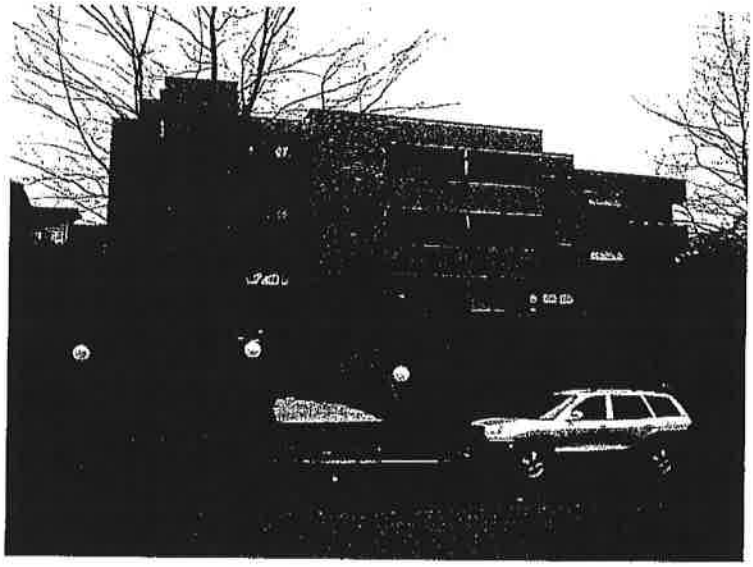
Read Jones Christoffersen
Consulting Engineers

1864 Frances Street
Building Envelope Condition Assessment

1864 Frances Street

Vancouver, B.C.



Prepared for:

Pennyfarthing Management Corp.
c/o Landview Place, Strata Plan VR 969
#100 - 1450 Creekside Drive
Vancouver, B.C. V6J 5B3

PRIVILEGED AND CONFIDENTIAL

Prepared by:

Read Jones Christoffersen Ltd.
Suite 300, 1285 West Broadway
Vancouver, B.C. V6H 3X8

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1.0 EXECUTIVE SUMMARY

As requested, Read Jones Christoffersen Ltd. (RJC) has completed an assessment of the building envelope assemblies at 1864 Frances, located in Vancouver, B.C.

RJC's assessment generally included a review of available original drawings, discussion of building envelope performance with building representatives, review of questionnaires completed by unit occupants, visual review of building envelope components (walls, windows, doors, balconies, roofs, plaza and foundation assemblies), visual review of the interior side of the exterior walls, examination of exterior recesses and examination of the wall cavity through cores cut into the sheathing.

Based on our condition assessment, elements of the building envelope for 1864 Frances Street are experiencing various levels of deterioration and require remediation in order to maintain the intended use of the building and ensure continued operation of building services. The recommended repairs are summarized in Section 5.1 - Recommendations of this report.

Conceptual level recommendations for building envelope remediation and renewal tasks have been provided, including associated magnitude of Opinions of Probable Cost to complete the work. A discussion of implementation timelines and alternate conceptual approaches are included where appropriate.

The total Opinion of Probable Cost to complete the recommended remediation program is provided in Section 5.2 - Opinions of Probable Costs.

2.0 INTRODUCTION

2.1 Terms of Reference

.1 Engagement

As requested, Read Jones Christoffersen Ltd. (RJC) conducted a Building Envelope Condition Assessment (BECA) of 1864 Frances Street, Vancouver, B.C.

The purpose of the BECA was to review and assess the present condition of the building envelope systems with regard to moisture ingress and moisture-induced deterioration.

This report documents the current condition of the building envelope and has been prepared in accordance with generally accepted engineering practices. No warranties, either expressed or implied, are made as to the professional services provided under the terms of our scope of work and included in this report.

Services performed and outlined in this report were based, in part, upon visual observations of the site and structure.

A Glossary of Terms is included in Appendix A to aid the reader in the understanding of standard construction terms used in this report.

.2 Scope of Work

A brief description of the work undertaken by RJC follows:

- Review of available original drawings to become familiar with design concepts and details pertaining to the building envelope.
- Questionnaires issued to the tenants regarding the building envelope performance.
- Visual review of building envelope components (walls, windows, doors, balconies, roofs, plaza and foundation, etc.).
- Review of the interior side of the exterior walls, including visual review and surface moisture content testing of the interior finishes.
- Examination of exterior recesses through the exterior cladding, including documenting the condition of the wall assembly materials and performing moisture testing of the exterior sheathing.
- Examination of exterior wall cavities through cores cut at recesses, including documenting the condition of the wall assembly materials and structural framing.

.3 Disclaimers

Structural comments are provided where applicable, but are limited to the condition of the structural members only. A structural design review was not conducted as it was beyond RJC's scope of work. Review of seismic aspects, mechanical, electrical, and fire safety systems, means of egress, and identification of mould-like substances were also beyond RJC's scope of work.

Neither RJC, nor any company with which it is affiliated, nor any of their respective directors, employees, agents, servants or representatives shall in any way be liable for any claim, whether in contract or in tort, including negligence, arising out of, or relating in any way to mould, mildew or other fungus, including the actual, alleged or threatened existence, effects, ingestion, inhalation, abatement, testing, monitoring, remediation, enclosure, decontamination, repair, or removal, or the actual or alleged failure to detect mould, mildew or other fungus.

2.2 Site and Building Description

.1 Site Description

The site is relatively flat with Frances Street sloping downwards in a westward direction. The first level of the north elevation is largely protected from the elements by low shrubs and trees, with the remaining levels being generally exposed. The east elevation of the building is heavily exposed to the elements with no natural protection and only partial protection provided by a two-storey residential house located on the adjacent lot. A few large trees and similar four-storey residential buildings across the alleyway provide minimal protection for the south elevation. The west elevation of the building is well-protected by high trees and a four-storey residential building on the adjacent lot.

All directional references made in this report are based on 1864 Frances Street running in an East/West direction.

.2 Building Description

1864 Frances is a 32-unit residential complex constructed circa 1981. The building is a four-storey, wood frame construction over an underground parking structure.

The exterior finishes consist of stucco cladding and soffits. Balconies are surrounded by stucco up-stand walls, some with sections of glass panel railings. The balconies have internal drains which are connected to single scuppers through the up-stand walls.

Window and door systems are typically constructed of non-thermally broken aluminum frame sections, fixed and operable, with double-glazed sealed units. Operable aluminum framed sliding patio doors open to private balconies.

