

Product Evaluation Report

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Product Manufacturer

Pella Corporation
102 Main Street
Pella, Iowa 50219

Product Name, Model and/or Description

Impervia Fiberglass 2.0 Window Frame
Mullion System – WZ3 Impact Rated

Mull Span vs. Load Width Rating Tables & Installation Details

Code: Current Edition of the Florida Building Code including the 8th Edition (2023) Florida Building Code

Compliance Methods: Florida Product Approval Rule and Florida Building Code

- Rule No. 61G20-3.005(1)(d) – Product Evaluation Report by a Licensed Professional Engineer
- AAMA 450-10, Option 1
- AAMA/WDMA/CSA 101/I.S. 2/A440-2008, 2011 and 2017

Code Conformance Evaluation:

The purpose of this evaluation is to determine product grouping of Pella Impervia Fiberglass Windows for testing of a combination mullion system with and without a mullion reinforcing as well as tight mullion (w/o reinforcing mullion) system.

Product grouping is in accordance with AAMA 450-10, Option No. 1 and Section 6.0 is detailed in Reference 1.a.

Based on this product grouping, the following mulled configurations are tested using various reinforced and unreinforced (tight) assemblies. Based on this testing, comparative analysis is generated for (a) the mullion assemblies listed in the Analysis Method and (b) various mullion spans vs. load widths. See Analysis Method below for additional details.

References:

1. Evaluations
 - a. PTC Product Design Group, Inc. Product Evaluation Report No. 2639, Rev. 6, Impervia Fiberglass 2.0 Window Frame Mullion System, AAMA 450-10 Mullion Grouping, Test Plan & Specimens; prepared, signed and sealed by Robert J. Amoruso, FL PE No. 49752.
 - b. PTC Product Design Group, Inc. Calculation No. 2722, Impervia Fiberglass 2.0 Window Frame Mullion System, Mullion Span vs. Load Width Evaluation; prepared, signed and sealed by Robert J. Amoruso, FL PE No. 49752.
 - c. PTC Product Design Group, Inc. Calculation No. 2692, Impervia Fiberglass 2.0 Window Frame Mullion System, Installation Anchorage Allowables; prepared, signed and sealed by Robert J. Amoruso, FL PE No. 49752.
 - d. PTC Product Design Group, Inc. Product Evaluation Report No. 2788, Impervia Fiberglass 2.0 Window Frame Mullion System, Evaluation for Wind Zone 3 Impact Protection; prepared, signed and sealed by Robert J. Amoruso, FL PE No. 49752.
2. AAMA 450-10 / AAMA/WDMA/CSA 101/I.S. 2/A440-2008, 2011 and 2017 testing by Element Materials Technology, 3922 Delaware Ave., Des Moines, IA 50313
 - a. Report No. ESP033370P.4, dated July 17, 2020, PRODUCT NAME: Impervia Mullion, PRODUCT TYPE: 3 Way Direct Mullion, SERIES/MODEL: Pella Impervia, Standard/Specifications: AAMA 450-10 and Summary FW – LC-MA-20. Specimen 1.
 - b. Report No. ESP033370P.1, dated June 30, 2020, PRODUCT NAME: Impervia Mullion, PRODUCT TYPE: 2 Way ½” Spread Mullion with Steel Reinforcement, SERIES/MODEL: Pella Impervia, Standard/Specifications: AAMA 450-10 and Summary FW – LC-MA-50. Specimen 2.

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- c. Report No. ESP033370P.3, dated June 30, 2020, PRODUCT NAME: Impervia Mullion, PRODUCT TYPE: 4 Way Mullion, 1" Spread Mullion with 2 steel reinforcements for horizontal through mullion, ½" spread mullion for vertical mullions, SERIES/MODEL: Pella Impervia, Standard/Specifications: AAMA 450-10 and Summary FW – LC-MA-35. Specimen 3.
- d. Report No. ESP033370P.2, dated June 30, 2020, PRODUCT NAME: Impervia Mullion, PRODUCT TYPE: 4 Way Mullion, 1" Spread Mullion with 2 steel reinforcements for vertical through mullion, ½" spread mullion for horizontal mullions, SERIES/MODEL: Pella Impervia, Standard/Specifications: AAMA 450-10 and Summary FW – LC-MA-50. Specimen 4.

Product Applicability: This report is applicable to the following product lines and types.

1. Product Lines
 - a. Pella Impervia 2.0 Fiberglass Windows
2. Product Types
 - a. Awning, Vented and Fixed
 - b. Casement, Vented and Fixed
 - c. Fixed Frame Direct Set
3. Product Materials
 - a. Windows are Pella Fiberglass composite
 - b. Structural Mullion is Extruded Aluminum 6063-T6
 - c. Structural Mullion Reinforcement is Mild-Carbon Steel

Analysis Methodology: The following methodology was used to develop the Load Width/Span Tables presented in the appendixes.

1. The tributary areas are identified and calculated.
2. These tributary areas are used to calculate the maximum pressure that the mullion can withstand without exceeding the allowable stresses or deflection and anchorage due to mullion end loading.
3. The minimum of these results is selected and defined as the design pressure for the mullion. Mullion stress and deflection is calculated using the AAMA 450 load distribution method.
4. For each mullion configuration, spreadsheet programs are used to calculate the equivalent Moment of Inertia (I) and Section Modulus (S) or the composite mullion/frame sections. The equivalent I and Z are determined based on fiberglass. This is done by a ratio of the Modulus of Elasticity (E) and Moment of Inertia (I) for the steel and aluminum components as compared to the fiberglass, to arrive at an equivalent I and Z for the combined section properties of the mullion/frame.
5. The worst-case framing component (2.0 Casement/Awning Frame, Fixed and Operable, ID No. DES-000034711) was determined in Reference 1.a and exhibits the lowest section properties of the window types previously listed.
6. Structural Analysis based on:
 - a. Horizontal Shear Stress = P/A (psi)
 - i. P is shear load
 - ii. A is web area
 - b. Bending Stress = $M_c/I = M/Z$ (psi)
 - i. M is bending moment and is equal to M/K_f
 - ii. K_f is moment coefficient based on trapezoidal distribution.
 - c. Deflection = WL^3 / K_dEI
 - i. K_d is deflection coefficient based on trapezoidal distribution.
 - ii. W is load on mullion in lbs = wL where w is distributed load in lbs/in and L in mullion span in inches.
 - d. Mullion End Load Reactions
 - i. Based on trapezoidal load on mullion resolved into total load distributed to each end of mullion.

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- e. Comparative Analysis of Tested Assembly with various mull spans vs. load widths and mullion assemblies (listed below) is conducted in Reference 1.b.
 - i. Mullion Assembly types reviewed.
 1. Tight Mullion
 2. 1/2" Mullion
 3. 1/2" Mullion + 1 Steel Reinforcement
 4. 1" Mullion
 5. 1" Mullion + 1 Steel Reinforcement
 6. 1" Mullion + 2 Steel Reinforcements
 - ii. The tributary loading area for various mullion span and load widths is determined and compared to the as-tested tributary loading area. This comparison considers the loading as related to Bending, Deflection and End Load Reactions (anchorage).
 - iii. The above comparison is extended to each of the mullion assembly types listed in 6.e.ii above.
 1. For the comparative analysis of the as-tested mullion assembly to the same mullion assembly and tributary loading areas, the resulting Design Pressure is equal to that in testing.
 2. For increases in tributary loading area, the resulting DP will decrease when the as-tested and as-compared mullion assembly are the same. Conversely, a decrease in tributary loading area results in an increase in DP.
 3. For increases in the mullion assembly section properties, the resulting DP will increase when the as-compared mullion assembly properties exceed that of the as-tested mullion assembly. Conversely, a decrease in the mullion assembly section properties of the as-compared mullion assembly results in a decrease in DP.
7. Anchorage Analysis based on:
 - f. Using the anchor allowables determined in Reference 1.c and the mullion end loading, the quantity of anchors required is determined in Reference 1.b.

Mullion Components: See Appendix A for mullion components and assemblies.

Installation Requirements: See Appendix B for basic installation requirements.

Mull Span vs. Load Width Table Usage: See Appendix C for Mull Span vs. Load Width Load Rating Tables usage instructions.

Mull Span vs. Load Width Tables: See the following Appendixes for Mull Span vs. Load Width Load Rating Tables.

Description	Appendix
Two-Way Mullion Assembly – Vertical or Horizontal	D
Three-Way Mullion Assembly (3-Way Mullion Assembly uses 4-Way Mullion Assembly Tables)	E
Four-Way Mullion Assembly – Vertical and Horizontal	E

Limitations & Conditions of Use:

- This product has not been evaluated for use inside the High Velocity Hurricane Zone (HVHZ).
- This product has been evaluated for use in mulled window assemblies where the windows have been tested, designed, and approved for use for impact protection (testing per ASTM E1886/E1996, WZ3 or TAS 201/203. In those instances, an approved impact protection system will not be required when used in Wind Zone 1, 2 or 3 wind borne debris regions. Usage is not allowed in Wind Zone 4 or High Velocity Hurricane Zone (HVHZ)
- If the windows of the mulled window assembly have not been tested for impact protection, this product will require an approved impact protective system when used in wind borne debris regions.
- Refer to Product Installation Instructions in Product Evaluation Report No. 2722 for:
 - Maximum allowable wind loads at related maximum allowable size(s).
 - Overall dimensions and material/grade of main product components, accessories, etc.
 - Illustrated diagrams of the attachment of the product to substrate structure.

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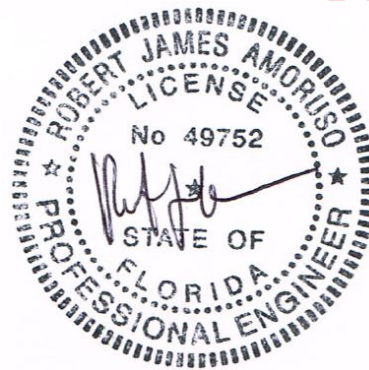
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- Anchor type(s), size(s), substrate(s), embedment, edge distance, and spacing/locations.
- Refer to Product Installation Instructions in Product Evaluation Report No. 2722 for:
 - Mullion Span vs. Load Width Rating Tables for the following.
 - Two-Way Vertical or Horizontal Mullion Configuration.
 - Three- Way Mullion Configuration.
 - Four-Way Mullion Configuration with a Horizontal Through Mullion
 - Four-Way Mullion Configuration with a Vertical Through Mullion
- Site wind pressures shall be determined by a licensed professional engineer in accordance with the current edition of the Florida Building Code (and/or ASCE 7 as referenced in the current edition of the Florida Building Code) for components and cladding based on allowable stress design.
- Site conditions not covered in this product evaluation document are subject to additional engineering analysis by a licensed professional engineer or registered architect as required by the authority having jurisdiction.
- Adequacy of the existing structural substrates as a main wind force resisting system capable of withstanding and transferring applied product loads to the foundation is the responsibility of the licensed professional engineer or registered architect acting as the design professional of record for the project of installation.

Certificate of Independence per Product Approval Rule 61G20-3.009

PTC Product Design Group, LLC and Robert J. Amoruso, P.E. does not have, nor will acquire, any financial interest in the company manufacturing or distributing product(s) covered by this Product Evaluation Report.

PTC Product Design Group, LLC and Robert J. Amoruso, P.E. do not have, nor will acquire any financial interest in any other entity involved in the approval process or testing of the product(s) covered by this Product Evaluation Report.



Digitally
signed by
Robert J
Amoruso

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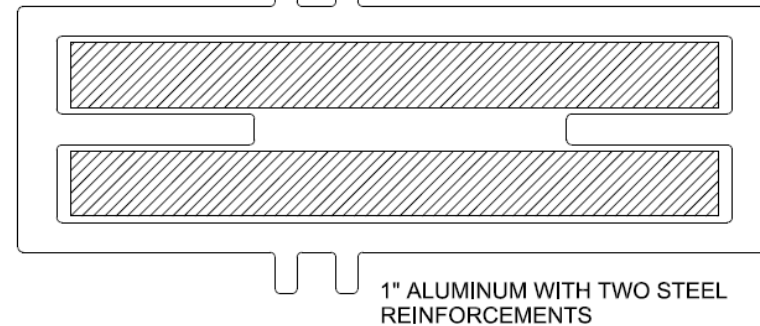
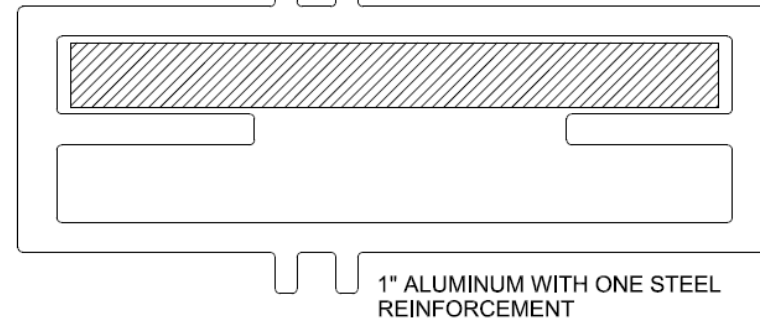
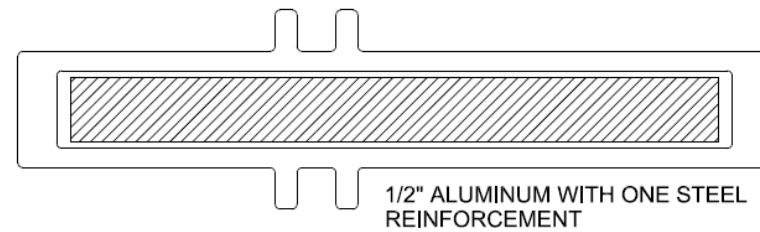
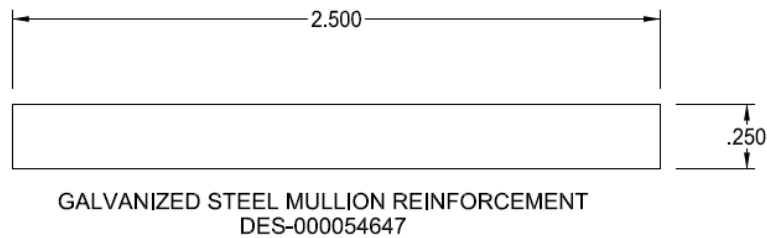
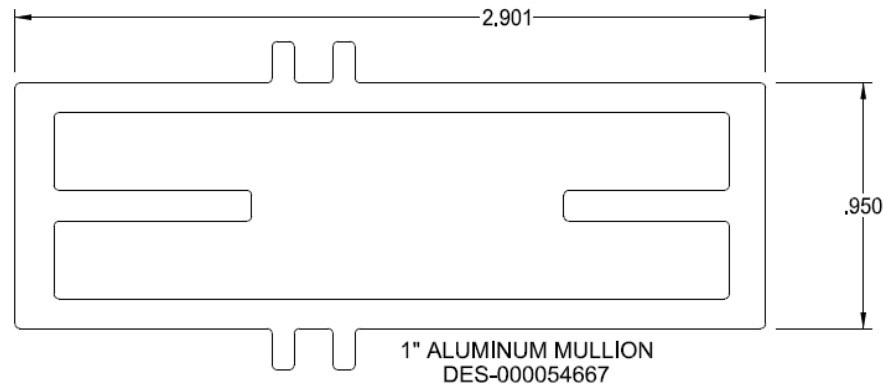
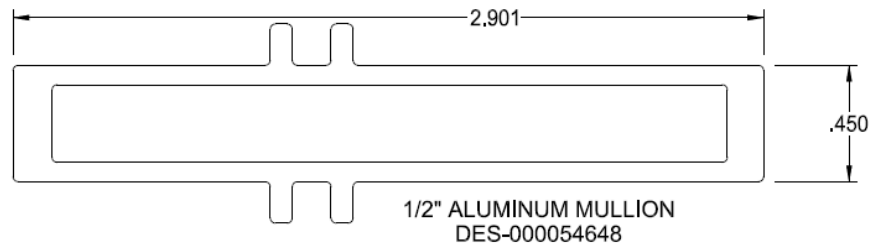
Evaluated By:
Robert J. Amoruso, P.E.
FL P.E. License Number 49752

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Appendix A – Mullion & Frame Assembly Components

Mullion Components



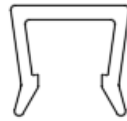
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Appendix A – Mullion & Frame Assembly Components

Mullion Covers

(These components are non-structural and may be changed as needed to accommodate interior/exterior finishes as applicable.)



