



REPORT

Building Envelope Condition Assessment – The Seastar

1003 Pacific Street
Vancouver, British Columbia

Presented to:

The Owners, Strata Plan LMS 2946

C/o Ms. Joan Bird , Property Manager
Gateway West Management Corporation
400 – 11950 80th Avenue
Delta, B.C. V4C 1Y2

TABLE OF CONTENTS

| | <u>Page</u> |
|---|-------------|
| 1. INTRODUCTION | 1 |
| 1.1 Terms of Reference..... | 1 |
| 1.2 Scope of Work..... | 1 |
| 1.3 Limitations..... | 1 |
| 1.4 Documents Reviewed..... | 2 |
| 1.5 Details and History of Building..... | 2 |
| 2. ASSESSMENT METHODS | 4 |
| 2.1 Occupant Questionnaire..... | 4 |
| 2.2 Site Work..... | 4 |
| 2.3 Interior Exploratory Openings..... | 5 |
| 3. ASSESSMENT OF CURRENT CONDITIONS | 6 |
| 3.1 Occupant Questionnaire..... | 6 |
| 3.2 Review of 2002 MH Report..... | 6 |
| 3.3 Walls..... | 7 |
| 3.4 Interior Visual Review..... | 9 |
| 3.5 Windows, Doors and Skylights..... | 11 |
| 3.6 Roofs, Decks and Balconies..... | 12 |
| 3.6.1 Flat Roof (used for main roof areas) and Roof Decks (over living space)..... | 13 |
| 3.6.2 Balconies (not over living space)..... | 13 |
| 3.7 Parking Garage..... | 14 |
| 3.7.1 Suspended Slab..... | 14 |
| 3.7.2 Planters..... | 14 |
| 3.7.3 Foundation Wall..... | 15 |
| 3.7.4 Exterior Stairs..... | 15 |
| 4. SUMMARY | 16 |
| 4.1 Highly Recommended (Second Priority)..... | 16 |
| 4.2 Maintenance Work (Third Priority)..... | 16 |

APPENDIX A: Proposal

APPENDIX B: Exploratory Openings

APPENDIX C: Photographs



TABLE OF CONTENTS (Cont.)

APPENDIX D: Occupant Questionnaire Survey Summary Reports

APPENDIX E: RDH Maintenance Manual Reference Pages

**APPENDIX F: Building Envelope Condition Assessment Report
prepared by Morrison Hershfield Ltd.**



1. INTRODUCTION

1.1 Terms of Reference

Morrison Hershfield (MH) was retained by the owners of The Seastar (Strata Plan LMS 2946) to undertake a building envelope condition assessment of their building located in Vancouver.

This review is an update from a previous MH report prepared in December 2002 (attached in Appendix F for reference).

The objective of this assessment is to review the claddings, windows, balconies and roofs and provide an opinion of the current condition of the facility and review maintenance requirements. We will also provide our recommendations with respect to any required remedial work or further investigations.

1.2 Scope of Work

The scope of our services was outlined in our proposal letter to Ms. Joan Bird of Gateway West Management Corp. dated February 8, 2008. Proposal approval was given by fax from Joan Bird on February 18, 2008. Refer to Appendix A for general description of our scope of work.

We deviated from the proposal in the following:

Only six openings within the wall assembly were made. We had requested access to twelve units with reported water ingress or building envelope concerns, however only six suites were accessible for our review.

1.3 Limitations

This assessment is based on a review of available documents, visual review, interior exploratory openings and sealant cut tests taken at a sample of building envelope elements. It is a basic assumption that any correspondence, material, data, evaluations and reports furnished by others are free of latent deficiencies or inaccuracies except for apparent variances discovered during the completion of this report.

The test openings were done at a sample of typical building details to confirm the construction. They do not represent a total listing of all locations with deficiencies nor do they imply all similar locations or items to be deficient.

This report documents the current condition of elements of the building envelope and may identify factors or mechanisms that lead to the current condition. The report is

not intended to provide an opinion regarding responsibility of any party in causing or contributing to the found condition.

Any comments or conclusions within this report represent our opinion, which is based upon the documents provided to us, our field review of physical conditions, specifically identified testing and our past experience.

In issuing this report, MH does not assume any of the duties or liabilities of the designers, builders or owners of the subject property. Owners, prospective purchasers, tenants or others who use or rely on the contents of this report, do so with the understanding as to the limitations of the documents reviewed, the general visual inspection undertaken and understand that MH cannot be held liable for damages which may be suffered with respect to the purchase, ownership, or use of the subject property.

1.4 Documents Reviewed

MH was provided with, and reviewed the following documents to assist in our assessment of the condition of the building envelope systems:

| Document Description | Prepared By | Date |
|---|---|-------------------|
| Architectural drawings A0.1 to A10.3 and details A51.01 to A55.01 | Davidson Yuen Simpson Architects (DYSA) | May 22, 1996 |
| Building Envelope Maintenance and Renewals Manual | RDH Building Engineering Ltd. (RDH) | January 15, 1999 |
| Building Envelope Condition Assessment Report | Morrison Hershfield Ltd. | December 31, 2002 |
| Water Ingress Summary | Michael Eddington, The Seastar | March 11, 2008 |

1.5 Details and History of Building

The Seastar is an 11-year-old (completed in 1997 by Greystone Properties Ltd.) 21-storey high-rise building that has 105 residential units. The complex includes a four level below grade concrete parking garage.

The construction trade manual by Bosa Construction identified Hydrotech 6125, Gacoflex and Elasto-deck 5000 as waterproofing membrane materials used. Typically, Hydrotech is used for roof and slab-on-grade waterproofing, Gacoflex is used for waterproofing exposed balcony surfaces and Elasto-deck is used as a parkade waterproofing traffic membrane.

Almetco windows were installed on the building.

Detailed descriptions of building envelope principles and specific components and assemblies used at The Seastar are identified on pages 37 to 48 of the RDH Maintenance Manual and are attached for reference in Appendix E.

The following table provides general information about the building. Refer to Photos 1 to 4 for general views of the buildings.

| | |
|---------------------------------|--|
| Building Address/Name | 1003 Pacific Street, Vancouver – The Seastar |
| Owner | Strata Plan LMS 2946 |
| Property Manager | Joan Bird, Gateway West Management Corp. |
| Building Type | High-rise |
| Type of Construction | Non-combustible, concrete framed construction. Exterior cladding primarily pre-fabricated panels and window wall. |
| Occupancy | Residential Strata |
| Date of Construction | Substantial completion on November 7, 1997 |
| Applicable Building Code | Vancouver Building By-Law No. 6134 as amended to the date of permit. |
| Sprinklered | Yes |
| Number of Suites | 105 residential units |
| Number of Storeys | 21 |
| Parking | 4-level reinforced concrete below grade |
| Adjoining Properties | North east elevation – laneway at rear of building North west elevation – lowrise building South west elevation – Pacific Street facing English Bay South east elevation – Burrard Street |

2. ASSESSMENT METHODS

MH's assessment approach can be considered as a series of steps, which focus the review and sample areas addressed.

The initial steps are a review of drawings, the occupant questionnaire survey and a visual review of a broad sampling of building elements. From this a focused sample of locations of concern is identified for closer review. In each section we provide a concise description of the issue, with comment on cause and our recommendation for further action. We have categorized each recommendation as follows:

| | | |
|------------------|---------------|---|
| Type: | Investigation | Further investigation is required (this could include further evaluation, testing or destructive openings). |
| | Action | A remedial task has been identified for the Strata to address |
| Priority: | 1 | Immediate – required because of codes, life safety issues, high liability or damage occurring |
| | 2 | Recommended by MH – good practice, to reduce risk of future damage |
| | 3 | Owner discretion is appropriate – low risk, preventative maintenance, immediate action not required |

We have also referenced our previous report and updated and commented on recommendations contained in that report.

2.1 Occupant Questionnaire

MH issued a standard Occupant Questionnaire form on March 3, 2008, which was distributed and collected by the Strata. The deficiencies questionnaire was devised to identify the extent and location of the water leakage and building deterioration problems experienced by the occupants. A summary of the comments is included in Appendix D.

2.2 Site Work

A site inspection was made on April 9, 2008. During the site visit we carried out an exterior and interior visual review of the building, including walls, roofs, balconies, windows and the parking garage.

We were provided access to the following suites: 505, 1008, 1207, 1208, 1707, 2005 and the amenity room. Charlie Chen and Jackie White, P.Eng., both of MH, performed the fieldwork in the company of Michael Eddington, building manager of The Seastar.

The weather at the time of the fieldwork was overcast and cool, with temperatures ranging from 5°C to 12°C. Periods of dry weather preceded the fieldwork.

2.3 Interior Exploratory Openings

Exploratory openings consisted of cutting approximately 150 x 150mm sections of the interior gypsum board to view the condition of the wall framing and sheathing.

The interior openings were made in the drywall under windows and at the wall-to-floor interface as a cost-effective approach to obtain the necessary information on the condition of the envelope to assess the condition of the stud framing (corrosion), wall cavity and the exterior sheathing/cladding.

Once the opening was made, the insulation was reviewed for staining and, when touched, for moistness indicating previous water ingress into the wall assembly. After the batt insulation was reviewed it was moved aside within the wall assembly so that the steel stud framing and exterior sheathing/cladding could be reviewed. After examination, the gypsum board was temporary secured in place.

The opening locations and detailed observations recorded at each opening are included in Appendix B, complete with an identifying photograph.

3. ASSESSMENT OF CURRENT CONDITIONS

3.1 Occupant Questionnaire

As part of this report, we initiated an occupant questionnaire survey that provided information on specific areas of concern. The owners were asked to indicate which areas of their unit (walls, ceiling, floors, windows, etc.) have problems of concern. Refer to Appendix D for reports summarizing the survey.

We received 57 out of a possible 105 response (54%). Of the 57 questionnaires returned, nine incidents of water penetration were reported in the following six units:

- Unit 2101: Water leak was reported at an unidentified door. We were unable to access this unit for review.
- Unit 2005: Leak was reported at north facing balcony swing door. Evidence of water ingress and interior damage were found at door sill. Further comment on this unit is provided in Section 3.4.
- Unit 1401: Water leak was reported in the master bathroom. We were unable to access this unit to confirm if this is a building envelope concern or a plumbing issue.
- Unit 1205: Water leak was reported on the kitchen ceiling and is reportedly associated with the use of the washer and dryer. This may be condensation from the in slab vents, which was a concern at some units in our 2002 report. We were unable to access this unit for review.
- Unit 1106: Water leak was reported on the ceiling at three locations (not associated with rain). Again this may be a concern with the in slab vents. We were unable to access this unit for review.
- Unit 505: Water leak was reported in the enclosed balcony. No sign of water was evident, and the owner was not available to further explain the concern. Continued monitoring is recommended.

Recommendation 1

Confirm concerns at units not reviewed (refer also to Appendix D).

Type: Action **Priority:** 2

3.2 Review of 2002 MH Report

The previous MH building envelope condition assessment report identified several deficiencies requiring maintenance including: various sealant joints, concrete coating, IGU replacements, planter waterproofing, balcony waterproofing and parkade waterproofing.

According to the building management, all previous leaks identified in units 2101, 1705, and 505 by MH have been resolved by replacing defective sealant. A leak from

the window in unit 1901 and the exhaust vent in unit 2103 have been resolved by replacing defective sealant. All leaks identified in the MH report related to blocked dryer exhaust vent ducts have been successfully repaired.

