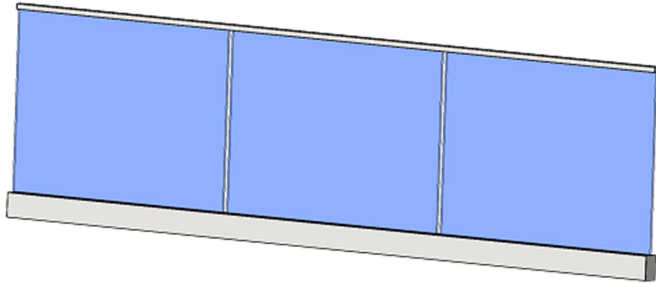


OFFICIAL TEST REPORT

(FBC, IBC: 2012, 2015, 2018, ANSI Z97.1, ASTM E2353 – E2358)



February 22, 2020

Report Number: Viewrail-08-2020

Manufacturer: Viewrail

Test Location: 2436 Dierdorf Road  
Goshen, IN 46526

Product Under Test: BR69 Base Channel

Test Witnessed By: Michael Hudson, P.E.  
JJ. Johnson (Manufacturer)

The BR69 Base Channel system is an interior glass rail/ guard/balustrade assembly with full view glazing material that is supported on one side with a structural top rail.

**Notes**

This report does not purport to address all possible impact and load cases that could result in railing system or glazing failure. If additional load or impact case testing is required by the qualified licensed engineer, please contact the Manufacturer.

For external installations the wind loads and glass stress must be calculated and accounted for by a qualified licensed engineer in charge of the fixed work. Further, if the system will be installed in exterior locations, corrosion and deterioration testing is required.

The test results herein are intended to assist a qualified licensed engineer in developing a code compliant guard that meets the applicable requirements of 2012, 2015, and 2018 International Building Code and state codes adopted from the IBC codes. This report is not intended to demonstrate the code compliance of an installation but is only to be utilized by the qualified licensed engineer in charge in analyzing the glass stresses and anchorage.

**Signature Page**

Michael Hudson, PE  
1725 Unicoi Road  
Nashville, NC 27856

252-382-1884  
mHUDSON.bsme@yahoo.com

## Referenced Codes and Standards



### ASTM International

- E2353 - 16 *Standard Test Methods for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades<sup>1</sup>*
- E935 – 13<sup>ε1</sup> *Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings<sup>2</sup>*
- E2358 - 17 *Standard Specification for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades<sup>4</sup>*
- E2025 – 99 *Standard Test Method for Evaluating Fenestration Components and Assemblies for Resistance to Impact Energies<sup>3</sup>*

1. This standard is issued under the fixed designation E2353; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval. Current edition approved Feb. 15, 2016. Published March 2016. Originally approved in 2004. Last previous edition approved in 2014 as E2353 – 14. DOI:10.1520/E2353-16.
2. This standard is issued under the fixed designation E935; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.  
 ε1 NOTE—Section 1.2 was editorially revised in October 2013.
3. This standard is issued under the fixed designation E2025; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.  
 (Reapproved 2006)  
**NOTICE: This standard has been withdrawn, however other active standards still reference this standard.**
4. This standard is issued under the fixed designation E2358; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval. This specification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.56 on Performance of Railing Systems and Glass for Floors and Stairs. Current edition approved Aug. 1, 2017. Published September 2017. Originally approved in 2004. Last previous edition approved in 2010 as E2358 – 04(2010). DOI: 10.1520/E2358-17.



### American National Standards Institute

- Z97.1-2015 *For safety glazing materials used in buildings –safety performance specifications and methods of test*



### Consumer Product Safety Commission

- 16 CFR Ch. II (1-1-12 Edition) *Part 1201 – Safety Standard for Architectural Glazing Materials*



### International Code Council

- 2018, 2015, and 2012 International Building Code® (IBC)*
- 2018, 2015, and 2012 International Residential Code® (IRC)*

Railing System Components and Hardware

Glazing Material

<b>Manufacturer:</b>	ViewRail – Goshen, Indiana
<b>Overall Glazing Thickness:</b>	½" (Nominal)
<b>Glazing Type:</b>	Tempered Transparent Glass (TTG)
<b>Thickness Standard:</b>	ASTM C1036
<b>CPSC 16 CFR Part 1201 Category:</b>	II <sup>1</sup>
<b>ANSI Z97.1 Class:</b>	A <sup>1</sup>

<sup>1</sup> Intertek Test Report Number K1004.02-119-37 (See Appendix A)

Glazing material has been tested and shown to meet the following minimum material requirements:

Category II (CPSC 16 CFR Part 1201)  
Class A (ANSI Z97.1 Class)

As required by:

Section 2407.1 of IBC (2018, 2015, 2012)  
Section R308.4 of IRC (2018, 2015, 2012)  
Section 3.3.1 of ICC-ES AC439

Substitution Note: In accordance with ASTM E2358-17, section 8:

**8. Permissible Variations and Substitutions:**

**8.2** Laminated glass shall be permitted to be substituted for tempered glass provided the structural loads (frame loads) are met and the nominal thickness is achieved with a minimum interlayer capable of passing ANSI Z97.1 Class A.

Components and Hardware

Component and assembly drawings contained in Appendix B. The glass rail, guard, and balustrade assembly was installed in the test fixture in accordance with the manufacturers written installation instructions as contained in Appendix C. All test specimens were conditioned as required by ASTM E2353-16 prior to testing.

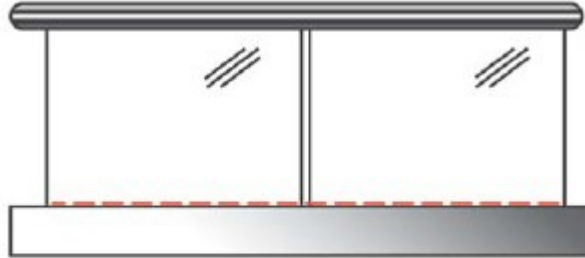
Substitution Note: In accordance with ASTM E2358-17, section 8

**8. Permissible Variations and Substitutions:**

**8.4** Larger systems shall qualify smaller systems provided there is no change to the attachment, anchoring or any other property that would decrease the structural performance of the system.

## ASTM System Classification

The BR69 Base Channel system is a One-side Support with Protected Top Rail – Glazing as Structural Member classification of Type V (FIG 7b) as defined by ASTM E2358-17:



**FIG. 7 b Type V: One-side Support with Protective Top Rail—  
Glazing as Structural Member** *(continued)*

## Instrumentation

Equipment Description	Manufacturer	Model/Part Number
Load Cell	Zemic	H3-C3-1.5t-3B
Digital Readout	Scientific Industries	FB 10k
Laser Deflection Sensor	Keyence	IL-300
Actuator	McMaster-Carr	6211K74

**Note**

All test instruments were calibrated and are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) or another National Measurement Institute or through consensus standards. ViewRail calibration providers meet the requirements of ISO 17025:2005.

