15th Canadian Conference on Building Science and Technology

November 6-8, 2017

Vancouver, BC, Canada

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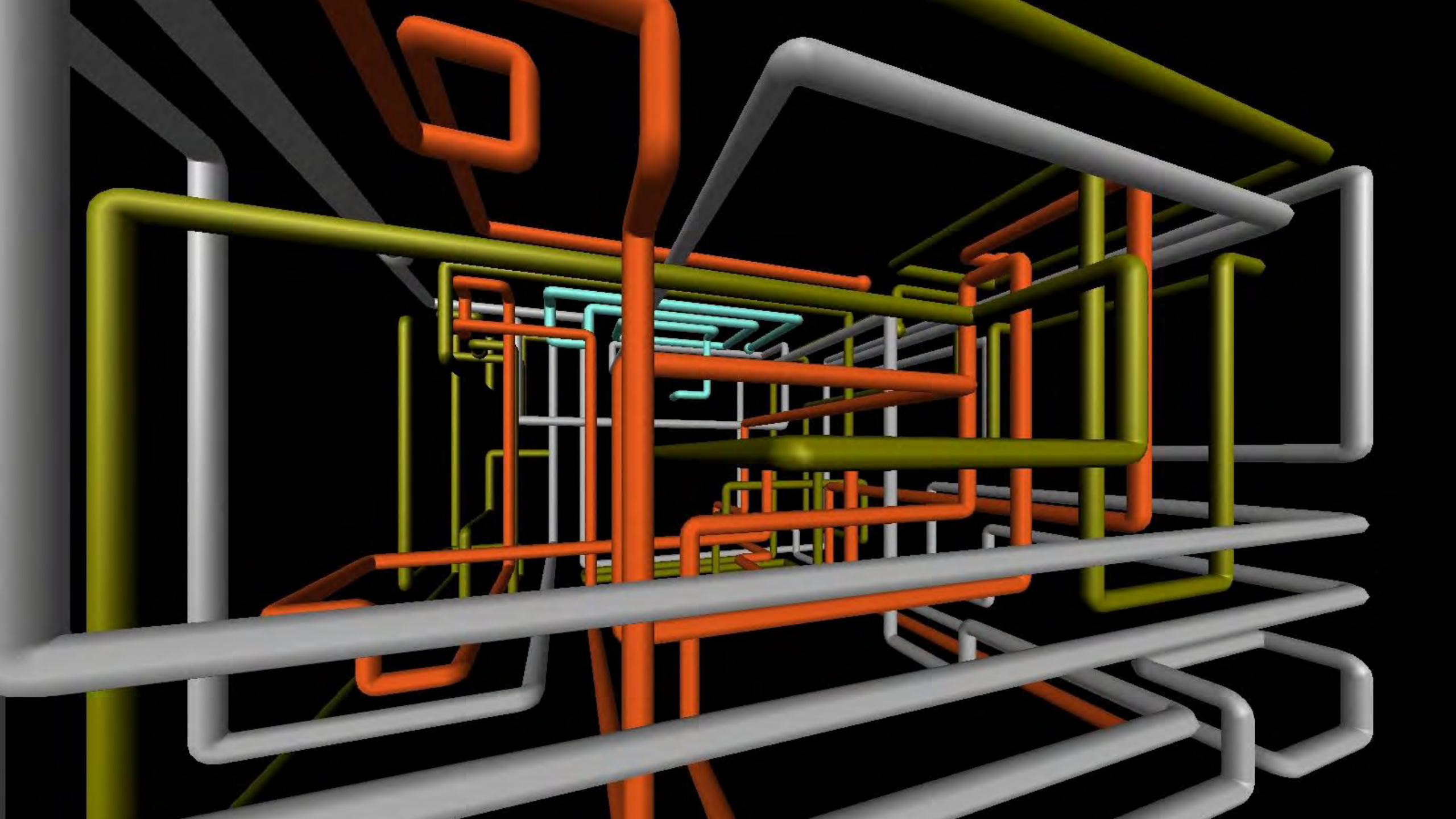
Fenestration Systems It's All About The Plumbing!

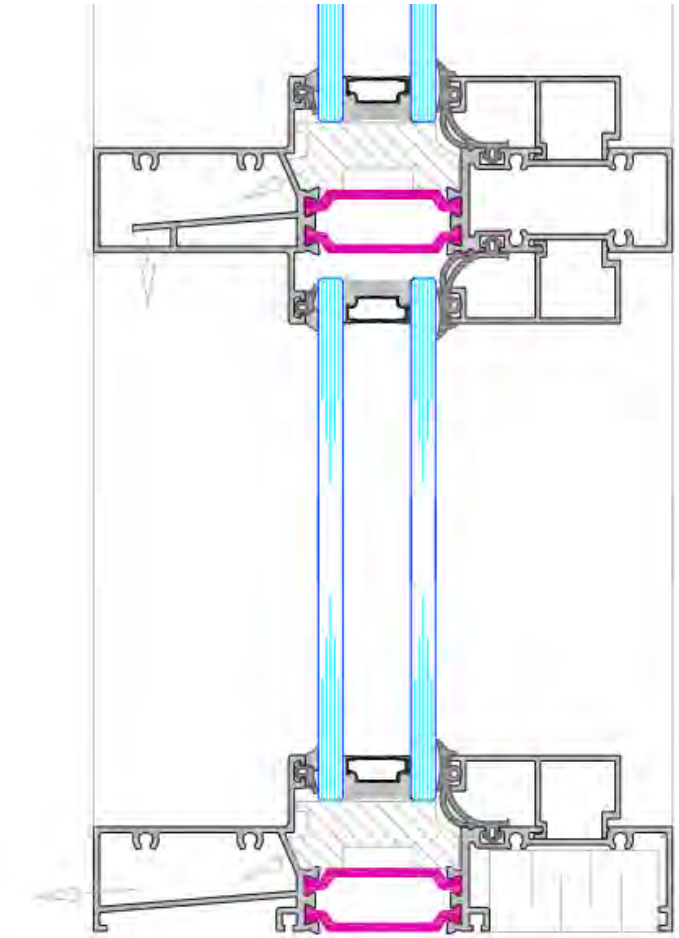


Fenestration Design and Construction: Fundamentals

What needs to be achieved?