Water ingress at the sloped curtain-wall glazing skylights of suite 2101 was reported in the previous investigation. According to the building management, this has been successfully repaired.

We were not provided with a log of repairs as recommended in the maintenance manual provided to the Strata. However, the building manager did provide information on repair history to date.

Recommendation 2

Review and update annual maintenance and renewals manual provided by RDH.

Type: Action **Priority:** 2

Recommendation 3

Review recommendations made by MH in previous report and update unresolved issues related to waterproofing, sealant and concrete repair.

Type: Action **Priority:** 2

3.3 Walls

There are several different wall assemblies used as envelope elements for The Seastar including; pre-fabricated masonry and concrete panels, stucco, brick veneer, cast-in-place concrete and various types of glazing assemblies (refer to section 3.5 for glazing assemblies). The majority of the exterior cladding on the building is pre-fabricated concrete and masonry panels. A detailed discussion of the wall assemblies is provided in Appendix E.

We made the following observations during our review of the wall areas:

- Minor cracks and spalling of the brick were observed on the masonry panel in the unit 2005 north elevation (refer to Photo 05).
- Efflorescence was noted at the door and masonry transition in unit 2005 (refer to Photo 06). This may require a weep at the window head to allow any water in the panel above to weep.
- Efflorescence was noted on the wall of the exterior stair adjacent to the lobby leading to level 2 garden (refer to Photo 08). A crack was observed between the stairs and masonry wall and extended up the wall (refer to Photo 09). No flexible joint was provided between the concrete wall and the masonry. Water ingress through the crack may have resulted in the efflorescence on the brick wall.

- Michael, the building manager, reported that ongoing crack repair is being completed on the stucco at the penthouse and roof levels (refer to Photos 10 and 11). Cracks greater than 1/8" should be routed out and caulked. Minor hairline cracking can be addressed with caulking alone.
- The paint applied to the mass concrete walls at the roof level is significantly eroded and has very poor adhesion to the concrete (refer to Photos 13 and 14). The loose and flaking paint requires removal and re-application of a new coating to the exposed concrete. Michael reported that this area is scheduled to be re-coated this spring; therefore, we have not included this cost in the budget.
- Small cracks and failed coating in the exposed concrete walls at the top band around the tower were noted (refer to Photo 15). All exposed concrete walls, eyebrows and columns on the ground level, 6th and 21st floor should be reviewed and re-coated as required.
- As was identified in the previous MH report, the dryer exhaust vents were found to be a source of water ingress into the building. The exhaust vent detail has been modified in some locations through the installation of a hood over the opening (refer to Photo 18). No water ingress at the modified units has been reported since.
- Six exploratory openings were made in the wall assemblies to confirm the construction and condition of materials in the walls. The only opening that showed evidence of water ingress was in the amenity room (refer to recommendation 9). We did not observe corrosion of the steel framing or evidence of moisture ingress, such as mold or staining, at any of the other five exploratory openings. Further discussion is provided in section 3.4.

Cracks and efflorescence are minor and localized. Maintenance of masonry walls should be carried out regularly. At the stairwell, reducing the frequency of cleaning of the stair treads is recommended to minimize the amount of moisture penetrating the wall causing the efflorescence.

Sealant joints were reportedly inspected every six months and fixed as required. The typical life expectancy of the sealant is 10-15 years, so complete replacement should be planned for in the next five years. We have provided a budget for sealant replacement in Table 4.1.

Dryer vents require routine cleaning to ensure that they do not become blocked with lint. Should a dryer vent become blocked, the warm, humid air that is produced by the dryer will not be properly discharged to the building exterior. When this occurs, there is a possibility that the air may penetrate discontinuities in the ducts and moist air will be forced into the building interior or into the exterior wall assemblies or, will condense within the slab. Condensation is likely to occur, which may result in deterioration of wall or slab components. If drying time increases this could be a sign of blockage.

Recommendation 4

Review, maintain and replace exterior sealant as required. Complete replacement should be planned for in the next 5 years.

Type: Action **Priority:** 3

Recommendation 5

Install sealant joint at the masonry and concrete wall and repair crack at the stairs by the lobby.

Type: Action **Priority:** 3

Recommendation 6

Maintain, re-coat (elastomeric) and seal cracks as necessary to the exposed concrete walls in the building.

Type: Action **Priority:** 3

Recommendation 7

Clean and remove lint from screens and ensure dryer lint traps work properly.

Type: Action **Priority:** 3

3.4 Interior Visual Review

The property and building managers arranged for the interior review of the following suites at locations where the owner's reported water ingress or building envelope concerns.

Suite 2005

Window gaskets at the transoms of the balcony sliding doors are short and not tightly secured in all locations (refer to Photo 06). This can easily be corrected by pushing the gasket seal into the window stop. The gasket is not the primary weather seal and water ingress is not expected as a result of the deficiency.

Water ingress was reported at the swing door connected to the north roof deck in the master bedroom (refer to Photo 19). Staining and damage of the wood stool were noted at the door sill. Gaskets around the door were thin and insufficient to provide a tight seal when closing the door (refer to Photo 20). A head flashing was installed recently as a retrofit (refer to Photo 21); however, it does not sufficiently protect the door from rain exposure.

It is generally a good practice to install canopy protection above doors or provide a high performance door (B5 rating) to avoid water ingress. Given that doors located on the 20th floor roof deck are in a highly exposed environment, canopy protection is recommended.

Recommendation 8

Install new door or new canopy with improved waterproofing around the door opening. Inspect gaskets on the doorframe and replace the defective ones. Installation of a canopy above the door should be considered at all exposed doors in the future. *Can be conducted systematically to all exposed balcony doors to prevent possible future leaks or on an as-required basis to address current active leaks.*

Type: Action **Priority:** 3

Suite 1707

The tenant reported wind noise and air leakage at the window and wall plug. We could not confirm the continuity of the air barrier in the plug behind the drywall. It appeared that the tenant was not using the top lock and therefore, the window was not sealed properly at the top resulting in air leakage and wind noises.

An exploratory opening was made in this suite at the northeast corner of the living room wall below the window (refer to Appendix B). All materials in the opening were clean and dry.

Suite 1208

The tenant reported condensation on the window in the wintertime. This could be a result of possible air leakage at the window, or inadequate ventilation or inadequate use of exhaust fans.

An exploratory opening was made in this suite at the northeast corner of the living room wall below the window (refer to Appendix B). All materials in the opening were clean and dry.

Suite 1207

The tenant reported cracks and blisters on the ceiling that we do not believe are water ingress related but rather related to poor drywall taping. There were no signs of water staining. An exploratory opening was made at ceiling level on the wall at the northwest corner of the living room (refer to Appendix B). All materials in the opening were clean and dry.

Another exploratory opening was made at the northeast corner of the living room wall below the window (refer to Appendix B). All materials in the opening were clean and dry.

Suite 1008

The tenant reported condensation in between the glazing units on the enclosed balcony windows. Failed IGU's were found in the enclosed balcony and the exterior glazing gasket was detached from the window (refer to Photo 23).

An exploratory opening was made in this suite on the north elevation of the bedroom wall below the glass block window (refer to Appendix B). All materials in the opening were clean and dry.

Suite 505

The tenant reported a ceiling leak in the enclosed balcony. No sign of water ingress was apparent and the tenant was not available to provide more information. No opening was made in the suite.

Amenity Room

An exploratory opening was made in this room on the west elevation below the window facing the exterior planter (refer to Appendix B). Batt insulation and both layers of drywall were dry. The steel studs were in good condition. However, evidence of fungal growth was found between the polyethylene and the outer layer of the drywall. This is an unusual location to find fungal growth. Typically moisture would be observed on the interior side of the polyethylene if interior moisture were the cause, as higher interior relative humidity tends to drive outward from warm to cold. Inward vapour drive is sometimes possible when exterior temperatures are greater than interior temperatures. As the mold was located on the exterior side of the air/vapour barrier (poly), it is unlikely to contribute to poor indoor air quality (IAQ). If the Strata is concerned, we recommend that an expert in IAQ conduct further review.

Recommendation 9

Remove and replace drywall affected by mold in the amenity room as deemed necessary.

Type: Action Priority: 3

3.5 Windows, Doors and Skylights

The following table identifies the primary glazed assemblies used in the project.

| Window Type / Use | Punch windows and window wall | Storefront windows |
|----------------------|--|--|
| Manufacturer | Almetco | Not Confirmed |
| Frame Material | Thermally broken aluminum | Thermally broken aluminum |
| Corner construction | Butt-framed with sealant | |
| Mounting method | Deflection head at window wall Sill angle at punch window | Rebate |
| Drainage | Drained Glazing Cavity. | Self-adhering membrane detail |
| Type of Operator | Casement and Awning | None |
| Glazing installation | Exterior - dry seal Interior - dry seal | Exterior - dry seal Interior - dry seal |

| Window Type / Use | Punch windows and window wall | Storefront windows |
|-------------------------|-------------------------------|------------------------------|
| Glazing | Insulated Glazing Unit (IGU) | Insulated Glazing Unit (IGU) |
| IGU seals | Aluminum | Aluminum |
| Flashing | Sill flashing | Sill flashing |
| Perimeter seal and trim | Concrete Panel with sealant | Concrete Panel with sealant |

We made the following observations at the window assemblies reviewed:

- No water staining was observed in the condensation track at the reviewed windows. Weep tubes installed into the condensation track of the windows were clear from debris (refer to Photo 25).
- In unit 1008, the exterior glazing gasket was detached from the window (refer to Photo 23).
- Condensation between the panes of Insulated Glazed Units (IGU's) was reported in several suites.
- No visual deficiencies were observed in the storefront window assembly at the entrance and common rooms.

The residents can expect the rate of IGU failure to gradually increase in the future, as the IGUs approach their life expectancy (15-25 years). This is mainly an aesthetic issue; it does not have a significant effect on the window's thermal or waterproofing performance. We recommend an annual budget for localized replacement of IGU's, as provided in Table 4.1.

The skylights on the roof level should be reviewed and maintained as required in accordance with regular roof maintenance.

Recommendation 10

Review and maintain sealant at window mitres and window gasket as required. Adjust operables as required.

Type: Action **Priority:** 3

Recommendation 11

Replace failed IGU's and exterior window gaskets as required.

Type: action **Priority:** 3

3.6 Roofs, Decks and Balconies

There are fundamentally three different roof, deck and balcony assemblies used at The Seastar. We did not conduct exploratory openings to confirm the roof assemblies.

3.6.1 Flat Roof (used for main roof areas) and Roof Decks (over living space)

The main roofing assemblies on the building consist of Hydrotech, "Hot Rubber", modified asphalt, waterproofing membrane protected with a drainage composite, rigid insulation and aggregate ballast or concrete pavers (refer to Appendix E for further discussion on the roofing assembly).

Water ingress under the roofing assembly has not been reported or observed. The perimeter of the roofing membrane is terminated at the concrete parapet wall with a gum-lip flashing and sealant.

On the northwest roof deck of level 19, vegetation and moss were observed in between the pavers (refer to Photo 26). This is an indication of poor drainage and possible blocked drains, however, no water ponding was observed. The bi-level drain requires regular cleaning at the paver level, as well as the roof deck level.