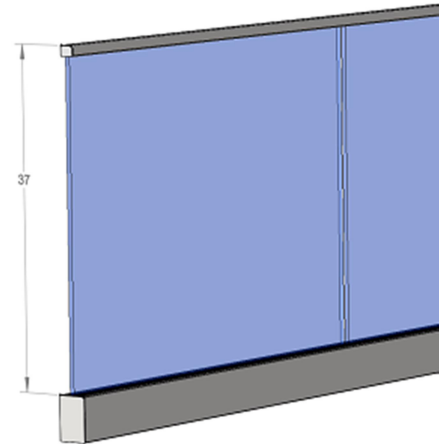
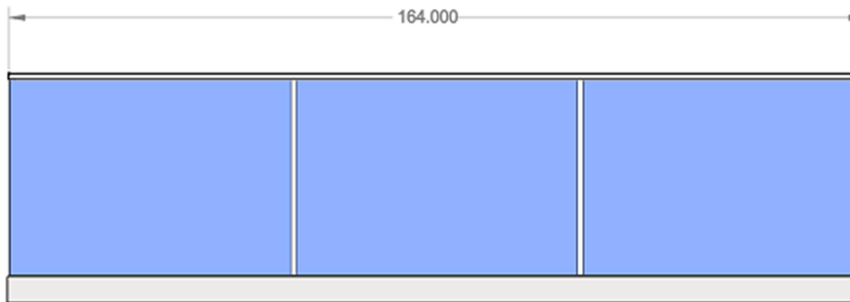
## Testing Preparation

**Test Sequence** (All tests performed on a single specimen in the order specified by ASTM E2353-16 and ASTM E935-13)

1. Infill Load Test
  - Vertical Edge of Center Lite
    - i. 4" x 4"
    - ii. 12" x 12"
2. Concentrated Load Test
  - i. Horizontal - Mid-Span of Handrail

### Calculated Permissible Deflection

Permissible deflection under load per ASTM 2358-17 calculated under worst case conditions (minimize *h* or *l* value):

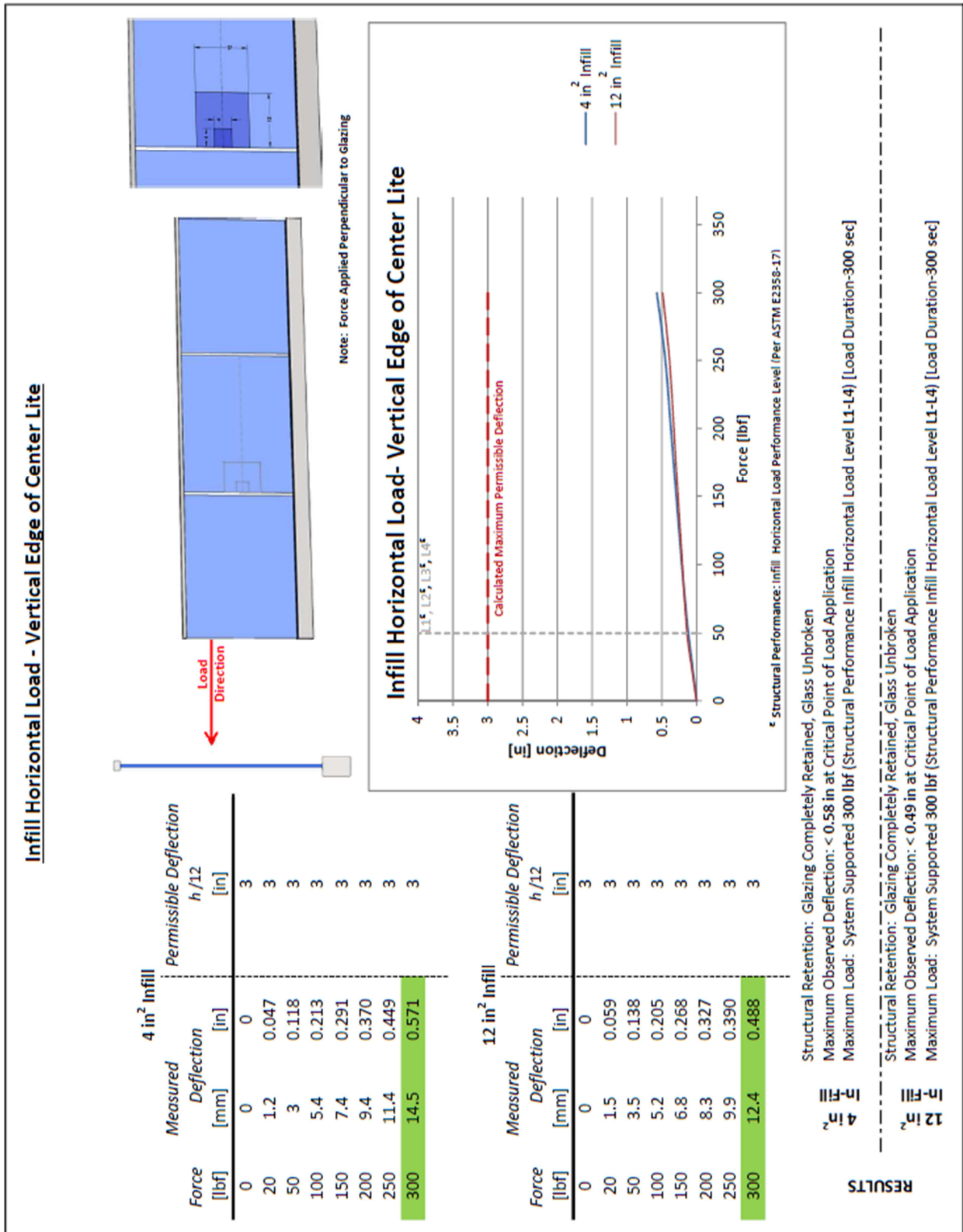


<b>Maximum Permissible Deflection</b>	<b><math>h/24 + l/96</math></b>
Horizontal Load Applied at Rail Mid-Span	(37"/24 + 164"/96) 1.5" + 1.7" 3.2"

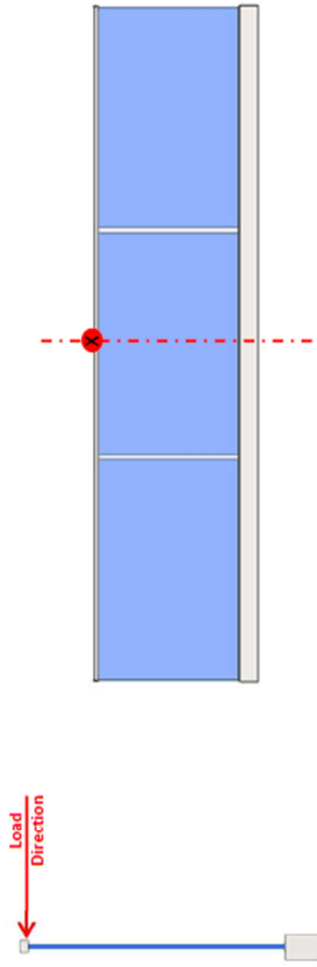
<b>Maximum Permissible Deflection</b>	<b><math>h/12</math></b>
Load Applied at the Line of Vertical Support	37"/12 3"

<b>Maximum Permissible Deflection</b>	<b><math>l/96</math></b>
Vertical Load Applied at Rail Mid-Span	164"/96 1.7"

