RAINFOREST
ENVELOPE
PROTECTION
SERVICES LTD.
Building Envelope Consulting

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REPORT OF
BUILDING ENVELOPE CONDITION ASSESSMENT

STRATA PLAN LMS 2093, THE OBSERVATORY

10899 WEST WHALLEY RING ROAD
SURREY, B.C.

Presented to

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Preface

TERMINOLOGY AND GLOSSARY

A number of terms used in this report have specific meaning in the context of this report and are therefore defined below All of the terms and abbreviations used are standard in the industry This glossary may be of some aid for those not familiar with construction terms

Air Barrier, refers to a combination of materials and components, including joints, that control the flow of air through an assembly, limiting the potential for heat loss and condensation due to air movement

Air Leakage, refers to the airflow into or out of a space through the wall assembly The outward leakage of air is known as exfiltration and the inward leakage is known as infiltration Exfiltration of warm, humid interior air will carry water vapour into the wall assembly to condense on contact with cold surfaces

Balcony, refers to a horizontal surface exposed to the outdoors, but projected from the building so that it is not located over a living space

Basecoat, refers to the initial wet state material, either factory or field mixed, used to encapsulate the fibreglass reinforced mesh (in E I.F S. applications).

Building Envelope, refers to those elements of the building that separate inside condition space from outside unconditioned space, and includes walls, windows, doors, roofs, balcony decks (over occupied living space) and foundations Sometimes referred to as (building enclosure) or an (environmental separator) in Building Codes.

Building Paper, refers to a breather/type sheathing paper which is rated in minutes (15, 30 or 60), based on preventing water flow through it for a number in accordance with a standard test

Capillary Break, refers to the gap between parallel layers of material sufficient to break the surface tension of water, which is typically a minimum of 10 mil (3/8 of and inch)

Cladding, refers to a material or assembly that forms the exterior skin of the wall and is exposed to the full force of the environment. Cladding types include stucco, E.I F S , metal panels, brick, stone veneer, wood siding and vinyl siding

Concealed Barrier, refers to a building envelope strategy where the performance of the wall is dependent on the underlying sheathing papers to protect the building components from the incidental water that penetrates past the exterior face of the wall claddings This system has limited ability to accommodate more than a small amount of moisture which may penetrate the surface

Control Joint or Movement Joint, refers to a continuous joint in a structure cladding or other element, used to regulate the amount of cracking and separation resulting from relative movement

Decks, refers to a horizontal surface exposed to the outdoors, located over a living space and intended for moderate use but not for access to other areas of the building

Delamination, refers to a separation along a plane parallel to the surface

Dew Point, refers to when the relative humidity for a given temperature reaches 100% The air is saturated with water when it reaches the dew point and condensation may occur

Drained Cavity (Also Rain Screen), refers to a design strategy whereby a positive drain drainage plane is created immediately behind the exterior cladding material, sufficient in width to break the surface tension of water, and allowing incidental water entry in the water system to drain by gravity with the aid of flashings and membranes

Drip Edge, refers to a projection detailed to direct water runoff away from wall, window, balcony or roofing element.

Efflorescence, refers to the dissolved salts in the material (such as concrete or brick) being transported by water and redepositing on the surface after evaporation.

E.I.F.S., refers to Exterior Insulated Finish System and generally consists of layers of rigid insulation adhered or fastened to the substrate and finished with thin coats (lamina) of reinforced cementitious material in a finish coat of acrylic colour.

Face Seal, refers to a building envelope strategy where the performance of the wall is dependent on the ability of the exterior face of the cladding, windows and associated sealant to shed water and prevent any water infiltration This system cannot easily accommodate water that penetrates past the exterior face since no positive drainage path or additional continuous barrier to water penetration are provided.

Finish Coat, refers to the final wet state material, which provides colour and texture, applied over the reinforced basecoat (on E I F.S. and stucco applications)

Fish Mouth, refers to a deficiency in the installation of waterproof membranes (roofing, self-adhering membranes, etc) which results in a fold in the edge of the membrane, through which water can penetrate

Flashing, refers to sheet metal or other material used in roof or wall construction and designed to shed water (typically sloped outwards, with a drip edge to shed water) Used in conjunction with

.a Cap or Parapet Flashings - flash top of wall, pier, column or chimney

b Saddle Flashings - an upturned sloping transition piece between a horizontal and vertical plane, example cap and wall intersection.
c Head/sill flashing – at head or sill of window opening or other penetration.
d Base Flashing – at bottom edge of wall surface.
.e Cross-Cavity or Throughwall Flashing – a flashing which sheds water from the weather barrier plane to the exterior, through the wall plane

Gumlip, refers to a method of sealing a flashing to a wall surface whereby the top edge of the flashing is bent outwards to form a caulk filled cavity (typically at the termination of a waterproof membrane).

Maintenance, refers to a regular process of inspection, cleaning and minor repairs of envelope elements and exterior systems such as roofs, walls, windows, gutters, downspouts and drains. Cleaning activities for these items as required on a regular basis, such as leaves from gutters and drains in the fall, and cleaning lint from dryer vents. Minor repairs are for small projects for reinstating failed elements such as areas of cracked caulking or peeling paint

Movement Joint or Control Joint, refers to a joint in the building which allows differential movement of portions of the building structure (expansion joint), or prevents or localizes cracking brittle material such as stucco where movement needs to be controlled (control joint)

Operation, of the building or envelope refers to normal occupancy of the building where the envelope is affected by interior space conditioning, changes to light fixtures, signs, vegetation and planters, and accidental damage or vandalism

Penetration, refers to a hole passing through the building envelope in which ducts, electrical wires, pipe and fasteners are run between inside and outside

Punched Windows, refers to the architectural style of window being expressed as a single punched opening surrounded by cladding materials, as opposed to being arranged in vertical or horizontal strips of several window units

Relative Humidity, refers to the moisture content in the air for the given temperature expressed as a percentage of the maximum possible moisture content at that temperature.

Saddle, refers to the transition of small horizontal surfaces, such as the top of the balcony guardrail or parapet wall, with a vertical surface, such as a wall

Scupper, refers to a metal pipe or trough section creating a drainage overflow from a roof or balcony to a downpipe or a surface below

Sheathing, refers to a material used to provide structural stiffness to the wall framing and to provide structural backing for the cladding and sheathing paper Typical materials are OSB (Oriented Strand Board), plywood or gypsum board

Sheathing Paper, refers to a material or combination of materials in an exterior wall whose purpose is to retard penetration of incidental water further into the wall structure once past the cladding. Commonly used materials are building paper or House Wrap

Spall, refers to fragment of material, such as concrete or masonry, detached from the larger mass by a physical blow, weather action, internal pressure or efflorescence within the mass (sub-florescence)

Strapping, refers to the use of wood or metal material, typically 19 millimetre (3/4 inch) nominal thickness, to form a drainage cavity and act as a capillary break behind cladding

Surfactants, refers to an agent (example detergent) that, when mixing with water, breaks the surface of water drops thus enabling easier absorption of water through a material. Without surfactants, water would have a greater tendency to remain as drops on the surface of a given material

Symptoms, refer to visual evidence, such as staining or wetting of surfaces, loss of strength, material delamination or cracking, peeling paint, debonded coatings, etc., which suggest a performance problem with in the exterior envelope of a building.