The roof is a conventional flat roof (low-slope), with a SBS modified bitumen membrane.

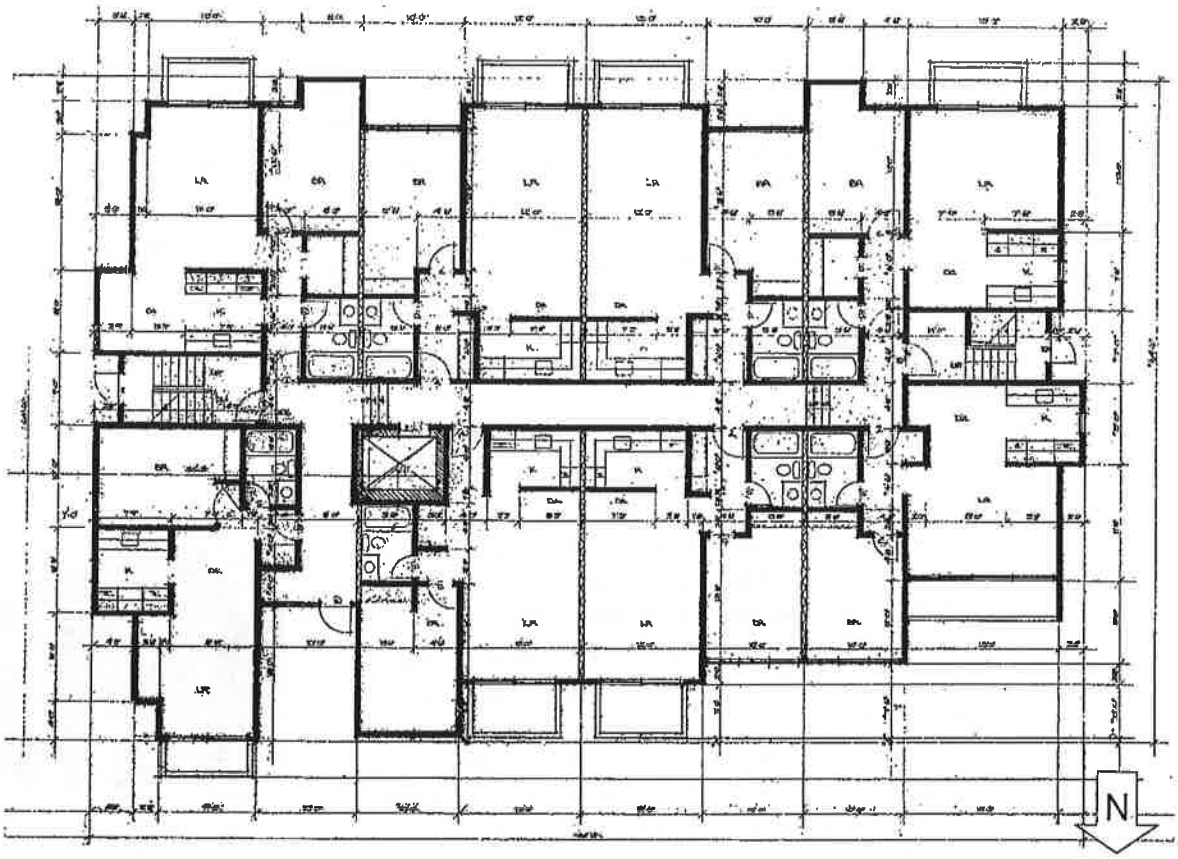


Figure 1.1 - Building Plan

A brief summary of the building construction is presented in Table 1.

Table 1 - Building Description	
Name	Landview Place
Address	1864 Frances Street
Number of Buildings	One
Number of Storeys	Four
Principal Occupancy	Residential
Date of Construction	1981
Architect	Lort Architects
Applicable Building Code	City of Vancouver Building By-Law
Code Requirements for Building Envelope	Part 5
Building Area	6300 Sq. Ft. per floor level
Number of Suites	32
Structural System	Wood frame
Cladding Types	Stucco
Roof Types	SBS Modified Bitumen Roof Membrane
Window Types	Aluminum frame, non-thermally broken
Door Types	Aluminum frame, non-thermally broken
Combustible	Yes
Sprinklered	No

2.3 Building History

A brief description of the major activities and events related to the building envelope as described in the documents reviewed are listed in Table 2.

Table 2 - Repair History	
1996	Tenant noted roof repairs were completed approximately 12 years ago.
06/22/00	General repairs, painting, flashing work on roof parapet.
09/21/01	Maintenance - drains cleaned out.
02/08/02	Ceiling leak in Unit 303.
09/19/05	Roof repair.
10/12/05	Leak repair in Unit 201.

2.4 Documents Reviewed

Table 3 lists the documents that were provided to RJC in order to assist with the building envelope condition assessment.

Table 3 - Documents Provided	
Architectural	Drawings 1 to 9 prepared by Lort Architecture dated July, 1980 as "Issued for Building Permit".
Structural	Drawings 8050-01 to 8050-04 prepared by C.A. Boom Engineering Ltd. dated December, 1980 as "Issued for Building Permit".

3.0 SUMMARY OF FIELD DATA

3.1 Questionnaires

The following is a summation of the information presented in Appendix C.

A Building Envelope Questionnaire was circulated to all of the unit occupants. The document requested information on the performance of the roofing, walls and window/door assemblies.

Responses were received from 25 of the 32 units (78%); this can be considered a representative sample of the building. A general summary of the questionnaire responses is outlined in Table 4.

Table 4 - Summary of Questionnaire Responses		
Description	**Number of Units**	**% of Responding Units**
Water Leaks	5	20
Area of Black Mildew	2	8
Window Problems	14	56
Exterior Door Problems	4	16
Air Leaks	3	12
Cracks	6	24
Balcony Problems	8	32
Water Leaks in the Parkade	7	28

Items of interest noted by RJC are as follows:

.1 A significant number of the units responding to the questionnaire reported problems with the windows. The problems typically related to air leaks and condensation on the window panes. Most of the problems were noted to be in the master bedrooms.

3.2 Interior Reviews

A total of 10 units were examined from the interior, which represents approximately 31% of the units. A visual review of the interior finishes and surface moisture testing of the exterior walls around windows and doors was completed. Summaries of the values assessed during the interior review are listed in Table 5.

Table 5 - Summary of Interior Moisture Content Readings

Scale Rating	Moisture Content Readings in 32 Locations	% of Overall Readings
Dry or Normal - <0.5%	27	84
Caution - 0.5% - 1%	3	10
Concern - > 1%	2	6

Surface moisture testing on the interior gypsum wall board of the exterior walls around windows and doors showed an average reading of 0.20-0.25% moisture content.

