

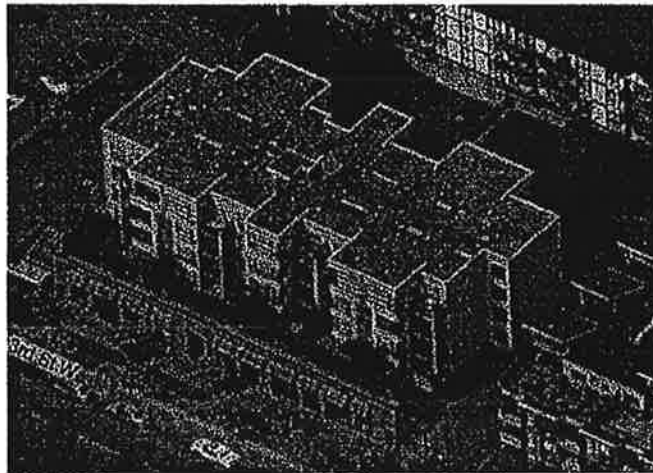


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Building Envelope Assessment

**The Vogue
124 3rd St W
North Vancouver, BC**



Presented to:

**The Owners, LMS 3459
c/o Ascent Real Estate Management
2176 Willingdon Avenue
Burnaby, BC V5C 5Z9**

**June 9th, 2009
File No. 5038**

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1 INTRODUCTION

1.1 Terms of Reference

Apex Building Sciences Inc. was engaged by the Owners, LMS 3459 to conduct a review at the above noted complex and to report on the condition of the building envelope.

1.2 Scope of Work

The scope of work for this assessment includes, but is not limited to investigation of the following areas:

- General cladding conditions
- Doors and windows
- Balconies and guard railings
- Vents
- Roofing system
- Parkade

This investigation is not intended to be a comprehensive survey to confirm all locations that may be affected by moisture, but to be a review of building envelope components to be used to identify problems and where potential problems may occur. Field investigations were carried out on May 8th, and June 4th, 2009.

1.3 Basic Information

The Vogue building is a four storey multi-residential, wood framed structure with a two storey parkade constructed partially below grade. The front of building also has commercial units along West 3rd Street (Photos 1-2). The West facing wall is a concrete block firewall with no fenestration (Photo 3). The building contains 40 residential units and five commercial units. The exterior is clad with a combination of rainscreen stucco on all four storeys of residential units and rainscreen brick masonry cladding over the commercial area. The windows are aluminum framed with insulated glazing units. The commercial units have storefront type windows and doors with steel and glass awnings over. There are balconies or patios attached to all 40 units. The flat roof is a 2-ply SBS membrane system installed approximately ten years ago when the building was constructed.

1.4 Limitations

This report discusses observed deficiencies and details of concern as well as any results for tests undertaken. Many of the comments that are presented in this report are based upon our experience with buildings of a similar design and construction in coastal British Columbia.

As the result of our firm's experience in the local area, we have become aware of problems that may arise or occur in wood frame buildings. Many of the observations may not be a violation of the BC Building Code, but are of concern based on our experience with similar buildings exhibiting failures.

Mitigating leakage involves the process of elimination regarding identifying leak sources. Sometimes primary sources of leaks must be identified and stopped before more subtle, secondary sources can be identified. Our moisture testing and infiltration pathway identification is potentially the first of two or more investigation steps needed to identify leakage pathways. Accordingly, if leakage persists after repair efforts, additional investigation and repair efforts would be needed.

This report is specifically designed for the owners' information and use. Apex Building Sciences' objective in producing this survey is to not only provide our client with a list of deficiencies, but to create an overall sense of awareness which we feel is required to properly maintain the property. The visual evaluation intends to provide a picture of processes at work.

This report has been prepared in accordance with generally accepted building science engineering practices. No other warranties, expressed or implied, are made as to the professional services provided under the terms of Apex Building Sciences' and included in this report.

Conclusions, recommendations or opinions presented in this report must be viewed in light of the information available from the scope of work outlined and cannot be extended to portions of the site which were unavailable for direct observation or situations reasonably beyond the control of Apex Building Sciences Inc.

2 INVESTIGATION OF EXISTING CONDITIONS

2.1 Occupant Survey

Apex Building Sciences Inc. prepared a questionnaire that was distributed to the residents at The Vogue. The occupants were asked to review and report on indications of moisture ingress, condensation, drafts at windows, or other similar concerns. Most of the returned questionnaires reported concerns related to difficult operation and/or misalignment of the balcony sliding door. A couple of tenants have reported issues with the condition of their balcony membrane. The issues reported in the occupant survey confirmed many of the observations made during Apex's site assessment. A table summarizing the owners' responses is outlined in Appendix B.

2.2 Field Observations

During the course of the investigation it became apparent that the rainscreen stucco cladding is performing as intended with no observable issues affecting the vertical wall surfaces. This was confirmed by tenant comments regarding no water ingress issues into the occupied space from exterior wall and window areas. It is the intent of this assessment to provide a summary overview of the building envelope issues relating to water ingress or potential for water ingress, and if required, to present a rehabilitation program which will ultimately resolve any of the envelope problems identified.

The conclusions of Apex Building Sciences Inc. contained in this report are based observations of surface details and performance history of these wall assemblies in the local environment. Apex Building Sciences Inc. cannot assume any responsibility for concealed conditions and deficiencies.

3 REVIEW of ASSEMBLIES

3.1 Cladding

There are primarily three types of wall assemblies at the Vogue. The west facing concrete block firewall and the rainscreen brick cladding along the commercial units were observed to be performing adequately. The highly exposed areas covering all four storeys of residential units have rainscreen stucco cladding with an acrylic finish. These areas appear to be functioning adequately with ventilation gaps provided at every floor level with through-wall-flashing and at the head of the sliding doors and windows (Photo 4). The following observations were made concerning the exterior cladding:

- A gumlip flashing along the West facing firewall was found to have poorly installed sealant and not completely adhered to its substrate (Photos 5-8)
- A flashing on the East foundation wall was found to be damaged and should be repositioned (Photo 9)
- Typical staining on the cladding due to rainwater runoff from the balconies with no provision for rainwater management (Photo 10)
- Some minor damage and cracks in the foundation wall should be patched and repainted. These areas do not appear to cause any water ingress into the structure (Photos 11-13)
- An interior standing pipe in the East stairwell was found to be unfinished around the pipe penetration into the adjacent wall (Photos 14-15)

The visual observations outlined above were typically found to be location specific. The cladding assembly has generally been detailed correctly and no major issues were found.

3.2 Windows and Sliding Doors

The windows and sliding doors are aluminum framed assemblies, with insulated glazing units (IGU's). Most appear to be the originally installed

units. There are head flashings, however no sill flashings around the windows or doors to direct water from the assembly transitions (Photos 16-17). Sill flashing was not a building code requirement when the building was designed. Properly installed head flashings direct water away from the cladding at the window opening at the top of the window. Sill flashings direct water away from the cladding face that flows down the outside of the windows. All windows investigated appeared to be functioning adequately with no failed IGU's. Windows of this configuration have a service life of approximately 20-25 years dependent on various factors. According to the observed data on the building plans, these windows are approximately ten years old. Additional observations at and around the windows or doors include the following:

- The stucco cladding terminates tight against the window frames not allowing for expansion and contraction of the two different building materials. The building code mandates that a caulk joint is required between dissimilar materials (Photos 18-19)
- A dry gasket on removable glazing stop was found to be damaged at one location on Unit #509's living room window (Photo 20)
- A piece of jagged metal was found at the sill of a window adjacent to the South patio walkway (Photo 21)
- The sill trim on most patio sliding doors should be repainted (Photo 22)
- The adhered membrane flashing at the sliding door sills are typically failing and bleeding onto the balcony vinyl membrane. This may be due to inadequate detailing or incompatible membranes (Photos 23-24)

Aluminum windows are typically constructed in a factory with a common extrusion cut at 45 degrees to form the mitred corners. The mitred corners are held together with a screw through the extrusion which penetrates into the adjoining piece. Sealant is then applied at the interior of the mitred joint. At the window sills the condensation track is provided to collect any condensation running down the interior of the windows and direct that moisture out of the assembly through weep holes drilled through the extrusion. Failures in the sealant at the mitred corners are common due to the movement at rough openings which causes the sealant to become brittle with time. Moisture penetrates the joint and deteriorates the sill and the wood framing below the window due to a lack of a secondary barrier.

3.3 Caulking

Caulking is a flexible sealant compound primarily used to seal joints between dissimilar materials in the building envelope assembly. Every second year a qualified caulking contractor should perform the following:

- Inspect all caulking joints.
- Inspect for missing or discontinuous sealants.
- Remove and replace sealant that has dried or hardened or that has lost adhesion or cohesion with the substrate.
- Provide a regular maintenance schedule.

Caulking should not be installed at horizontal joints as caulking at these locations may cause water to be trapped. These specific conditions should be reviewed during the repair process.

The existing sealants at The Vogue are still flexible and well adhered at all locations inspected. However, caulking is required under the BC Building Code between dissimilar materials and this has not been done at The Vogue. The windows and doors were not sealed at the termination with the stucco, and the stucco was not properly terminated with stucco stops against the windows. Ideally a small gap should be left between the frame of the window and the stucco to allow for the installation of backer rod and caulking.

3.4 Balconies, Guards and Soffits

The balconies at The Vogue are constructed with a sheet type waterproof vinyl membrane over a wood substrate. The balconies are sloped to allow water to drain off the edge of the balcony with no provision for rain water management. A visual assessment of the balconies was conducted and the following observations were recorded:

- The vinyl membrane is curling back along the perimeter of the balcony in one location on the South elevation (Photo 25)
- Cuts and split membranes were noted in a few locations allowing water direct access to the plywood substrate (Photos 26-27)
- A diverter angle flashing has been installed to minimize rainwater runoff onto the building façade. However, the Owners should consider having gutters installed around all balconies to manage all surface runoff and minimize organic build-up on the balconies below (Photos 28-29)
- Staining and organic build-up was present on some balconies. Most balconies appeared to be cleaned periodically. The accumulation of debris and organic build-up can negatively affect the performance of the membrane (Photos 30-32)

Many balcony membranes are exhibiting various signs of distress. A few tenants have reported issues with their balcony including loose, split and/or bubbled membrane. The upkeep and performance of the balcony membrane is critical to preserve the structural integrity of the wood substrate and joists below it. The balcony membrane has an effective service life of approximately 10-12 years. Replacement of the membrane system is recommended.

3.5 Roofing

The main roof assembly used at The Vogue is a 2-ply Styrene Butadiene Styrene (SBS) membrane system. The torch-on membrane appears to be in relatively good condition, with adequate overlapped seams and parapet cap flashings incorporating proper standing seams. However, some deficiencies were evident and should be addressed. A visual assessment of the roof was conducted and the following concerns were noted:

- The roof appears to be adequately sloped to a central drain, however stagnant water has built-up due to a clogged strainer on the drain (Photos 33-34)
- A 2x4 supporting an HVAC unit is beginning to deteriorate. Any wood member in contact with the roof should be pressure treated (Photo 35)
- Organic build-up was noted in many locations on the roof surface. All organic build-up including moss should be removed on a semi-annual basis (Photo 36-39)
- Concrete pavers can substitute for a splash pad, however the adjacent organic-up build-up should also be monitored and removed periodically (Photo 40)
- A few locations were noted to have bare spots missing the cap sheet granular. These locations must be patched to avoid further UV deterioration of the membrane (Photos 41-43)
- A poorly detailed overflow scupper relies on the pipe's perimeter sealant to keep water out of the wall cavity. This scupper system must be closely monitored to ensure continuous adhesion to its substrate. We recommend revising all roof scuppers with more adequate detailing (Photo 44)
- A roof vent was found to be damaged in one location (Photo 45)

3.6 Parkade

Leaks have been reported and are evident in the below grade parking structure at The Vogue. It was noted during the site review that one leak is originating from a sanitary pipe penetration through the South foundation wall (Photos 46-47). We would recommend the existing membrane to be reviewed for waterproofing and tested as necessary in this specific location. Additional observations in the parkade include the following:

- A few hairline cracks were noted, however the cracks do not appear to be active (48-50).
- A leak adjacent to a foundation wall-tie appears to be causing the metal tie to corrode and stain the interior wall finish (Photo 51)
- The traffic membrane located in the commercial parking area was found to be damaged in one location (Photo 52)

3.7 In-Suite Humidity

An additional possible source of high moisture in the walls of modern residences is moisture escaping from the suites caused by high humidity within the suites. This humidity can permeate to the exterior wall assembly at poorly sealed penetrations of the vapour barrier and condense at colder points in the wall cavity such as near corners or at window openings which are generally not well insulated. The suites may be equipped with upgraded bathroom fans and dehumidistats in order to reduce the in-suite humidity to acceptable levels. Operating de-humidistat devices on bathroom fans detects excessive moisture and causes the bathroom fan to start and stop

automatically to exhaust excessive moisture. The occupants must maintain the in-suite humidity at acceptable limits. The correct year round setting for this location is 40%. The occupants should be advised to use the kitchen and bath exhaust fans when moisture-producing activities are on-going. Dryer exhaust ducts should be checked for proper connection or blockage and the residents should clear the dryer lint trap after every use.

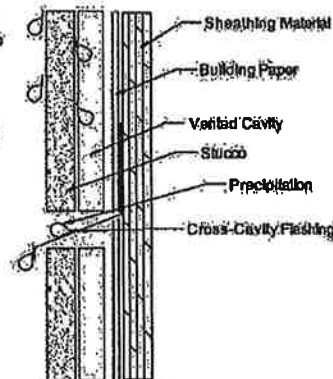
An indication of high in-suite humidity is condensation on the interior glass surface of the windows, particularly on a cool morning. Occupants should be instructed to observe moisture on the glazing, particularly on colder days and report accordingly. Moisture that forms on the warm side of the glazing that can be wiped off by the occupants is a sign of excessive humidity in the suite. The maintenance personnel should inspect for similar conditions and investigate for properly used exhaust fans and for blocked exhaust ducts and vents. These conditions should be reviewed and appropriate corrective action taken.

