OBC INTERIOR GUARDS DETAILS SB-7

Section 3 Interior Guards

3.1. Materials

3.1.1. Lumber and Wood Products

(1) Lumber species used for a primary loadbearing element in a guard shall be a species listed in the Table 3.1.2.

(2) Except as provided in Sentence (4), the minimum grade of softwood dimension lumber for posts, rails and joists shall be Northern Species, No. 2.

(3) Except as provided in Sentence (4), the minimum grade of softwood dimension lumber for cantilevered pickets shall be Northern Species, No. 2 Picket grade.

(4) White pine and hemlock lumber used for posts, rails and non-cantilevered pickets shall be clear straight grain material.

(5) Oak, maple and yellow poplar lumber used for posts, rails and pickets shall be clear straight grain material.

3.1.2. Lumber Dimensions

(1) The minimum sizes of loadbearing elements of wood guards shall conform to Table 3.1.2.

3.1.3. Floor Construction

(1) The minimum dimensions of wood floor joists and wood subflooring shall conform to Table 3.1.3. (See A-2.1.3. in Appendix A.)

3.1.4. Connectors

(1) Nails, screws, lag bolts and machine bolts shall not cause splitting of the wood elements. (See A-2.1.4. in Appendix A.) (See also A-2.1.4. in Appendix A for glued joints.)

3.2. Structural Details

3.2.1. Post and Rail System

(1) An interior guard constructed as a Post and Rail System shall conform to the applicable connection details listed in Table 3.2.1.

3.2.2. Cantilevered Picket System

(1) An interior guard constructed as a Cantilevered Picket System shall conform to the applicable connection details listed in Table 3.2.2.

3.2.3. Guards for Stairs

(1) An interior guard for a stair shall conform to the appropriate connection details listed in Table 3.2.3.

Table 3.1.2.
Minimum Size of Loadbearing Elements

Guard Element	Species	Minimum Size, mm (in)	Detail Number[1]
Post	Oak, Maple	70 x 70 (2¾" x 2¾") Base, 45 (1¾") Turned Diameter	IB-1, IG-1, IG-2, IG-3
	Hemlock, White Pine, Yellow Poplar	82 x 82 (3¼" x 3¼") Base, 50 (2") Turned Diameter	IB-1, IG-1, IG-2, IG-3
Post in a Volute	Oak, Maple	70 x 70 (2¾" x 2¾") Base, 50 (2") Turned Diameter	IG-4
Top Rail	Oak, Maple	41 x 67 (1⅝" x 2⅝")	IA-1, IF-1
Bottom Rail	Oak, Maple	41 x 67 (1⅝" x 2⅝")	
		19 x 67 (¾" x 2⅝"), if continuously supported	
Infill Picket	Oak, Maple	20 (¾") Diameter	IC-1, IC-2
	Yellow Poplar	22 (⅞") Diameter	
	White Pine, Hemlock	24 (31/32") Diameter	
Picket in a Volute	Oak, Maple	32 x 32 (1 9/32" x 1 9/32") Base, 20 (¾") Turned Diameter	IG-4
	Yellow Poplar	45 x 45 (1¾" x 1¾") Base, 22 (⅞") Turned Diameter	IG-5, IG-6
	White Pine, Hemlock	45 x 45 (1¾" x 1¾") Base, 24 (31/32") Turned Diameter	
Cantilevered Picket	Northern Species, Douglas Fir-Larch, Spruce-Pine-Fir, Hem-Fir, Hardwood	32 x 32 (1 9/32" x 1 9/32")	IE-1, IH-1
Column 1	2	3	4

Notes to Table 3.1.2:
1. This column lists details that incorporate the guard elements specified in this Table.

Table 3.1.3.
Minimum Size of Floor Elements

Floor Element	Minimum size, mm (in)
Subfloor	15.5 (⅝") plywood or equivalent
Dimension Lumber Joists	38 x 184 (2" x 8" nominal)
Column 1	2

e_1

Table 3.2.1.
Interior Post and Rail System Connection Details

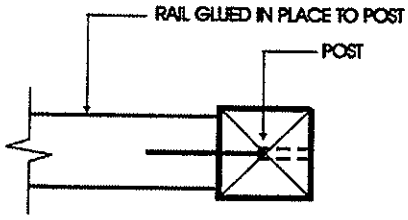
Connection Detail	Detail Number	Description
Top and/or Bottom Rail to Post	IA-1	Rail glued and screwed to post
Post to Floor	IB-1	Notched post glued and bolted to rim joist
Infill Picket	IC-1	Picket set into rails
	IC-2	Picket dowelled into rails
Stud Wall	ID-1	Wood stud and gypsum board
Column 1	2	3

Table 3.2.2.
Interior Cantilevered Picket System Connection Details

Connection Detail	Detail Number	Description
Picket to Floor	IE-1	Picket screwed to rim joist
Column 1	2	3

Table 3.2.3.
Interior Stair Guard Connection Details

Connection Detail	Detail Number	Description
Rail to Post	IF-1	Top or bottom rail glued and screwed to post
Post to Floor and/or Picket Volute to Floor	IG-1	Notched post glued and screwed to stringer and riser
	IG-2	Post glued and screwed to stringer
	IG-3	Post glued and screwed to stringer and stud wall
	IG-4	Post and picket volute, oak or maple
	IG-5	Picket volute, 260 mm (10¼") wide
	IG-6	Picket volute, 240 mm (9½") wide
Infill Picket	Detail IC-1 or IC-2 in Table 3.2.1., modified to suit a sloping installation, may be used.	
Cantilevered Picket	IH-1	Picket screwed to stair stringer
Column 1	2	3



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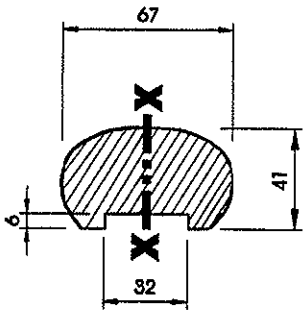
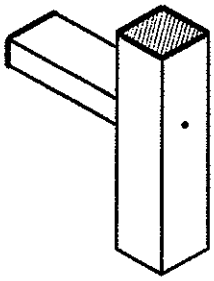
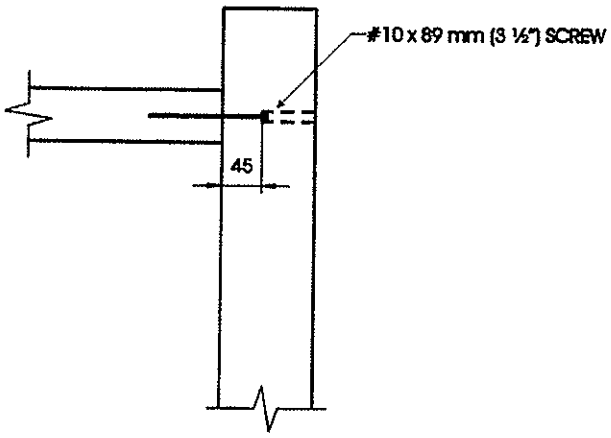