- Water Management
  - Rain Screen / Face Sealed
- Thermal Performance
  - Heat Loss
  - Condensation Control
  - Solar Gain / Loss
- Sustainability Issues
  - Durability – lifespan
  - LEED considerations
  - Material conservation
- Appearance Issues
  - Design Options

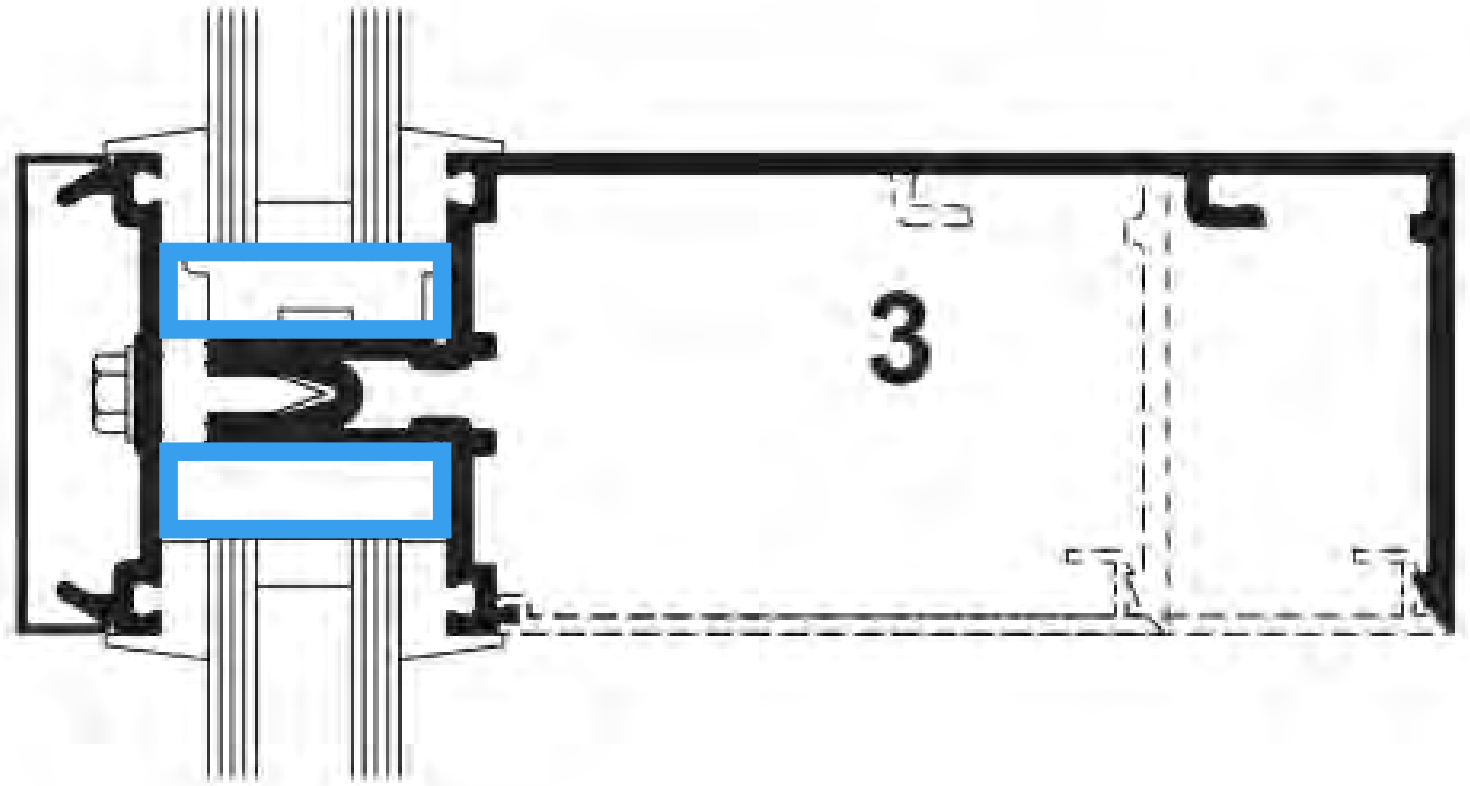
Fenestration Design and Construction: Water Management



Window Wall System

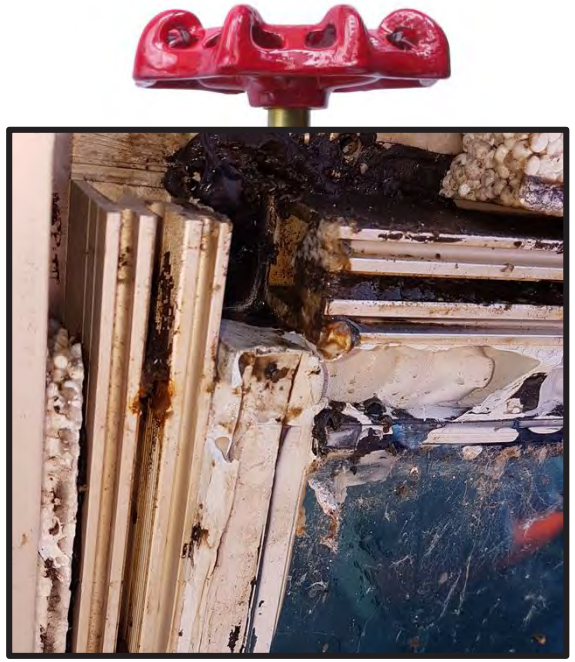
Curtain Wall System

The Pipes?



- Glazing pockets are pipes
- Effect of setting blocks?
  - Horizontal and Vertical
- Glass corner sealant?
- Corner block installation?
- Mechanical Joint seals?
- Random crap?
- What else will impede flow?

The Valves?