4 RAINSCREEN PRINCIPLE (for information only)

The rainscreen cladding system installed on The Vogue is recommend and now required by the British Columbia Building Code (BCBC) 2006 for long-term durability in the Lower Mainland's temperate climate. This system is expected to have good moisture control due to pressure equalized rainscreen principles which drain incidental moisture from behind the cladding and provide a continuous moisture and air barrier system at the surface of the sheathing. This assembly also reduces the air pressure differential across the assembly that can force moisture to the interior. Below is a diagram of a 'Rain-Screen Assembly' which is the system used on The Vogue.

Rain-Screen Assembly

The cavity utilized in a rain-screen assembly is pressure equalized, so pressure differences have a reduced effect on precipitation penetrating the cladding. When moisture gets behind the cladding, the cavity directs the moisture to a cross-cavity flashing where it can drain from the wall assembly.



5 RECOMMENDATIONS

This section summarizes the repair and replacement strategies that Apex Building Sciences Inc. recommends for The Vogue. The following repairs, maintenance and monitoring should be implemented in the near future.

5.1 Cladding

- Remove and reinstall caulking on gumltp flashing on the West facing firewall (Photos 5-8)
- The metal flashing on the East foundation wall was found to be damaged and should be bent back into its correct position (Photo 9)
- Repair and repaint cracks and spalled concrete found on exterior face of foundation wall (Photos 11-13)

5.2 Windows and Sliding Doors

- Repair loose dry gasket on removable glazing stop on Unit #509's living room window (Photo 20)
- The piece of jagged metal found at the sill of a window adjacent to the South patio walkway should be removed (Photo 21)
- Repaint the sill trim on targeted patio sliding doors (Photo 22)

5.3 Balconies

- Replace all balcony membranes.
- Replace damaged balcony framing and plywood at balcony decks as required ensuring a positive slope away from the building.
- Install a 60 mil vinyl membrane system returning vertically eight inches and over door sills on balcony locations.
- Rectify any structural issues (during a repair process) that may exist on balcony areas.
- Remove and reinstall all existing face mounted guards.
- Option: install new gutter and downspout system to every balcony.

5.4 Roofing

- The roof should be inspected and maintained on a regular basis.
- Clear roof drain strainer of debris on a regular basis.
- Remove all moss build-up on membrane surfaces on a semi-annual basis.
- Remove and replace 2x4 supporting HVAC unit with pressure treated wood or neoprene pads.
- Repair roof vent insect screens were necessary
- Repair bare spots missing granular on the SBS cap sheet
- Remove all roof scuppers and install new with improved detailing.

5.5 Parkade

- Identify the source of all leaks along the foundation walls. If the area is deemed to have an active moisture passage, then the existing membrane needs to be reviewed for waterproofing and tested as necessary.

5.6 In-Suite Humidity

- Maintain the in-suite humidity at acceptable limits at all times. The correct year round setting for the conditions found in the Lower Mainland area is 40%.
- Check dryer exhaust ducts for proper connection or blockage and have occupants clear the dryer lint trap after every use.
- Use exhaust fans when moisture-producing activities are on-going.

6 SUMMARY

The detailed assessment of repairs recommended should be scheduled in the immediate future to prevent further water ingress and the associated deterioration of the building components.

Apex Building Sciences Inc. would be pleased to perform the following:

- Prepare drawings and specifications.
- Provide tendering to qualified contractors.
- Provide contract review.
- Provide inspection services.
- Provide certification of the repairs.

Apex Building Sciences Inc. personnel are available to review the contents of this report with you at your convenience. Please contact the undersigned to arrange a meeting.

Respectfully submitted,

Apex Building Sciences Inc.

Prepared by:



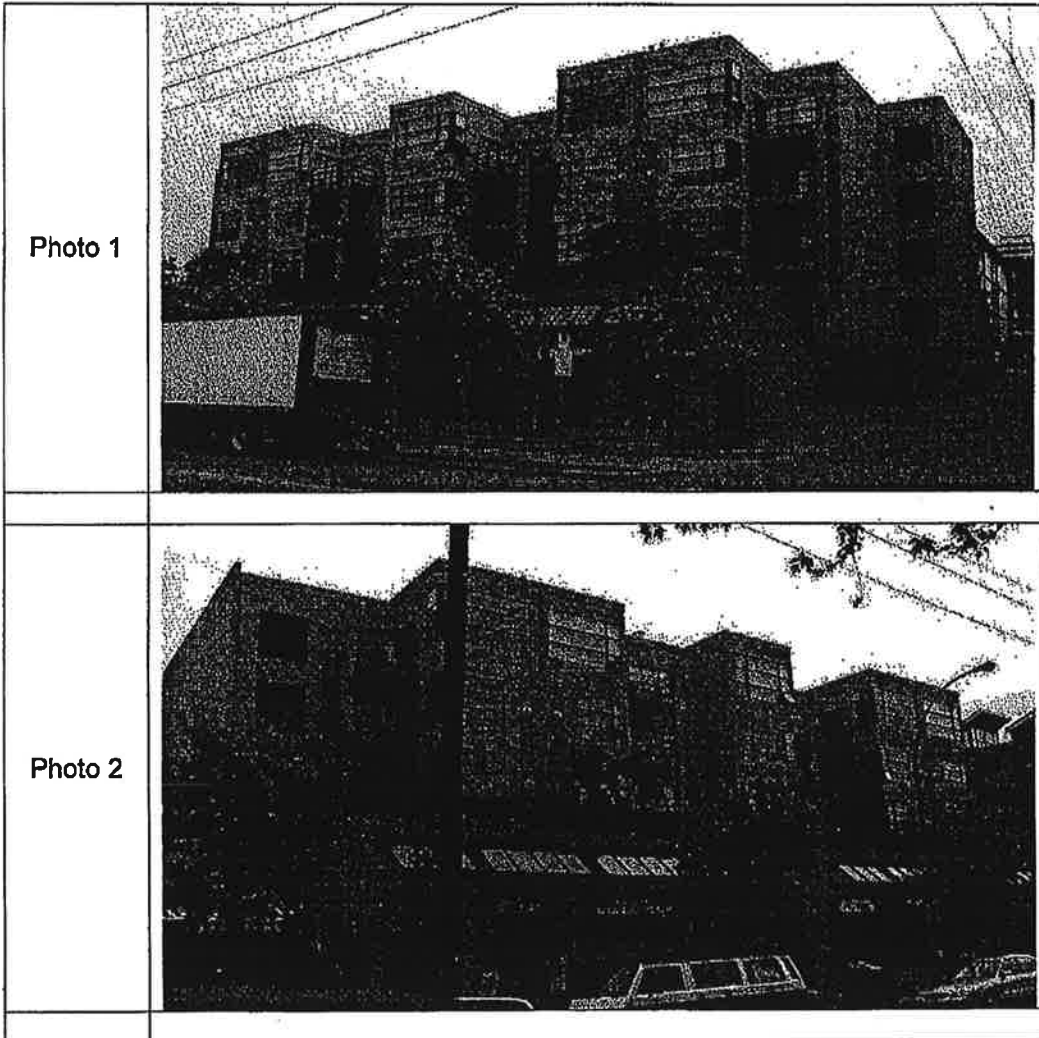
James Jackins, *Dipl. Tech.*
Consultant

Reviewed by:



C.V. Desrosiers, *P. Eng.*
President

7 APPENDIX A: PHOTOGRAPHS



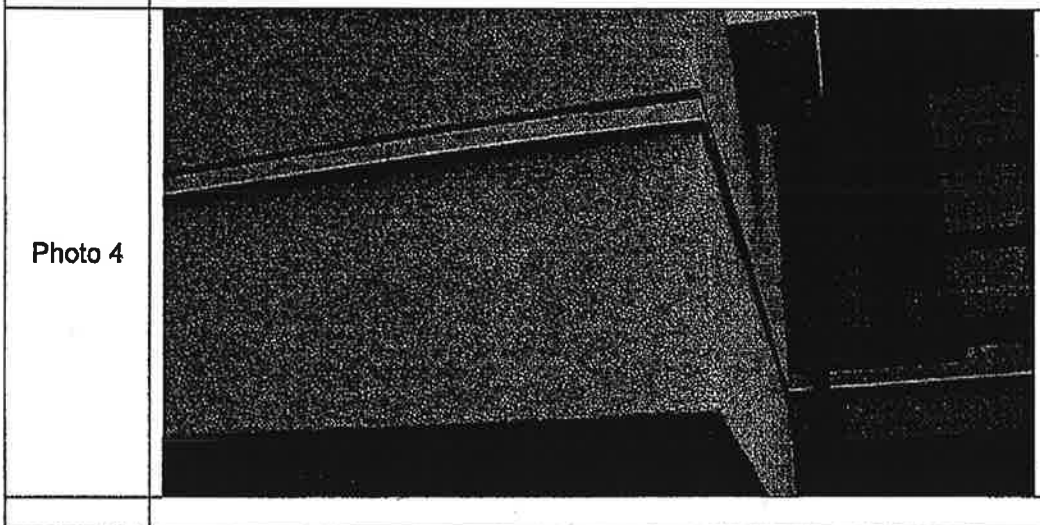
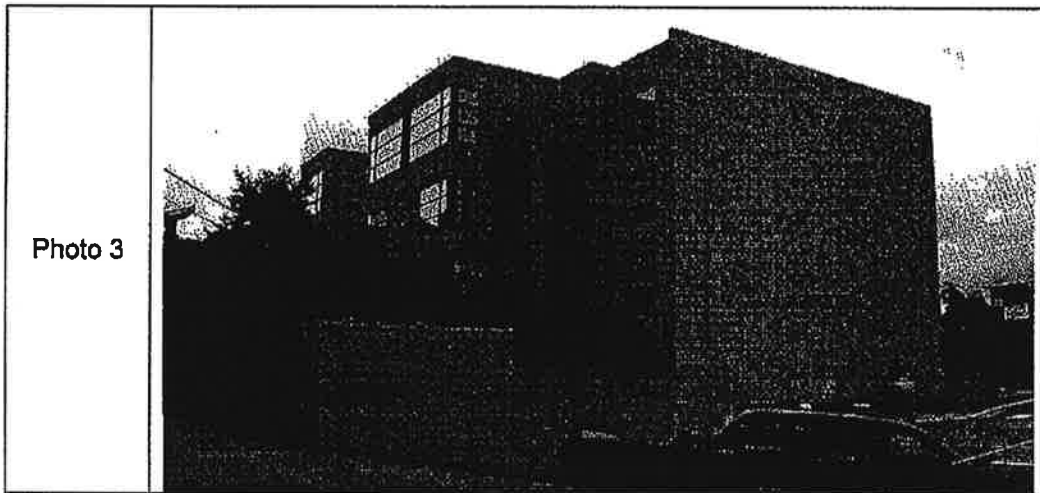