TIGHT MULLION COVER
DES-0AMJ



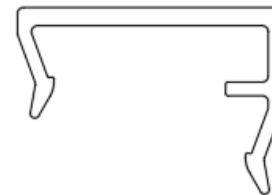
1/2" MULLION COVER
DES-0A6M



1" MULLION COVER
DES-000067325



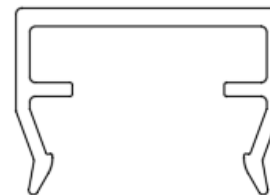
TIGHT MULLION COVER
OFFSET FRAME
DES-000057868



1/2" MULLION COVER
3" TO 3" FRAME
DES-000057838



1" MULLION COVER
3" TO 3" FRAME
DES-000057848



1/2" MULLION COVER
OFFSET FRAME
DES-000057859



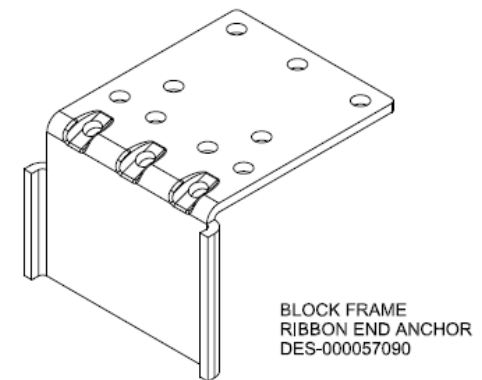
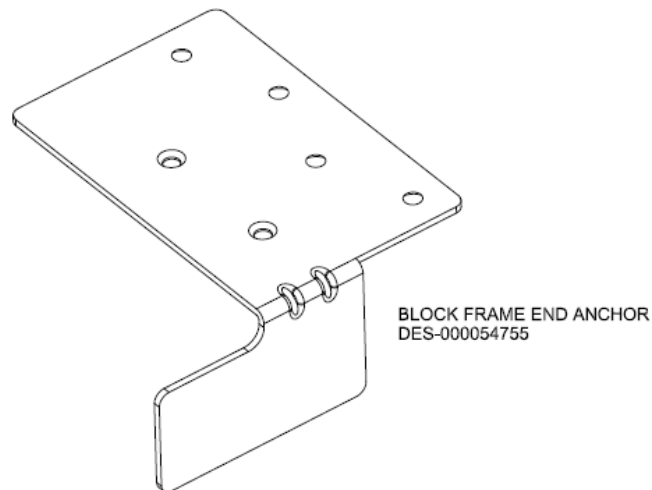
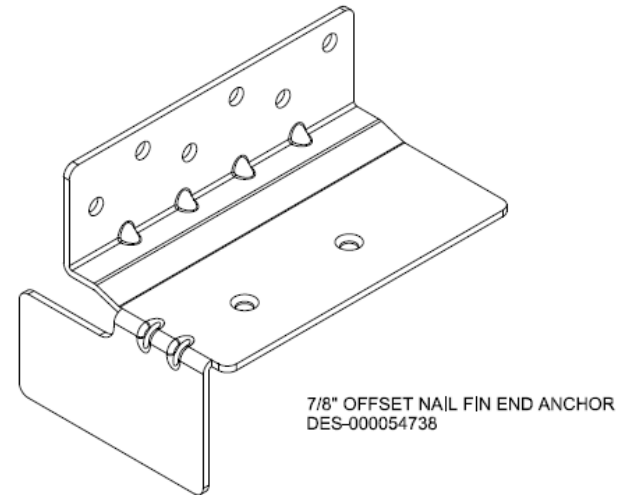
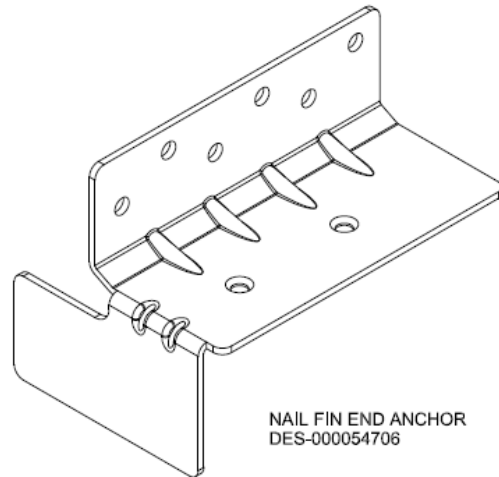
1" MULLION COVER
OFFSET FRAME
DES-000057866

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Appendix A – Mullion & Frame Assembly Components

End Clips

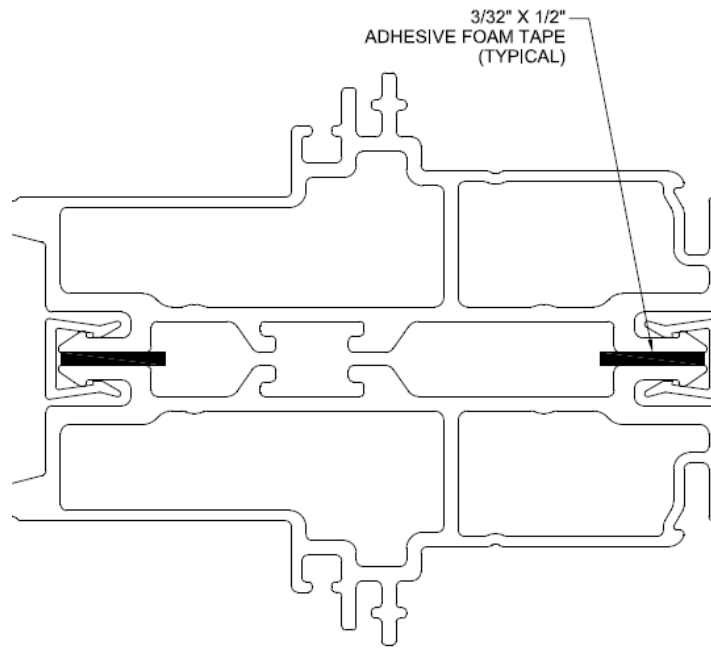


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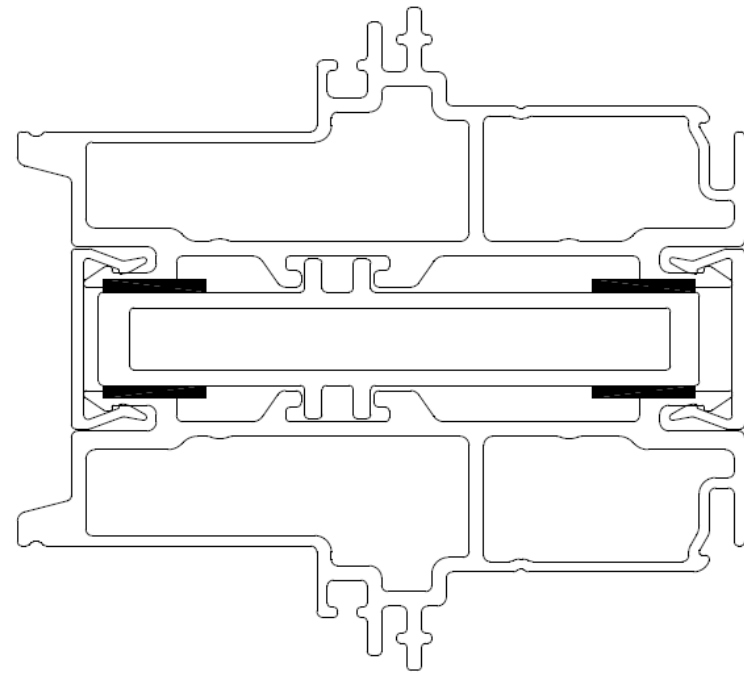
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Appendix A – Mullion & Frame Assembly Components

Mullion/Frame Assemblies (Frame shown is Casement/Awning/Fixed)



TIGHT MULLION



1/2" MULLION

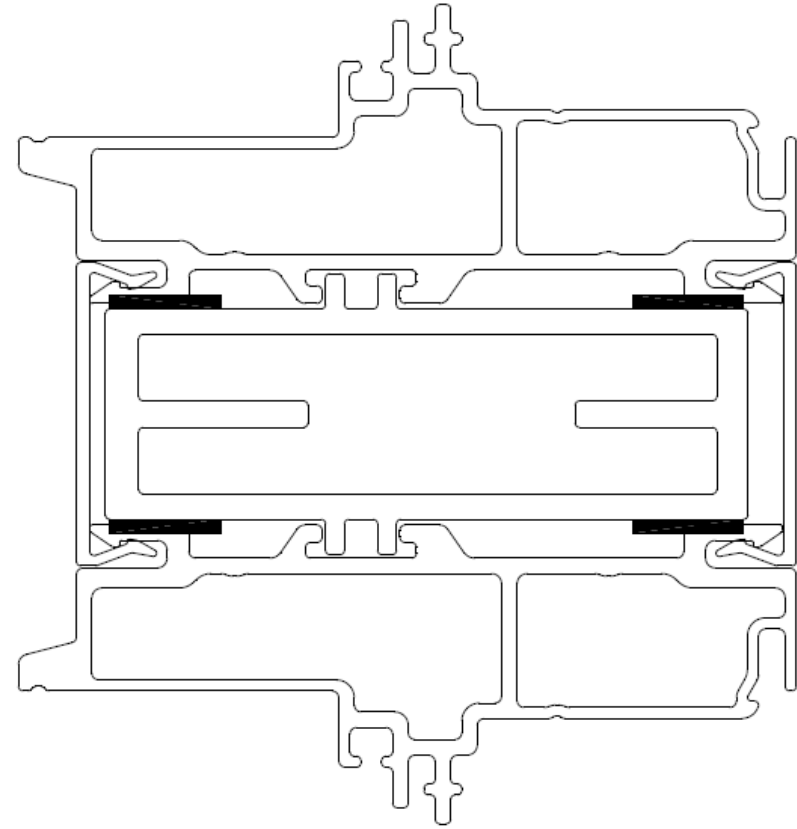
(ALSO AVAILABLE
WITH STEEL REINFORCEMENT)

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Appendix A – Mullion & Frame Assembly Components

Mullion/Frame Assemblies (Frame shown is Casement/Awning/Fixed)



1" MULLION

(ALSO AVAILABLE WITH
1 OR 2 STEEL REINFORCEMENTS)

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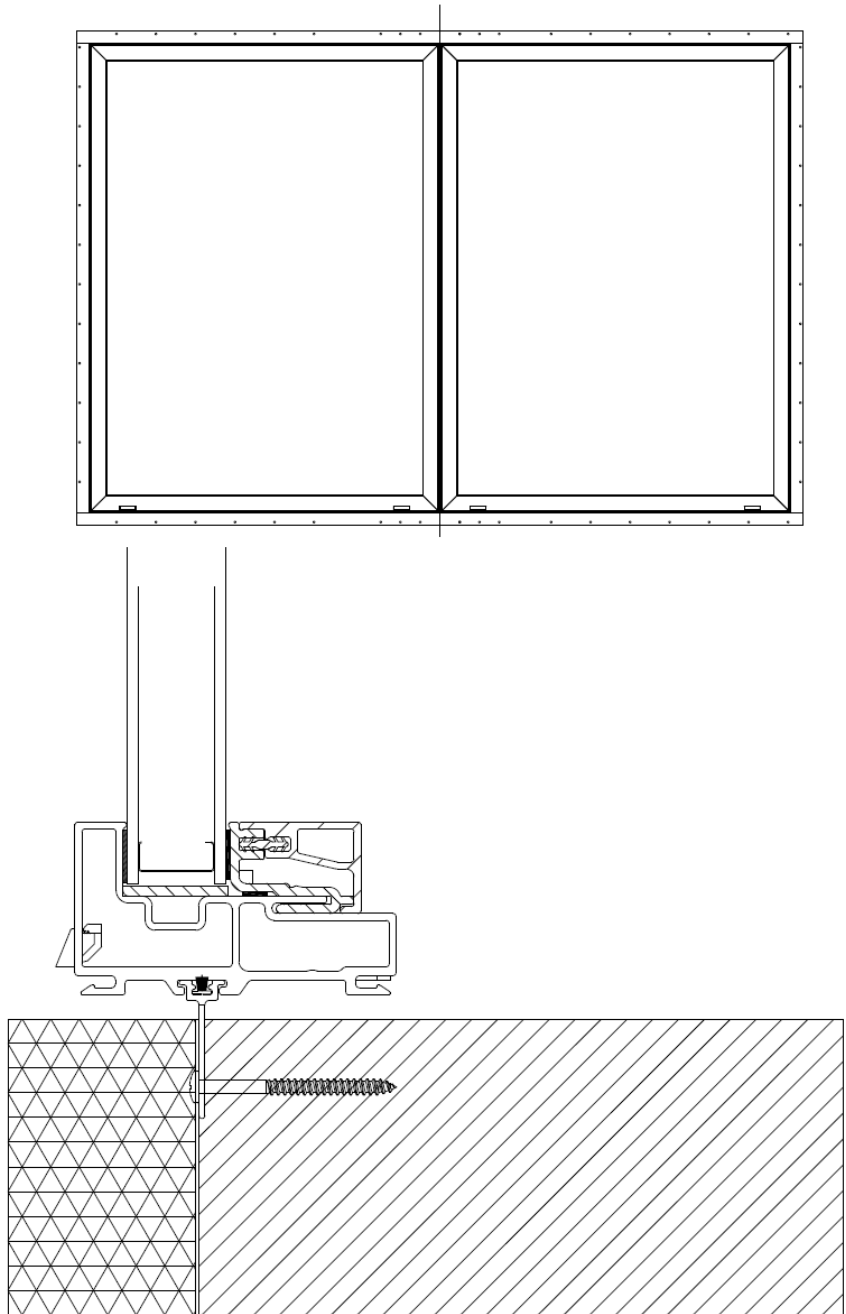
Appendix B

General Installation Methods

This installation for Fin Frame
Windows w/o Reinforcing
Mullion (Tight Mullion).

See Anchor Schedule below for
fastener requirements.

Refer to Pella Impervia Series 2.0
Mullion Installation Instructions
for further details.



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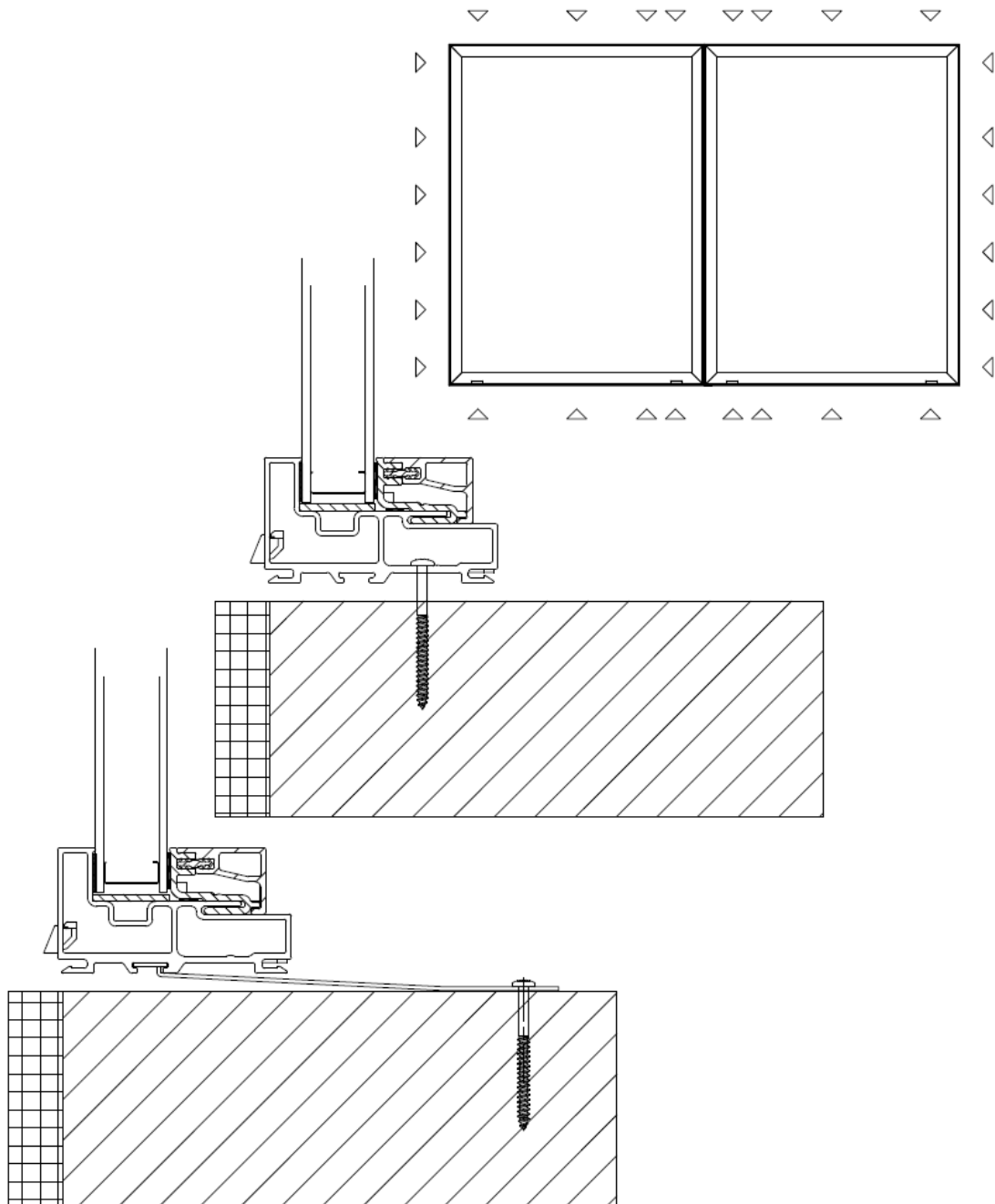
General Installation Methods

This
installation for
Block Frame
Windows w/o
Reinforcing
Mullion (Tight
Mullion).