Five of the readings equal to or greater then 0.5% moisture content were found along the east elevation and southeast elevation corner.

3.3 Exterior Recesses

The following is a summation of the information presented in Appendix E:

A total of 42 recesses were made in the exterior of the building. The exterior recesses were made by cutting through the exterior cladding to expose the underlying moisture barrier. The moisture barrier was cut to allow for examination of the condition of the wall assembly materials and to perform moisture testing on the exterior sheathing. Coring through the exterior sheathing allowed for examination of the condition of the wall cavity and structural framing. Observations were made with respect to construction, moisture content, and condition of the structural materials. The locations of the recesses have been shown on the elevation drawings in Appendix F.

The recesses were installed both at areas that have a high and low probability of moisture ingress. These included areas in the field of the wall, below windows, below roof terminations, below wall terminations, below scuppers, at and below stucco control joints, and at the base of the wall. Review of the recesses revealed varying degrees of deterioration to the structure of the building. The following is a summary of the exterior recess findings:

.1 The condition of each recess was given a value based on a scale of 0 to 5. A value of 0 was given to recesses with no evidence of deterioration or staining and a value of 5 was given to recesses with deteriorated materials. It is our opinion that a value of 0 or 1 can be considered normal in the West Coast environment and may not be detrimental to the structure. Values of 2 and 3 may lead to further deterioration if not addressed, while values of 4 and 5 are of immediate concern. These values were identified at the time of

review and may change with continuing exposure to moisture. Summaries of the values assessed at the exterior recesses are listed in Table 6.

Table 6 - Summary of Exterior Recess Deterioration Values

Scale Rating	Frequency of Deterioration in 42 Total Recesses	% of Overall Recesses
Deterioration Scale Value of 0	13	31
Deterioration Scale Value of 1	14	33
Deterioration Scale Value of 2	4	10
Deterioration Scale Value of 3	6	14
Deterioration Scale Value of 4	2	5
Deterioration Scale Value of 5	3	7

.2 As shown above, approximately 36% of the recesses had values of 2 or greater.

.3 Of the fifteen recesses that had ratings of 2 to 5, nine (60%) of them were located on the east elevation. Four out of the nine recesses (45%) had a rating of 4 or 5.

4.0 ASSESSMENT OF BUILDING ENVELOPE CONDITION AND PERFORMANCE

4.1 Interior Conditions

The following is a summation of the information presented in Appendix D.

A total of 10 units were examined from the interior, which represents approximately 31% of the units. A visual review of the interior finishes and surface moisture testing of the exterior walls around windows and doors were completed. Items of interest noted by RJC are as follows:

.1 Surface moisture testing on the interior gypsum wall board of the exterior walls around windows and doors showed and average reading of 0.20-0.25% moisture content.

.2 Many of the aluminum window frames were observed to be in poor condition. Operable window units were observed to be difficult to open, unable to properly close, were sealed closed and/or had corroded hardware.

.3 Black organic growth and deterioration was observed at interior millwork window sills and gypsum wall board returns.

.4 Various windows are experiencing condensation between the panes of the double-glazed units. Condensation within double-glazed window units is an indication of a failure of the seal along the edge of the glass unit and saturation of the desiccant. See photo D2-2.

.5 Dark organic staining was observed on the interior gypsum board of various units.

.6 Heavy surface corrosion was visible on many of the aluminum window frames, likely caused by continuous amounts of condensation forming on the non-thermally broken frames.

The conditions observed during the interior review were indicative of problems arising from the glazing systems: see recommendations in Section 4.3.

4.2 Wall Assemblies

The following is a summation of the information presented in Appendix G.

The walls are constructed of stucco cladding directly over building paper and wood frame walls. Items of interest noted by RJC at these areas are as follows:

.1 The east elevation was found to have the most significant deterioration of the structure. This was likely caused by the significant exposure to eastern wind-driven rain combined with a lack of any protection provided by natural landscape or adjacent buildings.

.2 Water ingress between the elastomeric paint and the stucco cladding has caused large blisters to form on the east elevation wall. Elastomeric paint will prevent water penetration but will also stop any moisture caught between the cladding and the paint from escaping.

.3 Reviews of the wall cavities showed various locations with no vapour barrier installed.

.4 The remaining building elevations do not show significant deterioration, but were observed to be in the initial stages of failure at various locations, and as such, have been recommended for replacement in the longer term.

If a significant amount of water penetrates past the exterior cladding of a concealed moisture barrier system, through imperfections in the moisture barrier, the water may not be able to escape or dry adequately, leading to deterioration and decay of the structural wood framing elements. Possible water ingress routes through the wall system include cracks within the cladding, absorption, poorly detailed wall penetrations (windows, doors, vents, etc.), and changes in plane of the exterior cladding.

An elastomeric coating has been applied to the entire stucco cladding. This may prevent moisture penetration through some of the above described water ingress routes, such as through the field of the cladding. However, this may not reduce water ingress at transitions and joint details. Application of the coating has both positive, as well as negative, effects on the building envelope system. Water may be prevented from penetrating past the elastomeric coating, however, any drying properties of the original wall assembly are severely minimized with the coating applied. Therefore, any imperfection in the cladding or areas where water may penetrate at openings in the wall system will result in water ingress into the wall system, which now has minimal ability to dry out. Examples of moisture being trapped between the elastomeric coating and the stucco cladding are the large blisters visible on the east elevation wall. See photos of recess number R15.

Elevated levels of rot were mainly observed on the east elevation of the building. The severity of the damage to the wood structural sheathing due to rot and water damage raises concerns regarding the integrity of the wood framed structural system. See photos of recess number R17.

No vapour barrier was observed in the wall assembly of five of the nineteen cores cut while reviewing the wall cavities during the exterior investigation. Four of the cores were on the east elevation of the building. The lack of a proper vapour barrier can increase the risk of vapour diffusion from the interior space into the exterior wall cavity and may result in structural damage. Once the warm vapour reaches the cooler backside of the exterior sheathing it, will condense into liquid water. The larger concern is that in this type of wall assembly, the polyethylene sheet forms part of the air tightness system; with significant sections missing from the wall assembly, there is an increased risk for warm moist air to be able to flow through irregularities in the wall, with water condensing on cooler exterior surfaces. The amount of structural damage that can be caused by this process is a significantly greater concern than through vapour diffusion alone.