The roofing membrane is protected with insulation and ballast or concrete pavers (in traffic areas) and is not exposed to UV. This type of roof assembly should have a service life of approximately 20 years or more, when well maintained.

Waterproofing saddle was missing at the concrete mass wall on the roof (refer to Photo 14). Saddle detail should be implemented along with roofing membrane replacement in the future.

Recommendation 12

Maintain roofing membrane as necessary. Clean out debris and weeds on the roof deck periodically. Maintain sealant of roof flashing as required. Ensure drains are free-flowing.

Type: Action

Priority: 3

3.6.2 Balconies (not over living space)

The balcony surface has been protected with a liquid membrane (Gacoflex) embedded with granules to form a non-slip coating. We did not see evidence of water leakage such as staining of the balcony soffit, at the areas reviewed.

The liquid applied membrane used on the balconies can typically have an expected lifetime of seven to ten years when properly installed and adequately maintained. Failure of the membrane can allow water to penetrate through cracks in the concrete. Over the course of several years, water leakage may cause deterioration of steel reinforcements and spalling of the concrete, which should be addressed in the long-term maintenance of the building. These membranes are nearing the end of their expected service life, and recoating should be planned for in the next 5 years. A cost is provided in Table 4.1.

Recommendation 13

Maintain balcony membranes as required. Clean debris from balcony surface annually. Plan for renewal in the next five years.

Type: Action **Priority:** 3

3.7 Parking Garage

3.7.1 Suspended Slab

A liquid membrane (Elasto-deck 5000) embedded with granules to form a non-slip coating was applied on the suspended slab at levels P1 to P3. There was no membrane applied over the concrete slab on grade at the P4 level.

We noted the following during our review:

- Efflorescence and water staining were observed at a few isolated locations (i.e. parkade entrance wall and P2 soffit below the entrance ramp, refer to Photos 27 and 28).
- Evidence of water ingress in the bike storage area and in the emergency generator room was observed (refer to Photos 29, 30, 31 and 32).
- Cracks in the concrete slab and wall were observed in a few isolated locations and should be repaired as required in accordance with regular parkade maintenance.

Based on our visual review, we did not see conditions that indicate structural distress at the present time. In our climate, water leakage can cause deterioration of steel reinforcements and spalling of the concrete over the course of several years, which should be addressed in the long-term maintenance of the building. Leaks into below-grade structures are often difficult to trace and may be costly to repair. Because of the time that it takes for corrosion of the reinforcing steel in the concrete to occur due to water ingress, leaks into parkades often cause more of a nuisance than a concern regarding occupant health or safety.

Recommendation 14

Maintain waterproofing membrane in the parkade and repair cracks in the concrete as necessary.

Type: Action **Priority:** 3

3.7.2 Planters

There are several planters located at the perimeter of the building. These planters typically were waterproofed with hot rubber, protection sheet and gumlip flashing. We observed a few areas where the protective sheet has

lifted leaving the membrane exposed (refer to Photo 33). This should be adjusted to protect the underlying membrane from UV.

3.7.3 Foundation Wall

Leakage was reported in the P1 bike storage room through a Telus wall mounted cable box, which connected to the underground main source located in the lane. Water staining can be seen inside the metal box and on the floor (refer to Photos 34 and 35). Reportedly water flooded the storage room and level below during a heavy rainstorm. A temporary repair patch in the cable box has been installed. No water leakage has been reported since the repair.

Recommendation 15

Further investigation is required at the through wall cable connection, to determine permanent repair strategy.

Type: Investigation

Priority: 2

3.7.4 Exterior Stairs

Water ingress was observed inside staircases 4, 5 and 6. Peeling of the paint, staining, cracking, and efflorescence were found on the wall and ceiling in all three staircases (refer to Photos 36 and 37). The exterior concrete wall of staircase #4 had water staining and deteriorated paint at the base of the wall (refer to Photo 38). Typically, water staining and peeling of the paint occurred at the concrete slab cold joint and on the walls that were adjacent to the planters (refer to Photos 39 and 40). Waterproofing of the interior wall along with concrete crack repair in the staircases is required to resolve the problems.

Recommendation 16

Waterproofing and crack repair are required in the staircases.

Type: Action

Priority: 3

4. SUMMARY

The following recommendations are based on visual observations and interior openings through the drywall. This condition assessment provides a review of the overall condition or status of the building envelope and components and focuses on specific locations where deficiencies or water ingress were noted. Locations requiring further investigation or maintenance were also noted.

4.1 Highly Recommended (Second Priority)

| No. | Recommendation | Type | Priority |
|-----|---|---------------|----------|
| 1 | Confirm concerns at units not reviewed (refer also to Appendix D) | Action | 2 |
| 2 | Renew and update annual maintenance and renewals manual provided by RDH. | Action | 2 |
| 3 | Review recommendations made by MH and update any unresolved issues related to waterproofing, sealant and concrete repair. | Action | 2 |
| 15 | Further investigation is required at the through wall cable connection to determine permanent repair strategy. | Investigation | 2 |

4.2 Maintenance Work (Third Priority)

| No. | Recommendation | Type | Priority |
|-----|--|--------|----------|
| 4 | Review, maintain and replace exterior sealant as required. Plan for complete replacement in the next five years. | Action | 3 |
| 5 | Install sealant joint at the masonry and concrete wall and repair crack at the stairs by the lobby. | Action | 3 |
| 6 | Maintain, recoat (elastomeric) and seal cracks as necessary to the exposed concrete walls in the building. | Action | 3 |
| 7 | Clean and remove lint from dryer screens. | Action | 3 |

| | | | |
|----|---|--------|---|
| 8 | Install new door or new canopy with improved waterproofing around the door opening. Inspect gaskets on the door frame and replace the defective ones. Consider installation of canopy above all exposed doors in the future. <i>Can be conducted systematically to all exposed balcony doors to prevent possible future leaks or on an as-required basis to address current active leaks.</i> | Action | 3 |
| 9 | Remove and replace drywall affected by mold in the amenity room as deemed necessary. | Action | 3 |
| 10 | Review and maintain sealant at window mitres and window gasket as required. Adjust operables as required. | Action | 3 |
| 11 | Replace failed IGU's as required and exterior window gaskets as required. | Action | 3 |
| 12 | Maintain roofing membrane as necessary. Clean out debris and weeds on the roof deck periodically. Maintain sealant of roof flashing as required. Ensure drains are free-flowing. | Action | 3 |
| 13 | Maintain balcony membranes as required. Clean debris from balcony surface annually. Plan for renewal in the next five years. | Action | 3 |
| 14 | Maintain waterproofing membrane in the parkade and repair cracks in the concrete as necessary. | Action | 3 |
| 15 | Waterproofing and crack repair are required in the staircases. | Action | 3 |

We provide a summary of costs for items that are considered renewals or repairs beyond regular maintenance as follows in Table 4.1.

**Table 4.1: Budget Cost for Repair/Replacement Items
(See Notes)**

| DESCRIPTION | Budget |
|---|------------------|
| Installation of Glass canopies (recommendation 8) | |
| Glass canopy above exposed doors level 18-21 6 X Swing doors (3' wide) 16 X Sliding doors (6' wide) | \$104,000 |
| Sealant Replacement (recommendation 4) | |
| All panel joints, window and wall penetrations | \$50,000 |
| Balcony Membrane Replacement (recommendation 13) | |
| Based on 32 balconies | \$30,000 |
| Paint Exposed Concrete (recommendation 6) | |
| Exterior face of roof parapet, 6 th floor band and ground floor | \$16,000 |
| Maintenance Contingency | |
| For miscellaneous repairs as noted in recommendations | \$20,000 |
| TOTAL | \$220,000 |
| IGU Replacements | |
| An annual contingency | \$2,000/yr |

Notes:

1. These order of magnitude opinions of probable costs are for initial budgeting purposes only. Estimates are initial figures only. Figures are rounded to the nearest thousand.
2. These estimates were developed using assumptions for unit costs and the scope of work for each item. These estimates should not be used to raise Special Assessment/funds without discussing the implications with Morrison Hershfield before hand.
3. The above budget costs exclude specific estimates for unseen conditions and permit fees.
4. Engineering Fees, contingencies, GST, PST etc are not included in the above budget.

Our review found very little evidence of water penetration and deterioration through the envelope of The Seastar. The few problems noted appear to be associated with specific elements or isolated details of the construction. However, as the building ages, it should be expected that maintenance and renewals of building envelope components would increase.

Maintenance of the building envelope is a critical component of the long-term water management performance of the building. It cannot be stressed strongly enough that the Strata must continue careful and regular maintenance of the building envelope components to ensure the expected long-life of the building is reached.

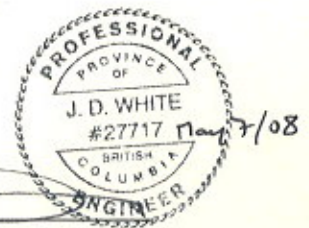
Maintenance requirements increase as time passes and the service life of materials and systems are approached. Building envelope maintenance items should be budgeted for by the Strata and re-assessed on a regular basis to reflect cost of living increases and the age of the various building elements.

In addition, there comes a point in the life of a system when maintenance is no longer practical and renewal is appropriate and more cost effective. The future renewal costs of the various building envelope components should also be established by the Strata Corporation. This information is usually provided in a reserve fund study.

MORRISON HERSHFIELD LIMITED

Charlie Chen
Building Science Consultant

Jacquelyn White, P.Eng.
Project Engineer



APPENDIX A: Proposal



February 8, 2008

MH ref. 5085154.99

Joan Bird
Property Manager
Gateway Property Management Corporation
400-11950 80th Avenue
Delta, BC V4C 1Y2

email: jbird@gatewaypm.com

Dear Ms. Bird

**Re: Building Envelope Condition Assessment,
Seastar, Strata Corp. LMS 2946, 1003 Pacific Street, Vancouver**

Thank you for the opportunity of providing a proposal for our services to meet the requirements of Strata Corporation LMS 2946 for a building envelope condition assessment.

Background Information

Our proposal is based on our prior knowledge of the building (BECA performed by MH dated December 31, 2002) and the information we obtained from phone correspondence with Gateway.

The Seastar is a 21-storey high-rise building completed in 1997. There are 105 residential units. The Seastar is non-combustible, concrete framed construction. Exterior cladding is primarily pre-fabricated panels with some stucco and cast in place concrete wall areas. Glazing is a combination of punched windows and window wall. The main roof is a protected flat roof system and units are provided with cantilevered balconies. The complex includes a four level below grade concrete parking garage.

It is our understanding that the Strata wishes to undertake a similar assessment as was performed by MH in 2002 to identify any maintenance items or renewals required in the next five years.

Scope of Work

The following tasks form our proposed scope of work for the Initial Assessment of the exterior envelope elements:

Task 1: Review available original design documents to become familiar with the designer's intent with respect to the exterior enclosure of the buildings. Review previous BECA by MH. This will be useful for us to become

acquainted with the facility details and determine if items previously identified have been addressed before we perform site visits, and afterwards for estimating quantities and budgets. Ideally the documents would include architectural drawings and specifications, and previous repair documents.

