Building Enclosure Condition Assessment

Cypress Point

7511, 7531 & 7651 Minoru Boulevard, Richmond, BC

Draft Issued - April 20, 2020
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RJC No. VAN.037207.0029

Prepared for:

Strata Plan NW 2050
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1.0 EXECUTIVE SUMMARY

At the request of Strata Plan NW 2050, Read Jones Christoffersen Ltd. (RJC) conducted a building envelope review of the un-remediated bay windows at the north and west elevations of Building B and the south and west elevations of Building C at Cypress Point located at 7511, 7531 & 7651 Minoru Boulevard, Richmond, BC.

Cypress Point consists of three 3-storey residential buildings over semi-underground parking structures. Construction is wood-frame for the above-grade structures and reinforced concrete for the parking structures. Exterior finishes are a combination of stucco, wood trim and brick. Many walls and balconies were remediated using rainscreen technology in 2001 and 2002. 13 un-remediated bay window assemblies along the north and west elevations of Building B and the south and west elevations of Building C form the basis of this evaluation.

RJC's assessment included a review of available drawings, examination of exterior recesses, visual review of interior wall assemblies, and review of an owner survey.

Based on our condition assessment, the bay window assemblies are generally in fair condition given their age, but are approaching the end of their expected service life. The wood frame windows are experiencing varying levels of deterioration and are considered to be at moderate risk of decay. Similarly, a large number of window frames are misaligned and unable to be opened properly. As such, remediation of all previously un-remediated windows is recommended.

The exterior wood trim is experiencing high levels of moisture and deterioration. Obvious staining and high moisture contents were observed at almost every location reviewed. It is recommended that the exterior wood trims be replaced at all un-remediated bay window locations during replacement.

The painted exterior plywood paneling above and below the windows is experiencing moderate levels of deterioration. Signs of moisture staining were observed at multiple locations reviewed. Given the access costs associated with the previous recommendations, is recommended that the exterior plywood paneling at the un-remediated bay windows be replaced at the same time.

Although the un-remediated exterior stucco walls on the north and west elevations of Building B and the south and west elevations of Building C were not reviewed at this time, an Opinion of Probable Cost of replacing the walls with a rainscreen system has been included below.

The total Opinion of Probable Cost for replacing only the wood windows, exterior wood trim, and painted exterior plywood paneling at the un-remediated bay windows is **$600,000.**

The total Opinion of Probable Cost for replacing the un-remediated wood frame windows (not at the bay window locations) is **$125,000.**

The total Opinion of Probable Cost for replacing the un-remediated exterior stucco walls along with the wood windows, insulation, exterior wood trim, and exterior plywood sheathing at the un-remediated bay windows is **$2,100,000.**

2.0 INTRODUCTION

At the request of Strata Plan NW 2050, RJC conducted a building envelope review of the un-remediated bay windows along the north and west elevations of Building B and the south and west elevations of Building C at 7511, 7531, & 7651 Minoru Boulevard, Richmond, BC. The intent of this review was to assess the present condition of the building envelope systems with regard to moisture ingress and moisture-induced deterioration.

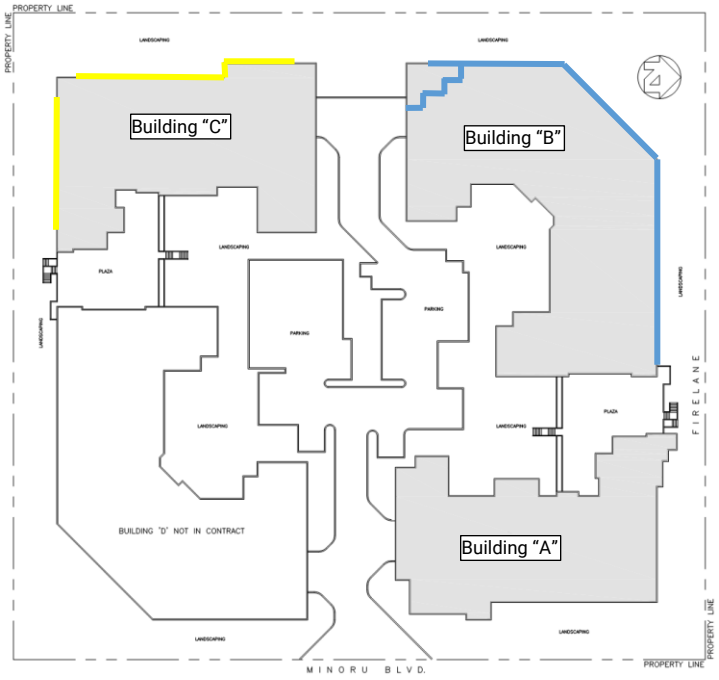

Figure 1: Key Plan

The intent of this review was for RJC to provide an opinion on the need for restoring the un-remediated bay windows that were not upgraded during the 2001/2002 building restoration program. The building envelope at the locations reviewed incorporate assemblies that were constructed approximately 37 years ago.

The report includes three appendices. The first appendix (Appendix A – Exterior Exploratory Recesses) provides the results of our findings from the exterior exploratory openings, as well as some guidance on how to interpret the results. This appendix does not include recommendations, as the recommendations related to the observations noted in this appendix are included in Section 5.0 below. Many of the recommendations included in Section 5.0 are based on the visual observations from both the interior and exterior.

The second appendix (Appendix B – Interior Exploratory Recesses) provides the results of our findings from the interior exploratory openings, as well as some guidance on how to interpret the results. This appendix does not include recommendations, as the recommendations related to the observations noted in this appendix are included in the report body (Section 5.0). Many of the recommendations included in Section 5.0 are based on the visual observations from both the interior and exterior.

The third appendix (Appendix C – Questionnaire Responses) provides the results of the online survey, along with percentages of abnormalities based on the total number of respondents for that portion of the complex. This appendix does not include comments on the responses or recommendations based on the responses. Some of the recommendations included in Section 5.0 below are partially based on the responses from the questionnaire.

3.0 SITE AND DOCUMENT REVIEWS

The following documents were provided by the property manager:

- Site maps with addresses and development phases
- Miscellaneous architectural, civil, structural, and landscape drawings of the original development
- Miscellaneous building enclosure restoration drawings for the remediated building envelope locations
- Strata plan

4.0 CONDITION ASSESSMENT

Generally, the building enclosures reviewed appeared to be in fair condition, with some areas of the bay window frames and exterior trim being in poor condition. The Building Enclosure Condition Assessment (BECA) consisted of visual observations and reviewing nine exterior recesses and nine interior exploratory cores.

4.1 EXTERIOR

The review consisted of nine exterior exploratory recesses across the north and west elevations of Building B and the south and west elevations of Building C. To capture a broad range of locations, recesses were reviewed on the 1st and 2nd levels of the building. Similarly, as the bay windows include a larger center window flanked by two smaller windows, recesses varied under both center and flanked windows. Given limited access to the 3rd floor level, no reviews were conducted at this level.

Exterior recesses were made using the following procedure:

- Removal of a section of the wood trim under the window sill
- Cutting of the existing building paper to expose the interior plywood sheathing and/or framing
- Taking moisture readings and completing visual reviews
- Reinstating the existing building paper with Tyvek building wrap and seal with tuck tape
- Reinstalling the wood trim

The deterioration results of the exterior recess are summarized in Table 1 and examples of representative recesses for each scale value can be found in Table 2. A more detailed description of the findings and evaluation metrics can be found in Appendix A: Exterior Exploratory Recesses.