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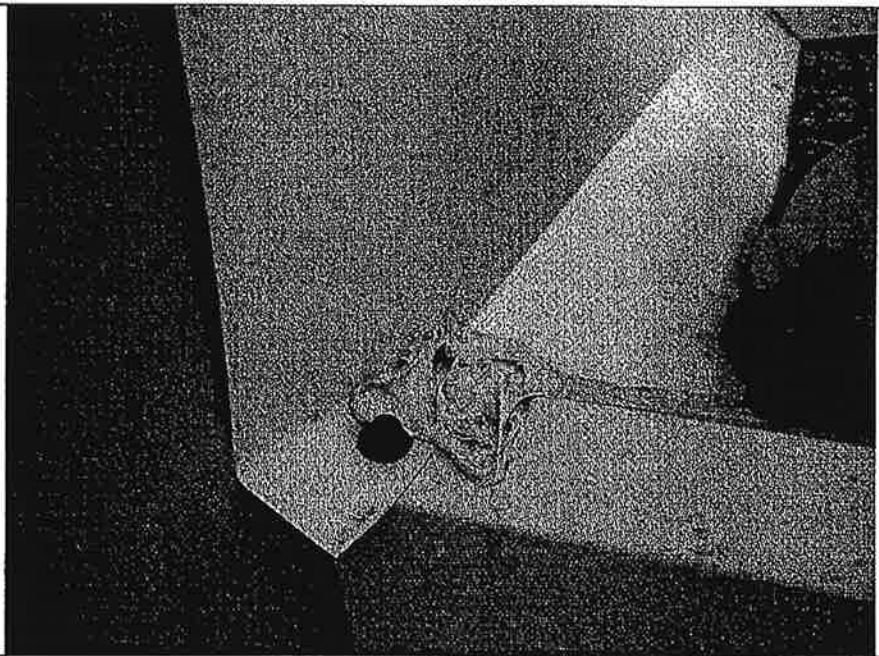
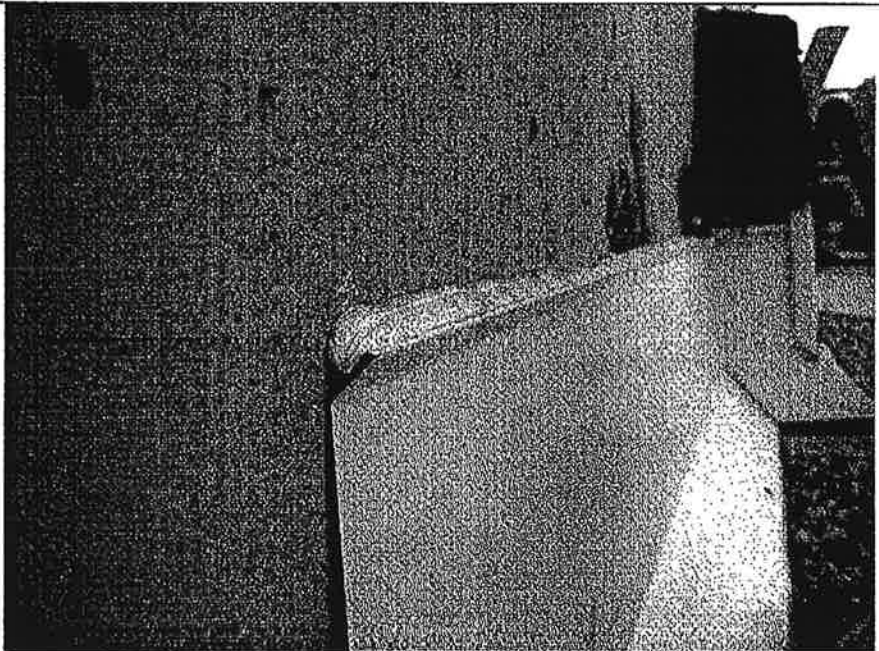
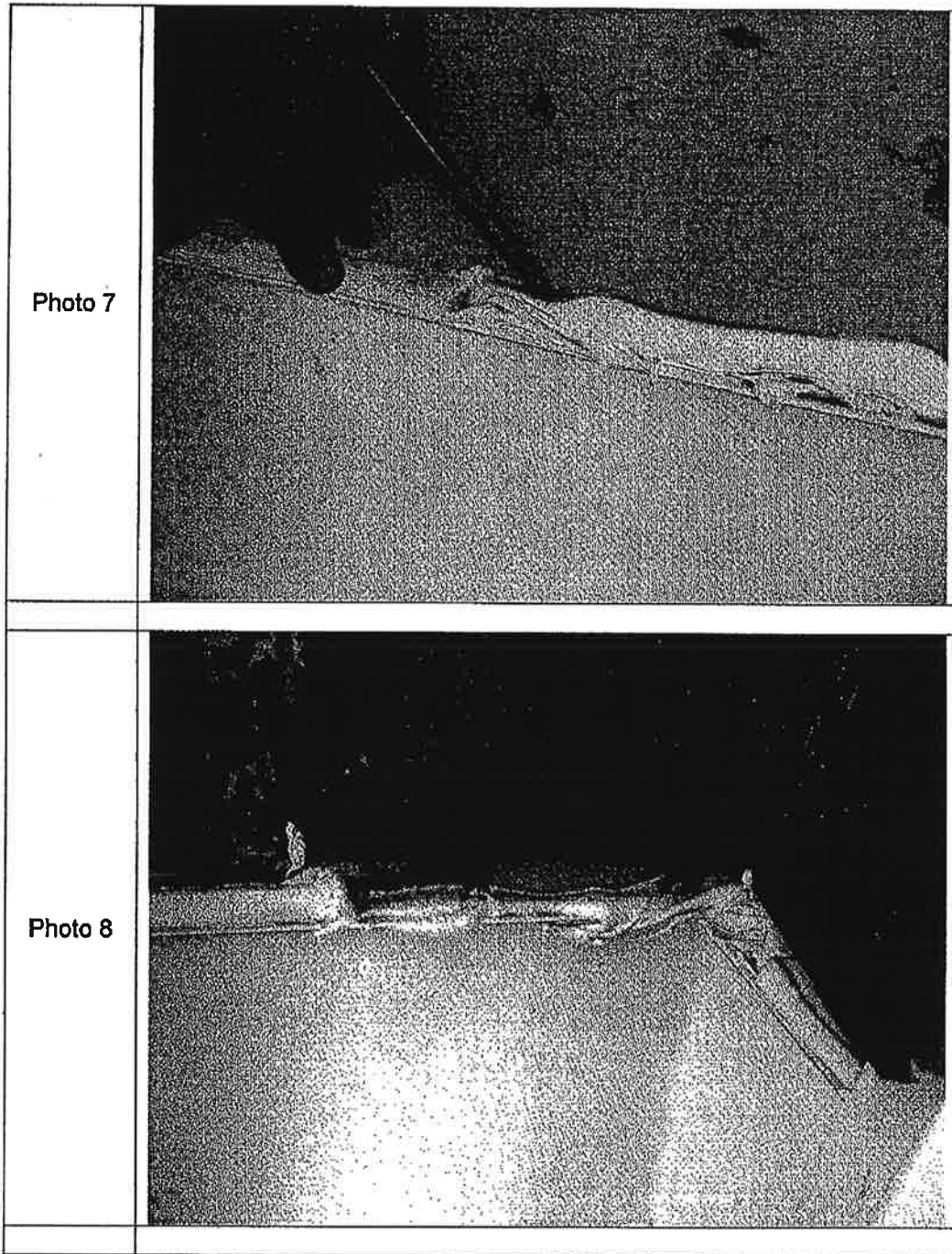
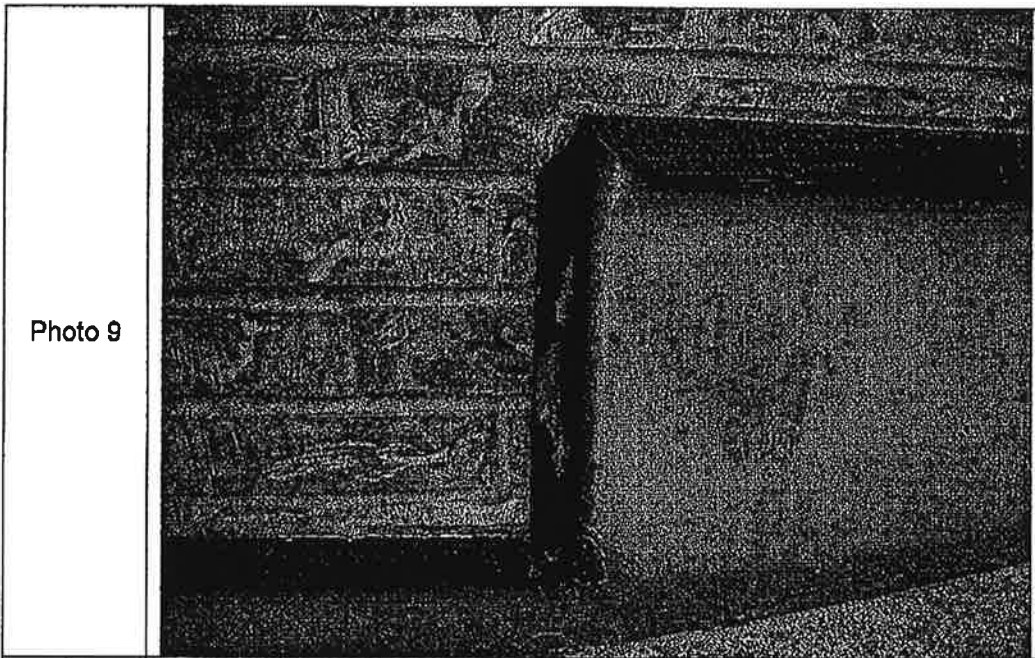
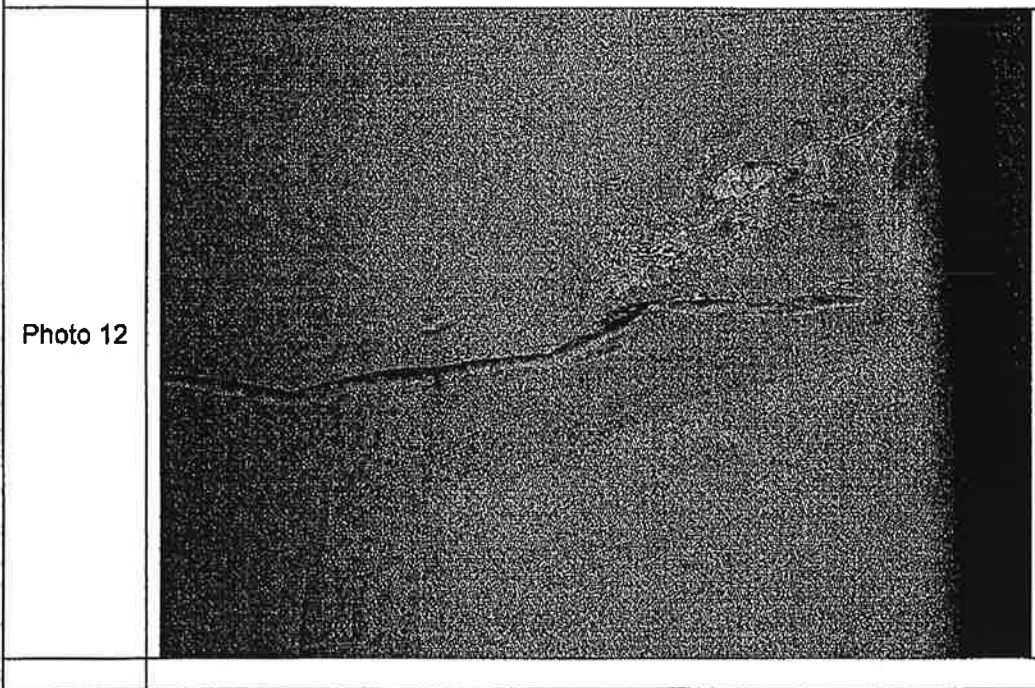
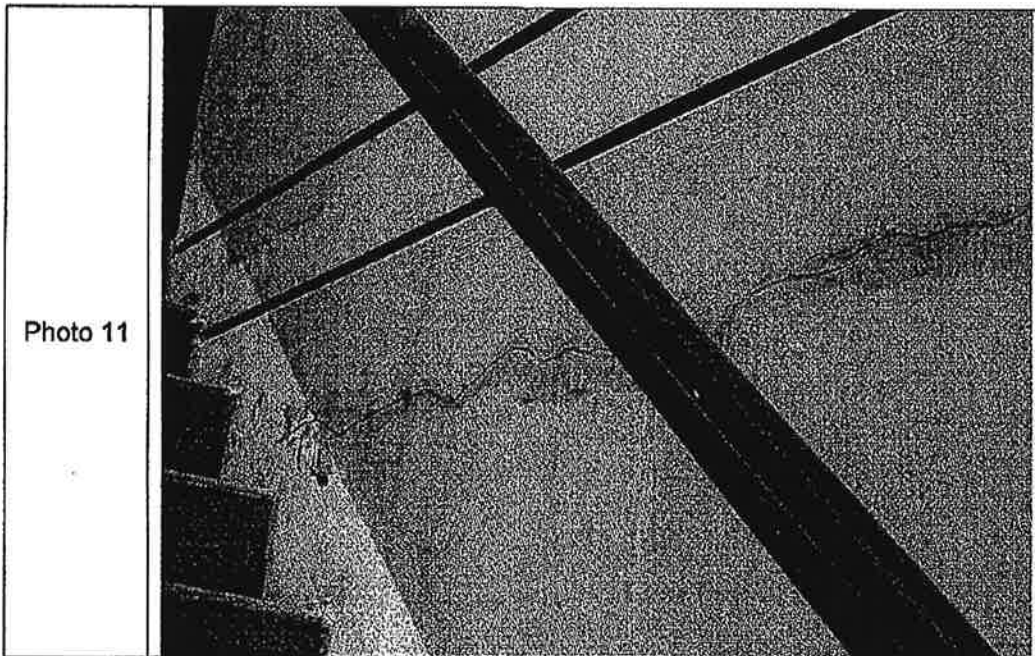


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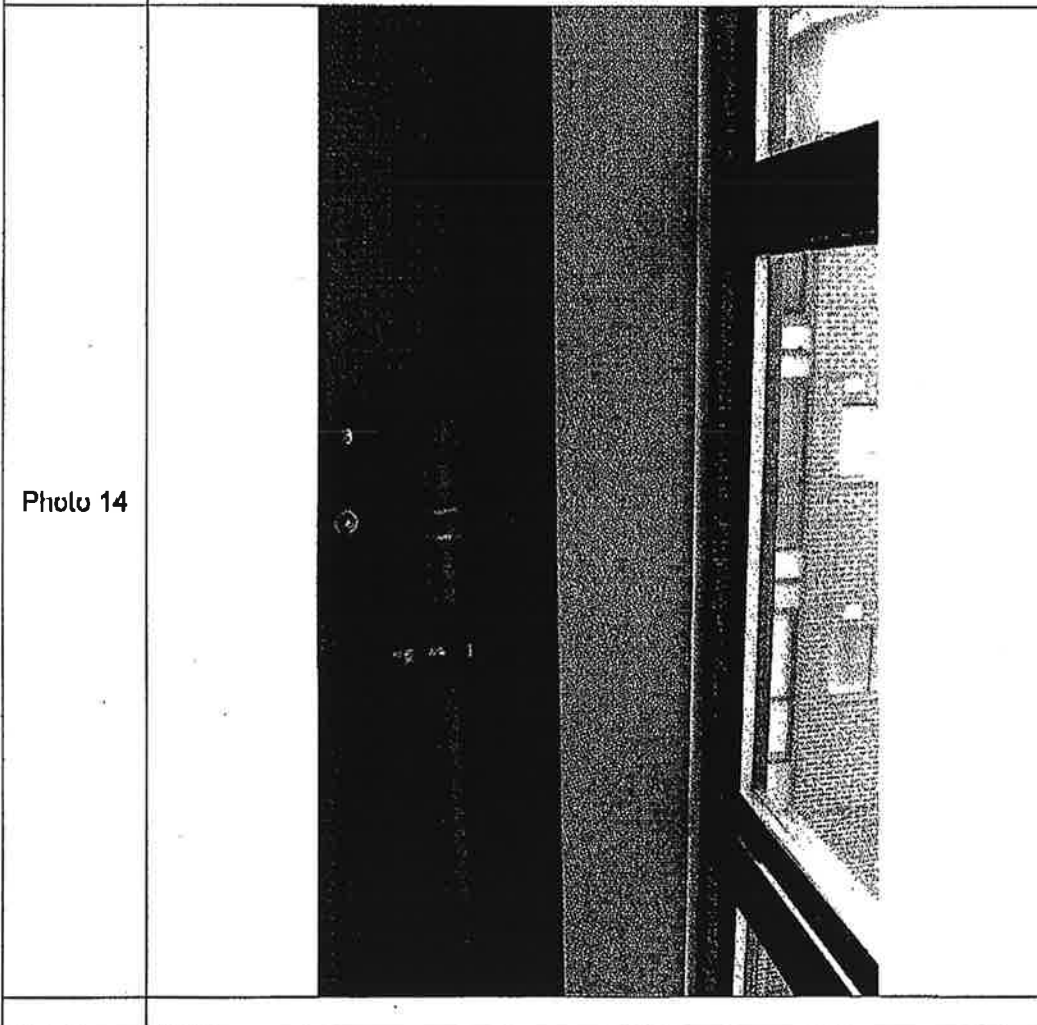
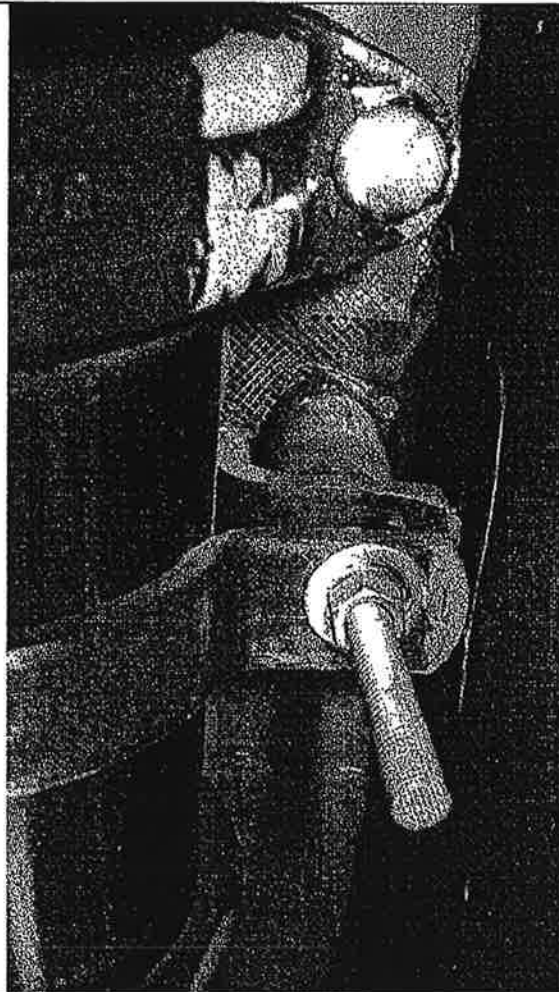


