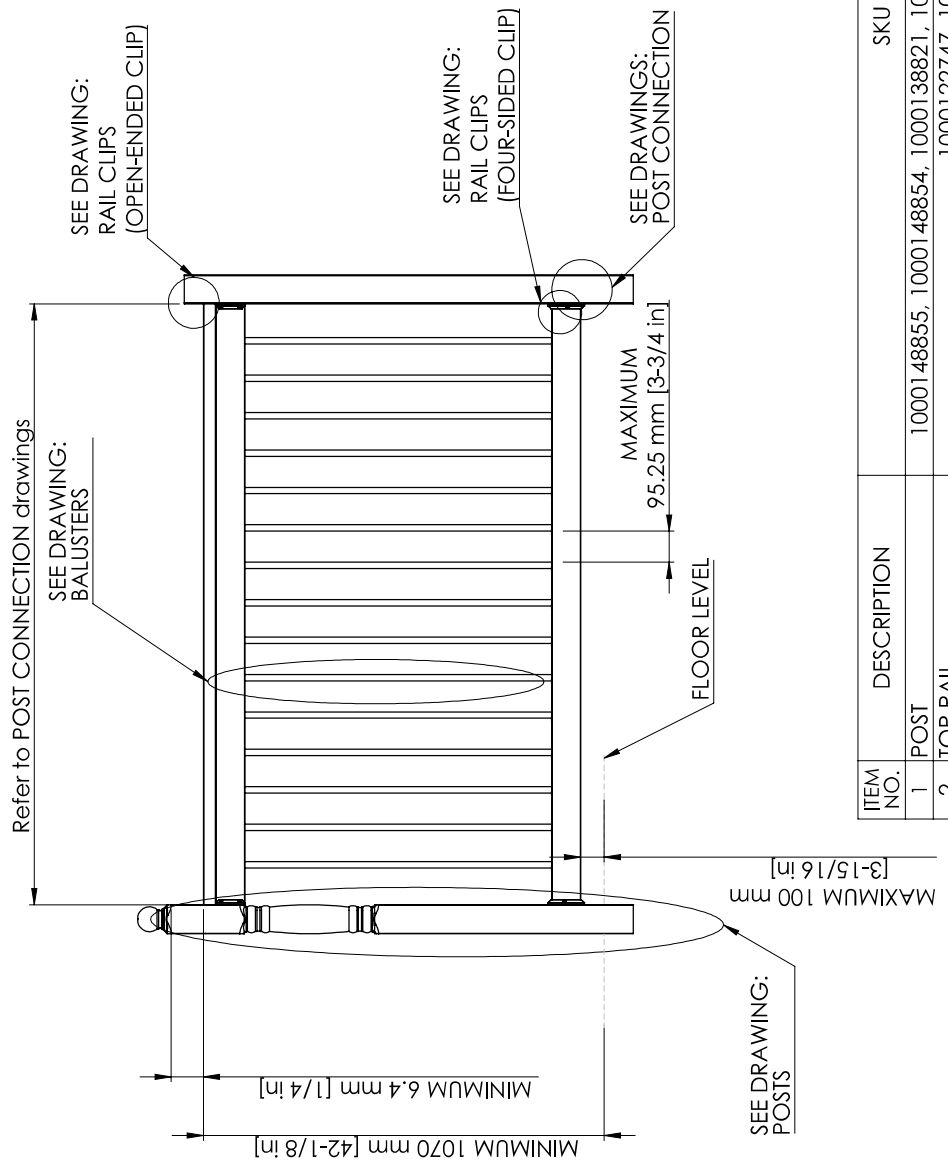
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SIZE
DWG. NO.

B Wood-Aluminum Railing Assem - 36 in

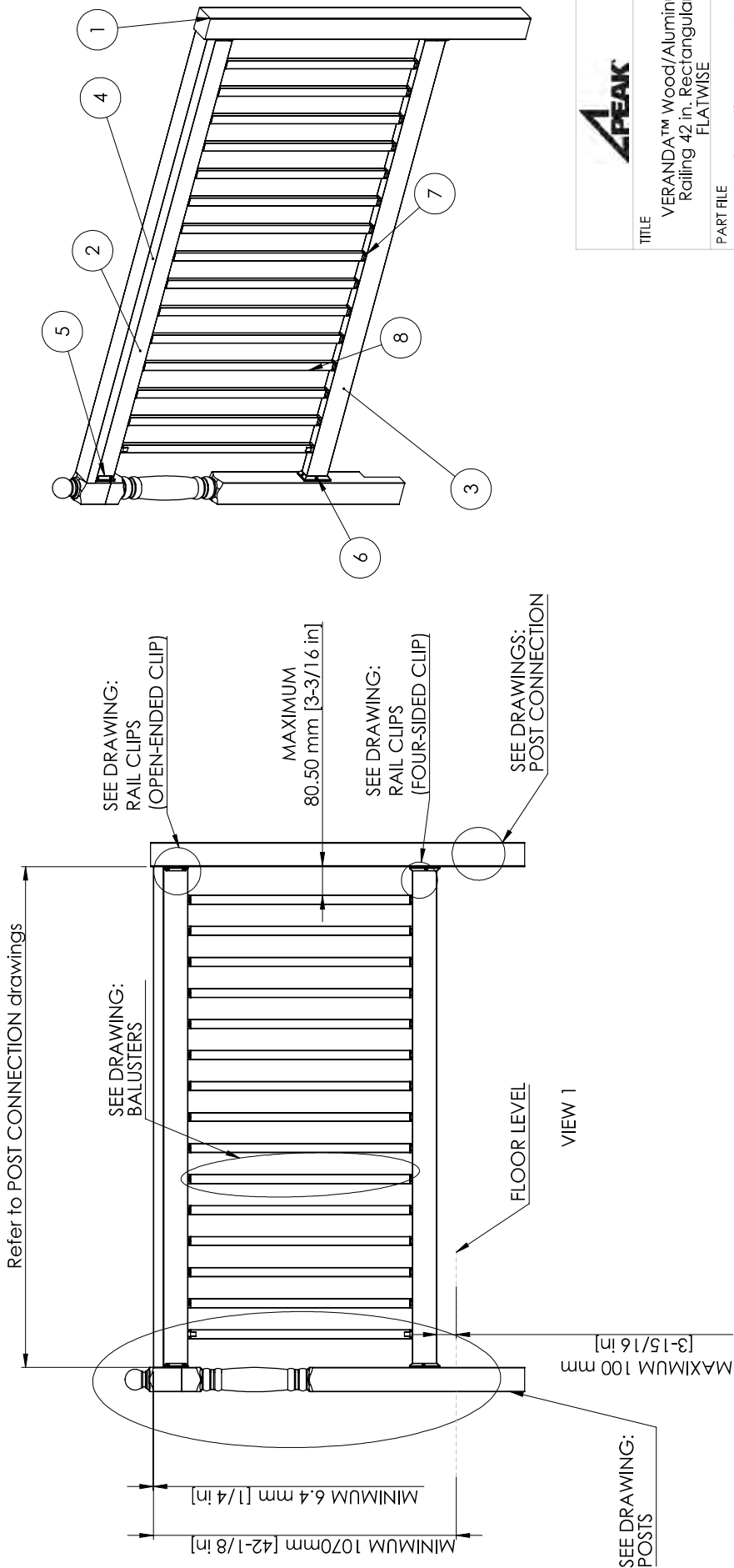
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8	BALUSTER	1001843331



TITLE	VERANDA™ Wood/Aluminum Railing 42 in. Round
PART FILE	Wood-Aluminum Railing Assem
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B	Wood-Aluminum Railing Assem
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8	BALUSTER	1000681500, 1001155196



