Glazing Inspection Report

[redacted]

Pembroke Pines, Fl 33028

[redacted] **Report date 8-1-21**

Services Performed

At the request of [redacted] TSSA Storm Safe DAC Inc. performed a diagnostic water penetration inspection of the installed glazed systems at the [redacted] on the following dates:

Inspection Dates
Wednesday, June 30th, 2021 – Main Sanctuary

The purpose of this inspection was to evaluate the following installed glazed systems' ability to manage water infiltration and penetration and ascertain any remedial procedures needed to correct the exterior building envelope of protection from reported moisture penetration.

- Commercial Storefront (LMI) installed into Punch Opening.

Present during the inspection and testing performed at the [redacted] were Ivan Browner (President), Steven Browner (Vice President), and Richard Orahood (Project Director) from TSSA Storm Safe DAC Inc., a professional Glazing Investigation Service. Also present during the testing performed at the [redacted] ESQ. of [redacted] as well as representatives of the [redacted] Management and Maintenance Staff.

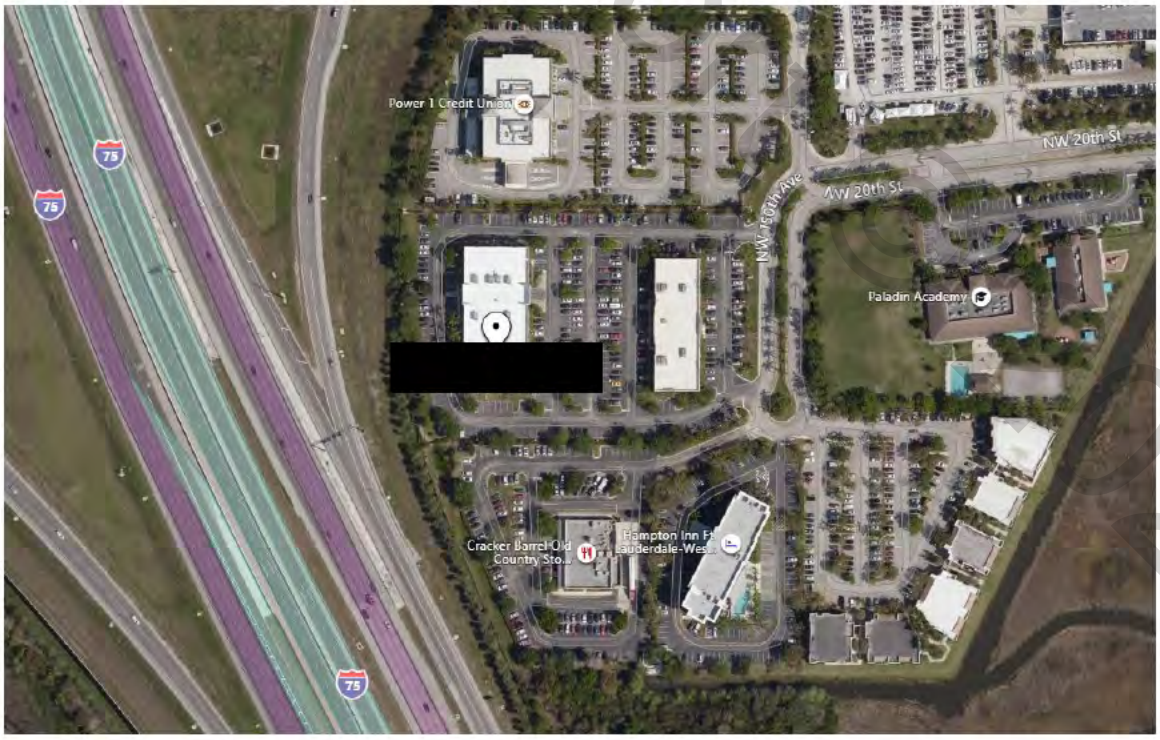
The Inspection Protocol followed during the [redacted] glazing evaluation was performed in general conformance with:

AAMA 501.2 – Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems

ASTM E-2128-17 "Standard Guide for Evaluation Water Leakage of Building Walls."

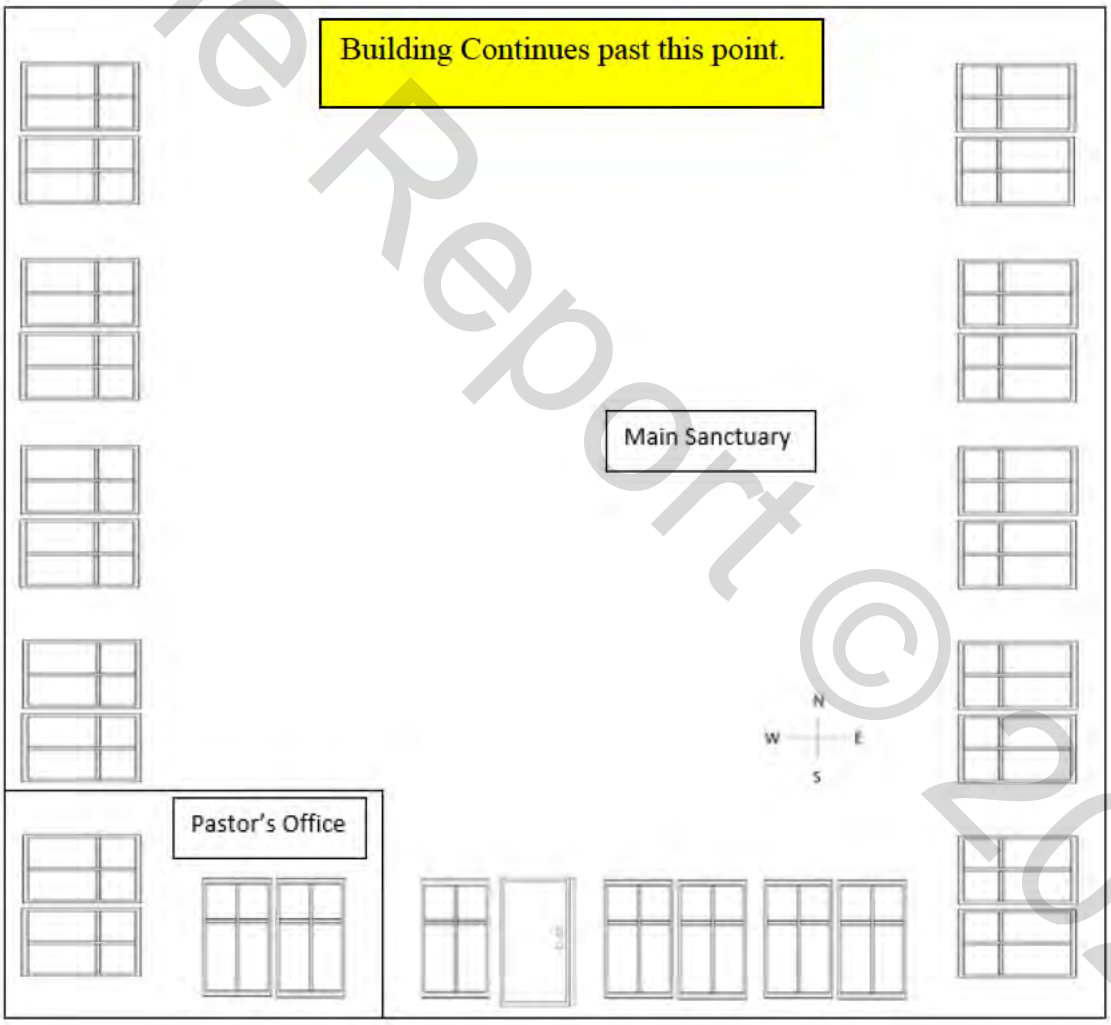
During our evaluation of the [redacted] TSSA Storm Safe DAC Inc. employed The Quikpoint, Inc. Smoke Point Air Flow Indicator, CEN-TECH Model # 67980 3.5 LCD Inspection Camera. (See the Limitations section). Also, Measuring Tapes, Screw Drivers, and Flashlights were employed by our inspection teams to visually evaluate the glazed systems in question.