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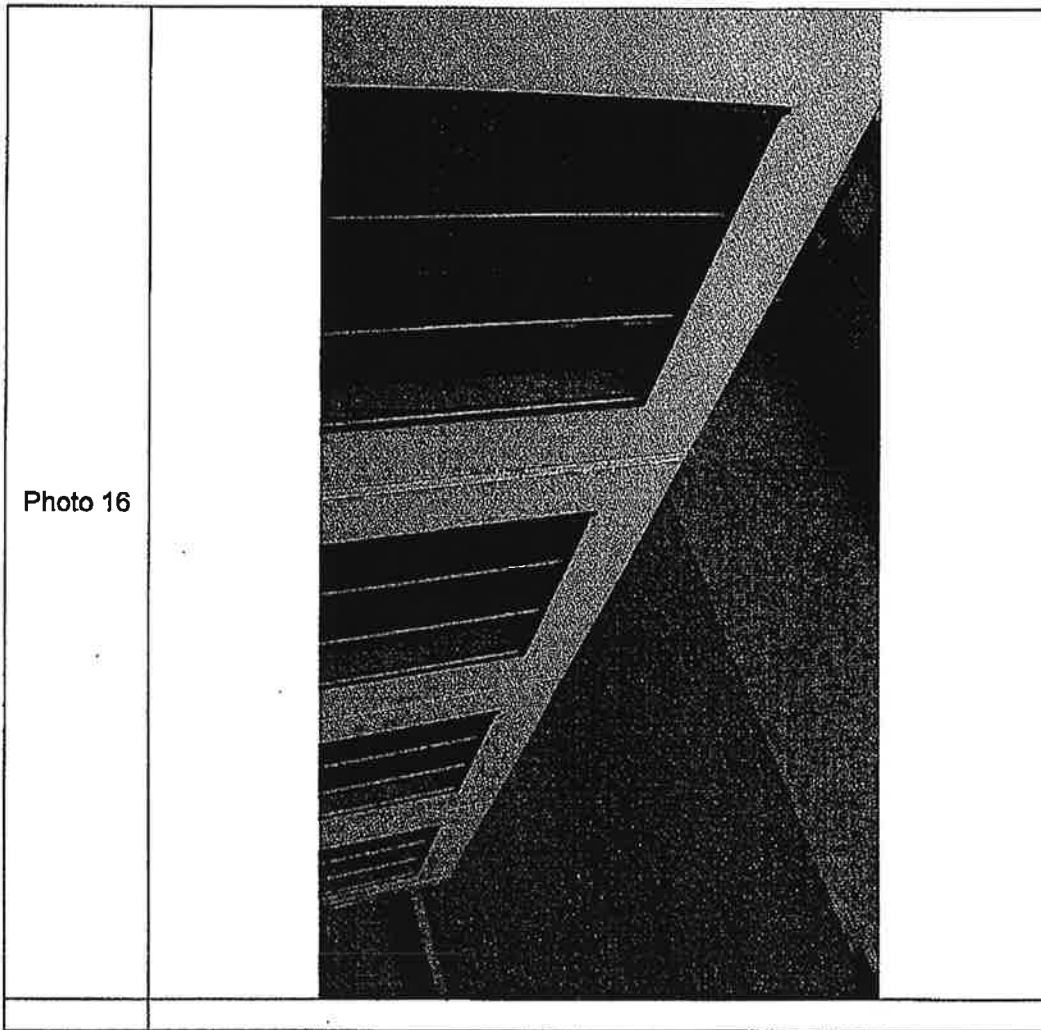


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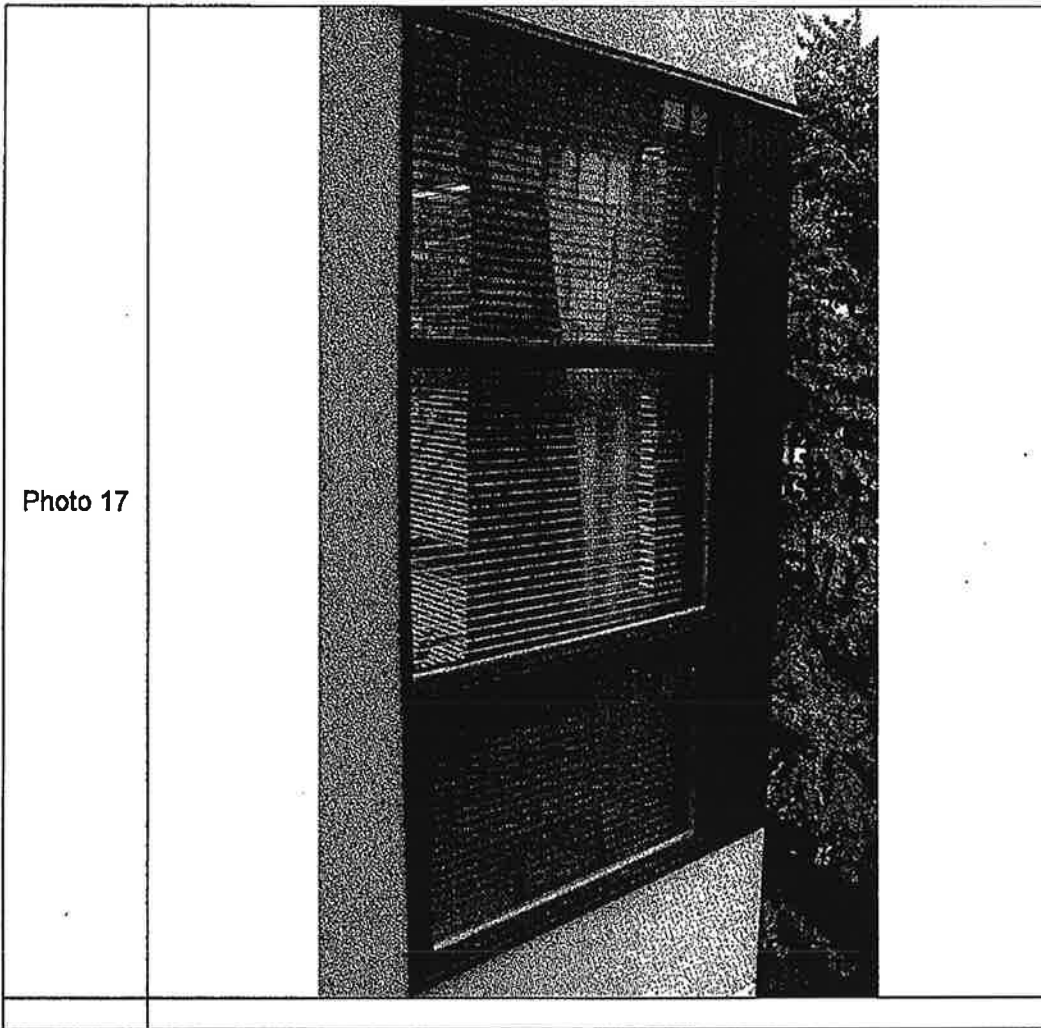
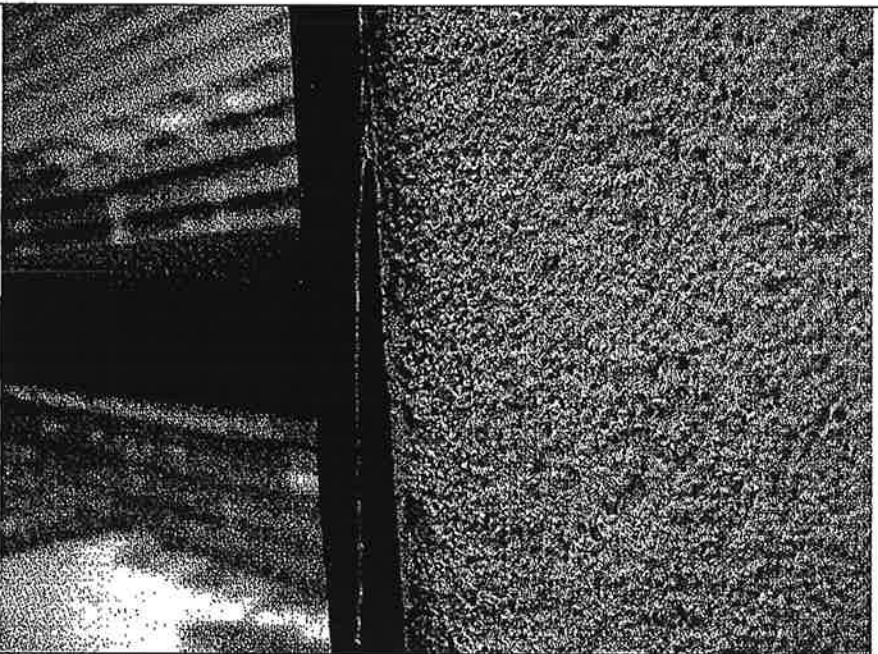
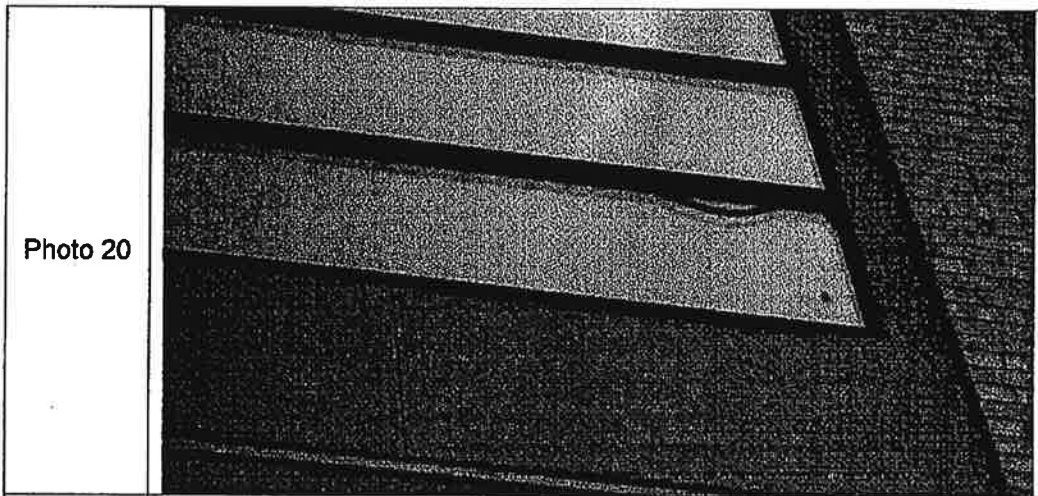