TABLE 1 – SUMMARY OF EXTERIOR RECESS DETERIORATION SCALE VALUES

Scale Rating	Frequency of Deterioration in 9 Total Recesses	% Of Overall Recesses
Deterioration Scale Value of 0	0	0
Deterioration Scale Value of 1	5	56
Deterioration Scale Value of 2	3	33
Deterioration Scale Value of 3	1	11
Deterioration Scale Value of 4	0	0
Deterioration Scale Value of 5	0	0

TABLE 2: EXAMPLES OF EXTERIOR DETERIORATION OBSERVED	
 **Photo 1**	**Description:** Photo 1 shows the visible deterioration associated with a scale value of 3. The deterioration includes: - wood window frame is misaligned at the corner of the sill - staining visible on plywood sheathing - excessive staining visible on exterior wood trim
 **Photo 2**	**Description:** Photo 2 shows the visible deterioration associated with a scale value of 2. The deterioration includes: - decay visible on wood window frame - light staining visible on plywood sheathing - excessive staining visible on exterior wood trim
 **Photo 3**	**Description:** Photo 3 shows the deterioration associated with a scale value of 1. The deterioration includes: - no signs of staining or deterioration on the wood framing - moderate staining visible on exterior wood trim

Moisture readings were also taken from both the exterior wood trim as well as the plywood sheathing and/or framing. Table 3 summarizes the findings of the results for exterior wood trim whereas Table 4 summarizes the results for the plywood sheathing and framing. A more detailed description of the findings and evaluation metrics can be found in Appendix A: Exterior Exploratory Recesses.

TABLE 3 - SUMMARY OF EXTERIOR WOOD TRIM MOISTURE CONTENT AT RECESSES		
Scale Rating	**# Recesses**	**% Of Overall Recesses**
Dry or Normal	0	0
Concerning	9	100

TABLE 4 - SUMMARY OF PLYWOOD SHEATHING MOISTURE CONTENT AT RECESSES		
Scale Rating	**# Recesses**	**% Of Overall Recesses**
Dry or Normal	9	100
Concerning	0	0

4.2 INTERIOR

The review of interior recesses consisted of 6 exploratory cores in various units in Building B and 3 exploratory cores in various units in Building C. Units #318, #322, #313, #222, and #120 in Building B were reviewed and units #336, #330, and #318. These units were selected partially based on both questionnaire responses and tenant availability. The observed wall assemblies were generally in good condition, Table 5 briefly summarizes the findings. A more detailed description of the results can be found in Appendix B: Interior Exploratory Recesses.

TABLE 5 – SUMMARY OF EXTERIOR RECESS DETERIORATION SCALE VALUES		
Scale Rating	**Frequency of Deterioration in 9 Total Recesses**	**% Of Overall Recesses**
Deterioration Scale Value of 0	1	11
Deterioration Scale Value of 1	8	89
Deterioration Scale Value of 2	0	0
Deterioration Scale Value of 3	0	0
Deterioration Scale Value of 4	0	0
Deterioration Scale Value of 5	0	0

Moisture readings were taken from the exterior wood framing, exterior plywood, and interior Gypsum Wall Board (GWB). Table 6 summarizes the findings of the results for the overall wall assemblies. A more detailed description of the findings and evaluation metrics can be found in Appendix B: Interior Exploratory Recesses.

Table 6 - Summary Of Moisture Content At Interior Recesses		
Scale Rating	**# Recesses**	**% Of Overall Recesses**
Dry or Normal	9	100
Concerning	0	0

5.0 RECOMMENDATIONS AND OPINIONS OF PROBABLE COST (OPC)

The condition of the windows are commensurate with their age of 37 years. Typically wood frame windows can have a life expectancy of between 30 and 40 years depending upon maintenance. Many of the wood frames had evidence of wood decay and many operable units were misaligned indicating that the windows are at the end of their life expectancy. Many wood trims were also found to have wood decay and the painted plywood paneling had water staining with some deterioration.

Deterioration of the underlying framing was limited at this time, but there was some evidence of moisture ingress in the form of water staining on the plywood sheathing starting to occur. If left unattended, moisture ingress will likely increase and can lead to structural deterioration of the underlying framing. It is recommended that the windows be replaced in the next two years to mitigate moisture ingress and to improve occupant comfort. The new windows should match those on the remaining of the buildings which have substantially higher thermal comfort levels and are more water tight. When completing the window replacement, it is recommended that the plywood paneling above and below the windows also be replaced using rainscreen strategies, similar to the rest of the buildings.

RECOMMENDATION 1	
Description	**OPC (in present dollars)**
Replace windows, insulation, wood trim and paneling at bay windows	**$600,000**

As an alternative to the above recommendation, an Opinion of Probable Cost (OPC) for replacing the un-remediated wood frame windows (not at the bay windows) has been provided below.

RECOMMENDATION 1A	
Description	**OPC (in present dollars)**
Replace un-remediated wood frame windows (not at bay window locations)	**$125,000**

As a majority of the exterior walls were upgraded to a stucco-clad rainscreen system in 2001-2002, we have also provided an additional OPC to replace the un-remediated walls at Building B & C along with replacing the windows, wood trim, and sheathing at the bay window sections. Replacing the un-remediated stucco walls with a stucco-clad rainscreen assembly offers improved durability and a more consistent appearance with the rest of the buildings. The estimate provided below includes the windows noted above and assumed that the work will be completed at the same time. If the walls are completed separately, we expect that the overall project cost will increase by at least 10%.

RECOMMENDATION 2	
Description	**OPC (in present dollars)**
Replace un-remediated walls with rain-screen system (bay windows included)	**$2,100,000**

Opinions of Probable Costs (OPC) 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 in 2019, 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 RJC's review of the present condition of the building. Deferral of the work may result in increased repair costs. Please note that the cost of remediation could vary greatly depending upon the materials chosen and any deterioration uncovered during the remediation work. There is no allowance for survey or abatement of hazardous materials that may be required for associated construction work.

The estimates provided should only be used for general budgeting purposes (not for special resolutions at an AGM). Before determining how the project will be funded, including the value of a special levy if any, we strongly recommend that bid documents are prepared and are issued for tender.

Once the owners have determined in which fiscal year a project will occur, we recommend using an inflation rate of between 4% and 6% if an inflation-adjusted value is required for capital planning.

In addition to the budget values presented in the OPC table, we recommend that a minimum 10% contingency be included on all construction projects (for unforeseen conditions or to modify the scope of the project as the work progresses). Depending on scope, we would also recommend allowing a further 10% to 20% for consulting services (the smaller the project, the higher the percentage). Consulting services would include preparation of contract documents (drawing and specifications), administering a tender process, contract administration and field reviews.

OPCs do not take into account possible fluctuations as a result of the current COVID-19 pandemic.

6.0 LIMITS OF LIABILITY

This report is intended to provide the Client with a general description of the systems employed in the building and to comment on their general condition that was apparent at the time of our review. We did not perform any calculations to confirm the adequacy of the elements. The scope of services did not include an evaluation of the original building design or a detailed engineering investigation. A structural loading or seismic review was not performed.

Drawings and information relating to the building were used solely to supplement the visual review and to obtain design information on elements hidden from view so that a more accurate building description could be provided.

Opinions of probable cost provided by RJC may be based on incomplete or preliminary information, and may also be based on factors over which RJC has no control. RJC does not guarantee the accuracy of these cost estimates and shall have no liability where cost estimates are exceeded or are less.