[redacted]



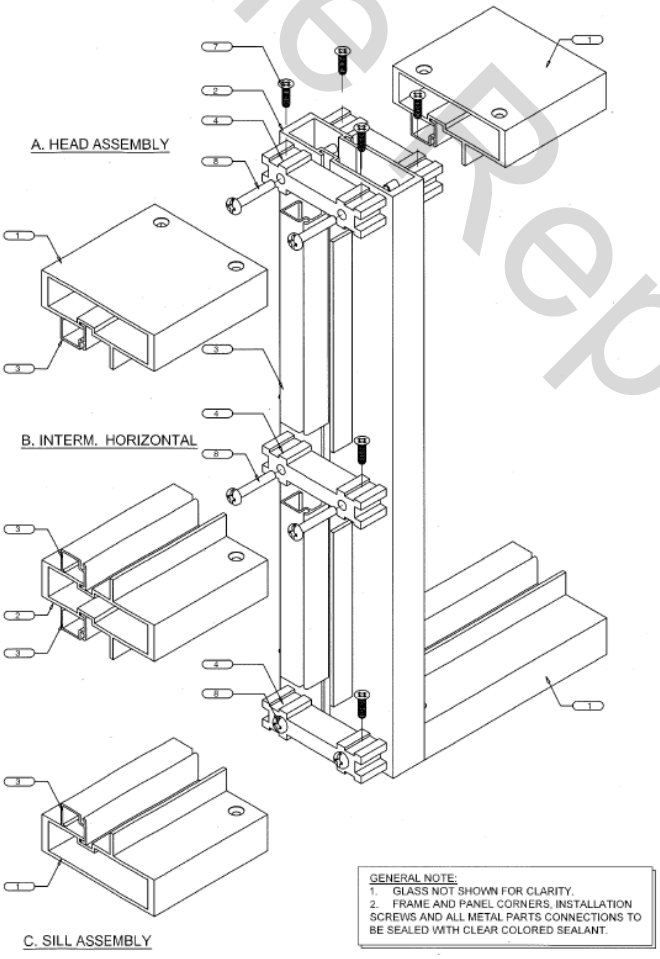
[redacted]

According to the [redacted] County Property Appraisers, the [redacted] was built in 1999. The campus includes two 2-story multi-tenant office buildings constructed via tilt-wall concrete and steel with a concrete slab and stucco finish. Each building is approx. 85,000 sq. ft. The glazed envelope was constructed utilizing Large Missile Impact rated Commercial Storefront systems installed within punch wall openings.



Glazed System Installed

The Storefront Window Systems installed at the [redacted] were identified as “Resister 3000 Aluminum Storefront Wall-LMI” manufactured by Trulite Glass & Aluminum Solutions, LLC, located in Deerfield Beach, Florida.



Testing Plan

History:

On Saturday, April 29th, 2021, Ivan Browner (President) and Steven Browner (Vice President) had a conversation with [redacted] of [redacted]

[redacted] explained that the facility used to be a warehouse complex constructed with overhead garage doors, concrete loading ramps, and storefront window systems. In preparation for a new occupant, the concrete loading ramps and garage doors were removed, and new sections of pre-cast concrete panels were constructed and tied into the existing structure. Openings were punched into the new wall sections and glazed with Storefront window systems to match the original building construction.

Original building footprint before renovation:

From conversations with the building management, it was explained that several windows installed into the newly constructed wall sections have been suffering from water penetration, causing interior damage to the drywall and carpeting. [redacted] asked TSSA Storm Safe DAC Inc to perform a diagnostic test and ascertain the source of the water penetration and help to prepare a remediation protocol to remedy the water penetration issues.

On Wednesday, June 30th, 2021, Ivan Browner (President) and Steven Browner (Vice President) performed a physical evaluation of the Storefront window systems installed within the [redacted] During our evaluation, TSSA Storm Safe DAC Inc measured and physically inspected the Storefront Systems in question. Upon physical inspection, TSSA Storm Safe DAC Inc. agreed that a diagnostic testing protocol would be necessary to assist the [redacted] in creating an achievable remediation protocol.

TSSA Storm Safe DAC Inc. prepared a testing plan following the guidelines laid out in the following recognized national standard:

> ASTM E-2128-17 "Standard Guide for Evaluation Water Leakage of Building Walls."

Planning:

Testing Protocol:

When planning the testing of the glazed systems selected at the [redacted] the steps put forth in section 5.1.1 of the ASTM E-2128 document titled "Sequence of Activities" were taken into consideration:

5.1.1.1 Review of project documents.
5.1.1.2 Evaluation of design concept.
5.1.1.3 Determination of service history.
5.1.1.4 Inspection.
5.1.1.5 Investigative testing.
5.1.1.6 Analysis.
5.1.1.7 Report preparation.

It was determined that the appropriate test protocol to employ would be:

AAMA 501.2 – Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems To be applied in conformity with the protocol established by

ASTM E-2128 "Standard Guide for Evaluating Water Leakage in Building Walls."