TITLE
VERANDA™ Wood/Aluminum
Railing 42 in. Rectangular
FLATWISE

PART FILE
Wood-Aluminum Railing Assem - Rectangular

DWG REV
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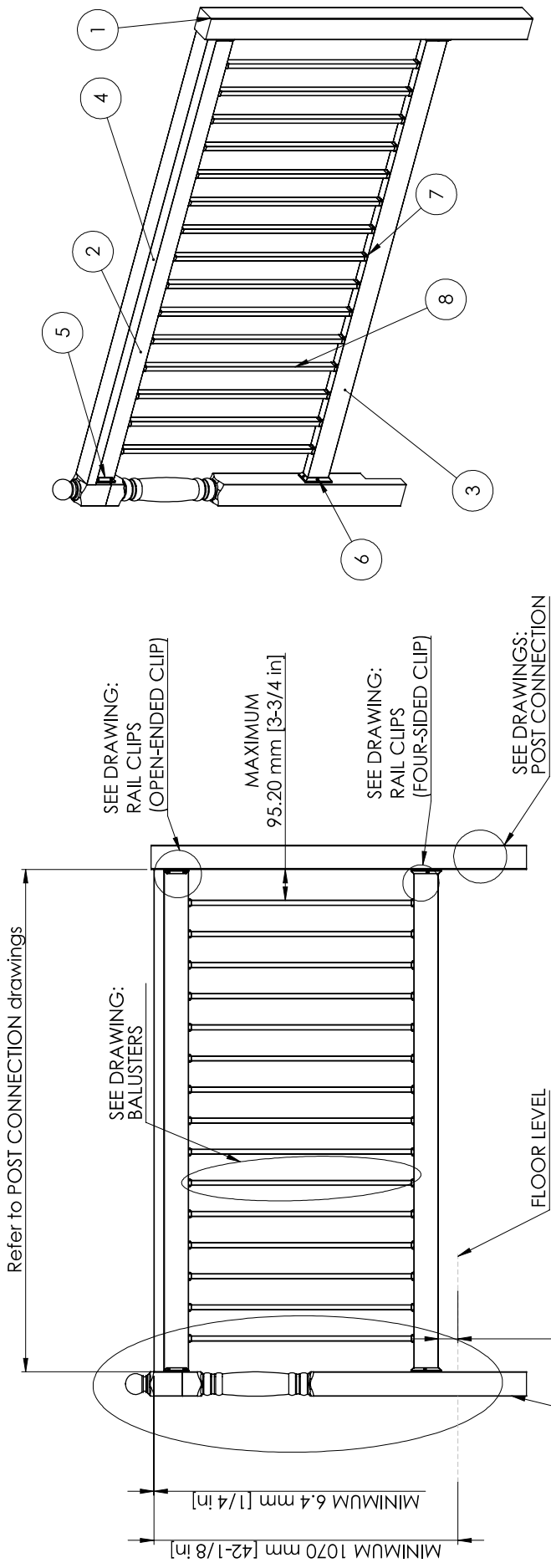
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SIZE
DWG. NO.
B Wood-Aluminum Railing Assem - 42 in - Rectangular

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

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7	BALUSTER CONNECTOR	1000744988
8	BALUSTER	1000744988



TITLE
VERANDA™ Wood/Aluminum
Railing 42 in. Rectangular
EDGEWISE

PART FILE
Wood-Aluminum Railing Assem - Rectangular

DWG REV
A

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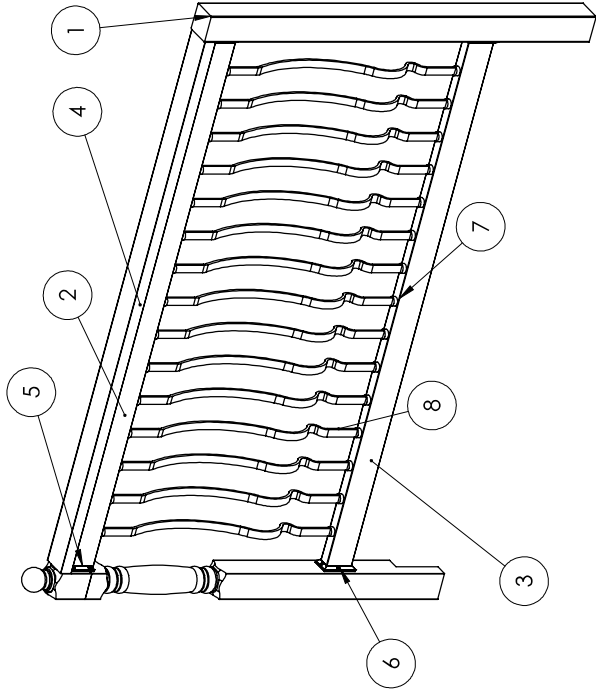
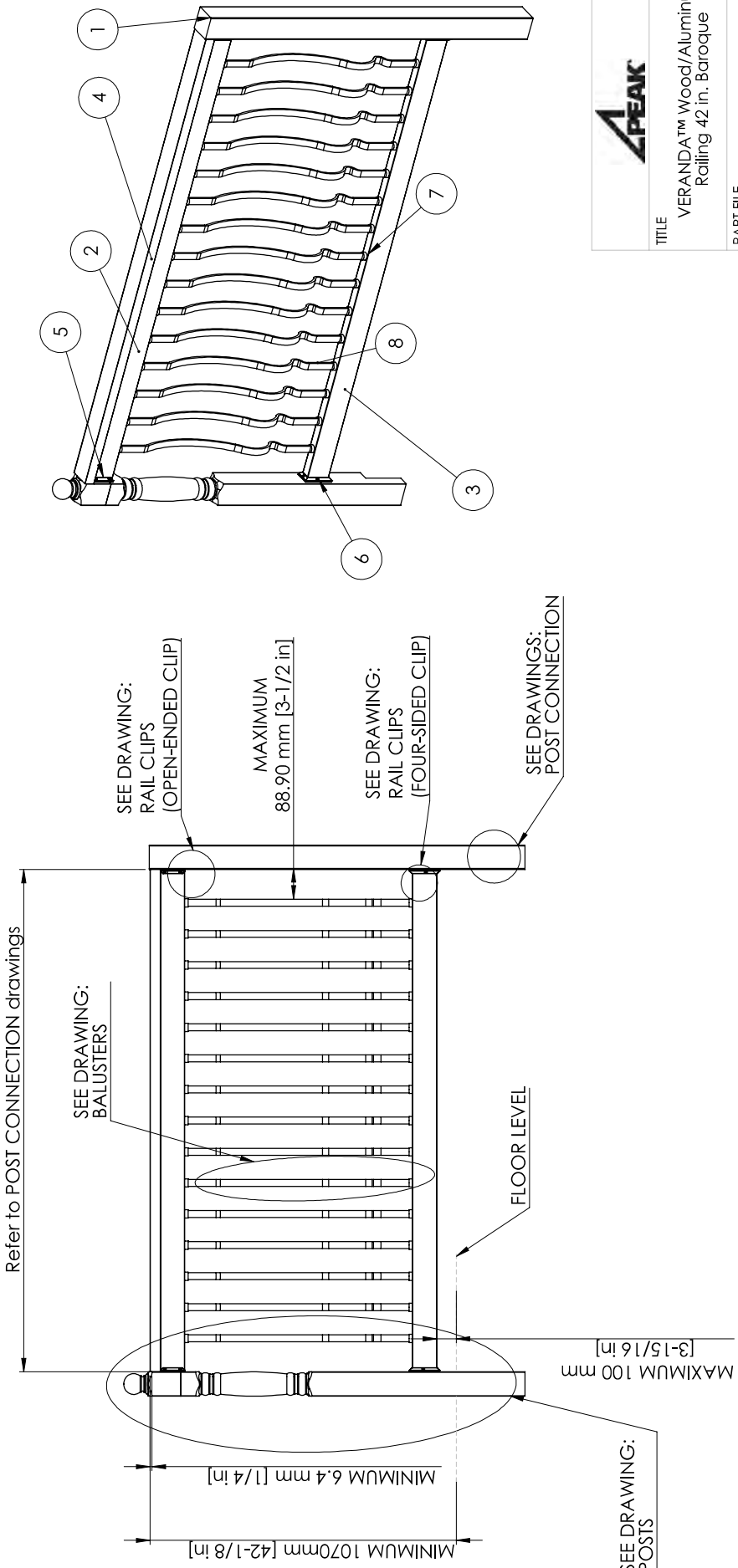
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SIZE
DWG. NO. **B**

Web: **B** Aluminum Railing Assem - 42 in - Rectangular Continued

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6	FOUR-SIDED CLIP	1000682048, 1000744988
7	BALUSTER CONNECTOR	1000744988
8	BALUSTER	1000744988