- Task 2: An *Occupant Questionnaire Survey* will be distributed and returned prior to the site visit. This survey is a useful tool to focus our exterior wall assessment, as it would provide information on the nature and extent of any moisture ingress issues that owners may have noted. We will issue a customized *Occupant Questionnaire Survey* form to the Strata Council to copy, distribute, collect and return to us. We would then tabulate the results in a computerized database program we have developed for this purpose.
- Task 3: Undertake a visual examination of the building envelope components: precast panels, windows, and balconies from grade and from a minimum of five suites. The purpose of this examination is to identify the current condition of the various components of the building envelope, and to identify probable locations of moisture problems for more in-depth survey and exploratory work. Some of our findings will be based on a random sampling and specific location testing, and some of the findings will be based on a visual review of the surface conditions only. We will require the Strata's assistance to gain access to suites.
- Task 4: Although intrusive, interior openings are necessary to the condition of the envelope components. Approximately 10 interior openings would be made in the interior drywall in order to assess the condition of the interior gypsum, and exterior wall assembly. The interior openings will be patched and temporarily sealed with tape to ensure the safety of the occupants. Permanent repairs can take place once a remedial work program has been established and authorized to proceed.
- Task 5: Update previous identified items and any new conceptual repair and renewal recommendations with associated budget cost estimates for each element of the exterior building envelope that is likely to require action over the next five years. We would provide a priority rating for each task
- Task 6: Prepare two copies of the final, professionally sealed report. Based on our findings we will propose a conceptual remedial work program, including quantity and cost estimates and an implementation plan. We will meet with owner representatives on one occasion after the report is submitted to discuss our conclusions and recommendations.

The above scope of work is developed to provide a method for determining whether there are any water ingress issues of concern at your facility, at a low initial cost. It is possible that we may need to recommend additional investigative work as one of the outcomes of this Initial Assessment. We have endeavored to provide the most cost effective, rational approach to identifying the current condition of the building and the needed strategies for continued maintenance and repair of the facility.

The above scope of services does not include our involvement in the design (drawings and specifications) and management of the contractor's activities for any of the recommended renewals work. A proposal for this work can be provided once the renewals plan has been established.

Fees and Expenses

For the above scope of work, we propose a **fixed fee of \$9,500** plus GST. This fee includes our anticipated expenses and one meeting with the Strata.

This proposal is open for acceptance for 60 days. The Goods and Services Tax (GST) will be added to the above fees and will be shown as a separate item on our invoices. Our billing terms are enclosed for your information. Please note that the quoted fees and expenses exclude costs associated with obtaining original drawings, attendance at additional meetings, and assistance in negotiating with the original builder or assistance in litigation support.

Schedule

We will schedule the field investigative work within five (5) weeks of receiving written authorization to proceed. This waiting period can be effectively utilized by circulating and responding to the *Occupant Questionnaire Survey*. We would request that the documents noted in Task 1 be forwarded for our review together with authorization to proceed, as this affords us the time to perform a proper review before arriving on-site. Our report would be submitted within five to six (5-6) weeks of completing the fieldwork.

Morrison Hershfield Limited

Morrison Hershfield (MH) was incorporated in 1946, and has been working with Lower Mainland clients in the building science field for over 15 years. Since establishing an office here, we have focused primarily on the building envelope services part of our business. We have worked on hundreds of complexes with similar building enclosures and associated performance problems to those at your building.



The field of building science, and in particular building envelope engineering, is now recognized as a specialty that is focused on the elimination of performance problems associated with the enclosures of buildings. Our company's strength resides with our broad team of engineers, architects, technologists and former contractors, all with direct knowledge of the Lower Mainland's special issues. Morrison Hershfield is recognized as a leader in the building envelope field across North America.

In addition to the services we traditionally provide to new construction projects, our company has been involved in thousands of investigations of buildings with envelope performance problems. In most cases this investigative work has led to the design of remedial work and, in many cases, to the management of exterior wall, window and/or roof replacement or rehabilitation programs.

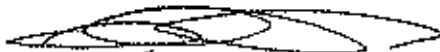
In 1996, Morrison Hershfield completed a study for CMHC that looked at the causes of building envelope failures in the Lower Mainland, entitled *Survey of Building Envelope Failures in the Coastal Climate of British Columbia*. This study resulted in the CMHC retaining Morrison Hershfield to prepare the *Best Practice Guide (BPG)*, a guideline document for improved design and construction practices for the Lower Mainland. The published BPG guideline document was prepared as a joint venture with another engineering firm.

We are currently involved with many Strata Owners, Property Managers and Co-op Boards in the various stages of Assessment, Tender document preparation and Project Management of the rehabilitation phase. References are available upon request.

We look forward to completing this project and providing you with high quality, professional service. Please do not hesitate to contact us at 604-454-0402 if you require additional information or if you have any questions regarding our proposal.

Sincerely,

MORRISON HERSHFELD LIMITED



Jacquelyn White, P.Eng.
Project Engineer

encl.

M:\PROJ\5085154\SeaStar Proposal.doc



Appendix B: Exploratory Openings

Exploratory Opening No. 1

| | | |
|---------------------------------|------------------------------|-------------------------------|
| Location | Unit 1707 | Elevation : North/East |
| Detail Addressed | Below window | |
| Reason location selected | Susceptible, Assembly | |
| Condition | Dry, no evidence of moisture | |



Overview

Observations:

- Stucco cladding and concrete back wall
- 4" steel stud filled with batt insulation
- 2 layers of drywall with polyethylene sheet sandwiched in between.



Close-up

Condition:

- Concrete back wall was dry and in good condition.
- Steel stud was in good condition, no sign of corrosion.
- Batt insulation was clean dry.
- Drywall was clean and dry.

Exploratory Opening No. 2

| | | |
|---------------------------------|------------------------------|------------------------|
| Location | Unit 1208 | Elevation: East |
| Detail Addressed | Below window | |
| Reason location selected | Susceptible, Assembly | |
| Condition | Dry, no evidence of moisture | |



Overview



Close-up

Observations:

- Masonry cladding and concrete back wall
- 4" steel stud filled with batt insulation
- 2 layers of drywall with polyethylene sheet sandwiched in between.

Condition:

- Concrete back wall was dry and in good condition.
- Steel stud was in good condition, no sign of corrosion.
- Batt insulation was clean and dry.
- Drywall was clean and dry.

Exploratory Opening No. 3

| | | |
|---------------------------------|---------------------------------|-------------------------|
| Location | Unit 1207 | Elevation: North |
| Detail Addressed | Top of the wall, near window | |
| Reason location selected | Cracking, Susceptible, Assembly | |
| Condition | Dry, no evidence of moisture | |



Overview



Close-up

Observations:

- Drywall
- 4" steel stud filled with batt insulation
- 2 layers of drywall.

Condition:

- Crack on the ceiling and wrinkles in the paint on wall/ceiling transition.
- Steel stud was in good condition, no sign of corrosion.
- Batt insulation was clean and dry.
- Drywall was clean and dry.

Exploratory Opening No. 4

| | | |
|---------------------------------|------------------------------|-------------------------------|
| Location | Unit 1207 | Elevation : North/East |
| Detail Addressed | Below window | |
| Reason location selected | Susceptible, Assembly | |
| Condition | Dry, no evidence of moisture | |



Overview



Close-up

Observations:

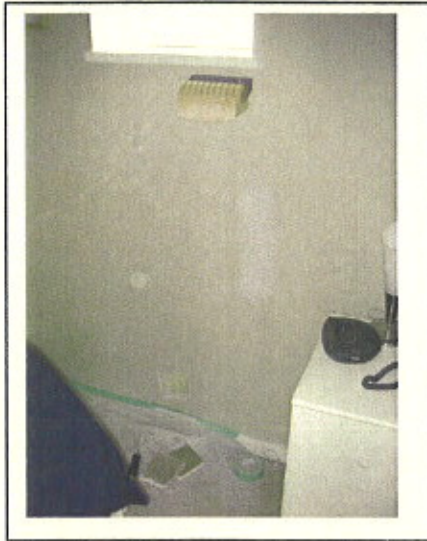
- Concrete back wall with a piece of plywood anchored at the top of wall.
- 4" steel stud filled with batt insulation
- 2 layers of drywall with polyethylene sheet sandwiched in between.

Condition:

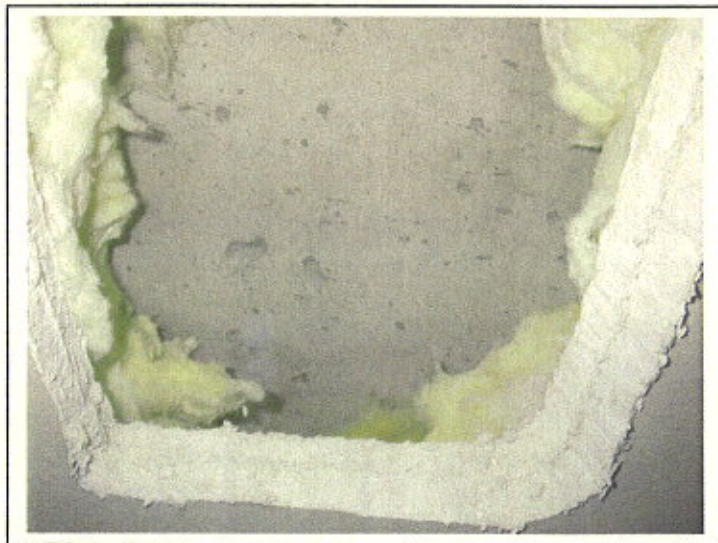
- Staining on the back side of the concrete wall.
- Plywood was dry (11% MC).
- Steel stud was in good condition.
- Batt insulation was clean and dry.
- Drywall was clean and dry.

Exploratory Opening No. 5

| | | |
|--------------------------|------------------------------|------------------|
| Location | Unit 1008 | Elevation: North |
| Detail Addressed | Below glass blocks | |
| Reason location selected | Susceptible, Assembly | |
| Condition | Dry, no evidence of moisture | |



Overview



Close-up

Observations:

- Concrete back wall
- 4" steel stud filled with batt insulation
- 2 layers of drywall with polyethylene sheet sandwiched in between.

Condition:

- Concrete wall was dry and in good condition.
- Steel stud was in good condition, no sign of corrosion.
- Batt insulation was clean and dry.
- Drywall was clean and dry.

Exploratory Opening No. 6

| | | |
|---------------------------------|-------------------------------|------------------------|
| Location | Amenity room | Elevation: West |
| Detail Addressed | Below window | |
| Reason location selected | Susceptible, Assembly | |
| Condition | Dry, but evidence of moisture | |



Overview



Close-up

Observations:

- Planter
- Concrete back wall
- 4" steel stud filled with batt insulation
- 2 layers of drywall with polyethylene sheet sandwiched in between.

Condition:

- Concrete wall was dry and in good condition.
- Steel stud was in good condition, no sign of corrosion.
- Insulation was clean and dry.
- Evidence of fungal growth on the backside of the outer layer of drywall.
- Staining on the inner layer of drywall.

APPENDIX C: Photographs

SEASTAR LMS 2946



Photo 01 Southwest Elevation - Pacific Street



Photo 02 Northwest Elevation - Lowrise Building



Photo 03 Southeast Elevation - Burrad Street



Photo 04 Northeast Elevation - Lane

SEASTAR LMS 2946



Photo 05 Minor crack and spalling of the masonry panel observed at 2005.