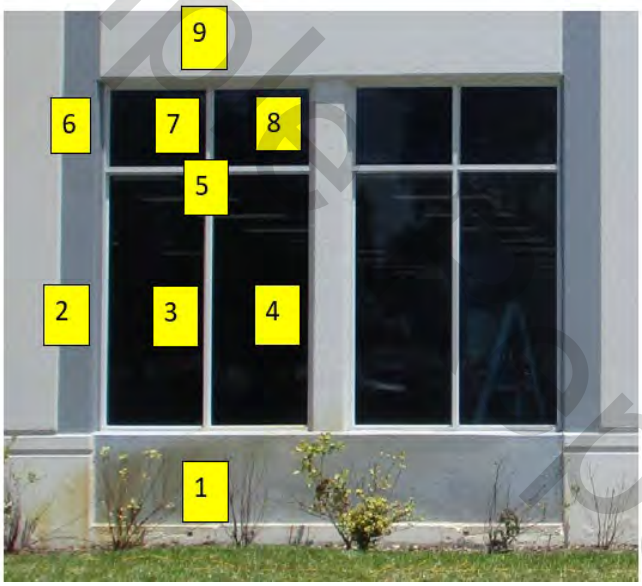
Testing Plan Explanation:

TSSA Storm Safe DAC, Inc. created a testing plan following the guidelines of the AAMA 501.2 testing standard:

> As specified in the AAMA 501.2 Standard Section 6.0 “Procedure:”
>
> 6.1 The designated test area shall be divided into and evaluated in 1.5 m (5 ft) sections of the framing and joint. The nozzle shall be held normal to the plane of the wall and at a distance of 305 ± 25 mm (1 ft ± 1 in) from the location under test. Each 1.5 m (5 ft) section of test area shall be evaluated for a period of five minutes by slowly moving the nozzle back and forth over the test section (see Figure 4) while maintaining the nozzle perpendicular to the plane of the wall.
>
> 6.2 Working from the exterior, the wall test section shall be selectively wetted progressing from the lowest horizontal framing member, then the adjacent framing intersections, then the adjacent vertical framing members, etc. During the test, an observer on the indoor side of the wall, using a flashlight, if necessary, shall check for any water leakage and shall note where it occurs.

The Test Specimens were measured and organized into 5 ft sections to perform the AAMA 501.2 testing protocol. (NOTE – The testing plan was reviewed and finalized on the day of testing to ensure compliance with the standard. See Testing Results Analysis section.)

Step	Mullion type	Frame member	size				# of 5 ft testing lengths per mullion	Minutes of testing
1	Horizontal Mullion	Sill Frame Member	69.25	in.	5.77	ft.	1.154	5.77
2	Vertical Mullion	Left Jamb	81	in.	6.75	ft.	1.350	6.75
3	Vertical Mullion	Intermediate Vertical	81	in.	6.75	ft.	1.350	6.75
4	Vertical Mullion	right Jamb	81	in.	6.75	ft.	1.350	6.75
5	Intermediate Horizontal	Lower Intermediate Horizontal	69.25	in.	5.77	ft.	1.154	5.77
6	Vertical Mullion	Left Jamb	27	in.	2.25	ft.	0.450	2.25
7	Vertical Mullion	Intermediate Vertical	27	in.	2.25	ft.	0.450	2.25
8	Vertical Mullion	right Jamb	27	in.	2.25	ft.	0.450	2.25
9	Horizontal Mullion	Head Frame Member	69.25	in.	5.77	ft.	1.154	5.77
				Totals	44.31	ft.	8.863	44.31



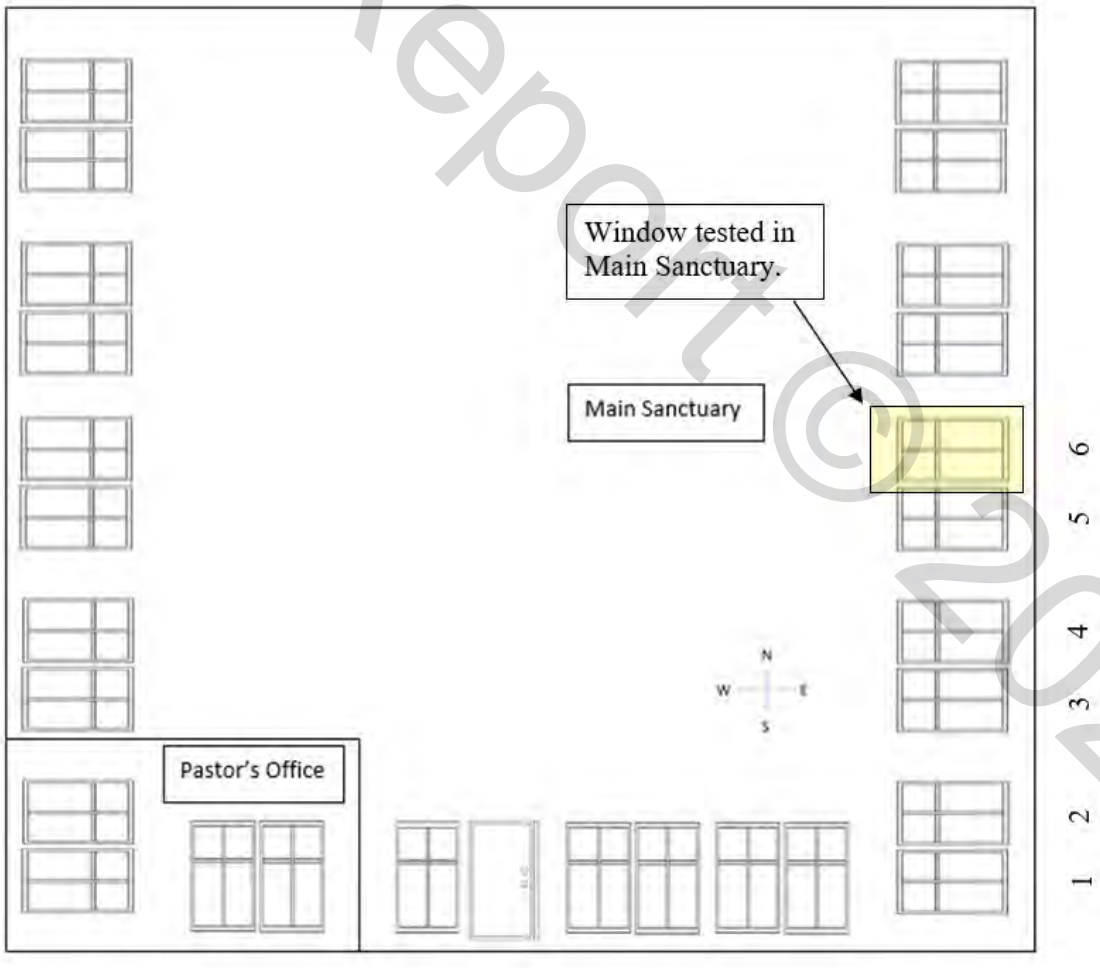
Testing Results

Specimen #1 – Main Sanctuary

Test Date - Wednesday, June 30th, 2021

TSSA Storm Safe DAC Inc. performed testing on one of the Storefront window systems installed within a new wall section.

