



2017 ONPHA Conference and Trade Show

Shaping
OUR
Future

Session 303

Prolonging asset life
and saving you capital

PRESENTED BY:

Pretium Anderson Building Engineers

Sergio Laudisio, P.Eng. – Project Manager

Jennifer Hogan, B.Arch.Sci., C.E.T., RRO, LEED AP O+M – Branch
Operations Director and Project Manager

Learning goals

1. What is preventative maintenance?
2. Learn how to identify and address common maintenance deficiencies.
3. Maintenance deficiencies vs. Capital deficiencies (i.e. when to hire a consultant).
4. Cost of different maintenance strategies (i.e. preventative vs. deferral vs. neglect).
5. Learn how preventative maintenance affects your Capital Plan.



Agenda

- Who We Are
- Building Components – Top to Bottom
 - For Building Managers and Maintenance Technicians
 - Based on the most common failure mechanisms of building components only.
 - Managers should be able to recognize deficiencies and discern whether the issue should be resolved through a contractor or if a trained Professional is required.
- Breakout Sessions – Find the Deficiencies



Who We Are

- A professional engineering firm providing high-quality, evidence-driven services.
- Pragmatic Approach – Informed Decisions – Rewarding Results
- History:
 - Anderson Building Science Inc. – 1996
 - Pretium Engineering Limited – 2004
 - Pretium Anderson – 2010
 - A C3 Group member company - 1973
- 50 Employees, 4 Offices
- Commercial, residential, institutional, industrial, recreational and hospitality.

Burlington



Breslau – Waterloo Region



Toronto



Ottawa

*Satellite to the Toronto Office



Component Priority

Priority	Definition
1	Good (Low Priority) Obvious but minor aesthetic, functional or operational deficiency. No Repair or Replacement required for the next 5+ years.
2	Fair (Medium Priority) Generally in acceptable condition but is highlighted as an on-going annual expenditure or requires frequent maintenance, adjustment, reset, etc. or a serious aesthetic annoyance. Repair or Replacement in 2-5 years.
3	Poor (High Priority) Functioning unreliably, but imminent failure expected, requires major operator intervention. Repair or Replacement in 1-2 years.
4	Critical (Urgent Priority) System or component non-functional or missing or a severe visual annoyance. Repair or Replacement in 60 days.



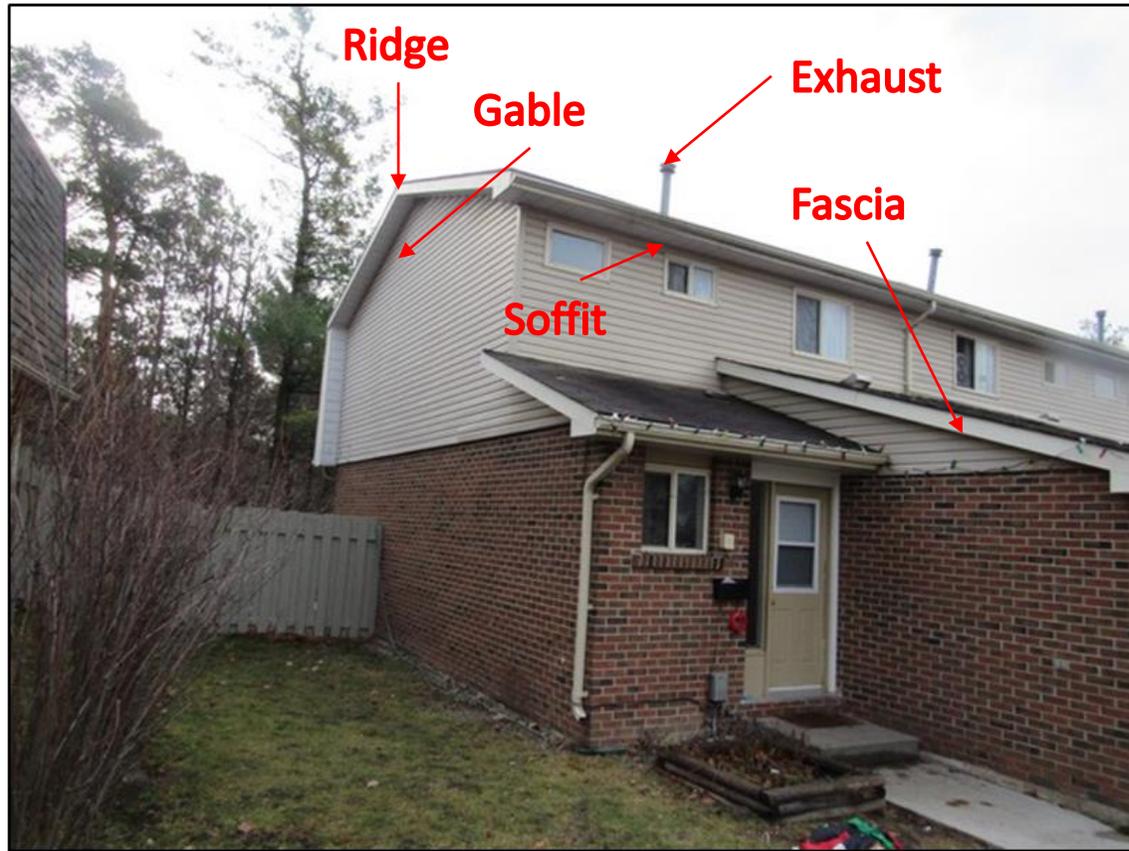
Facility Condition Index (FCI)