Thru-frame or
Clip-to-frame
allowed.

See Anchor
Schedule
below for
fastener
requirements.

Refer to Pella
Impervia
Series 2.0
Mullion
Installation
Instructions
for further
details.



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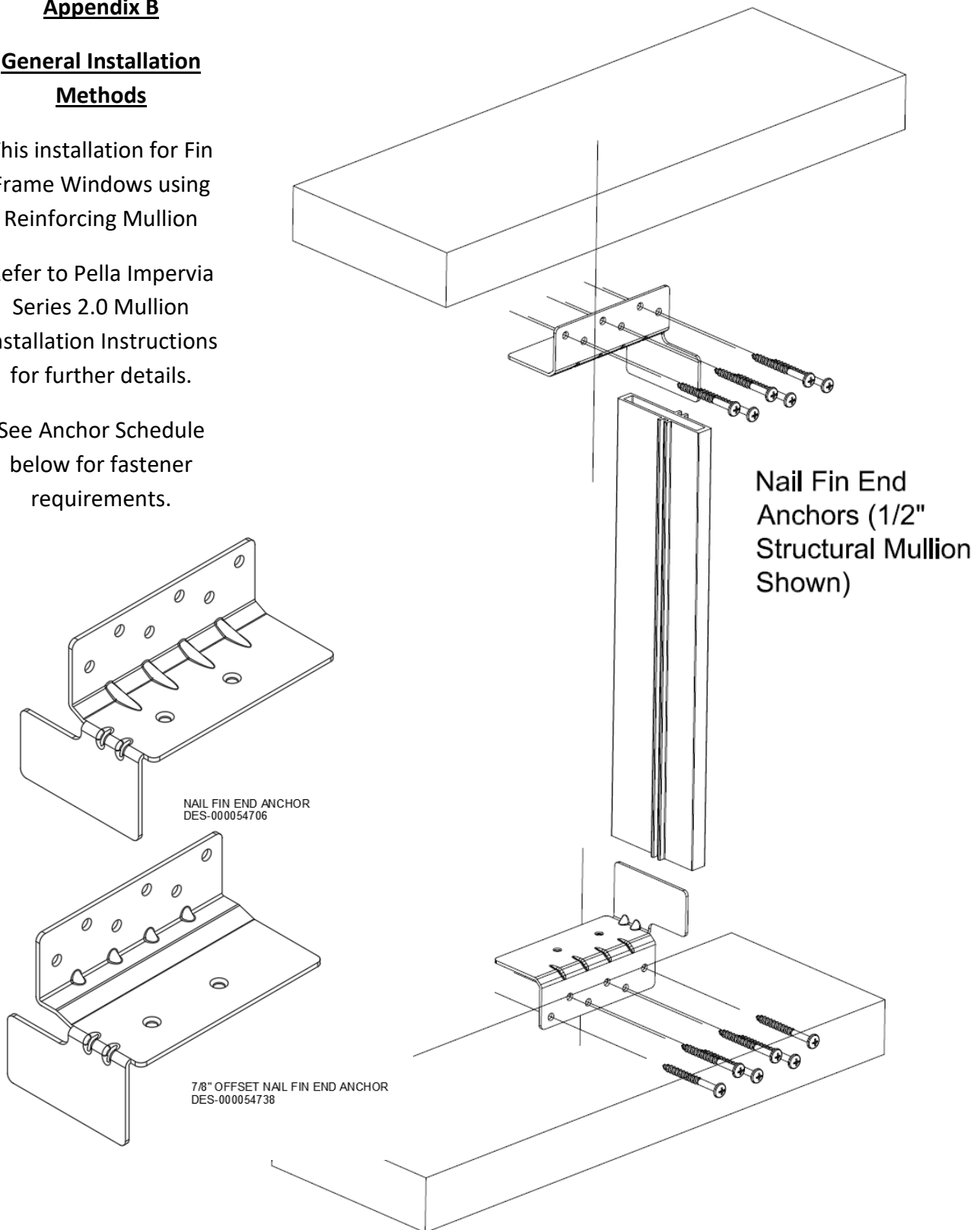
General Installation

Methods

This installation for Fin
Frame Windows using
Reinforcing Mullion

Refer to Pella Impervia
Series 2.0 Mullion
Installation Instructions
for further details.

See Anchor Schedule
below for fastener
requirements.



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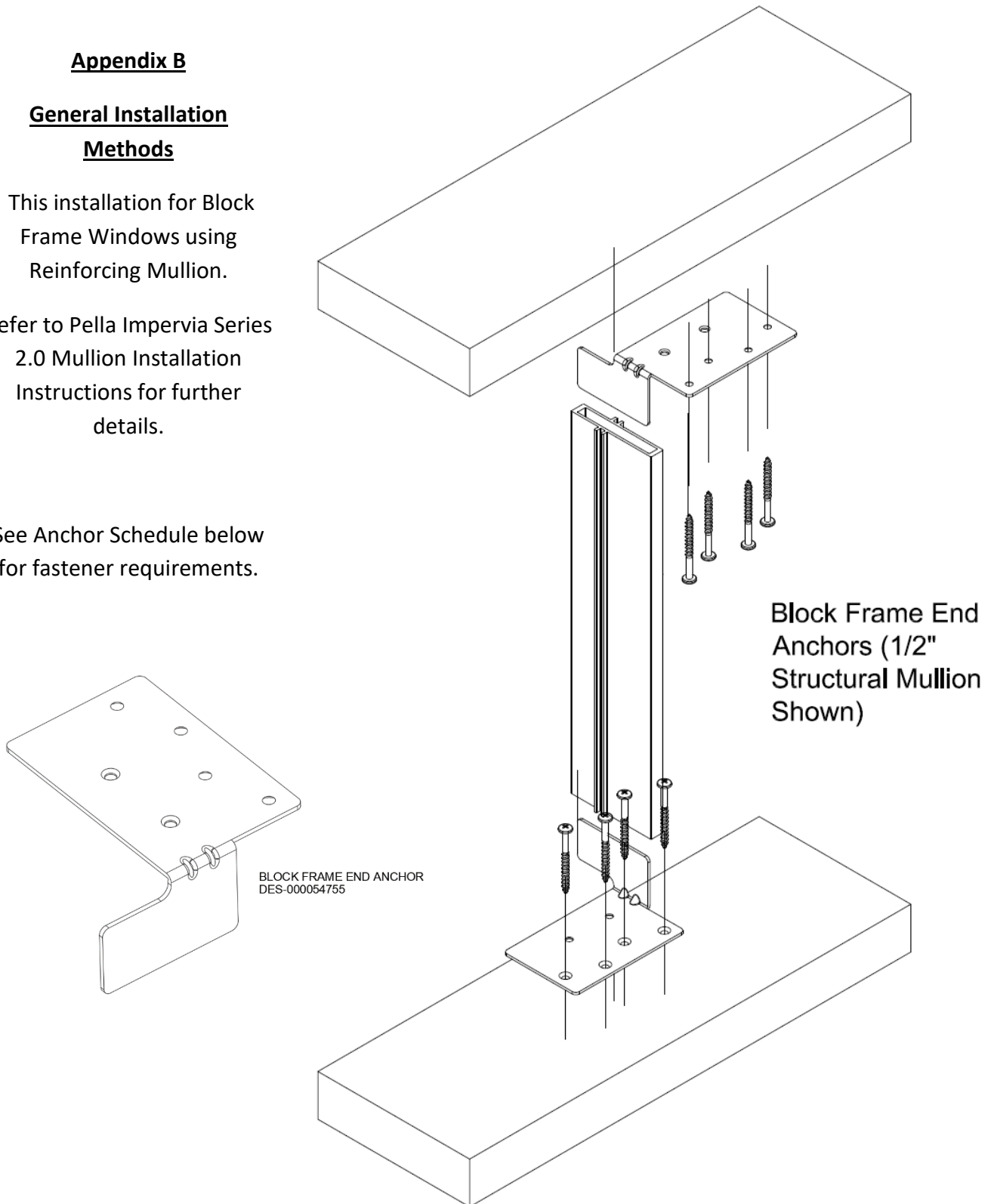
General Installation

Methods

This installation for Block
Frame Windows using
Reinforcing Mullion.

Refer to Pella Impervia Series
2.0 Mullion Installation
Instructions for further
details.

See Anchor Schedule below
for fastener requirements.



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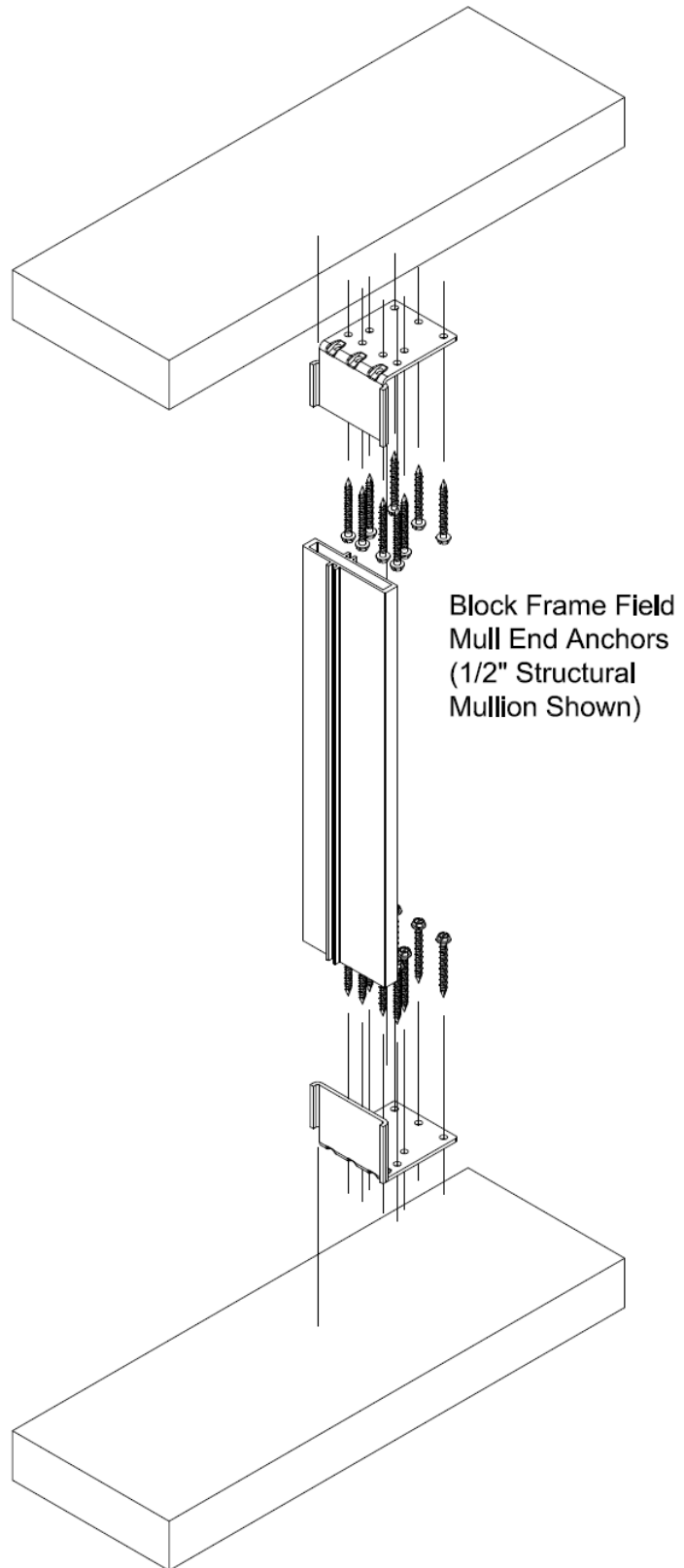
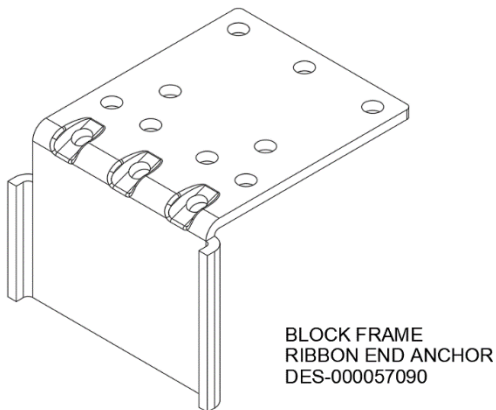
Appendix B

General Installation Methods

This installation for Block Frame Windows using Reinforcing Mullion

Refer to Pella Impervia Series 2.0 Mullion Installation Instructions for further details.

See Anchor Schedule below for fastener requirements.



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Appendix B - General Installation Methods

ANCHOR SCHEDULE						
Clip Type (*)	Substrate	Fastener Type	Size	Embedment (in)	Spacing (in)	Edge Distance (in)
Fin	Concrete	ITW Tapcon	3/16" dia.	1-1/2"	1-1/2"	1"
	Masonry (CMU)	ITW Tapcon	NR	NR	NR	NR
	Wood	Wood Screw (ANSI B18.6.1) Tapping Screw (ANSI B18.6.4)	#10	1-1/2"	3/4"	3/4"
	Steel Stud (20 GA)	Thread Forming/Cutting Screw (ASME B18.6.4)	#10	Stud Thickness + 3 Threads	1/2"	3/8"
	1/8" Steel Tube		#10	Tube Thickness + 3 Threads	1/2"	3/8"
	1/8" Aluminum Tube		#10	Tube Thickness + 3 Threads	1/2"	3/8"
Block	Concrete	ITW Tapcon	3/16" dia.	1-1/2"	1-1/2"	1-1/8"
	Masonry (CMU)	ITW Tapcon	3/16" dia.	1"	1-1/2"	2"
	Wood	Wood Screw (ANSI B18.6.1) Tapping Screw (ANSI B18.6.4)	#10	1-1/2"	3/4"	3/4"
	Steel Stud (20 GA)	Thread Forming/Cutting Screw (ASME B18.6.4)	#10	Stud Thickness + 3 Threads	1/2"	3/8"
	1/8" Steel Tube		#10	Tube Thickness + 3 Threads	1/2"	3/8"
	1/8" Aluminum Tube		#10	Tube Thickness + 3 Threads	1/2"	3/8"

NR = Not Recommended

* See Appendix A for Clip Types used in Reinforced Mullions and Tight Mullions (where applicable). Tight Mullions also installed without clips, thru-frame or thru-fin.

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Appendix C - Mull Span vs. Load Width Table Usage

Appendix D and E present the Mull Span vs. Load Width Tables. This Appendix will explain their usage.

Mulled Window Assembly Type	Mullion	Table ID	Appendix
Two-Way Mullion Assembly	Vertical or Horizontal	1 thru 6	D
Three-Way Mullion Assembly (3-Way Mullion Assembly uses 4-Way Mullion Assembly Tables)	Vertical or Horizontal	7 thru 11	E
Four-Way Mullion Assembly	Vertical or Horizontal	7 thru 11	E

Table ID (Table Number) are applicable to mullion type follows:

Mullion Type		Mullion Window Assembly Type	
		Two-Way	Four-Way (includes Three-Way)
Tight Mullion	Table ID	1	n/a
1/2" Mullion		2	7
1/2" Mullion + 1 Steel Reinforcement		3	8
1" Mullion		4	9
1" Mullion + 1 Steel Reinforcement		5	10
1" Mullion + 2 Steel Reinforcements		6	11

To use these tables, determine the following.

- Mulled Window Assembly Type (see following pages for additional details).
 - Use this information to choose the correct Table ID shown above.
- Mullion Type.
 - This is the method used to reinforce the mulled windows (see Appendix A for additional details).
 - Use this information to choose the correct mullion assembly type (z) as described above.

The following pages illustrate how to use Table 4 (two-way mullion assembly using a 1" Mullion) and Table 10 (four-way mullion assembly using a 1" Mullion + 1 Steel Reinforcement).

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Appendix C - Mull Span vs. Load Width Table Usage

Appendix B presented the general installation methods. Page 15 of Appendix B shows a table of the required installation fasteners approved along with requirements for size, type, embedment, spacing and edge distance.

Anchor quantities are summarized at the end of each mullion vs. load width table in Appendix D and E.

This table (sample below) indicates the required anchor quantities for various installations.

Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
See Appendix B for full Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

Linear Interpolation between Mullion Spans and/or Load Width is allowed.

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Appendix C - Mull Span vs. Load Width Table Usage

Below are illustrations of the Two-Way Mullion Assembly in both vertical and horizontal orientation.

Load Width and Mullion Span are defined.