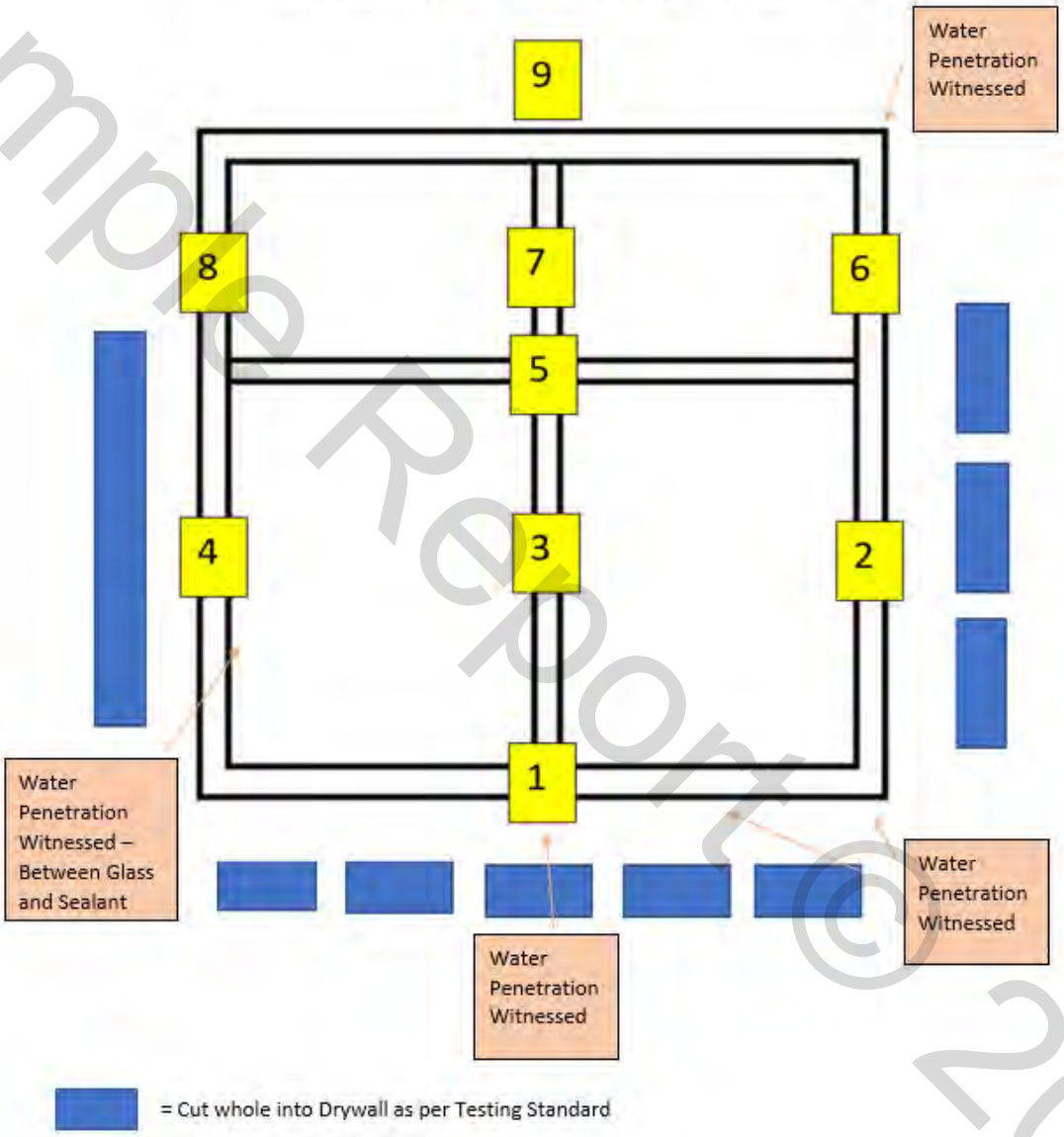
The specimen was the 6th east-facing window assembly from the Southeast corner of the building.



Main Sanctuary Testing Results – Analysis

Step	Mullion type	Frame member (Interior view)	Mullion Testing Size				# Of 5 ft testing lengths per mullion	Minutes of testing	Water Penetration Witnessed (interior view)
1	Horizontal Mullion	Sill Frame Member	69.3	in.	5.77	ft.	1.154	5.77	1. Directly under Intermediate Vertical Mullion at Sill 2. Below right jamb at sill connection
2	Vertical Mullion	Right Jamb	54	in.	4.50	ft.	0.900	4.50	1. Below right jamb at sill connection
3	Vertical Mullion	Intermediate Vertical	54	in.	4.50	ft.	0.900	4.50	1. Directly under Intermediate Vertical Mullion at Sill
4	Vertical Mullion	Left Jamb	54	in.	4.50	ft.	0.900	4.50	1. Water witnessed at glass lite between the exterior sealant and foam glazing tape
5	Intermediate Horizontal	Intermediate Horizontal	69.3	in.	5.77	ft.	1.154	5.77	1. Directly under Intermediate Vertical Mullion at Sill 2. Below right jamb at sill connection
6	Vertical Mullion	Right Jamb	54	in.	4.50	ft.	0.900	4.50	1. Below right jamb at sill connection 2. At Head to Right jamb Connection point
7	Vertical Mullion	Intermediate Vertical	54	in.	4.50	ft.	0.900	4.50	1. Directly under Intermediate Vertical Mullion at Sill
8	Vertical Mullion	Left Jamb	54	in.	4.50	ft.	0.900	4.50	None
9	Horizontal Mullion	Head Frame Member	69.3	in.	5.77	ft.	1.154	5.77	1. At Head to Right jamb Connection point
				Totals	44.31	ft.	8.863	44.31	

Interior View – Inspection Results



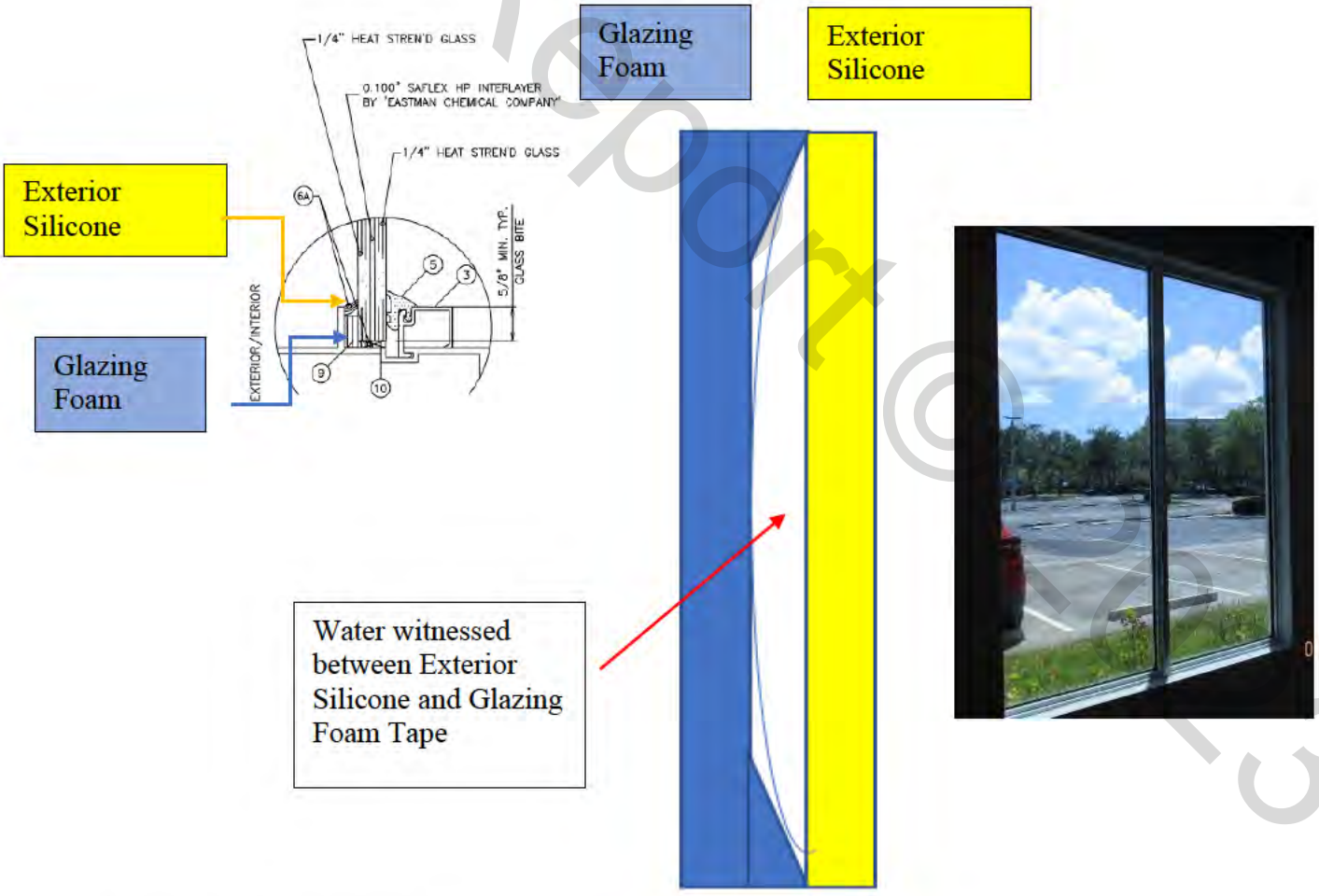
Water Penetration Witnessed
During AAMA 501.2 Testing Operations