FCI Condition Rating	Definition	Percentage Value
Good	In new or well-maintained condition, with no visual evidence of wear, soiling or other deficiencies.	0% to 5%
Fair	Subjected to wear and soiling but is still in a serviceable and functioning condition.	> 5% to 10%
Poor	Subjected to hard or long-term wear. Nearing the end of its useful or serviceable life.	> 10% to 30%
Critical	Has reached the end of its useful or serviceable life. Renewal is now necessary.	> 30%



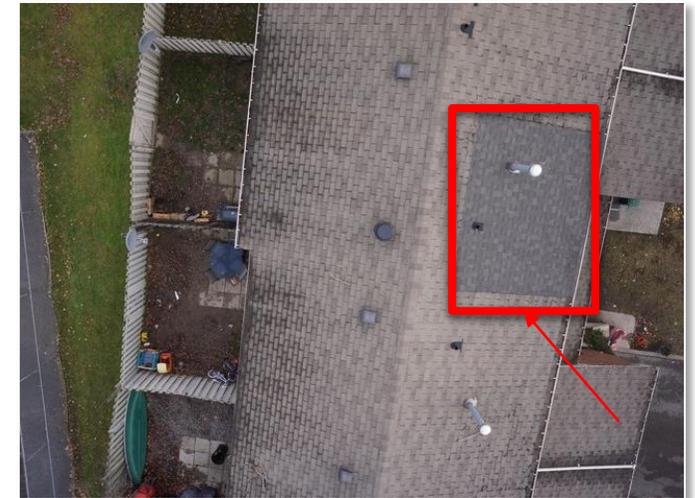
Starting on Top...Roofs

- Sloped Shingle Roofing



Starting on Top...Roofs

- Sloped Shingle Roofing



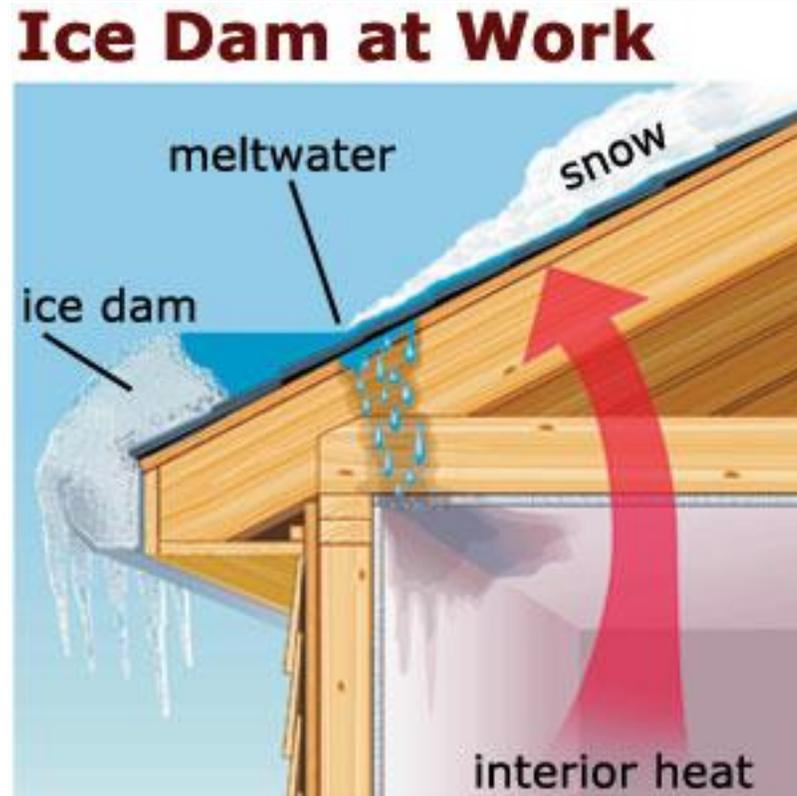
Starting on Top...Roofs

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Starting on Top...Roofs

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<http://theclimatchief.com/insulation-air-sealing/albany-ice-damming/>