TITLE
VERANDA™ Wood/Aluminum
Railing 42 in. Baroque

PART FILE
Wood-Aluminum Railing Assem - Baroque

DWG REV
A

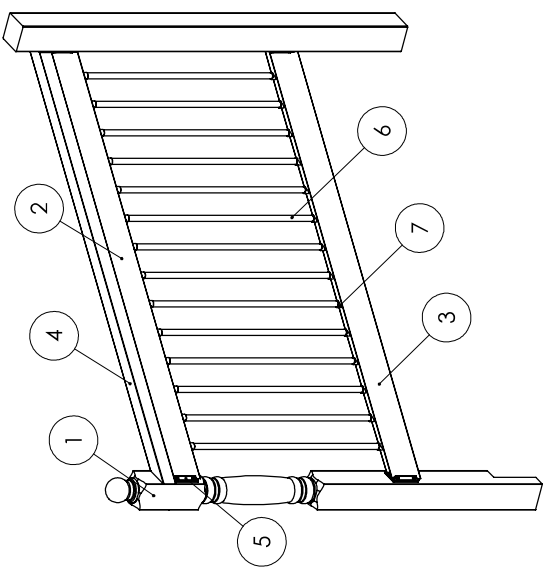
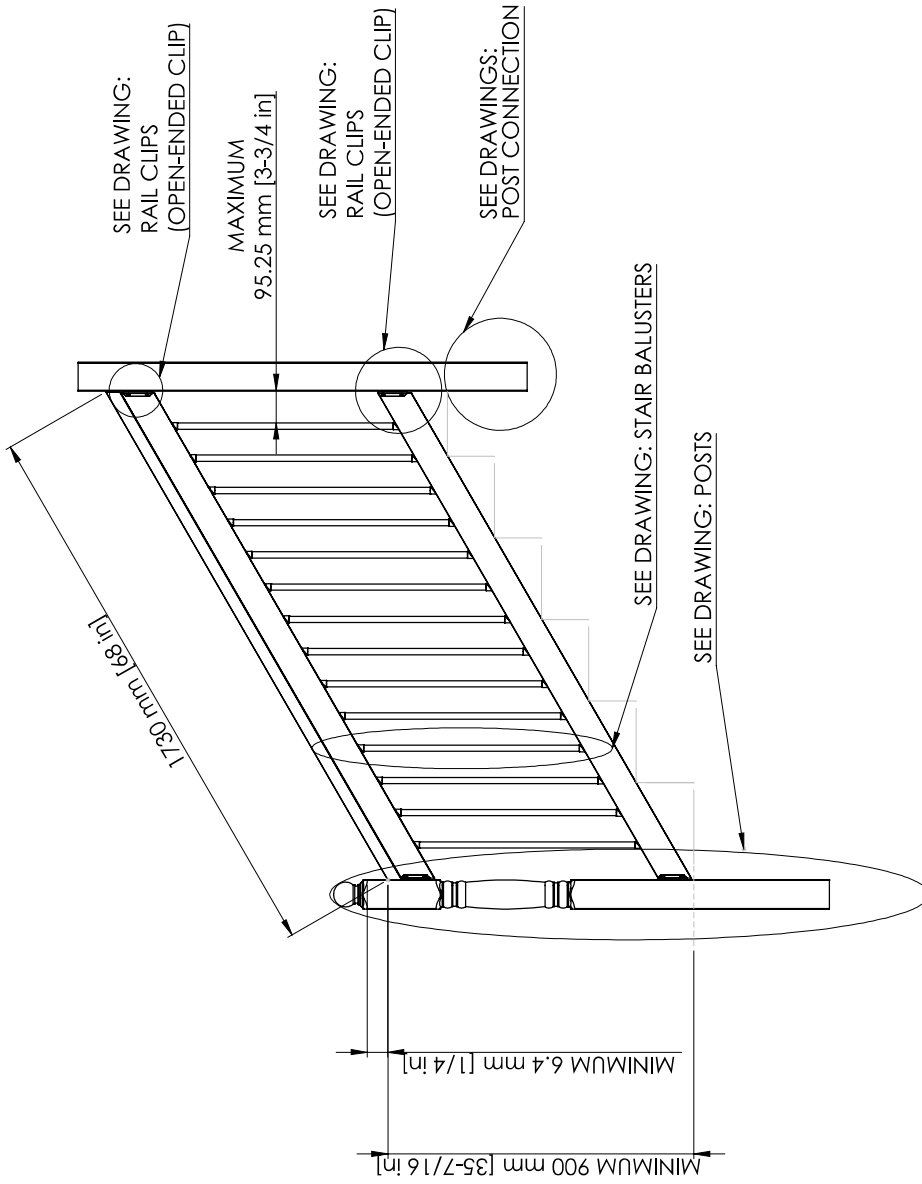
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SIZE
DWG. NO. B Wood-Aluminum Railing Assem - 42 in - Baroque