U.V., refers to ultra violet radiation (from the sun), which has a degrading effect on many membrane and sealing materials (asphalt based) unless protect by an appropriate shielding layer.

Vapour Retarder, refers a material having a high resistance to water vapour diffusion that is located within the assembly to control the flow of vapour and limit the potential for condensation due to diffusion

Weep Hole, refers to an opening placed in a wall or window assembly to permit the escape of liquid water form within the assembly. Weep holes can also act as vents

Window, refers to a manufactured assembly of a frame, sash, glazing and necessary hardware, made to fit an opening in a wall

a Window Sill – horizontal member at the base of a window opening
.b Window Head – horizontal member at the top of a window opening.
c Window Jamb – either of the vertical members at the sides of a window opening
d Mullion – a vertical member within the glazing units
e Rail – a horizontal member between the glazing units
f Glazing – the glass portion of the window.
g IGU – insulation glazing unit Double or triple panes of glass sealed together to provide insulation value The still gas between the panes acts as the insulation
h Condensation Track – a channel at the interior sill level of the window intended to intercept small amounts of water condensating on the interior surface of the glass

1.0 INTRODUCTION

1.1 Terms of Reference

Rainforest Envelope Protection Services Ltd was retained by the Owners of The Observatory (Strata Plan LMS 2093) to undertake an assessment of the current condition of the building envelope system of the residential high-rise located in Surrey British Columbia. Mr John Gorman, the Property Manager, provided authorization for the study in December of 2002.

The object of this investigation was to gain an overall understanding of the condition of the building envelope. As previous reviews, testing and modifications had been carried out to the window wall system of the north elevation this investigation was concentrated on the punched window openings and the interfaces between various claddings Our objective was to assess the condition and to implement a plan for any required remedial work Deficiencies reported herein are based on visual examinations and selected exploratory openings in addition to negative pressure testing They do not represent a total listing of all locations with deficiencies nor do they imply all similar locations are items to be deficient

1.2 Scope of Work

The scope of our services was outlined in our October 31, 2002 letter to Strata Plan LMS 2093 care of Gateway North Property Management and is summarized as follows. As the window wall system has been previously investigated, tested and a repair procedure is in place, the remaining investigations should be concentrated on the south elevation of the 02 and 03 Units Therefore we propose the following:

1 Conduct bosun's chair drops at the 02 Unit run of the living room next to the fireplace exhaust

2 Conduct bosun's chair drops at the 02 Unit run at the den corner window

3. Conduct bosun's chair drops at the 03 Unit master bedroom, 90° corner window.

We would carefully review the condition of the exterior cladding, including the interfaces, to determine potential point(s) for rainwater. Photographs would be taken and documented for use in the final report

Negative pressure testing would be conducted to the wall and window interfaces in two areas with the first being Unit 702 at the living room window/fireplace interfacing. The second area would be determined after our bosun's chair drops However, we will attempt to keep the testing within the 7th Floor Unit on the 02 drop This testing would involve removing sections of drywall for review of exterior wall components and all drywall would be reinstated, primed and repainted if no significant corrosion is noted within

1.3 Occupant Questionnaire

As part of this report, we provided an Occupant Questionnaire Survey that is intended to provide us with information on specific areas of concerns The Owners were asked to indicate whether or not they were experiencing leaks or other problems within their Units, at walls, ceilings, floors, windows etcetera. Results of this survey will be discussed later in this report.

1.4 Limitations

This review was based on a visual inspection, random negative pressure testing, exploratory openings and documentation provided from the Occupants Questionnaire Unless specifically noted in this report, no other testing, detailed analysis or design calculations were completed, nor were they within the scope of this review.

Any comments or conclusions within this report represent our opinion, which is based upon our visual reviews during site visits, our negative pressure testing and our past experience with buildings similar to The Observatory Some of the findings herein are based on random sampling, and others are based on a visual review of the surface conditions only. Deficiencies that may exist, but were not recorded in this report, were not apparent given the level of study undertaken

In issuing this report, Rainforest Envelope Protection Services Ltd. does not assume any of the duties or liabilities of the designers, builders and/or owners of the subject property. Owners, prospective purchasers, tenants or others who use or rely on the contents of this report do so with the understanding as to the limitations of the study undertaken and understand that Rainforest Envelope Protection Services Ltd cannot be held liable for damages they may suffer with respect to the purchase, ownership or use of the subject property.

2.0 REVIEW OF EXISTING CONDITIONS

The Observatory consists of a 22 storey high-rise structure, constructed of concrete and steel stud The building is constructed over a concrete parking garage The building has 127 residential units and an amenity area that contains a hot tub, exercise rooms and an activity room. The exterior walls are clad with conventional portland cement stucco complete with a decorative acrylic coating and aluminum window wall systems complete with spandrel panels. The Tower has terraced roof decks at the penthouse levels and a main roof with a roofing membrane over which rigid styrofoam insulation and concrete paving stones or rock ballast have been applied. The suspended concrete balconies are coated with a deck paint that does not appear to have any elongation to span shrinkage cracking. The window walls as well as punched windows are constructed of aluminum frames with double paned glazing units The building is located at 10899 West Whalley Ring Road, Surrey, B C

23 of 127 Units are reporting incidence of water ingress, typically associated with the window wall system. The building was constructed in 1994 – 95 and is approximately 8 5 years of age

2.1 Exterior Observations

Between December 2002 and March 2003 a total of seven site visits were made in addition to the previous testing carried out on August 6 and 14 of 2002 A total of 14 Suites were visited which had identified water ingress related problems including the areas identified in the Occupant Questionnaires. We also carried out visual reviews of the exterior cladding from the ground, main roof level and from bosun's chairs, as well as the Contractor's swingstage on the north elevation Negative testing of windows and window walls were conducted in August of 2002 and in February of 2003. Mr. Randy Faustmann and Mr Gary Bawtinheimer carried out the field work with the assistance of Ms Laura Watamanuk for the bosun's chair work and window testing

2.1.1 Wall Claddings

The wall claddings at The Observatory as stated above consist of conventional portland cement stucco with a decorative acrylic finish and aluminum window wall systems.