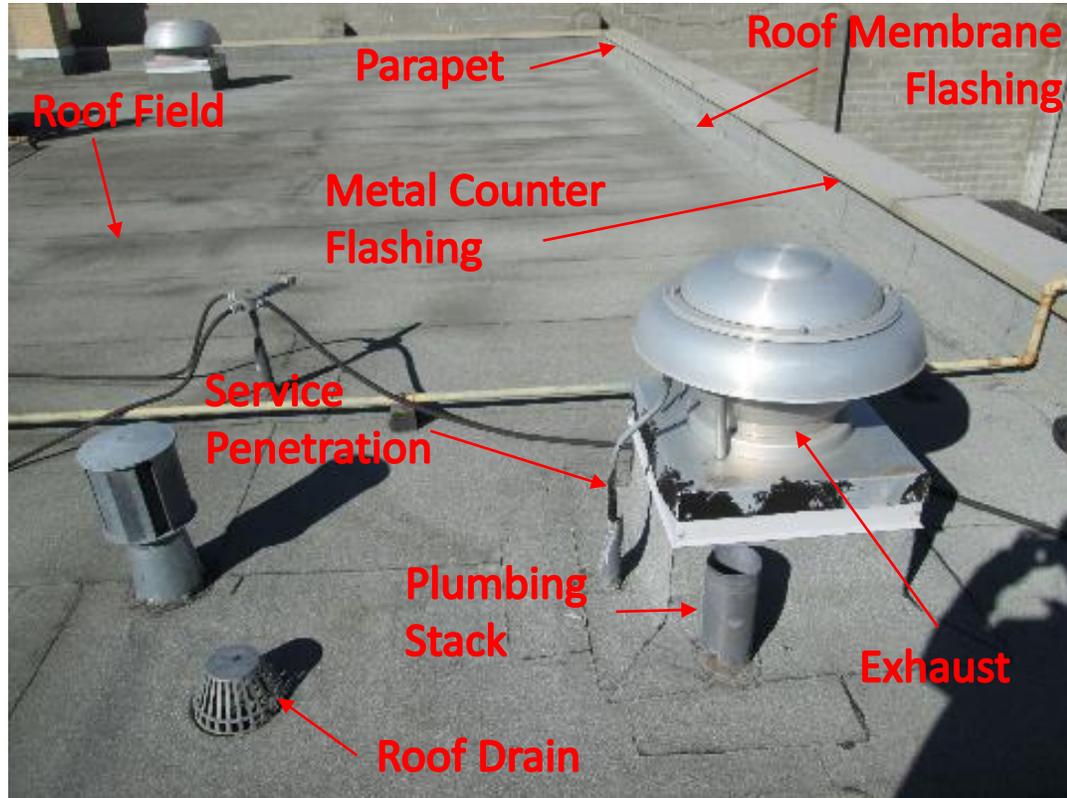
Starting on Top...Roofs

- Summary:
 - Expected Useful Life = 15 – 25 Years
 - South elevations tend to deteriorate faster
 - Trim back nearby trees - every Fall.
 - Check attics upon vacancies.
 - Remove organic growth – twice per year.
 - Respond to leak reports immediately.
 - Visual review for ice damming – every Winter.
 - Visual review of shingle deterioration – every summer.



Top...Roofs

- Low-Slope Roofing



- Built-Up Roof (BUR)
- 2-Ply Modified Bitumen
- EPDM
- Others (TPO, PVC, etc.)



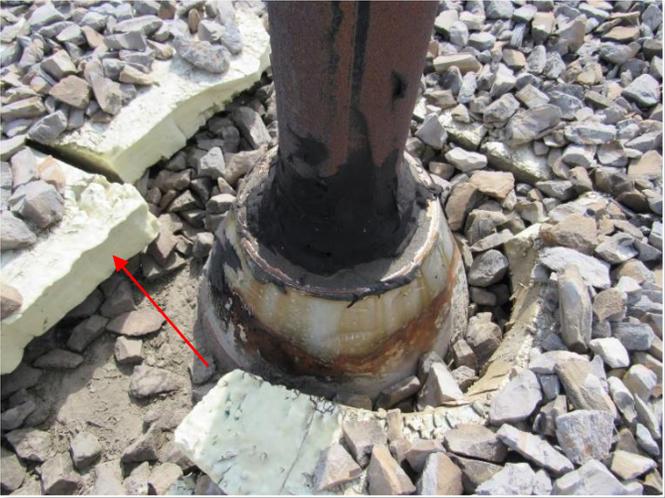
Top...Roofs

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Top...Roofs

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Top...Roofs

- Low-Slope Roofing



Top...Roofs

- Low-Slope Roofing



Top...Roofs

- Low-Slope Roofing Summary:
 - Expected Useful Life = 20 – 25 Years
 - Remove all organic growth – Twice per year.
 - Remove all debris - Ongoing.
 - Check ballast – Once per year.
 - Check pitch pockets – Once per year.
 - Check sealant around all penetrations – Once per year.
 - Address leaks immediately.
 - Intrusive Assessment on Roofs > 25 years old – Once every two or three years.
 - Warranty inspections – As required.