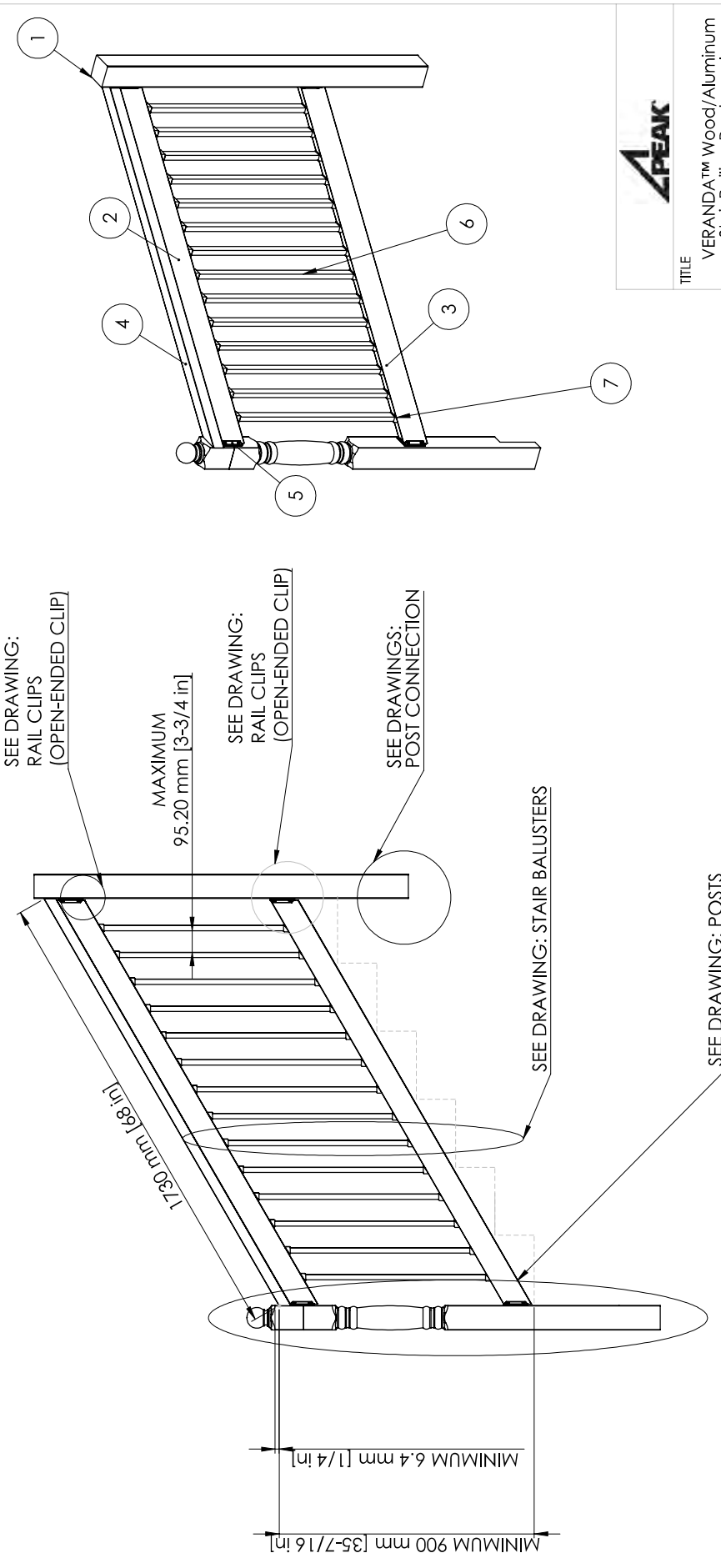
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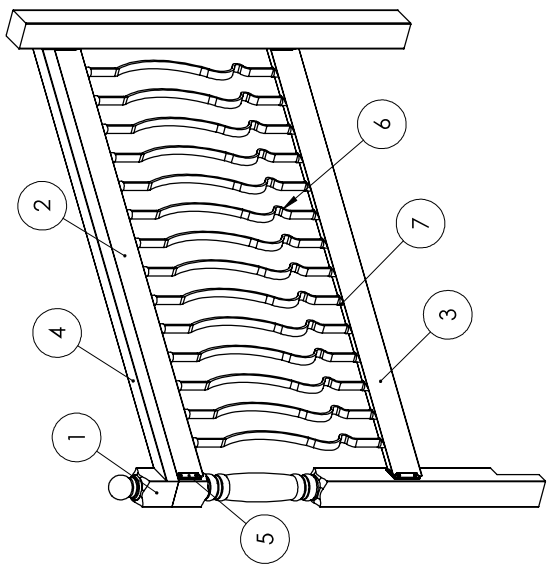
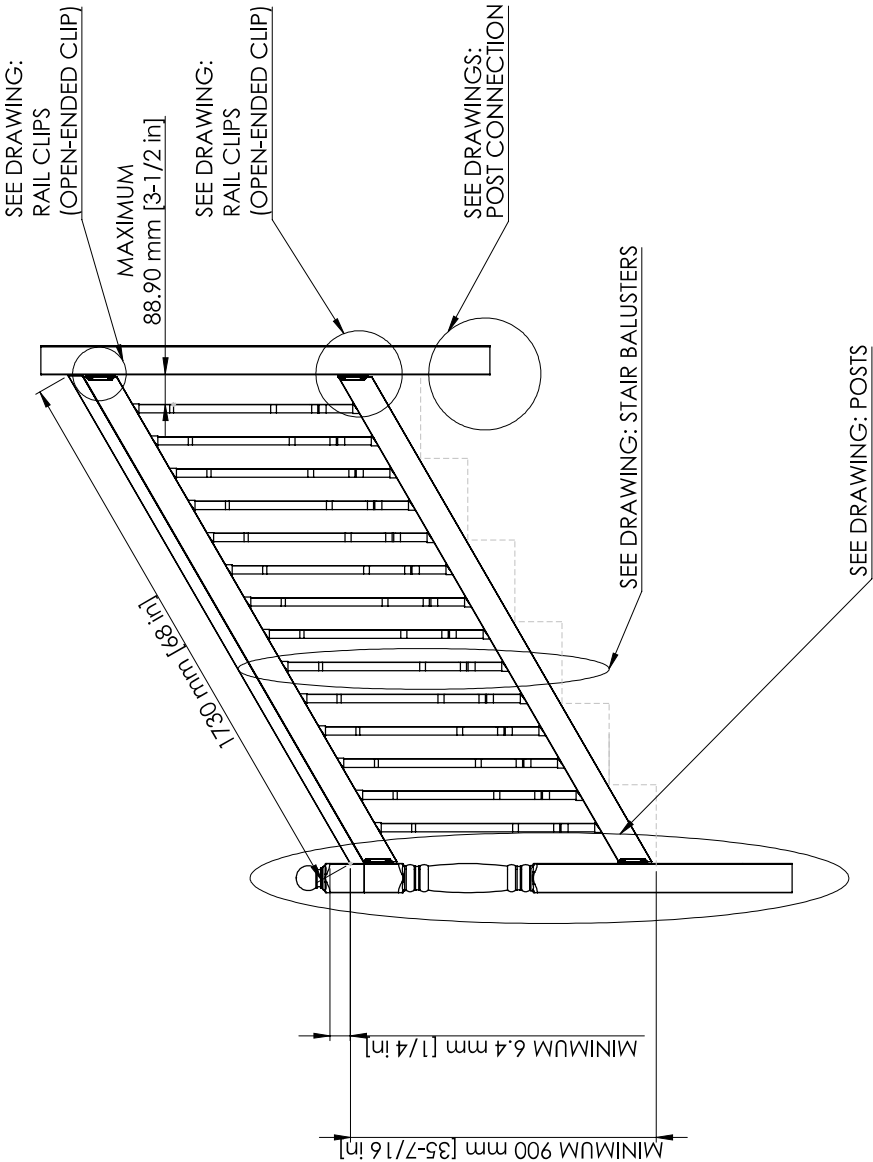
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SIZE	DWG. NO.
B	Wood-Aluminum Stair Railing Assem
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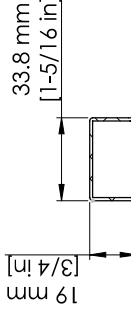
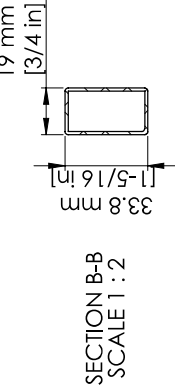
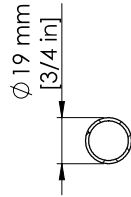
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B Wood-Aluminum Stair Railing Assem-Rectangular	
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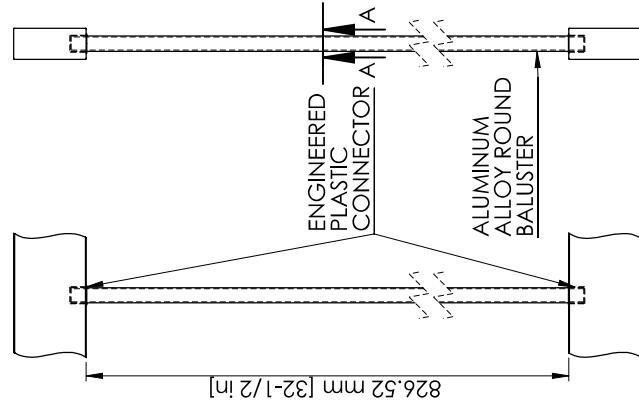
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SIZE	DWG. NO. B
Wood-Aluminum Stair Railing Assem-Baroque	
SCALE:	1:10 2016-06-01-A

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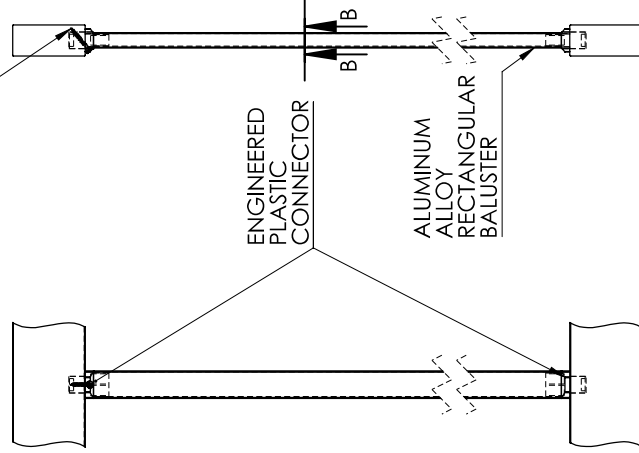


#8 x 38 mm [1-1/2 in]
SELF-TAPPING SCREW

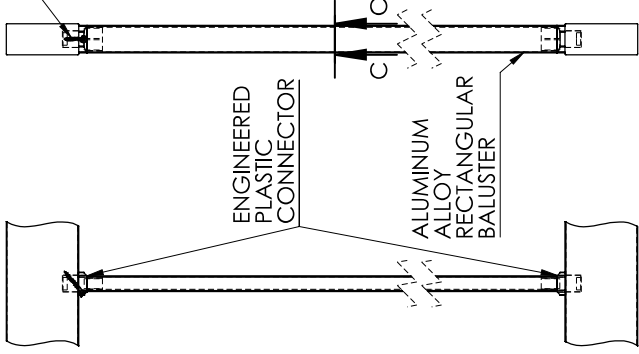
#8 x 38 mm [1-1/2 in]
SELF-TAPPING SCREW



ROUND BALUSTER | SKU: 1000681500



FLATWISE RECTANGULAR BALUSTER | SKU: 1000744988



EDGEWISE RECTANGULAR BALUSTER | SKU: 1000744988



TITLE VERANDA™ Balusters

PART FILE Standard Pickets Assem

DWG REV B

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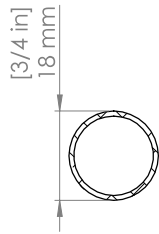
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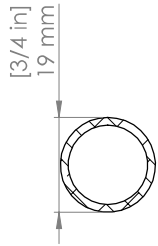
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B Standard Pickets Assem