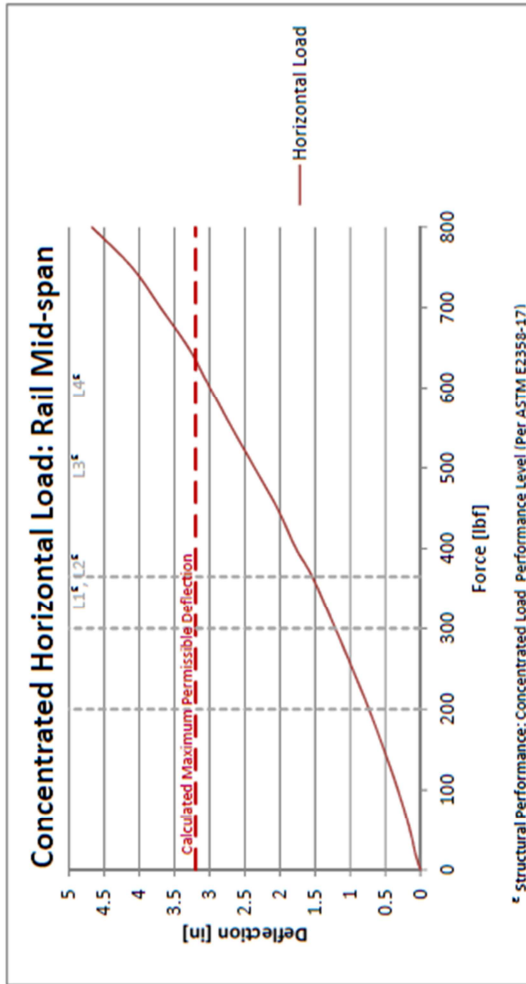
## Testing: Results



### Concentrated Horizontal Load: Rail Mid-span



Force [lbf]	Horizontal Load		Permissible Deflection $h/24 \pm 1/96$ [in]
	Measured Deflection [mm]	Deflection [in]	
0	0	0	3.2
20	1.8	0.071	3.2
50	3.8	0.150	3.2
100	8.1	0.319	3.2
150	13.2	0.520	3.2
200	18.6	0.732	3.2
250	24.6	0.969	3.2
300	30.8	1.213	3.2
365	39.1	1.539	3.2
400	45	1.772	3.2
450	51.7	2.035	3.2
500	59.9	2.358	3.2
550	68.2	2.685	3.2
600	76	2.992	3.2
650	83.8	3.299	3.2
700	93.9	3.697	3.2
750	104.2	4.102	3.2
800	118.7	4.673	3.2



Structural Retention: Glazing Completely Retained, Glass Unbroken

Maximum Observed Deflection: < 3.0 at Critical Point of Load Application (@ 600 lbf)

Maximum Load: System Supported 650 lbf (Structural Performance Concentrated Load Level L4) [Load Duration-300 sec]

### RESULTS



Appendix A – Glazing Impact Test Report



# VIEWRAIL TEST REPORT

SCOPE OF WORK  
IMPACT TESTING ON TEMPERED TRANSPARENT SAFETY GLAZING MATERIAL

REPORT NUMBER  
K1004.02-119-37

TEST DATE(S)  
08/28/19

ISSUE DATE  
09/03/19

PAGES  
5

DOCUMENT CONTROL NUMBER  
RT-R-AMER-Test-2881 (02/25/19)  
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130 Derry Court  
York, Pennsylvania 17406

Telephone: 717-764-7700  
Facsimile: 717-764-4129  
www.intertek.com/building

**TEST REPORT FOR VIEWRAIL**  
Report No.: K1004.02-119-37  
Date: 09/03/19

**REPORT ISSUED TO**  
**VIEWRAIL**  
1755 Ardmore Court  
Goshen, Indiana 46526

**SECTION 1**  
**SCOPE**

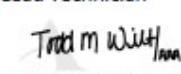
Intertek Building & Construction (B&C) was contracted by Viewrail - Goshen, Indiana to perform safety glazing impact testing in accordance with ANSI Z97.1, CAN/CGSB 12.1, and CPSC 16 CFR 1201 on tempered transparent glass. Results obtained are tested values and were secured by using the designated test methods. Testing was conducted at the Intertek B&C test facility in York, Pennsylvania.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek will service this report for the entire test record retention period. The test record retention period ends four years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period.

**SECTION 2**  
**SUMMARY OF TEST RESULTS**

SPECIMEN NUMBER	1	2	3	4
IMPACT TEST RESULTS	Pass	Pass	Pass	Pass
THICKNESS COMPLIANCE	Pass	Pass	Pass	Pass

For INTERTEK B&C:

**COMPLETED BY:** Todd M. Wilt  
**TITLE:** Lead Technician  
**SIGNATURE:**   
Digitally signed by Todd M. Wilt on 09/03/19  
**DATE:** 09/03/19  
tmw:vtm/aas

**REVIEWED BY:** Virgal T. Mickley, Jr., P.E.  
**TITLE:** Senior Staff Engineer  
**SIGNATURE:**   
Digitally signed by Virgal Thomas Mickley, Jr. on 09/03/19  
**DATE:** 09/03/19



2019.09.04 10:20:13 -04'00'

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TEST REPORT FOR VIEWRAIL

Report No.: K1004.02-119-37

Date: 09/03/19

SECTION 3

TEST METHODS

The specimens were evaluated in accordance with the following:

ANSI Z97.1-2015, *For safety glazing materials used in buildings - safety performance specifications and methods of test*, American National Standard

CAN/CGSB 12.1-2017, *Safety Glazing*, National Standard of Canada

CPSC 16 CFR 1201, *Safety Standard for Architectural Glazing Materials*, Consumer Product Safety Commission (Version: 2012; Source: 42 FR 1441, Jan. 16, 1977)

SECTION 4

MATERIAL SOURCE

Test samples were obtained from the manufacturer. The specimens were received on 08/23/19, in good condition and suitable for testing unless noted otherwise.

SECTION 5

SAMPLE RETENTION

All test specimens were destroyed by test or by personnel and have been disposed of as trash. Representative sections of the samples will be retained for up to 30 days from the date of report issuance. After 30 days, representative samples will be automatically discarded.

SECTION 6

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Todd M. Wilt	Intertek B&C



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**TEST REPORT FOR VIEWRAIL**  
Report No.: K1004.02-119-37  
Date: 09/03/19

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## SECTION 7 TEST PROCEDURE

### Overview

All specimens were impacted once from the select drop height unless noted otherwise. Specimens which were not broken after impact from the designated drop height were broken in accordance with the Center Punch Fragmentation Test per ANSI Z97.1-2015.

### Drop Height Classification

All specimens were impacted once from a drop height of 48 inches.

DROP HEIGHT CLASSIFICATION			
ANSI	CGSB	CPSC	DROP HEIGHT
Class A	Class A	Category II	48 in.