TWO-WAY MULLION VERTICAL MULL SPAN (APPLICABLE TO HORIZONTAL MULLION)

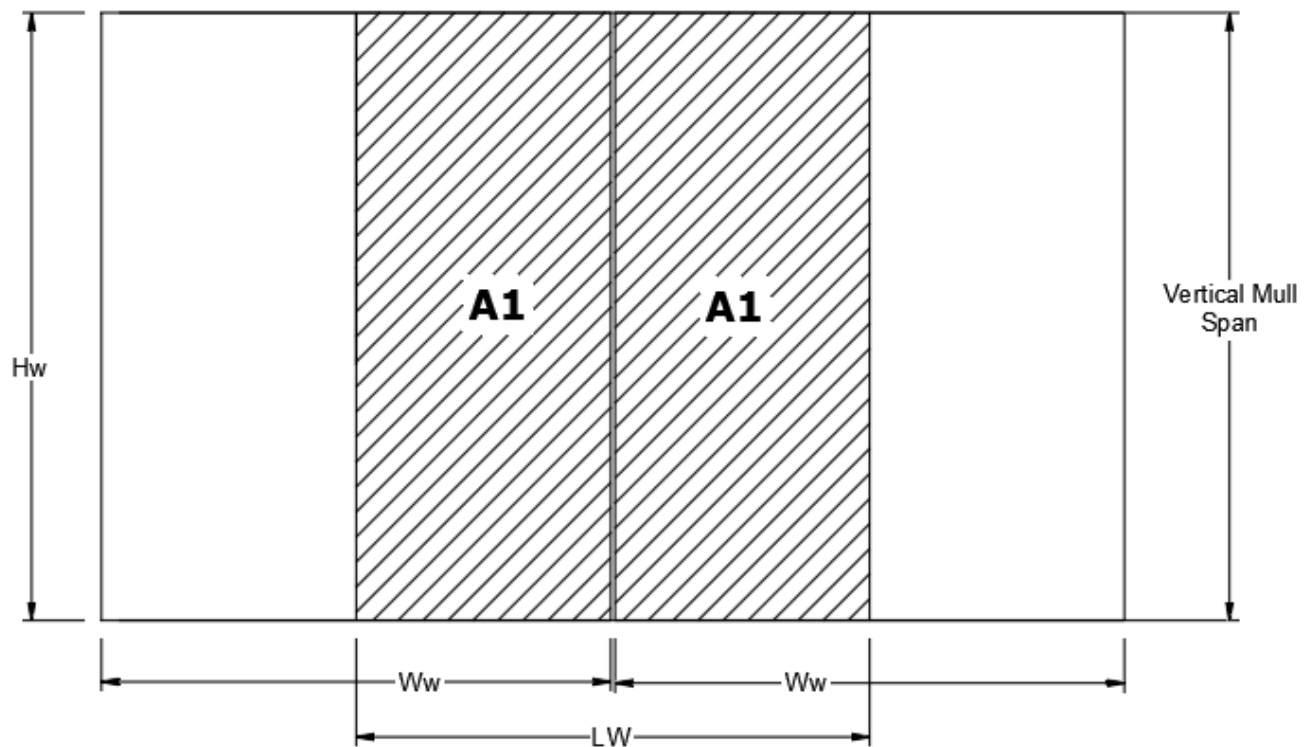
A1 = WINDOW RECTANGULAR TRIBUTARY AREA

Ww = WINDOW WIDTH

Hw = WINDOW HEIGHT

LW = LOAD WIDTH

$LW = [Ww(WINDOW) + Ww(WINDOW)]/2$



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Appendix C - Mull Span vs. Load Width Table Usage

TWO-WAY MULLION HORIZONTAL MULL SPAN

A₂ = TRANSOM RECTANGULAR TRIBUTARY AREA

A₂ = WINDOW RECTANGULAR TRIBUTARY AREA

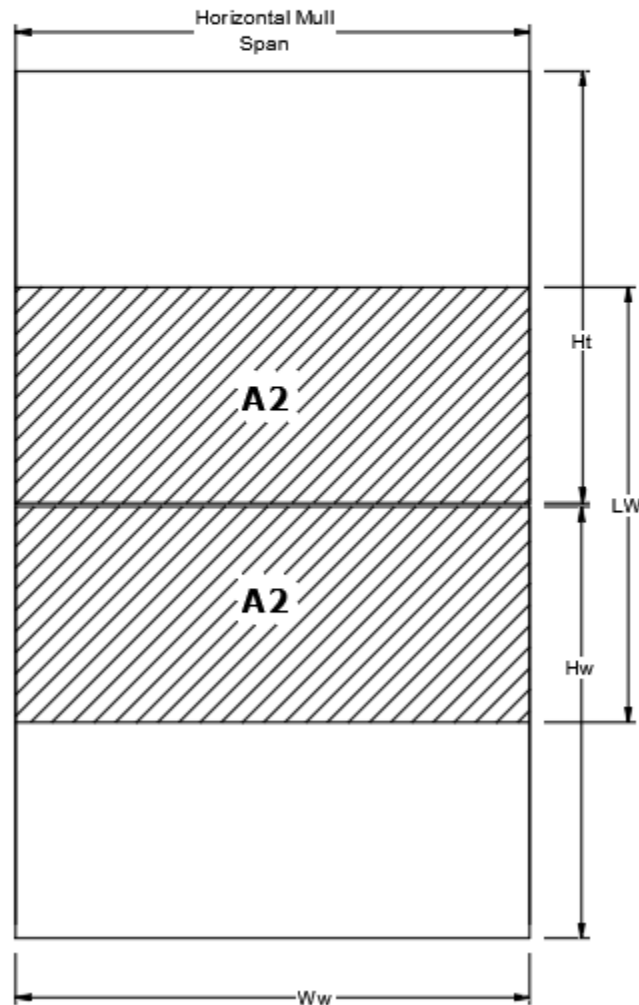
W_w = WINDOW AND TRANSOM WIDTH

H_w = WINDOW HEIGHT

H_t = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = [W_w(WINDOW) + W_w(WINDOW)]/2$



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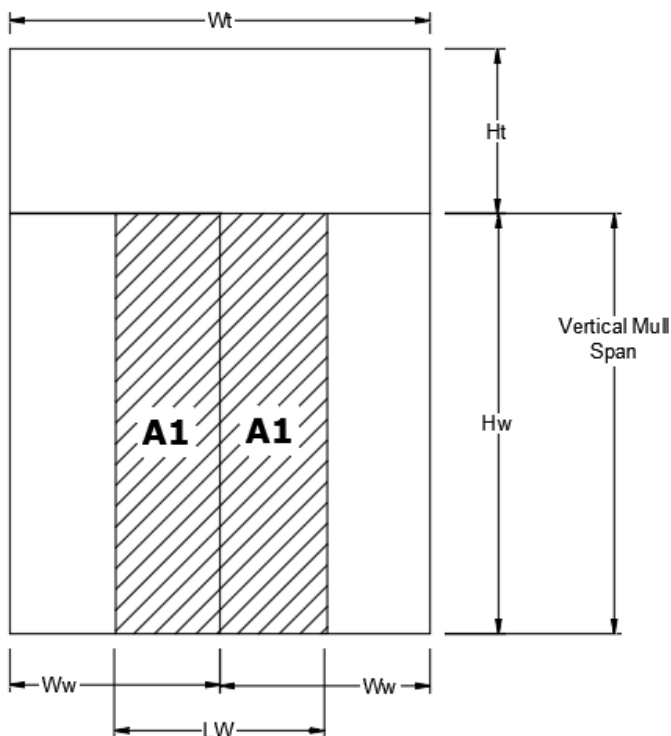
Appendix C - Mull Span vs. Load Width Table Usage

Below are illustrations of the Three-Way Mullion Assembly.

Load Width and Mullion Span are defined.

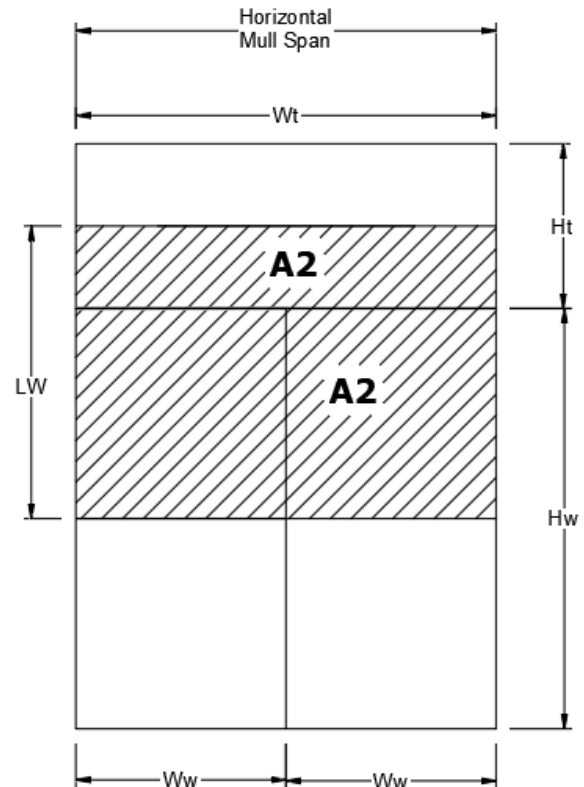
THREE-WAY MULLION VERTICAL MULL SPAN

A1 = WINDOW RECTANGULAR TRIBUTARY AREA
Ww = WINDOW WIDTH
Hw = WINDOW HEIGHT
Wt = TRANSOM WIDTH
Ht = TRANSOM HEIGHT
LW = LOAD WIDTH
 $LW = [Ww \text{ (WINDOW)} + Ww \text{ (WINDOW)}]/2$



THREE-WAY MULLION HORIZONTAL MULL SPAN

A2 = TRANSOM RECTANGULAR TRIBUTARY AREA
A2 = WINDOW RECTANGULAR TRIBUTARY AREA
Ww = WINDOW WIDTH
Hw = WINDOW HEIGHT
Wt = TRANSOM WIDTH
Ht = TRANSOM HEIGHT
LW = LOAD WIDTH
 $LW = \{Ht \text{ (TRANSOM)} + Hw \text{ (LOWER WINDOWS)}\}/2$



The Vertical and Horizontal Mullions must be load rated separately and the lower of the vertical mullion or horizontal mullion shall governing the full mullied assembly.

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Appendix C - Mull Span vs. Load Width Table Usage

Below are illustrations of the Four-Way Mullion Assembly in both vertical and horizontal orientation.

Load Width and Mullion Span are defined.

The Vertical and Horizontal Mullions must be load rated separately and the lower of the vertical mullion or horizontal mullion shall governing the full mullied assembly.

FOUR-WAY MULLION **HORIZONTAL MULL SPAN**

A2 = TRANSOM RECTANGULAR TRIBUTARY AREA

A2 = WINDOW RECTANGULAR TRIBUTARY AREA

Ww = WINDOW WIDTH

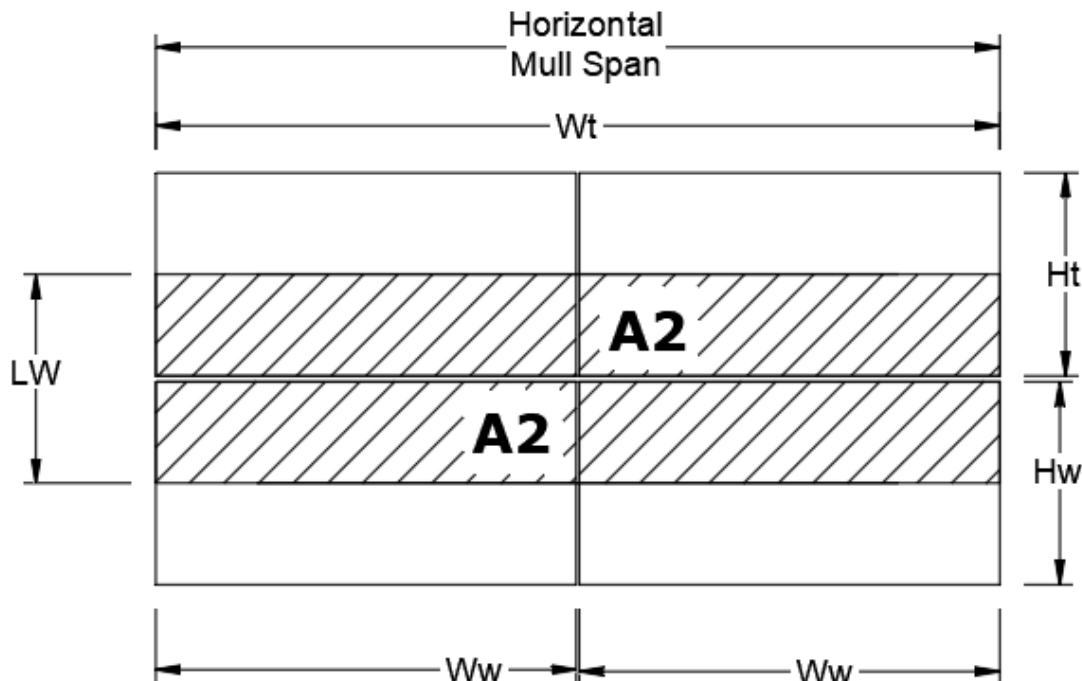
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = \{Ht \text{ (TRANSOM)} + Hw \text{ (LOWER WINDOWS)}\}/2$



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Appendix C - Mull Span vs. Load Width Table Usage

FOUR-WAY MULLION **VERTICAL MULL SPAN**

A1 = TRANSOM RECTANGULAR TRIBUTARY AREA

A1 = WINDOW RECTANGULAR TRIBUTARY AREA

Ww = WINDOW WIDTH

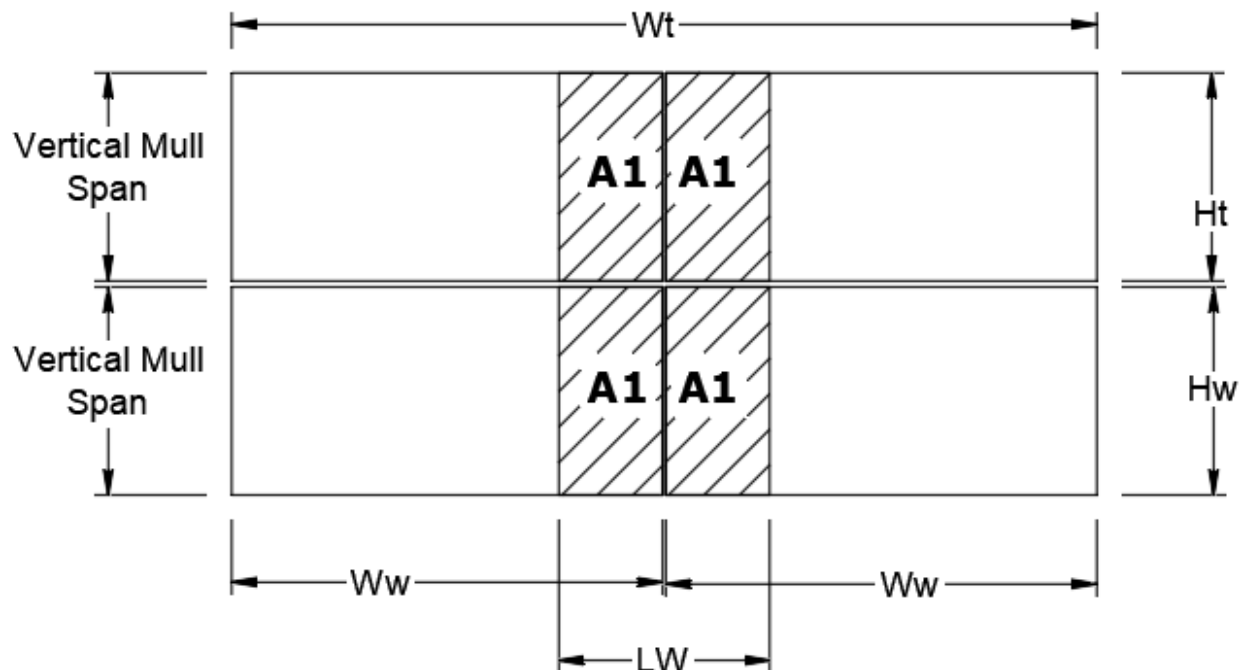
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = [Ww \text{ (WINDOW)} + Ww \text{ (WINDOW)}]/2$



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Appendix C - Mull Span vs. Load Width Table Usage