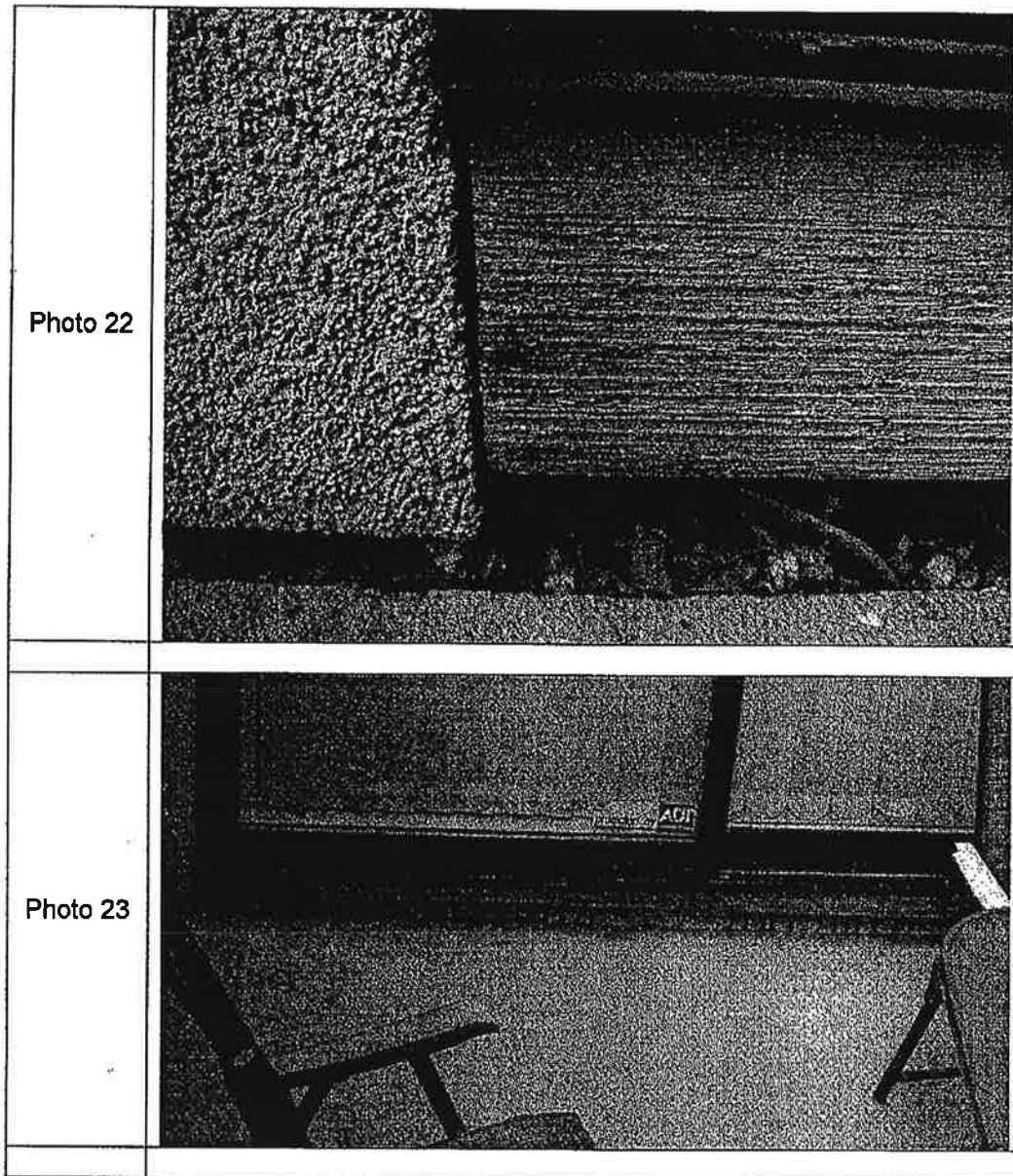
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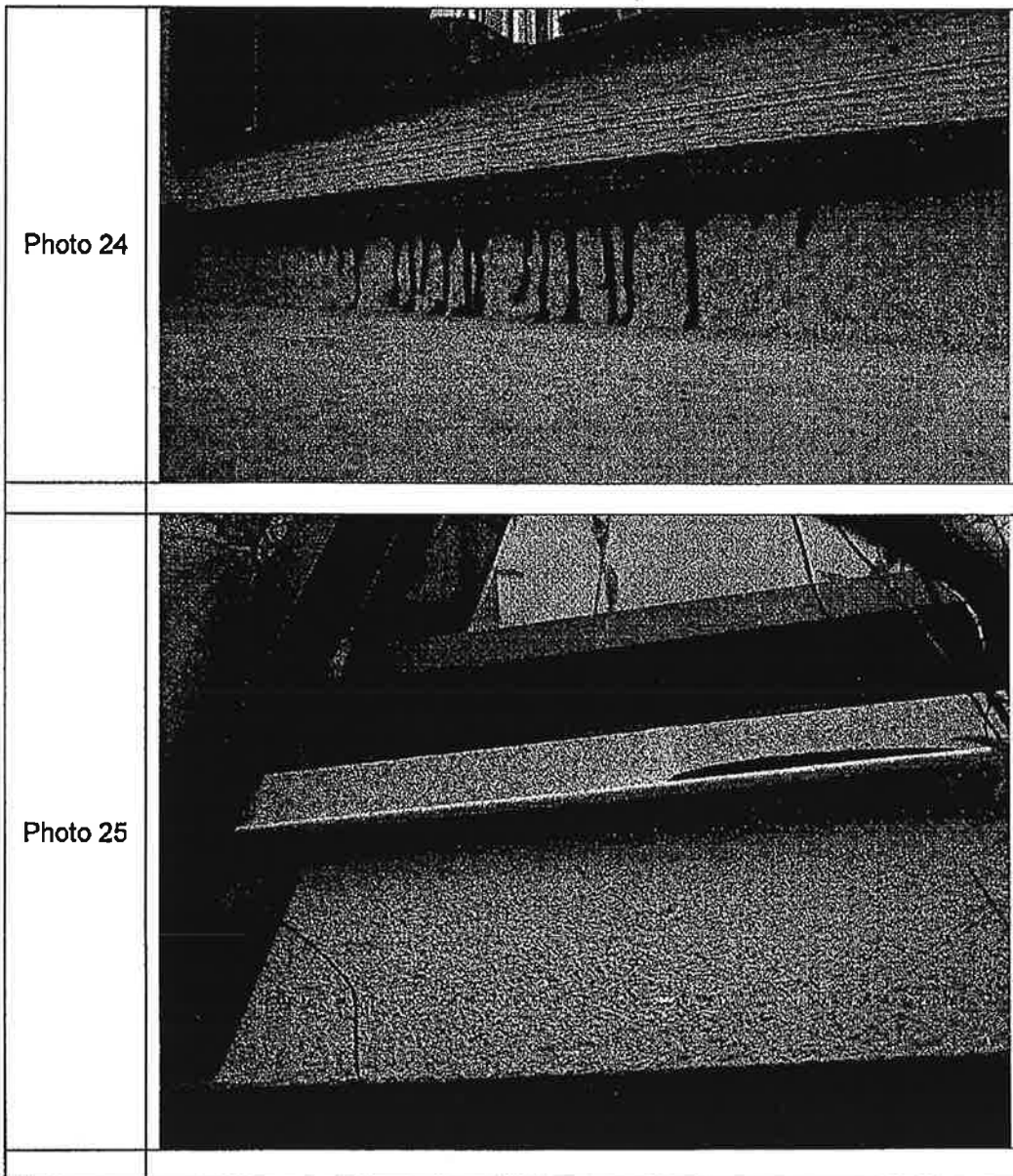


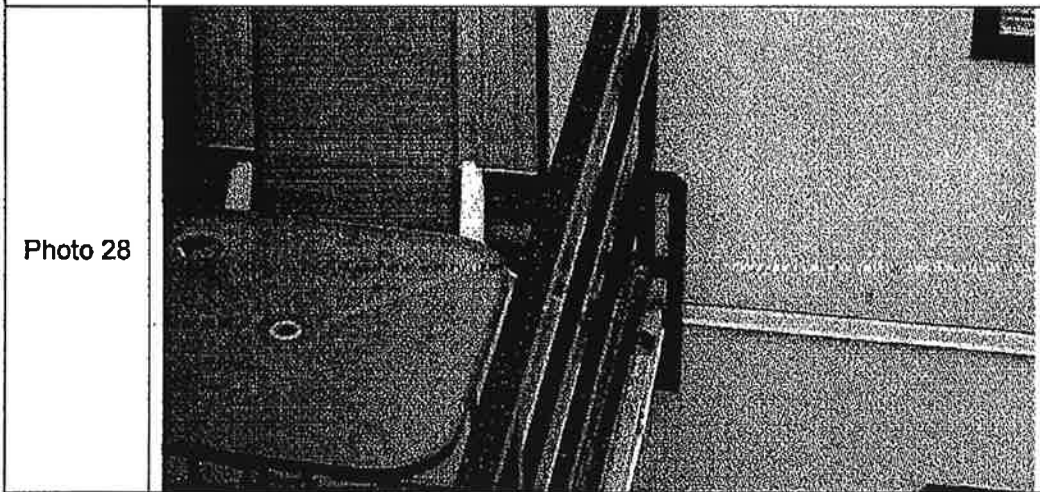
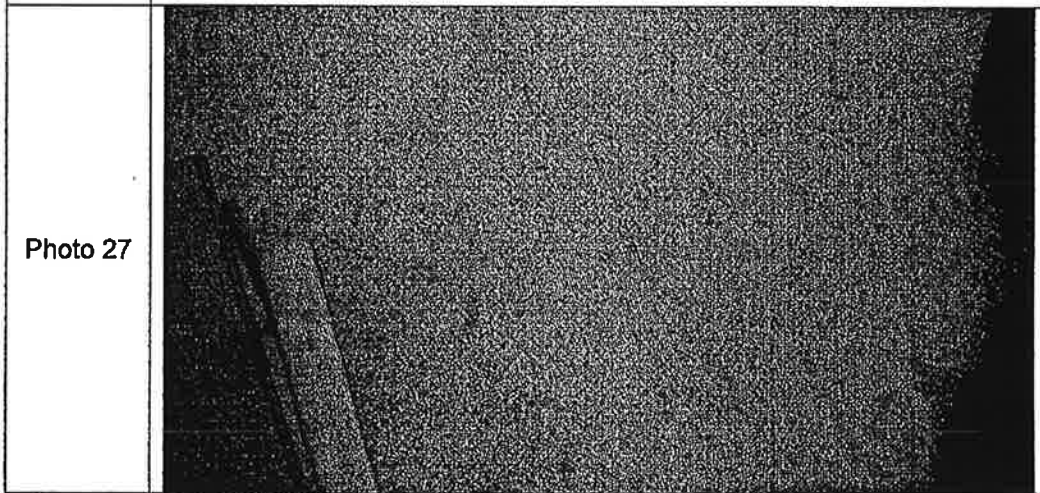
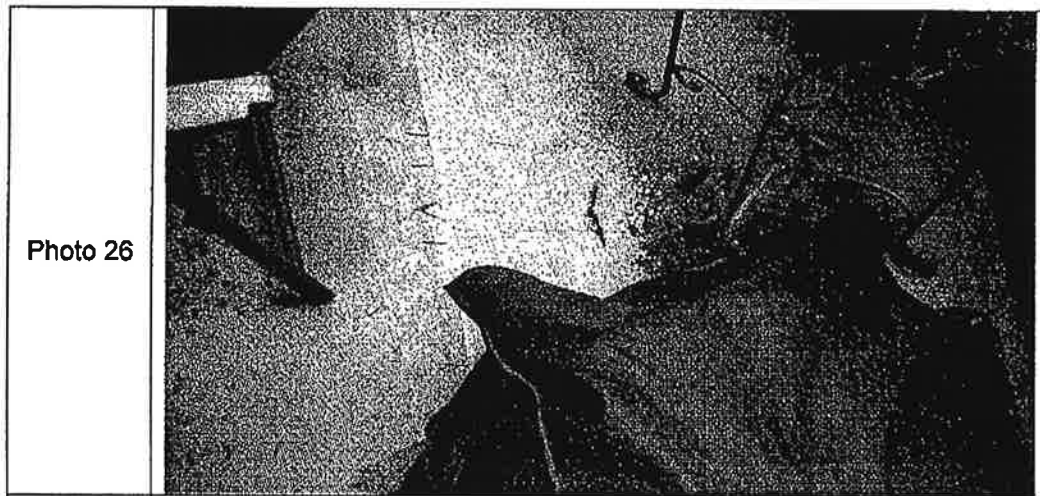
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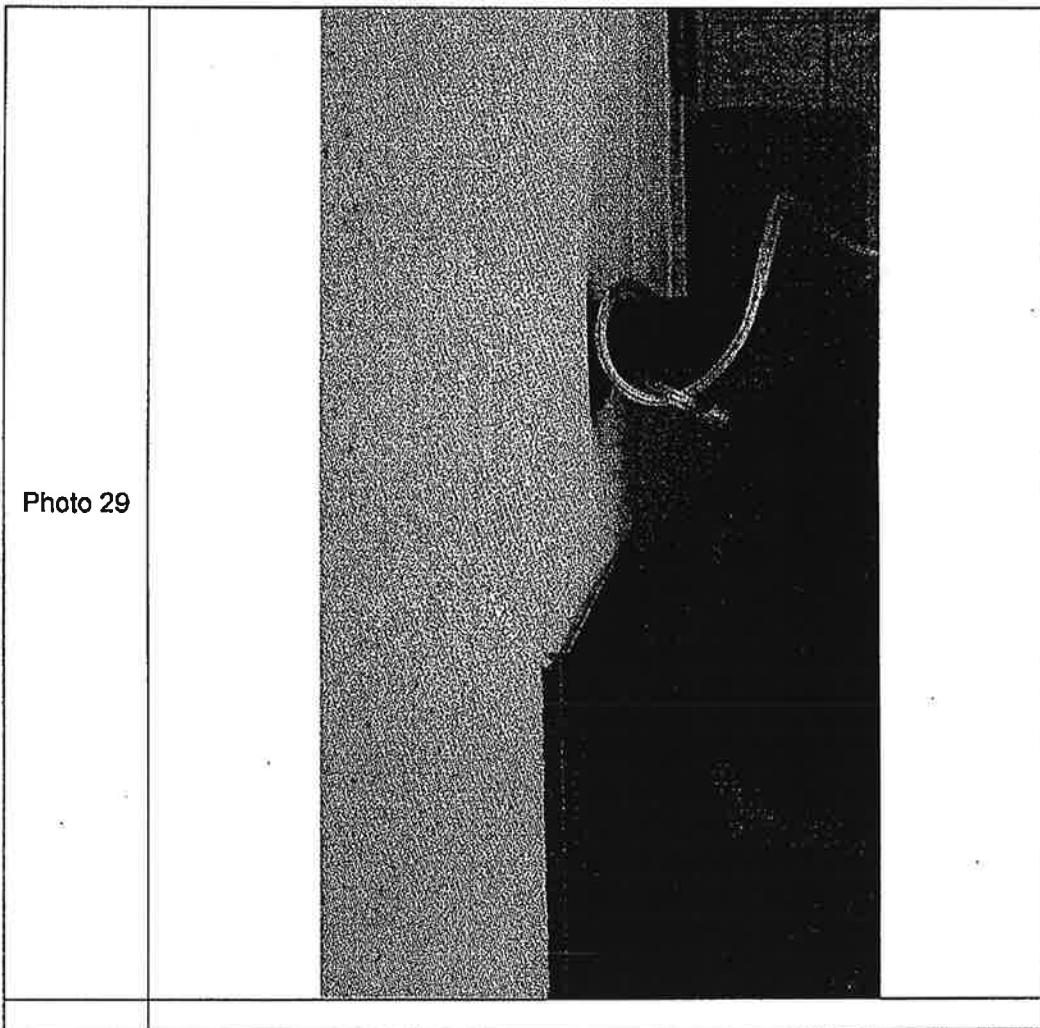