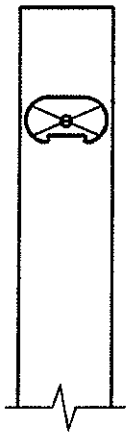
TOP RAIL SECTION



AXONOMETRIC



FRONT ELEVATION



SIDE ELEVATION

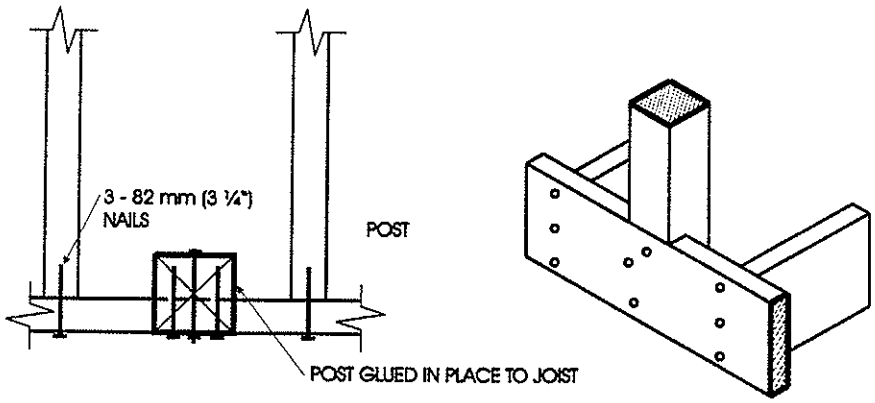
Detail IA-1

Interior Connection: Rail Glued and Screwed to Post

Notes:

1. Other top rail systems may be used provided the section modulus is not less than 24,000 mm^3, measured about the x-x axis.
2. Pickets omitted on drawing for clarity.
3. Connection details for fastening of pickets to rails are shown on Details IC-1 and IC-2.
4. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Oak, Maple	3.30 (10'-10")
Column 1	2



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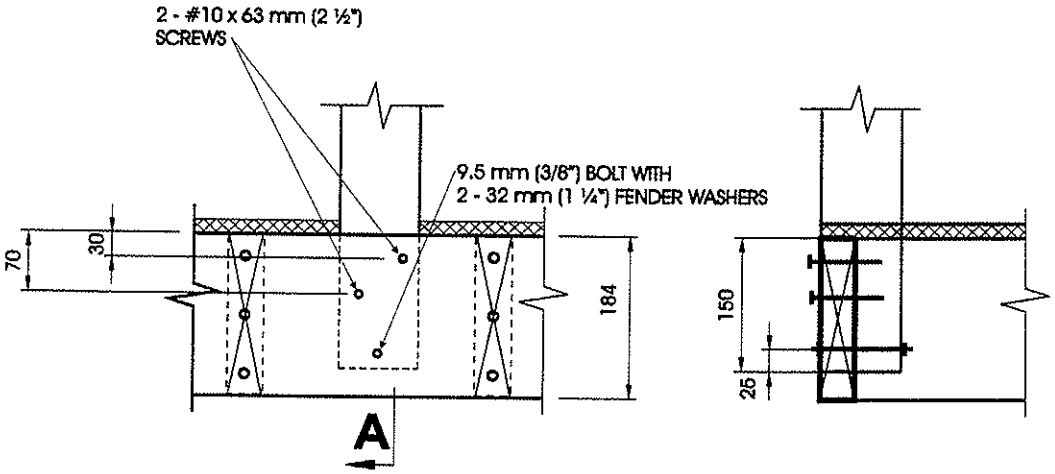


FRONT ELEVATION SECTION-A

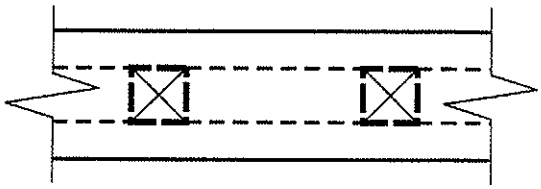
Detail IB-1

Interior Connection: Notched Post Glued and Bolted to Rim Joist

Notes:

1. Minimum dimension of post is 82 mm x 82 mm (3¼" x 3¼").
2. Notch post 38 mm x 152 mm (1½" x 6") at rim joist.
3. Dimensions shown are in mm unless otherwise specified.

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



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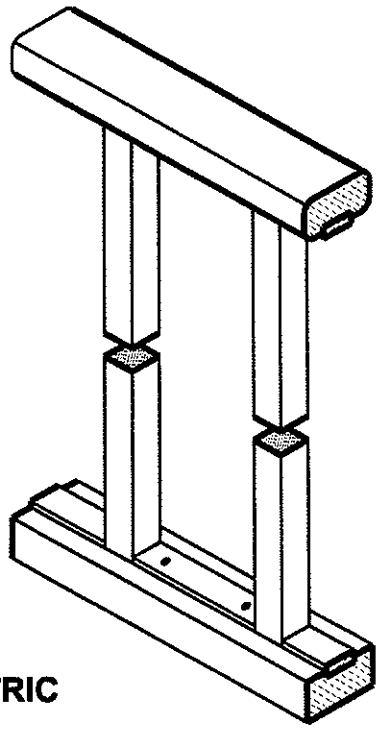

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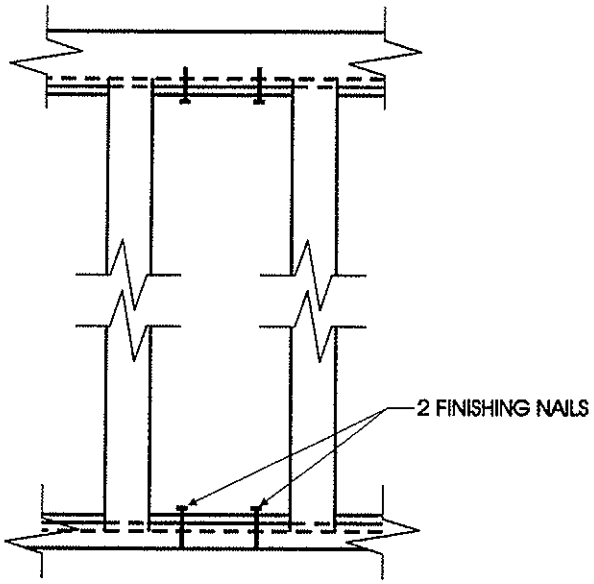
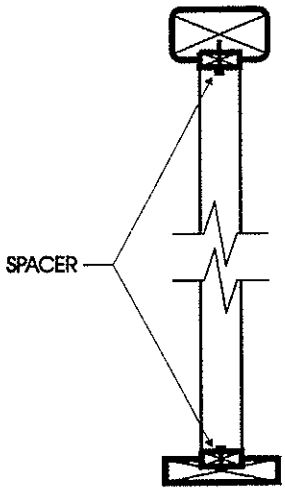


FRONT ELEVATION



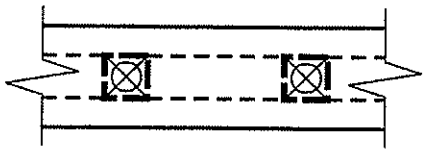
SIDE ELEVATION

Detail IC-1

Interior Connection: Infill Picket Set into Rails

Notes:

1. See Table 3.1.2. for minimum sizes of pickets.
2. For top and bottom rail provide 6 mm (¼") deep rabbet.



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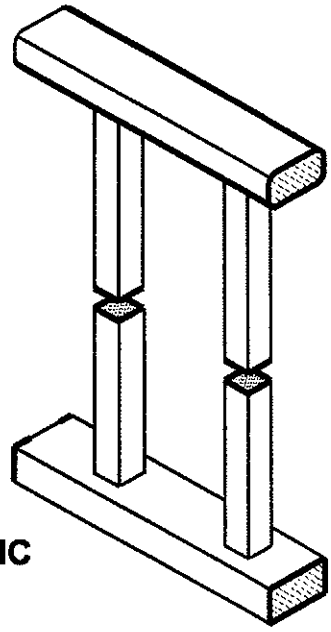