## SECTION 8 TEST SPECIMEN DESCRIPTION

Manufacturer: Viewrail - Goshen, Indiana  
Glazing Product Designation: Prototype  
Overall Glazing Thickness: 1/2" (nominal)  
Glazing Type: Tempered Transparent Glass (TTG)  
Sample Dimensions: Impact: 34" wide x 76" high (±1/8")  
Size Classification: Unlimited  
Thickness Standard: ASTM C1036

## SECTION 9 TEST RESULTS

Lab Temperature: 71°F  
Duration of Pre-Conditioning @ 65 - 85°F: 24 Hours

### Impact Test Results

SPECIMEN NUMBER	THICKNESS (inches)	TEST RESULTS (grams)	CENTER PUNCH (YES/NO)	ACCEPTANCE CRITERIA (grams)	RESULT (PASS/FAIL)
1	0.498	23	Yes	205	Pass
2	0.500	31	Yes	206	Pass
3	0.499	25	Yes	206	Pass
4	0.500	22	Yes	206	Pass

Acceptance Criteria: The 10 largest crack-free particles collected after specimen breakage shall weigh no more than 10 sq. in. of the original specimen.



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TEST REPORT FOR VIEWRAIL  
Report No.: K1004.02-119-37  
Date: 09/03/19

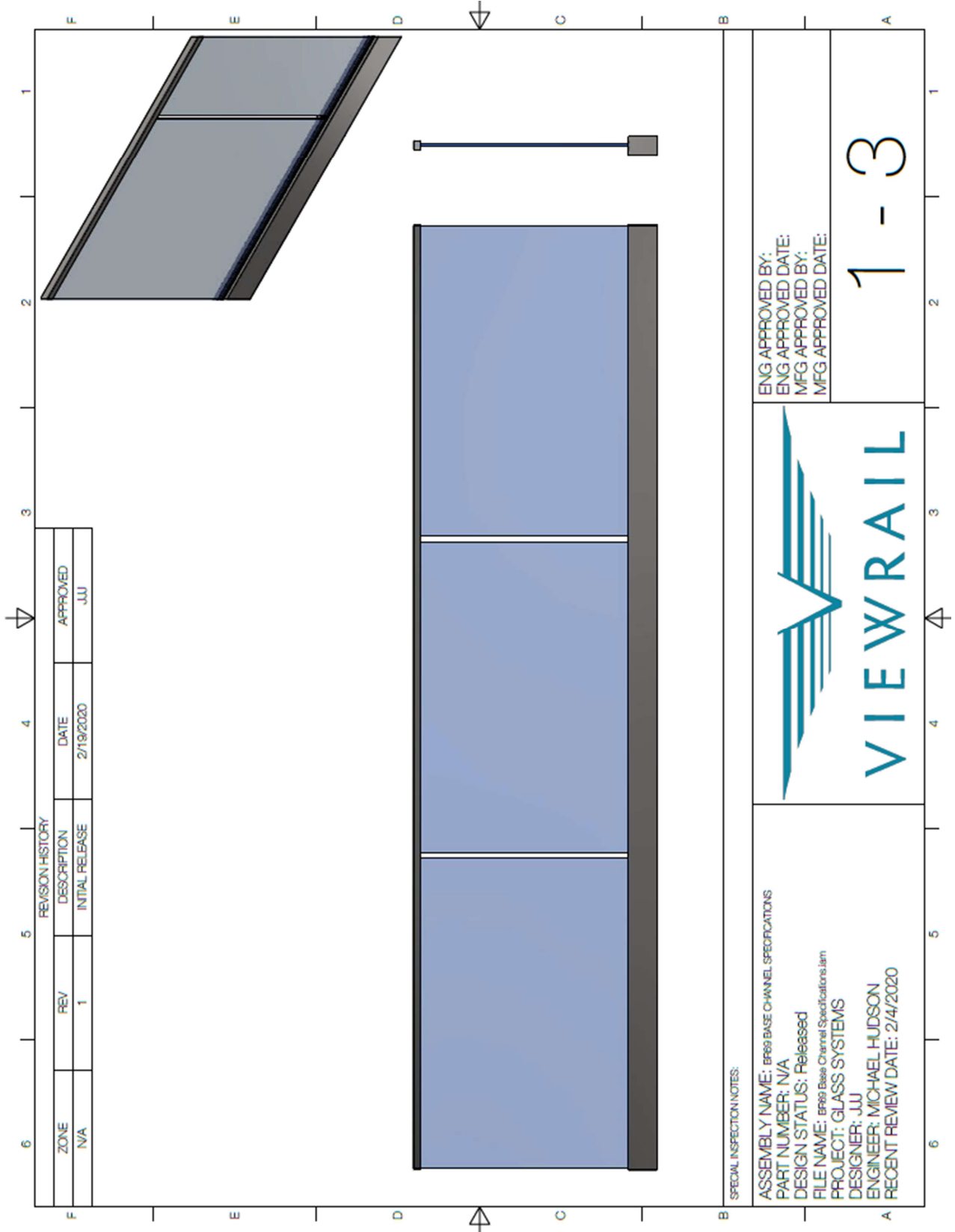
**SECTION 10**  
**CONCLUSION**

The specimens meet the test requirements of the referenced standards for the size classification listed.

**SECTION 11**  
**REVISION LOG**

	DATE	PAGES	REVISION
0	09/03/19	N/A	Original Report Issue

## Appendix B: System Components and Drawings



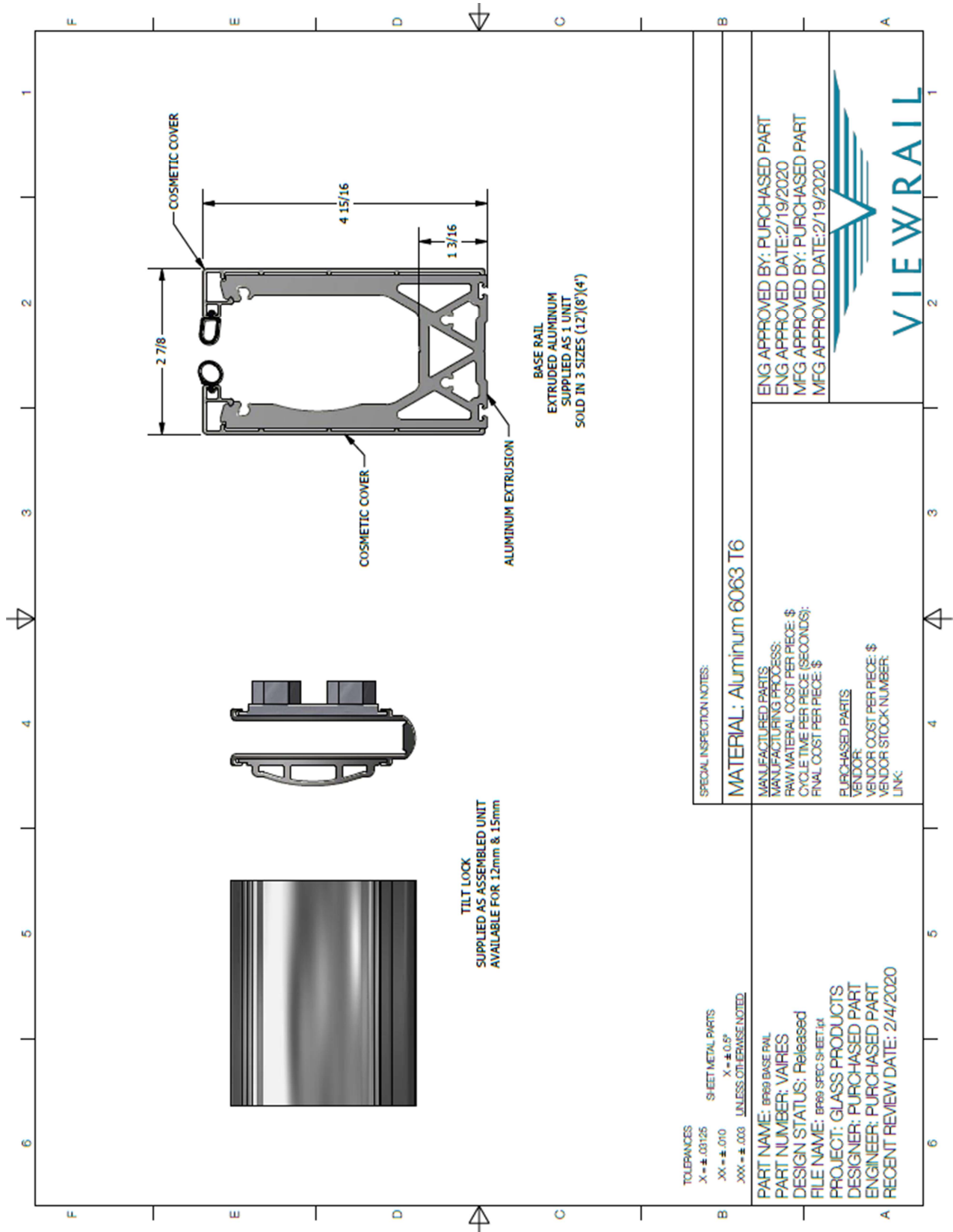
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 ENG APPROVED DATE:  
 MFG APPROVED BY:  
 MFG APPROVED DATE:

# 1 - 3



**SPECIAL INSPECTION NOTES:**  
 ASSEMBLY NAME: BR69 BASE CHANNEL SPECIFICATIONS  
 PART NUMBER: N/A  
 DESIGN STATUS: Released  
 FILE NAME: BR69 Base Channel Specifications.lam  
 PROJECT: GLASS SYSTEMS  
 DESIGNER: J.U  
 ENGINEER: MICHAEL HUDSON  
 RECENT REVIEW DATE: 2/4/2020

# BR69 Base Channel Glass Baluster Test Report



**TOLERANCES**  
 X = ± .0125 SHEET METAL PARTS  
 XX = ± .010 X = ± 0.5°  
 XXX = ± .003 UNLESS OTHERWISE NOTED

**PART NAME:** BR69 BASE RAIL  
**PART NUMBER:** VAIPES  
**DESIGN STATUS:** Released  
**FILE NAME:** BR69 SPEC SHEET.dwg  
**PROJECT:** GLASS PRODUCTS  
**DESIGNER:** PURCHASED PART  
**ENGINEER:** PURCHASED PART  
**RECENT REVIEW DATE:** 2/4/2020

**SPECIAL INSPECTION NOTES:**

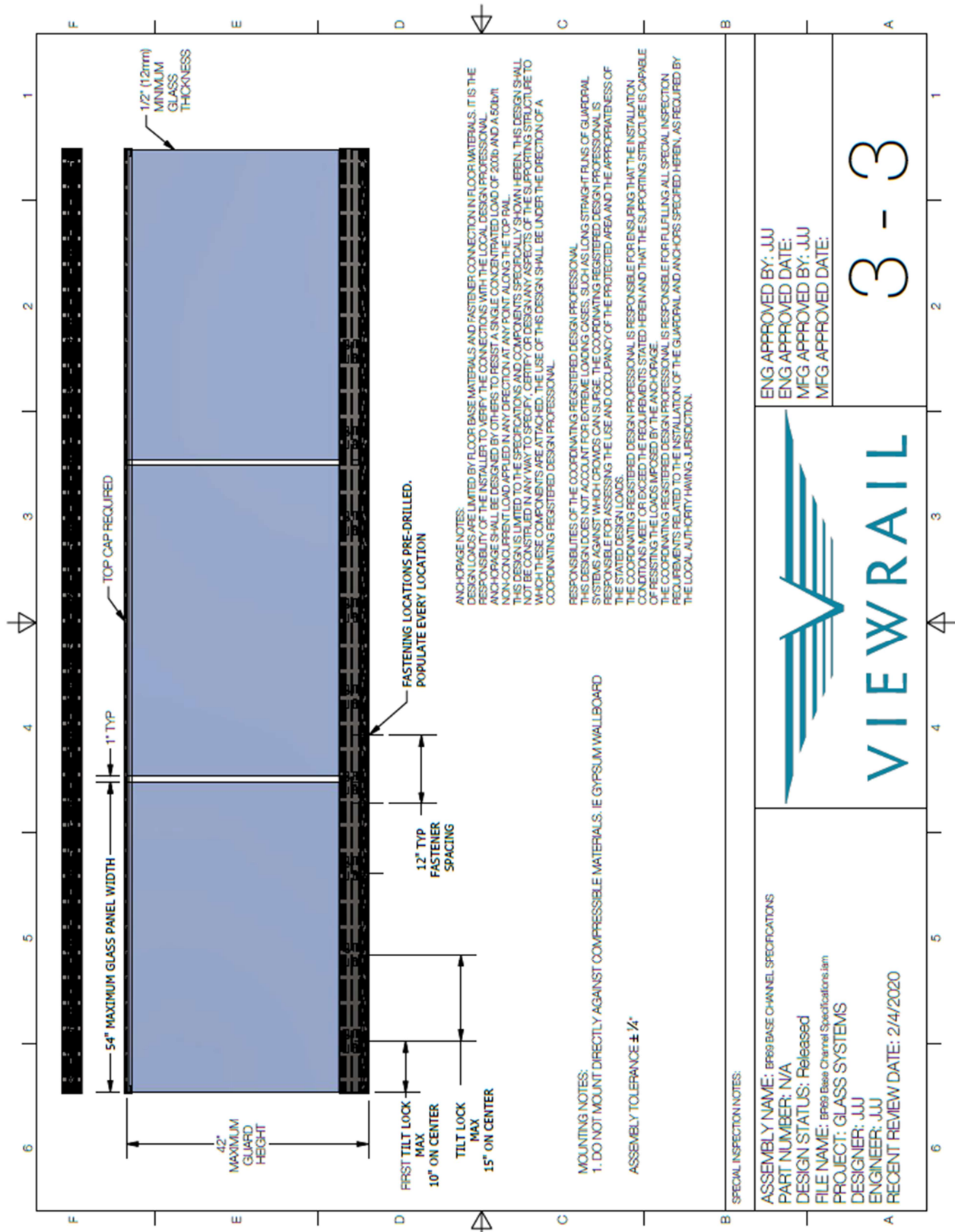
**MATERIAL:** Aluminum 6063 T6

**MANUFACTURED PARTS**  
 MANUFACTURING PROCESS:  
 RAW MATERIAL COST PER PIECE: \$  
 CYCLE TIME PER PIECE (SECONDS):  
 FINAL COST PER PIECE: \$  
**PURCHASED PARTS**  
 VENDOR:  
 VENDOR COST PER PIECE: \$  
 VENDOR STOCK NUMBER:  
 LINK:

ENG APPROVED BY: PURCHASED PART  
 ENG APPROVED DATE: 2/19/2020  
 MFG APPROVED BY: PURCHASED PART  
 MFG APPROVED DATE: 2/19/2020