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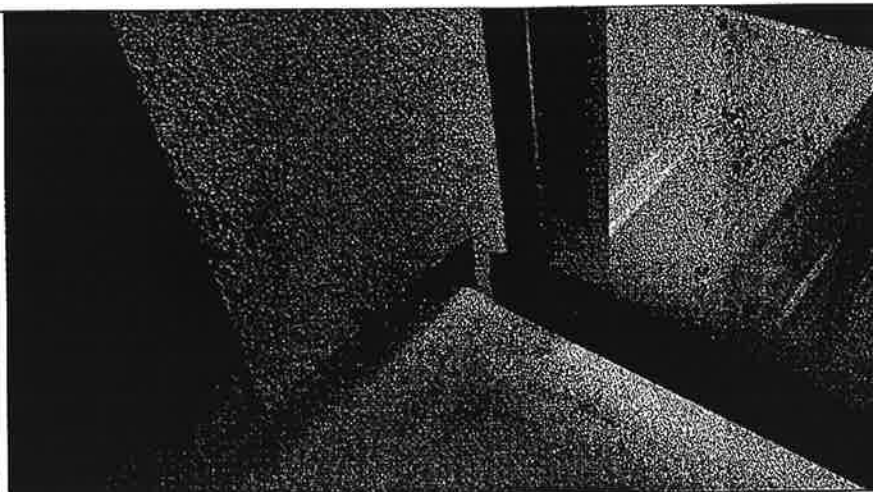


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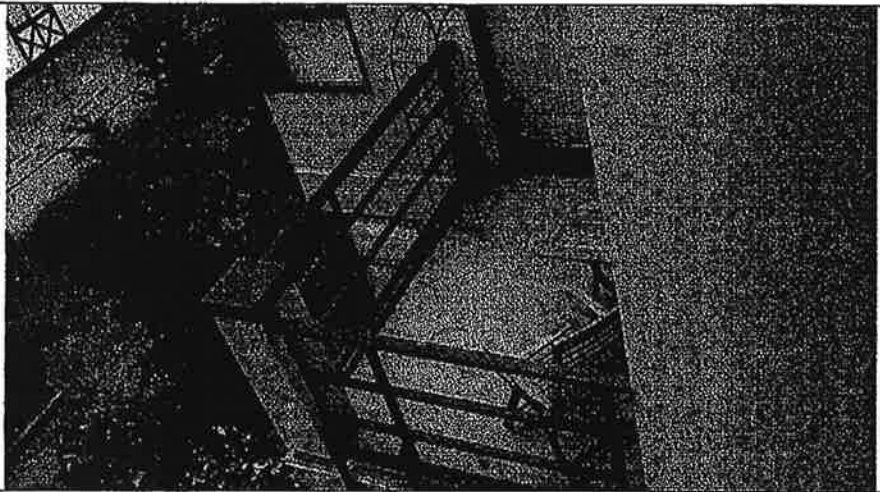
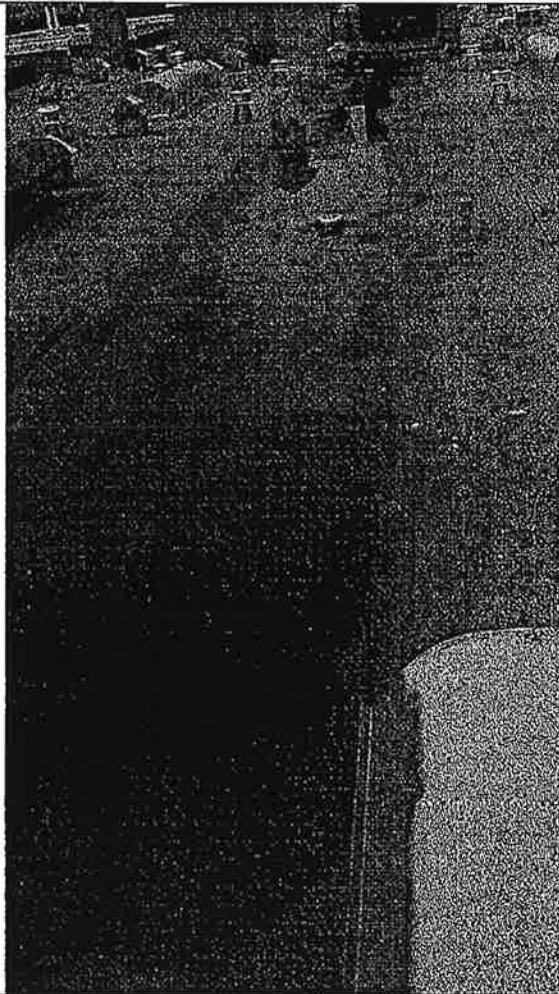
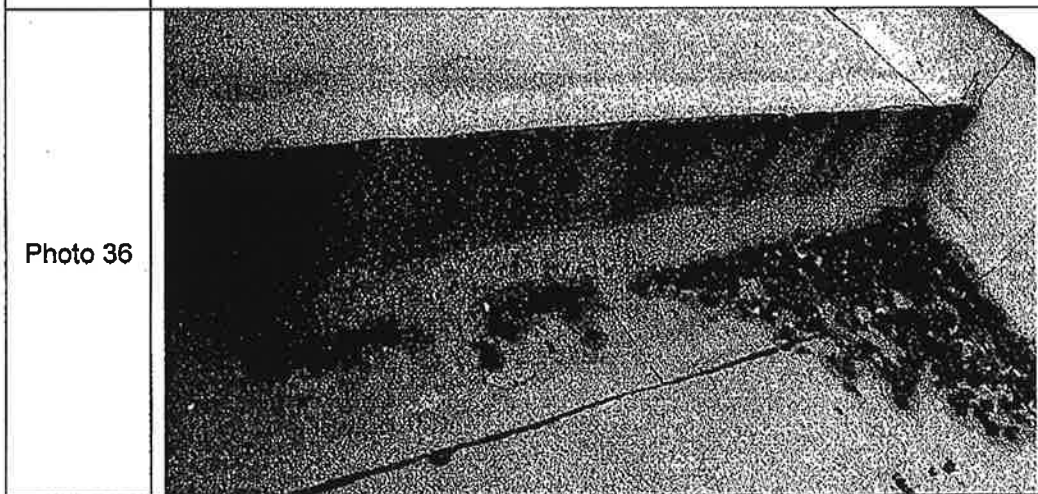
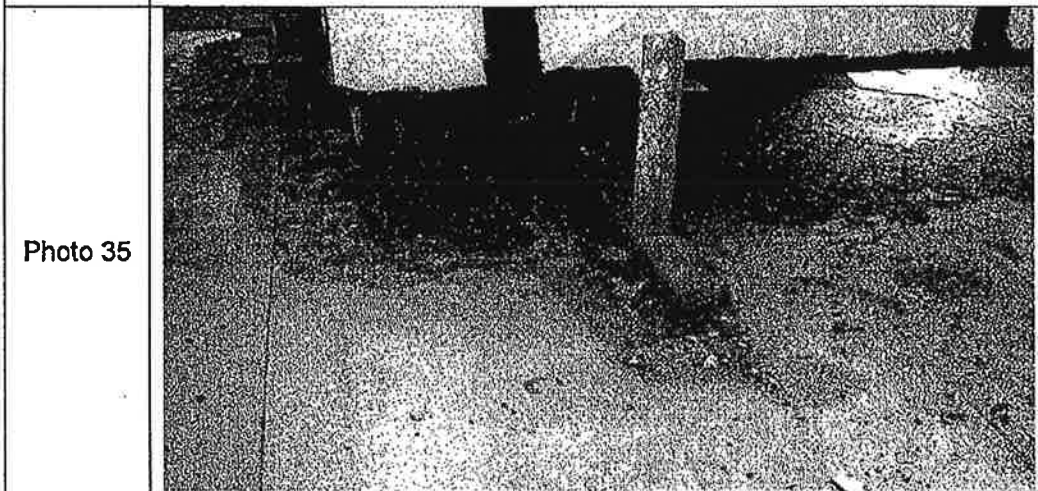
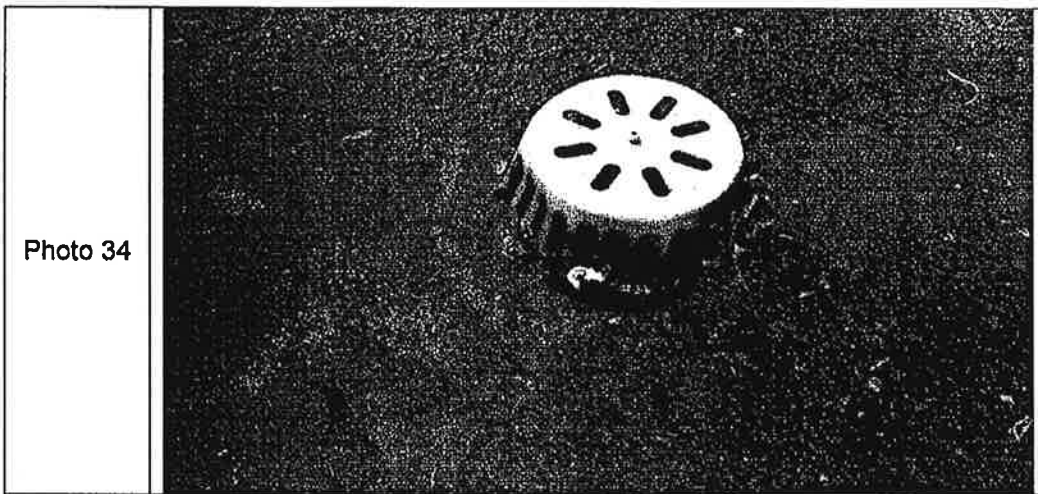
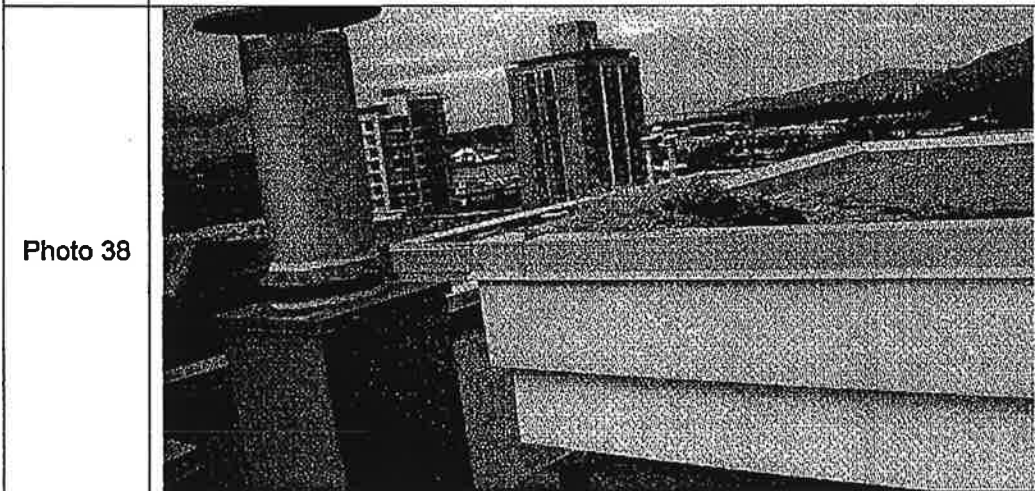
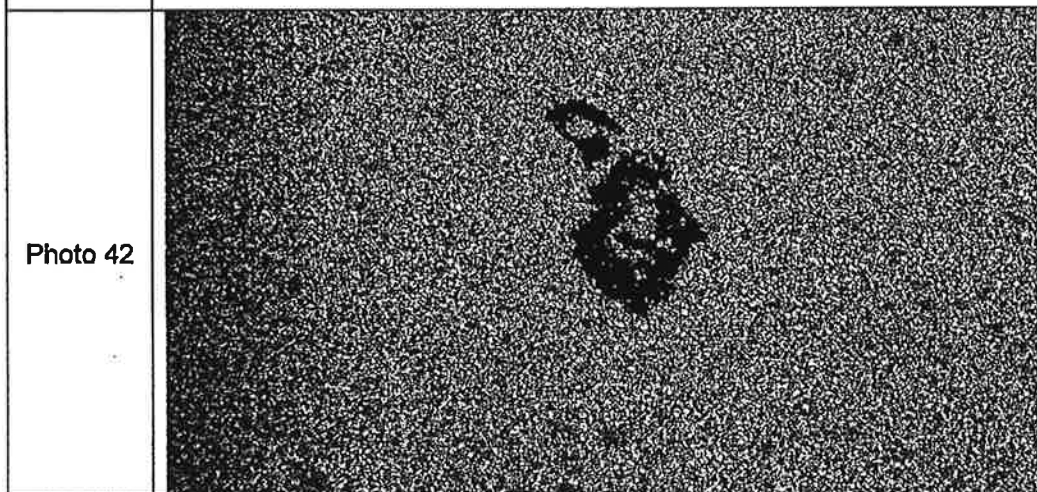
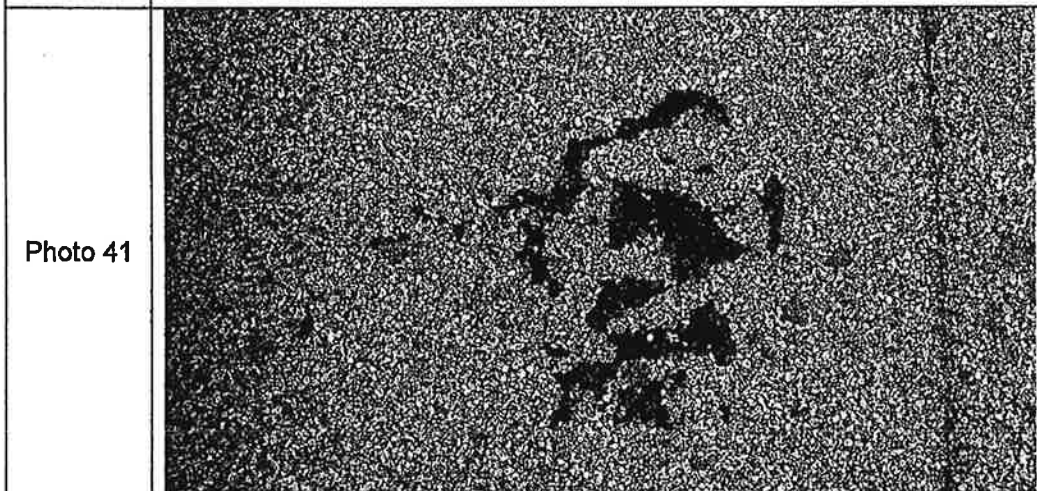
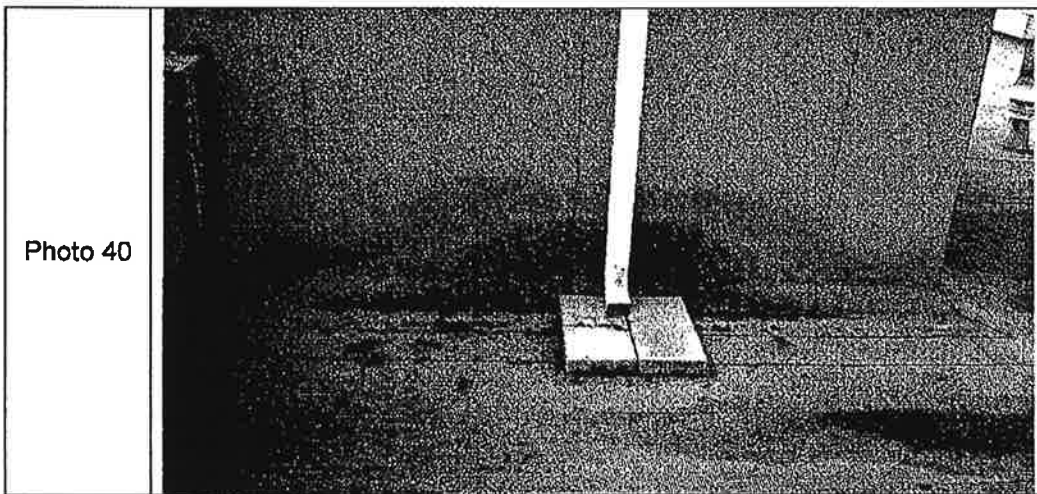