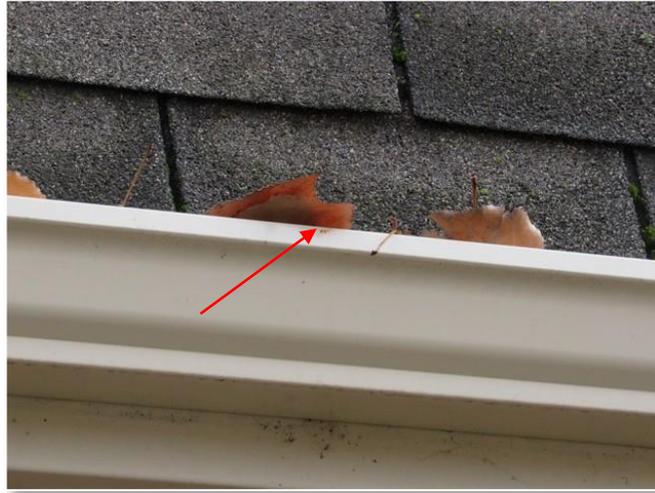
Eaves Troughs, Downspouts, Soffits, and Fascia (EDSF)



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Eaves Troughs, Downspouts, Soffits, and Fascia (EDSF)



Eaves Troughs, Downspouts, Soffits, and Fascia (EDSF)

- Summary:
 - Expected Useful Life = 25 – 35 Years
 - Check eaves trough – Once per year in the Fall.
 - Check downspouts – Twice per year in Fall and Spring.
 - Check soffits and fascia – Once per year.



Eaves Troughs, Downspouts, Soffits, and Fascia (EDSF)

- Breakout Session #1
 - Open envelope 1
 - Pass the photos around the table.
 - Discuss the maintenance deficiencies.
 - 10 minutes.



Summary of Breakout Session #1



P1 - Inverted Roof

Deficiency?
-Unevenly distributed ballast.

Maintenance Repair/Strategy?
-Redistribute ballast.

Deferred Repair?
-Slippery
-Membrane punctures at exposed areas
-Possible UV degradation
-Susceptible to wind uplift



P2 - Inverted Roof

Deficiency?
-Missing and failed sealant at a plumbing stack.

Maintenance Repair/Strategy?
-Remove and replace sealant.

Deferred Repair?
-Leakage into building.
-Interior finish repairs.
-Roof deck repairs.
-Mould remediation.



Summary of Breakout Session #1



P3 - Rooftop HVAC Unit

Deficiency?
-Loose debris.

-Maintenance Repair/Strategy?
-Remove debris.

Deferred Repair?
-Debris could be blown off roof.
-Debris could damage the membrane.



P4 - Inverted Roof

Deficiency?
-Two trees growing out of the roof.

Maintenance Repair/Strategy?
-Check if roots are through membrane. If so, contract a roofer to remove trees and repair membrane.

Deferred Repair?
-Leaks into building.
-Damage to interior finishes.
-Damage to the roof deck.
-Unhappy tenants.



Summary of Breakout Session #1



P5 - Attic

Deficiency?

- Poor air seal between the exhaust duct and the roof vent which is leaking warm air and condensing on the roof deck. The condensation has caused localized rot and mould growth in the wood deck.
- Damaged insulation on the duct.

Maintenance Repair/Strategy?

- Remove and replace the roof vent.
- Localized remediation of mould and/or rotted wood deck.

Deferred Repair?

- Major mould growth throughout the attic.
- Major decay in the wood deck (could eventually compromise the structure in that area).



P6 - Attic

Deficiency?

- Blocked soffit baffle.

Maintenance Repair/Strategy?

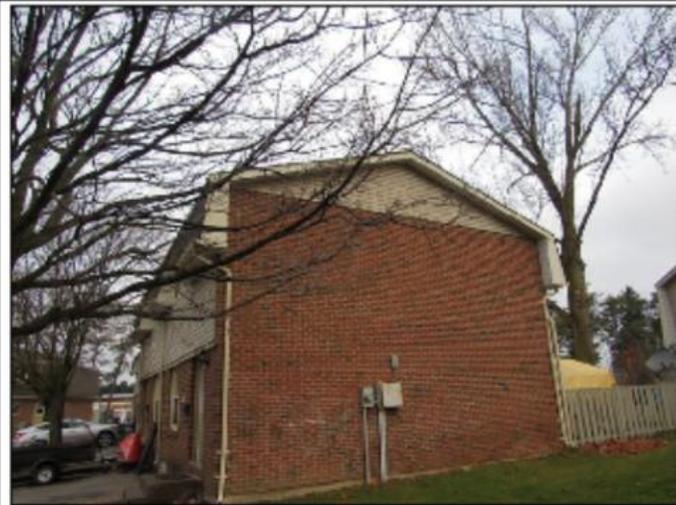
- Remove insulation inside the baffle.

Deferred Repair?

- Reduced ventilation in the attic can lead to overheating, which could cause severe ice damming in the winter and accelerated shingle deterioration in the summer.
- Potential for mould growth.



Summary of Breakout Session #1



P7 - Sloped Shingle Roof

Deficiency?

-Trees too close to the roof edge.

Maintenance Repair/Strategy?

-Trim back trees.

Deferred Repair?

-Organic growth on the roof.
 -Shingle deterioration.
 -Higher chance of damage due to insects and animals.
 -More frequently blocked eaves troughs.



P8 - Sloped Shingle Roof

Deficiency?

-Organic growth on the roof.

Maintenance Repair/Strategy?