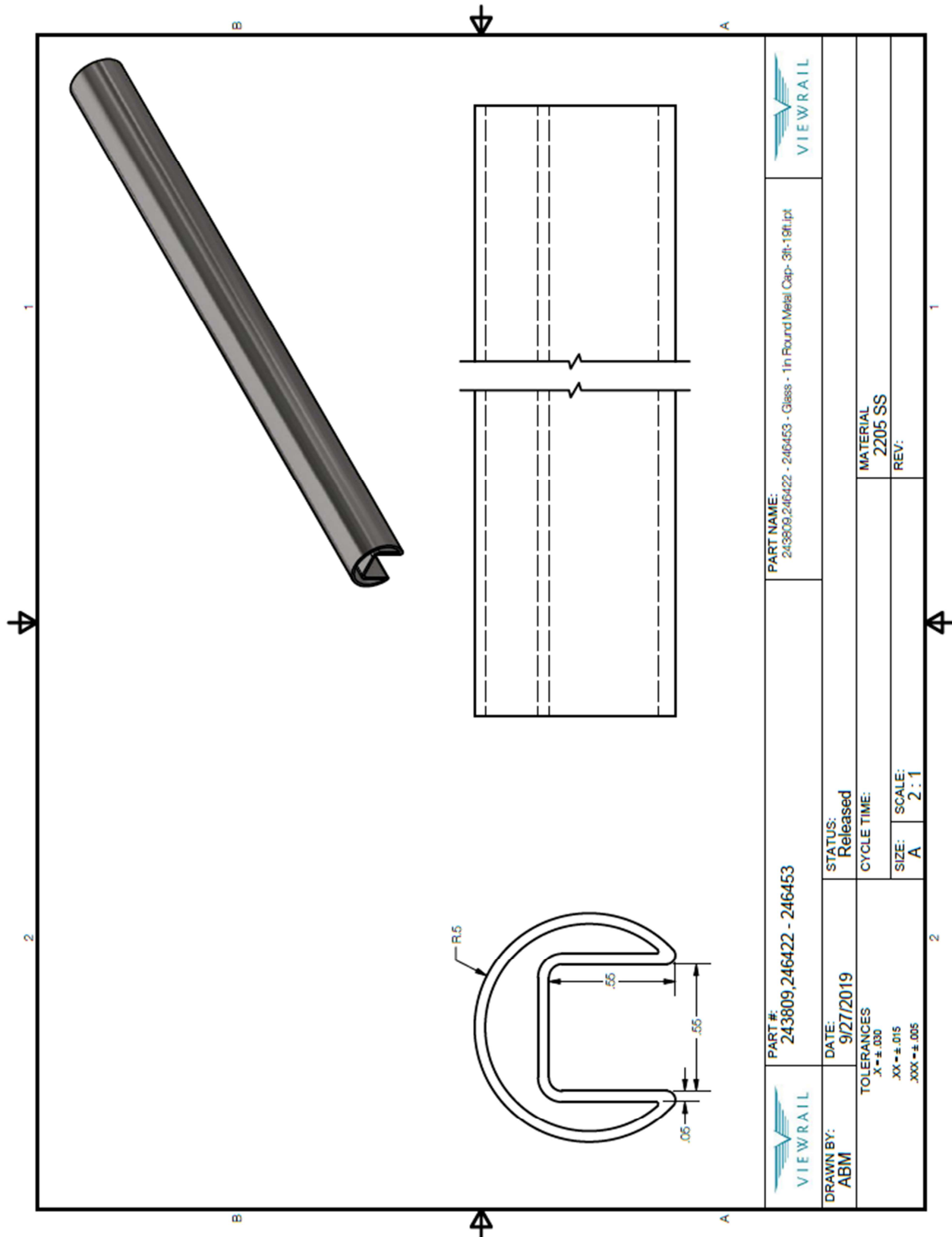
# BR69 Base Channel Glass Baluster Test Report



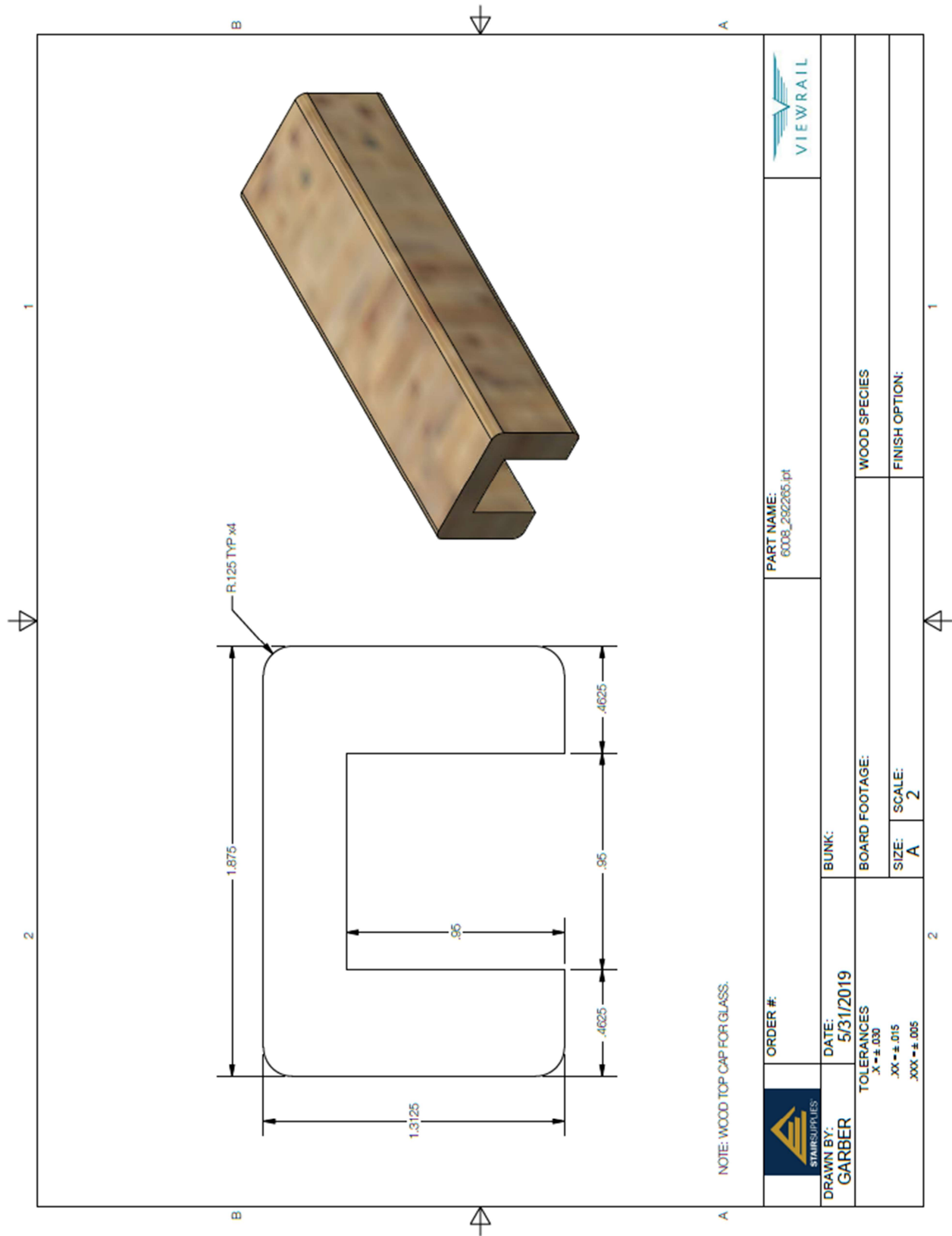
 <b>VIEWRAIL</b>	<b>3 - 3</b>	ENG APPROVED BY: JUU ENG APPROVED DATE: MFG APPROVED BY: JUU MFG APPROVED DATE:
<b>SPECIAL INSPECTION NOTES:</b> ASSEMBLY NAME: BR69 BASE CHANNEL SPECIFICATIONS PART NUMBER: N/A DESIGN STATUS: Released FILE NAME: BR69 Base Channel Specifications.lam PROJECT: GLASS SYSTEMS DESIGNER: JUU ENGINEER: JUU RECENT REVIEW DATE: 2/4/2020		