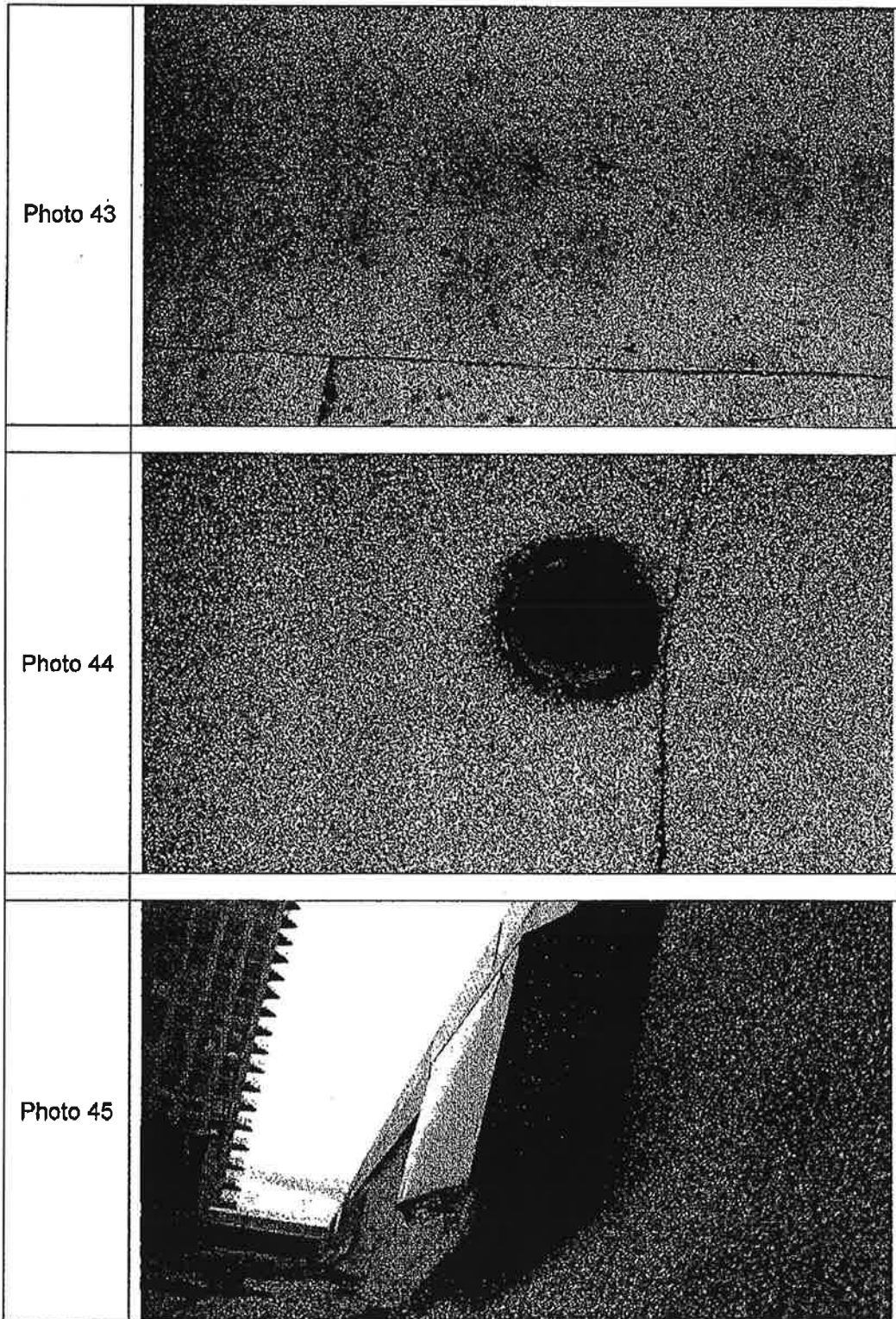
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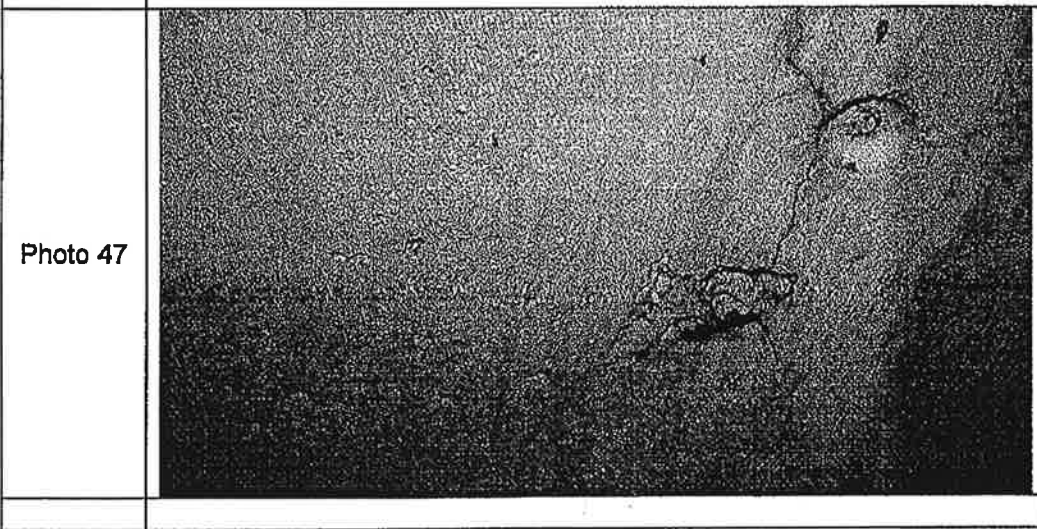
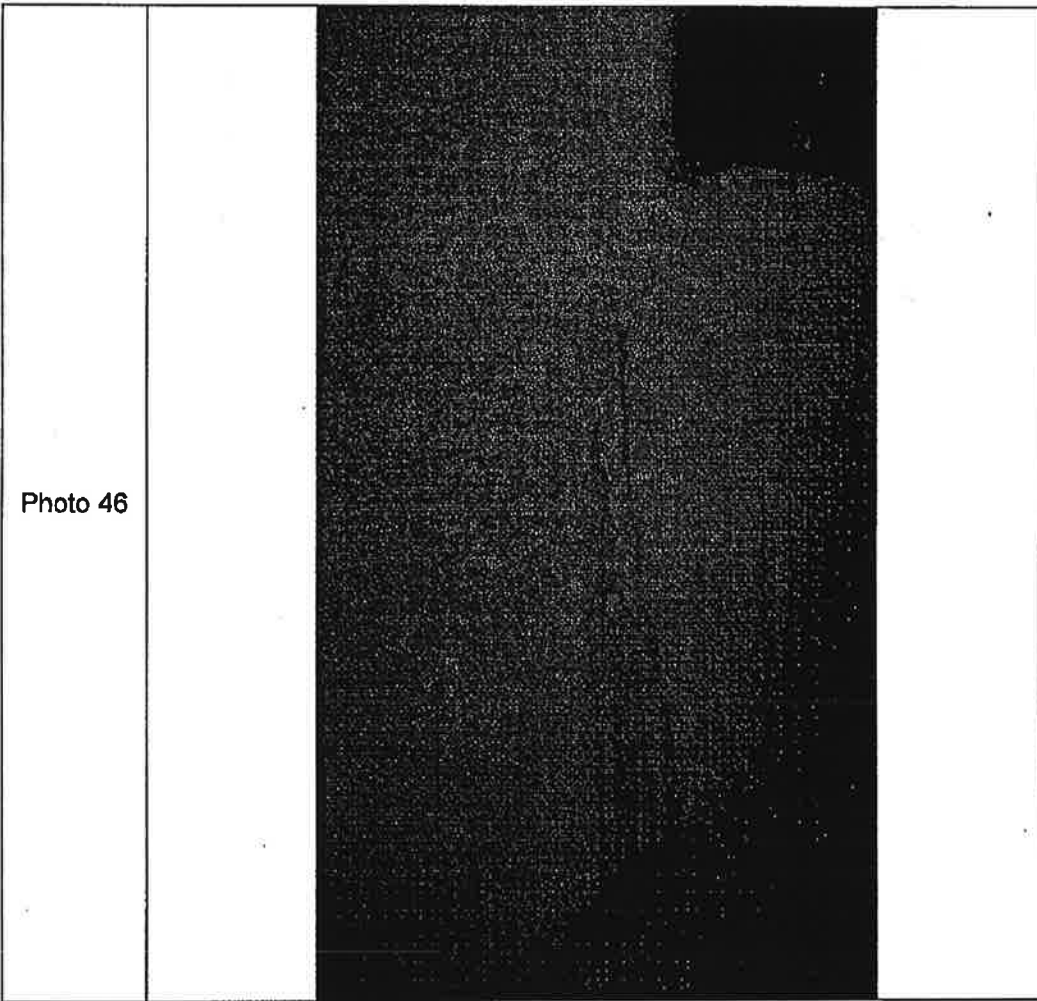