Water Penetration Between Exteriors Sealant Bead and Foam Glazing Tape

We witnessed at the Left Jamb of the installed Storefront movement and displacement of the Glazing Foam Tape from our inspection.

In the middle of the left jamb, the Glazing Foam Tape is seen entirely off to the side of the glass, leaving the glass not connected to the glazing style.

Also, the Exterior Silicone Sealant is supposed to be butted up against the Glazing Foam Tape. However, the undulation between the glazing foam tape and exterior sealant has allowed water to become trapped within the void created by this disconnection of materials.



Structural Installation Issues
Witnessed During Onsite Testing

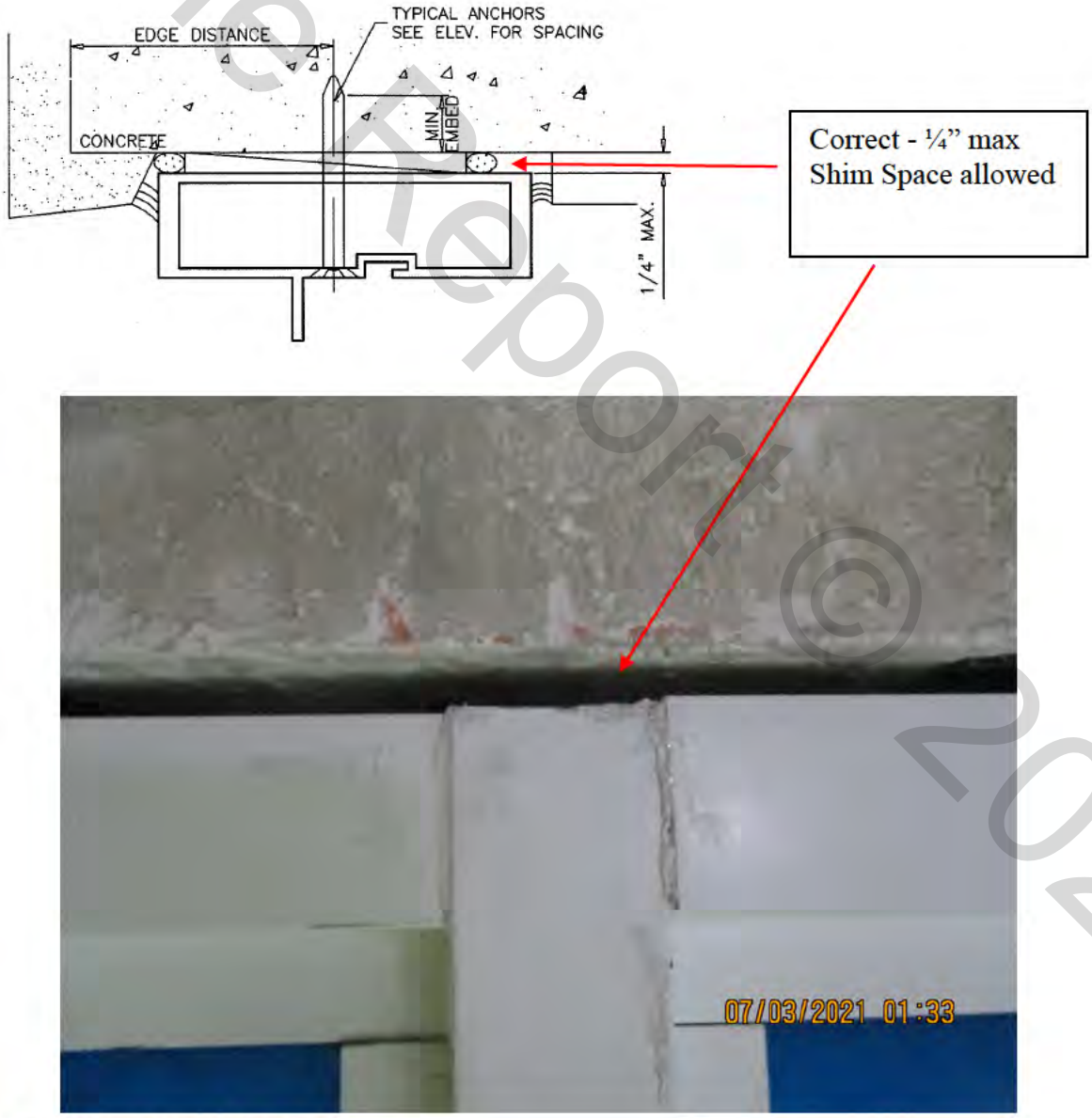
Upon opening the Drop Ceiling to have a clear view of the Head Frame member, installation issues were discovered that contributed to water intrusion and left the system in a structurally unsafe condition.

On the left side of the head frame member and intermediate vertical mullion, a layer of grout was witnessed between the concrete lentil and horseshoe shims. The grout was soft enough to break into pieces with our inspectors' hands and cannot sustain loads imposed by the Glazing System and Transfer them to the building Structure as specified on page 9 of 11 in the Miami Dade NOA 17-1017.16.

At the right side of the head frame member and intermediate vertical mullion, there was an extremely large space between the head frame member and the concrete lintel. This excessive space does not allow the installation fasteners to adequately support the system in the masonry opening.