In general, the concealed moisture barrier system appeared to have had moderate success in preventing moisture ingress in the past on the north, south and west elevations. Despite past performance, the building envelope system appears to be nearing the end of its service life. Several of the exploratory recesses revealed wood structural sheathing and framing with elevated moisture content levels, which were mainly free of water staining. Due to the lack of staining and rot, it would appear that water ingress at these locations is relatively recent. The cause of the apparent recent water ingress is likely due to a combination of a breakdown of the stucco cladding, due to the effects of aging, and failures in the aluminum framed windows.

The east wall has already undergone enough deterioration that we must recommend remediation of the wall. Due to the concerns with the gaps in the air barrier and vapour retarder, and the higher exposure of this wall, we recommend that the wall system be rehabilitated with an exterior air/vapour barrier assembly.

The north, south and west elevations are beginning to show signs of deterioration as well. Therefore, it may be a consideration to rehabilitate these walls in conjunction with the east elevation wall. As we will also be recommending replacement of the glazing systems, the amount of disruption and exterior stucco work around the windows may make replacing all of the cladding at once a more cost appropriate solution. As the three remaining elevations do not exhibit the same concern with gaps in the air barrier and vapour retarder, and as these walls have less exposure, we would recommend a more conventional strapped rainscreen assembly for the rehabilitation of these walls.

Table 7 - Recommendations for Remediation	
A	East elevation wall - Replacement of the existing cladding system with an exterior air/vapour barrier rainscreen wall system.
B	Consideration for replacement of the existing cladding system on the north, south and west elevations with a strapped rainscreen wall system.

4.3 Window and Door Assemblies

The following is a summation of the information presented in Appendix H.

Window and sliding door assemblies are comprised of non-thermally broken aluminum framing with fixed and operable double-glazed units. The operable units in the windows are

predominantly comprised of horizontal awning units. Items of interest noted by RJC are as follows:

.1 Various windows are experiencing condensation between the panes of the double-glazed units. Condensation within double-glazed window units is an indication of a failure of the seal along the edge of the glass unit and saturation of the desiccant. See photo D2-2.

.2 Head flashing above windows were observed to have a negative slope towards the building. See photo H2-4.

.3 A number of operable windows have been closed and permanently sealed shut. See photo H2-2.

The windows are constructed of non-thermally-broken aluminum frames. Condensation will form on the interior of the aluminum window frame when cold exterior temperatures cause the interior of the frame to drop below the dew point of the moist interior air. This is the likely cause of the corrosion of the aluminum window frames and hardware observed during our interior review.

We also observed glazing seals that have failed, generally meaning that moist air has entered into the sealed insulated glazing unit. Not only is this moisture within the sealed glazing unit not aesthetically pleasing, it also reduces the thermal properties of the window, making it less energy efficient. The failure of the sealed units indicates moisture is not draining properly from the frames.

Due to the service condition of the windows, and their contribution to the ongoing deterioration of the wall assembly, we recommend replacement of these systems. If the whole exterior envelope is not rehabilitated, the replacement of the window systems will involve the removal of approximately 12" of stucco around the perimeter of each window unit. This is to ensure the ability to complete proper tie-ins around the new windows. If the replacement of the window systems is done in combination with the replacement of the entire exterior cladding, the costs for stripping around the windows will be absorbed into the wall remediation costs. As well, if the whole exterior envelope is rehabilitated, it may be a consideration to replace the balcony sliding doors at the same time.

Table 8 - Recommendations for Remediation	
C	Replacement of existing windows with new aluminum thermally broken windows or high performance vinyl framed windows with double glazed units.
D	Consideration for replacement of existing balcony sliding doors with new aluminum thermally broken or vinyl framed double glazed balcony sliding doors.

4.4 Balcony Assembly

The following is a summation of the information presented in Appendix I.

The wood framed balconies are protected on the horizontal surface with a liquid applied neoprene hypalon membrane. Items of interest noted by RJC are as follows:

.1 The end of a balcony up-stand wall cap-flashing was turned up against the exterior surface of the stucco cladding. See photo 12-3. No sealant was observed at the balcony wall to exterior wall interface. These interfaces are typically areas of concern due to the difficulty of ensuring a proper transition from a vertical surface to a horizontal surface.

.2 No moisture barrier was found under any of the balcony up-stand wall cap-flashings.

.3 The cap-flashing on the balcony up-stand walls were observed to be flat lapped joints or butt joints. This method of joint connection provides minimal protection against water infiltration and has resulted in significant damage to the framing of the up-stand wall. See photo 12-5.

The combination of flat lapped flashing joints and the absence of a moisture barrier over the top of the balcony wall has allowed for significant amounts of moisture to accumulate and sit directly on the surface of the wood members for extended periods of time. This has resulted in the inevitable deterioration of the balcony wall structure.

We would recommend the removal of the existing balcony wall cap-flashing, repair to the underlying structure, and the installation of a moisture barrier membrane and proper cap-flashing.

If a full envelope rehabilitation is considered, it may then be appropriate to replace the up-stand walls with conventional railings, and replace the deck surfaces, as making tie-ins while maintaining these two existing systems would be cost prohibitive.

Table 9 - Recommendations for Remediation	
E	Remove and replace existing balcony wall cap-flashing and repair damage to the balcony wall structure.
F	Consideration for removal of the balcony up-stand walls and replace with new metal railings.
G	Consideration for removal and replacement of the existing balcony membrane with new liquid applied membrane.

4.5 Roof Assembly

The following is a summation of the information presented in Appendix J.

The flat (low-slope) roofs are composed of a 2-ply SBS modified bitumen membrane. The membrane appears to be in generally good condition with the exception of a few areas. Items of interest noted by RJC are as follows:

.1 A large blister in the roof's membrane was located at the northeast corner of the upper level roof. Blisters in the roof are typically caused by moisture trapped below the membrane's surface that expands during warm weather.

.2 Large areas of ponding were noted adjacent to the area roof drain. Standing water can increase the risk of ingress through the roof membrane.

.3 The parapet cap-flashing is joined using standing seam s-lock connections. The parapets showed no signs of water ingress and appeared to be in good condition.

.4 Several mechanical roof vents are heavily corroded.

.5 A significant build-up of organic material, which appeared to be a bird's nest, was found at the southeast corner of the elevator penthouse. Built-up organic material can allow the growth of plants, and their root systems can cause damage at the seams of the roof membrane.