Stucco

The stucco consists of a decorative acrylic finish over portland cement stucco basecoat applied to wire reinforcing mesh on Tyvek moisture barrier with the backer board being Dens Glass Gold exterior grade sheathing that is complete with fiberglass reinforced face and back layers, and both the reinforcing and gypsum core are treated with silicone for moisture resistance The stucco is considered a face seal cladding Face sealing means no provision for drainage of incidental moisture has been provided behind the cladding system The surface of this wall assembly must shed all rainwater This therefore places a large reliance on the caulk seals which are present at the perimeter of the stucco panels, perimeter of window assemblies, perimeter of wall penetrations etcetera

The stucco cladding in itself is relatively low maintenance with the acrylic coating in need of periodic cleaning

Very little cracking was evident through the acrylic finish and the minor hairline cracking would not be seen as being detrimental in allowing water ingress at this time The stucco cladding was noted to be severely soiled at the terminations to the throughwall flashings that also incorporate the head flashings of the punched windows

Window Wall

The aluminum window wall system rests on Dens Glass clad steel stud framed curbs that is protected with Tyvek moisture barrier and a final covering of aluminum panels The window

frames are constructed of individual units which are coupled together at the jambs. The assembly is then applied over the upturned leg of the spandrel panel with the intent that any leakage through the window frame components would be drained through the exterior weep holes and be directed down the face of the panels to the exterior

The window wall system would be considered a concealed barrier in that water that bypasses the glazing stops would be contained within the glazing pockets and directed from the upper glazing units to the condensation gutter at the sill extrusion, then through the weep holes to the exterior. This places complete reliance on the seals of the miter and butt joints as well as the screw chases fastening the frame components together, in addition to the sealing of the vertical couplers between the window frame sections.

At the majority of areas reviewed and tested the small joint sealant at the miters, butt joints and screw chases were in very poor condition and would be allowing water ingress to the frame components. Without a complete sub-sill pan to collect this water it is being directed to the deflection heads of the units below and subsequently into the building

The horizontal frame member separating the lower glazing from the upper glazing is designed to drain to the condensation gutter at the sill of the assembly, then to the exterior. With the unsealed screw chases at the butt joints to the vertical members, rainwater is being directed into the vertical couplers with no means of escape to the exterior

2.1.2 Windows and Other Wall Penetrations

In addition to the window walls system there are also punched window assemblies set into fully framed steel stud openings. While both assemblies consist of insulated glazing units installed into the aluminum frames, the punched windows are recessed into the framing and are protected by head flashings that are continuous through the adjoining stucco clad panels The sill flashings are similar to that of the metal spandrel panels in that the upturned leg extends behind the unequal leg of the sill extrusion The sloped portion of the flashing is constructed to immediately shed water and a sufficient vertical drip edge has been provided that is well sealed to the stucco below. At the end terminations of the sill flashings, additional 90° shaped sections have been added that appear to return behind the stucco cladding at the jambs and are caulked to the stucco as well as the window sill flashing and the extrusion of the window frame In the majority of the locations reviewed the sealant was debonding and gaps were present that would allow minor amounts of water into the frame assembly below. Evidence of this could be seen by staining of some of the caulk joints between the underside of the window head flashings and the flashing covering the framing components.

The frame joinery is reliant on small joint sealant as explained for the window walls, with spot checks of the sealants showing the same general condition with some sealant missing and some debonding

The head flashings that also continue throughwall at the stucco panel locations consist of straight sections that are mitered in the corners with the outside corners being a section that was snipped and folded to form the 90° break The ends of the outside corners have been pop-riveted to the straight sections and a seal was applied during construction that is failing in the majority of locations reviewed Water staining of the sealants used to seal the back of the head flashings to the 90° flashing covering the framing at the head of the windows was evident in several locations

Where the throughwall flashings terminate against the exposed balcony edges a sealant dam had been provided during construction. However, in all areas reviewed the sealant was not placed entirely to the back of the joint between the sloped portion of flashing and the slab edge In extreme wind driven rains water would be directed into this opening and behind the cladding, into the framed wall assembly

At the perimeters of the punched windows the waterproof seal was achieved by the use of a two-part urethane caulking. Random areas of this caulking are beginning to delaminate either from the window frames or the stucco cladding, which would be anticipated due to the age of the sealants.

The fireplace vents are caulked at the spandrels and at intermediate joint between sections. The caulking used appeared to have been a thermoplastic which has little capability of movement and breaks down quickly from ultraviolet radiation In the majority of areas reviewed the sealant was cracked and had shrunk away at corners

2.1.3 Decks and Balconies

There are two separate balcony assemblies constructed on The Observatory They consist of the terraced roof decks on the penthouse levels and the exposed concrete balconies on the remainder of the building.

Roof Decks

The deck surface is waterproofed, over which rigid insulation and concrete pavers have been applied and have internal drains The perimeter curb is used as the overflow in the event that the main drains become clogged and would prevent water ingress into the units Soil build-up and weed growth should be removed regularly and the drains should be checked for restrictions as part of regular and ongoing maintenance As no leakage was reported and this was not within the present Scope of Work, no testing was conducted

Exposed Concrete Balconies

The remaining balconies are exposed concrete balcony slabs with drains that are internal and expel the water through scuppers on the exterior of the slab edges The coating that has been applied over the concrete does not appear to be waterproof and some water ingress to the slabs

should be anticipated through shrinkage cracking However, a waterproof coating on exposed suspended balcony slabs is not a Building Code requirement.

46 of the Units responding to the Occupant Questionnaire indicated ponding on the balcony slabs although several of the questionnaires indicated that this was at the outside edge or around the drain and was minimal The ponding water on exposed concrete balconies would be a difficult deficiency to repair. The resloping of such balconies is somewhat difficult to achieve positive results Therefore, as none of the Occupant Questionnaires or our observations indicated that this ponding was allowing water entry to the spatial separations, the resloping of the balconies should be considered when and if the Owners decide to recoat the balconies with a more durable product

3.0 INTERIOR OBSERVATIONS

In addition to the Units reviewed during the initial testing, 9 Units were accessed based on comments made in the Questionnaires Other than water ingress at the window wall assemblies the staining noted was typically due to condensation from high humidity. The only exception was water ingress that has been occurring through the fireplace exhaust vents and being deposited onto the fire box which shows up as rust staining on the shield in the fire box. To assist in reducing the humidity levels, the use of interior fans is encouraged and the curtains should be left open during the day with windows left slightly ajar particular in kitchens and bedrooms

4.0 NEGATIVE PRESSURE TESTING

The second bedroom punched window openings of Unit 1702 and 702 were selected for destructive testing and review. The testing involved providing a sealed chamber on the interior to which an air evacuation unit and digital monometer were installed for providing and recording the negative pressure during the testing A water spray rack was lowered from the roof level and was situated to deliver 5 U.S. gal./sq.ft.hr. water spray over the entire specimen as required by the ASTM E1105-00 Testing Protocol for Installed Windows The testing requires cycling of the negative pressure at 5 minute intervals of pressure with 1 minute between the cycles of no pressure, although the water is maintained. This is repeated so a minimum of 15 minutes of pressurization occurs. Our testing was conducted with four cycles giving 20 minutes of pressure with 1 minute intervals between cycles with no pressure