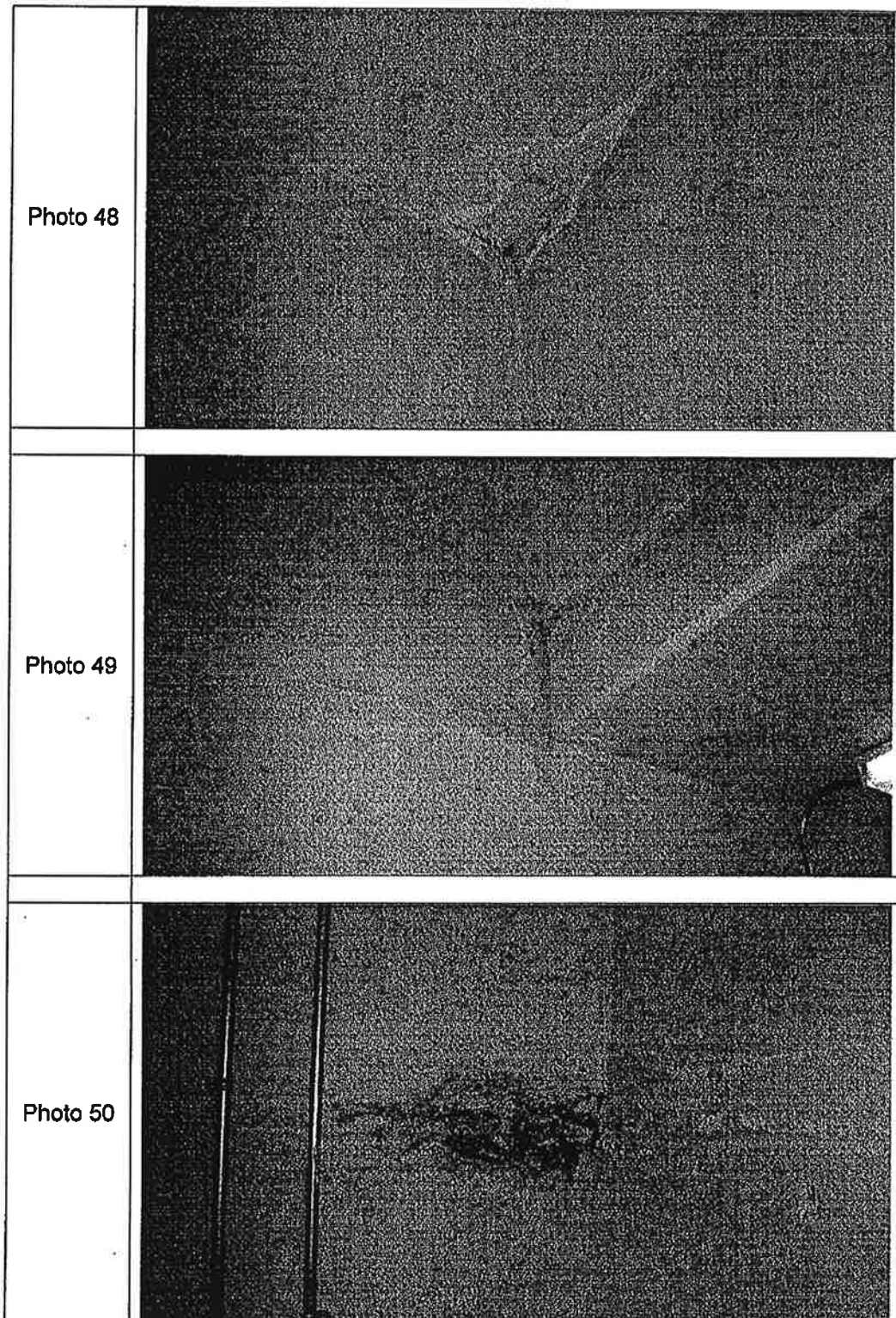


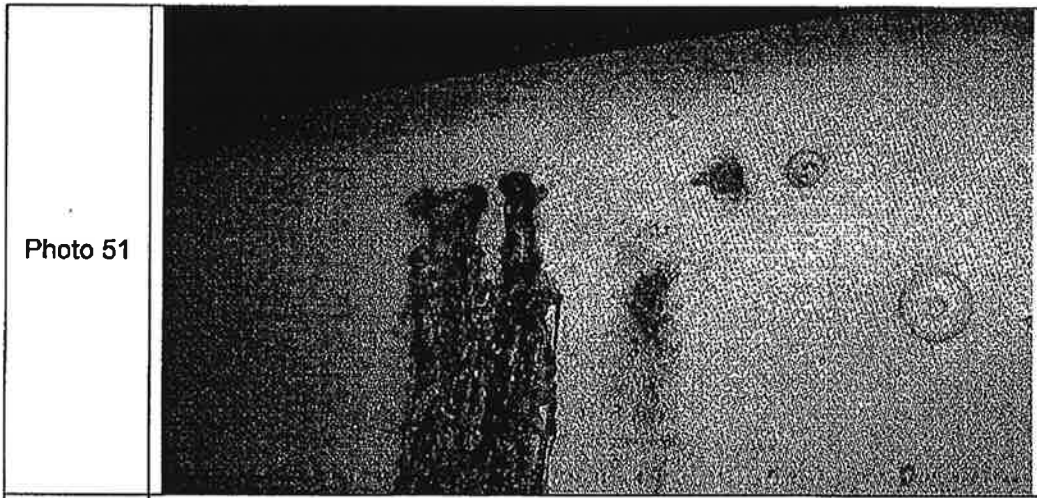












8 APPENDIX B: OCCUPANT SURVEY RESULTS

The following pages (1-2) summarize the responses of the resident building envelope report forms submitted by the occupants to Apex Building Sciences Inc.

RESIDENT BUILDING ENVELOPE SURVEY RESULTS
APEX 5038 - THE VOGUE

Unit	Safe	Direction	Comments	Comments	Comments	Comments	Comments	Comments	Comments	Comments	Comments	Comments
116 S	No comment	No comment	No comment	No comment	No comment	No comment	No comment	No comment	No comment	No comment	No comment	No comment
202 S	No problems	No problems	No problems	No problems	No problems since they moved in March 2008	No problems since they moved in March 2008	No problems since they moved in March 2008	No problems since they moved in March 2008	No problems since they moved in March 2008	No problems since they moved in March 2008	No problems since they moved in March 2008	No problems since they moved in March 2008
203 S			LA windows difficult to operate misaligned		Wish yet, fan doesn't work well. Has humidistat device on the wall outside the bathroom. Notices smell of cat urine from previous owners. In summer had humidity in the suite.	Wish yet, fan doesn't work well. Has humidistat device on the wall outside the bathroom. Notices smell of cat urine from previous owners. In summer had humidity in the suite.	Wish yet, fan doesn't work well. Has humidistat device on the wall outside the bathroom. Notices smell of cat urine from previous owners. In summer had humidity in the suite.	Wish yet, fan doesn't work well. Has humidistat device on the wall outside the bathroom. Notices smell of cat urine from previous owners. In summer had humidity in the suite.	Wish yet, fan doesn't work well. Has humidistat device on the wall outside the bathroom. Notices smell of cat urine from previous owners. In summer had humidity in the suite.	Wish yet, fan doesn't work well. Has humidistat device on the wall outside the bathroom. Notices smell of cat urine from previous owners. In summer had humidity in the suite.	Wish yet, fan doesn't work well. Has humidistat device on the wall outside the bathroom. Notices smell of cat urine from previous owners. In summer had humidity in the suite.	Wish yet, fan doesn't work well. Has humidistat device on the wall outside the bathroom. Notices smell of cat urine from previous owners. In summer had humidity in the suite.
207 NE	Crack on the ceiling in hallway near RT		Condensation on LA windows		Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%
201 S					Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.
303 S				Air leakage/ drafts in LA. Patio doors are difficult to operate, misaligned, handle and grip at frame. Metal shavings coming off.		Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.	Has humidistat device outside bathroom.
308 NW					Cracks in wall	Cracks in wall	Cracks in wall	Cracks in wall	Cracks in wall	Cracks in wall	Cracks in wall	Cracks in wall
402 S					Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%
409 S					Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%	Humidistat set at 50%
401 S			LA window has water leaks during pressure washing not when it rains.		Humidistat set at 60%	Humidistat set at 60%	Humidistat set at 60%	Humidistat set at 60%	Humidistat set at 60%	Humidistat set at 60%	Humidistat set at 60%	Humidistat set at 60%

RESIDENT BUILDING ENVELOPE SURVEY RESULTS
APEX 505B - THE VOGUE

Unit	Dir	Comments	Comments	Comments	Comments	Comments	Comments	Comments
505	S				Water leaks into door channel and apartment only during heavy rain.	Humidistat set at 65%.		
506	N	Cold air penetrates from exterior balcony area into bedroom. Dislocated pipes in bathroom difficult to clean in colder weather.						
506	N		U.S. & B.C. windows have gaps at frames. Closing mechanisms on bedroom window are loose.		Water leaks in LR doors. Doors are difficult to operate and are misaligned.	Humidistat is off.		
500	S				Water does in LR difficult to operate.			

9 APPENDIX C: TERMINOLOGY

ABS Apex Building Sciences Inc.

Balcony An above ground walkway or platform connected to the outside of a building.

Building Code Published regulations controlling design, construction, quality of materials, use and occupancy, and location of structures within the area for which the code has been legally adopted.

Building envelope The entire assembly of the exterior skin of a building including cladding, sheathing papers, windows and doors, joint sealants, and roof, balcony, parking roof, and deck membranes.

Building paper A general term used to describe a heavy paper, usually asphalt impregnated for water resistance, and used under exterior cladding. Product performance is measured in minutes of resistance to moisture penetration, as in 30 minute or 60 minute ratings.

Built-up roofing (BUR) A roofing system "built-up" with layers of sheet felts and asphalt. The asphalt provides the waterproofing and the felts act as the reinforcement.

Capillary action The tendency of water to rise in a network of small spaces, caused by the surface tension of the water. In a rain-screen assembly, a gap is provided between the parallel layers of material to break the surface tension of water and promote rapid passage of water to the exterior via through-wall flashings.

Cladding The material used on an exterior wall to protect the structure and interior spaces from environmental forces. Types of cladding include stucco, vinyl siding, brick and concrete, stone veneer, wood siding, and EIFS.

Concealed barrier A cladding assembly such as vinyl siding that relies on the building papers or house-wrap to provide the primary defense against moisture and air infiltration.

Deck An exterior area similar to a balcony, but usually located over an occupied part of the building.

Efflorescence A white powder-like deposit appearing on the surface of concrete, stucco, or brick. It is generally caused by soluble salts within the

material being carried to the surface by moisture and deposited as a residue when the water evaporates.

EIFS Exterior Insulation Finishing System (EIFS) is composite cladding system which consists of insulation board fastened to an exterior grade gypsum board on steel stud framing; a fiber mesh and acrylic based stucco product (primus) is applied to the insulation complete with a finish coat. The cladding is a "face-sealed" assembly, and depends on the acrylic coating and the caulked joints at interfaces to prevent moisture ingress. By its very nature this cladding system requires constant monitoring and immediate repair should deficiencies become apparent.

EPDM Ethylene Propylene Diene Monomer (or Terpolymer which is simply a product consisting of three distinct monomers). EPDM is classified as a Thermoset material which means it is either fully-cured prior to being installed or that it cures during natural weathering after installation. EPDM roofs are single-ply membranes meaning there is only one ply of roofing material, not multiple plies laminated together. EPDM is a rubber material whose principal components consist of the compounds ethylene and propylene. A flexible rubber matrix forms when a small amount of diene is added to the mix. EPDM is available reinforced or unreinforced with both commonly used; it's also available in either a cured (vulcanized) or uncured (non-vulcanized) state. Vulcanized EPDM is the most common with non-vulcanized often used for flashing purposes. EPDM membrane thickness ranges from thirty mils (0.030") to one-hundred mils (0.100") with the most common thicknesses being forty-five mils (0.045") and sixty mils (0.060"). There are three standard application procedures: (1) fully-adhered; (2) mechanically-fastened; (3) loose-laid. Fully-adhered EPDM uses water or solvent-based adhesives to adhere the rubber to the substrate. Mechanically-fastened EPDM is attached by manufacturer-approved mechanical means to the substrate, and loose-laid membranes are secured only at the perimeters and any penetrations. A ballast of round river rock or concrete pavers is used to hold the materials in place. River rock is usually installed at a rate of 1000 - 1200 pounds per roof square (100 square feet) and the pavers generally weigh approximately 20 pounds per square foot. Structural integrity is important with loose-laid roof systems. The seams of all systems are then sealed using either an adhesive or a splice tape. Splice tapes have been tested with a higher tear-strength.

Face-seal A building envelope strategy, which depends on the cladding and windows and associated sealants to shed water. No ancillary method of positive drainage is provided behind the face sealed exterior. This system is prone to failure.

Fascia is the exposed vertical edge of a roof or balcony deck.

Fibre Cement Cladding A composite material that is made up of cement, sand and cellulose fibres. It is a commonly used siding material as it is durable, paintable and can be made to mimic the look of wood, stone, stucco or other finishes.

Flashing Sheet metal weather protection utilized at details that are subject to movement, or details having membranes that require protection from mechanical or environmental damage. Common flashing types and usage include:

- **Cap flashing:** on parapet walls, columns or chimney enclosures
- **Head or sill flashing:** above or below a wall opening to effect the transition between dissimilar materials or assemblies
- **Saddle flashing:** A three dimensional flashing, usually welded, and installed in a location where 3 or more planes intersect, for example at the interface of a parapet wall cap flashing with the main building wall.
- **Through-wall flashing:** A flashing that extends from behind the sheathing paper material, across the cladding, and extends outside and slightly down over the cladding, and is shaped to redirect incidental moisture to the exterior side of the cladding.

House-wrap A sheet polyethylene material used as a sheathing paper between the wall sheathing material and the exterior cladding. One common type of house-wrap consists of Spun-Bonded Poly-Olefin; another is made of perforated polyethylene. Their resistance to liquid water is high, but resistance to water vapour is lower than many common "vapour barrier" materials. These products are used primarily as air barriers in buildings.

Insulating glass Glazing units consisting of two pieces of glass spaced apart, usually ½ inch, and hermetically sealed leaving air or inert gas in the space to provide improved thermal efficiency.

Maintenance Regular inspection of the building envelope and systems including roof, walls, windows, gutters, downspouts and drains, followed by the cleaning and repair of those items as required.

Moisture content The amount of water contained in a sample of wood expressed as a percentage.

Movement Joint A joint intentionally introduced into the building envelope to permit differential movement between portions of the building structure (expansion joint), or to control and localize cracking of materials such as stucco (control joint).

Oriented Strand Board A panel material commonly used for exterior sheathing in wood frame construction. The material consists of chips of

softwood pressure bonded with adhesives into panels. This product is somewhat more susceptible to moisture damage than wood or plywood.

Parapet wall A partial height wall surrounding a balcony, roof deck, or roofing area.

Penetration An opening in the building envelope through which ducts, electrical wires, pipes and fasteners pass.

Plywood A sheathing product made by gluing several thin layers of wood together in a perpendicular direction.

Rain-screen (also drained cavity) A building envelope strategy using a positive drainage plane created immediately behind the exterior cladding material. Incidental water entering this system is allowed to drain to the exterior by way of flashings and membranes.

SBS (Styrene Butadiene Styrene) Modified Bitumens: Sheet membranes consisting of a bitumen base modified with SBS to provide improved flexibility, elasticity, and aging characteristics. Commonly used as roofing or deck membranes.

Scupper drain A type of drain passing through the vertical portion of roof curbs or balcony parapet walls.

Sheathing (See also Oriented Strand Board and plywood) Panel material used to provide structural stiffness to wall framing and to provide structural backing for the cladding and sheathing paper. Also includes exterior grades of gypsum board, and some rigid insulations.

Sheathing paper (See building paper or house-wrap)

Strapping or furring The use of wood or metal strips to form a drainage cavity and to introduce a capillary break behind the cladding material.

UV Ultra-violet radiation that has a degrading effect on some membrane materials unless protected by an appropriate shielding layer such as flashings or gravels.