There are several stains caused by pools of standing water due to poor roof slope towards the area drains. This standing water may have contributed to the growth of areas of moss observed on the roof membrane. The imbedded roots of the moss will slowly break down the effectiveness of the membrane to repel water and could lead to possible leaks.

With the concerns concentrated on the eastern (highest) section of the roof due to the large blistered area, we would recommend replacement of this section.

Table 10 - Recommendations for Remediation	
H	Remove and replace the eastern section of the roof's existing membrane with two-ply SBS Modified Bitumen membrane including removal and replacement of deck sheathing.

4.6 Plaza Assembly

The following is a summation of the information presented in Appendix K.

The plaza and foundation assemblies were briefly reviewed during the exterior investigation. A small area of landscaping was removed to identify the type of membrane used on the plaza. The area excavated showed the plaza membrane is likely a liquid applied membrane.

A more thorough review of the plaza membrane was not completed at this time, but is recommended prior to making a more informed restoration recommendation. Items of interest noted by RJC are as follows:

.1 Review of the parkade ceiling below the plaza area showed signs of water infiltration through the concrete slab.

.2 The plaza membrane that was observed appears to be a liquid applied membrane.

A likely cause for the water ingress into the parkade is due to small puncture holes in membrane.

The structural condition of the parkade was not reviewed. Any concerns regarding damage caused by water ingress should be completed through further investigation.

There were not enough concerns raised during our visual review for us to recommend any rehabilitation work at this time.

APPENDIX A

GLOSSARY OF TERMS

A number of terms used in the Condition Assessment have specific meaning and are defined below.

Air Barrier; refers to materials and components that together control the flow of air through an assembly and thus limit the potential for heat loss and condensation due to air movement.

Assembly; refers to the collective layers of components and materials which together comprise the complete cross section of a wall or roof.

Balcony; a horizontal surface exposed to the outdoors, projected from the building so that it is not located over a living space or acting as a roof.

Basecoat; refers to the initial wet state material of stucco, either factory or field mixed.

Blistering; raised air pockets in a membrane resulting from evaporation of water that is trapped in the roof system during application or which migrates into the roof system either from exterior deficiencies or vapour drive through the roof assembly. The condition can occur between the membrane plies or between the membrane and the substrate.

Blocking; a solid block of material used to support or raise up another material or element.

Bubbling; raised air pockets in a sealant resulting from expansion of air trapped in the material during application or evaporation of water trapped in the material during production or application.

Building Envelope; is an environmental separator, generally between the inside and the outside of a building (including the ground), but also between dissimilar environments within the building.

Building Paper; refers to asphalt impregnated organic sheet material that creates a water shedding surface behind the cladding.

Cladding; a material or assembly, which forms the exterior skin of the wall, and is exposed to the exterior environment.

Control Joint; a joint in the building envelope permitting differential movement of portions of the building structure due to thermal changes, shrinkage of materials and pre-determined locations of movement. Also reduces or localizes cracking of brittle materials such as stucco, where movement needs to be controlled.

Detail; refers to a location within the building envelope assembly where the typical construction is interrupted because it meets a penetration of the assembly. Examples include balcony guardrail connections, window and door penetrations, balcony to wall intersections.

Dimensional Lumber; refers to pieces of wood that are cut to standard sizes.

Drainage; refers to a water management principal that utilizes surfaces of the assemblies to drain water away from the assembly.

Drainage Cavity; refers to the space behind the water shedding surface (cladding) that provides a path for free drainage of incidental water within the assembly.

Drying; refers to a water management principal that incorporates features and materials that facilitate diffusion and evaporation of moisture from materials that get wet.

Durability; refers to the ability of a material, components, assembly or building to perform its required function in its service environment over a period of time without unforeseen maintenance, repair or renewal.

EPDM; acronym for Ethylene Propylene Diene Terpolymer. Refers to a single-ply rubber roofing membrane.

Face-seal; building envelope assembly where the water penetration performance of the wall is dependent on the ability of the exterior surface of the cladding/windows and associated sealant to shed water. This system cannot easily accommodate water that penetrates past the exterior face since no positive drainage path or additional continuous barrier to water is provided.

Finish Coat; refers to the final wet state material of stucco, which provides colour and texture, applied over the basecoat.

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

Cap (or parapet) flashing; top of wall (at roof), pier, column or chimney.

Counter flashing; prevents water from penetrating behind the top edge of base flashing, and consists of a separate piece of flashing placed over the top of the base flashing.

Drip flashing; directs water flowing down the face of vertical component, such as walls or windows, away from the surface so that it does not continue to run down the surface below the component.

Saddle flashing; an upturn, transition piece between a horizontal and vertical plane, i.e. balcony guard wall caps and wall intersection.

Head/sill flashing; at head or sill of window or other penetration.

Base flashing; refers to part of the roofing that is turned up at the intersection of a roof with a wall or another roof penetration.

Through or Cross Cavity Flashing; a flashing that intercepts and directs any water flowing down the moisture barrier plane of a wall assembly to the outside (at floor levels, above windows and doors, etc.), and prevents exterior moisture from entering the wall assembly below the flashing. Typically found in rainscreen wall assemblies.

Glazing; the glass portion of a window, door or skylight.

Head; horizontal member at the top of a window or door opening.

Insulated Glass Unit (IGU); refers to a hermetically sealed assembly consisting of two or more lites of glass separated by a spacer bar and sealed/joined with sealant.

Jamb; either of the vertical members at the sides of a window or door opening.

Lite; refers to an industry term for piece or pane of glass (includes sealed units).

Low-E Glass; Low emissivity glass; a type of reflective glass used to reduce radiation heat transfer and improve the 'U' value of the glazing.

Maintenance; refers to a regular process of inspection, minor repairs and replacement of components of the building envelope to maintain a desired level of performance for the intended service life without unforeseen renewal activities. Maintenance activities are typically for items with life cycles of less than one year.

Membrane; waterproof material or combination of materials in an exterior wall or floor assembly whose purpose is to prevent moisture and water vapour from passing through.

Moisture Barrier; material or combination of materials in an exterior wall assembly whose purpose is to retard the penetration of incidental water further into the wall structure once past the cladding. Materials used commonly are building paper and house wrap.

Moisture Content; amount of moisture based on either a relative scale or for wood, the weight of water contained in the wood expressed as a percentage of the weight of oven dry wood.

Mullion; a vertical or horizontal member that separates lites of glass.

Muntin bar; a vertical or horizontal member within a sealed unit to give the appearance of separate lites.