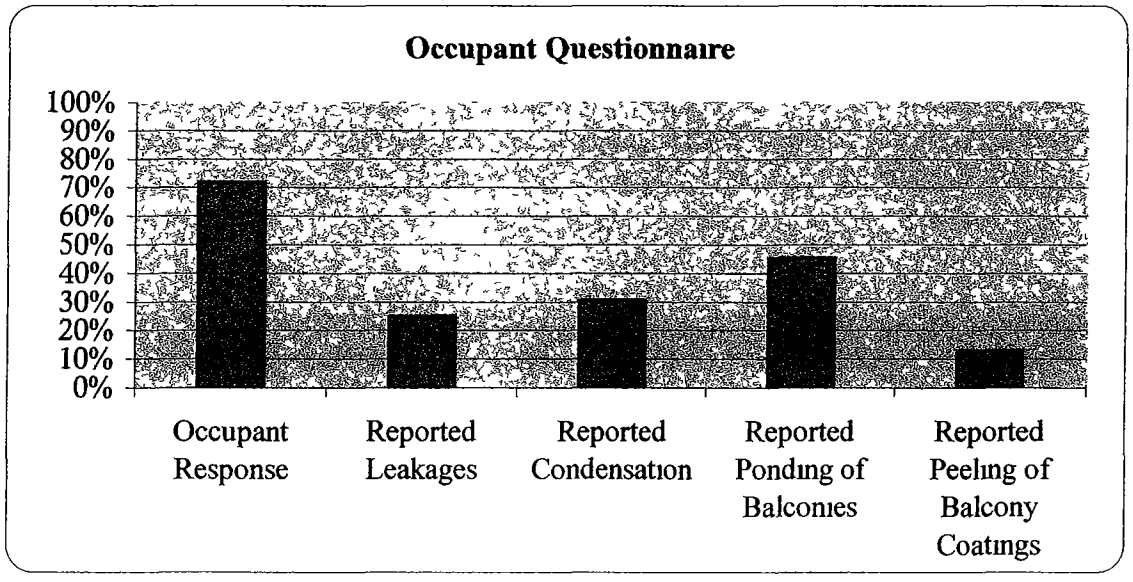
The design parameters in accordance with the A440 Window Selection Guide in place at the time of construction indicates the windows should be tested at a B3 or 250 Pa rating of negative pressure. Our testing was conducted at the new A440 Standards which is 300 Pa for a B3 rating and during the testing no leakage occurred The pressure was increased to 400 Pa which is the design requirements of a B4 window rating for water penetration that is consistent with the current A440-M98 Standard in use today During the cycles at this pressure no water penetration was noted

At the conclusion of the tests, sections of drywall were removed from below the windows with no water ingress seen and the moisture contents of the exterior Dens Glass sheathing ranged between 16 5% and 23% which is consistent with dry conditions of gypsum as the gypsum mineral contains a 20% moisture content by weight Typically, when water ingress, even in a minor nature is found in gypsum, the moisture contents are in the high 30% + ranges.

In reviewing the conditions of the steel studs, steel tracks and screw fasteners in the seven locations where observation holes were cut only one area showed very slight corrosion on the screw coming from the stucco with some slight staining on the back of the Dens Glass sheathing This was located directly below a failed seal joint at the termination of the sill flashing to the stucco return In this observation hole as well as the remaining, no corrosion was noted even in the cut sections of steel stud or track within the bottom floor plate or in the double sill tracks for the window support.

5.0 OCCUPANT QUESTIONNAIRE

Rainforest Envelope Protection Services issued a standard Occupant Questionnaire form that was distributed and collected by the Property Manager The questionnaire was devised to identify the extent and location of the water leakage and the building problems experienced by the Occupants Including the amenity area we received 92 of a possible 128 response (72%). Of these responses, 23 (25%) reported some form of leakage, 28 (30.5%) reported condensation, 41 (44 5%) reported ponding of balconies and 12 (13%) reported peeling of balcony coatings



6.0 RECOMMENDATIONS

From the visual review and testing of The Observatory, Rainforest Envelope Protection Services is of the opinion that the building is in need of immediate modifications to the window systems as well as maintenance to the sealants Throughout the body of the Report and in the Annotated Photographs we have made several recommendations There are however, four main issues that REPS would like to highlight as follows·

a. Resealing of screw chases, couplers, miter and butt joints, and modifications to the drain path of the upper horizontal frame units in the window wall

b Cleaning and recaulking of lap and miter joints of the throughwall flashings and terminations to the underside of the balcony slabs

c Removal and replacement of sealants at the sill flashing joints and terminations of the end dam flashings to the window extrusions and stucco returns.

d. Removal and replacement of the remaining sealants at penetrations and perimeters of exposed windows and fireplace exhaust vents

We offer the following discussion and recommendations for your review and consideration.

Window Walls

All exterior snap beads should be removed; the glazing pockets cleaned and new sealant applied at all screw chases, miter joints and butt joints. The horizontal bars separating the lower glazing from the upper glazing require new drainage notches cut as the current drainage path into the couplers will be sealed. All couplers require new caulk seals and the metal spandrel covers require all joints resealed including the terminations into the stucco panels and balcony slab edges

Punch Windows

All internal seals require replacement and modification as explained for the window wall system. Additionally, the existing sealants at the terminations of the sill flashings and the additional sill dam flashings require removal and replacement with a good quality urethane elastomeric caulking compound All perimeter seals between the window jambs and surrounding stucco should be removed and replaced with the same sealant

Flashings, Fireplace Vents and Other Penetrations

The joints of all throughwall flashings should have the existing caulking removed, be thoroughly cleaned and resealed. As the proximity of the stucco stop to the sloped portion of the flashing will not allow continuation of the sealant up the vertical legs of the flashing joints, the joints

should be dammed with sealant to the back of the stucco stops. The terminations of the throughwall flashings to the balcony upstands should have the existing sealants removed, the substrates thoroughly cleaned and new urethane sealants applied that will fill the entire depth of the stucco thickness, and prevent water migration into the spatial separation.

The aged caulking on the fireplace exhaust vents requires removal and new sealants applied in larger cap beads that will allow for the anticipated thermal expansion and contraction due to the heat in the exhausts The water penetration through the exhaust vents that is being deposited onto the fire box does not appear to be severe and as long as the pilot light remains on heating the fire box, the water will evaporate However, as a separate item from this remediation, baffles should be researched that would also prevent the pilot lights from blowing out during high winds.

All remaining sealants in exposed conditions should be removed and replaced as the end of their serviceable life is quickly nearing Completing the replacement of these sealants with this program will substantially reduce costs in the long term.