FOUR-WAY MULLION VERTICAL MULL SPAN

A1 = TRANSOM/WINDOW RECTANGULAR
TRIBUTARY AREA

Ww = WINDOW WIDTH

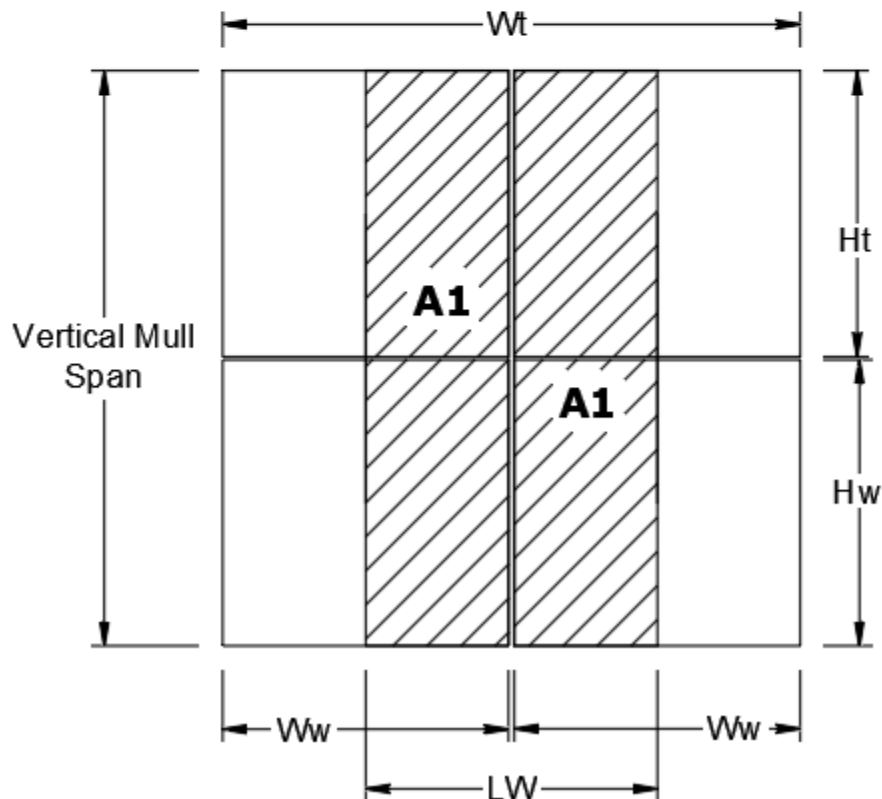
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

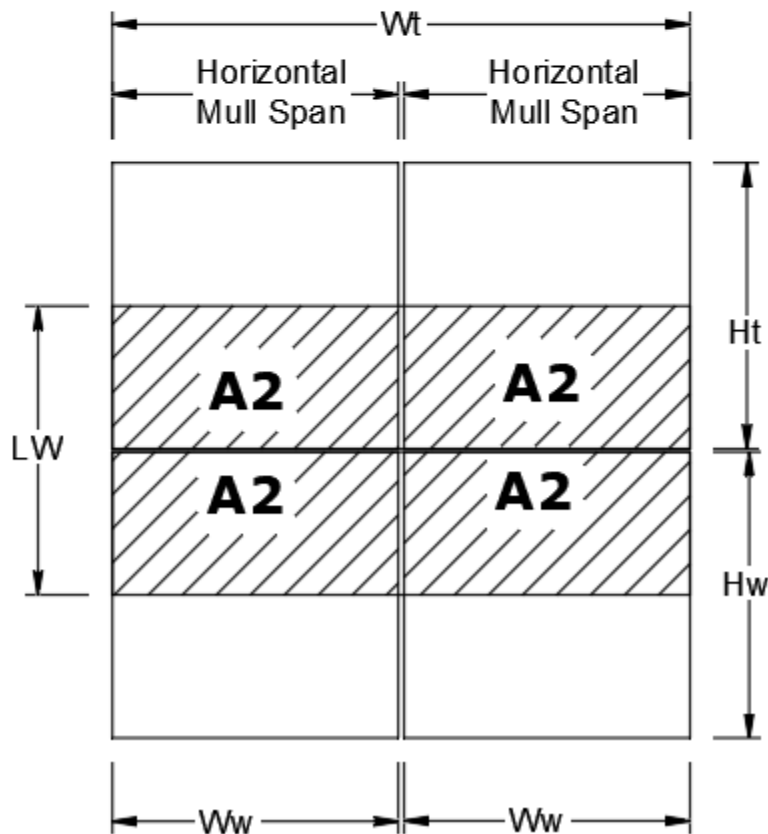
LW = LOAD WIDTH

$LW = [Ww \text{ (LEFT WINDOW)} + Ww \text{ (RIGHT WINDOW)}]/2$



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FOUR-WAY MULLION HORIZONTAL MULL SPAN

$$LW = \{Ht (TRANSOM) + Hw (LOWER WINDOW)\}/2$$


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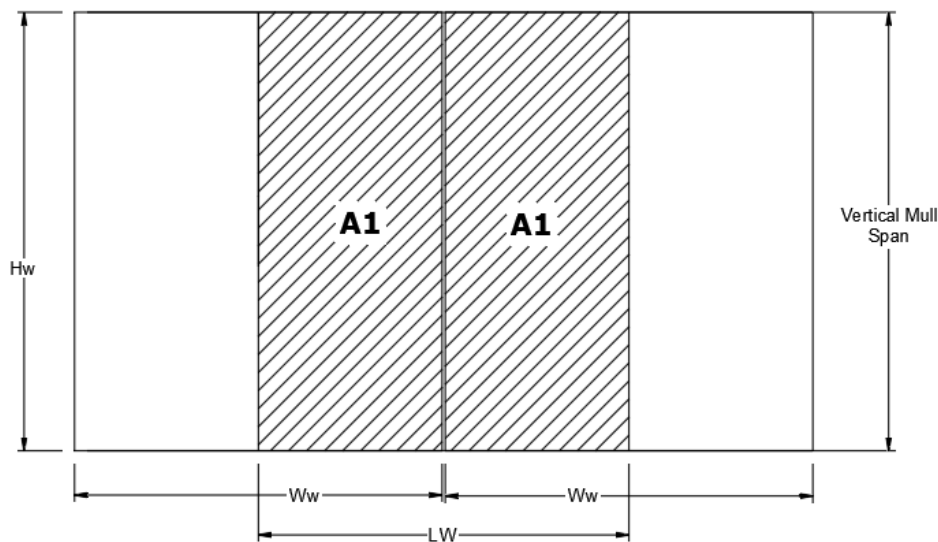
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Appendix C - Mull Span vs. Load Width Table Usage

From Appendix D, Two-Way Mullion Example. Vertical mullion results can be used for horizontal mullions in a two-way configuration.

TWO-WAY MULLION VERTICAL MULL SPAN (APPLICABLE TO HORIZONTAL MULLION)

A1 = WINDOW RECTANGULAR TRIBUTARY AREA
Ww = WINDOW WIDTH
Hw = WINDOW HEIGHT
LW = LOAD WIDTH
 $LW = [Ww(WINDOW) + Ww(WINDOW)]/2$



The diagram at left shows the Vertical Mullion Span and Load Width (LW) definitions.

As previously noted, the vertical two-way mullion assembly results can be used for a horizontal two-way mullion assembly as well.

Table 4 (two-way mullion assembly using a 1" Mullion) will be used.

Mull Span = 78" Load Width (LW) = 66"

Locate mull span and load width corresponding to the above in the following table. Design Pressure (DP in psf) is 43 psf. The anchor quantities required for the mullion end are shown in Table 4 Anchor Schedule.

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Appendix C - Mull Span vs. Load Width Table Usage

MULLION TABLE 4										
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50		96	24	50		114	24	37
	30	50			30	50			30	30
	36	50			36	42			36	25
	42	50			42	36			42	-
	48	50			48	31			48	-
	54	50			54	28			54	-
	60	47			60	25			60	-
	66	43			66	23			66	-
	72	39			72	21			72	-
	78	36			78	-			78	-
	84	33			84	-			84	-
	90	31			90	-			90	-
	96	29			96	-			96	-
	108	26			108	-			108	-
84	24	50		102	24	50		120	24	32
	30	50			30	42			30	26
	36	50			36	35			36	21
	42	50			42	30			42	-
	48	47			48	26			48	-
	54	42			54	23			54	-
	60	37			60	21			60	-
	66	34			66	-			66	-
	72	31			72	-			72	-
	78	29			78	-			78	-
	84	27			84	-			84	-
	90	25			90	-			90	-
	96	23			96	-			96	-
	108	21			108	-			108	-
90	24	50		108	24	44		126	24	28
	30	50			30	35			30	22
	36	50			36	29			36	-
	42	43			42	25			42	-
	48	38			48	22			48	-
	54	34			54	-			54	-
	60	30			60	-			60	-
	66	28			66	-			66	-
	72	25			72	-			72	-
	78	23			78	-			78	-
	84	22			84	-			84	-
	90	20			90	-			90	-
	96	-			96	-			96	-
	108	-			108	-			108	-

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Appendix C - Mull Span vs. Load Width Table Usage

The applicable anchor schedule is shown below.

TABLE 4 ANCHOR SCHEDULE				
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix C - Mull Span vs. Load Width Table Usage

FOUR-WAY MULLION VERTICAL MULL SPAN

A1 = TRANSOM/WINDOW RECTANGULAR
TRIBUTARY AREA

Ww = WINDOW WIDTH

Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = [Ww \text{ (LEFT WINDOW)} + Ww \text{ (RIGHT WINDOW)}]/2$

The diagram at left shows the Vertical Mullion Span and Load Width (LW) definitions for a Four-Way mullion assembly.

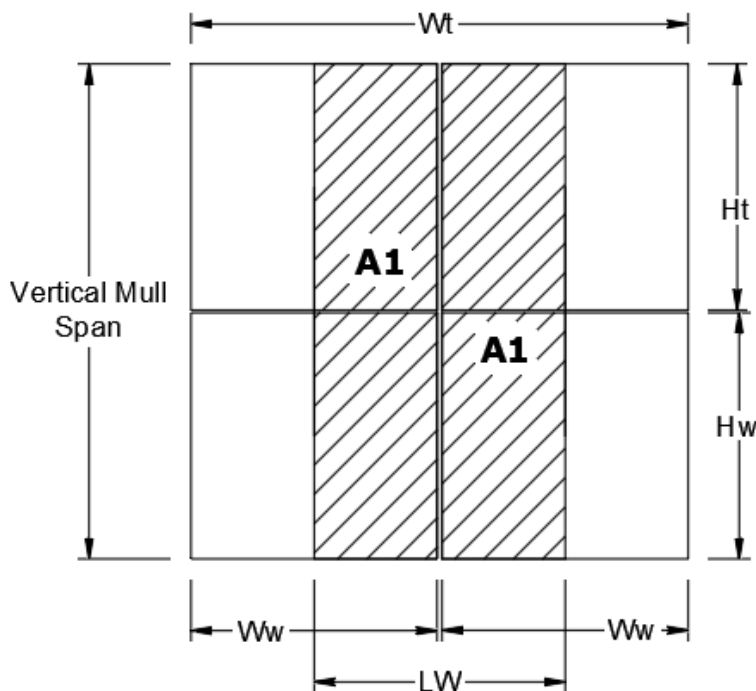


Table 10 (four-way mullion assembly using a 1" Mullion +

1 Steel Reinforcement) will be used.

Mull Span = 90"

Load Width (LW) = 48"

Locate mull span and load width corresponding to the above in the following table. Design Pressure (DP in psf) is 46 psf. The anchor quantities required for the mullion end are shown in Table 10 Anchor Schedule.

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Appendix C - Mull Span vs. Load Width Table Usage

MULLION TABLE 10								
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50	96	24	50	114	24	46
	30	50		30	50		30	37
	36	50		36	50		36	30
	42	50		42	44		42	26
	48	50		48	38		48	23
	54	50		54	34		54	20
	60	50		60	31		60	-
	66	50		66	28		66	-
	72	48		72	26		72	-
	78	44		78	24		78	-
	84	41		84	22		84	-
	90	38		90	20		90	-
	96	36		96	-		96	-
	108	32		108	-		108	-
84	24	50	102	24	50	120	24	39
	30	50		30	50		30	31
	36	50		36	43		36	26
	42	50		42	36		42	22
	48	50		48	32		48	-
	54	50		54	28		54	-
	60	46		60	26		60	-
	66	42		66	23		66	-
	72	38		72	21		72	-
	78	35		78	-		78	-
	84	33		84	-		84	-
	90	30		90	-		90	-
	96	29		96	-		96	-
	108	25		108	-		108	-
90	24	50	108	24	50	126	24	34
	30	50		30	43		30	27
	36	50		36	36		36	23
	42	50		42	31		42	-
	48	46		48	27		48	-
	54	41		54	24		54	-
	60	37		60	21		60	-
	66	34		66	-		66	-
	72	31		72	-		72	-
	78	29		78	-		78	-
	84	27		84	-		84	-
	90	25		90	-		90	-
	96	23		96	-		96	-
	108	21		108	-		108	-

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The applicable anchor schedule is shown below.

TABLE 10 ANCHOR SCHEDULE				
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

Additionally, the horizontal mullion assembly must be evaluated to determine the total assembly for the four-way mullion example. See the following.

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Appendix C - Mull Span vs. Load Width Table Usage

FOUR-WAY MULLION HORIZONTAL MULL SPAN

The diagram at left shows the Horizontal Mullion Span and Load Width (LW) definitions for a Four-Way mullion assembly.

A2 = TRANSOM RECTANGULAR TRIBUTARY AREA

A2 = WINDOW TRAPEZOIDAL TRIBUTARY AREA

Ww = WINDOW WIDTH

Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = \{Ht \text{ (TRANSOM)} + Hw \text{ (LOWER WINDOW)}\}/2$

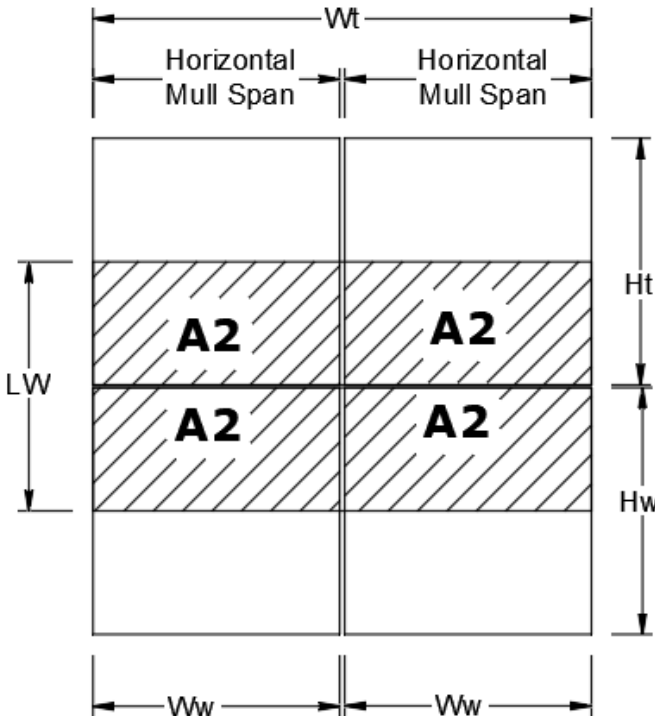


Table 10 (four-way mullion assembly using a 1" Mullion + 1 Steel Reinforcement) will be used.

Mull Span = 48"

Load Width (LW) = 45" (use next largest LW = 48" as 45" is not in table, or linear interpolate between 42" and 48").

Locate mull span and load width corresponding to the above in the following table. Design Pressure (DP in psf) is 50 psf. Note that 45" LW is not included in the table; therefore use 48". The anchor quantities required for the mullion end are shown in Table 10 Anchor Schedule.

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Appendix C - Mull Span vs. Load Width Table Usage

MULLION TABLE 10								
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50	42	24	50	60	24	50
	30	50		30	50		30	50
	36	50		36	50		36	50
	42	50		42	50		42	50
	48	50		48	50		48	50
	54	50		54	50		54	50
	60	50		60	50		60	50
	66	50		66	50		66	50
	72	50		72	50		72	50
	78	50		78	50		78	50
	84	50		84	50		84	50
	90	50		90	50		90	50
30	96	50		96	50		96	50
	108	50		108	50		108	50
	24	50	48	24	50	66	24	50
	30	50		30	50		30	50
	36	50		36	50		36	50
	42	50		42	50		42	50
	48	50		48	50		48	50
	54	50		54	50		54	50
	60	50		60	50		60	50
	66	50		66	50		66	50
	72	50		72	50		72	50
	78	50		78	50		78	50
	84	50		84	50		84	50
36	90	50		90	50		90	50
	96	50		96	50		96	50
	108	50		108	50		108	50
	24	50	54	24	50	72	24	50
	30	50		30	50		30	50
	36	50		36	50		36	50
	42	50		42	50		42	50
	48	50		48	50		48	50
	54	50		54	50		54	50
	60	50		60	50		60	50
	66	50		66	50		66	50
	72	50		72	50		72	50
	78	50		78	50		78	50
	84	50		84	50		84	50
	90	50		90	50		90	48
	96	50		96	50		96	45

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Appendix D – Two-Way Mullion Assembly Mull Span vs. Load Width Table

Appendix D represents the Mull Span vs. Load Width (LW) for a Two-Way Mullion configuration. This configuration shown below is comprised of a vertical mullion separating two windows. This configuration is also applicable to a horizontal mullion in a two-way configuration.