Penetration; an intentional opening through an assembly in which ducts, electrical wires, pipes, and fasteners are run between inside and outside.

Rainscreen; a strategy for rain penetration control that relies on deflection of the majority of water at the cladding, a cavity which provides a drainage path for water that penetrates past the cladding, and air tightness within the assembly to the interior of the cavity which limits pressure differentials across the cladding.

Renewal; refers to activities associated with expected replacement of worn out components or materials of a building envelope and are typically for items with life cycles in excess of one year.

Repair; replacement or reconstruction of envelope assemblies, components or materials at specific localized areas of the building envelope so that it can fulfill its original intended functions.

Reverse Lap; refers to a negative lap in building materials where the upper layer of material extends behind the lower layer of material.

Saddle; transition of horizontal surfaces such as a top of a balcony guardrail or parapet wall with a vertical wall surface.

SBPO; acronym for Spun-Bonded Polyolefin. Refers to a sheet material that creates a water shedding surface behind the cladding.

Sealant; is an elastomeric material with adhesive properties used to seal joints or openings against the passage of air and water.

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

Service Life; refers to the period of time during which building envelope materials, components and assemblies perform without unforeseen maintenance and renewals costs.

Sheathing; material (oriented strand board (OSB), plywood, exterior gypsum board, etc.) used to provide structural stiffness to the wall framing and backing for the cladding and sheathing paper.

Sheathing Paper; refers to asphalt impregnated organic sheet material which creates a water shedding surface behind the cladding.

Sill; horizontal member at the base of a window or door opening.

Soffit; refers to the underside of a horizontal exterior surface, such as at the underside of balconies or eaves.

Stucco; refers to a material usually made of portland cement, sand, and a small percentage of lime and applied in a plastic state to form a hard covering for exterior walls

- **Basecoat**; refers to the initial wet state material of stucco, either factory or field mixed.
- **Finish Coat**; refers to the final wet state material of stucco, which provides colour and texture, applied over the basecoat.
- **J-Stop**; a metal extrusion formed in the shape of a 'J' used in enclose the edges of panel materials or stucco.
- **Lath**; a metal grid used as a reinforcing layer for the stucco.
- **W-Channel**; a metal w-shaped extrusion commonly used in buildings as control joints.

Swiggle Seal; a material used as a spacer between glazing panes in insulated glazing units (IGUs) that has a corrugated aluminum strip encased in a bituminous resin. A desiccant may be included within the seal.

System; describes a combination of materials and components that perform a particular function such as an air barrier system, or moisture barrier system.

Tempered Glass; is a stronger glass, created in a secondary process via controlled air-cooling of the heated glass. Tempered glass is four times stronger than annealed glass and when shattered breaks into small pieces. It is resistant to thermal stress and often used as safety glass.

Thermal Break; refers to a low heat conducting layer between the interior and exterior portions of a metal frame to reduce heat flow and decrease condensation potential.

Threshold; the lower horizontal member of a doorframe extending from jamb to jamb that lies directly under a door and is set on the floor.

Vapour Barrier; refers to a material with low vapour permeability which is located on the warm side of the assembly to control the flow of vapour through the wall assembly and limit the potential for condensation due to diffusion.

Walkway; refers to a corridor exposed to outdoors which provides pedestrian access between suites and stairwells or elevators. It may or may not also act as a roof.

Weather-stripping; refers to the material around operable lites used to reduce air leakage or water penetration, or both.

Weep hole; a small opening in the sill or intermediate horizontal members or a window or door, that allows infiltrated water to drain to the building exterior.

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

Awning; an operable window with a top mounted hinged sash that swings out at the bottom.

Casement; an operable window with a vertically hinged sash to open in or out.

Fixed; a window in which the glazed unit is fixed in place and does not open.

Slider; an operable window that contains one or more operating sashes that open and close by sliding sideways in the frame.

APPENDIX B

TESTING PROCEDURES AND DETERIORATION OF MATERIALS

Testing Procedures

Moisture Testing

Moisture tests were carried out at various locations on surfaces of building components, including interior drywall on exterior walls, and the exterior sheathing exposed at the exterior recesses.

Moisture tests performed on interior surfaces are intended to locate areas of dampness not immediately visible. These tests are used as a tool to identify areas that have a high probability of underlying rot. It should be noted that moisture content (MC or moisture content by mass of dry material) testing with electric moisture meters is "inferential, that is electrical parameters are measured and compared against a calibration curve to obtain an indirect measure of moisture content. The range of moisture content that can be detected by these meters is from a minimum of 6% or 7% MC to a maximum of 25% to 27% MC (nominal value of the fibre saturation point in wood). The accuracy of these meters is ±0.5 to 2% MC over a 95% confidence interval" (ASTM Standard D4444-92).

Moisture content readings were taken using a Protimeter Surveymaster SM moisture meter. This moisture meter measures the moisture content scale for wood. In any material other than wood, such as gypsum wallboard, the meter gives readings of % Wood-Moisture-Equivalent (%WME). %WME is the moisture level in porous building materials other than wood expressed as moisture content of wood. Discussion of the deterioration of the various materials found in the building is outlined below.

As described in succeeding sections, the bio-deterioration of wood typically requires a moisture content of some 19% with sustained fungal growth occurring above 27% or the fibre saturation point. Given the limitations of electric moisture meters, measured moisture contents below 7% will be presented as DRY with measured values above 27% recorded as FS or Fibre Saturation. Values between these values will be reported as recorded with an estimated accuracy of ± 2%.

Deterioration of Materials

All building components can be subject to deterioration if exposed to less than optimal conditions during service. The primary structural building component is light wood framing. Included for reference is a brief description of the deterioration process of light wood frame construction and gypsum sheathing.

Fungal Growth in Cellulose Materials

Fungi are microscopic organisms that feed on organic matter and can develop on cellulose based building materials, if conditions conducive to growth of the fungi persist. Among the factors required for growth of cellulose deteriorating fungi (most commonly basidiomycetes) moisture content of the host material is the only controllable factor. The fungi develop from spores that germinate on suitable host substrates, such as wood or the paper facing of gypsum board. The spores use various parts of the materials cellular structure as both a food source and a space to colonize. The consumption of nutrients and spread of the colony in the wood or paper continues as long as the appropriate environmental conditions are available, principally warm temperatures and a supply of moisture.