RJC prepared this report for the use of the Client. The material in it reflects RJC's judgement in light of information available at the time of preparation. Any use that a third party makes of this report (including relying on this report for any decisions) is the responsibility of such third parties. RJC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The work in this report does not include any assessment or costing of hazardous materials that may be present at the building. Assessment and inventory of hazardous materials should be made by consultants specializing in that field 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 of or relating in any way to hazardous materials such as asbestos, lead, mould, mildew or other fungus, including the actual, alleged or threatened existence, effects, ingestion, inhalation, abatement, testing, monitoring, remediation, enclosure, decontamination, repair, or removal of the actual or alleged failure to detect hazardous materials.

7.0 CLOSING

Thank you for choosing RJC to provide this BECA. Should you have any further questions or comments, or if we can be of further assistance, please contact this office.

Yours truly,

READ JONES CHRISTOFFERSEN LTD.

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2020-06-02

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Report reviewed by:

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APPENDIX A: EXTERIOR EXPLORATORY RECESSES
APPENDIX B: INTERIOR EXPLORATORY RECESSES
APPENDIX C: QUESTIONNAIRE RESPONSES

APPENDIX A Exterior Exploratory Recesses

DESCRIPTION OF APPENDIX

This Appendix includes data collected from the 9 exploratory recesses and available openings that were reviewed as well as the testing procedure used during the field review. Dates of site visits and weather during the review are noted in Table A1, below:

Table A1 - Site Visit Data

Date of Review	Description of Work	Weather Conditions
February 18, 2020	ER-01 – ER-09	8°C, Sunny

TESTING PROCEDURES

Exterior Exploratory Recess Review

The exterior exploratory recesses were made by removing existing wood trim under the window sills and peeling back building paper. Observations were made to determine the wall construction and underlying conditions. The moisture content of the exterior surface of the plywood was measured using a moisture meter.

Moisture Content Testing

Moisture content (MC) readings were taken using a Delmhorst Total Check handheld combination moisture meter/thermo-hygrometer. This instrument has built in calibration for several wood species.

For plywood sheathing and wood framing, the moisture meter is capable of providing MC readings on a calibrated wood species scale ranging from 5% to 60%. As described in succeeding sections, the bio-deterioration of wood typically requires a moisture content of some 19% with germination and 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%.

Moisture tests 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 accuracy of these meters is ±0.5 to 2% MC over a 95% confidence interval (ASTM Standard D4444-92).

DETERIORATION OF MATERIALS

All building components can be subject to deterioration if exposed to less than optimal conditions during service. The following is a discussion on the deterioration of the several major building envelope materials used at Cypress Point.

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, we have classified moisture content readings into three categories:

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

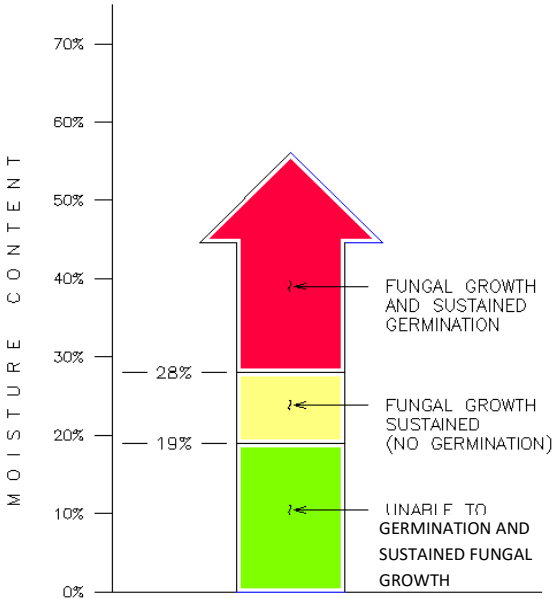

Figure A1 – relationship between moisture content and fungal growth in typical wood species.

Figure A1 shows the relationship between moisture contents in typical species of wood and fungal growth. 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 Scale and Legend

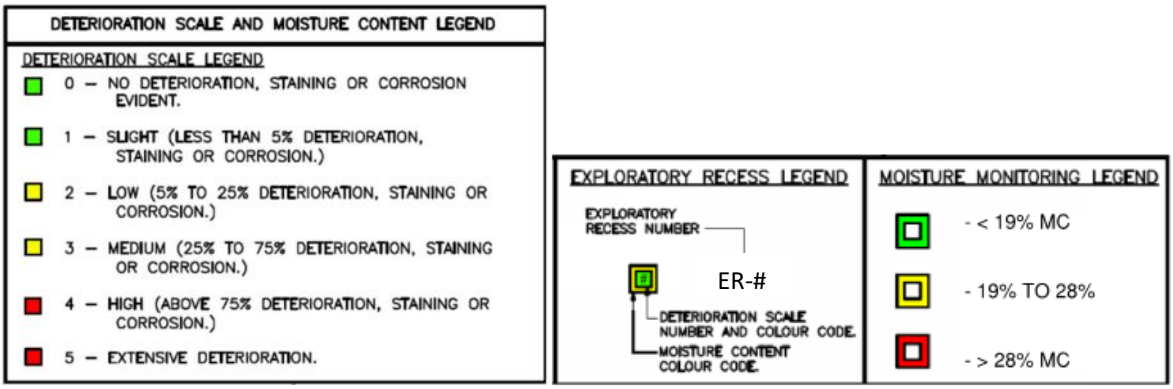

Figure A2 – Labeling convention for recess locations.

Figure A2 shows the labeling convention used for recess locations in the following tables.

Exterior Recess 1 (ER-01)			
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**
Building B, North Elevation, 1st Level, Under Northwest Facing Window Sill	Exterior Wood Trim, 2 Layers of Building Paper, Wood Framing, Plywood Sheathing	Interior: 10.9% MC (D-Fir), Wood Framing Exterior: FS (D-Fir), Wood Trim	1

Observations:

- Exterior wood trim removed under right (northwest facing) window sill
- Visible decay of wooden window frame observed at bottom right corner
- Excessive staining on exterior wood trim

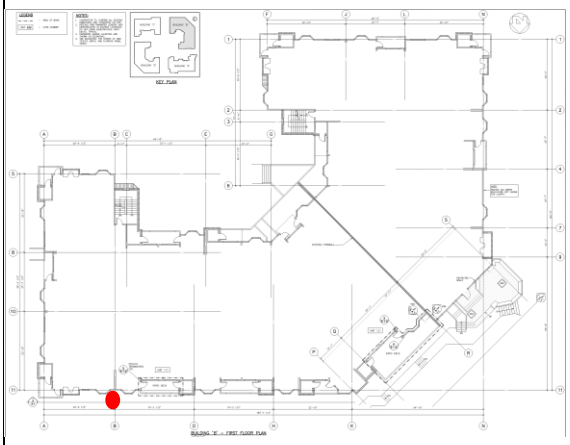

Photo A1

Photo A2

Photo A3

Photo A4

Exterior Recess 2 (ER-02)			
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**
Building B, North Elevation, 1st Level, Under North Facing Window Sill	Exterior Wood Trim, 2 Layers of Building Paper, Wood Framing, Plywood Sheathing	Interior: 14.5% MC (D-Fir), Plywood Exterior: FS (D-Fir), Wood Trim	2

Observations:

- Exterior wood trim removed under middle (north facing) window sill
- Minimal staining observed on plywood
- Excessive staining on exterior trim
- Staining on fibreglass insulation under window sill
- Organic growth visible on wooden window sill