Page 9 of 11 in the Miami Dade NOA 17-1017.16 allows for the installation of the Storefront System into concrete with no bucking, as long as the min embedment into the concrete is adhered to, and the system is shimmed with ¼" max space between the Masonry Opening and the system frame.

The window systems installed into the new punch openings were installed contrary to the directions outlined in the Miami Dade NOA 17-1017.16. An Example of the correct shim space for installation into concrete is shown below:



On Wednesday, July 7th, 2021, TSSA Storm Safe DAC, inc., met with [redacted], a professional glazing and caulking company at the [redacted] to achieve two objectives.

1. Perform further invasive testing of the previously tested "Main Sanctuary" Storefront window system.
2. Create a remediation protocol to address and repair the water penetration issues experienced through the newly installed Storefront window systems.

During our site visit, [redacted] performed the following activities onsite. TSSA Storm Safe DAC Inc photographed and notated the process to diagnose the Water Penetration issues further and ensure the repair protocol would sufficiently remedy further water penetration.

Exterior:

1. Remove the Exterior Sealant around the Perimeter of the Storefront System.
2. Remove the Exterior Silicone around the glass to frame connection.
3. Remove the Glazing Foam Tape from the glass to frame connection.

Interior:

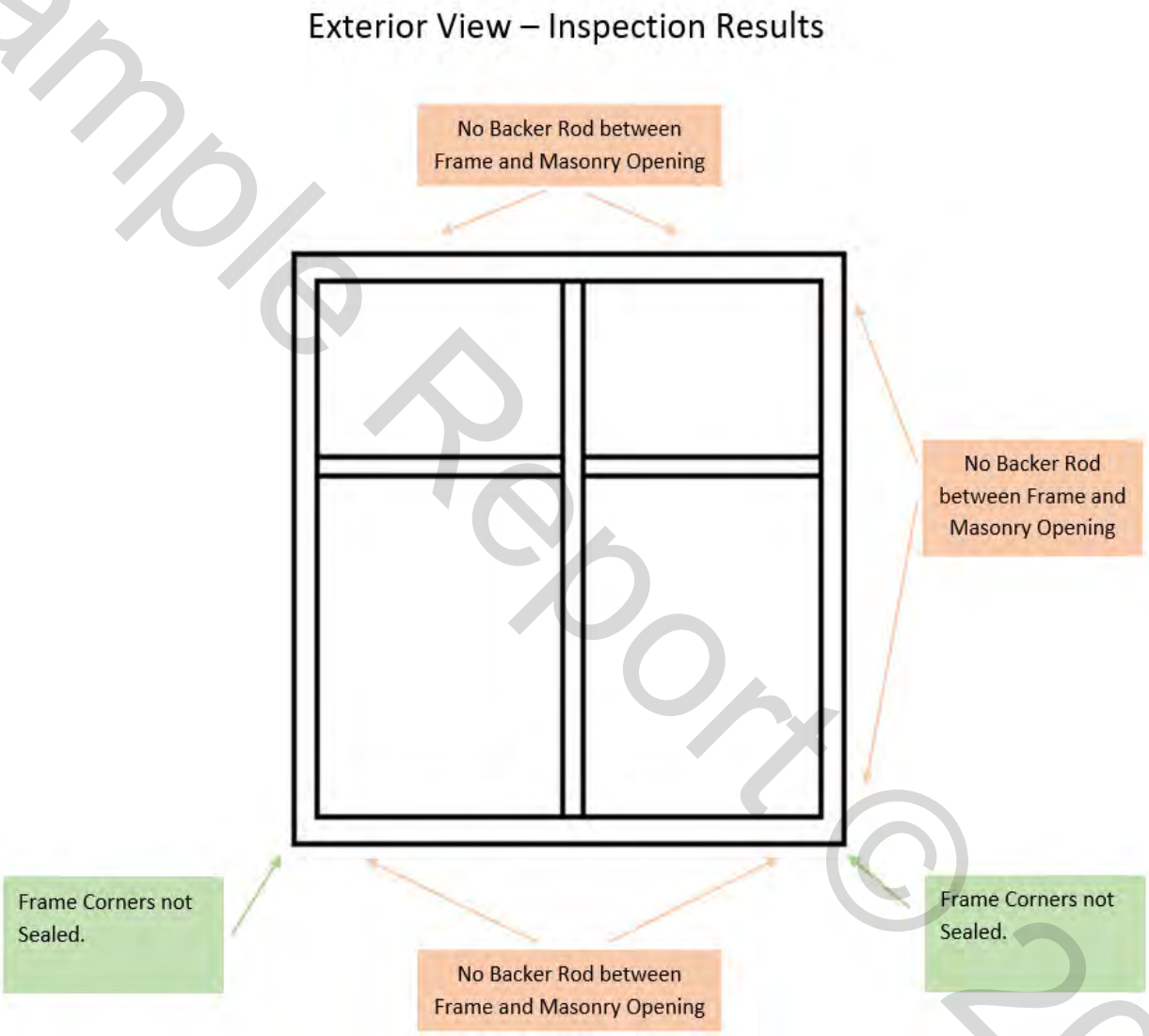
4. Remove the Two Lower Glass Lites from their installed position.

TSSA Storm Safe DAC, Inc. and [redacted] were able to identify several key issues that were found to contribute to the Water Penetration through the Storefront system inspected.

Below is a list of the physical damages identified during our invasive examination:

1. Backer Rods not found installed between the Head, Right Jamb, and Sill frame members and the Masonry Opening.
    - Backer Rod – A material placed into a joint, primarily to control the depth and shape of the sealant. A Backer Rod also serves as a bond breaker that prevents three-sided adhesion in sealant joints.
2. Rolled-up paper was found to be used as a Backer Rod between the Head Frame member and Masonry Opening.
3. Due to the lack of an installed Backer Rod, the depth of sealant between the frame and masonry opening was not sufficiently controlled. This did not allow the sealant to bond between the two construction materials adequately.
4. Sufficient cleaning was not performed around the frame and masonry opening during the original installation allowing sediment and debris to interfere with the sealant's ability to create proper adhesion between the two construction materials.
5. Voids were witnessed between the exterior silicone bead and the glass to frame connection allowing water to intrude between the foam glazing tape and silicon exterior bead.
6. The Glass panes were found to be resting on small pieces of hard plastic shim material, which did not correctly support the entire width of the glazing edge.
    - A Setting Block is made of an elastomeric material that supports the glazing weight and is in direct contact with an edge of the glazing after final installation.
    - A hard plastic material creates the possibility of spontaneous glass breakage because the glass edge is the weakest part of the glass pane and is most susceptible to glass breakage.
7. One of the Glass lites was found to be 1/2” short, allowing excess space between the edge of the glass lite and the glazing frame.
8. Frame Corner joints and End Dams were not sealed before glass installation.