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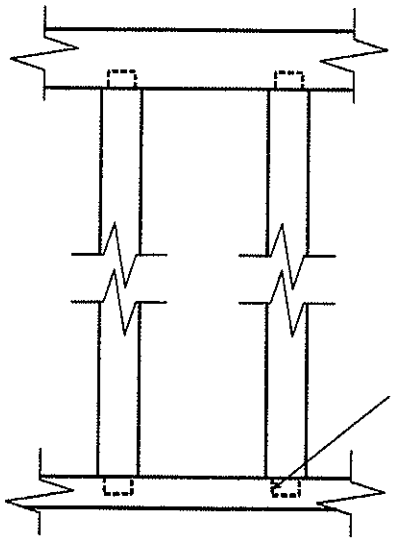
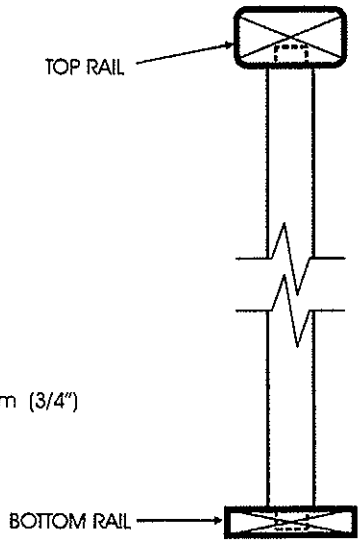


FRONT ELEVATION



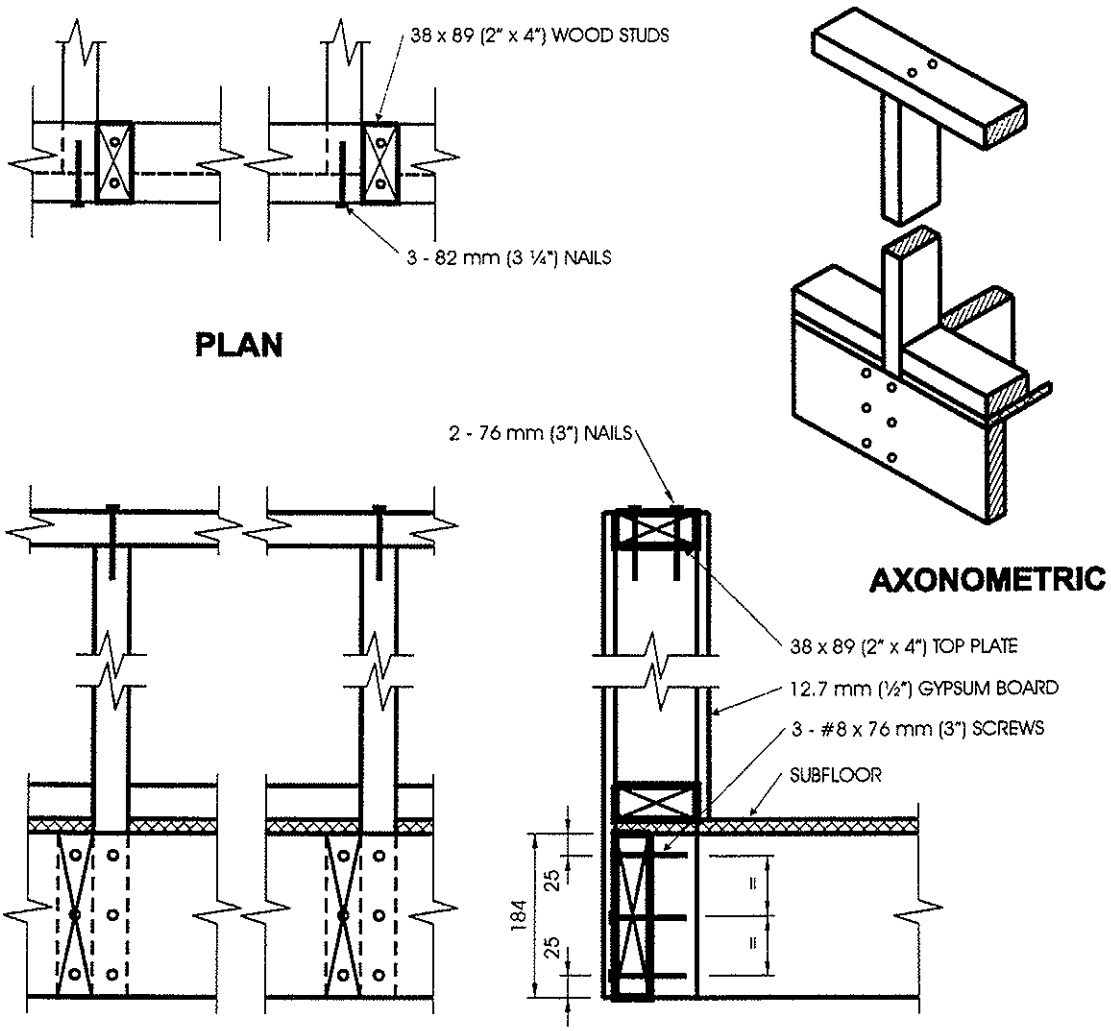
SIDE ELEVATION

Detail IC-2

Interior Connection: Infill Picket Dowelled into Rails

Notes:

1. See Table 3.1.2 for minimum sizes of pickets.
2. Pickets dowelled 19 mm (¾") deep into rails with 19 mm (¾") diameter dowels.



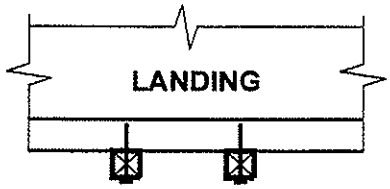
Detail ID-1

Interior Connection: Wood Stud and Gypsum Board Guard

Notes:

1. Fasten plywood subfloor to joists with 50 mm (2") nails at 150 mm (6") oc along edges and at 300 mm (12") oc along intermediate supports.
2. Gypsum board omitted on plan, front elevation, and axonometric for clarity.
3. Dimensions shown are in mm unless otherwise specified.
4. Provide a suitable post, return, or solid support at each end of the guard.

