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Glass Condos: Throw away or here to stay?

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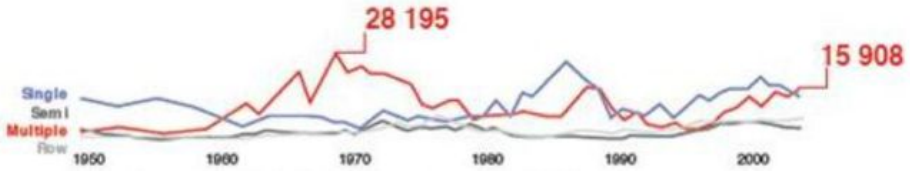
Introduction

- Windowall exterior skin "glass condo"
  - Almost the only solution provided today
  - Different than the past solution
- Problems / Risks
  - Durability of components is limited
  - Energy performance is abysmal

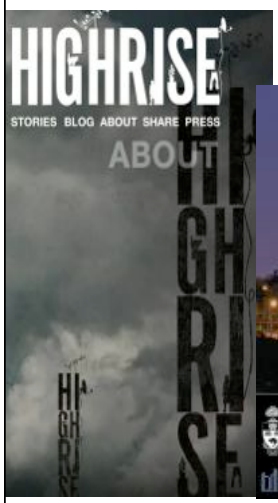
The Last Boom

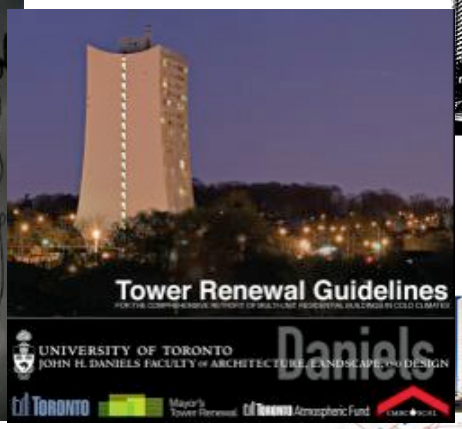
- A MURB construction boom occurred in the late 1960s

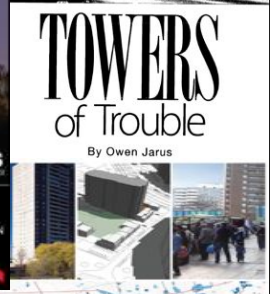


- Demographics, density, and technology
- Result: concrete apartment towers of 5-20+ storeys
- Mostly durable materials: brick, mortar, concrete
- These towers now over 40 years old and need renewal