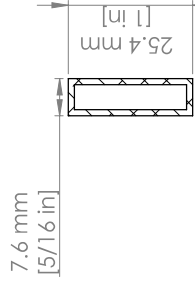
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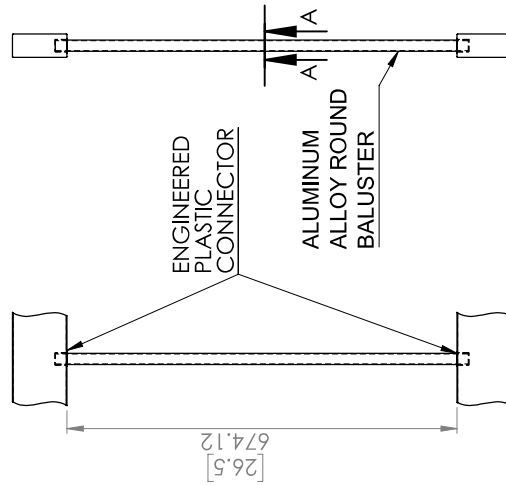
SECTION A-A
SCALE 1 : 1



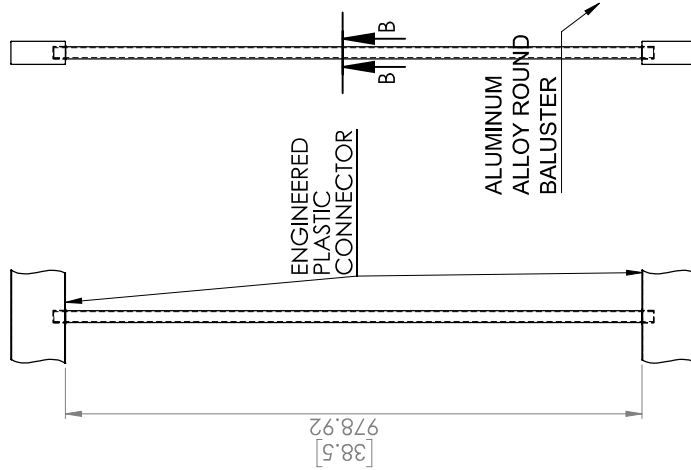
SECTION B-B
SCALE 1 : 1



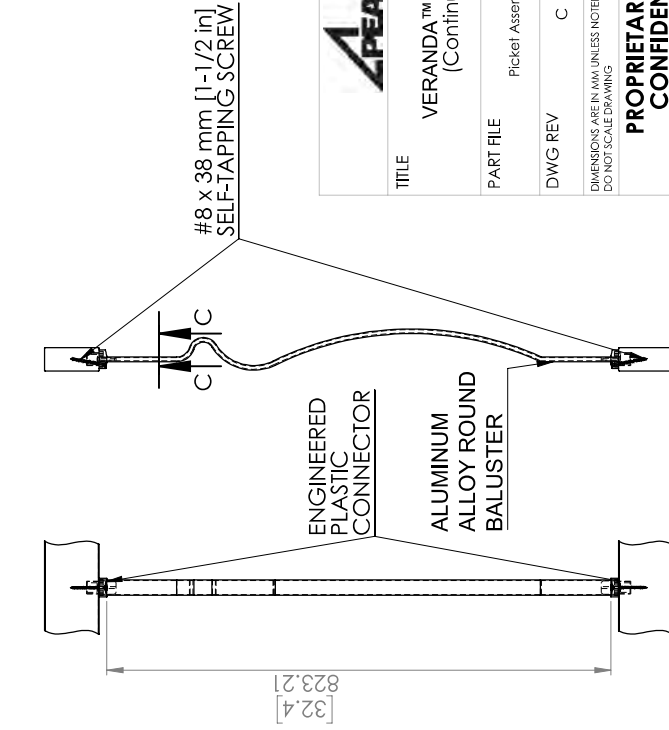
SECTION C-C
SCALE 1 : 1



ROUND DECK
BALUSTER - 28 in. SKU: 1001843331



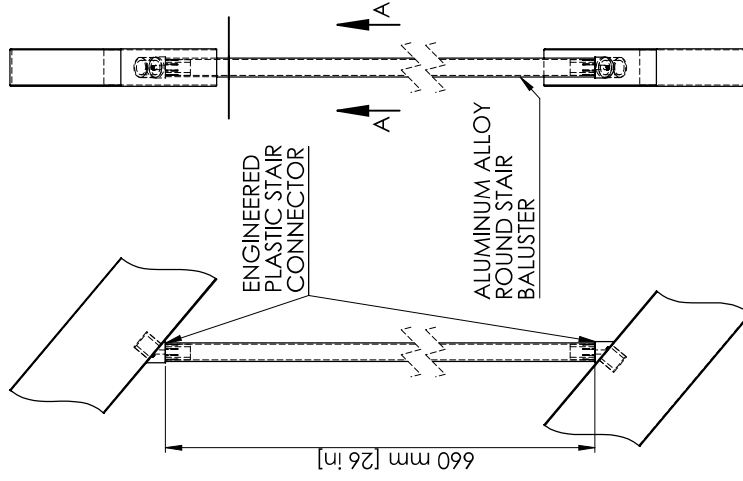
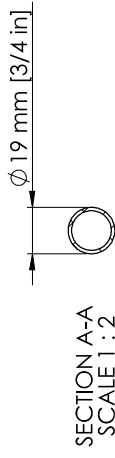
ROUND DECK
BALUSTER - 40 in. SKU: 1001843332



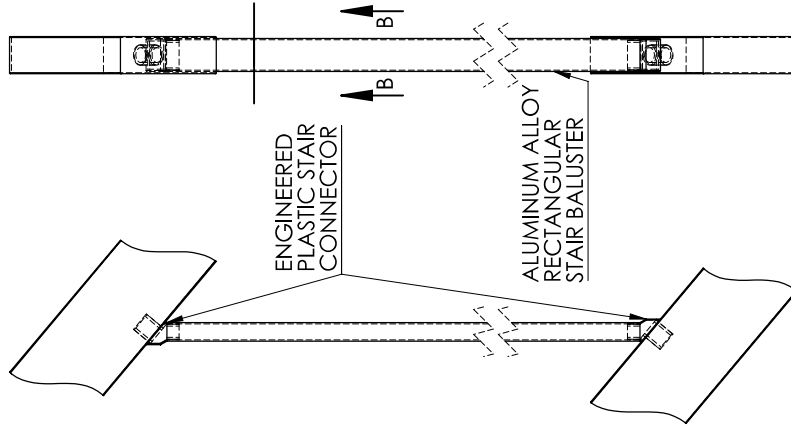
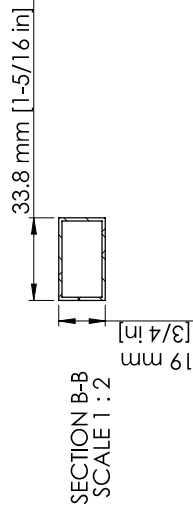
BAROQUE
BALUSTER SKU: 1000819913



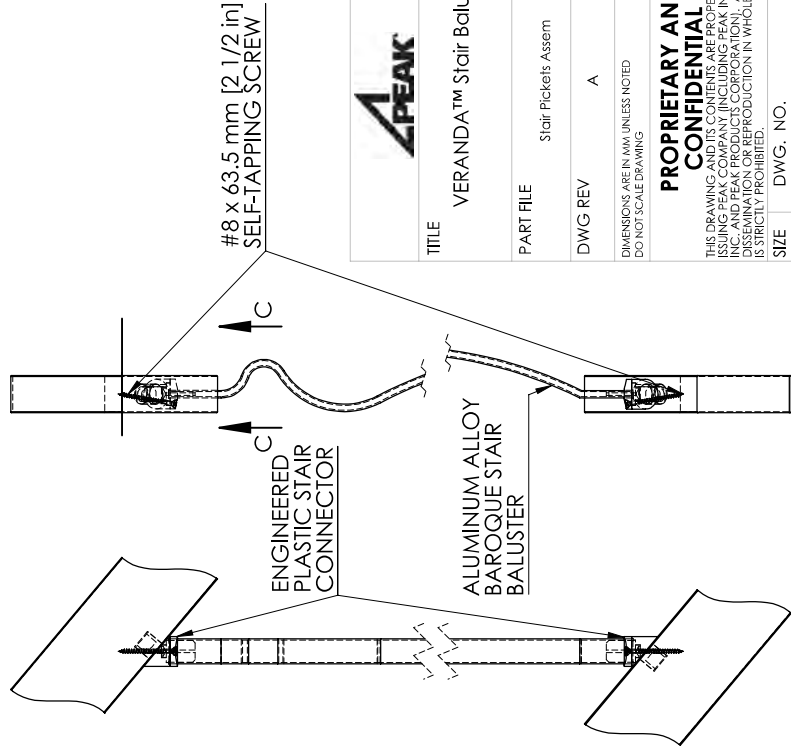
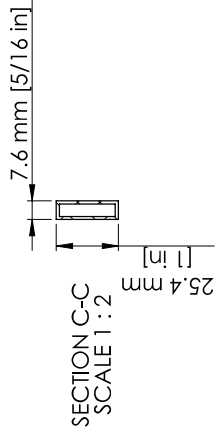
TITLE	VERANDA™ Balusters (Continued)
PART FILE	Picketl Assem - RDH
DWG REV	C
DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
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SIZE	DWG. NO.
B	Picketl Assem - Report DWG
SCALE: 1:10 5/16 REV 2017-05-16	