-Remove organic growth and trim back trees.

Deferred Repair?

-Accelerated deterioration.
 -Reduced drying capacity after rain events.
 -Aesthetic issues.



Summary of Breakout Session #1



P9 - Sloped Shingle Roof

Deficiency?
-Ice damming

Maintenance Repair/Strategy?
-Multiple causes. Bring in a qualified consultant.

Deferred Repair?
-Accelerated deterioration of shingles.
-Premature failure of eaves troughs and downspouts.
-Safety hazard.
-Potential for structural damage to the roof deck.



P10 - Eaves trough and Downspout

Deficiency?
-Disconnected downspout.

Maintenance Repair/Strategy?
-Reconnect downspout and discharge away from foundations.

Deferred Repair?
-Brick deterioration.
-Garage door frame deterioration.
-Potential for leaks into the basement.
-Slipper conditions in the winter.

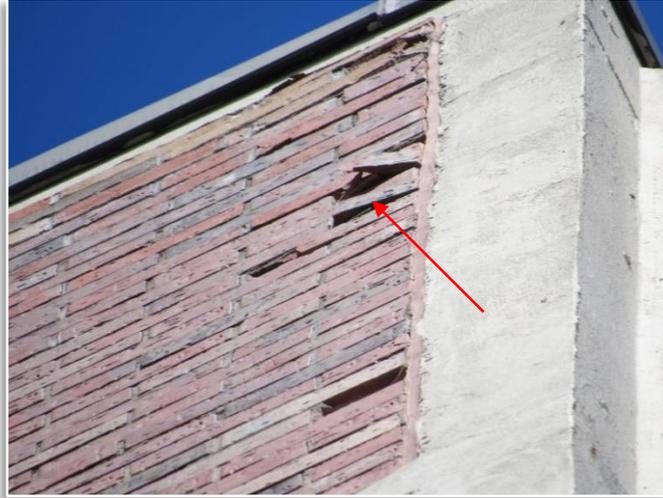


Exterior Walls



Exterior Walls

- Brick and Concrete Block



Exterior Walls

- Brick and Concrete Block



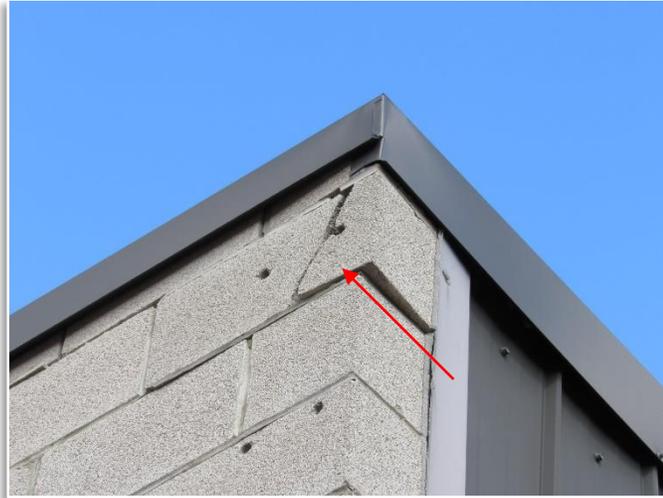
Exterior Walls

- Brick and Concrete Block



Exterior Walls

- Brick and Concrete Block



Exterior Walls

- EIFS / Stucco



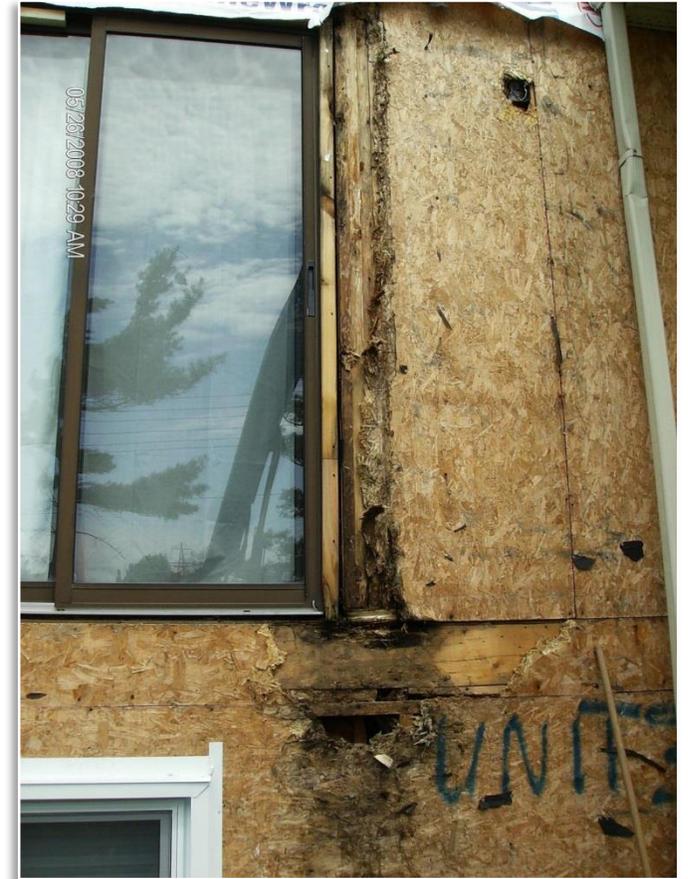
Exterior Walls

- Siding



Exterior Walls

- Siding



Exterior Walls

- Summary:
 - Expected Useful Life of Brick/Block = 100 Years
 - Expected Useful Life of EIFS = 25 Years
 - Expected Useful Life of Siding = 25 Years
 - Expected Useful Life of Sealants = 10 to 15 Years
 - Perform visual assessment of all exterior walls – Twice per year.
 - Check wetting patterns.
 - Check deterioration patterns.
 - Check for staining or efflorescence (salt deposits).
 - Deterioration below corners of windows.
 - Check mortar joints.
 - Address leaks immediately.



Exterior Walls

- Breakout Session #2
 - Open envelope 2
 - Pass the photos around the table.
 - Discuss the maintenance deficiencies.
 - 10 minutes.



Summary of Breakout Session #2

	
<p>P1 - Brick Veneer</p>	<p>P2 - Brick Veneer</p>
<p>Deficiency? -Dislodged bricks at top right corner.</p>	<p>Deficiency? -Missing brick.</p>
<p>Maintenance Repair/Strategy? -Knock off loose bricks. -Replace the bricks.</p>	<p>Maintenance Repair/Strategy? -Replace the missing brick.</p>
<p>Deferred Repair? -Potential safety hazard. -Water and air penetration into the building.</p>	<p>Deferred Repair? -Water and air penetration into the building.</p>



Summary of Breakout Session #2

	
<p>P3 - Brick Veneer</p>	<p>P4 - Window Lintel</p>
<p>Deficiency? -Brick deterioration beside the steps.</p>	<p>Deficiency? -Leakage behind wall and ceiling finishes.</p>
<p>Maintenance Repair/Strategy? -Repoint the mortar joints. -Obtain proper de-icing salts chemicals (i.e. urea or calcium magnesium acetate). -Avoid calcium and sodium chlorides</p>	<p>Maintenance Repair/Strategy? -Multiple causes. Bring in a consultant for investigation.</p>