Issues Identified:



Damages Identified when
removing sealant and resetting system

Water Penetration Testing Results

Specimen #1 – Main Sanctuary

New Wall Construction

During testing, water penetration was witnessed at the following locations:

- Under lower right Jamb to Sill Connection point.
- Directly Under the Center Intermediate Vertical Mullion
- At the upper right jamb to head connection point
- Between the glass lite foam glazing tape and exterior glazing silicon

Repair Recommendation:

To properly remediate the uncontrolled water penetration experienced through the installed glazing systems of the newly renovated wall sections, TSSA Storm Safe DAC Inc. in cooperation with Dynamic Caulking Corp, have created the following Repair Recommendations:

Sealant Remediation Areas of Concentration

Preparation:

Exterior:

1. Remove existing sealant from around the perimeter of the storefront framing and masonry opening.
2. Remove the existing silicone from the Installed Glass Lites and Glazing Channel.
3. Clean existing construction sediment from between the framing system and masonry opening
4. Clean the exterior frame with Silane Solution to promote a clean oil/sediment-free resealing surface.

Interior:

1. Remove Glass Stops and Gaskets from each frame member
2. Deglaze the glass lite by removing the Glass adherence to the Foam Glazing Tape
3. Using a glazing plunger, carefully remove glass lites from the frame glazing style.
4. Clean existing construction sediment from the interior portion of the framing system.
5. Clean the interior frame with Silane Solution to promote a clean oil/sediment-free resealing surface.
6. Clean residue of Foam Glazing Tape and Exterior Silicon from the perimeter of glass lite.

Remediation:

Interior:

1. Seal Corner Frame Joints with Tremco Dymonic FC "High Performance, Fast-Curing, Single Component Hybrid Sealant."
2. Apply new Foam Glazing tape to interior glazing style in a straight and uniform manner. (Note - leave sufficient room for the insertion of exterior silicone to create a watertight exterior seal around the glass lite and exterior glazing frame member.)
3. Reglaze window by inserting glass lite into the interior frame unto approved setting block and press glass against the newly installed glazing tape. (Note – be sure the glass is balanced in the frame between each side of the interior frame members.)
4. Replace the interior glass stops and glazing gaskets.

Exterior:

1. Insert Backer Rod between the exterior frame members and the masonry openings. (Note – Backer Rods should be installed between every side of the exterior framing system and building masonry openings.)

2. Apply Tremco Dymonic FC “High Performance, Fast-Curing, Single Component Hybrid Sealant.” Between the exterior framing members and the building masonry openings. (Note – Sealant should be installed in a manner that allows sufficient adhesion to both the aluminum frame members and the masonry opening.)
3. Insert sufficient Silicone glazing sealant between the exterior glazing stile and glass lite (Note – Exterior Silicon should be applied consistently with equal pressure not to leave any voids between the glazing foam tape and the exterior edge of the glazing stile.

Remediation Activities

Post Remediation – Quality Assurance Test

On Friday, July 30th, 2021, TSSA Storm Safe DAC Inc performed a Post Remediation Quality Assurance Test at the [redacted] The purpose of the test was to verify that the repair protocol performed on the Storefront windows system is successfully performing its function and all water penetration has been remediated.

Witnessing the testing activities on site was [redacted] of [redacted], as well as maintenance staff representing the [redacted]

TSSA Storm Safe DAC Inc performed a modified version of the AAMA 501.2 – Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.

TSSA Storm Safe DAC inc. deviated from the standard protocol in the following manner:

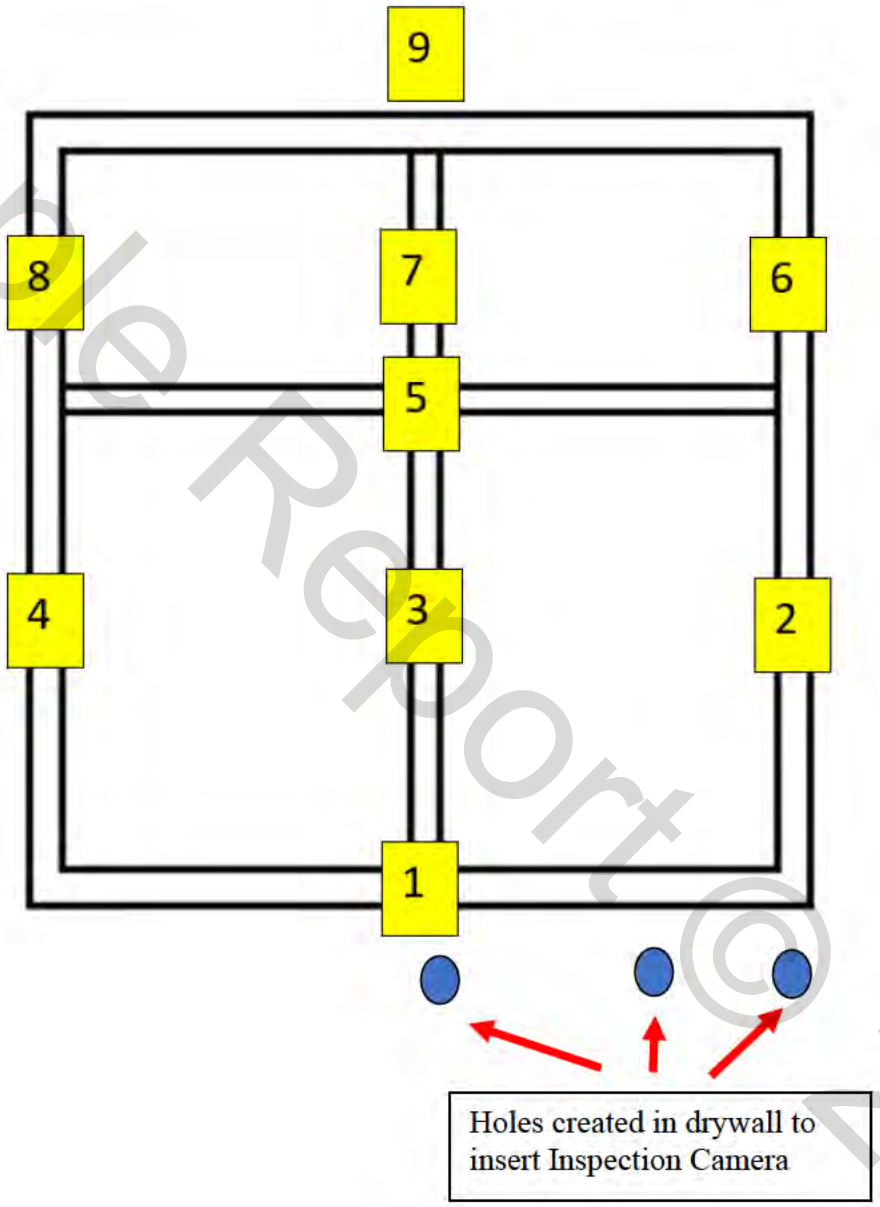
1. No Drywall was removed around the test specimen.
2. TSSA Storm Safe DAC Inc. utilized the CEN-TECH Model # 67980 3.5 LCD Inspection Camera to visually verify if any water penetration was still occurring during the water leakage test.