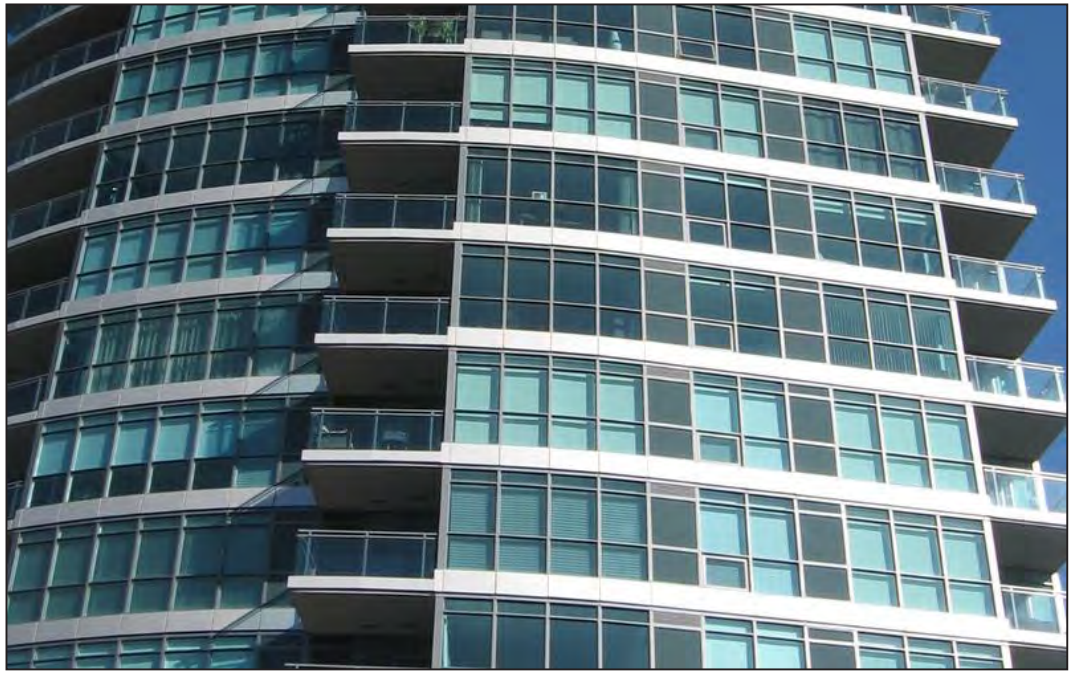


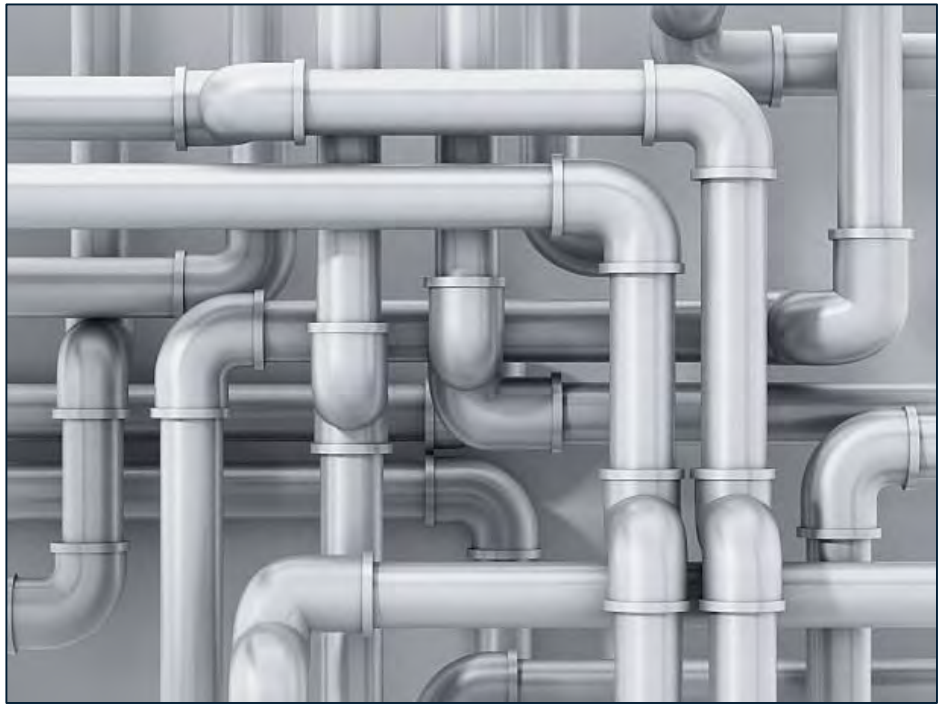
Flow Control

Drainage Control

Inlet Control

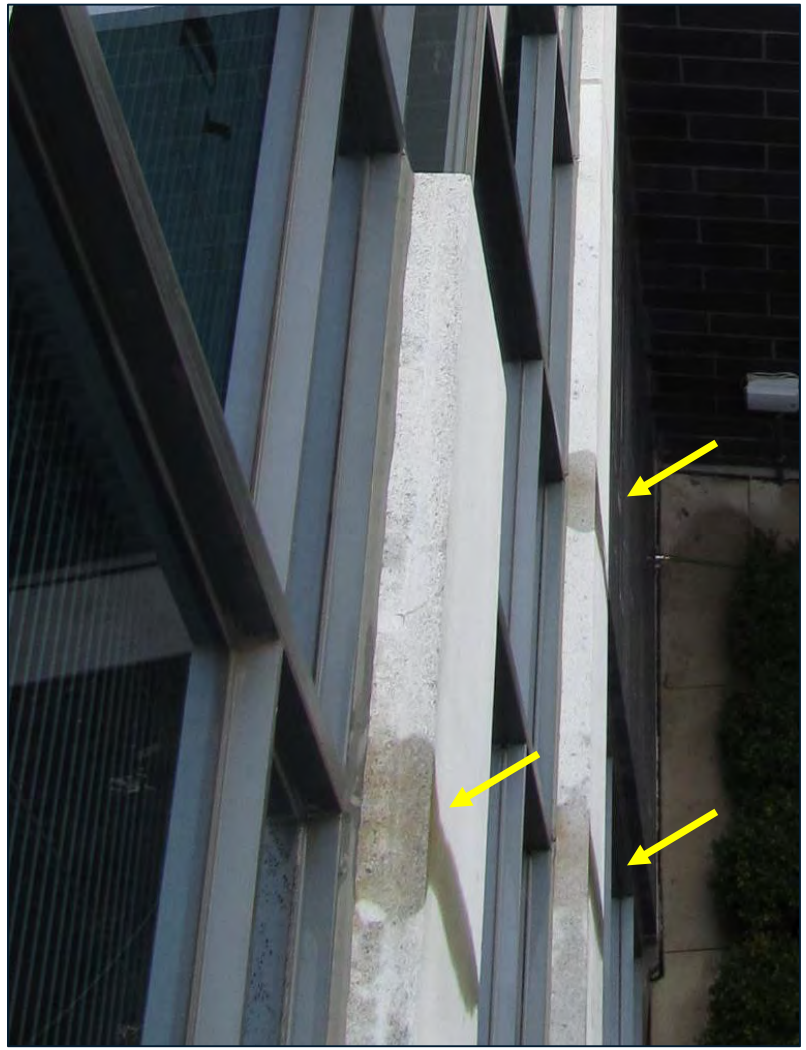
It’s All About The Plumbing





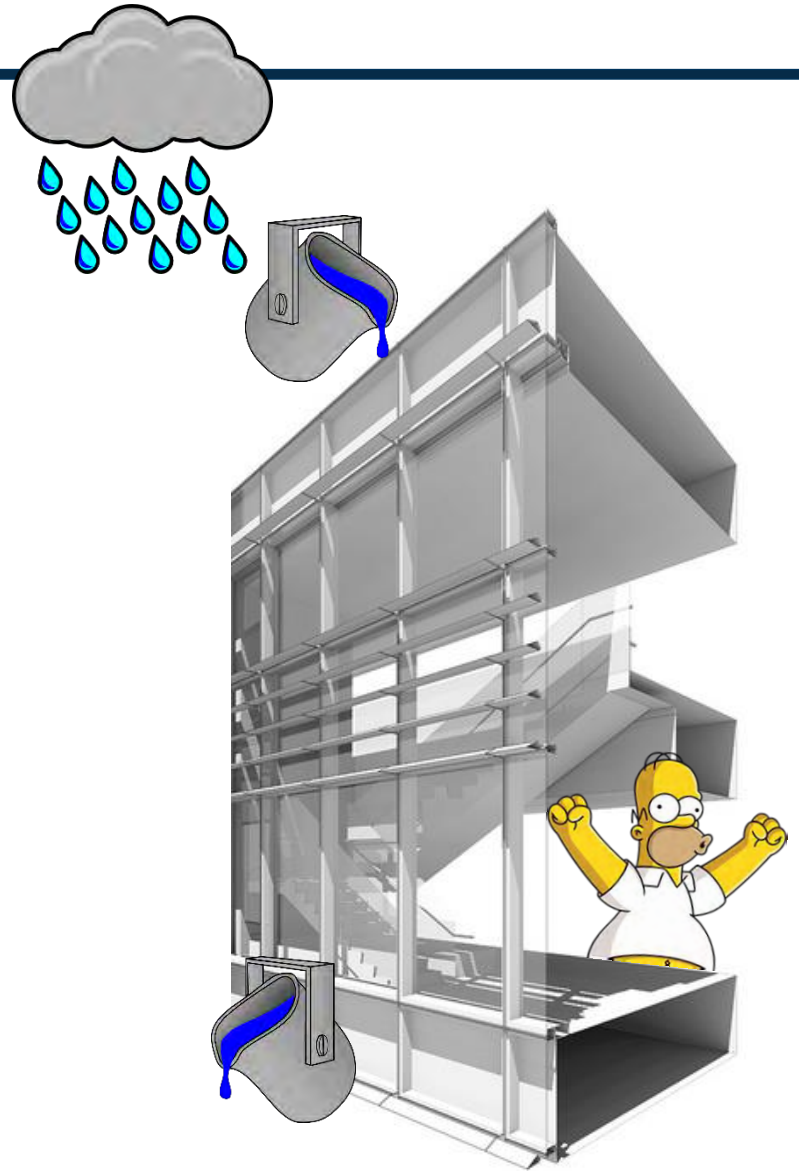
A Series of Interconnected “Pipes” With Inlet and Outlet Valves,
Affected By Expected and Unexpected Flow Impedances