<p>Deferred Repair? -Brick spalling. -Accelerated deterioration of bricks and joints leading to eventual air/water penetration.</p>	<p>Deferred Repair? -Deteriorated wall studs. -Deteriorated finishes. -Potential for mould growth. -Deteriorated structural elements.</p>



Summary of Breakout Session #2



P5 - Concrete Parapet Wall – Looking Down

Deficiency?

-Spalling and delamination of concrete at parapet.

Maintenance Repair/Strategy?

-Immediately have the loose pieces knocked off.
-This type of spalling is not typical and should be investigated. Bring in Consultant to review.

Deferred Repair?

-Safety hazard.
-Accelerated deterioration of the parapet wall/structure.
-Air/water infiltration.



P6 - Window Lintel

Deficiency?

-Corrosion on window lintel indicating a leak.

Maintenance Repair/Strategy?

-Multiple causes. Bring in Consultant to review.

Deferred Repair?

-Rot and mould growth within the wall assembly.
-Damage to structural elements.
-Damage to interior finishes.



Summary of Breakout Session #2



<p>P7 - Siding Penetration</p>	<p>P8 - Brick Veneer</p>
<p>Deficiency? -Poorly installed sealant at wall penetration.</p>	<p>Deficiency? -Spalling bricks.</p>
<p>Maintenance Repair/Strategy? -Remove and replace sealant.</p>	<p>Maintenance Repair/Strategy? -Have loose bricks knocked off – safely. -Replace bricks.</p>
<p>Deferred Repair? -Air/water leakage into the building. -Damage to interior finishes.</p>	<p>Deferred Repair? -Safety hazard. -Accelerated deterioration as more air/water are able to get behind loose bricks. -Deterioration of brick ties, window lintels, wall assemblies, and possibly structural elements.</p>



Summary of Breakout Session #2

	
<p>P9 - Brick Veneer</p>	<p>P10 - Brick Control Joint</p>
<p>Deficiency? -Efflorescence (salts).</p>	<p>Deficiency? -Adhesively failed and missing sections of sealant.</p>
<p>Maintenance Repair/Strategy? -Not typical. Bring in a Consultant to review. -Potential for major moisture issues within the wall assembly.</p>	<p>Maintenance Repair/Strategy? -Remove and replace sealant.</p>
<p>Deferred Repair? -Deterioration of brick ties and other structural elements. -Aesthetic issues.</p>	<p>Deferred Repair? -Air/water infiltration into building. -Insects.</p>



Windows and Doors



Windows and Doors



Windows and Doors



Windows and Doors



Windows and Doors



Windows and Doors

- Summary:
 - Expected Useful Life of Windows and Doors = 35 Years
 - Expected Useful Life of Sealants = 10 to 15 Years
 - Check sealants – Once per year.
 - Check corners of windows on the interior – Ongoing.
 - Check operability – Twice per year.
 - For high-rise multi-res buildings, check for open windows during precipitation events – Ongoing.
 - Check for closers on operable sashes – Ongoing.
 - Check for worn and damaged weather-stripping at doors and operable window perimeters.