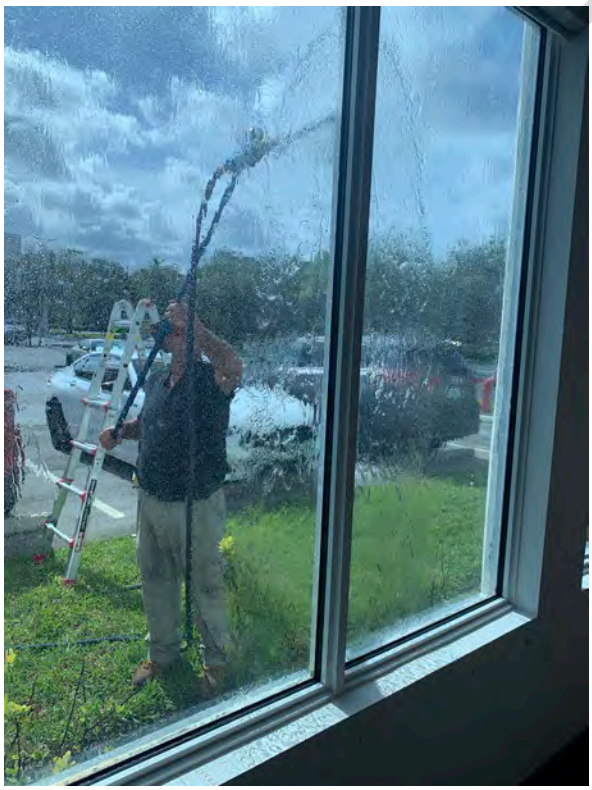
Testing Protocol followed:

TSSA Storm Safe DAC Inc. punched small holes in the drywall reveal directly under the Storefront System at the locations where water penetration was witnessed during our original AAMA 501.2 test.

TSSA Storm Safe DAC Inc inserted the CEN-TECH Model #67980 Inspection camera during the testing operation to witness any water penetration after the remediation protocol has been completed.

Interior View – Inspection Results





Testing Result

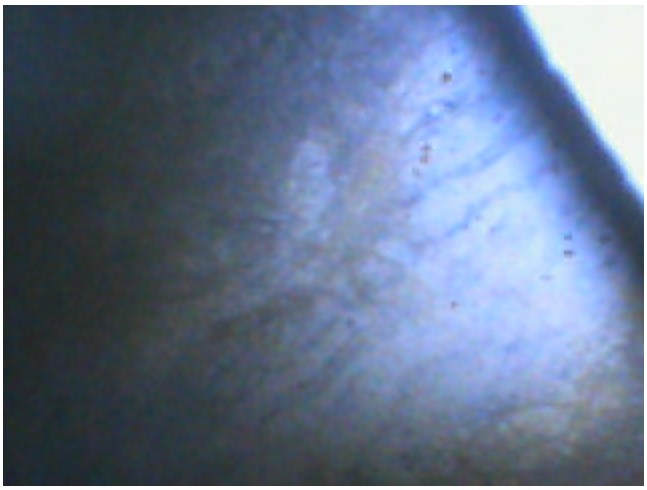
Upon following the prescribed testing protocol during the re-test, it was verified that no water was witnessed penetrating the exterior of the storefront system into the interior wall.

The remediation protocol created by TSSA Storm Safe DAC Inc. in cooperation with [redacted] has successfully ceased any uncontrolled water penetration that was previously witnessed on the Storefront system.

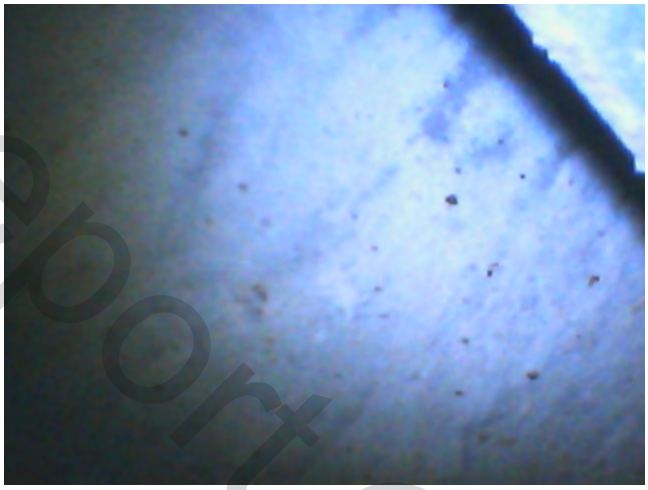
Newly Installed Sealant Bead fully adhered and cured.

Borescope Image taken under the Center Mullion of the Storefront System showing old water staining, but no evidence of new water penetration during the retest.

Borescope Image taken under the Right Jamb Mullion of the Storefront System showing old water staining, but no evidence of new water penetration during the retest.



Borescope Image taken under the Right Jamb Mullion of the Storefront System showing old water staining, but no evidence of new water penetration during the retest.



Borescope Image taken under the Right Jamb Mullion of the Storefront System showing Backer Rod correctly installed and performing its function as a bond breaker promoting proper sealant adhesion

Limitations – The contents of this report are intended for the use of the [redacted] and its representatives or clients. TSSA Storm Safe DAC Inc. assumes no liability for the misuse of this information by others. The professional opinions and recommendations included within this report are based on the results and interpretations of the invasive testing and the data collection activities performed at the site. TSSA Storm Safe DAC Inc. reserves the right to update this report should additional information become available.

MOISTURE INSPECTION TECHNOLOGY – The Quikpoint, Inc. Smoke Point Air Flow Indicator and CEN-TECH Model # 67980 3.5 LCD Inspection Camera used during our evaluation of the [redacted] were utilized for the sole purpose of documenting Air and Moisture penetration in and around the Glazed Systems. No Microbial, Bacterial, Environmental, or other scientific data was investigated, interpreted, or otherwise implied by the testing, data gathering, and investigation completed onsite.

Closing Statement - The opinions authored in this report are a direct result of Ivan Browner (TSSA's President) and TSSA Storm Safe DAC Inc.'s background, training, and combined experience, which spans over 70 years in all facets of the glazing industry. TSSA Storm Safe DAC Inc. has inspected over 500,000 windows, sliding glass doors, curtain walls, storefront systems, and architectural products in multiple states.

As the author of this findings report, the basis for the opinions expressed herein are to a reasonable degree of professional certainty. The TSSA Storm Safe DAC Inc. glazed damage assessment investigation of the [redacted] was performed by the TSSA Storm Safe DAC Inc. Field Inspection Team under my direct supervision.

Attached to this Glazing Testing Report are the following exhibits:

Exhibit A – Field Inspection Notes and Photos
Exhibit B – TSSA Storm Safe DAC Inc. Curriculum Vitae

TSSA Storm Safe DAC Inc. appreciates this opportunity to have assisted the [redacted] with this investigation. Please call if you have any questions concerning this information.

Sincerely,

Ivan Browner - FMPC
President
TSSA Storm Safe DAC Inc.

Exhibit A

Field Inspection Notes and Photos

Exhibit B

TSSA Storm Safe DAC Inc. Curriculum Vitae