Photo 06 Efflorescence at the door and brick transition. Shortened gasket in the spandrel



Photo 07 Typical punched window assembly in pre-fabricated panel



Photo 08 Efflorescence on the exterior stairwell

SEASTAR LMS 2946



Photo 09 Open joint between concrete wall and masonry



Photo 10 Crack repair at the window in penthouse



Photo 11 Crack repair on stucco at the skylight wall

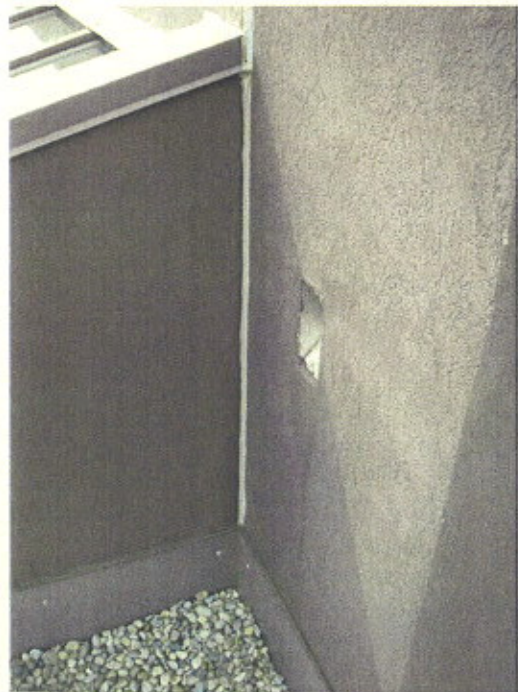


Photo 12 Caulking applied at corner of the wall on the roof

SEASTAR LMS 2946



Photo 13 Erosion and flaking paint on concrete on the roof



Photo 14 Erosion of the paint on concrete and inadequate saddle detail



Photo 15 Crack on the exposed concrete above the window

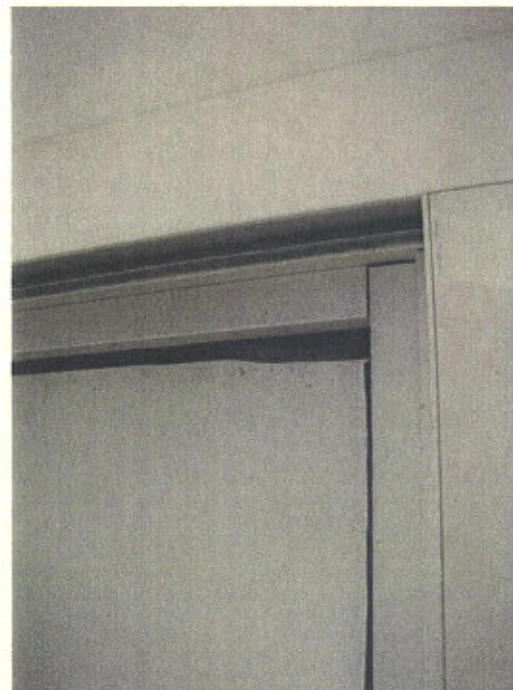


Photo 16 Loose gasket in the spandrel panel

SEASTAR LMS 2946



Photo 17 Eroded paint on concrete parapet



Photo 18 Modified hood over the exhaust vent



Photo 19 Evidence of water ingress at door sill in unit 2005



Photo 20 Inadequate gasket at the door

SEASTAR LMS 2946



Photo 21 Added head flashing above the swing door in unit 2005



Photo 22 Typical window wall assembly at enclosed balcony

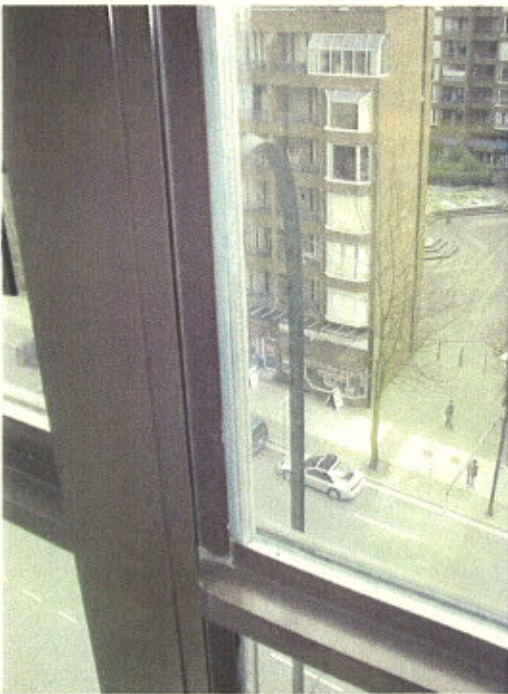


Photo 23 Exterior glazing gasket detached from the window in unit 1008



Photo 24 Displaced aluminum spacer in unit 1008

SEASTAR LMS 2946



Photo 25 Unobstructed weep holes in the condensation track



Photo 26 Lack of maintenance on roof deck in unit 1905



Photo 27 Crack and efflorescence at the parkade entrance



Photo 28 Water stain on the P2 soffit, below entrance ramp

SEASTAR LMS 2946



Photo 29 Water stain on the soffit in the emergency generator room



Photo 30 Water stain on the mechanical duct in the emergency generator room



Photo 31 Crack and efflorescence on the soffit in the bike storage room

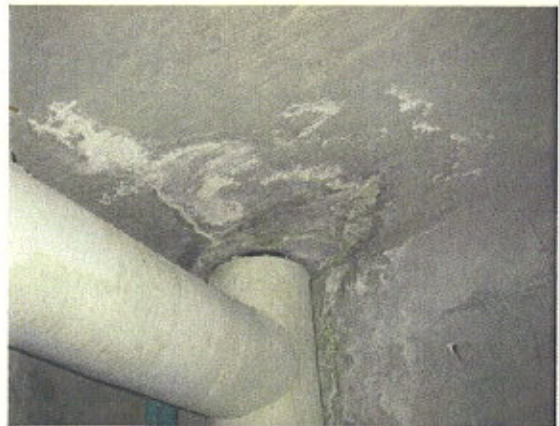


Photo 32 Efflorescence around the drain in the bike storage room

SEASTAR LMS 2946



Photo 33 Exposed membrane in the planter



Photo 34 Water ingress at the Telus cable box in the bike storage room



Photo 35 Water stain on the floor in the bike storage room



Photo 36 Cracking and efflorescence in the staircase

SEASTAR LMS 2946



Photo 37 Dark staining on the soffit in the staircase



Photo 38 Peeling of the paint at the base of the wall, adjacent to the staircase



Photo 39 Typical crack along the concrete slab cold joint



Photo 40 Dark staining on the wall adjacent to the planter

APPENDIX D: Occupant Questionnaire Survey
Summary Reports

Summary of Comments

| <i>Phase</i> | <i>Unit</i> | <i>Comments</i> | <i>Mildew</i> | <i>Doors</i> | <i>Windows</i> |
|--------------|-------------|---|-----------------------------------|--------------|--|
| | 1002 | | | | Condensation Living Room, Den, Solarium |
| | 1007 | | | | Condensation - Living Room, Screws Rusting East side Living Room |
| | 1008 | Lining around Solarium window is slowly falling off. | | | Deteriorated Exterior Finishes windows in Solarium, Condensation Solarium/LR |
| | 1106 | | | | Condensation at Living Room when doing Laundry/dishwasher |
| | 1203 | | | | Condensation in Master Bedroom |
| | 1207 | Some cracks at ceiling. Some bubbling at this level. | | | (e) at Living Room |
| | 1208 | | Halfway Door Black Mildew on wall | | |
| | 1401 | | | | Air Leakage at Master Bedroom |
| | 1406 | Humidifier at Living Room | | | |
| | 1503 | Floor of bike locker has efflorescence. | | | |
| | 1505 | | | | see attached letter to this survey |
| | 1508 | | | | Condensation at Bedroom #1 |
| | 1603 | 1603 balcony (South) missing drain pipe, water runs down side balcony below | | | |



| <i>Phase</i> | <i>Unit</i> | <i>Comments</i> | <i>Mildew</i> | <i>Doors</i> | <i>Windows</i> |
|--------------|-------------|---|--|---|--|
| | 1608 | | | | Rusting Screws at Living Room, Den and Bedroom 1 |
| | 1703 | | | | Condensation at Master Bedroom |
| | 1707 | Fireplace switch is leaking air. Switch is located by the window. | | | Air Leakage, Wind noises at Living Room |
| | 1708 | | | | Condensation at Master Bedroom |
| | 2001 | | | Air Leaks at LR. Big gap btwn Ste. bottom door and flr. | |
| | 2005 | Clipping of paint on one deck and kitchen window. Brown paint is chipped off would like | | Condensatio/Difficulties - Other | |
| | 2101 | | Mildew on Floor - Other | Operating Difficulties/Misalignment- other locations | Condensation in Kitchen |
| | 301 | | | | Condensation @ Solarium |
| | 306 | couple of cracks in ceiling. Living Room and Bedroom. Landlord is aware. | | | |
| | 402 | | | | Dificulty using in Den |
| | 507 | Air vents in units cold and dusty causing filth to build up on walls and ceilings | | | Condensation/Wind Noises in Living Room area |
| | 701 | | Mildew on floors in Living Room/Master bedroom | | Condensation in Living Room area |
| | 703 | | | | Water stains- Solarium/Condensation- Living Room |
| | 705 | | Mildew-Main Bathroom | | Air Leaks - Living Room/Den, (H) Living Room/Den, Master Bedroom |



| <i>Phase Unit</i> | <i>Comments</i> | <i>Mildew</i> | <i>Doors</i> | <i>Windows</i> |
|-------------------|------------------------|---------------|--------------|--|
| 706 | | | | Condensation-Living Room |
| 806 | Humidifier-Living Room | | | |
| 808 | | | | Living Room window latch breaks often, Condensation in Living Room |



Detailed Balcony Report

| Phase Unit | Exposure | Pooling | Coating Problems | Ceiling Stains | Wall Stains | Comments |
|------------|----------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|---|
| 1002 | S, SE | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1003 | W | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4 small rust stains each as big as a nickle |
| 1007 | N | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1008 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1101 | SE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1102 | S | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 1103 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Spotted stains-appear to be rust coloured-oth |
| 1106 | NW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1201 | SE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1203 | S | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 1205 | NW, S | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1206 | N | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1207 | N | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1208 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1401 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1406 | NW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1407 | N | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1501 | E | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1503 | SW | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1505 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1508 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1603 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1606 | NW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1607 | N | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1608 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1703 | S | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Stains on Floor |
| 1707 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1708 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2001 | NW, S | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Stains are from rails |
| 2005 | W | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 2101 | E | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 301 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 305 | NW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 306 | NW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 401 | SE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 402 | SE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 403 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |



| <i>Phase Unit</i> | <i>Exposure</i> | <i>Pooling</i> | <i>Coating Problems</i> | <i>Ceiling Stains</i> | <i>Wall Stains</i> | <i>Comments</i> |
|-------------------|-----------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|-----------------|
| 502 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 503 | W | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 505 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 506 | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 507 | N | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 603 | W | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 606 | NW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 607 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 701 | E | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 703 | SW | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 705 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 706 | NW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 707 | N | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 801 | SE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 805 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 806 | NW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 808 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 902 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 903 | SW | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 908 | NE | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |



Leakage by Location

Location of Reported Water Leakage:

| <i>Phase Unit</i> | <i>Expo</i> | <i>Walls</i> | <i>Ceilings</i> | <i>Floors</i> | <i>Windows</i> | <i>Sloped Windows</i> | <i>Doors</i> |
|-------------------|-------------|--------------|-----------------|---------------|----------------|-----------------------|--------------|
| 1002 | S, SE | 0 | 0 | 0 | 0 | 0 | 0 |
| 1003 | W | 0 | 0 | 0 | 0 | 0 | 0 |
| 1007 | N | 0 | 0 | 0 | 0 | 0 | 0 |
| 1008 | NE | 0 | 0 | 0 | 0 | 0 | 0 |
| 1101 | SE | 0 | 0 | 0 | 0 | 0 | 0 |
| 1102 | S | 0 | 0 | 0 | 0 | 0 | 0 |
| 1103 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 1106 | NW | 0 | 3 | 0 | 0 | 0 | 0 |
| 1201 | SE | 0 | 0 | 0 | 0 | 0 | 0 |
| 1203 | S | 0 | 0 | 0 | 0 | 0 | 0 |
| 1205 | NW, S | 0 | 1 | 0 | 0 | 0 | 0 |
| 1206 | N | 0 | 0 | 0 | 0 | 0 | 0 |
| 1207 | N | 0 | 0 | 0 | 0 | 0 | 0 |
| 1208 | NE | 0 | 0 | 0 | 0 | 0 | 0 |
| 1401 | NE | 0 | 1 | 0 | 0 | 0 | 0 |
| 1406 | NW | 0 | 0 | 0 | 0 | 0 | 0 |
| 1407 | N | 0 | 0 | 0 | 0 | 0 | 0 |
| 1501 | E | 0 | 0 | 0 | 0 | 0 | 0 |
| 1503 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 1505 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 1508 | NE | 0 | 0 | 0 | 0 | 0 | 0 |
| 1603 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 1606 | NW | 0 | 0 | 0 | 0 | 0 | 0 |
| 1607 | N | 0 | 0 | 0 | 0 | 0 | 0 |
| 1608 | NE | 0 | 0 | 0 | 0 | 0 | 0 |
| 1703 | S | 0 | 0 | 0 | 0 | 0 | 0 |
| 1707 | NE | 0 | 0 | 0 | 0 | 0 | 0 |



Location of Reported Water Leakage:

| <i>Phase Unit</i> | <i>Expo</i> | <i>Walls</i> | <i>Ceilings</i> | <i>Floors</i> | <i>Windows</i> | <i>Sloped Windows</i> | <i>Doors</i> |
|-------------------|-------------|--------------|-----------------|---------------|----------------|-----------------------|--------------|
| 1708 | NE | 0 | 0 | 0 | 0 | 0 | 0 |
| 2001 | NW, S | 0 | 0 | 0 | 0 | 0 | 0 |
| 2005 | W | 1 | 0 | 0 | 0 | 0 | 1 |
| 2101 | E | 0 | 0 | 0 | 0 | 0 | 1 |
| 301 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 305 | NW | 0 | 0 | 0 | 0 | 0 | 0 |
| 306 | NW | 0 | 0 | 0 | 0 | 0 | 0 |
| 401 | SE | 0 | 0 | 0 | 0 | 0 | 0 |
| 402 | SE | 0 | 0 | 0 | 0 | 0 | 0 |
| 403 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 502 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 503 | W | 0 | 0 | 0 | 0 | 0 | 0 |
| 505 | SW | 0 | 1 | 0 | 0 | 0 | 0 |
| 506 | | 0 | 0 | 0 | 0 | 0 | 0 |
| 507 | N | 0 | 0 | 0 | 0 | 0 | 0 |
| 603 | W | 0 | 0 | 0 | 0 | 0 | 0 |
| 606 | NW | 0 | 0 | 0 | 0 | 0 | 0 |
| 607 | NE | 0 | 0 | 0 | 0 | 0 | 0 |
| 701 | E | 0 | 0 | 0 | 0 | 0 | 0 |
| 703 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 705 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 706 | NW | 0 | 0 | 0 | 0 | 0 | 0 |
| 707 | N | 0 | 0 | 0 | 0 | 0 | 0 |
| 801 | SE | 0 | 0 | 0 | 0 | 0 | 0 |
| 805 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 806 | NW | 0 | 0 | 0 | 0 | 0 | 0 |
| 808 | NE | 0 | 0 | 0 | 0 | 0 | 0 |
| 902 | SW | 0 | 0 | 0 | 0 | 0 | 0 |
| 903 | SW | 0 | 0 | 0 | 0 | 0 | 0 |



Location of Reported Water Leakage:

| <i>Phase Unit</i> | <i>Expo</i> | <i>Walls</i> | <i>Ceilings</i> | <i>Floors</i> | <i>Windows</i> | <i>Sloped Windows</i> | <i>Doors</i> | |
|-----------------------|-------------|--------------|-----------------|---------------|----------------|-----------------------|--------------|--------|
| 908 | NE | 0 | 0 | 0 | 0 | 0 | 0 | |
| Subtotal: | | 1 | 6 | 0 | 0 | 0 | 2 | = 9 |
| % By Location: | | 11.11% | 66.67% | 0.00% | 0.00% | 0.00% | 22.22% | = 100% |

Total Number of Responses: 57

Total Number of Units: 105

Total Occurances of Water Leakage: 9

10.53% of All Survey Responses Reported At Least One Instance of Water Leakage



Parkade Summary

| Phase | Unit | Parking Drips: | Efflorescence | Broken Concrete |
|-------|------|----------------|---------------|-----------------|
| | 1002 | | | |
| | 1003 | | | ✓ |
| | 1007 | | | |
| | 1008 | | | |
| | 1101 | | | |
| | 1102 | | | |
| | 1103 | | | |
| | 1106 | | | |
| | 1201 | | | |
| | 1203 | | | |
| | 1205 | | | |
| | 1206 | | | |
| | 1207 | | | |
| | 1208 | | | |
| | 1401 | | | |
| | 1406 | Ceiling | | ✓ |
| | 1407 | | | |
| | 1501 | | | |
| | 1503 | | | |
| | 1505 | | | |
| | 1508 | | | |
| | 1603 | | | |
| | 1606 | | | |
| | 1607 | | | |
| | 1608 | | | |
| | 1703 | | | |
| | 1707 | | | |
| | 1708 | Ceiling | ✓ | ✓ |
| | 2001 | | | |
| | 2005 | | | ✓ |
| | 2101 | | | |
| | 301 | | | |
| | 305 | | | |
| | 306 | | | |



| <i>Phase</i> | <i>Unit</i> | <i>Parking_Drips:</i> | <i>Efflorescence</i> | <i>Broken Concrete</i> |
|--------------|-------------|-----------------------|----------------------|------------------------|
| | 401 | | | |
| | 402 | | | |
| | 403 | | | |
| | 502 | | | |
| | 503 | | | |
| | 505 | | | |
| | 506 | | | |
| | 507 | | | |
| | 603 | | | |
| | 606 | | | |
| | 607 | | | |
| | 701 | | | |
| | 703 | | | |
| | 705 | | | |
| | 706 | | | |
| | 707 | | | |
| | 801 | | | |
| | 805 | | | |
| | 806 | | | |
| | 808 | | | |
| | 902 | | | |
| | 903 | | | |
| | 908 | | | |

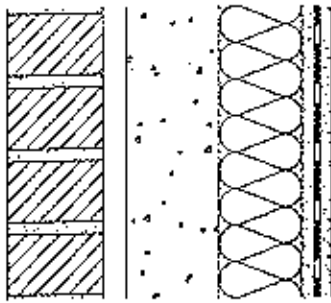


APPENDIX E:
RDH Maintenance Manual Reference Pages

| | |
|---|---|
| <p>Stucco – Interior Insulation Wall Assembly</p> <p>Location of Assembly Includes: Penthouses, Feature Strips, Balconies.</p> | |
| | <p>Assembly Components</p> <p>22mm STUCCO SHEATHING PAPER 12mm EXTERIOR SHEATHING (DENS GLASS GOLD) 89mm STEEL STUD SPACE AND BATT INSULATION 12mm AQUABOARD 6 MIL POLYETHYLENE 12mm INTERIOR GYPSUM BOARD</p> |
| <p>Description of Assembly</p> <p>The assembly relies on the exterior stucco to deflect the water away from the wall assembly. The sheathing paper will restrict very minor amounts of water from entering the wall assembly and can be considered as the moisture barrier. Moisture located beyond the exterior face of the stucco can migrate down and out at the base of the wall assembly. The polyethylene acts as both the air and vapour barrier, supported on each side by the Aquaboard and interior gypsum board. The three coat stucco is supported by lath and secured to the exterior sheathing and supporting steel studs or concrete back-up.</p> | |
| <p>Maintenance of Key Elements</p> | |
| <p>Stucco Cladding</p> <p>Stucco cladding can be expected to have a lifespan of 20 years if maintained. Cleaning of the coating is recommended to minimize the staining and vegetation growth. Between 5 and 10 years, the acrylic finish coat will likely require recoating with an acrylic finishcoat or paint. It can be expected that the stucco will crack to a limited extent. Shrinkage cracks are normal, however areas of significant cracking of the stucco should be corrected to minimize any potential freeze thaw damage and water ingress past the cladding. If efflorescence, or uneven staining is present, the cause should be determined and corrected immediately.</p> | |
| <p>Sealants</p> <p>The exterior sealants provide continuity of the exterior water shedding surface at the joints in the cladding and are required to accommodate the majority of the associated movement. Continuity of these seals is essential to maximize the life expectancy of the assembly, and will likely require ongoing maintenance. Maintenance of the sealants include regular inspections for discontinuities including cracking or debonding, and repair as required.</p> | |
| <p>Steel Studs</p> <p>Galvanized steel studs support the stucco cladding and should not require maintenance during the life of the cladding. If significant moisture enters the cavity, it will promote premature corrosion of the zinc galvanizing, and eventually the steel, possibly resulting in rust staining below. Maintaining continuity of the exterior seals is essential to ensure that the wall assembly meets its expected life. If rust staining below is noted during inspections, water penetration should be corrected immediately.</p> | |
| <p>Polyethylene Sheet</p> <p>The assembly relies on a polyethylene sheet to control water vapour migration to the stud cavity space. The polyethylene is located on the interior side of the batt insulation to restrict any significant warm interior moisture from diffusing to the cooler concrete. It is unlikely that the polyethylene will require any maintenance during the life of the wall assembly. However if discontinuities are identified through moisture deposition, these areas should be corrected.</p> | |
| <p>Sheathing Paper</p> <p>If small amounts of moisture are able to migrate behind the exterior face of the stucco, the sheathing paper will restrict its entry into the building. It is unlikely that the membrane will require any maintenance during the life of the cladding. However if discontinuities are identified through water leakage activity or moisture deposition due to air leakage, these areas should be corrected.</p> | |

Brick Veneer – Rainscreen Interior Insulation Wall Assembly

Location of Assembly Includes: Lower levels ground to 6.