ROUND STAIR BALUSTER | SKU: 1000681548



RECTANGULAR STAIR BALUSTER | SKU: 1000744987



BAROQUE STAIR BALUSTER | SKU: 1000819746



TITLE	VERANDA™ Stair Balusters
PART FILE	Stair Pickets Assem
DWG REV	A

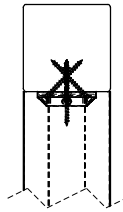
DIMENSIONS ARE IN MM UNLESS NOTED
DO NOT SCALE DRAWING

PROPRIETARY AND CONFIDENTIAL

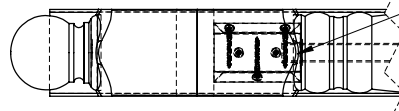
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SIZE DWG. NO.
B Stair Pickets Assem

SCALE: 1:5 SHEET 2016-06-01-A

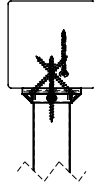


2 - #10 x 63.5 mm [2-1/2 in]
SELF-TAPPING SCREW

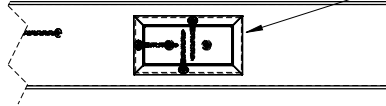


ENGINEERED PLASTIC
OPEN-ENDED CLIP

SKU: 1000682067, 1000681500,
1000744988, 1000819913,
1001843331, 1001843332

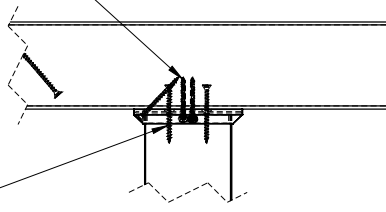


2 - #10 x 63.5 mm [2-1/2 in]
SELF-TAPPING SCREW



ENGINEERED PLASTIC
FOUR-SIDED CLIP

SKU: 1000682048, 1000681500,
1000744988, 1000819913,
1001843331, 1001843332



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



TITLE
VERANDA™ Rail Clips

PART FILE
Wood-Aluminum Railing Assem

DWG REV
B

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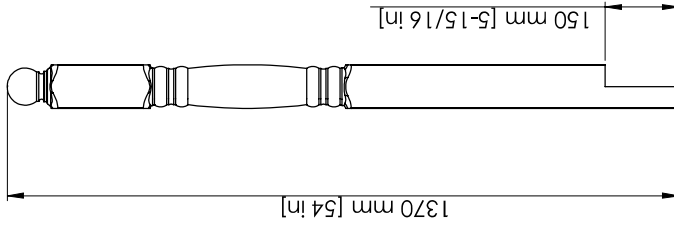
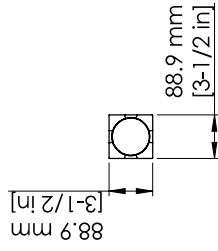
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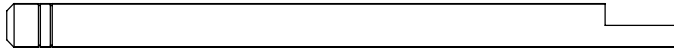
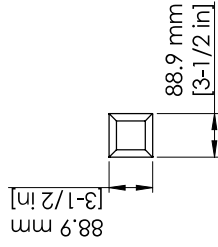
SIZE
DWG. NO.

B
Brackets and Connectors

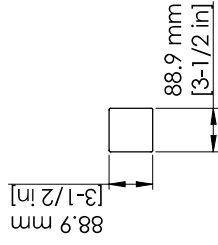
SCALE: 1:10
SHEET REV
2016-06-01-A



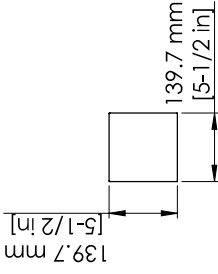
POST WITH BALL
SKU: 1000148855



V-GROOVE POST
SKU: 1000148854,
1000138821



4x4 in POST
SKU: 1000108805,
1000100112



6x6 in POST
SKU: 1000108806



TITLE

Posts

PART FILE

Posts Assem

DWG REV

B

DIMENSIONS ARE IN MM UNLESS NOTED
DO NOT SCALE DRAWING

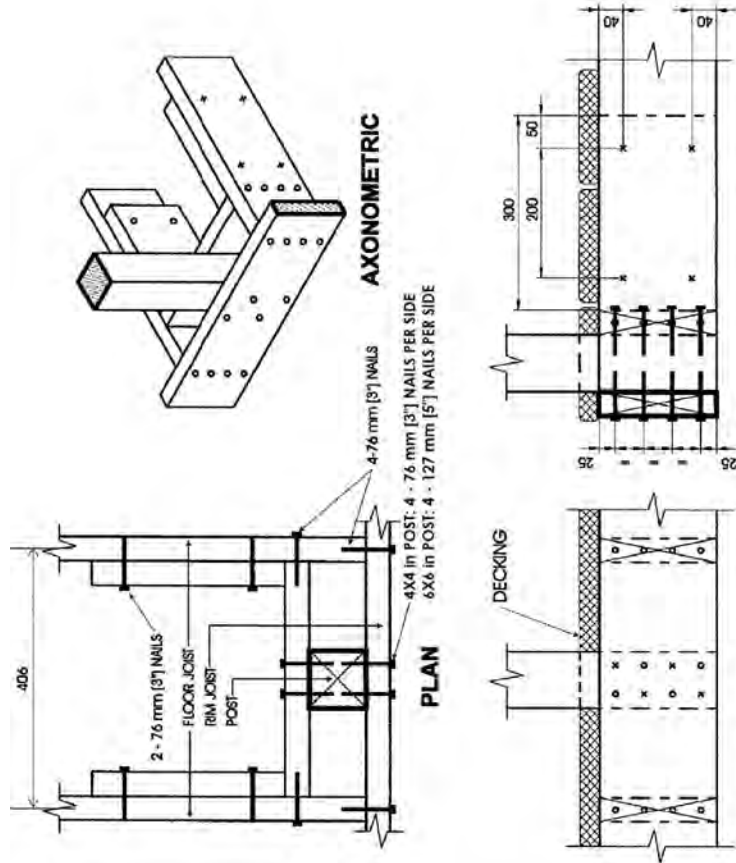
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SIZE DWG. NO.

B Posts Assem

SCALE: 1:10 SHEET NO. 2016-06-01-A



4x4 in AND 6x6 in POSTS

METHOD 1: POST NAILED TO RIM JOIST

Notes:

- Decking is omitted from the plan view and the axonometric view for clarity.
- Fasten 25 mm x 140 mm (1" x 6" nominal) outer deck board to rim joist with 63 mm (2 1/2") nails at 300 mm (12").
- Fasten 25 mm x 140 mm (1" x 6" nominal) outer deck board to floor joist with 1 - 63 mm (2 1/2") nail at each joist.
- The post may be positioned anywhere between the joists.
- Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.22 (4'-0")
Northern Species	1.20 (3'-11")
Column 1	2