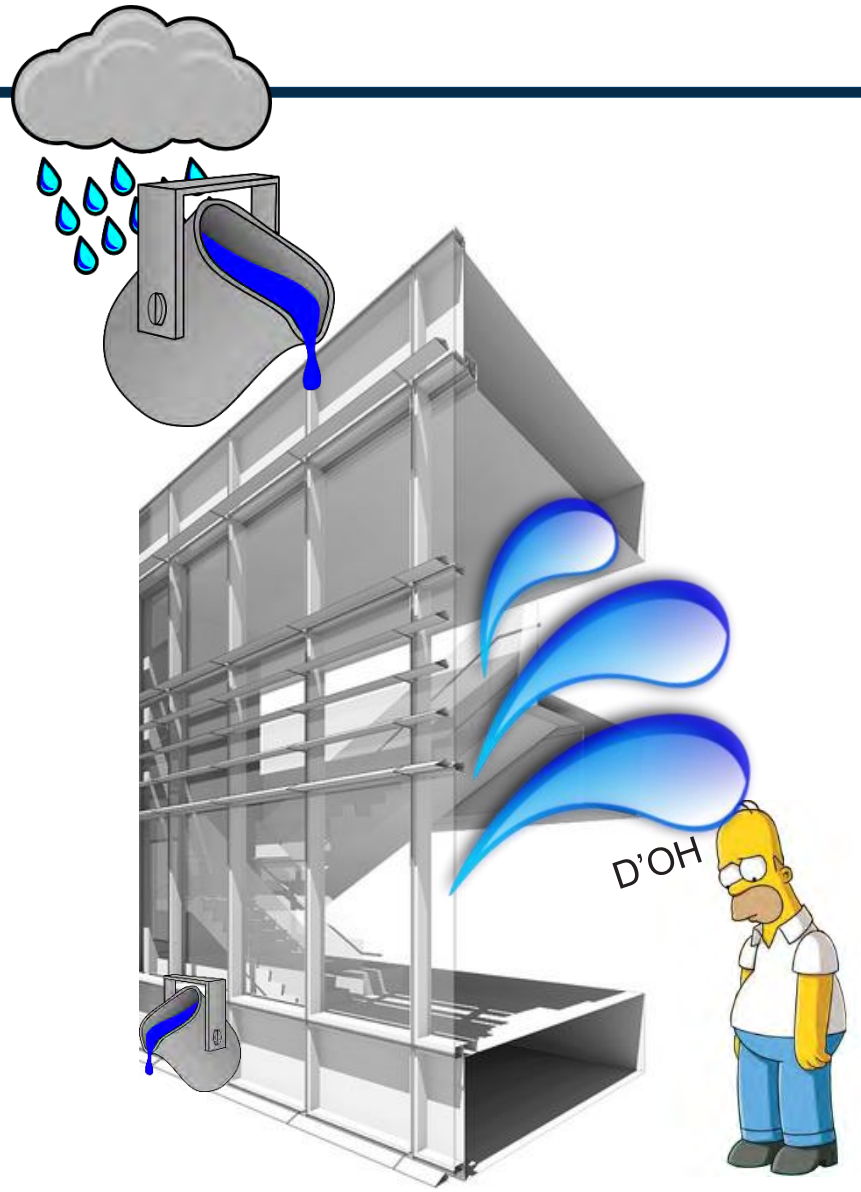
Pipe Flow



Flow Balance

- Water will get into system
- Volume in less than or equal to volume Out? OK
- Volume In greater than volume Out? Not OK
- Maximize system drainage capacity
  - Keep outlets open
- Minimize stress
  - Keep inlets closed





Chronic Problem….