Assembly Components

- BRICK VENEER
- 25mm DRAINAGE CAVITY
- 150mm CONCRETE WALL
- 89mm STEEL STUD SPACE AND BATT INSULATION
- 12mm AQUABOARD
- 6 MIL POLYETHYLENE
- 12mm INTERIOR GYPSUM BOARD

Description of Assembly

The assembly utilizes the concrete wall as the moisture barrier, with the polyethylene sandwiched between the Aquaboard and interior gypsum as both the air and vapour barriers. The drainage cavity, located immediately behind the brick, allows any incidental moisture from the exterior to drain down to the flashings below, through the weep holes and back to the exterior. The brick veneer is connected to the concrete wall with stainless steel connectors.

Maintenance of Key Elements

Brick Veneer

Brick Veneer can be expected to have a lifespan of up to 50 years if maintained. Problems are typically moisture related and may include: efflorescence, spalling, deteriorated mortar joints, vegetation growth and interior moisture damage. Cracking may also become evident and is usually associated with differential movement of the veneer. Cleaning of the brick is recommended to remove efflorescence, vegetation growth or staining. Some efflorescence are not water soluble, and the manufacturer or consultant should be contacted with respect to cleaning solutions. In all cases, cleaning solutions should be washed from the masonry upon completion of work. It can be expected that the mortar joints will crack or deteriorate, and repointing will likely be required every 10 to 20 years. Cracked mortar joints and moisture within the bricks will accelerate freeze thaw damage and increase future maintenance requirements.

Sealants

The exterior sealants provide continuity of the exterior water shedding surface at the joints in the cladding and are required to accommodate the majority of the associated movement. Continuity of these seals is essential to maximize the life expectancy of the assembly, and will likely require ongoing maintenance. Maintenance of the sealants include regular inspections for discontinuities including cracking or debonding, and repair as required.

Structural Supports

The concrete curbs, shelf angles, and masonry connectors provide structural support for the brick veneer. The shelf angles also act as the cross cavity flashings to redirect water from the drainage cavity to the exterior. In order for the water to effectively drain, the weep holes in the masonry should be cleaned out at regular intervals. If significant moisture enters the cavity, it will promote premature corrosion of both the shelf angles and connectors, possibly resulting in rust staining below. Ensuring the exterior seals are continuous and minimizing water within the cavity can therefore prolong the life of the assembly.

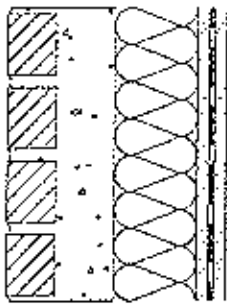
Polyethylene Sheet

The assembly relies on a polyethylene sheet to control interior moisture migration to the stud cavity space and also acts as the air barrier, restricting air movement through the wall assembly. The polyethylene is located on the interior side of the batt insulation to restrict any significant warm interior moisture from migrating to the cooler concrete by either air leakage or diffusion. It is unlikely that the polyethylene will require any maintenance during the life of the wall assembly. However if discontinuities are identified through moisture deposition, these areas should be corrected.

| | |
|---|---|
| <p>Exposed Concrete - Interior Insulation Wall Assembly</p> <p>Location of Assembly Includes: Lower Levels and Penthouses.</p> | |
| | <p>Assembly Components</p> <p>ACRYLIC FINISHCOAT BASECOAT/PARGING CONCRETE WALL 89mm STEEL STUD SPACE AND BATT INSULATION 12mm AQUABOARD 6 MIL POLYETHYLENE 12mm INTERIOR GYPSUM BOARD</p> |
| <p>Description of Assembly</p> <p>The assembly relies on a combination of the exterior finish of the concrete to deflect the water away from the building with a small capacity of the concrete to absorb moisture until a later time at which it can evaporate. The concrete is considered to be the water barrier. The polyethylene sheet, supported by both the Aquaboard and interior gypsum, acts as both the air and vapour barriers by restricting air movement and moisture from migrating past this plane. The polyethylene is continuously sealed around the perimeter and at penetrations.</p> | |
| <p>Maintenance of Key Elements</p> | |
| <p>Exposed Concrete</p> <p>Concrete wall can be expected to have a lifespan up to of 50 years if maintained. Problems are typically moisture related and may include: cracking, spalling, vegetation growth, efflorescence and interior moisture damage. Cleaning of the concrete is recommended to remove vegetation growth, staining or efflorescence. The acrylic coating is relied on to deflect the exterior moisture away from the concrete substrate, and will require recoating in 8 to 15 years. Although the concrete used at these walls is resistant to freeze thaw damage, maintenance of the exterior coating will greatly increase its life by both minimizing freeze thaw and carbonation related deterioration of the concrete. Once cracks or delaminations become evident, they should be repaired and recoated to maintain the performance of the wall assembly.</p> | |
| <p>Sealants</p> <p>The exterior sealants provide continuity of the exterior water shedding surface at the joints in the cladding and are required to accommodate the majority of the associated movement. Continuity of these seals is essential to maximize the life expectancy of the assembly, and will likely require ongoing maintenance. Maintenance of the sealants include regular inspections for discontinuities including cracking or debonding, and repair as required.</p> | |
| <p>Structural Supports</p> <p>The concrete wall provides structural support for not only the building envelope, but also is a part of the main structure. It is therefore essential that deterioration of the concrete be repaired to ensure the building meets its expected life.</p> | |
| <p>Polyethylene Sheet</p> <p>The assembly relies on a polyethylene sheet to control interior moisture migration to the stud cavity space and also acts as the air barrier, restricting air movement through the wall assembly. The polyethylene is located on the interior side of the batt insulation to restrict any significant warm interior moisture from migrating to the cooler concrete by either air leakage or diffusion. It is unlikely that the polyethylene will require any maintenance during the life of the wall assembly. However if discontinuities are identified through moisture deposition, these areas should be corrected.</p> | |

Prefabricated Masonry Panel - Interior Insulation Wall Assembly

Location of Assembly Includes: Masonry panels on tower.



Assembly Components

- BRICK / CONCRETE WITH CAST IN STEEL STUDS
- STEEL STUD SPACE AND BATT INSULATION
- 12mm AQUABOARD
- 6 MIL POLYETHYLENE
- 12mm INTERIOR GYPSUM BOARD

Description of Assembly

The assembly relies on a combination of the exterior finish of the brick/concrete panel to deflect the water away from the building with a small capacity of the brick/concrete to absorb moisture until a later time at which it can evaporate. The brick/concrete is considered to be the water barrier. The base of the panel is allowed to drain in the event of any incidental moisture within the stud space. The polyethylene sheet, supported by both the Aquaboard and interior gypsum, acts as both the air and vapour barriers by restricting air movement and moisture from migrating past this plane. The polyethylene is continuously sealed around the perimeter and at penetrations.

Maintenance of Key Elements

Precast Brick / Concrete Panel

Brick/concrete panel can be expected to have a lifespan up to 25 years if maintained. Problems are typically moisture related and may include: cracking, spalling, vegetation growth, efflorescence and interior moisture damage. Cleaning of the exterior finish is recommended to remove vegetation growth, staining or efflorescence. Cracking may occur around the bricks in the panels which will require sealing. Although the concrete used in these panels is resistant to freeze thaw damage, a sealer should be used to minimize both freeze thaw deterioration and moisture from remaining in these cracks. Once significant cracks or delaminations become evident, they should be repaired to maintain the performance of the wall assembly.

Sealants

The exterior sealants provide continuity of the exterior water shedding surface at the joints in the cladding and are required to accommodate the majority of the associated movement. Continuity of these seals is essential to maximize the life expectancy of the assembly, and will likely require ongoing maintenance. The panels incorporate both inner and outer sealant joints (two stage) so that any moisture that migrates behind the exterior sealant will be redirected to the exterior by the interior joint. It is therefore essential that the weep holes at the bottom of the panel joints remain free of obstructions. Maintenance of the sealants include regular inspections for discontinuities including cracking or debonding, and repair as required.

Structural Supports

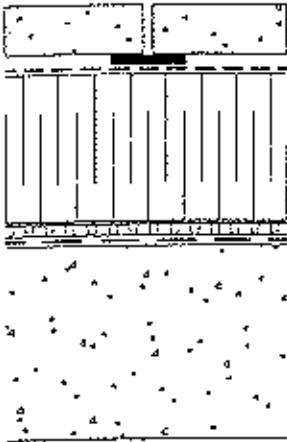
The prefabricated panels rely on the steel studs cast into the concrete and steel anchors for structural support. The galvanized steel studs or anchors should not require maintenance during the life of the cladding. If significant moisture enters the cavity, it will promote premature corrosion of the steel and connections, possibly resulting in rust staining below. Maintaining continuity of the exterior seals is essential to ensure that the wall assembly meets its expected life. If rust staining below is noted during inspections, any water penetration should be corrected immediately.

Polyethylene Sheet

The assembly relies on a polyethylene sheet to control interior moisture migration to the stud cavity space and also acts as the air barrier, restricting air movement through the wall assembly. The polyethylene is located on the interior side of the batt insulation to restrict any significant warm interior moisture from migrating to the cooler concrete by either air leakage or diffusion. It is unlikely that the polyethylene will require any maintenance during the life of the wall assembly. However if discontinuities are identified through moisture deposition, these areas should be corrected.

| Prefabricated Concrete Panel - Interior Insulation Wall Assembly | |
|--|--|
| Location of Assembly Includes: Penthouses, Feature Strips | |
| | <p>Assembly Components</p> <p>CONCRETE WITH CAST IN STEEL STUDS STEEL STUD SPACE AND BATT INSULATION 12mm AQUABOARD 6 MIL POLYETHYLENE 12mm INTERIOR GYPSUM BOARD</p> |
| Description of Assembly | |
| <p>The assembly relies on a combination of the exterior finish of the concrete panel to deflect the water away from the building with a small capacity of the concrete to absorb moisture until a later time at which it can evaporate. The concrete is considered to be the water barrier. The base of the panel is allowed to drain in the event of any incidental moisture within the stud space. The polyethylene sheet, supported by both the Aquaboard and interior gypsum, acts as both the air and vapour barriers by restricting air movement and moisture from migrating past this plane. The polyethylene is continuously sealed around the perimeter and at penetrations.</p> | |
| Maintenance of Key Elements | |
| Precast Concrete Panel | |
| <p>Concrete panels can be expected to have a lifespan up to 25 years if maintained. Problems are typically moisture related and may include: cracking, spalling, vegetation growth, efflorescence and interior moisture damage. Cleaning of the exterior finish is recommended to remove vegetation growth, staining or efflorescence. Minor cracks may occur in the panels over the life of the building. Although the concrete used in these panels is resistant to freeze thaw damage, a sealer should be used to minimize both freeze thaw deterioration and moisture from remaining in these cracks. Once significant cracks or delaminations become evident, they should be repaired to maintain the performance of the wall assembly.</p> | |
| Sealants | |
| <p>The exterior sealants provide continuity of the exterior water shedding surface at the joints in the cladding and are required to accommodate the majority of the associated movement. Continuity of these seals is essential to maximize the life expectancy of the assembly, and will likely require ongoing maintenance. The panels incorporate both inner and outer sealant joints (two stage) so that any moisture that migrates behind the exterior sealant will be redirected to the exterior by the interior joint. It is therefore essential that the weep holes at the bottom of the panel joints remain free of obstructions. Maintenance of the sealants include regular inspections for discontinuities including cracking or debonding, and repair as required.</p> | |
| Structural Supports | |
| <p>The prefabricated panels rely on the steel studs cast into the concrete and steel anchors for structural support. The galvanized steel studs or anchors should not require maintenance during the life of the cladding. If significant moisture enters the cavity, it will promote premature corrosion of the steel and connections, possibly resulting in rust staining below. Maintaining continuity of the exterior seals is essential to ensure that the wall assembly meets its expected life. If rust staining below is noted during inspections, any water penetration should be corrected immediately.</p> | |
| Polyethylene Sheet | |
| <p>The assembly relies on a polyethylene sheet to control interior moisture migration to the stud cavity space and also acts as the air barrier, restricting air movement through the wall assembly. The polyethylene is located on the interior side of the batt insulation to restrict any significant warm interior moisture from migrating to the cooler concrete by either air leakage or diffusion. It is unlikely that the polyethylene will require any maintenance during the life of the wall assembly. However if discontinuities are identified through moisture deposition, these areas should be corrected.</p> | |