Tower Renewal

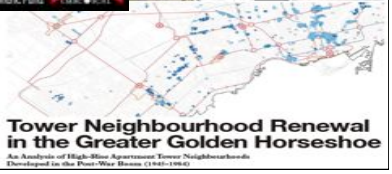






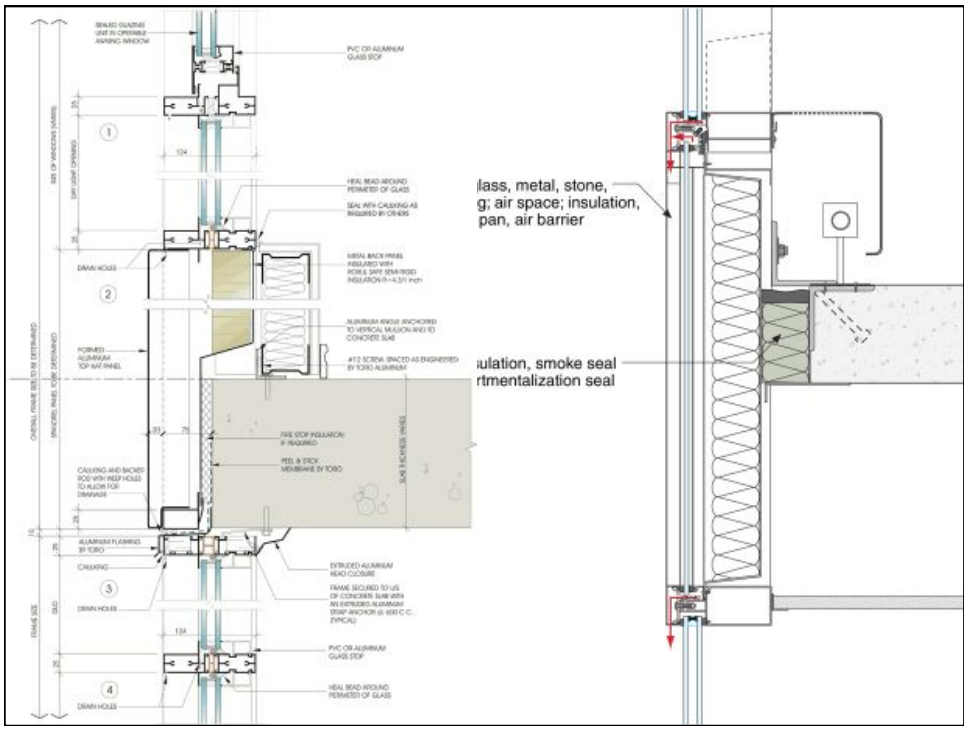
zerofootprint™

Zerofootprint Building Re-Skinning Competition



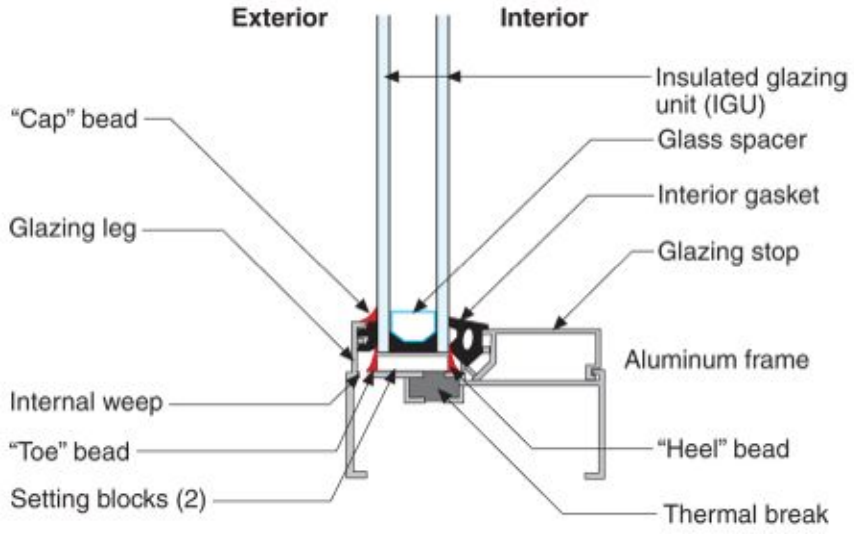
Technology: Curtainwall Windowall

- Curtainwalls are *different* than Windowalls
- Look similar to the untrained eye
- Small details matter a lot to performance
  - Specialists are required
  - Typical contractors / engineers often unaware of how they work



Sealants/Gaskets

- Exposed and hidden sealants are the key to most window-wall systems
  - Used to stop water and air leaks
- Essentially all materials are organic, and these break down with exposure to sun/ heat/cold
  - Polyurethane, neoprene, PVC
- Maintenance will be required
  - When? 5 yrs? 10 yrs?20 yrs?




Window wall
Many many joints and connections

Maintenance

- Low-cost designs (e.g. most condos) rely on organic gaskets and sealants to stop air and water leakage
- Sealants / gaskets deteriorate over time
- Need repair/maintenance
- Access to high-rise is expensive

Glazing tape failures

IGU "fogging"

- Condensation between panes of glass
- Caused by seal failure
- Expected to occur 20+ years after install
- Premature failure common due to rain leaks into glazing cavity

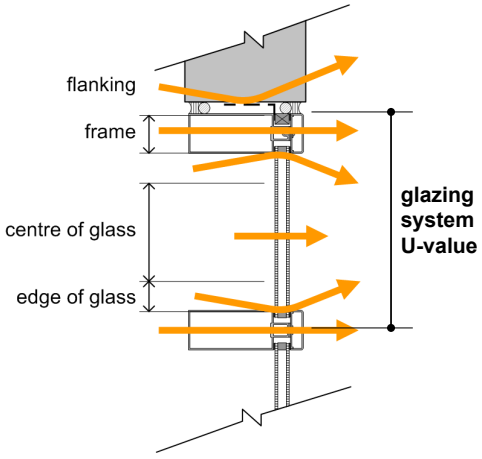
IGU spacer corrosion

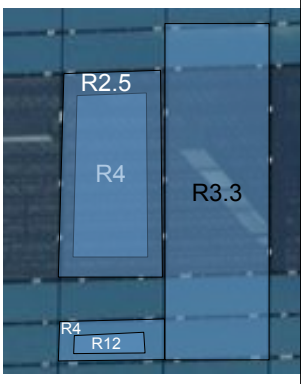
Heat Loss

- R-values
  - measures resistance to heat loss
  - Current code for walls, about R15
  - Current value for curtainwall / window-wall R2.5
- *Glazed part of building SIX times more heat loss*

Total Heat Flow

Curtain Wall Plan View





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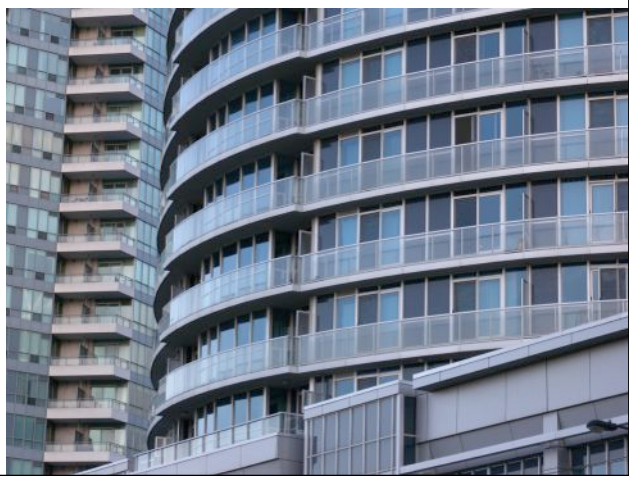
Windows and Curtainwalls No. 1680

Thermal Resistance

- Transparent Glazing (R3 to R4)
- Aluminum Frames (R1)
- Balconies (R1)
- Spandrels (R5)



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Solar Gain

- Modern windows allow 20 times as much solar heat gain as opaque insulated walls
- This creates the need for air conditioning
- Peak power needs are now summer afternoon
- Major AC loads on office buildings

Public Policy

- What durability is desirable?
- How do we avoid another thousand towers?
- High-rise is not equal to high density
- E.g. Vienna / Stockholm/Paris

Conclusions

- Higher energy performance should be demanded of our high-rise condos
- Consumers need to protected from future high energy /maintenance costs
- Plan now for longer-term high costs

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