When You Are Expecting Good Drainage

Section 08460 Aluminum Window-Wall and Window Systems

1.17 Design and Performance Requirements - Water and Air Infiltration

.3 Design the glazing system using "Rain Screen Principle" with the following characteristics:

.1 An interior (room-side) air seal at component interfaces.

.2 An exterior (weather-side) deterrent seal formed by continuous gaskets or flush silicone seal as applicable.

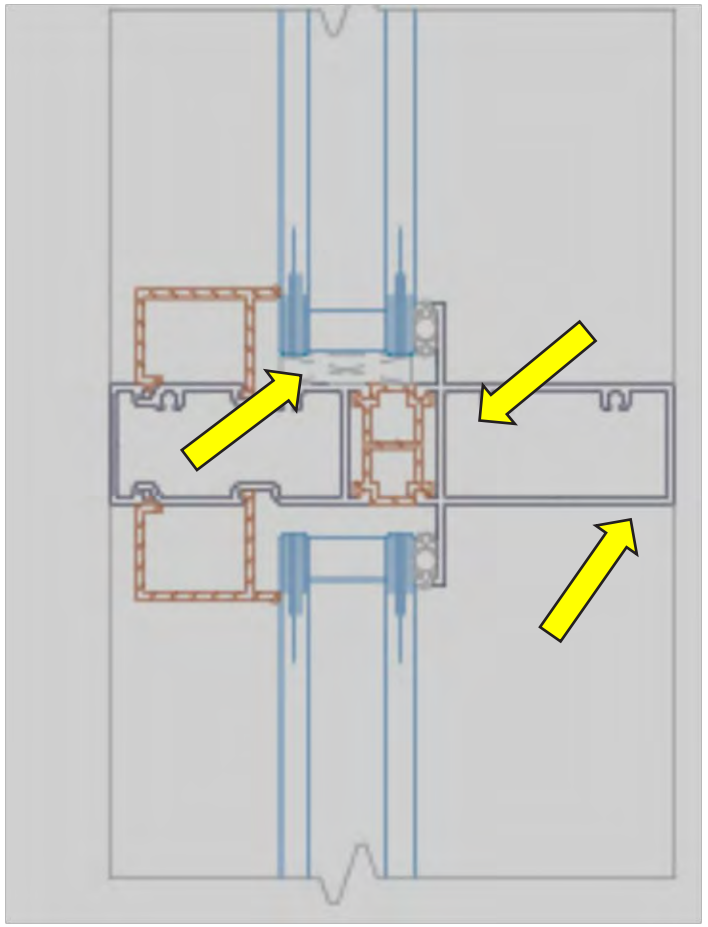
.3 A glazing pocket vented and drained to the exterior, at the sill.

.4 Pressure equalization holes at the sills comprising a minimum of two slots measuring 50 mm x 8 mm or as required to achieve pressure equalization.

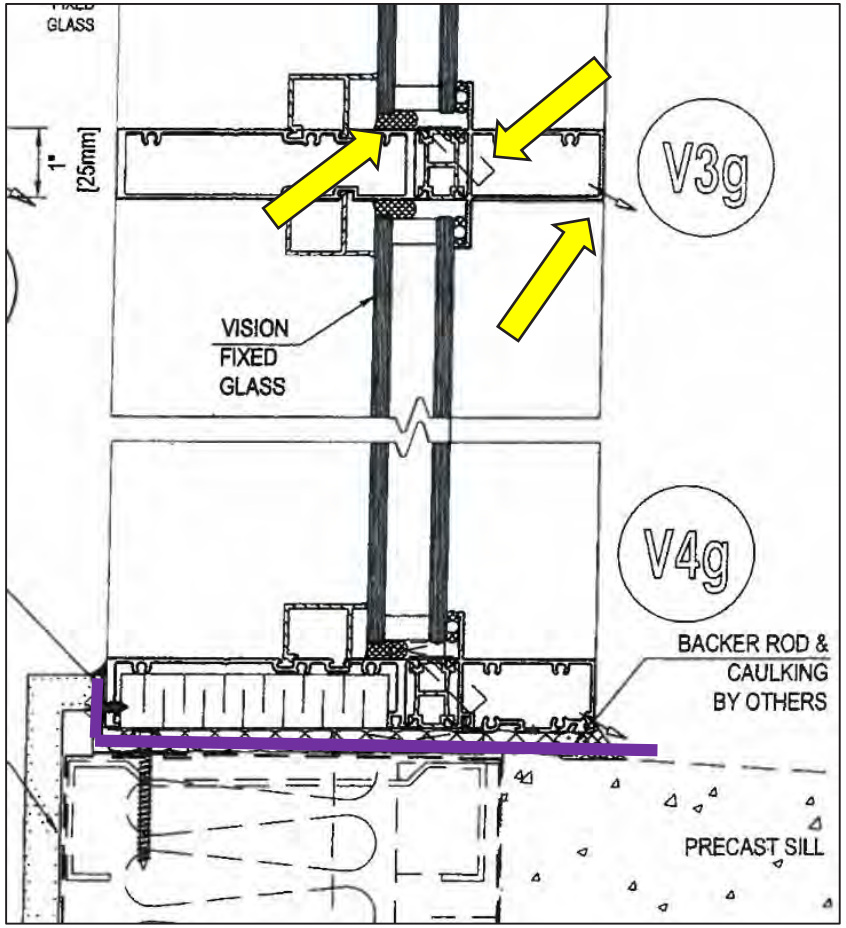
.5 A system of baffles to prevent water entering the glazing cavity due to gravity, capillary action or rain momentum.