TITLE Post Connection - Method 1

PART FILE

DWG REV B

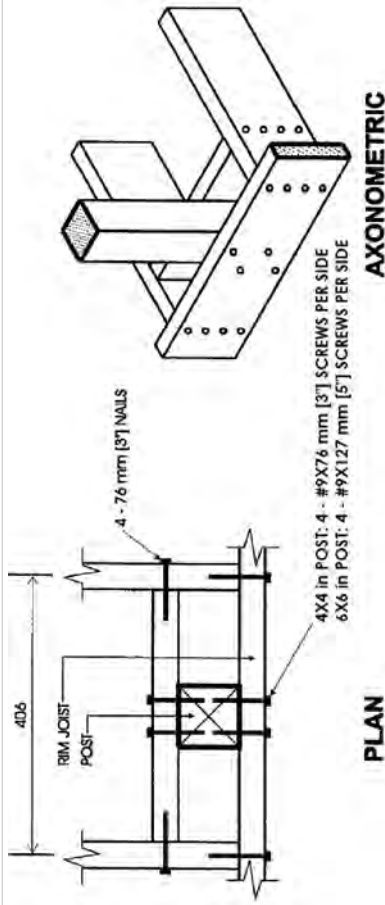
DIMENSIONS ARE IN MM UNLESS NOTED
DO NOT SCALE DRAWING

PROPRIETARY AND CONFIDENTIAL

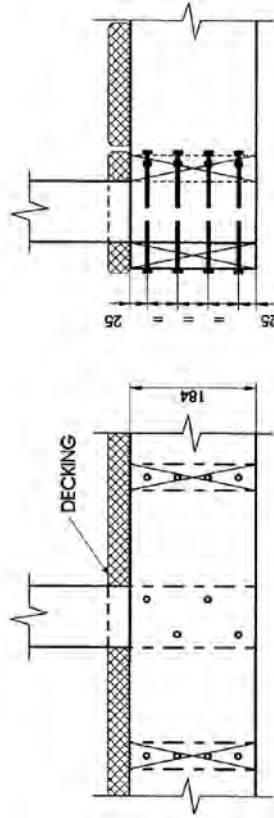
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SIZE DWG. NO. B Post Connection - Option 1

SCALE: 9/15 REV 2016-06-01-A



4x4 in AND 6x6 in POSTS



METHOD 2: POST SCREWED TO RIM JOIST

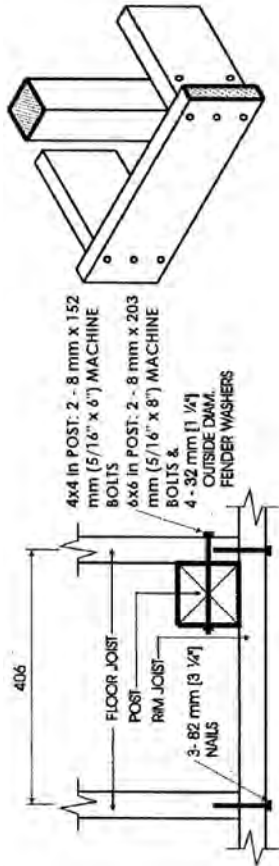
Notes:

1. Decking is omitted from the plan view and the axonometric view for clarity.
2. Fasten 25 mm x 140 mm (1" x 6" nominal) outer deck board to rim joist with 63 mm (2 1/2") nails at 300 mm (12").
3. Fasten 25 mm x 140 mm (1" x 6" nominal) outer deck board to floor joist with 1 - 63 mm (2 1/2") nail at each joist.
4. The post may be positioned anywhere between the joists.
5. #9 screws may be replaced by #8 screws if the maximum spacing between posts is not more than 1,20 mm (3'-11").
6. Dimensions shown are in mm unless otherwise specified.

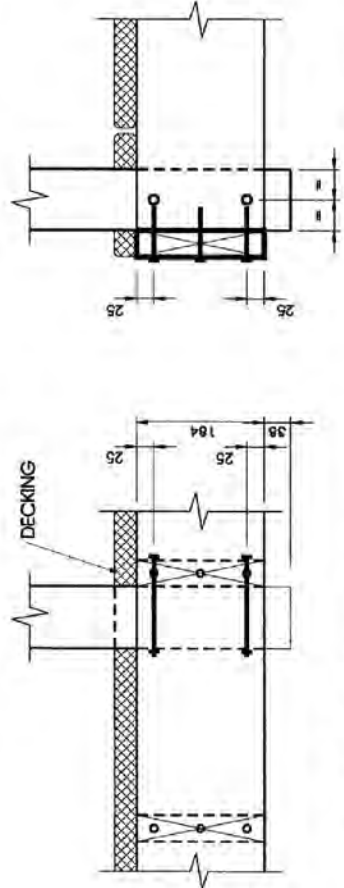
MAXIMUM SPAN OF RAIL BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.56 (5'-1")
Northern Species	1.20 (3'-11")
Column 1	2



TITLE	Post Connection - Method 2
PART FILE	
DWG REV	B
DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
PROPRIETARY AND CONFIDENTIAL	
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SIZE	DWG. NO.
B	Post Connection - Option 2
SCALE:	9/16 REV 2016-06-01-A



PLAN



FRONT ELEVATION

AXONOMETRIC



4x4 in AND 6x6 in POSTS

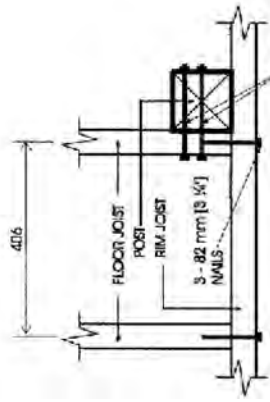
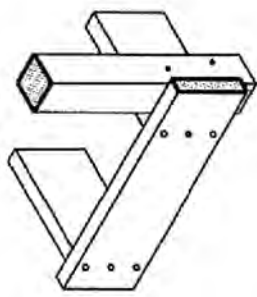
METHOD 3: POST BOLTED TO FLOOR JOIST - 8 mm [5/16 in] BOLTS

- Notes:**
- Decking is omitted from the plan view and the axonometric view for clarity.
 - 38 mm (1 1/2") post projection is not required where the maximum spacing between posts does not exceed 1.20 m (3'-11").
 - Joists may be spaced at 610 mm (24") o.c. or 406 mm (16") o.c.
 - Where floor joists are spaced at 610 mm (24") o.c., decking shall have a minimum thickness of 38 mm (1 1/2") and shall be fastened to the floor with 2 - 76 mm (3") nails.
 - Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPACING BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.29 (4'-3")
Northern Species	1.20 (3'-11")
Column 1	2



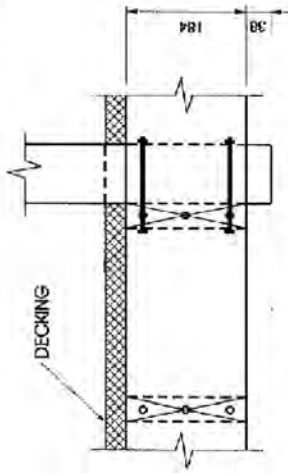
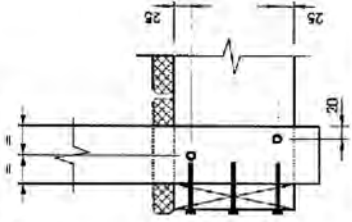
TITLE	Post Connection - Method 3
PART FILE	
DWG REV	B
DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
PROPRIETARY AND CONFIDENTIAL	
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SIZE	DWG. NO.
B	Post Connection - Option 3
SCALE:	9/16 REV 2016-06-01-A



AXONOMETRIC

PLAN

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



SIDE ELEVATION

FRONT ELEVATION

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

- Notes:**
- Decking is omitted from the plan view and the axonometric view for clarity.
 - 38 mm (1 1/2") post projection is not required where the maximum spacing between posts does not exceed 1.20 m (3'-11").
 - Joists may be spaced at 610 mm (24") o.c. or 406 mm (16") o.c.
 - Where floor joists are spaced at 610 mm (24") o.c., decking shall have a minimum thickness of 38 mm (1 1/2") and shall be fastened to the floor with 2 - 76 mm (3") nails.
 - Dimensions shown are in mm unless otherwise specified.