Windows and Doors

- Breakout Session #3
 - Open envelope 3
 - Pass the photos around the table.
 - Discuss the maintenance deficiencies.
 - 10 minutes.



Summary of Breakout Session #3



P1 - Single Glazed, Metal Framed Window

Deficiency?

-Cracked and deteriorated window sealants.

Maintenance Repair/Strategy?

-Remove and replace sealants.
-Likely that all similar sealants are failing, in which case a Consultant should be involved.

Deferred Repair?

-Air/water infiltration.
-Deterioration within the wall assembly and interior finishes.
-Condensation and potential for mould growth.
-Tenant discomfort.



P2 - Single Glazed, Metal Framed Balcony Sliding Door

Deficiency?

-Ice on inside of door.

Maintenance Repair/Strategy?

-Multiple causes. Bring in a Consultant to review.

Deferred Repair?

-Not fully operable.
-Tenant discomfort.
-Air leakage into unit.
-Condensation and potential mould growth.



Summary of Breakout Session #3



P3 - Interior Wall Below a Bedroom Window

Deficiency?
-Deteriorated finishes.

Maintenance Repair/Strategy?
-Multiple causes. Bring in Consultant to review.

Deferred Repair?
-Leakage/deterioration within wall assembly.



P4 - Emergency Exit Door

Deficiency?
-Corrosion at base of door frames.
-Damaged baseboard.

Maintenance Repair/Strategy?
-Monitor during heavy rain event.
-Check sealants around outside of door.
-Check for ponding water outside of door.

Deferred Repair?
-Further deterioration of interior finishes.
-Further corrosion of door frame, requiring eventual replacement.
-Leakage into wall assembly.



Summary of Breakout Session #3



P5 - Single Glazed Window and Metal Sill Flashing

Deficiency?
Deteriorated window sealants.

Maintenance Repair/Strategy?
-Remove and replace sealants.
-Likely that all similar sealants are failing, in which case a Consultant should be involved.

Deferred Repair?
-Air/water infiltration.
-Deterioration within the wall assembly and interior finishes.
-Condensation and potential for mould growth.
-Tenant discomfort.



P6 - Main Entrance Double Doors

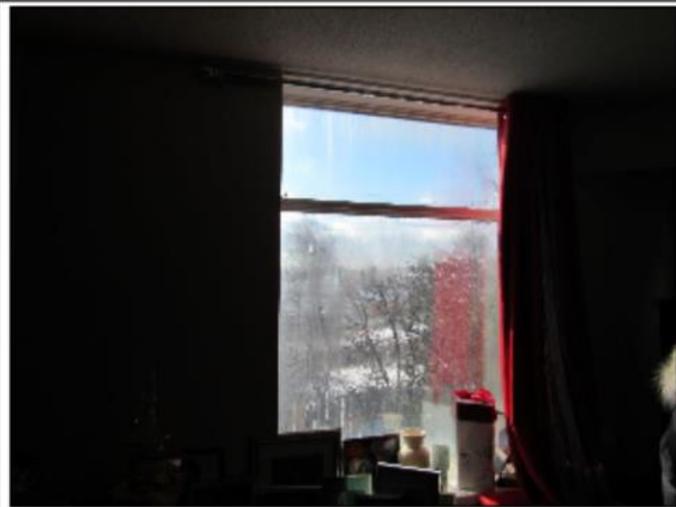
Deficiency?
-Large gap between entrance doors.

Maintenance Repair/Strategy?
-Install new weatherstripping.

Deferred Repair?
-Air leakage.
-Energy loss.



Summary of Breakout Session #3



P7 - Insulated Glass Bedroom Window

Deficiency?

-Failed insulated glass unit (condensation between panes).

Maintenance Repair/Strategy?

-Replace window.
-If widespread failure, a consultant should be involved.

Deferred Repair?

-Energy loss.
-Tenant complaints.



P8 - Insulated Glass Bedroom Window

Deficiency?

-Deteriorated window sealant.
-Failed insulated glass unit.

Maintenance Repair/Strategy?

-Replace window.

Deferred Repair?

-Energy loss.
-Air/water infiltration causing deterioration within wall assembly.



Summary of Breakout Session #3



P9 - Insulated Glass Hallway Window

Deficiency?
Mould on inside of window frame.

Maintenance Repair/Strategy?
-Replace window.
-If widespread failure, a consultant should be involved.

Deferred Repair?
-Air/water infiltration causing deterioration within wall assembly.
-Potential mould growth.



P10 - Living Room Spandrel Panel Windows

Deficiency?
-Mould on windows, frames, and back of spandrel panels.
-Damaged flooring and rug.

Maintenance Repair/Strategy?
-Multiple causes. Bring in Consultant to review.