.6 Metal to metal joints within the glazing cavity shall be designed and installed to be sealed prior to assembly and fixing and so as to provide continuous drainage of water to points of egress from assembly. Where location of drainage must drain more than one light and/or spandrel, the number of drainage holes shall be increased accordingly.

Know What You Are Getting



Face-Sealed



“Reluctant Rain-Screen”

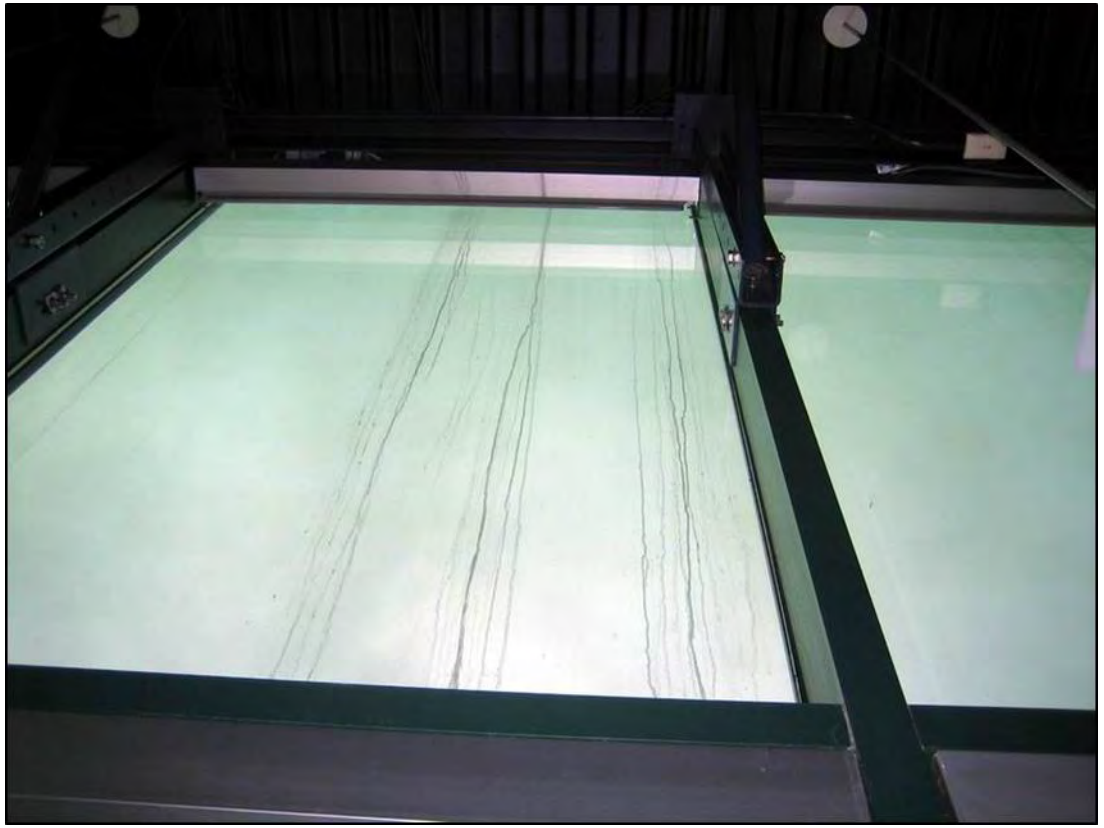
Know What You Are Getting

Outlet Valves Closed!

Outlet Valves Closed!

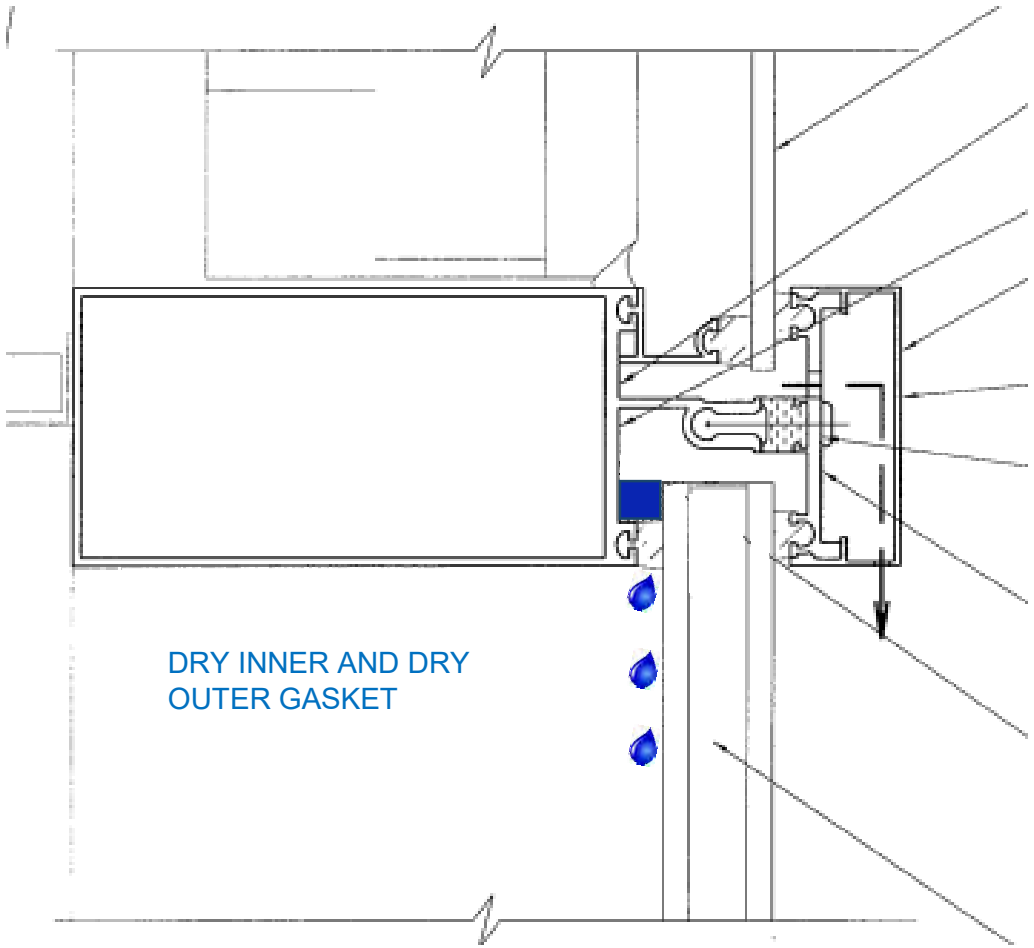
Inlet Valves Open!