MAXIMUM SPACING BETWEEN WOOD STUDS	
Stud Species	Maximum Spacing, mm (in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, Northern Species	406 (16")
Column 1	2



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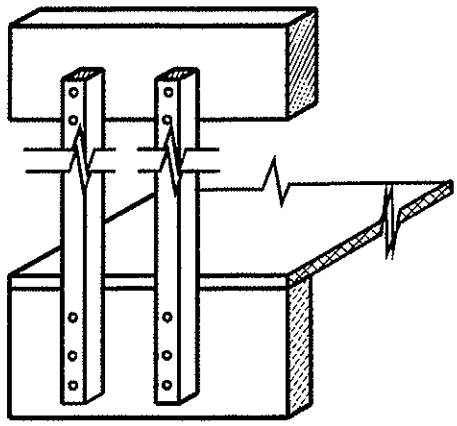

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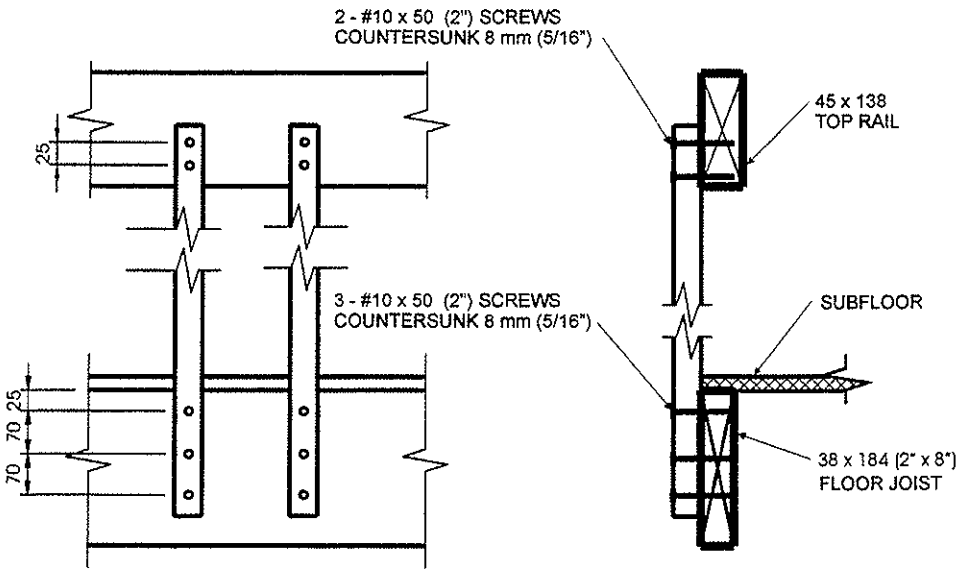


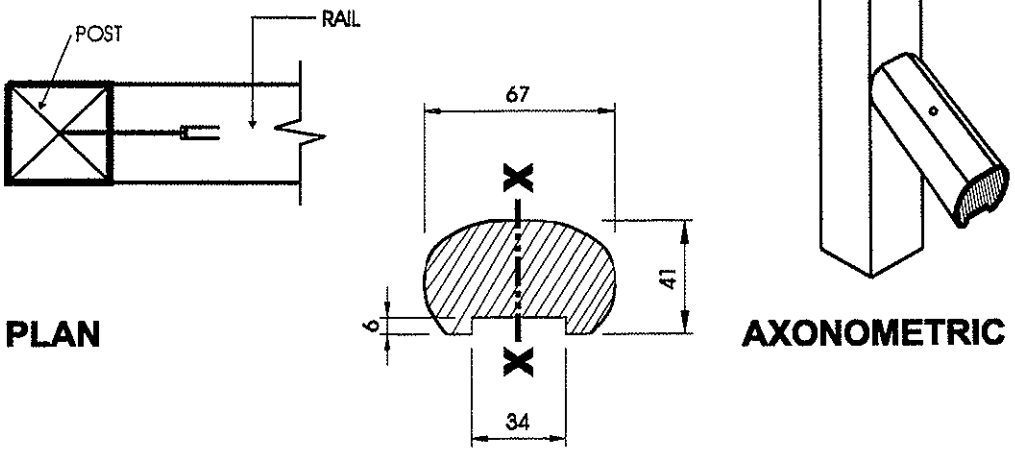
FRONT ELEVATION SIDE ELEVATION

Detail IE-1

Interior Connection: Cantilevered Picket Screwed to Rim Joist

Notes:

1. Provide a suitable post, return, or solid support at each end of the guard.
2. See Table 3.1.2. for minimum sizes of pickets.
3. Dimensions shown are in mm unless otherwise specified.
4. Rim joist and top rail of oak or maple.



PLAN

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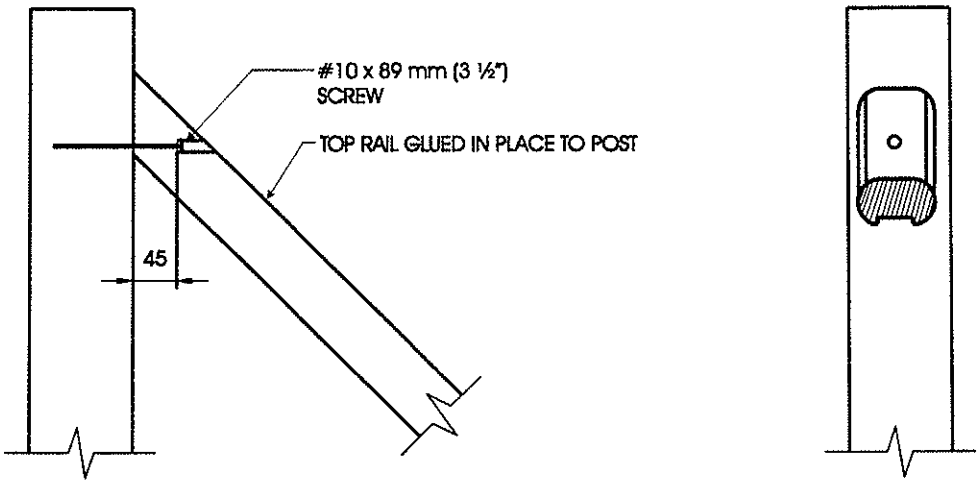
TOP RAIL SECTION



FRONT ELEVATION

SIDE ELEVATION

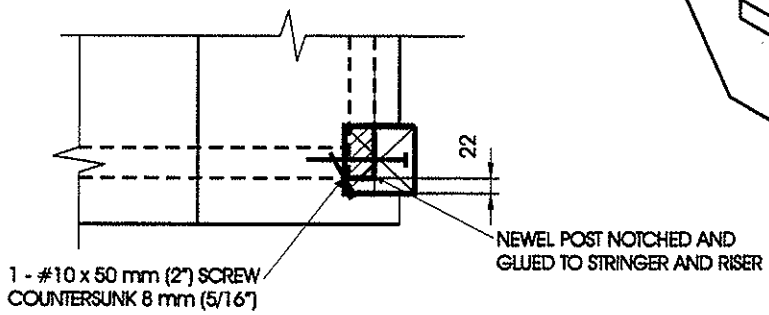
Detail IF-1

Interior Stair Guard Connection: Top/Bottom Rail Glued and Screwed to Post

Notes:

1. Maximum permitted span is based on a slope between 35° and 45° from the horizontal.
2. Minimum section modulus of top rail shall be 24,000 mm^3, measured about the x-x axis.
3. Pickets omitted on drawing, for clarity.
4. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections.