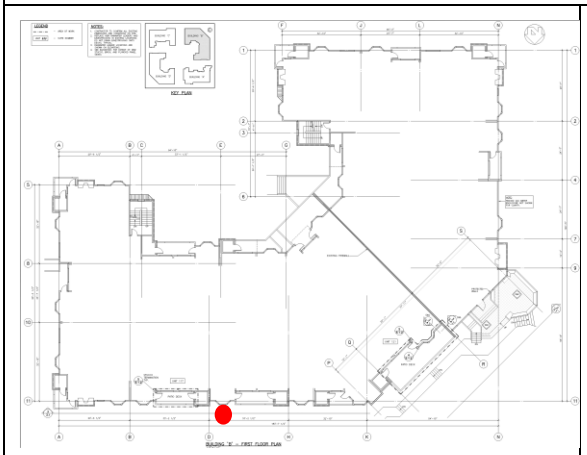

Photo A5

Photo A6

Photo A7

Photo A8

Exterior Recess 3 (ER-03)			
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**
Building B, North Elevation, 2nd Level, Under Northwest Facing Window Sill	Exterior Wood Trim, 2 Layers of Building Paper, Wood Framing, Plywood Sheathing	Interior: 11.2% MC (D-Fir), Wood Framing Exterior: 17% MC (D-Fir), Wood Trim	3

Observations:

- Exterior wood trim removed under middle (northwest facing window) window sill
- Excessive staining of interior wood framing
- Moderate staining of exterior wood trim
- Misalignment of wooden window jamb

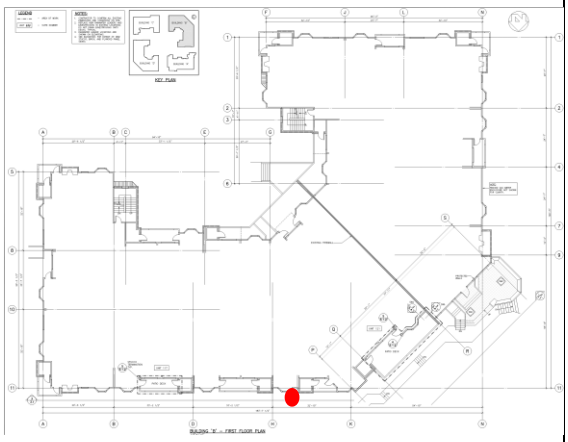

Photo A9

Photo A10

Photo A11

Photo A12

Exterior Recess 4 (ER-04)			
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**
Building B, West Elevation, 1st Level, Under Northwest Facing Window Sill	Exterior Wood Trim, 1 Layer of Building Paper, Wood Framing, Plywood Sheathing	Interior: 10.0% MC (D-Fir), Sheathing Exterior: FS (D-Fir), Wood Trim	1

Observations:

- Exterior wood trim removed under left (northwest facing window) window sill
- Minimal deterioration observed on plywood sheathing
- Visible signs of decay observed in wood trim
- Misalignment of wooden window jamb

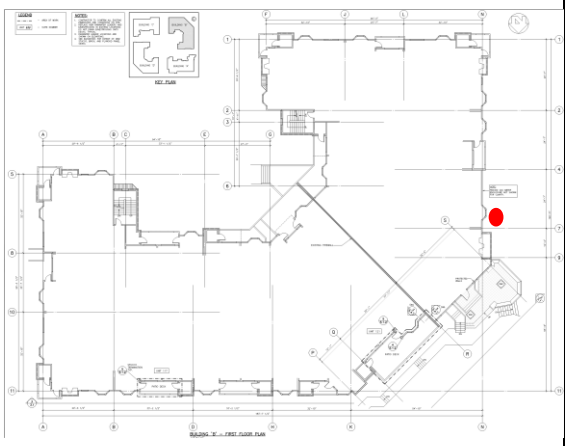

Photo A13

Photo A14

Photo A15

Photo A16

Exterior Recess 5 (ER-05)			
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**
Building B, West Elevation, 1st Level, Under West Facing Window Sill	Exterior Wood Trim, 1 Layer of Building Paper, Wood Framing, Plywood Sheathing	Interior: 9.2% MC (D-Fir), Wood Framing Exterior: 16% MC (D-Flr), Wood Trim	1

Observations:

- Exterior wood trim removed under middle (west facing) window sill
- No deterioration observed on interior wood framing
- Staining of fibreglass insulation observed

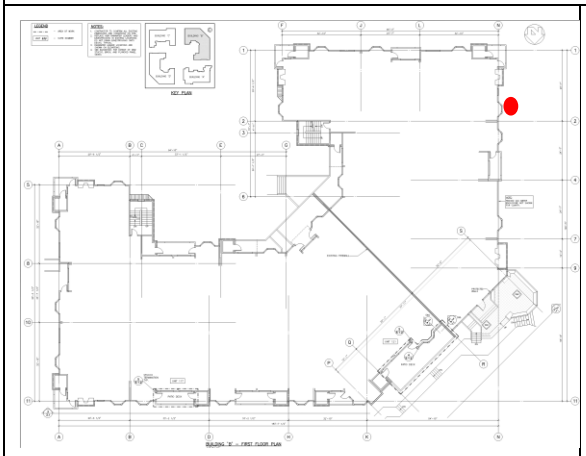

Photo A17

Photo A18

Photo A19

Exterior Recess 6 (ER-06)			
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**
Building C, West Elevation, 1st Level, Under Northwest Facing Window Sill	Exterior Wood Trim, 2 Layers of Building Paper, Layered Wood Framing, Plywood Sheathing	Interior: 9% MC (D-Fir), Wood Framing Exterior: 23% MC (D-Fir), Wood Trim	1

Observations:

- Exterior wood trim removed under left (northwest facing) window sill
- No deterioration observed on interior wood framing
- Misalignment of wooden window frame
- Grey paint visible throughout window frame
- Staining of fibreglass insulation observed

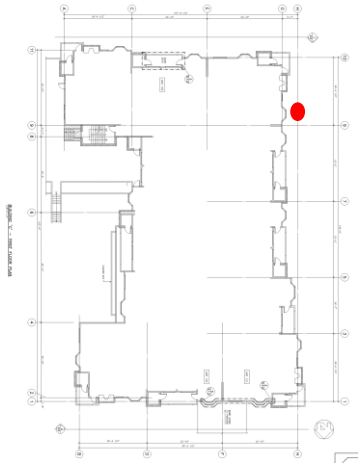

Photo A20

Photo A21

Photo A22

Photo A23

Exterior Recess 7 (ER-07)			
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**
Building C, South Elevation, 2nd Level, Under Southwest Facing Window Sill	Exterior Wood Trim, 2 Layers of Building Paper, Wood Framing, Plywood Sheathing	Interior: 9% MC (D-Fir), Plywood Exterior: 14% MC (D-Fir), Wood Trim	1

Observations:

- Exterior wood trim removed under left (southwest facing) window sill
- Minimal deterioration observed on interior plywood
- Wooden window sill decay observed
- Missing fibreglass insulation under window sill

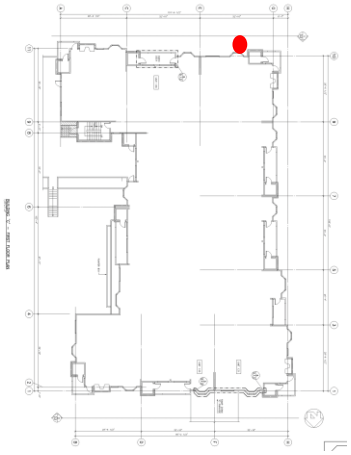

Photo A24

Photo A25

Photo A26

Photo A27

Exterior Recess 8 (ER-08)			
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**
Building C, West Elevation, 1st Level, Under West Facing Window Sill	Exterior Wood Trim, 2 Layers of Building Paper, Layered Wood Framing, Plywood Sheathing	Interior: 11.8% MC (D-Fir), Wood Framing Exterior: FS (D-Fir), Wood Trim	2