7.0 SUMMARY OF COSTS

As the recommendations made through this Report are of a maintenance nature and not restoration, the requirements of the Homeowner Protection Act for Third Party Warranties would not be required Additionally, Details, Specifications and Letters of Assurance would not be required for the Municipality having jurisdiction, leaving only the Contractor's costs and our fees should you determine that Field Reviews of the Contractors work is required. We have retained West Coast Building Coatings to provide a firm price quotation for the removal, cleaning, priming and caulking of the window couplers, jambs, heads and sills as well as the fireplace vent penetrations and throughwall flashing joints and terminations. The total cost of the Contractor's work including labour, materials and equipment are summarized in the following table and in the event that you require Field Reviews we have estimated our costs and include them in the following summary

SUMMARY OF COSTS

West Coast	North Elevation	$48,350 00
	South Elevation	$49,667 00
	East Elevation	$35,978 00
	West Elevation	$37,947 00
	Sub-Total	$171,942 00
REPS	Field Reviews	$20,633 00
	Sub-Total	$192,575 00
	GST	$13,480 25
	Total	$206,055 25

Contingency $30000.-

8.0 CONCLUSIONS

Our investigation and testing has been concentrated on the vertical spatial separations. The intent of the investigations and testing was to determine the water entry points of the vertically applied claddings including interfaces of various claddings and joints in the framing of the window assemblies Failed sealed units, damaged or worn hinges and cam handles, worn gaskets on operating windows and doors etcetera can allow water ingress. Deficiencies in the above are a result of normal wear and will require regular maintenance with all Owners reporting any incidence of failure as they occur However, we are confident that once the necessary remediation has been completed to window frame joinery and all transitioning of the components comprising the vertical spatial separations of the building envelope, the water ingress at these locations will be rectified However as with a building of any age, design and cladding system, regular and ongoing maintenance is required

The provision of a Maintenance and Procedures Manual should also be considered The maintenance of a building exterior has long been recognized as an important factor in the overall performance of a building structure It is referred to in the British Columbia Homeowners Protection Act, as a requirement of the building owners Performing maintenance is crucial to the long-term performance of building assemblies and their materials.

Regardless of the design of your building, or the materials used, all exterior building assemblies require maintenance in order to realize the full service life of the building components. Building exteriors are subjected to harsh environment conditions such as wind driven rain and snow, in addition to extreme temperature variations and air-borne contaminates. These conditions breakdown the materials of your building and will therefore, require ongoing inspections and repair in order to realize longevity from the building and cost effectiveness from your operating budget

Building exteriors are made up of a variety of building materials and components attached together through various means, into which is commonly referred to an assembly or a system These systems are designed and constructed to provide separation of the interior environment from the exterior environment. They control a number of factors such as temperature, humidity, air pressure and moisture and are instrumental in providing the comfortable atmospheres that we enjoy in modern buildings today. The relentless task of maintaining the serviceability of these assemblies requires a basic understanding of their function and the prudent implementation of a program that regularly addresses the requirements of each component in the assembly An exterior maintenance program should therefore, include a review process to identify the condition of the materials and the potential for problems, to determine a repair process to renew damaged and deteriorated materials as well as a replacement process to replace entire systems when their service life has been achieved

A regular program of building care includes maintenance and repair as well as a plan for replacement. Replacement planning refers to the regular replacement or renewal of components such as a roof or deck membrane, windows or paint, which have designated life expectancies

Renewal projects are generally of a large scale and should therefore be scheduled and budgeted for well in advance of the requirement It is important to recognize that even minor repair items can have a significant impact on the eventual cost of replacement projects Additionally, the timeliness of replacement projects can also significantly impact the cost

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per,

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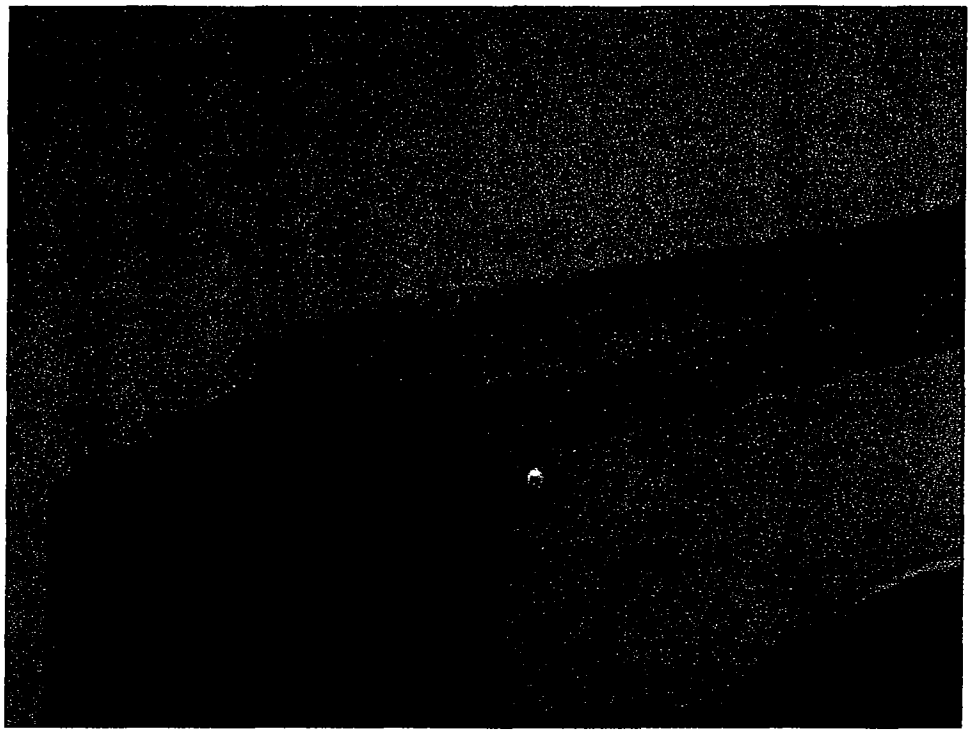
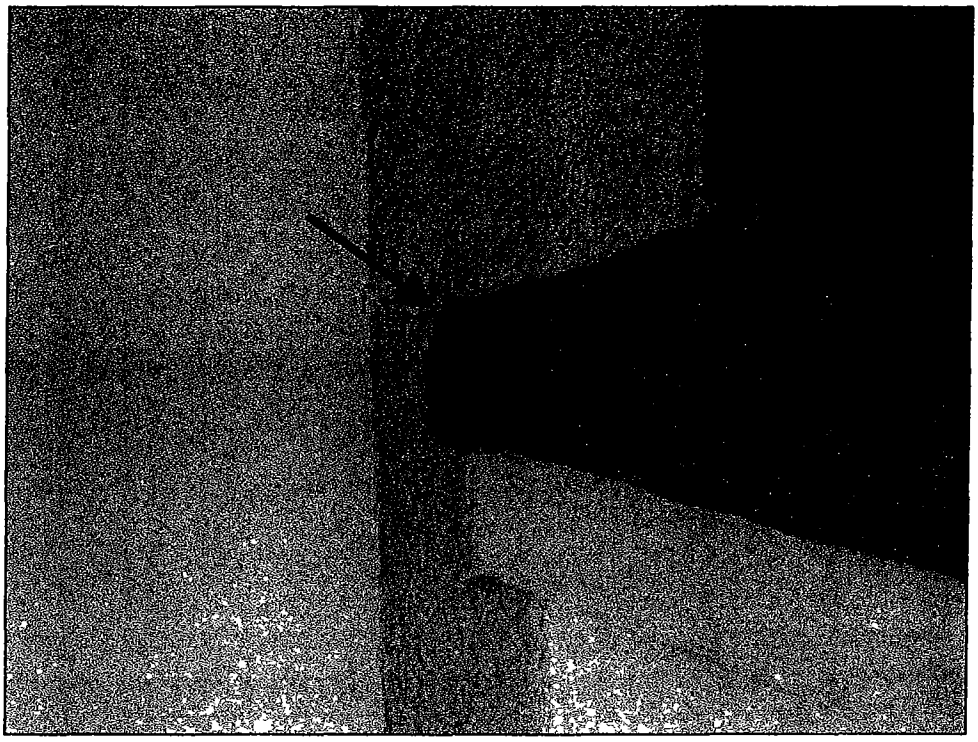
9.0 ANNOTATED PHOTOGRAPHS