MAXIMUM SPAN OF RAIL, MEASURED ALONG THE SLOPE	
Rail Species	Maximum Span, m (ft-in)
Oak, Maple	4.30 (14'-1")
Column 1	2



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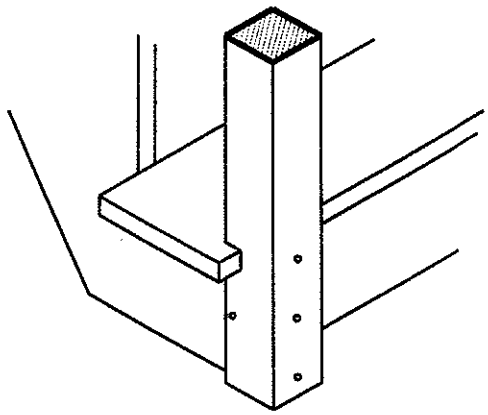

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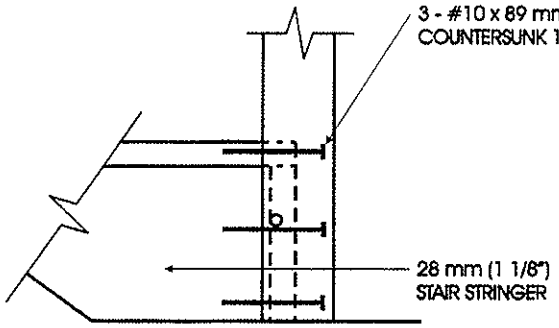
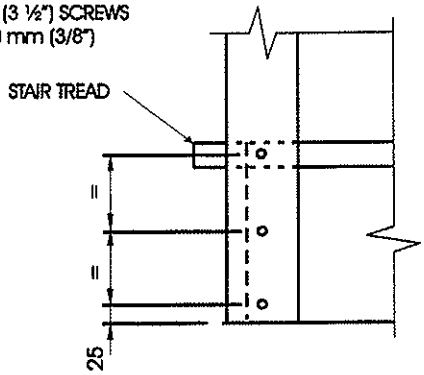


FRONT ELEVATION



SIDE ELEVATION

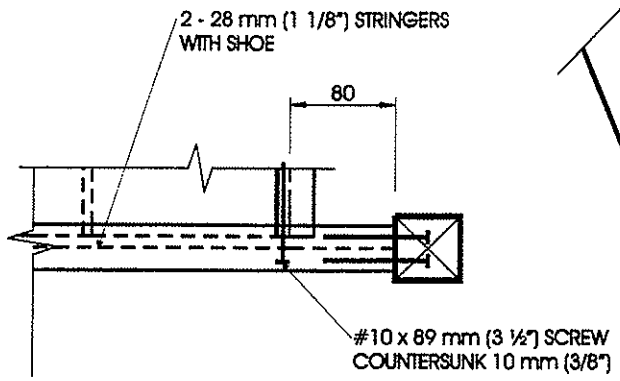
Detail IG-1

Interior Stair Guard Connection: Notched Post Glued & Screwed to Stringer & Riser

Notes:

1. Stringer shall be oak or maple.
2. Notch post 38 mm x 60 mm (1½" x 2⅜") to fit over stair stringer.
3. Only the first riser and tread are shown, for clarity.
4. Minimum thickness of riser shall be 12 mm (½").
5. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections.
6. Dimensions shown are in mm unless otherwise specified.

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



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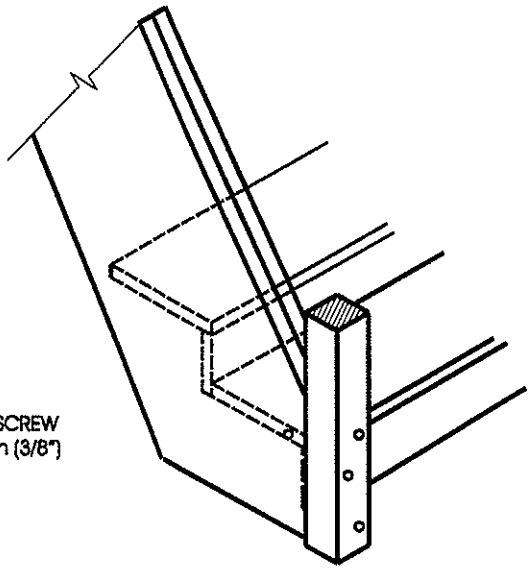

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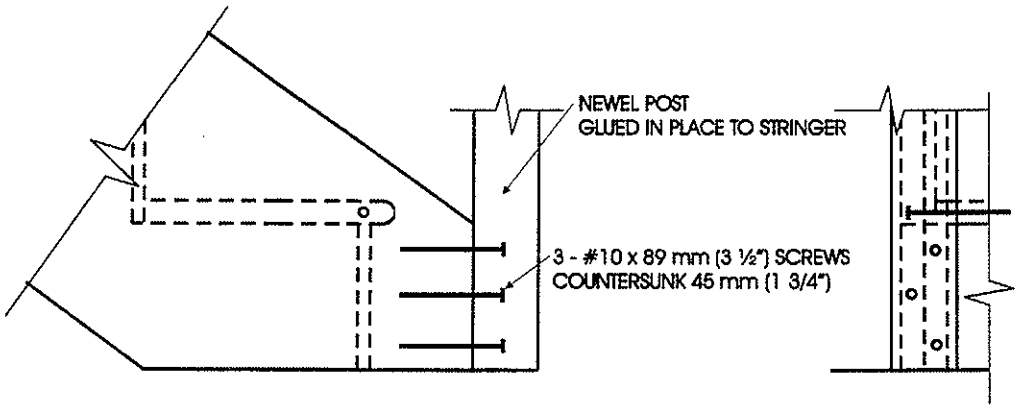


FRONT ELEVATION

SIDE ELEVATION

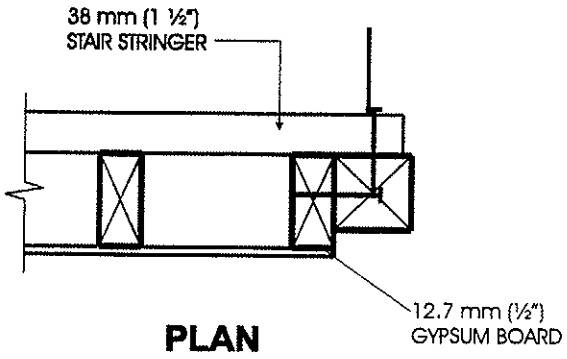
Detail IG-2

Interior Stair Guard Connection: Post Glued and Screwed to Stringer

Notes:

1. Stringer shall be oak or maple.
2. Only the first riser and tread are shown, for clarity.
3. Minimum thickness of riser shall be 12 mm (½").
4. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections.
5. Dimensions shown are in mm unless otherwise specified.

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



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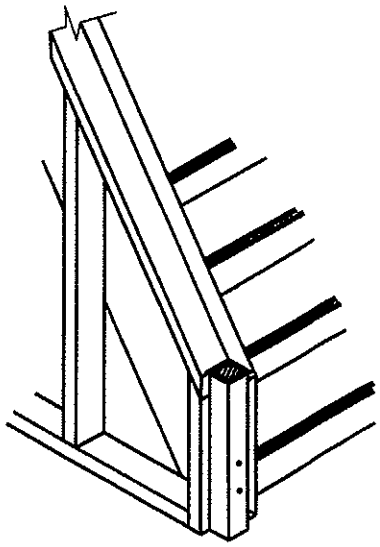