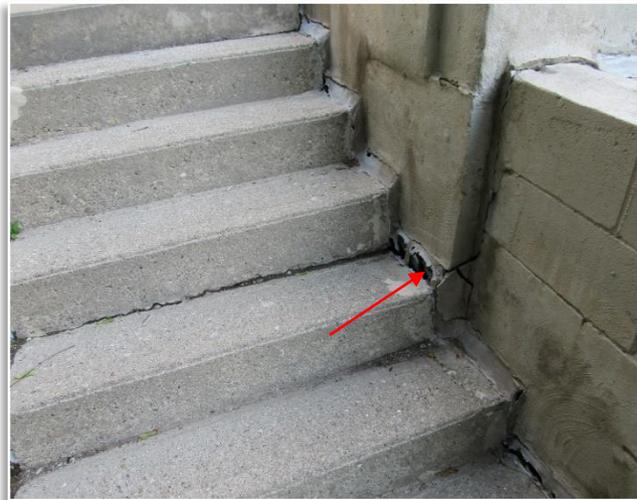
Deferred Repair?
-Further mould growth.
-Continued deterioration of window frame, wall assembly, structural elements, and interior finishes.



Site and Landscaping



Site and Landscaping



Site and Landscaping



Site and Landscaping

- Summary:
 - Check wood elements (e.g. decks, posts, beams, etc.)
 - Check guard railings
 - Check fences and retaining walls
 - Check height of grading around the foundation walls
 - Obtain proper de-icing salts chemicals (i.e. urea or calcium magnesium acetate)
 - Avoid calcium and sodium chlorides



Structural Elements



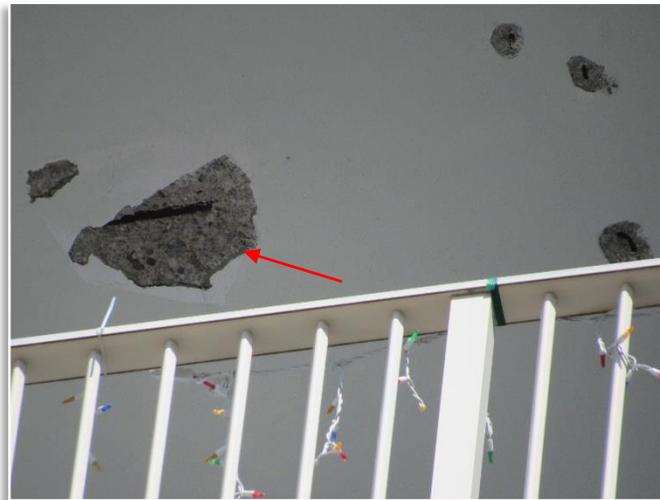
Structural Elements

- Balconies



Structural Elements

- Balconies



Structural Elements

- Parking Garages



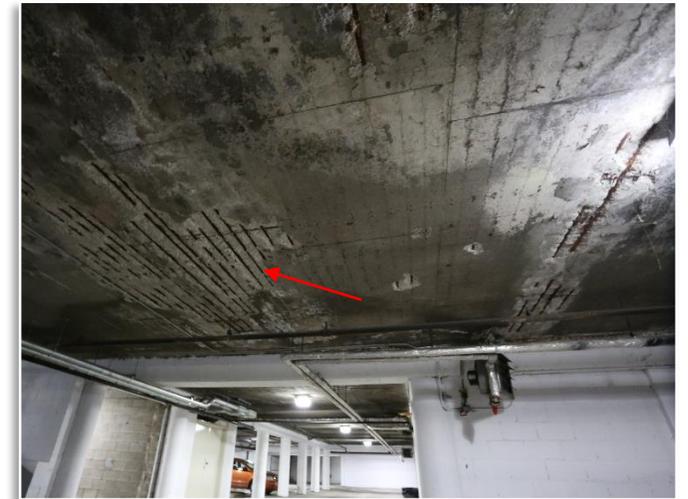
Structural Elements

- Parking Garages



Structural Elements

- Parking Garages



Structural Elements

- Balconies:
 - Expected Useful Life of Guards = 30 Years
 - Expected Useful Life of Slab Waterproofing = 20 Years
 - Expected Useful Life of Structure = Life of Building
 - Visual Review from Exterior – Once Per Year.
 - Check for Staining (i.e. corrosion) – Ongoing.
 - Check for Cracking – Ongoing at Tenant Turnover.
 - Remove Carpets – Ongoing at Tenant Turnover.
- Parking Garages:
 - Expected Useful Life of Roof Slab Waterproofing = 30 Years
 - Expected Useful Life of Expansion Joint Waterproofing = 25 Years
 - Expected Useful Life of Structure = Life of Building
 - Walk-through Entire Garage – Twice per year.
 - Check for Cracking – Ongoing.
 - Check for Leaks – Ongoing.



Contracting Out Preventative Maintenance

- Tips:
 - Local
 - Approved contractors only
 - Poor quality repairs can be costly
 - Majority of failures caused by installation, not the material
 - Seek out help from qualified consultants



Potential Project Costs

Ignored Deferred Maintenance With Regular Maintenance