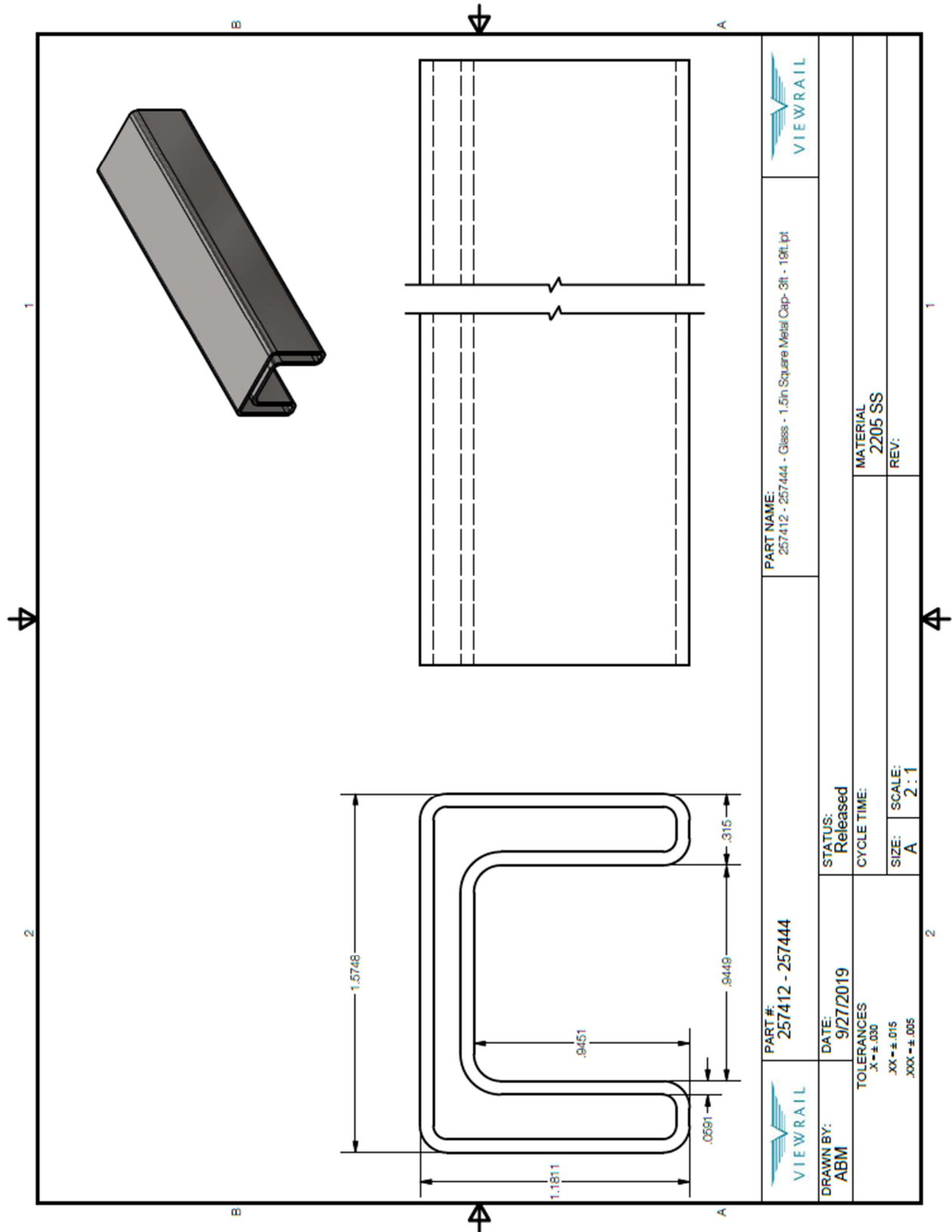
# BR69 Base Channel Glass Baluster Test Report



# BR69 Base Channel Glass Baluster Test Report



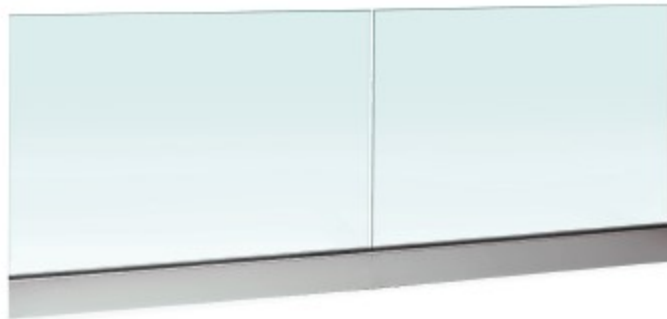
# BR69 Base Channel Glass Baluster Test Report



Appendix C: Manufacturer's Published Installation Instructions



Base Rail  
Installation Instructions



**Before You Begin**

Inspect area where the Spigots are being installed.  
Ensure that your mounting surface has sufficient backing.  
For most jobs, a minimum of 4" of backing material is recommended in order to securely mount your Base Rail.

**Protect All Finished Surfaces**

At each phase of installation, be sure to protect your base rail and glass panels from debris that can cause marring to their finished surfaces.

**Items You'll Need**

Viewrail Layout Drawing

Glass Installation Kit:

- (1) Bottle of Gyeon Glass Cleaner
- (1) Microfiber Cloth
- (1) #5 Allen Wrench
- (1) #4 Allen Wrench
- (1) 2" T-80 Drive Bit
- (1) Stainless Steel Wipes
- (1) Pair Glass Suction Cup Handles

Cordless Drill

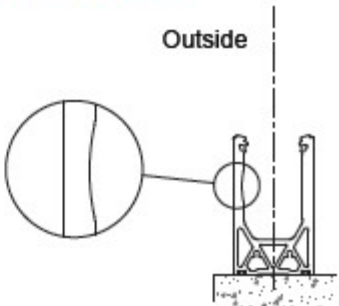
Impact Driver

Pencil

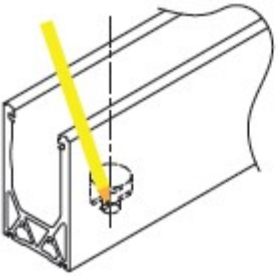
**1** Refer to your Layout Drawing to determine the mounting location for Base Rail.