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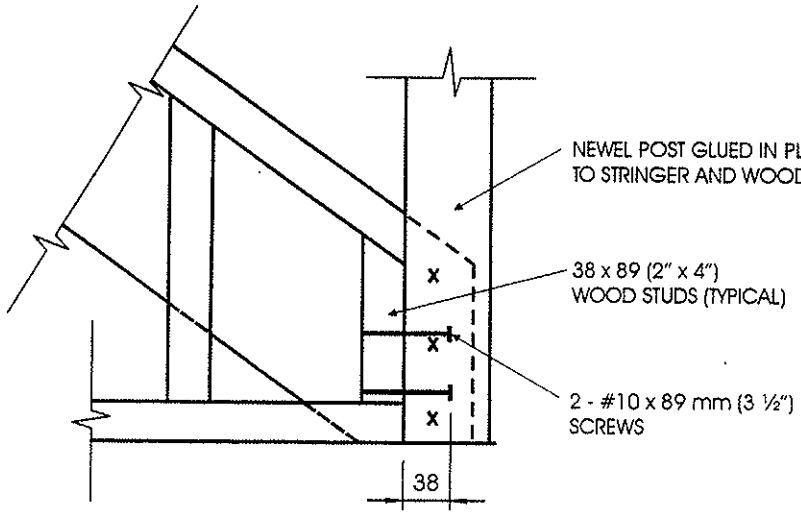
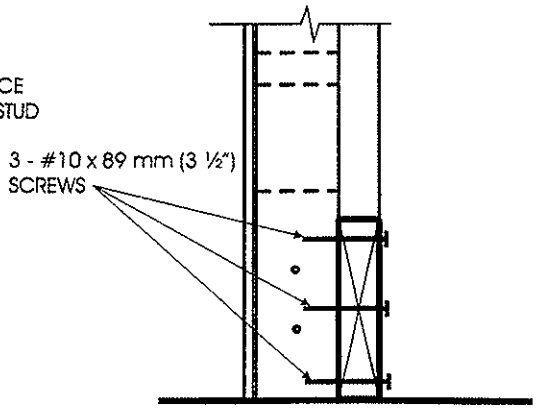


FRONT ELEVATION



SIDE ELEVATION

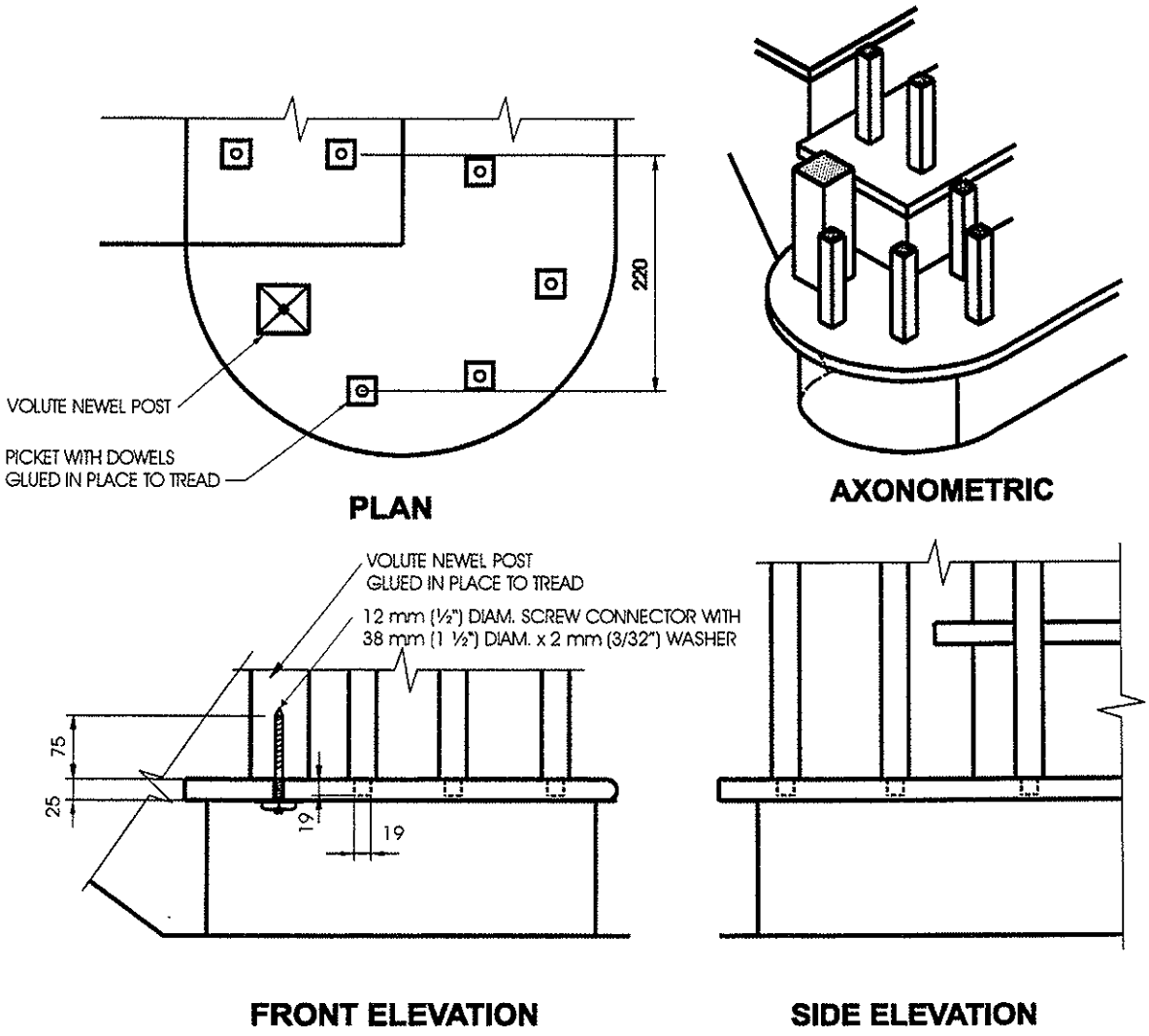
Detail IG-3

Interior Stair Guard Connection: Post Glued and Screwed to Stringer and Stud Wall

Notes:

1. Minimum thickness of riser shall be 12 mm (½").
2. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections.
3. Dimensions shown are in mm unless otherwise specified.

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



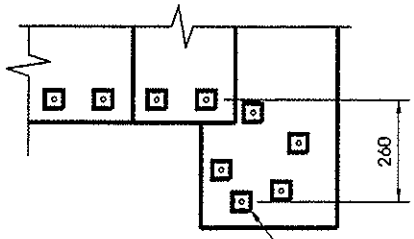
Detail IG-4

Interior Stair Guard Connection: Oak or Maple Post and Picket Volute

Notes:

1. Maximum permitted span is measured from the centre of the volute to a post or other solid support.
2. Other top rail systems may be used provided that the section modulus is not less than 24,000 mm^3, measured about the vertical axis.
3. Newel post and pickets in the volute shall be oak or maple. See Table 3.1.2. for minimum sizes of pickets.
4. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections.
5. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL, MEASURED ALONG THE SLOPE	
Post and Picket Species	Maximum Span, m (ft-in)
Oak, Maple	4.30 m (14'-1")
Column 1	2



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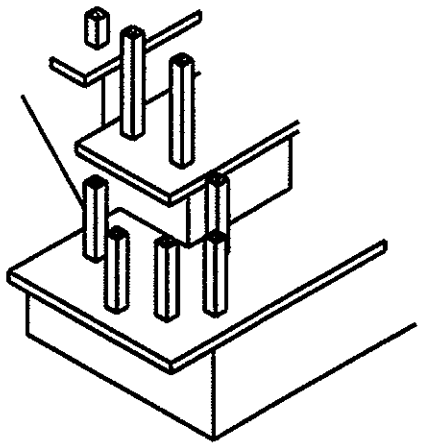
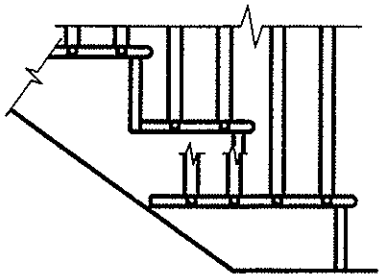
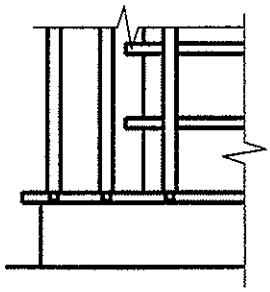