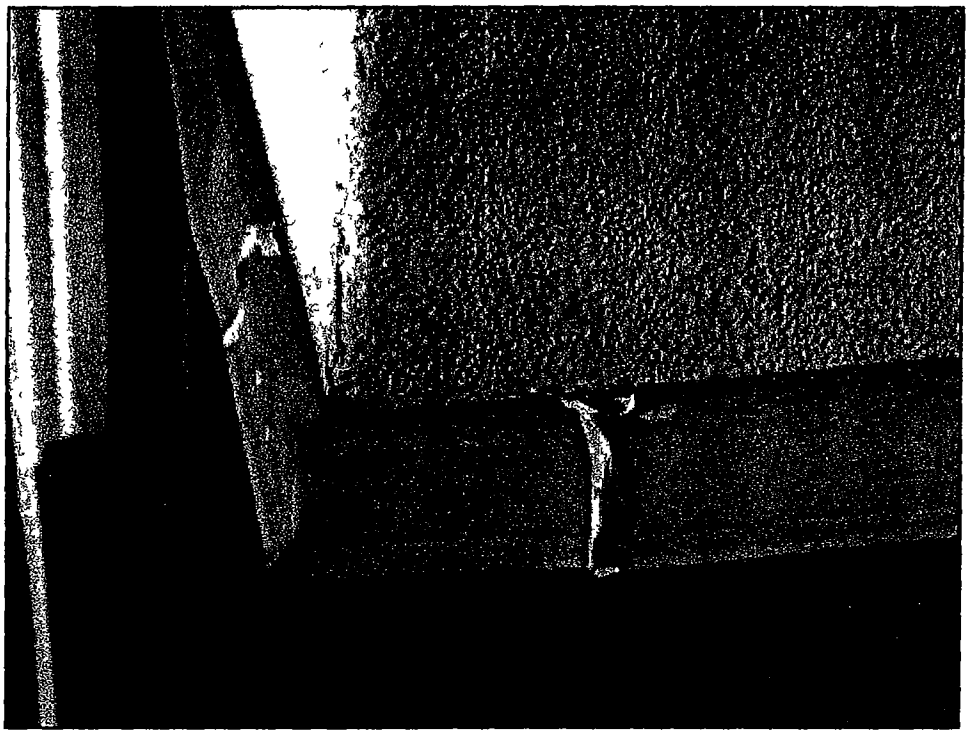
Photograph #1

The majority of caulking between the spandrel glass and fireplace exhaust units, as well as the outer flange of the exhaust is alligatored, checked and there were gaps noted at corners



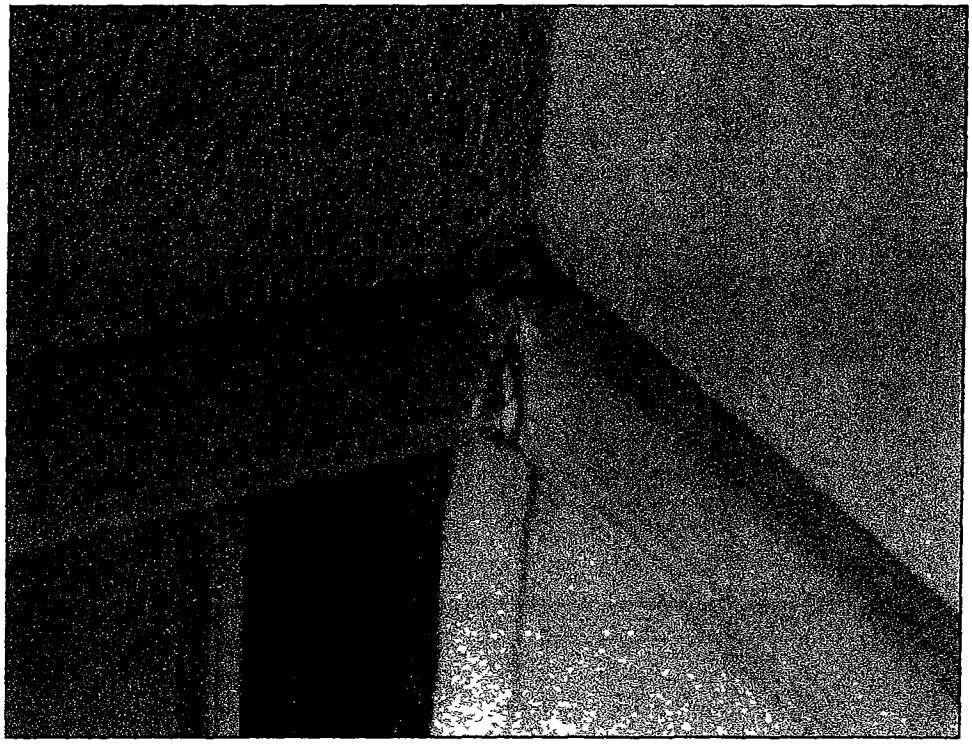
Photograph #2

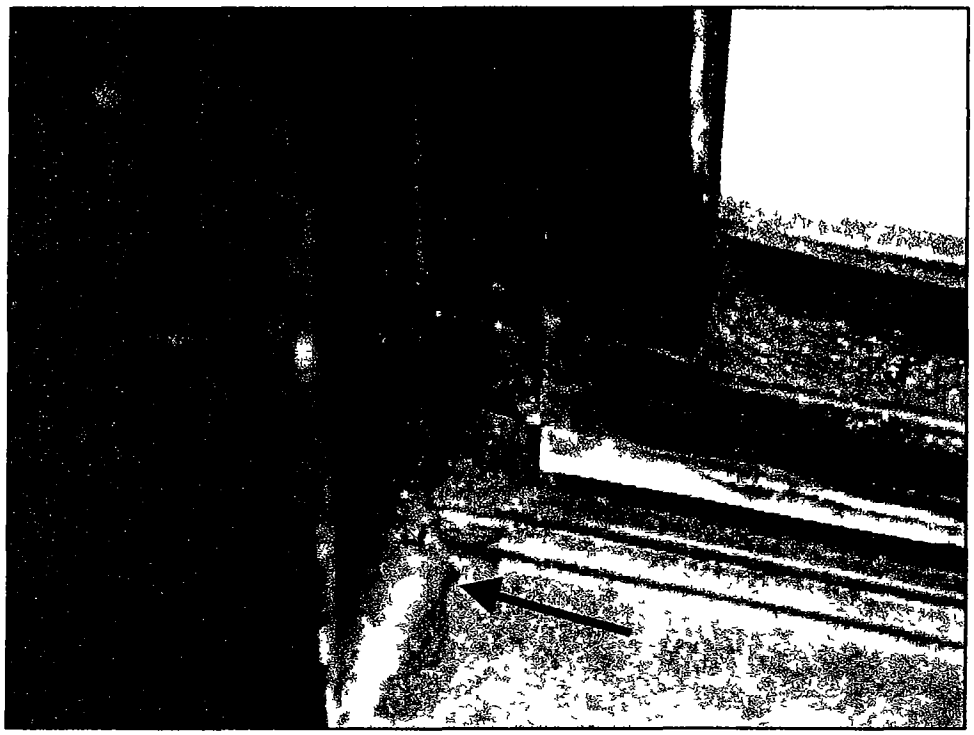
The sill flashings are three-piece with the ends appearing to go throughwall as separate pieces They were caulked, however, some of the sealant has separated leaving holes between the stucco stop and flashing return as well as the two sections of flashing