See Appendix C for explanations and examples of table usage.

TWO-WAY MULLION VERTICAL MULL SPAN (APPLICABLE TO HORIZONTAL MULLION)

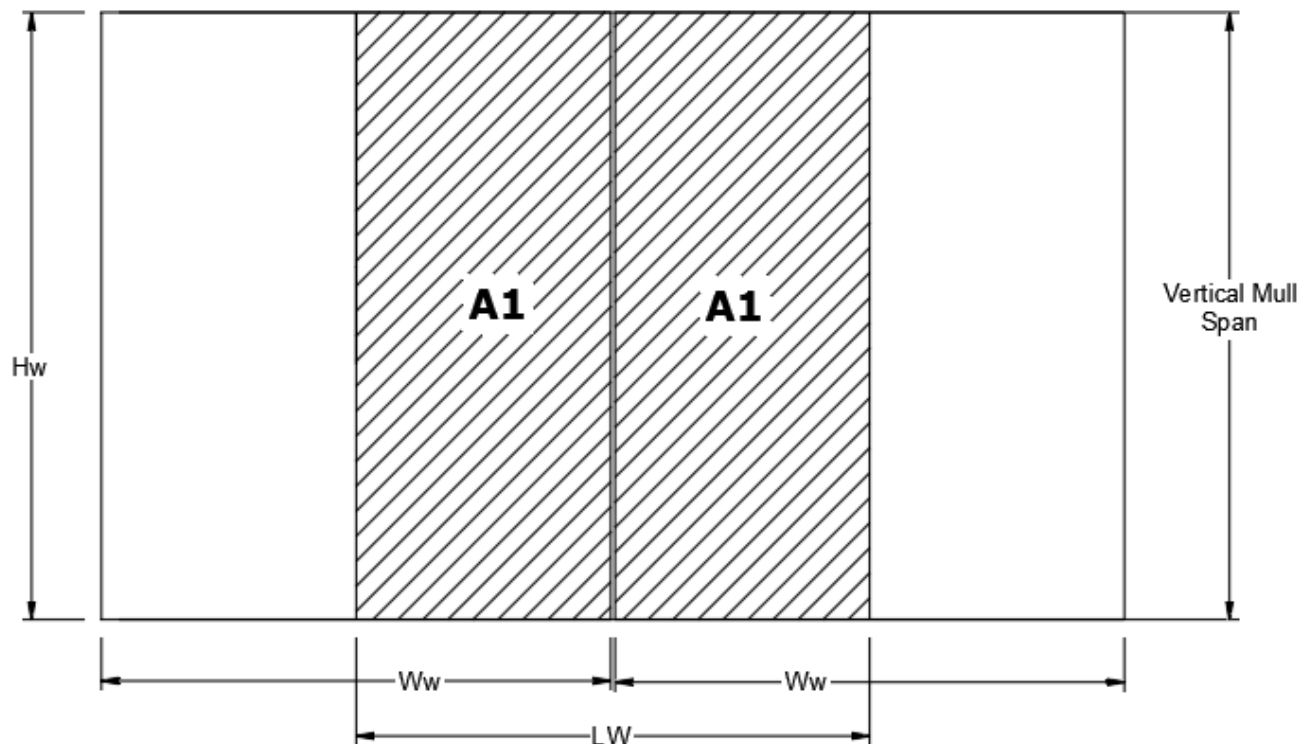
A1 = WINDOW RECTANGULAR TRIBUTARY AREA

Ww = WINDOW WIDTH

Hw = WINDOW HEIGHT

LW = LOAD WIDTH

$LW = [Ww(WINDOW) + Ww(WINDOW)]/2$



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Appendix D – Two-Way Mullion Assembly Mull Span vs. Load Width Table

The Vertical Mullion configuration is also applicable to a Horizontal Mullion in a two-way configuration shown below.

TWO-WAY MULLION HORIZONTAL MULL SPAN

A2 = TRANSOM RECTANGULAR TRIBUTARY AREA

A2 = WINDOW RECTANGULAR TRIBUTARY AREA

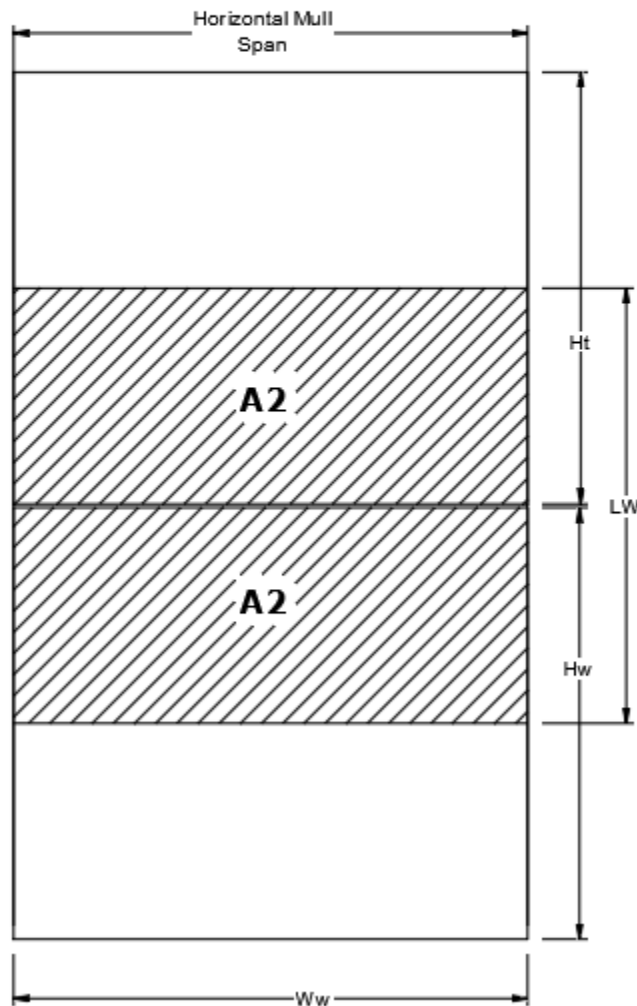
Ww = WINDOW AND TRANSOM WIDTH

Hw = WINDOW HEIGHT

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = [Ww(WINDOW) + Ww(WINDOW)]/2$



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Appendix D Two-Way Joint Mullion Assembly – Table 1, Tight Mullion

MULLION TABLE 1									
2-WAY JOINT MULLION ASSEMBLY - TIGHT MULLION									
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	
24	24	50	42	24	50	60	24	50	
	30	50		30	50		30	50	
	36	50		36	50		36	50	
	42	50		42	50		42	50	
	48	50		48	50		48	50	
	54	50		54	50		54	47	
	60	50		60	50		60	43	
	66	50		66	50		66	39	
	72	50		72	50		72	36	
	78	50		78	50		78	33	
	84	50		84	50		84	31	
	90	50		90	50		90	28	
30	96	50		96	50		96	27	
	108	50		108	50		108	24	
	24	50	48	24	50	66	24	50	
	30	50		30	50		30	50	
	36	50		36	50		36	50	
	42	50		42	50		42	46	
	48	50		48	50		48	40	
	54	50		54	50		54	36	
	60	50		60	50		60	32	
	66	50		66	50		66	29	
	72	50		72	50		72	27	
	78	50		78	50		78	25	
	84	50		84	50		84	23	
36	90	50		90	50		90	21	
	96	50		96	50		96	20	
	108	50		108	46		108	-	
	24	50	54	24	50	72	24	50	
	30	50		30	50		30	49	
	36	50		36	50		36	41	
	42	50		42	50		42	35	
	48	50		48	50		48	31	
	54	50		54	50		54	27	
	60	50		60	50		60	25	
	66	50		66	50		66	22	
	72	50		72	49		72	21	
	78	50		78	45		78	-	
	84	50		84	42		84	-	
	90	50		90	39		90	-	
	96	50		96	37		96	-	
	108	50		108	33		108	-	

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Appendix D Two-Way Joint Mullion Assembly – Table 1, Tight Mullion

MULLION TABLE 1					
2-WAY JOINT MULLION ASSEMBLY - TIGHT MULLION					
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	49	96	24	26
	30	39		30	21
	36	32		36	-
	42	28		42	-
	48	24		48	-
	54	22		54	-
	60	-		60	-
	66	-		66	-
	72	-		72	-
	78	-		78	-
	84	-		84	-
	90	-		90	-
	96	-		96	-
	108	-		108	-
84	24	39	102	24	22
	30	31		30	-
	36	26		36	-
	42	22		42	-
	48	-		48	-
	54	-		54	-
	60	-		60	-
	66	-		66	-
	72	-		72	-
	78	-		78	-
	84	-		84	-
	90	-		90	-
	96	-		96	-
	108	-		108	-
90	24	32	108	24	-
	30	25		30	-
	36	21		36	-
	42	-		42	-
	48	-		48	-
	54	-		54	-
	60	-		60	-
	66	-		66	-
	72	-		72	-
	78	-		78	-
	84	-		84	-
	90	-		90	-
	96	-		96	-
	108	-		108	-

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Appendix D Two-Way Joint Mullion Assembly – Table 1, Tight Mullion

TABLE 1 ANCHOR SCHEDULE				
2-WAY JOINT MULLION ASSEMBLY - TIGHT MULLION				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	1	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
Block	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	1	#10
	Steel Stud	SMS	1	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix D, Two-Way Joint Mullion Assembly – Table 2, 1/2" Mullion

MULLION TABLE 2										
2-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
	96	50			96	50			96	47
	108	50			108	50			108	42
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	47
	78	50			78	50			78	44
	84	50			84	50			84	41
	90	50			90	50			90	38
	96	50			96	50			96	36
	108	50			108	50			108	32
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	49
	60	50			60	50			60	44
	66	50			66	50			66	40
	72	50			72	50			72	37
	78	50			78	50			78	34
	84	50			84	50			84	31
	90	50			90	50			90	29
	96	50			96	50			96	27
	108	50			108	50			108	24

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Appendix D, Two-Way Joint Mullion Assembly – Table 2, 1/2" Mullion

MULLION TABLE 2										
2-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50		96	24	46		114	24	28
	30	50			30	37			30	22
	36	50			36	31			36	-
	42	49			42	26			42	-
	48	43			48	23			48	-
	54	38			54	21			54	-
	60	34			60	-			60	-
	66	31			66	-			66	-
	72	29			72	-			72	-
	78	27			78	-			78	-
	84	25			84	-			84	-
	90	23			90	-			90	-
	96	22			96	-			96	-
	108	-			108	-			108	-
84	24	50		102	24	39		120	24	24
	30	50			30	31			30	-
	36	46			36	26			36	-
	42	39			42	22			42	-
	48	35			48	-			48	-
	54	31			54	-			54	-
	60	28			60	-			60	-
	66	25			66	-			66	-
	72	23			72	-			72	-
	78	21			78	-			78	-
	84	-			84	-			84	-
	90	-			90	-			90	-
	96	-			96	-			96	-
	108	-			108	-			108	-
90	24	50		108	24	32		126	24	20
	30	45			30	26			30	-
	36	37			36	22			36	-
	42	32			42	-			42	-
	48	28			48	-			48	-
	54	25			54	-			54	-
	60	22			60	-			60	-
	66	20			66	-			66	-
	72	-			72	-			72	-
	78	-			78	-			78	-
	84	-			84	-			84	-
	90	-			90	-			90	-
	96	-			96	-			96	-
	108	-			108	-			108	-

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Appendix D, Two-Way Joint Mullion Assembly – Table 2, 1/2" Mullion

TABLE 2 ANCHOR SCHEDULE				
2-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix D, Two-Way Joint Mullion Assembly – Table 3, 1/2" Mullion with 1 Steel Reinforcement

MULLION TABLE 3										
2-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION WITH 1 STEEL REINFORCEMENT										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
	96	50			96	50			96	50
	108	50			108	50			108	50
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
	96	50			96	50			96	50
	108	50			108	50			108	50
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	47
	96	50			96	50			96	44
	108	50			108	50			108	39

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Appendix D, Two-Way Joint Mullion Assembly – Table 3, 1/2" Mullion with 1 Steel Reinforcement

MULLION TABLE 3								
2-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION WITH 1 STEEL REINFORCEMENT								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50	96	24	50	114	24	44
	30	50		30	50		30	35
	36	50		36	50		36	30
	42	50		42	42		42	25
	48	50		48	37		48	22
	54	50		54	33		54	-
	60	50		60	30		60	-
	66	50		66	27		66	-
	72	46		72	25		72	-
	78	43		78	23		78	-
	84	40		84	21		84	-
	90	37		90	0		90	-
	96	35		96	0		96	-
	108	31		108	0		108	-
84	24	50	102	24	50	120	24	38
	30	50		30	50		30	30
	36	50		36	41		36	25
	42	50		42	35		42	22
	48	50		48	31		48	-
	54	49		54	28		54	-
	60	44		60	25		60	-
	66	40		66	23		66	-
	72	37		72	21		72	-
	78	34		78	0		78	-
	84	32		84	0		84	-
	90	30		90	0		90	-
	96	28		96	0		96	-
	108	25		108	0		108	-
90	24	50	108	24	50	126	24	33
	30	50		30	42		30	26
	36	50		36	35		36	22
	42	50		42	30		42	-
	48	45		48	26		48	-
	54	40		54	23		54	-
	60	36		60	21		60	-
	66	33		66	0		66	-
	72	30		72	0		72	-
	78	28		78	0		78	-
	84	26		84	0		84	-
	90	24		90	0		90	-
	96	23		96	0		96	-
	108	20		108	0		108	-

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Appendix D, Two-Way Joint Mullion Assembly – Table 3, 1/2" Mullion with 1 Steel Reinforcement

MULLION TABLE 3		
2-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION WITH 1 STEEL REINFORCEMENT		
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
132	24	29
	30	23
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
138	108	-
	24	25
	30	20
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
144	96	-
	108	-
	24	22
	30	-
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-

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Appendix D, Two-Way Joint Mullion Assembly – Table 3, 1/2" Mullion with 1 Steel Reinforcement

TABLE 3 ANCHOR SCHEDULE				
2-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION WITH 1 STEEL REINFORCEMENT				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix D, Two-Way Joint Mullion Assembly – Table 4, 1" Mullion

MULLION TABLE 4										
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
	96	50			96	50			96	50
	108	50			108	50			108	50
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
	96	50			96	50			96	48
	108	50			108	50			108	43
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	46
	84	50			84	50			84	42
	90	50			90	50			90	40
	96	50			96	50			96	37
	108	50			108	50			108	33

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Appendix D, Two-Way Joint Mullion Assembly – Table 4, 1" Mullion

MULLION TABLE 4								
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50	96	24	50	114	24	37
	30	50		30	50		30	30
	36	50		36	42		36	25
	42	50		42	36		42	-
	48	50		48	31		48	-
	54	50		54	28		54	-
	60	47		60	25		60	-
	66	43		66	23		66	-
	72	39		72	21		72	-
	78	36		78	-		78	-
	84	33		84	-		84	-
	90	31		90	-		90	-
84	96	29	102	96	-	120	96	-
	108	26		108	-		108	-
	24	50		24	50		24	32
	30	50		30	42		30	26
	36	50		36	35		36	21
	42	50		42	30		42	-
	48	47		48	26		48	-
	54	42		54	23		54	-
	60	37		60	21		60	-
	66	34		66	-		66	-
	72	31		72	-		72	-
	78	29		78	-		78	-
90	84	27		84	-	126	84	-
	90	25		90	-		90	-
	96	23		96	-		96	-
	108	21		108	-		108	-
	24	50	108	24	44		24	28
	30	50		30	35		30	22
	36	50		36	29		36	-
	42	43		42	25		42	-
	48	38		48	22		48	-
	54	34		54	-		54	-
	60	30		60	-		60	-
	66	28		66	-		66	-
	72	25		72	-		72	-
	78	23		78	-		78	-
	84	22		84	-		84	-
	90	20		90	-		90	-
90	96	-		96	-		96	-
	108	-		108	-		108	-

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Appendix D, Two-Way Joint Mullion Assembly – Table 4, 1" Mullion

MULLION TABLE 4		
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION		
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
132	24	24
	30	-
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-
138	24	21
	30	-
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-

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Appendix D, Two-Way Joint Mullion Assembly – Table 4, 1" Mullion

TABLE 4 ANCHOR SCHEDULE				
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix D, Two-Way Joint Mullion Assembly – Table 5, 1" Mullion with 1 Steel Reinforcement

MULLION TABLE 5										
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50			
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50			
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	48			

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Appendix D, Two-Way Joint Mullion Assembly – Table 5, 1" Mullion with 1 Steel Reinforcement