Deterioration of Wood

Destruction of the wood cells, resulting from fungal growth described above, reduces a timber's ability to resist structural stresses and ultimately leads to a loss of structural capacity. Some wall systems manage to collect and store water for considerable periods of time, which can allow rapid and extensive deterioration of structural wood framing to take place.

For the purpose of this report, as shown in Figure B-1, we have classified moisture content readings into three categories:

- Less than 19% (below 7% - DRY)
- Between 19% and 28%
- Greater than 28% - FS

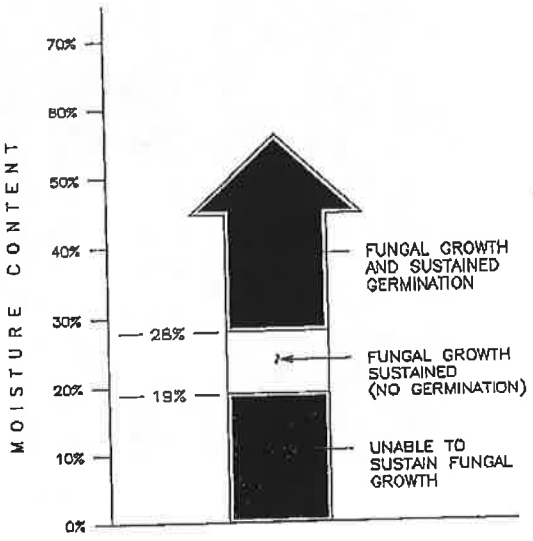


Figure B-1

Wood elements with moisture content of less than 19% may be considered unable to sustain fungal growth. In light of the inaccuracies of the meter at lower readings, for the purpose of this report, readings below 7% have been noted as "Dry". Between 19% and 28%, fungal growth may be sustained but not initiated. At approximately 28%, germination and growth of fungal spores can be expected. Above 28%, a substantial increase in fungal growth and associated wood rot can be expected. For the same reasons as stated above, recorded readings greater than 28% have been assigned "FS" indicating Fibre Saturation. Moisture content readings should be interpreted in combination with all other factors.

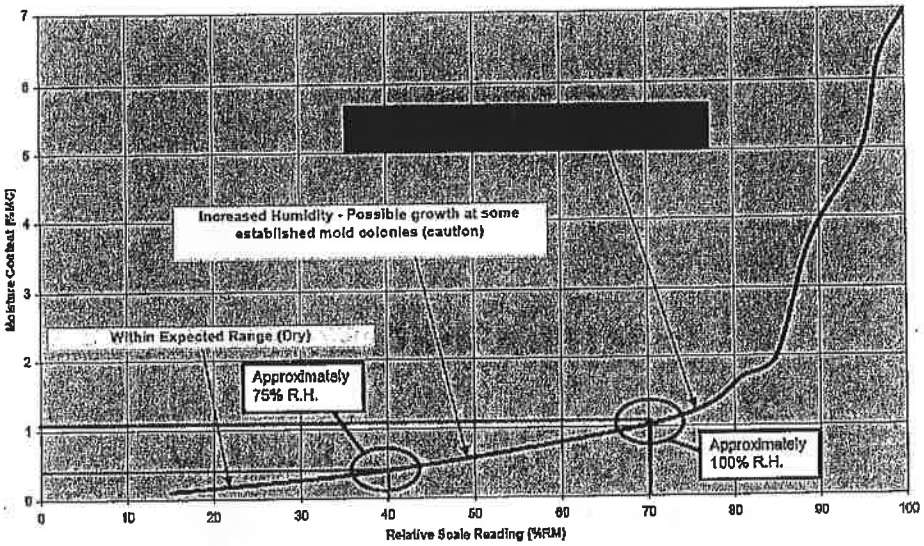
Deterioration of Gypsum Board

Deterioration of gypsum board results when the board is wetted for extended periods. Though affected by the same conditions, the two components of the board, gypsum and paper, deteriorate in different manners. As discussed above, the deterioration of the paper is primarily due to fungal growth, which uses the cellulose fibre in the paper as both a food source and a space to colonize. The gypsum is hygroscopic, so will absorb moisture, gradually softening with continued exposure to damp conditions.

Moisture in Gypsum Board

The typical moisture content of gypsum board is fairly low (around 0.5% or less). At this low level, the normal propensity of gypsum is for the moisture content of the core to seek equilibrium with the surrounding air. This ability to absorb moisture from the surrounding environment means the moisture content of gypsum board may fluctuate as the relative humidity changes. This characteristic of gypsum board makes accurate and reliable measurement of its moisture content very difficult, if not impossible, to attain with the average hand-held moisture meter.

In view of the above, hand-held moisture meters are more appropriately used to provide a "relative" moisture content, or a "rank ordering" of moisture contents between gypsum board in one area of a building when compared with that in another area of the building. Comparative tests of board in two different areas in the same building may determine which board is "wetter" but will not necessarily quantify "how much wetter." As such, a hand-held moisture meter may be used to determine the relative level of moisture but not the absolute amount.



For the purpose of this report, relative moisture content readings in the gypsum wallboard were taken using a moisture meter. This moisture meter is calibrated to measure the moisture content of wood expressed by percentage of weight. Based on literature provided by Protimeter, in any material other than wood, such as gypsum wallboard, the meter gives readings of Wood-Moisture-Equivalent (WME). WME is the moisture level in any building material other than wood expressed as the moisture content of wood.

Based upon RJC's experience with use of the meter, we have classified relative moisture content readings into three categories:

- Dry or Normal - <0.5% - Normal conditions, no deterioration anticipated.
- Caution - 0.5% - 1% - Reduced physical properties, biological growth possible. Corrosion of attached or adjacent metal possible.
- Concern - > 1% - High potential for biological growth, severe strength loss and corrosion of metals accelerated.

Published research indicates a significant loss in structural properties of gypsum wall board at moisture contents as low as 0.5%. Above 1% moisture most physical properties including fastener pull through, and flexural strength are reduced below target values specified in the relevant material standards. Above 2% these same physical parameters are reduced to 50% or less of expected values. The potential for biological growth increases for moisture contents above 1% with corrosion of metals increasing as well.

5.0 RECOMMENDATIONS AND OPINIONS OF PROBABLE COST

5.1 Summary of Remediation Recommendations

Table 12 lists all remediation recommendations associated with the building envelope assemblies outlined in Section 4 of this report.

It is recommended that the work be completed in the near future as moisture ingress will continue and restoration costs will increase if delayed. If restoration of the building envelope is deferred beyond a period of six months, we recommend that all exterior recesses be repaired or at the very least, reviewed for leakage.