**2** Set Base Rail so the curved side is on the outside.


Outside



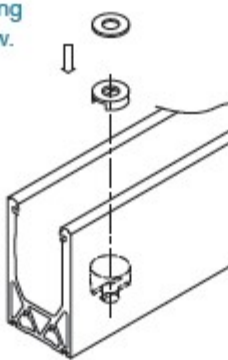
**3** Mark locations for pilot holes.



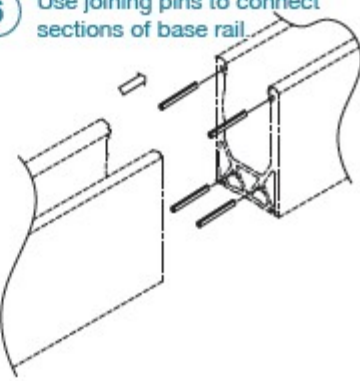
**4** Drill pilot holes.

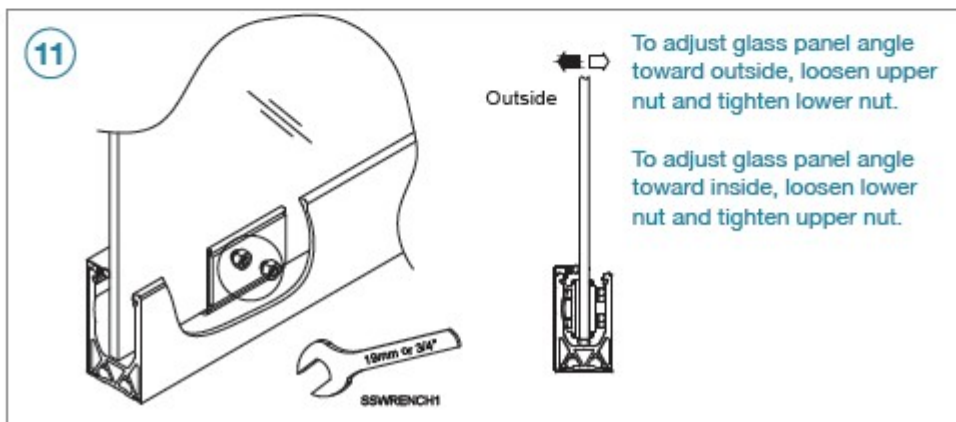
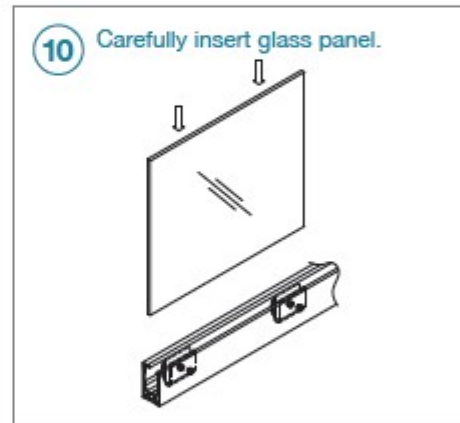
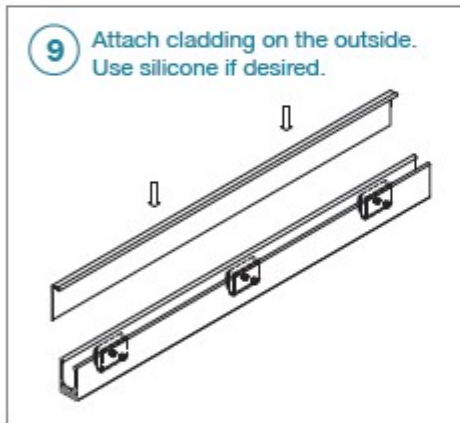
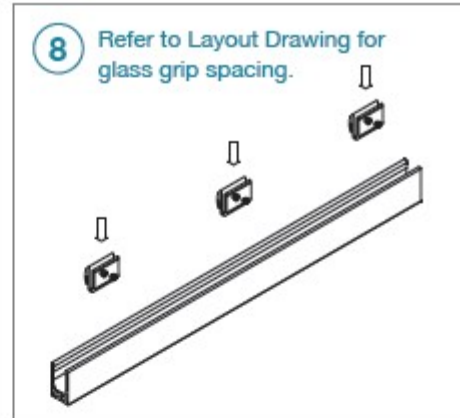
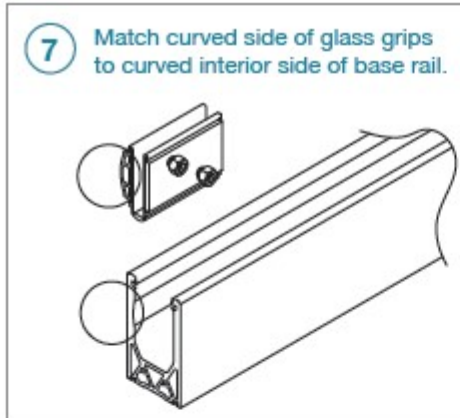


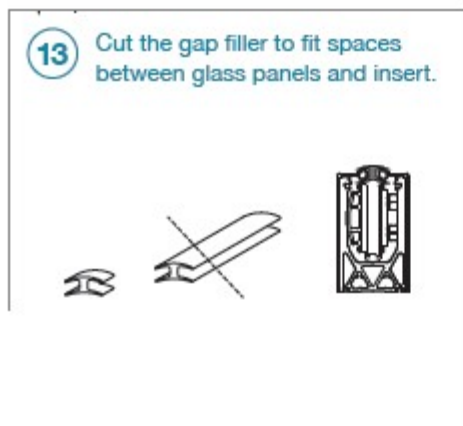
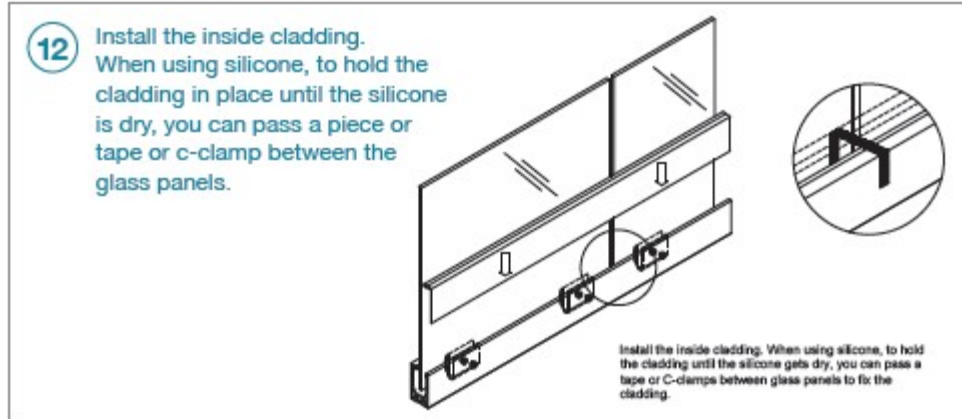
**5** Add Stabilizing Washer & Washer before securing with lag screw.



**6** Use joining pins to connect sections of base rail.







### Congratulations! Your Install is Done

We'd love to see your work! Snap a few pics with your phone and send them to us. Thanks for choosing Viewrail. Enjoy your new installation!