Observations:

- Exterior wood trim removed under middle (west facing) window sill
- No deterioration observed on interior wood framing
- Wooden window sill decay observed
- Excessive staining of wood trim observed

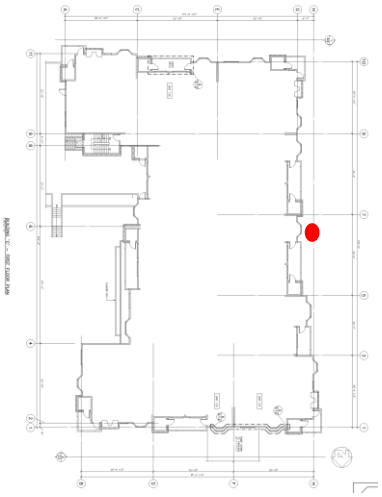

Photo A28

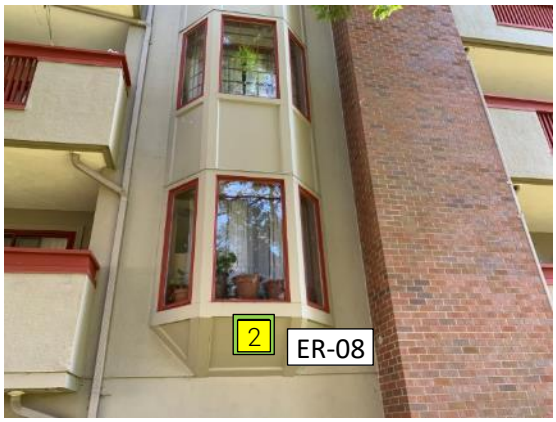

Photo A29

Photo A30

Photo A31

Exterior Recess 9 (ER-09)			
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**
Building B, North Elevation, 1st Level, Under North Facing Window Sill	Exterior Wood Trim, 1 Layer of Building Paper, Wood Framing, Plywood Sheathing	Interior: 12.5% MC (D-Fir), Wood Framing Exterior: FS (D-Fir), Wood Trim	2

Observations:

- Exterior wood trim removed under middle (north facing) window sill
- Moderate staining observed on interior wood framing
- Excessive staining on exterior trim
- Staining on fibreglass insulation under window sill
- Decay visible on wooden window frame, organic growth visible and paint flaking

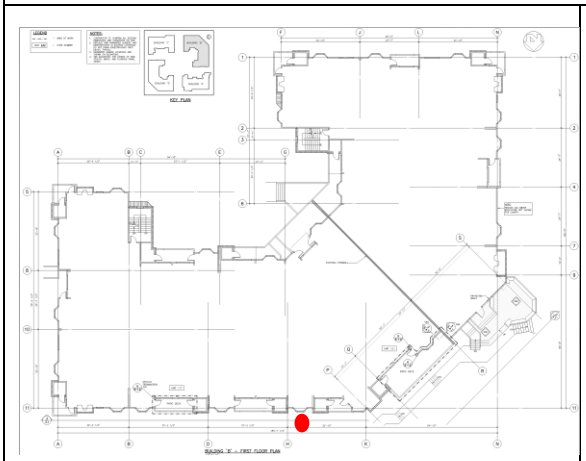

Photo A32

Photo A33

Photo A34

Photo A35

APPENDIX B Interior Exploratory Recesses

DESCRIPTION OF APPENDIX

This appendix includes data collected from the nine exploratory recesses and available openings that were reviewed as well as the testing procedure used during the field review. Dates of site visits and weather during the review are noted in Table B1, below:

Table B1 - Site Visit Data

Date of Review	Description of Work	Weather Conditions
February 18, 2020	IR-01 – IR-09	8°C, Sunny

TESTING PROCEDURES

Interior Exploratory Recess Review

The interior exploratory recesses were made by cutting small 3-1/2" diameter round holes through the drywall into the wall cavity space of exterior walls. Observations were made to determine the wall construction and underlying conditions. The moisture content of the interior surface of the exterior sheathing was typically measured using a moisture meter.

Moisture Content Testing

Moisture content (MC) readings were taken using a Delmhorst Total Check handheld combination moisture meter/thermo-hygrometer. This instrument has built in calibration for several wood species.

For gypsum board sheathing, this moisture meter is capable of providing MC readings on a calibrated gypsum-based scale ranging from 0.1% to 6% MC. The Delmhorst Instrument Company states that the equilibrium MC for gypsum board at 50% relative humidity (RH) is 0.3%. At 90 - 95%, they equalize at 0.7 - 0.8% MC. The readings the meter provides up to about 1% on the drywall scale are of most value since a significant change in conductivity occurs at approximately 2%. For practical purposes, readings above this point are compressed and should be considered more qualitative.

For plywood sheathing and wood framing, the moisture meter is capable of providing MC readings on a calibrated wood species scale ranging from 5% to 60%. As described in succeeding sections, the bio-deterioration of wood typically requires a moisture content of some 19% with germination and 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%.

Moisture tests 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 accuracy of these meters is ±0.5 to 2% MC over a 95% confidence interval (ASTM Standard D4444-92).

DETERIORATION OF MATERIALS

All building components can be subject to deterioration if exposed to less than optimal conditions during service. The following is a discussion on the deterioration of the several major building envelope materials used at Cypress Point.

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 Gypsum Board

Deterioration of gypsum wall board (GWB) 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. Once gypsum board has deteriorated, the holding power of the fasteners that attach the gypsum board to structural supports, in this case wood framing, are reduced below ASTM minimum standards. This can result in the exterior drywall becoming detached from the wood studs.

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.

For the purpose of this report we have classified gypsum moisture content readings into three categories:

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

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, we have classified moisture content readings into three categories:

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

Figure B1 shows the relationship between moisture contents in typical species of wood and fungal growth. 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.

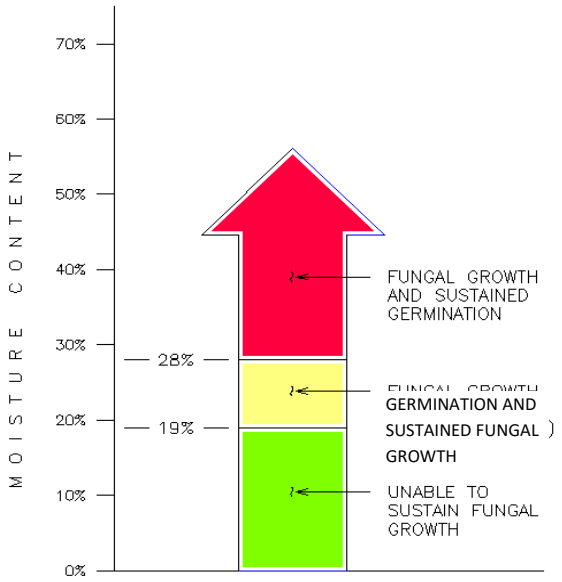

Figure B1 – relationship between moisture content and fungal growth in typical wood species.