AXONOMETRIC



FRONT ELEVATION



SIDE ELEVATION

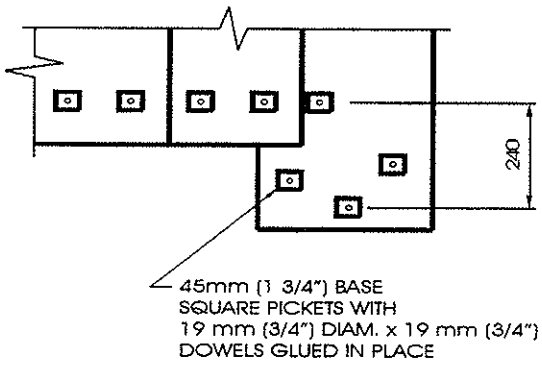
Detail IG-5

Interior Stair Guard Connection: Picket Volute, 260 mm (10¼") Wide

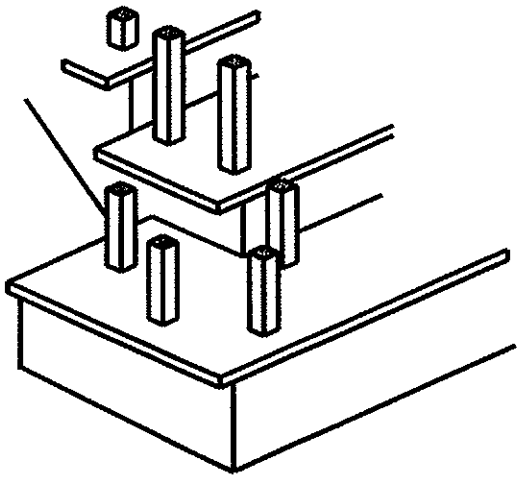
Notes:

1. Maximum permitted span is measured from the centre of the volute to a post or other solid support.
2. Other top rail systems may be used provided that the section modulus is not less than 24,000 mm^3, measured about the vertical axis.
3. See Table 3.1.2. for minimum sizes of pickets.
4. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections.
5. Dimensions shown are in mm unless otherwise specified.

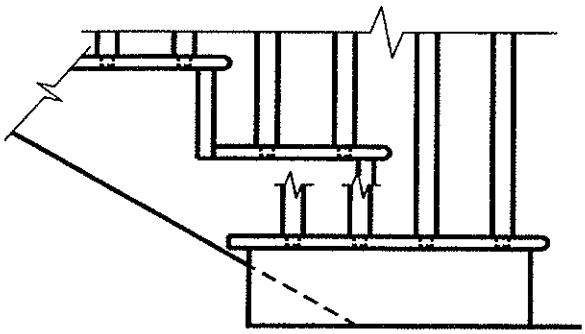
MAXIMUM SPAN OF RAIL	
Picket Species	Maximum Span, m (ft-in)
Yellow Poplar, Hemlock, White Pine	1.80 (5'-11)
Column 1	2



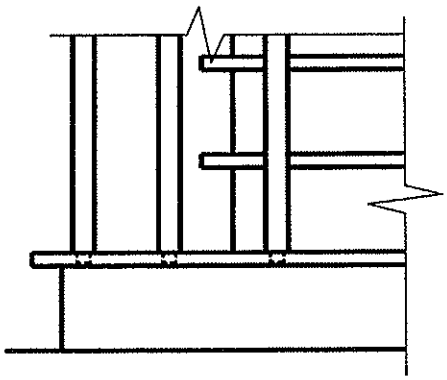
PLAN



AXONOMETRIC



FRONT ELEVATION



SIDE ELEVATION

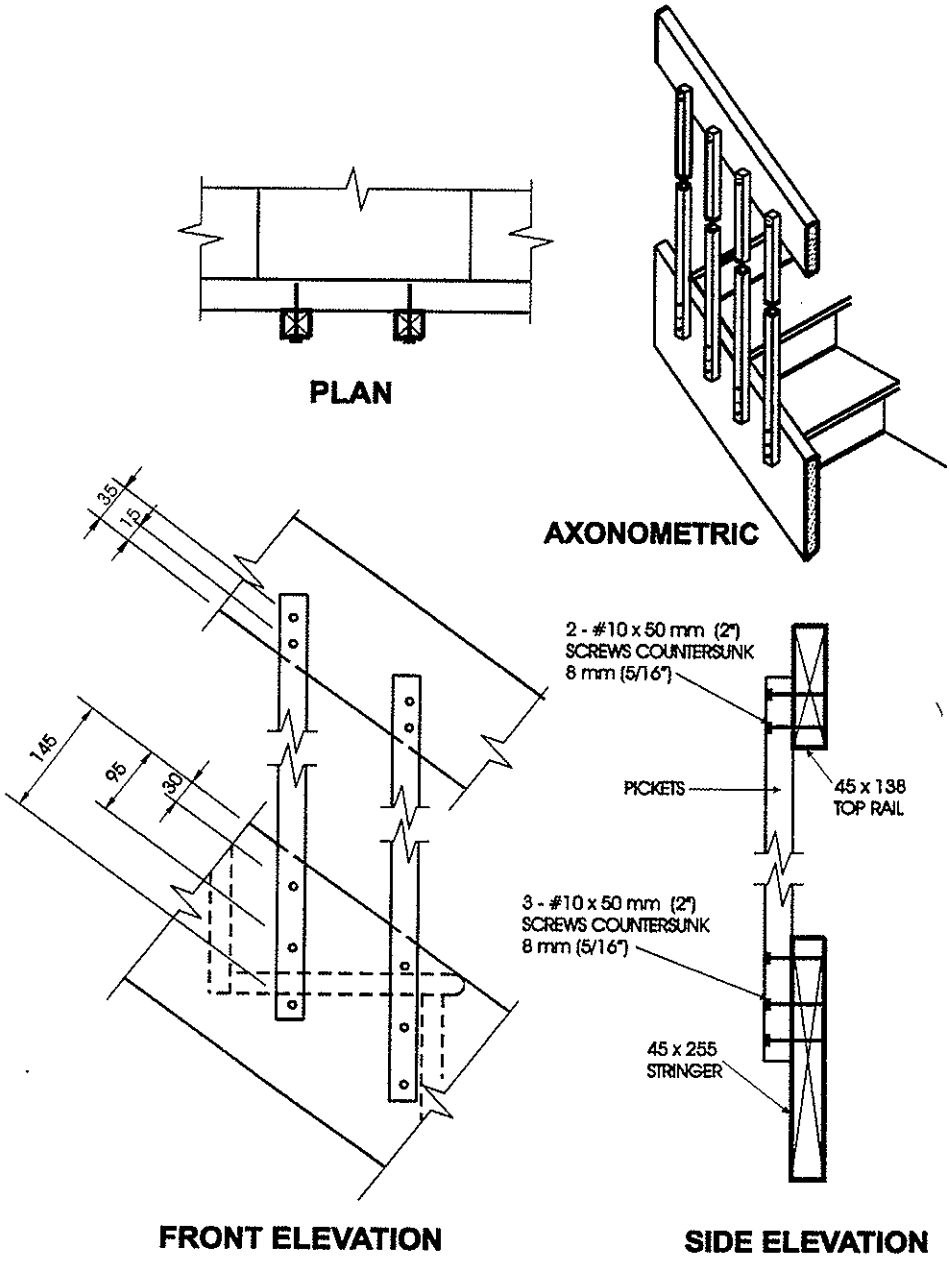
Detail IG-6

Interior Stair Guard Connection: Picket Volute, 240 mm (9½") Wide

Notes:

1. Maximum permitted span is measured from the centre of the volute to a post or other solid support.
2. Other top rail systems may be used provided that the section modulus is not less than 24,000 mm^3, measured about the vertical axis.
3. See Table 3.1.2. for minimum sizes of pickets.
4. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections.
5. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL	
Species	Maximum Span, m (ft-in)
Yellow Poplar, Hemlock, White Pine	1.80 (5'-11")
Column 1	2



Detail IH-1

Interior Stair Guard Connection: Cantilevered Picket Screwed to Stair Stringer

Notes:

1. Stair stringer shall be oak or maple.
2. Provide a suitable post, return, or solid support at each end of the guard.
3. See Table 3.1.2. for minimum sizes of pickets.
4. Dimensions shown are in mm unless otherwise specified.

9.8.8.3. Height of Guards (See Appendix A.)

(1) Except as provided in Sentences (2) to (4), all *guards* shall be not less than 1 070 mm (3 ft 6 in) high.

(2) All *guards* within *dwelling units* shall be not less than 900 mm (2 ft 11 in) high.

(3) Exterior *guards* serving not more than one *dwelling unit* shall be not less than 900 mm (2 ft 11 in) high where the walking surface served by the *guard* is not more than 1 800 mm (5 ft 11 in) above the finished ground level.

(4) *Guards* for flights of steps, except in required *exit* stairs, shall be not less than 900 mm (2 ft 11 in) high.

(5) The height of *guards* for flights of steps shall be measured vertically from a line drawn through the leading edge of the treads served by the *guard*.

9.8.8.6. Design to Prevent Climbing (See Appendix A.)

(1) *Guards* required by Article 9.8.8.1., except those in *industrial occupancies* and where it can be shown that the location and size of openings do not represent a hazard, shall be designed so that no member, attachment or opening will facilitate climbing.

(2) *Guards* shall be deemed to comply with Sentence (1) where any elements protruding from the vertical and located within the area between 140 mm (5½ in) and 900 mm (2 ft 11 in) above the floor or walking surface protected by the *guard*,

(a) are located more than 450 mm (17¾ in) horizontally and vertically from each other,

(b) provide not more than 15 mm (e in) horizontal offset,

(c) do not provide a toe-space more than 45 mm (1¾ in) horizontally and 20 mm (13/16 in) vertically, or

(d) present more than a 1-in-2 slope on the offset.

9.8.8.5. Openings in Guards (See Appendix A.)

(1) Except as provided in Sentence (2), openings through any *guard* that is required by Article 9.8.8.1. shall be of a size that will prevent the passage of a spherical object having a diameter of 100 mm (4 in) unless it can be shown that the location and size of openings that exceed this limit do not represent a hazard.

(2) Openings through any *guard* that is required by Article 9.8.8.1. and that is installed in a *building* of *industrial occupancy* shall be of a size that will prevent the passage of a spherical object having a diameter of 200 mm (7f in) unless it can be shown that the location and size of such openings that exceed this limit do not represent a hazard.

(3) Unless it can be shown that the location and size of openings that do not comply with the following limits do not represent a hazard, openings through any *guard* that is not required by Article 9.8.8.1. and that serves a *building* of other than *industrial occupancy*, shall be of a size that,

(a) will prevent the passage of a spherical object having a diameter of 100 mm (4 in), or

(b) will permit the passage of a spherical object having a diameter of 200 mm (7f in).

A-1.2.2. Classification. A Post and Rail System consists of a top rail that transfers horizontal loads to posts. The posts transfer the loads from the rail to the floor system. This system may incorporate a bottom rail that is anchored at each end to the posts. Infill panels or infill pickets are installed between the top rail and the floor or bottom rail. Examples of Post and Rail Systems are shown in Figure A-1.2.2.A.

The term "infill pickets" refers to an assembly of vertically oriented elements that span between the floor or bottom rail and the top rail. For the purpose of this Supplementary Standard, the words "picket" and "baluster" both relate to these individual elements.

The spacing of the posts in a Post and Rail System is detailed in this Supplementary Standard and is dictated by the ability of the posts to accept the design loads. The maximum spanning capacity of the rails is often not realised because it is dictated by the post spacing.

A Cantilevered Picket System consists of a top rail that transfers horizontal loads to pickets. The pickets transfer the loads from the top rail to the floor system. An example of a Cantilevered Picket System is shown in Figure A-1.2.2.B.

A guard classified as a Post and Rail System or a Cantilevered Picket System need not always terminate at a post if:
(a) the top rail is connected adequately to an element capable of accepting the forces applied to it, or
(b) the guard changes direction and the rails are adequately fastened at the return.

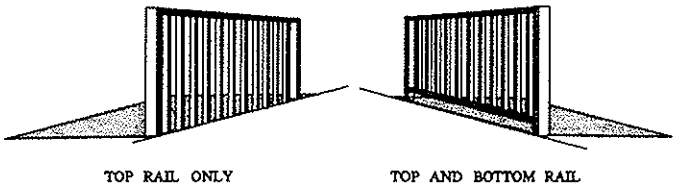


Figure A-1.2.2.A
Typical Post and Rail Systems

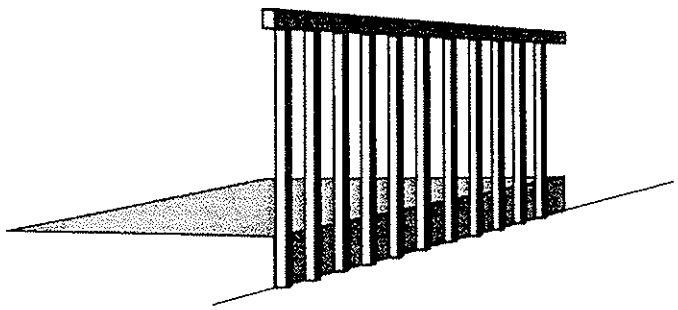


Figure A-1.2.2.B
Cantilevered Picket System

A-2.1.1. Lumber Grades. Whereas Northern Species is specified as the minimum lumber grade, Spruce-Pine-Fir, Douglas Fir-Larch and Hem-Fir may also be used since their structural properties exceed those of Northern Species. Cedar falls within the classification of Northern Species Group.

A-2.1.3. Floor Construction. The lateral loads acting on a guard are transferred from either the posts or the pickets to the floor system. Therefore, the floor system must be sufficiently strong to transfer these loads.

A-2.1.4. Connectors. Pre-drilling of wood elements may be required in order to avoid splitting of structural wood elements. Where a glued joint is required, an adhesive conforming to CSA Standard O112.4-M1977 (Polyvinyl Adhesives for Wood) and CSA Standard O112.8-M1977 (Polyvinyl Adhesives - Cross Linking, for Wood) is acceptable.

A-2.1.5. Decay-Resistant Lumber. Cedar is a species considered resistant to decay.