Table 11 - Recommendations for Remediation	
A	East elevation wall - Replacement of the existing cladding system with an exterior air/vapour barrier rainscreen wall system.
B	Consideration for replacement of the existing cladding system on the north, south and west elevations with a strapped rainscreen wall system.
C	Replacement of existing windows with new aluminum thermally broken windows or high performance vinyl framed windows of double glazed units.
D	Consideration for replacement of existing balcony sliding doors with new aluminum thermally broken or vinyl framed double glazed balcony sliding doors.
E	Remove and replace existing balcony wall cap-flashing and repair damage to the balcony wall structure.
F	Consideration for removal of the balcony up-stand walls and replace with new metal railings.
G	Consideration for removal and replacement of the existing balcony membrane with new liquid applied membrane.
H	Remove and replace the eastern section of the roof's existing membrane with two-ply SBS Modified Bitumen membrane including removal and replacement of deck sheathing.

5.2 Opinions of Probable Cost

The Opinions of Probable Cost are presented by RJC to provide an expectation as to the magnitude of costs required to complete the recommended remediation work. The opinions provided are based on conceptual repair methods, recently obtained broad unit rates, and past experience with similar projects. A detailed estimate of costs has not been provided, as it would require the preparation of plans, details, specifications and schedules to achieve a quantified summary of estimated costs.

Opinions of Probable Cost are based on RJC's review of the present condition of the building and are given in third-quarter 2008 dollars. Deferral of the work will result in increased repair costs. Recent pricing forecasts received from contractors suggest budgeting for a 5% increase in labour and material costs per quarter. Please note that the cost of renewal could vary greatly depending upon the materials chosen and material deterioration uncovered during the remediation work.

The total Opinion of Probable Cost to complete the recommended Building Envelope Remediation Program for the building located at 1864 Frances Street is **$697,305.00** for the minimum recommended rehabilitation, and **$2,182,320.00** if the larger scope of rehabilitation is considered. Please refer to Appendix L for a spreadsheet presentation of the recommendations and cost opinions provided.

For budgeting purposes, an allowance for consulting fees has been assumed to be in the order of 15% of construction costs. An owner contingency is included in the order of 10% of construction costs. This contingency should be included in all construction budgets to allow for variation in estimated unit prices due to competitive bidding, repair work resulting from additional wood rot, and additional work required to repair any damage to electrical or mechanical systems caused by, or discovered during, construction.

However, any Opinions of Probable Cost prepared by the Engineer are based on incomplete or preliminary information and on factors over which the Engineer has no control, the Engineer does not guarantee the accuracy of these probable costs and shall have no liability where the probable costs are exceeded.

6.0 CLOSING COMMENTS

In general, the building envelope system of 1864 Frances Street is experiencing varying levels of distress. Our evaluation revealed that underlying areas of deterioration and moisture ingress were more prevalent on the east elevation. Remedial building envelope repair work has been recommended and we have presented Opinions of Probable Cost to address moisture ingress and deterioration. Remedial work is intended to restore the integrity of the building envelope.

If restoration of the building envelope is deferred beyond a period of six months, we recommend that all exterior recesses be repaired, or at the very least, reviewed for leakage.

Prior to any decisions being made as to repairs, we recommend that a meeting be held with the Strata Council and Property Manager to discuss the results of our evaluation and to address any questions that the Owners may have.

This Report was prepared for Strata Plan VR 969. It is not for the use or benefit of, nor may it be relied upon, by any other person or entity without the written permission of RJC.

We trust that the information contained within this report satisfies your current requirements. Should you have any comments, questions, or concerns, please contact the undersigned.

READ JONES CHRISTOFFERSEN LTD.

Prepared by:

Jay Corder, Dipl. Tech.
Building Science Technologist

JC/ab/js

Reviewed by:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
DOUGLAS L. WATTS

Douglas L. Watts, P.Eng., MABC, CP, BEP, LEED-AP
Associate – Building Science

14 Aug '08

The Opinions of Probable Cost are presented to provide an expectation as to the magnitude of costs required to complete the recommended remediation work. The Opinions provided are based on conceptual repair methods, recently obtained broad unit rates, and past experience with similar projects. A detailed *estimate* of costs has not been provided, as it would require the preparation of plans, details, specifications and schedules to achieve a quantified summary of estimated costs.

Opinions of Probable Costs are based on the present condition of the building and are given in third quarter 2008 dollars. Deferral of the work will result in increased repair costs. Recent pricing forecasts received from Contractors suggest budgeting for a 2-3% increase in labour and material costs per quarter.

The Opinion of Probable Costs Summaries are presented in Table L1 below:

L1 - Opinions of Probable Cost

Description	Option A	Option B
East elevation wall - Replacement of the existing cladding system with an exterior air/vapour barrier rainscreen wall system.	$ 246,000.00	$ 246,000.00
Consideration for replacement of the existing cladding system on the north, south and west with a strapped rainscreen wall system.	$ -	$ 1,060,000.00
Replacement of existing windows with new aluminum thermally broken windows or high performance vinyl framed windows with double glazed units.	$ 180,000.00	$ 101,000.00
Consideration for replacement of existing balcony sliding doors with new aluminum thermally broken or vinyl framed double glazed balcony sliding doors.	$ -	$ 64,000.00
Remove and replace existing balcony wall cap-flashing and repair damage to the balcony wall structure.	$ 44,000.00	$ -
Consideration for removal of the balcony up-stand walls and replace with new metal railings.	$ -	$ 33,000.00
Consideration for removal and replacement of the existing balcony membrane with new liquid applied membrane.	$ -	$ 84,000.00
Remove and replace the eastern section of the roof's existing membrane with two-ply SBS Modified Bitumen membrane including removal and replacement of deck sheathing.	$ 55,000.00	$ 55,000.00
Opinions of Probable Cost SUBTOTAL	**$ 525,000.00**	**$ 1,643,000.00**
Contingency Allowance (10%)	$ 52,500.00	$ 164,300.00
Probable Construction Cost SUBTOTAL	**$ 577,500.00**	**$ 1,807,300.00**
Estimated Consultant Fees	$ 86,600.00	$ 271,100.00
SUBTOTAL	**$ 664,100.00**	**$ 2,078,400.00**
GST (5% of SUBTOTAL)	$ 33,205.00	$ 103,920.00
TOTAL PROBABLE COST	**$ 697,305.00**	**$ 2,182,320.00**