Deterioration Scale and Legend

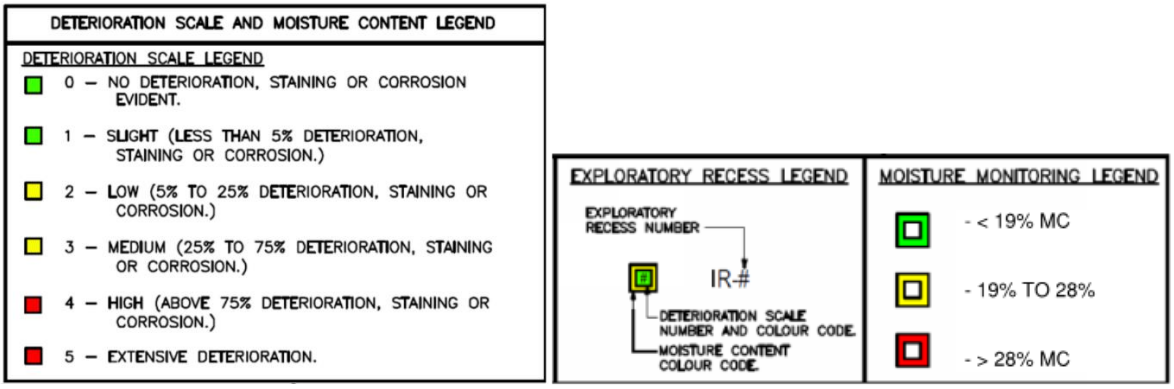

Figure B2 – Labeling convention for recess locations.

Figure B2 shows the labeling convention used for recess locations in the following tables.

Interior Recess 1 (IR-01)				
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**	**Interior Conditions**
Unit 318 Bldg B Living Room North Elevation	Stucco Cladding, Batt Insulation on 2x4 Wood Framing	Exterior: Dry (D-Fir), Wood Framing Exterior: 12% MC (D-Fir), Plywood Interior: 0.1% MC (GWB)	1	T: 22^{0}C* RH: 61%**

* T: Temperature, ** RH: Relative Humidity

Observations:

- Opening made below the sill and adjacent to the mullion of the window.
- Minor staining observed on exterior sheathing, paper batt insulation and wood stud framing.

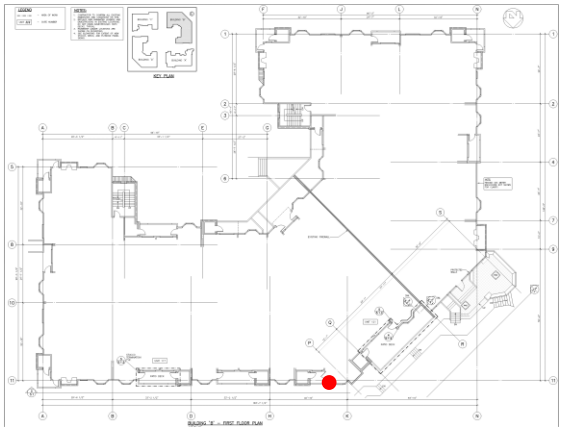

Photo B1

Photo B2

Photo B3

Interior Recess 2 (IR-02)				
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**	**Interior Conditions**
Unit 318 Bldg B Bedroom North Elevation	Wood Cladding, Batt Insulation on 2x4 Wood Framing	Exterior: Dry (D-Fir), Wood Framing Exterior: 8% MC (D-Fir), Plywood Interior: 0.1% MC (GWB)	1	T: 22^{0}C* RH: 61%**

* T: Temperature, ** RH: Relative Humidity

Observations:

- Opening made below the sill and adjacent to the mullion of the bay window.
- Minor staining observed on paper batt insulation and wood stud framing.

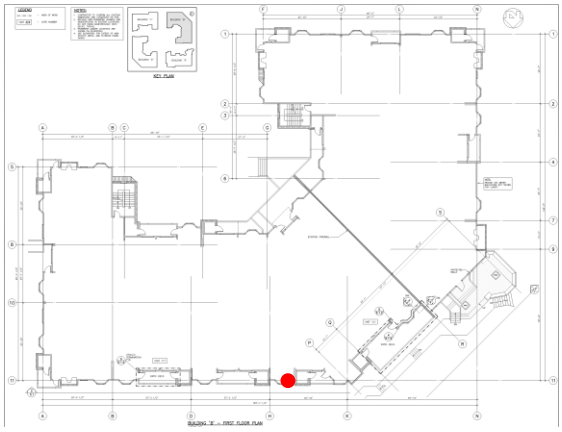

Photo B4

Photo B5

Photo B6

Interior Recess 3 (IR-03)				
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**	**Interior Conditions**
Unit 322 Bldg B Bedroom Northwest Corner	Wood Cladding, Batt Insulation on 2x4 Wood Framing	Exterior: Dry (D-Fir), Wood Framing Exterior: Dry (D-Fir), Plywood Interior: 0.2% MC (GWB)	1	T: 22^{0}C* RH: 61%**

* T: Temperature, ** RH: Relative Humidity

Observations:

- Opening made below the sill and adjacent to the mullion of the bay window.
- Minor staining observed on paper batt insulation and wood stud framing.

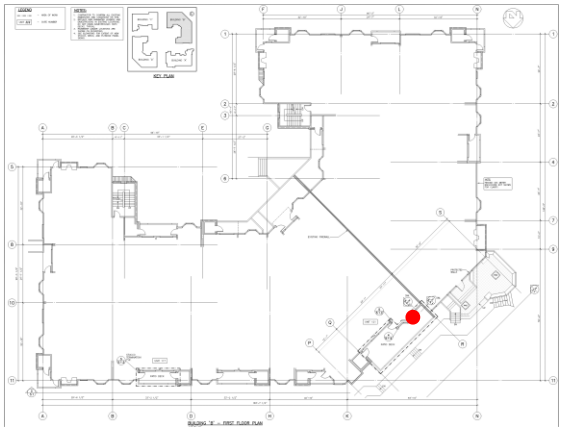

Photo B7

Photo B8

Photo B9

Interior Recess 4 (IR-04)				
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**	**Interior Conditions**
Unit 313 Bldg B Living Room North Elevation	Wood Cladding, Batt Insulation on 2x4 Wood Framing	Exterior: 7% MC (D-Fir), Wood Framing Exterior: 8% MC (D-Fir), Plywood Interior: 0.1% MC (GWB)	1	T: 22^{0}C* RH: 61%**

* T: Temperature, ** RH: Relative Humidity

Observations:

- Opening made below the sill and adjacent to the mullion of the bay window.
- Minor staining observed on paper batt insulation and wood stud framing.

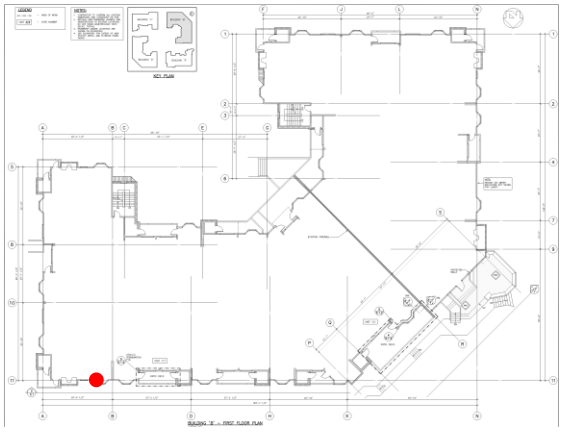

Photo B10

Photo B11

Photo B12

Interior Recess 5 (IR-05)				
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**	**Interior Conditions**
Unit 222 Bldg B Living Room Northwest Corner	Wood Cladding, Batt Insulation on 2x4 Wood Framing	Exterior: Dry (D-Fir), Wood Framing Exterior: Dry (D-Fir), Plywood Interior: 0.2% MC (GWB)	1	T: 22^{0}C* RH: 61%**

* T: Temperature, ** RH: Relative Humidity

Observations:

- Opening made below the sill and adjacent to the mullion of the bay window.
- Minor staining observed on exterior sheathing, paper batt insulation and wood stud framing.