MULLION TABLE 5								
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50	96	24	50	114	24	50
	30	50		30	50		30	43
	36	50		36	50		36	36
	42	50		42	50		42	31
	48	50		48	45		48	27
	54	50		54	40		54	24
	60	50		60	36		60	22
	66	50		66	33		66	-
	72	50		72	30		72	-
	78	50		78	28		78	-
	84	48		84	26		84	-
	90	45		90	24		90	-
84	96	42	102	96	23	120	96	-
	108	38		108	20		108	-
	24	50		24	50		24	46
	30	50		30	50		30	37
	36	50		36	50		36	31
	42	50		42	43		42	27
	48	50		48	38		48	23
	54	50		54	34		54	21
	60	50		60	30		60	-
	66	49		66	28		66	-
	72	45		72	25		72	-
	78	42		78	23		78	-
90	84	39		84	22		84	-
	90	36		90	20		90	-
	96	34		96	-		96	-
	108	30		108	-		108	-
	24	50	108	24	50	126	24	40
	30	50		30	50		30	32
	36	50		36	42		36	27
	42	50		42	36		42	23
	48	50		48	32		48	20
	54	49		54	28		54	-
	60	44		60	25		60	-
	66	40		66	23		66	-
	72	37		72	21		72	-
	78	34		78	-		78	-
	84	31		84	-		84	-
	90	29		90	-		90	-
96	96	28		96	-		96	-
	108	24		108	-		108	-

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Appendix D, Two-Way Joint Mullion Assembly – Table 5, 1" Mullion with 1 Steel Reinforcement

MULLION TABLE 5		
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT		
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
132	24	35
	30	28
	36	23
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-
138	24	31
	30	24
	36	20
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-
144	24	27
	30	22
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-

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Appendix D, Two-Way Joint Mullion Assembly – Table 5, 1" Mullion with 1 Steel Reinforcement

TABLE 5 ANCHOR SCHEDULE				
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	4	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	3	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix D, Two-Way Joint Mullion Assembly – Table 6, 1" Mullion with 2 Steel Reinforcements

MULLION TABLE 6										
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 2 STEEL REINFORCEMENTS										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50		108	50
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50		108	50
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50		108	50

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Appendix D, Two-Way Joint Mullion Assembly – Table 6, 1" Mullion with 2 Steel Reinforcements

MULLION TABLE 6								
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 2 STEEL REINFORCEMENTS								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50	96	24	50	114	24	50
	30	50		30	50		30	50
	36	50		36	50		36	47
	42	50		42	50		42	41
	48	50		48	50		48	35
	54	50		54	50		54	32
	60	50		60	48		60	28
	66	50		66	43		66	26
	72	50		72	40		72	24
	78	50		78	37		78	22
	84	50		84	34		84	20
	90	50		90	32		90	-
	96	50		96	30		96	-
	108	49		108	26		108	-
84	24	50	102	24	50	120	24	50
	30	50		30	50		30	49
	36	50		36	50		36	41
	42	50		42	50		42	35
	48	50		48	50		48	30
	54	50		54	44		54	27
	60	50		60	40		60	24
	66	50		66	36		66	22
	72	50		72	33		72	20
	78	50		78	30		78	-
	84	50		84	28		84	-
	90	47		90	26		90	-
	96	44		96	25		96	-
	108	39		108	22		108	-
90	24	50	108	24	50	126	24	50
	30	50		30	50		30	42
	36	50		36	50		36	35
	42	50		42	48		42	30
	48	50		48	42		48	26
	54	50		54	37		54	23
	60	50		60	33		60	21
	66	50		66	30		66	-
	72	48		72	28		72	-
	78	44		78	26		78	-
	84	41		84	24		84	-
	90	38		90	22		90	-
	96	36		96	21		96	-
	108	32		108	-		108	-

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Appendix D, Two-Way Joint Mullion Assembly – Table 6, 1" Mullion with 2 Steel Reinforcements

MULLION TABLE 6		
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 2 STEEL REINFORCEMENTS		
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
132	24	46
	30	37
	36	30
	42	26
	48	23
	54	20
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-
138	24	40
	30	32
	36	27
	42	23
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-
144	24	35
	30	28
	36	23
	42	20
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-

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Appendix D, Two-Way Joint Mullion Assembly – Table 6, 1" Mullion with 2 Steel Reinforcements

TABLE 6 ANCHOR SCHEDULE				
2-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 2 STEEL REINFORCEMENTS				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	3	#10
	Steel Stud	SMS	4	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	3	3/16"
	Wood	WS/TS	3	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix E, Four-Way Joint Mullion Assembly Mull Span vs. Load Width Tables

Appendix E represents the Mull Span vs. Load Width (LW) for a Four-Way Mullion configuration. This configuration shown below is comprised of a vertical and horizontal mullion separating four windows. The Three-Way Mullion configuration is enveloped by the Four-Way Mullion configuration.

See Appendix C for explanations and examples of table usage.

FOUR-WAY MULLION **HORIZONTAL MULL SPAN**

A2 = TRANSOM RECTANGULAR TRIBUTARY AREA

A2 = WINDOW RECTANGULAR TRIBUTARY AREA

Ww = WINDOW WIDTH

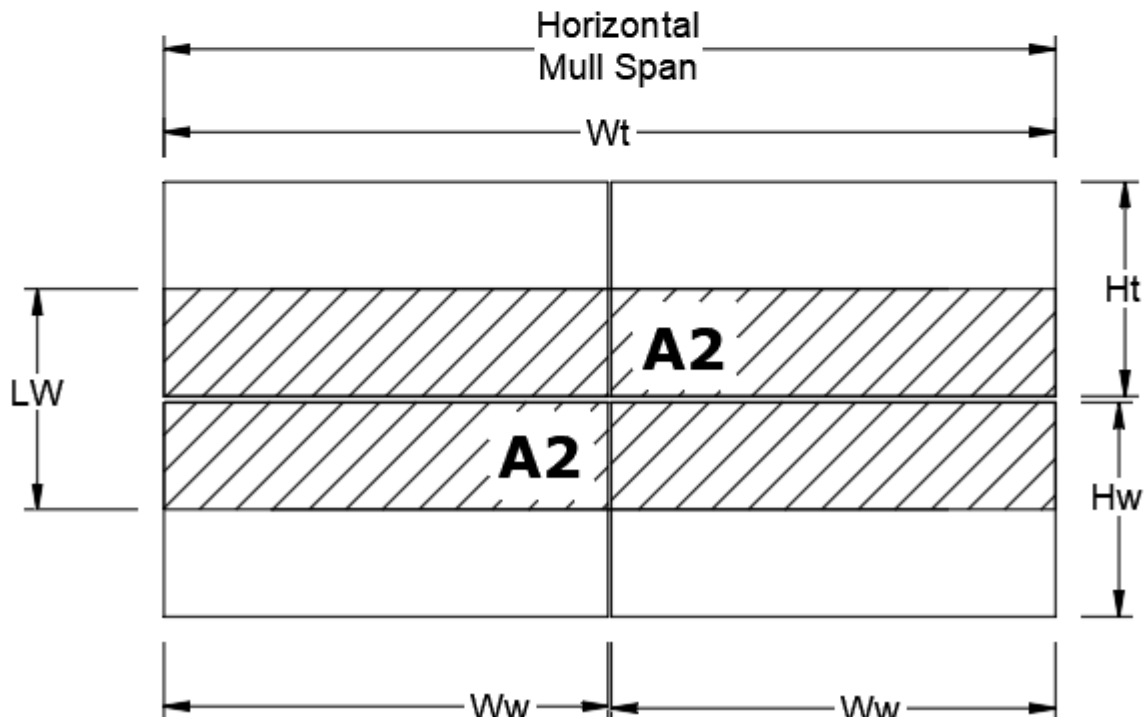
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = \{Ht \text{ (TRANSOM)} + Hw \text{ (LOWER WINDOWS)}\}/2$



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Appendix E, Four-Way Joint Mullion Assembly Mull Span vs. Load Width Tables

FOUR-WAY MULLION **VERTICAL MULL SPAN**

A1 = TRANSOM RECTANGULAR TRIBUTARY AREA

A1 = WINDOW RECTANGULAR TRIBUTARY AREA

Ww = WINDOW WIDTH

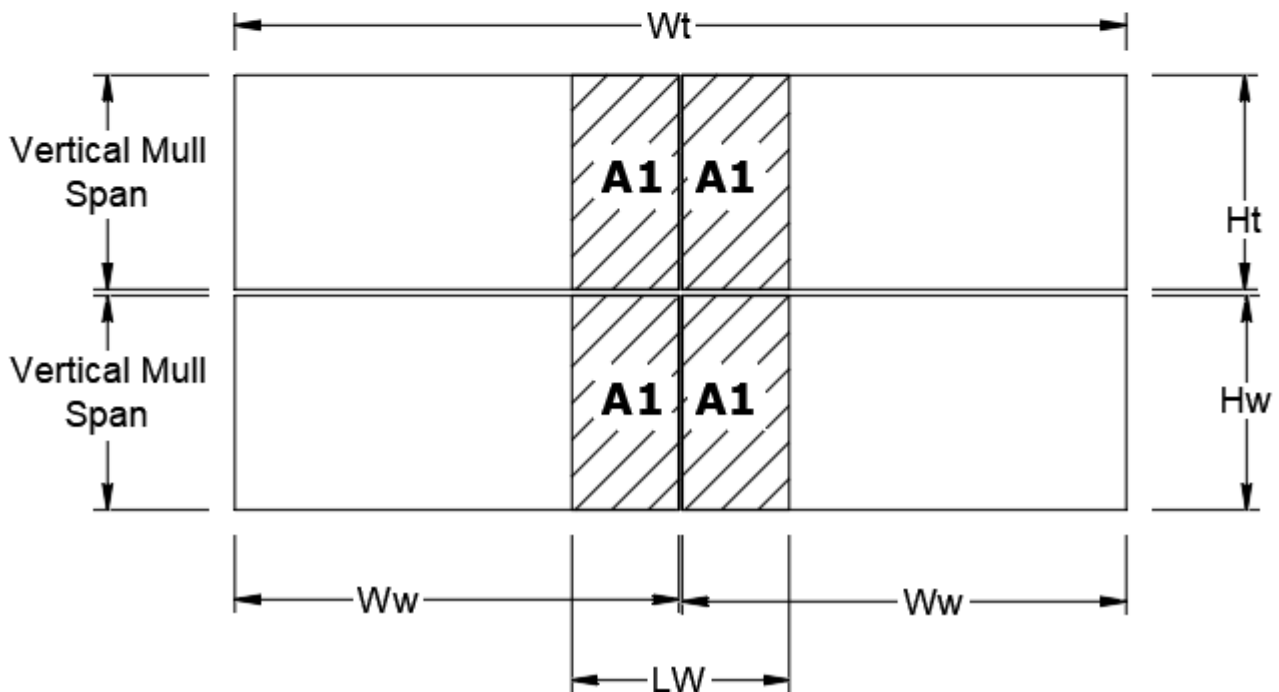
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = [Ww \text{ (WINDOW)} + Ww \text{ (WINDOW)}]/2$



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Appendix E, Four-Way Joint Mullion Assembly Mull Span vs. Load Width Tables

FOUR-WAY MULLION VERTICAL MULL SPAN

A1 = TRANSOM/WINDOW RECTANGULAR
TRIBUTARY AREA

Ww = WINDOW WIDTH

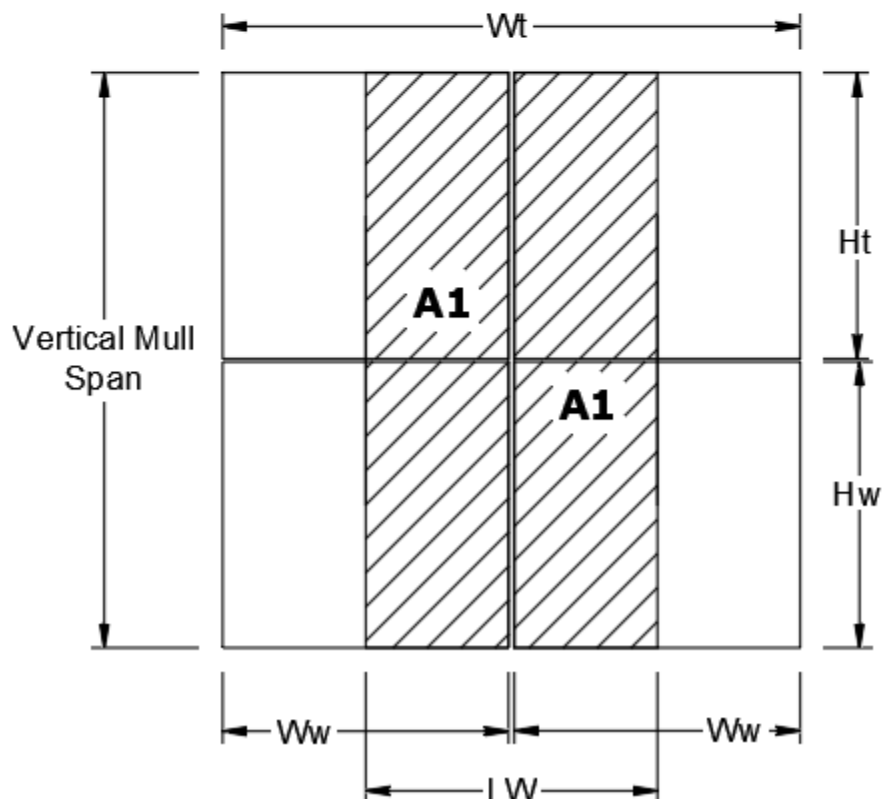
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = [Ww \text{ (LEFT WINDOW)} + Ww \text{ (RIGHT WINDOW)}]/2$



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Appendix E, Four-Way Joint Mullion Assembly Mull Span vs. Load Width Tables

FOUR-WAY MULLION HORIZONTAL MULL SPAN

A2 = TRANSOM RECTANGULAR TRIBUTARY AREA

A2 = WINDOW TRAPEZOIDAL TRIBUTARY AREA

Ww = WINDOW WIDTH

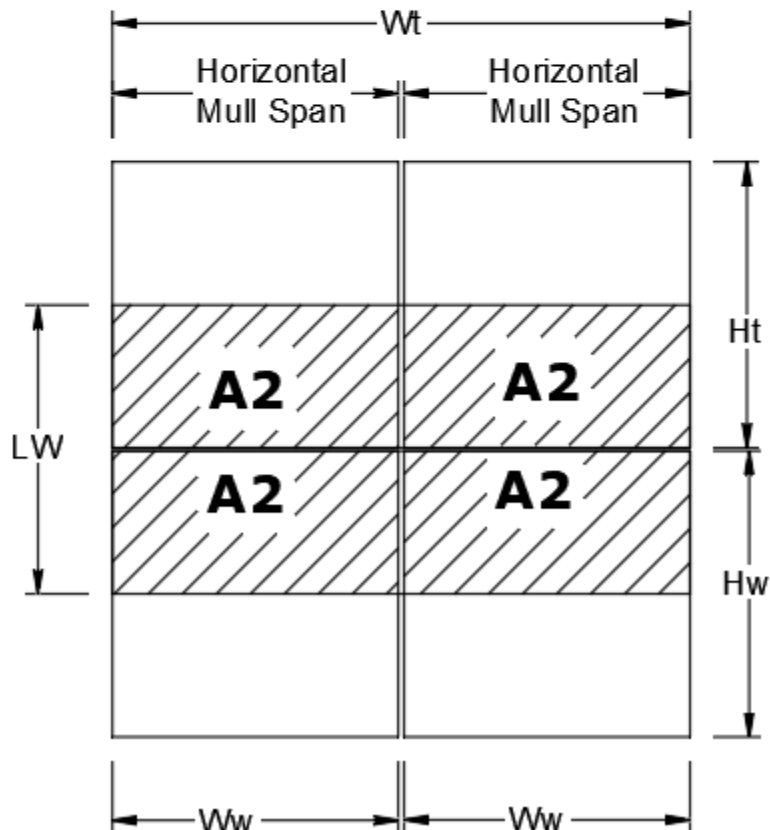
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = \{Ht \text{ (TRANSOM)} + Hw \text{ (LOWER WINDOW)}\}/2$



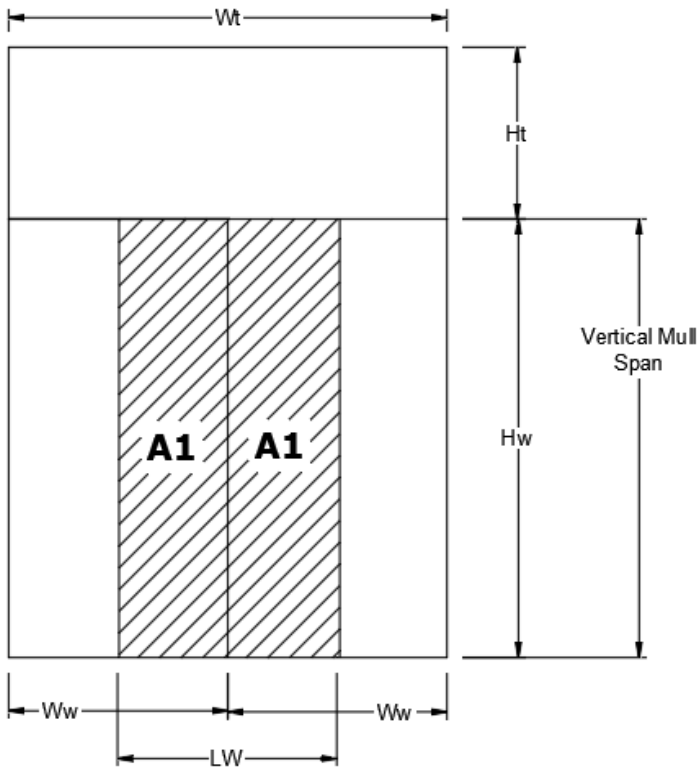
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Appendix E, Four-Way Joint Mullion Assembly Mull Span vs. Load Width Tables