When Curtain Walls Cry….



they need more love….

Dry-Dry Curtain Wall



- IG under stress – high humidity
- Smaller glazing pocket, less volume to handle water
- Screw spline design creates uneven p.plate force
- Relaxed gaskets reduces pressure
- Hardy ever get “re-torqued”

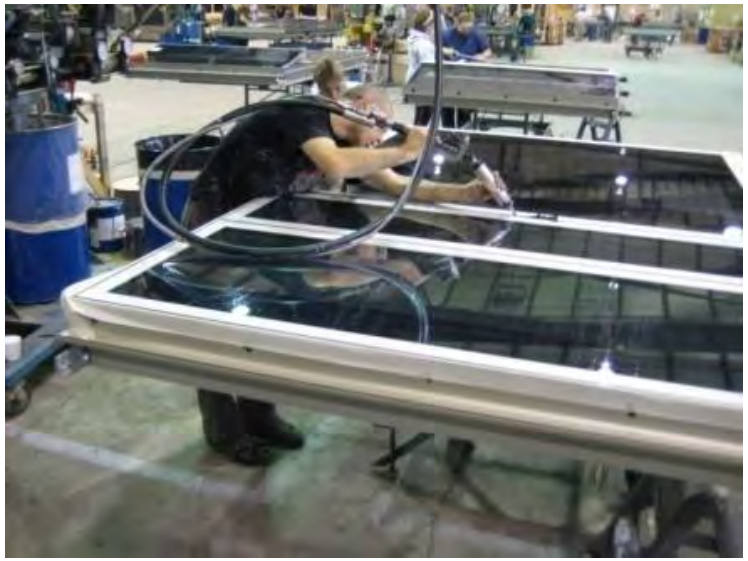
They need a lot more love…yeesh!

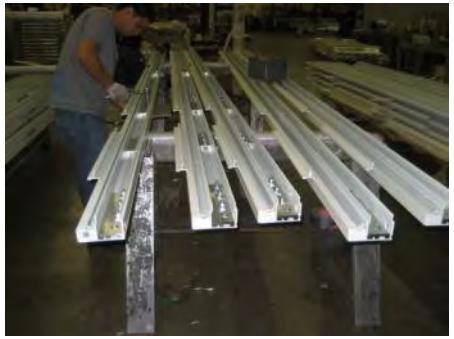
OAA Window Wall Endorsement

- Insurance will be provided if:
  - The Window Wall system has primary and secondary planes of protection + ventilated air spaces + provisions for **positive drainage** in rainscreen design
  - Design incorporates recommendations from independent expert who has approved the architect's design
  - Has been constructed in accordance with the architect's design
  - Engineer sealed and approved shop drawings
  - Full scale mock up and site testing
  - Five year warranty against air and water leaks
  - Others listed

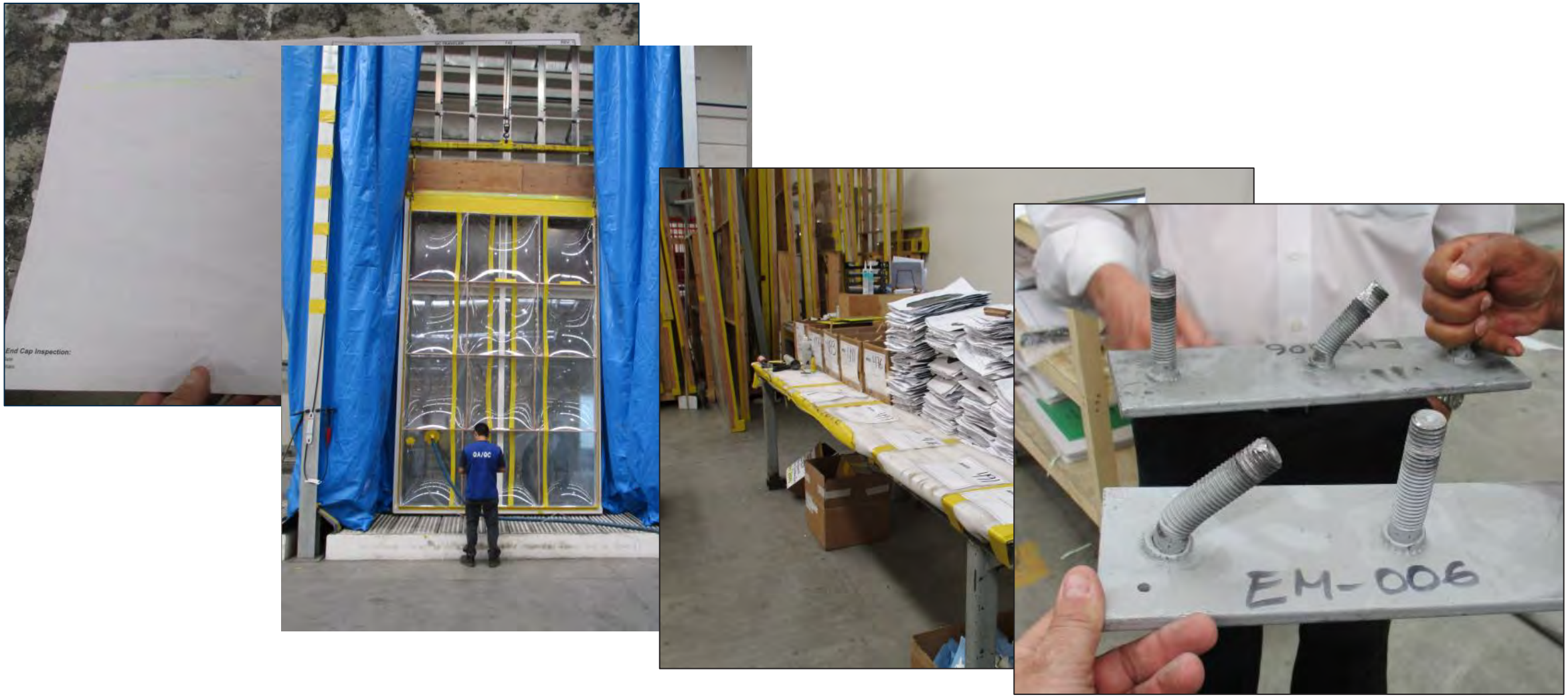
Plant Visits

- Visit the shop where wall components are being fabricated.
- Check the frame's "birth certificate"
- Review shop QA/QC plan in action