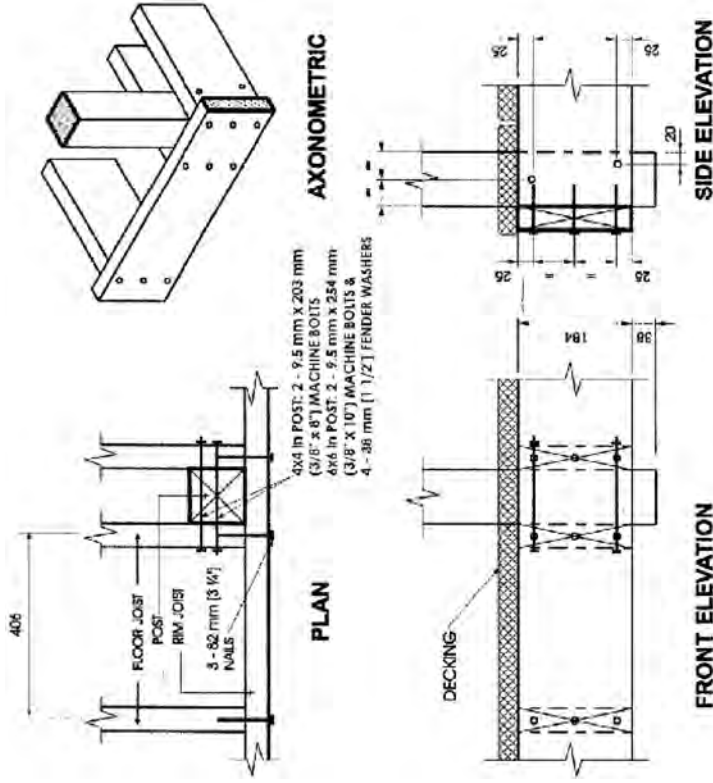
MAXIMUM SPACING BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.49 (4'-11")
Northern Species	1.20 (3'-11")
Column 1	2



4x4 in AND 6x6 in POSTS



TITLE	Post Connection - Method 4
PART FILE	
DWG REV	B
DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
PROPRIETARY AND CONFIDENTIAL	
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SIZE	DWG. NO.
B	Post Connection - Option 4
SCALE:	9/16 REV 2016-06-01-A



4x4 IN AND 6x6 IN POSTS

METHOD 5: POST BOLTED TO 2 FLOOR JOIST

Notes:

1. Decking is omitted from the plan view and the axonometric view for clarity.
2. 38 mm (1½") post; projection is not required where the maximum spacing between posts does not exceed 1.20 m (3'-11").
3. Joists may be spaced at 610 mm (24") o.c. or 406 mm (16") o.c.
4. Where floor joists are spaced at 610 mm (24") o.c. decking shall have a minimum thickness of 38 mm (1½") and shall be fastened to the floor with 2 - 76 mm (3") nails.
5. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPACING BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	2.14 (7'-0")
Northern Species	1.20 (3'-11")
Column 1	2



TITLE Post Connection - Method 5

PART FILE

DWG REV B

DIMENSIONS ARE IN MM UNLESS NOTED
DO NOT SCALE DRAWING

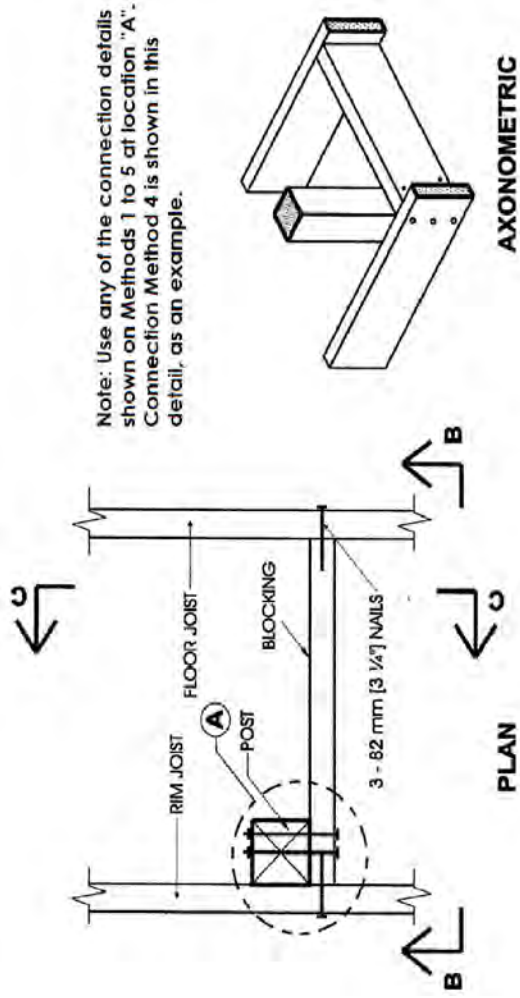
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SIZE DWG. NO.

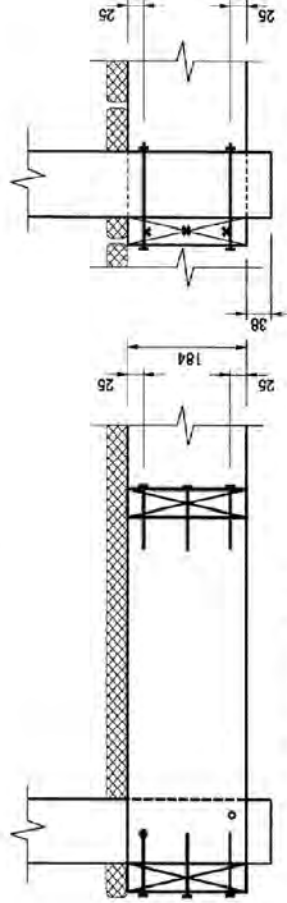
B Post Connection - Option 5

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



4x4 in AND 6x6 in POSTS

AXONOMETRIC



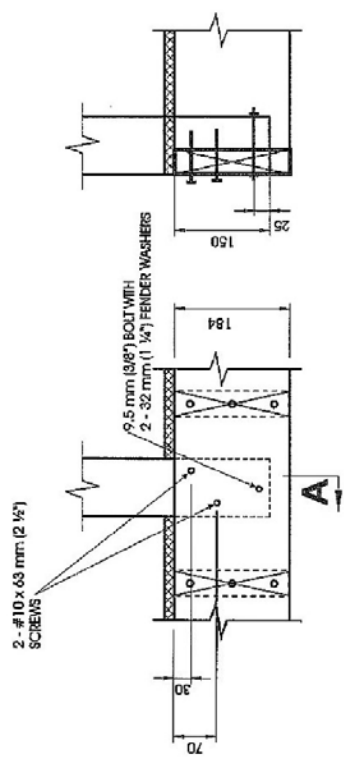
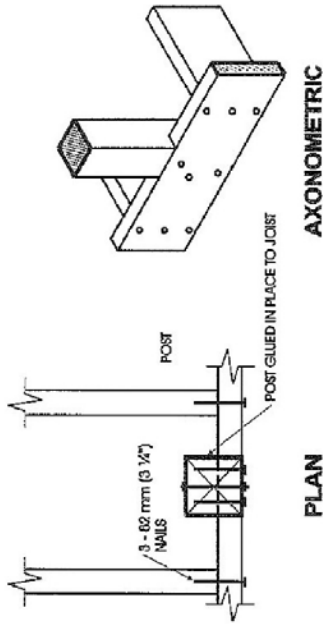
METHOD 6: POST FASTENED TO FLOOR, GUARD PARALLEL TO FLOOR JOISTS

Notes:

1. Use any of the connection details shown on Details EB-1 to EB-5 at location "A". Connection Detail EB-4 is shown in this detail, as an example.
2. Maximum spacing between posts is determined from connection detail used at location "A".
3. Decking is omitted from the plan view and the axonometric view for clarity.
4. Blocking shall be not less than 38 mm x 184 mm (2" x 8" nominal).
5. Dimensions shown are in mm unless otherwise specified.



TITLE	Post Connection - Method 6
PART FILE	
DWG REV	B
DIMENSIONS ARE IN MM UNLESS NOTED DO NOT SCALE DRAWING	
PROPRIETARY AND CONFIDENTIAL	
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SIZE	DWG. NO.
B	Post Connection - Option 6
SCALE:	9/15 REV 2016-06-01-A



FRONT ELEVATION

SECTION-A

METHOD 7: NOTCHED POST GLUED AND BOLTED TO RIM JOIST

Notes:

1. Minimum dimension of post is 82 mm x 82 mm (3 1/4" x 3 1/4").
2. Notch post 38 mm x 152 mm (1 1/2" x 6") at rim joist.
3. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPACING BETWEEN POSTS	
Post Species	Maximum Span, m (ft-in)
Oak, Maple, Yellow Poplar, Hemlock, White Pine	3.30 (10'-10")
Column 1	2



V-GROOVE POST AND POST WITH BALL



TITLE
Post Connection - Method 7

PART FILE

DWG REV B

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SIZE DWG. NO.

B Post Connection - Option 7

SCALE: 9/15 REV 2016-06-01-A