Photographs #3 and #4

These show the typical condition of the lap and miter joints in the throughwall flashings The caulking is severely damaged by ultraviolet degradation and is failing in many locations





Photograph #5

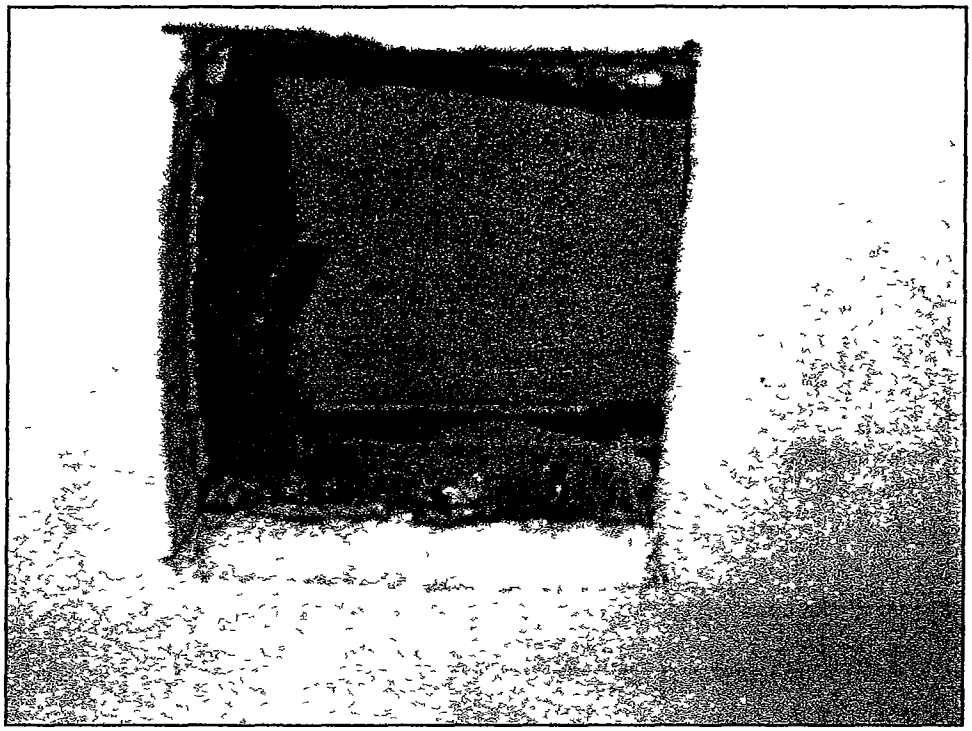
This shows the typical condition of the butt joint between the horizontal frame member to a coupler The upper arrow demonstrates where a gap is present that will direct rainwater into the coupler The bottom arrow shows where the sealant has failed at the butt joint This is typical at the majority of areas reviewed

Photograph #6

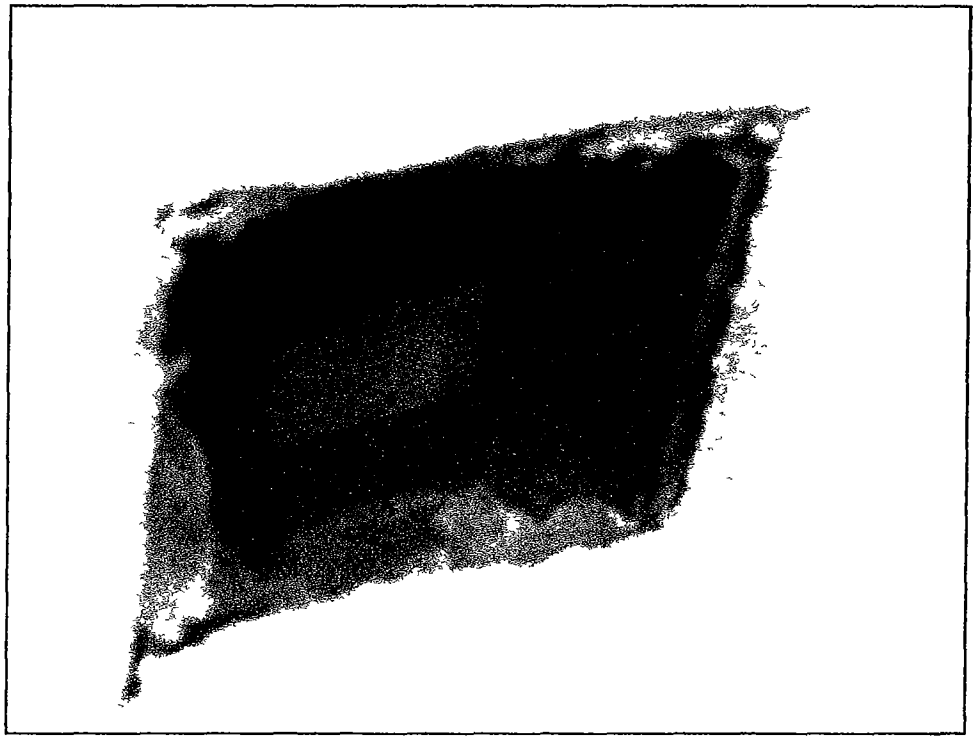
This shows swelling of the wood valances from minor water ingress at the failed sealant joints at the terminations of the window sill flashings at punched windows