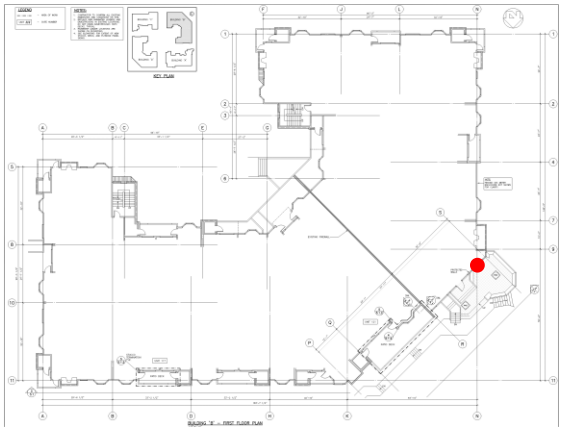

Photo B13

Photo B14

Photo B15

Interior Recess 6 (IR-06)				
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**	**Interior Conditions**
Unit 120 Bldg B Living Room East Elevation	Stucco Cladding, Batt Insulation on 2x4 Wood Framing	Exterior: Dry (D-Fir), Wood Framing Exterior: Dry (D-Fir), Plywood Interior: 0.1% MC (GWB)	0	T: 22^{0}C* RH: 61%**

* T: Temperature, ** RH: Relative Humidity

Observations:

- Opening made below the sill and adjacent to the mullion of the bay window.
- No staining observed on exterior sheathing, paper batt insulation and wood stud framing.

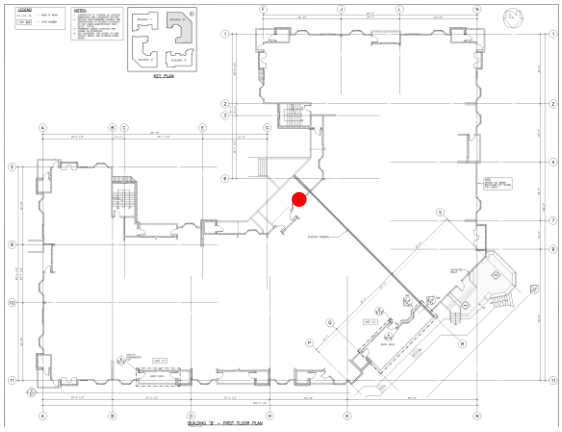

Photo B16

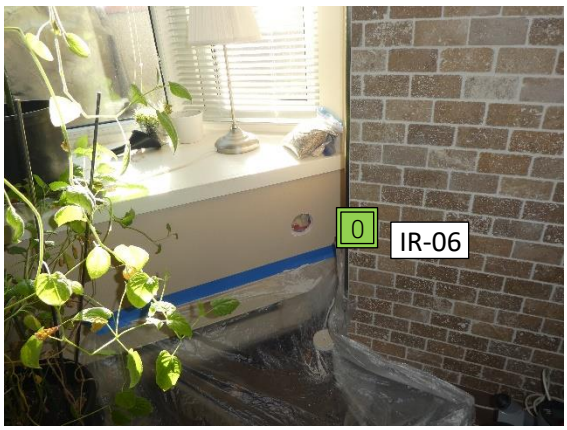

Photo B17

Photo B18

Interior Recess 7 (IR-07)				
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**	**Interior Conditions**
Unit 336 Bldg C Kitchen South Elevation	Wood Cladding, Batt Insulation on 2x4 Wood Framing	Exterior: 8% MC (D-Fir), Wood Framing Exterior: Dry (D-Fir), Plywood Interior: 0.1% MC (GWB)	1	T: 22^{0}C* RH: 61%**

* T: Temperature, ** RH: Relative Humidity

Observations:

- Opening made below the sill and adjacent to the mullion of the bay window.
- Minor staining observed on exterior sheathing, paper batt insulation and wood stud framing.

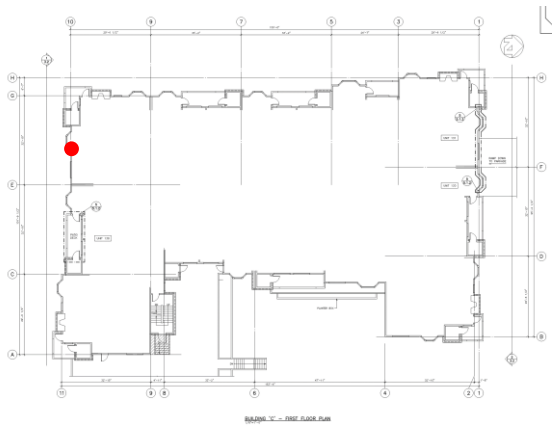

Photo B19

Photo B20

Photo B21

Interior Recess 8 (IR-08)				
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**	**Interior Conditions**
Unit 330 Bldg C Bedroom North Elevation	Wood Cladding, Batt Insulation on 2x4 Wood Framing	Exterior: Dry (D-Fir), Wood Framing Exterior: Dry (D-Fir), Plywood Interior: 0.2% MC (GWB)	1	T: 22^{0}C* RH: 61%**

* T: Temperature, ** RH: Relative Humidity

Observations:

- Opening made below the sill and adjacent to the mullion of the bay window.
- Minor staining observed on paper batt insulation and wood stud framing.

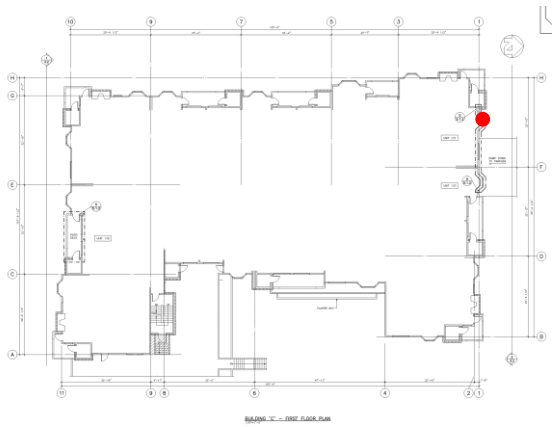

Photo B22

Photo B23

Photo B24

Interior Recess 9 (IR-09)				
Location	**Wall Type**	**Moisture Content (MC) of Wall Components**	**Deterioration Scale**	**Interior Conditions**
Unit 138 Bldg C Bedroom South Elevation	Wood Cladding, Batt Insulation on 2x4 Wood Framing	Exterior: 7% MC (D-Fir), Wood Framing Exterior: 8% MC (D-Fir), Plywood Interior: 0.1% MC (GWB)	1	T: 22^{0}C* RH: 61%**

* T: Temperature, ** RH: Relative Humidity

Observations:

- Opening made below the sill and adjacent to the mullion of the bay window.
- Minor staining observed on exterior sheathing and wood stud framing.

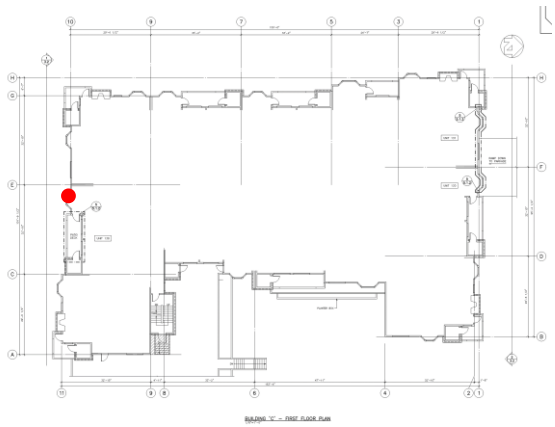

Photo B25

Photo B26

Photo B27

APPENDIX C QUESTIONNAIRE RESPONSES

DESCRIPTION OF APPENDIX

This appendix includes survey response data collected from the unit owners in the un-remediated portions of building B and building C that were reviewed before the field review.