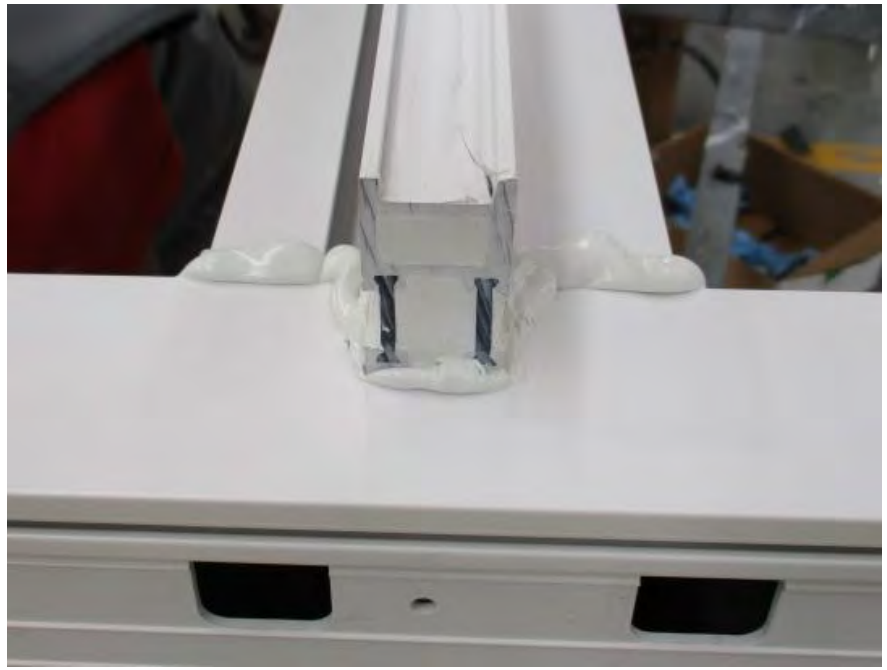




QA/QC



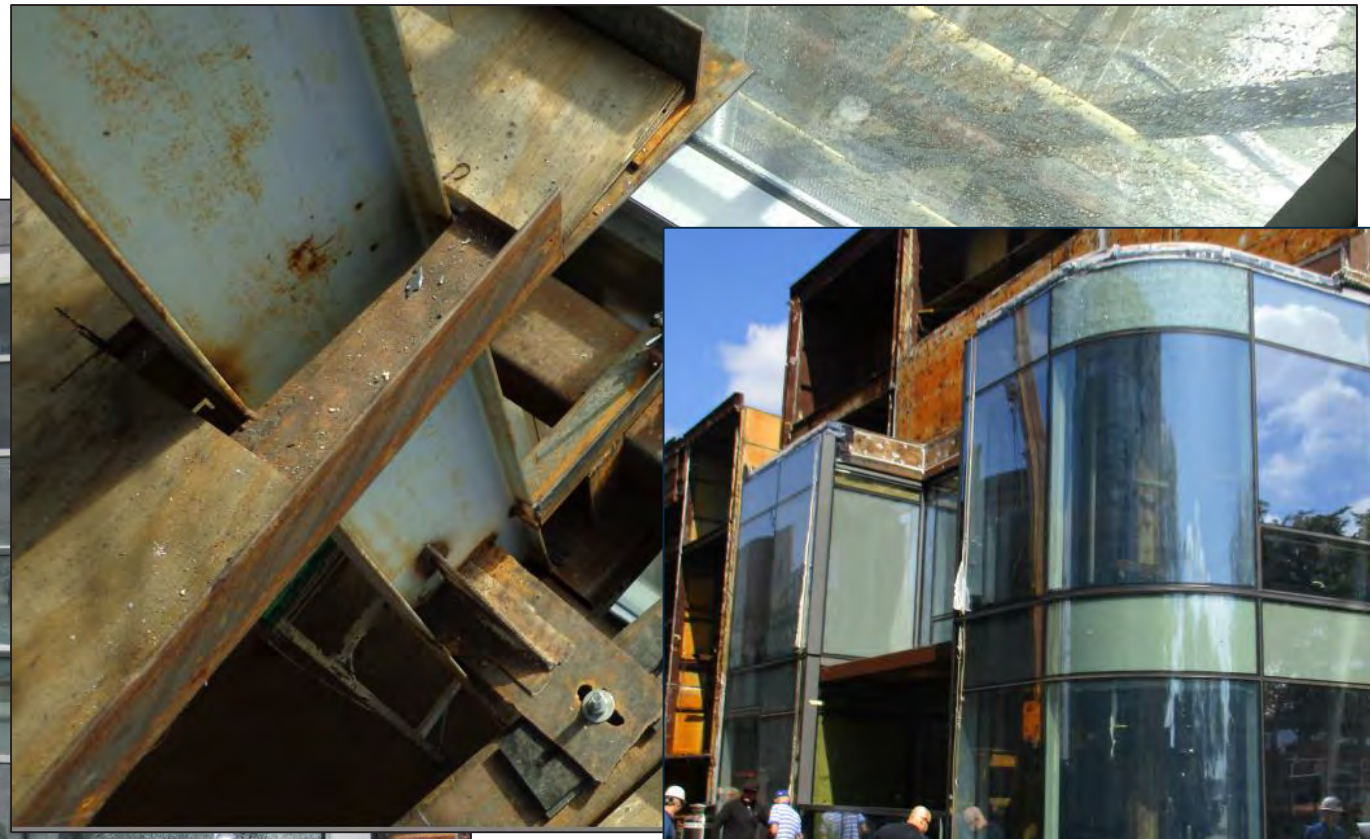
Giant Beads?



Mock Ups

- Review contractor's workmanship & quality control
- Potential transition issues
- Contractor's Quality Assurance activities
- Review expected quality of installation
- Review roles and responsibilities of the team members
- Comfort level for future installations
  - Can be lab or field
  - They may or may not remain as part of final work
  - Additional opportunity for testing

Mock-ups & Testing



Thinking Time is Critical!

Take Aways….

- Select quality systems from the start
- Ensure specifications are clear and call for grassroots rainscreen systems
- Keep the water flowing
- Mock ups are your bestest friend
- Push hard for qualified and frequent “adult” supervision
- Remember importance of “thinking time”

THANK YOU!

Morrison Hershfield