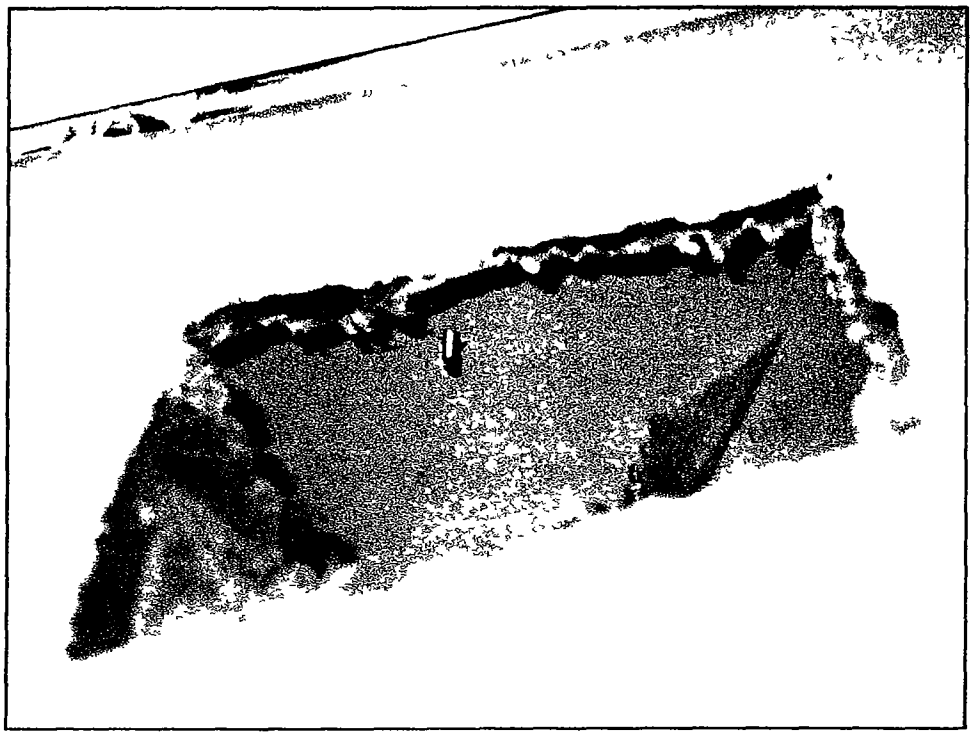
Photograph #7 through #10

These show the condition of the interior of the wall framing at areas tested No staining, corrosion or signs of water ingress were noted

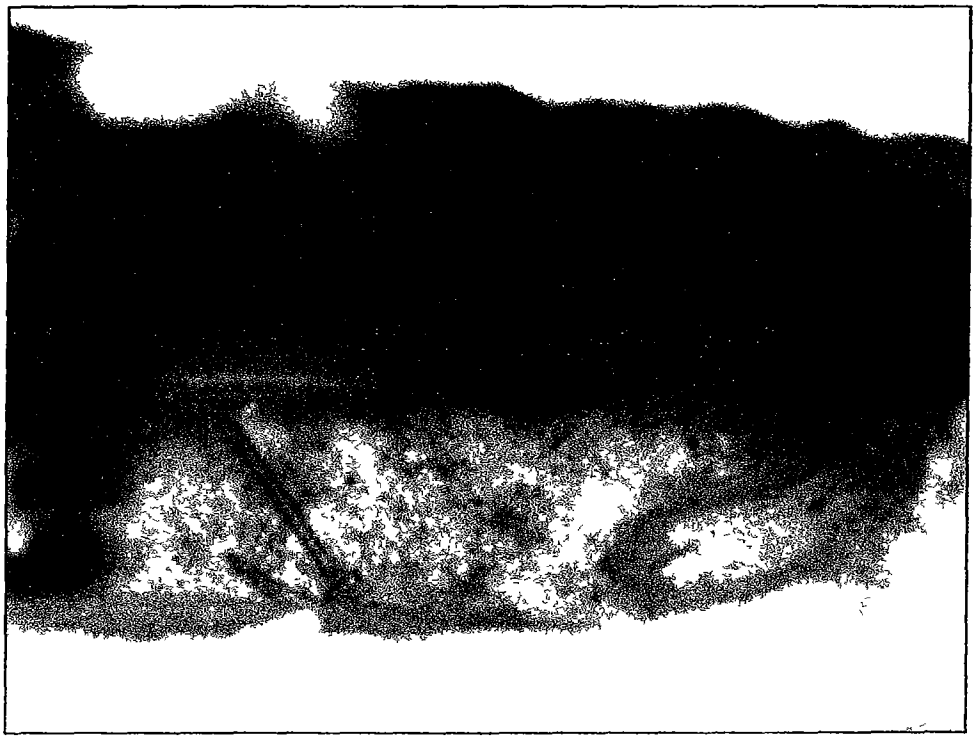


Photograph #8

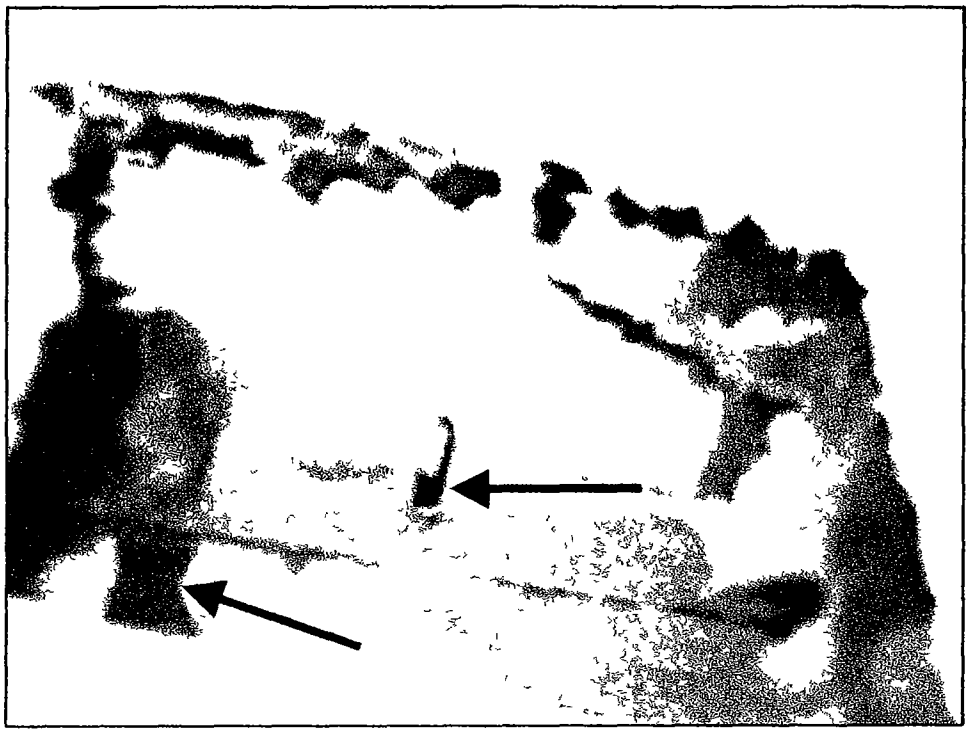




Photograph #9



Photograph #10



Photograph #11

This shows minor staining on the shank of the screw fastener of the Dens Glass and stucco and some slight staining on the Dens Glass Gold. This is directly below a termination of a window sill flashing where the sealant had failed