Of the 40 occupants in the un-remediated portions of the buildings, 19 (48%) responded to the questionnaire RJC submitted to NW 2050 for distribution. Where the percentage does not total 100%, it indicates that some respondents did not answer the question.

1. How long have you owned and/or occupied the unit?

1.	115B: 5 years
2.	117B: 15 years
3.	120B: 8 years
4.	121B: 30 years plus
5.	215B: 10 years
6.	221B: 22 years
7.	222B: 3 years
8.	226B: 5 years
9.	313B: 24 years
10.	318B: 2 years
11.	321B: 10+ years
12.	322B: 16 years
13.	131C: 5 years
14.	132C: 2011 – 2020
15.	134C: 6 years
16.	232C: 11 years
17.	330C: 17 years
18.	331C: 8 years
19.	336C: 30 plus years

2. Has the waterproofing membrane on your balcony/deck been replaced since you began living in the unit?

1.	No	63%
2.	Yes (121B, 221B, 313B, 322B, 134C, 330C, 336C)	37%
3.	121B: yes upgraded in 2013	
4.	221B: Can not remember	
5.	313B: I believe it was replaced during remediation approx. 2001	
6.	322B: The scaffolding was still up outside my balcony when I moved in (Sept. 1st, 2003) and was removed shortly afterward	
7.	134C: JULY 2014	
8.	330C: We can't recall for sure if it was replaced or not when the north side of Bldg. C and Bldg. B were remediated.. (We are away for the winter so can't check)	
9.	336C: when the first round of remediation was done about 20 plus years ago	

3. Have any windows or sliding doors in your unit been replaced since you began living in the unit?

1.	No	79%
2.	Yes (121B, 313B, 330C)	16%
3.	121B: Not replaced but have been checked and any repairs done during our full renovation of the condo in 2018	
4.	313B: Windows on the east side only. Mine is a northeast corner unit and north side are still originals	
5.	330C: The bay windows in our dining-room and the windows in our bedroom on the north side of building C (facing the driveway) were done in the last phase of remediation.	

4. Does your unit have (or has your unit had) any active water leaks on ceilings or exterior walls?

1.	No	79%
2.	Yes (115B, 121B, 222B, 226B, 313B, 322B, 336C)	16%
3.	115B: in washroom because the pipe damage, remember around 2 years ago	
4.	121B: Just after our total renovation the suite above ours left water running in sink came down through ceiling light. Needed an insurance claim to re do hallway area ceiling and replace new flooring in hall area	
5.	222B: Water from above neighbour leaked into cupboard above fridge	
6.	226B: Water damage on January 25, 2018	
7.	313B: Minor ceiling issue in living room prior to roof replacement	
8.	322B: There seems to be a water stain above my living room. I informed the past Administrator at the time. She checked it and said would have someone take a look at it. Nothing has been done.	
9.	336C: none that I can see.	

5. Does your unit have (or has your unit had) any mould-like substances on ceilings or exterior walls?

1.	No	79%
2.	Yes (115B, 331C)	11%
3.	115B: not sure if this is count, I found black mouldish substances inside slide door and windows, it was not very much and I regularly clean them	
4.	331C: Bathroom ceiling	

6. Are there any walls or floors that are unusually cold during periods of cold weather?

1.	No	58%
2.	Yes (120B, 318B, 322B, 132C, 134C, 331C, 336C)	37%
3.	120B: All areas near the windows and doors seem to be cold	
4.	318B: All floors near all windows are unusually cold, including bedrooms and living room	
5.	322B: Balcony door and around the bay windows	
6.	132C: Bedroom and living room	
7.	134C: probably colder compared to others as an average, as we are 1st floor over car garage	
8.	331C: the wall of the bathroom cabinet	
9.	336C: some windows don't seal properly	

7. Are you having problems with windows and/or exterior doors?

1.	No	47%
2.	Water leaks	0%
3.	Air leaks (drafts) (318B, 322B)	11%
4.	Condensation (on inside face of frame or between panes of glass) (321B, 336C)	11%
5.	Broken glass	0%
6.	Difficulty in operation (222B, 313B, 318B, 322B, 330C, 331C, 336C)	37%
7.	Frame finish (paint) (336C)	5%
8.	Wind noise/rattles (318B, 336C)	11%
9.	Gaps around the frame	0%
10.	Bent window frame (318B, 336C)	11%
11.	Weather stripping falling out (318B)	5%
12.	Other (121B, 222B, 226B, 313B, 132C, 330C, 331C, 336C)	42%

13.	121B: All windows and doors were checked when doing renovations 2018
14.	222B: Bedroom sliding glass door is difficult to open/shut
15.	226B: We don't know
16.	313B: North side windows are sometimes hard to close
17.	132C: Nothing reported by tenants
18.	330C: Window in our bedroom (west side of Bldg. C) is hard to close at times, especially in the winter when it has rained lots.
19.	331C: The right window in the living room is a bit tight, and the handles are a bit loosened. It is a little bit hard to be tightly closed
20.	336C: My unit is on a South East corner so I get wind and rain on the outer walls and windows plus my unit gets the direct rays of the sun which deteriorates the wooden window frames, and caulking. So my unit gets the full effects of the weather good or bad.

8. Where is the problem (in question 7) occurring?

1.	121B: none
2.	222B: Second bedroom patio door
3.	226B: We don't know
4.	313B: North bedroom windows
5.	318B: Window frames of the master bedroom are broken. Windows cannot be closed in the master bedroom. The unit is unusually cold overall, even when all windows (in small bedroom and living room) are closed.
6.	322B: Balcony door and bay windows
7.	330C: second bedroom – west side of building C
8.	331C: The right window in the living room
9.	336C: South East and South West walls

9. Have you noticed any problems with your balcony/deck?

1.	No	79%
2.	Ponding of rain water (over 48 hours) (222B)	5%
3.	Peeling finishes on the floor, walls or soffit	0%
4.	Mould-like substances on the floor, walls or soffit (222B, 330C)	11%
5.	Water stains on the floor, walls or soffit (222B)	5%
6.	Wood decay on the floor, walls or soffit	0%
7.	Deflection of balcony	0%
8.	Loose guardrail (232C)	5%
9.	I don't have a balcony/deck	0%

10. Where is the problem (in question 9) occurring?

1.	115B: I have a wooden deck on the balcony, I could not check what under the deck.
2.	121B: Each spring we scrub the balcony, spray with the recommended solution from Can Tire. Have two drains on balcony and check regularly for leaves and deb-re coming over balcony.
3.	222B: Water pools on the rubber tiles near the drain pipe. The tiles are often wet and appear to have moss on them.
4.	226B: We don't know
5.	232C: The balcony
6.	330C: Black substance on the floor around the edges of the balcony. Don't know how we can get rid of it.

11. Do you have any other comments on any other building envelope-related problems that you have observed?

1.	No	26%
2.	Yes (121B, 226B, 318B, 134C, 331C)	26%
3.	121B: None, building is kept very clean and fresh looking as well as pool area, gym area, and underground parking	
4.	226B: We don't know	
5.	318B: Aside unusual, consistent low interior temperatures throughout fall and winter, strong odor from the adjacent unit is regularly seeped into unit 318 (marijuana), areas that are affected include bathroom, storage room, entrance area, and master bedroom.	
6.	134C: stucco is cracked in some places, but it is an old building. Perhaps to be expected	
7.	331C: the baseboard (plastic seal) along the street facing side of the balcony had been loosened.	