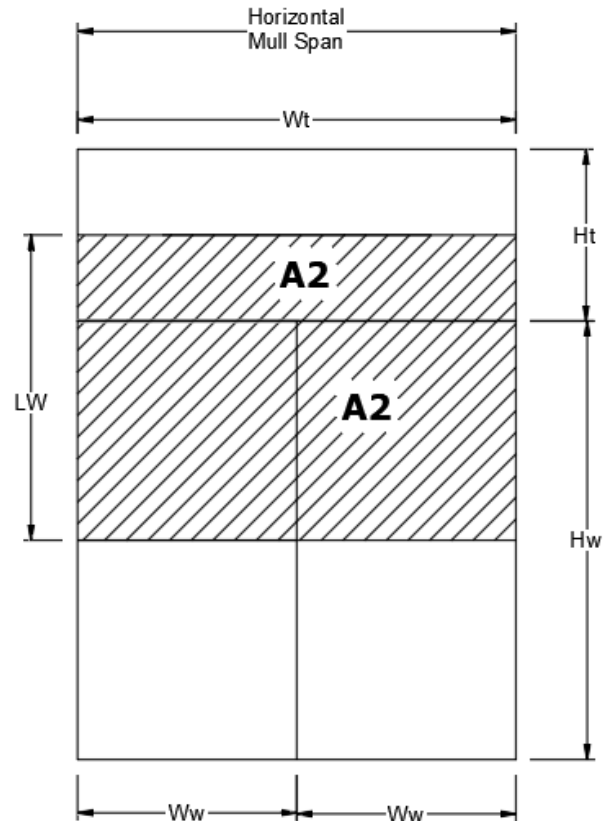
THREE-WAY MULLION VERTICAL MULL SPAN

A1 = WINDOW RECTANGULAR TRIBUTARY AREA
Ww = WINDOW WIDTH
Hw = WINDOW HEIGHT
Wt = TRANSOM WIDTH
Ht = TRANSOM HEIGHT
LW = LOAD WIDTH
 $LW = [Ww \text{ (WINDOW)} + Ww \text{ (WINDOW)}]/2$



THREE-WAY MULLION HORIZONTAL MULL SPAN

A2 = TRANSOM RECTANGULAR TRIBUTARY AREA
A2 = WINDOW RECTANGULAR TRIBUTARY AREA
Ww = WINDOW WIDTH
Hw = WINDOW HEIGHT
Wt = TRANSOM WIDTH
Ht = TRANSOM HEIGHT
LW = LOAD WIDTH
 $LW = [Ht \text{ (TRANSOM)} + Hw \text{ (LOWER WINDOWS)}]/2$



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Appendix E, Four-Way Joint Mullion Assembly – Table 7, 1/2" Mullion

MULLION TABLE 7										
4-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	47
	54	50			54	50			54	42
	60	50			60	50			60	38
	66	50			66	50			66	34
	72	50			72	50			72	31
	78	50			78	50			78	29
	84	50			84	50			84	27
	90	50			90	50			90	25
	96	50			96	50			96	24
	108	50			108	50			108	21
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	47
	42	50			42	50			42	40
	48	50			48	50			48	35
	54	50			54	50			54	31
	60	50			60	50			60	28
	66	50			66	50			66	26
	72	50			72	50			72	24
	78	50			78	50			78	22
	84	50			84	50			84	20
	90	50			90	49			90	-
	96	50			96	46			96	-
	108	50			108	41			108	-
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	44
	36	50			36	50			36	36
	42	50			42	50			42	31
	48	50			48	50			48	27
	54	50			54	50			54	24
	60	50			60	50			60	22
	66	50			66	47			66	-
	72	50			72	43			72	-
	78	50			78	40			78	-
	84	50			84	37			84	-
	90	50			90	35			90	-
	96	50			96	32			96	-
	108	50			108	29			108	-

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Appendix E, Four-Way Joint Mullion Assembly – Table 7, 1/2" Mullion

MULLION TABLE 7					
4-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION					
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	43	96	24	23
	30	34		30	-
	36	29		36	-
	42	25		42	-
	48	21		48	-
	54	-		54	-
	60	-		60	-
	66	-		66	-
	72	-		72	-
	78	-		78	-
	84	-		84	-
	90	-		90	-
	96	-		96	-
	108	-		108	-
84	24	34	102	24	-
	30	28		30	-
	36	23		36	-
	42	-		42	-
	48	-		48	-
	54	-		54	-
	60	-		60	-
	66	-		66	-
	72	-		72	-
	78	-		78	-
	84	-		84	-
	90	-		90	-
	96	-		96	-
	108	-		108	-
90	24	28	108	24	-
	30	22		30	-
	36	-		36	-
	42	-		42	-
	48	-		48	-
	54	-		54	-
	60	-		60	-
	66	-		66	-
	72	-		72	-
	78	-		78	-
	84	-		84	-
	90	-		90	-
	96	-		96	-
	108	-		108	-

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Appendix E, Four-Way Joint Mullion Assembly – Table 7, 1/2" Mullion

TABLE 7 ANCHOR SCHEDULE				
4-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	1	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
Block	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	1	#10
	Steel Stud	SMS	1	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix E, Four-Way Joint Mullion Assembly – Table 8, 1/2" Mullion with 1 Steel Reinforcement

MULLION TABLE 8										
4-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION WITH 1 STEEL REINFORCEMENT										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	49			
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	47
	90	50			90	50			90	44
96	50		96	50		96	41			
108	50		108	50		108	37			
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	46
	72	50			72	50			72	42
	78	50			78	50			78	39
	84	50			84	50			84	36
	90	50			90	50			90	34
96	50		96	50		96	32			
108	50		108	50		108	28			

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Appendix E, Four-Way Joint Mullion Assembly – Table 8, 1/2" Mullion with 1 Steel Reinforcement

MULLION TABLE 8								
4-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION WITH 1 STEEL REINFORCEMENT								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50	96	24	50	114	24	32
	30	50		30	43		30	26
	36	50		36	36		36	21
	42	50		42	31		42	-
	48	50		48	27		48	-
	54	44		54	24		54	-
	60	40		60	21		60	-
	66	36		66	-		66	-
	72	33		72	-		72	-
	78	31		78	-		78	-
	84	28		84	-		84	-
	90	27		90	-		90	-
	96	25		96	-		96	-
	108	22		108	-		108	-
84	24	50	102	24	45	120	24	27
	30	50		30	36		30	22
	36	50		36	30		36	-
	42	46		42	25		42	-
	48	40		48	22		48	-
	54	35		54	-		54	-
	60	32		60	-		60	-
	66	29		66	-		66	-
	72	27		72	-		72	-
	78	25		78	-		78	-
	84	23		84	-		84	-
	90	21		90	-		90	-
	96	-		96	-		96	-
	108	-		108	-		108	-
90	24	50	108	24	38	126	24	24
	30	50		30	30		30	-
	36	43		36	25		36	-
	42	37		42	21		42	-
	48	32		48	-		48	-
	54	29		54	-		54	-
	60	26		60	-		60	-
	66	24		66	-		66	-
	72	22		72	-		72	-
	78	-		78	-		78	-
	84	-		84	-		84	-
	90	-		90	-		90	-
	96	-		96	-		96	-
	108	-		108	-		108	-

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Appendix E, Four-Way Joint Mullion Assembly – Table 8, 1/2" Mullion with 1 Steel Reinforcement

MULLION TABLE 8		
4-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION WITH 1 STEEL REINFORCEMENT		
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
132	24	21
	30	-
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-
138	24	-
	30	-
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-
144	24	-
	30	-
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-

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Appendix E, Four-Way Joint Mullion Assembly – Table 8, 1/2" Mullion with 1 Steel Reinforcement

TABLE 8 ANCHOR SCHEDULE				
4-WAY JOINT MULLION ASSEMBLY - 1/2" MULLION WITH 1 STEEL REINFORCEMENT				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix E, Four-Way Joint Mullion Assembly – Table 9, 1" Mullion

MULLION TABLE 9										
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	49
	90	50			90	50			90	45
	96	50			96	50			96	43
	108	50			108	50			108	38
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	47
	72	50			72	50			72	43
	78	50			78	50			78	39
	84	50			84	50			84	37
	90	50			90	50			90	34
	96	50			96	50			96	32
	108	50			108	50			108	28
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	49
	54	50			54	50			54	44
	60	50			60	50			60	39
	66	50			66	50			66	36
	72	50			72	50			72	33
	78	50			78	50			78	30
	84	50			84	50			84	28
	90	50			90	50			90	26
	96	50			96	50			96	25
	108	50			108	50			108	22

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Appendix E, Four-Way Joint Mullion Assembly – Table 9, 1" Mullion

MULLION TABLE 9								
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50	96	24	42	114	24	25
	30	50		30	33		30	-
	36	50		36	28		36	-
	42	44		42	24		42	-
	48	39		48	21		48	-
	54	34		54	-		54	-
	60	31		60	-		60	-
	66	28		66	-		66	-
	72	26		72	-		72	-
	78	24		78	-		78	-
	84	22		84	-		84	-
	90	21		90	-		90	-
84	96	-	102	96	-	120	96	-
	108	-		108	-		108	-
	24	50		24	35		24	21
	30	50		30	28		30	-
	36	41		36	23		36	-
	42	35		42	-		42	-
	48	31		48	-		48	-
	54	28		54	-		54	-
	60	25		60	-		60	-
	66	23		66	-		66	-
	72	21		72	-		72	-
	78	-		78	-		78	-
90	84	-	108	84	-	126	84	-
	90	-		90	-		90	-
	96	-		96	-		96	-
	108	-		108	-		108	-
	24	50		24	29		24	-
	30	40		30	23		30	-
	36	34		36	-		36	-
	42	29		42	-		42	-
	48	25		48	-		48	-
	54	22		54	-		54	-
	60	20		60	-		60	-
	66	-		66	-		66	-
	72	-		72	-		72	-
	78	-		78	-		78	-
	84	-		84	-		84	-
	90	-		90	-		90	-
	96	-		96	-		96	-
	108	-		108	-		108	-

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Appendix E, Four-Way Joint Mullion Assembly – Table 9, 1" Mullion

TABLE 9 ANCHOR SCHEDULE				
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix E, Four-Way Joint Mullion Assembly – Table 10, 1" Mullion with 1 Steel Reinforcement

MULLION TABLE 10										
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50		108	50
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50		108	50
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	48
96	50		96	50		96	45			
108	50		108	50		108	40			

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Appendix E, Four-Way Joint Mullion Assembly – Table 10, 1" Mullion with 1 Steel Reinforcement

MULLION TABLE 10								
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50	96	24	50	114	24	46
	30	50		30	50		30	37
	36	50		36	50		36	30
	42	50		42	44		42	26
	48	50		48	38		48	23
	54	50		54	34		54	20
	60	50		60	31		60	-
	66	50		66	28		66	-
	72	48		72	26		72	-
	78	44		78	24		78	-
	84	41		84	22		84	-
	90	38		90	20		90	-
84	96	36	102	96	-	120	96	-
	108	32		108	-		108	-
	24	50		24	50		24	39
	30	50		30	50		30	31
	36	50		36	43		36	26
	42	50		42	36		42	22
	48	50		48	32		48	-
	54	50		54	28		54	-
	60	46		60	26		60	-
	66	42		66	23		66	-
	72	38		72	21		72	-
	78	35		78	-		78	-
90	84	33		84	-		84	-
	90	30		90	-		90	-
	96	29		96	-		96	-
	108	25		108	-		108	-
	24	50	108	24	50	126	24	34
	30	50		30	43		30	27
	36	50		36	36		36	23
	42	50		42	31		42	-
	48	46		48	27		48	-
	54	41		54	24		54	-
	60	37		60	21		60	-
	66	34		66	-		66	-
	72	31		72	-		72	-
	78	29		78	-		78	-
	84	27		84	-		84	-
	90	25		90	-		90	-
96	96	23		96	-		96	-
	108	21		108	-		108	-

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Appendix E, Four-Way Joint Mullion Assembly – Table 10, 1" Mullion with 1 Steel Reinforcement

MULLION TABLE 10		
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT		
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
132	24	29
	30	24
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-
138	24	26
	30	21
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-
144	24	23
	30	-
	36	-
	42	-
	48	-
	54	-
	60	-
	66	-
	72	-
	78	-
	84	-
	90	-
	96	-
	108	-

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Appendix E, Four-Way Joint Mullion Assembly – Table 10, 1" Mullion with 1 Steel Reinforcement

TABLE 10 ANCHOR SCHEDULE				
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 1 STEEL REINFORCEMENT				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				

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Appendix E, Four-Way Joint Mullion Assembly – Table 11, 1" Mullion with 2 Steel Reinforcements

MULLION TABLE 11										
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 2 STEEL REINFORCEMENTS										
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)		MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
24	24	50		42	24	50		60	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50		108	50
30	24	50		48	24	50		66	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50		108	50
36	24	50		54	24	50		72	24	50
	30	50			30	50			30	50
	36	50			36	50			36	50
	42	50			42	50			42	50
	48	50			48	50			48	50
	54	50			54	50			54	50
	60	50			60	50			60	50
	66	50			66	50			66	50
	72	50			72	50			72	50
	78	50			78	50			78	50
	84	50			84	50			84	50
	90	50			90	50			90	50
96	50		96	50		96	50			
108	50		108	50		108	50		108	50

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Appendix E, Four-Way Joint Mullion Assembly – Table 11, 1" Mullion with 2 Steel Reinforcements

MULLION TABLE 11								
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 2 STEEL REINFORCEMENTS								
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)	MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
78	24	50	96	24	50	114	24	50
	30	50		30	50		30	50
	36	50		36	50		36	43
	42	50		42	50		42	37
	48	50		48	50		48	32
	54	50		54	48		54	29
	60	50		60	43		60	26
	66	50		66	39		66	23
	72	50		72	36		72	21
	78	50		78	33		78	0
	84	50		84	31		84	0
	90	50		90	29		90	0
	96	50		96	27		96	0
	108	45		108	24		108	0
84	24	50	102	24	50	120	24	50
	30	50		30	50		30	44
	36	50		36	50		36	37
	42	50		42	50		42	32
	48	50		48	45		48	28
	54	50		54	40		54	25
	60	50		60	36		60	22
	66	50		66	33		66	20
	72	50		72	30		72	0
	78	49		78	28		78	0
	84	46		84	26		84	0
	90	43		90	24		90	0
	96	40		96	22		96	0
	108	36		108	0		108	0
90	24	50	108	24	50	126	24	48
	30	50		30	50		30	38
	36	50		36	50		36	32
	42	50		42	43		42	27
	48	50		48	38		48	24
	54	50		54	34		54	21
	60	50		60	30		60	0
	66	48		66	28		66	0
	72	44		72	25		72	0
	78	40		78	23		78	0
	84	37		84	22		84	0
	90	35		90	20		90	0
	96	33		96	0		96	0
	108	29		108	0		108	0

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Appendix E, Four-Way Joint Mullion Assembly – Table 11, 1" Mullion with 2 Steel Reinforcements

MULLION TABLE 11		
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 2 STEEL REINFORCEMENTS		
MULL SPAN (in)	LOAD WIDTH (in)	DESIGN PRESSURE (psf)
132	24	41
	30	33
	36	28
	42	24
	48	21
	54	0
	60	0
	66	0
	72	0
	78	0
	84	0
	90	0
	96	0
	108	0
138	24	36
	30	29
	36	24
	42	21
	48	0
	54	0
	60	0
	66	0
	72	0
	78	0
	84	0
	90	0
	96	0
	108	0
144	24	32
	30	26
	36	21
	42	0
	48	0
	54	0
	60	0
	66	0
	72	0
	78	0
	84	0
	90	0
	96	0
	108	0

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Appendix E, Four-Way Joint Mullion Assembly – Table 11, 1" Mullion with 2 Steel Reinforcements

TABLE 11 ANCHOR SCHEDULE				
4-WAY JOINT MULLION ASSEMBLY - 1" MULLION WITH 2 STEEL REINFORCEMENTS				
Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	3	#10
	Steel Stud	SMS	4	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	3	3/16"
	Wood	WS/TS	3	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10
See Appendix B for Anchor Schedule Details				
NR = Not Recommended				
* See Appendix A for Clip Types				