| Residential Glazing Assemblies | |
|--|---|
| Location of Assembly Includes: Residential Glazing on the tower. | |
| | <p>Assembly Components</p> <ul style="list-style-type: none"> THERMALLY BROKEN ALUMINUM FRAME SEALED GLAZING UNIT POLYSHIM II GLAZING TAPE EXTRUDED ALUMINUM GLAZING STOP EPDM GASKET |
| Description of Assembly | |
| <p>Aluminum residential window assemblies can be expected to last 25 years if maintained. The window assembly deflects the majority of the water at the exterior plane. Some incidental water is expected to migrate into the glazing cavity behind the glazing stop. The moisture, air and vapour barriers are all shown by the heavy dark line above is comprised of the sealed glass unit, shimmed glazing tape and sealed aluminum frame. Water within the glazing cavity is restricted from migrating to the interior by the moisture barrier and is redirected back to the exterior.</p> | |
| Maintenance of Key Elements | |
| Sealed Glazing Units | |
| <p>Sealed glazing units are expected to last 15 to 25 years. The sealed glazing units are comprised of two panes of glass, a spacer shim, desiccant, and continuous perimeter seal. Replacement of the sealed units will likely be required to replace broken glass, or condensation between the panes of glass due to a failed seal. These units should be replaced when problems detected. Maintenance to ensure the sealed units reach their expected lifespan include: maintaining interior relative humidities to acceptable levels, cleaning of weepholes to allow drainage of glazing cavity, and regular inspection of exterior EPDM gasket for continuity and positive seal.</p> | |
| Shimmed Glazing Tape | |
| <p>The interior perimeter of the glass is sealed to the aluminum frame with shimmed glazing tape. Over time, it can be expected that the glazing tape will be forced out due to the movement of the glass. If the tape is found to be discontinuous or the aluminum frame is touching the glass, the glazing tape should be replaced.</p> | |
| Operable Vent Units | |
| <p>The constant use of the operable vent units will result in the requirement for regular maintenance. The hardware, including the cam handles, and hinges may show signs of deterioration as a result of this use. The operable vent restricters are in place to limit the opening size of the vents as part of safety requirements. The seals around the operable vent are typically gaskets, and may deteriorate over time due to age and use. Maintenance of the operable vents should include inspection of all seals, cleaning of debris from the vent adapters and weep holes, inspection of the vent restricters, hardware, and all seals.</p> | |
| Sealant | |
| <p>The exterior sealants provide continuity of the exterior water shedding surface at the joints in the cladding and are required to accommodate the majority of the associated movement. Interior sealant around the perimeter of the window unit provides continuity of the water, air, and vapour barriers to the window frame. Continuity of these seals is essential to maximize the life expectancy of the assemblies, and will likely require ongoing maintenance. Maintenance of the sealants include regular inspections for discontinuities including cracking or debonding, and repair as required.</p> <p>Mitre joint sealant is used to seal the horizontal and vertical frame members and is an integral part of the moisture barrier in the assembly, particularly at the bottom corners. The sealant is expected to perform for 10 to 15 years, provided exterior gaskets and sealants are maintained. Maintenance should include inspection of 10% of these seals every 5 years to confirm their continuity. If greater than 5% of failures are observed during the review, all joints should be inspected and corrected.</p> | |

| | |
|---|---|
| <p>Inverted Roof Assemblies</p> <p>Location of Assembly includes: Main Roof Assemblies</p> | |
|  | <p>Assembly Components</p> <p>CONCRETE PAVERS OR GRAVEL BALLAST PEDESTALS FILTER FABRIC EXTRUDED POLYSTYRENE INSULATION DRAINAGE COMPOSITE HYDROTECH MODIFIED ASPHALT REINFORCED MEMBRANE CONCRETE SUBSTRATE</p> |
| <p>Description of Assembly</p> <p>The inverted roof assemblies are expected to last 15 to 25 years if maintained. The assembly anticipates the control of the majority of the exterior moisture control at the waterproof roof membrane system with some amounts of water shed to the drainage system by the ballast and insulation. The roofing membrane acts as the moisture, air and vapour barrier for the assembly. The continually adhered membrane will likely isolate any water leakage that occurs in the result of a failure. The ballast (pavers or gravel) are relied on to protect the roofing system from damage.</p> | |
| <p>Maintenance of Key Elements</p> | |
| <p>Roof Drainage</p> <p>The roof drainage requires that all debris be removed from the assembly at regular intervals so as not to obstruct drainage and result in backflow. This work includes all drains, scuppers, as well as debris on the pavers or gravel ballast including vegetation.</p> | |
| <p>Roof Membrane</p> <p>Since the roof membrane is protected, it is not expected to require much ongoing maintenance. The roof assembly should be regularly inspected for vegetation growth since it can adversely affect the membrane system. It can be expected however that over the life of the roof membrane system, isolated leakage may occur. These areas should be corrected immediately so as to minimize water migration under the membrane which could result in debonding and significantly reducing the expected life of the assembly. At some point in the future, replacement of the roof membrane is expected to be required and should be planned for accordingly.</p> | |
| <p>Ballast - Pavers and Gravel</p> <p>The ballast provides the protections for the roof membrane and insulation below. The ballast should therefore remain continuous over the roof system to ensure this protection.</p> | |
| <p>Sealants</p> <p>The exterior sealants provide continuity of the exterior water shedding surface around the perimeter of the roof assembly. Continuity of these seals is essential to maximize the life expectancy of the assembly, and will likely require ongoing maintenance. Maintenance of the sealants include regular inspections for discontinuities or deterioration including at the reglets, flashing joints, and penetrations, with these areas immediately repaired as required.</p> | |
| <p>Flashings</p> <p>The roof perimeter flashings protect the roof membrane termination locations. Constant washing of the metal flashing will result in degradation of the paint and protective coatings, and eventually corrosion of the flashing. Maintenance should include regular cleaning to remove any chlorides or other debris, and repainting when corrosion becomes evident.</p> | |

APPENDIX F:
Building Envelope Condition Assessment Report
prepared by Morrison Hershfield Ltd.



REPORT

**Building Envelope Condition
Assessment – The Seastar**

OFFICE COPY 5302

1003 Pacific Street
Vancouver, British Columbia

Presented to:

The Owners, Strata Plan LMS 2946

C/o Mr. Jason So, Property Manager
Gateway West Management Corporation
100 – 10851 Shellbridge Way
Vancouver, B.C.
V6X 2W8

TABLE OF CONTENTS

| | <u>Page</u> |
|---|-------------|
| 1. INTRODUCTION | 1 |
| 1.1 Terms of Reference..... | 1 |
| 1.2 Scope of Work..... | 1 |
| 1.3 Limitations..... | 2 |
| 1.4 Documents Reviewed..... | 3 |
| 1.5 Details and History of Building..... | 4 |
| 2. ASSESSMENT METHODS | 5 |
| 2.1 Occupant Questionnaire..... | 5 |
| 2.2 Site Work..... | 5 |
| 2.3 Interior Exploratory Openings..... | 6 |
| 3. ASSESSMENT OF CURRENT CONDITIONS | 7 |
| 3.1 Environmental Conditions..... | 7 |
| 3.2 Building Envelope Condition Survey..... | 7 |
| 3.3 Review of Documentation..... | 8 |
| 3.4 Walls..... | 9 |
| 3.4.1 Pre-Fabricated Panels..... | 9 |
| 3.4.2 Stucco Walls..... | 10 |
| 3.4.3 Cast-in-place Concrete Walls..... | 10 |
| 3.4.4 Exploratory Openings..... | 11 |
| 3.4.5 Exterior Vents..... | 11 |
| 3.5 Interior Visual Review..... | 12 |
| 3.6 Windows, Doors and Skylights..... | 15 |
| 3.6.1 Punched Windows..... | 16 |
| 3.6.2 Window Wall..... | 16 |
| 3.6.3 Skylights..... | 17 |
| 3.6.4 Storefront Glazing..... | 17 |
| 3.7 Roofs, Decks and Balconies..... | 17 |
| 3.7.1 Flat Roof (used for main roof areas) and Roof Decks (over living space)..... | 18 |
| 3.7.2 Balconies (not over living space)..... | 18 |
| 3.8 Parking Garage..... | 19 |

TABLE OF CONTENTS (Cont.)

| | <u>Page</u> |
|---|-------------|
| 4. SUMMARY OF RECOMMENDATIONS | 20 |
| 4.1 Immediate Action (First Priority) | 20 |
| 4.2 Highly Recommended (Second Priority)..... | 20 |
| 4.3 Maintenance Work (Third Priority)..... | 21 |

APPENDIX A: Glossary

APPENDIX B: Exploratory Openings

APPENDIX C: Photographs

APPENDIX D: Drawings

APPENDIX E: Occupant Questionnaire Survey Summary Reports



1. INTRODUCTION

1.1 Terms of Reference

Morrison Hershfield (MH) was retained by the owners of The Seastar (Strata Plan LMS 2946) to undertake a building envelope condition assessment of their building located in Vancouver.

The objective of this assessment is to review the claddings, windows, balconies and roofs and provide an opinion of the current condition of the facility and review maintenance requirements. We will also provide our recommendations with respect to any required remedial work or further investigations.

1.2 Scope of Work

The scope of our services was outlined in our proposal letter to Mr. Jason So of Gateway West Management Corp. dated July 19, 2002. Proposal approval was given by fax from Paul Klann on September 11, 2002.

Tasks outlined in our original proposal are restated below for reference purposes:

Task 1: Review available original design documents to become familiar with the designer's intent with respect to the exterior enclosure of the buildings. This will be useful for us to become familiar with the facility details before we perform site visits. Ideally the documents would include architectural drawings and specifications. We will also require a copy of the Strata's current maintenance manual and/or plan as well as previous records of maintenance procedures.

Task 2: We will issue a customized Occupant Questionnaire Survey form to the Strata Council to copy, distribute, collect and return to us. We would then tabulate the results in a computerized database program we have developed for this purpose. It is most helpful for the assessment if this survey can be completed before we undertake the activities identified in Tasks 3, 4 and 5 below.

Task 3: We will undertake a visual examination of the building cladding elements. The purpose of this examination is to assess the condition of the various components of the building envelope, and identify specific areas where more in-depth survey and exploratory work is warranted. We also would like to conduct a walk-through of five to seven Strata units to observe some typical owner-identified issues and co-ordinate interior conditions to those observed from the outside.

Task 4: Based on the results of the above tasks, we will identify locations where larger exploratory openings may be warranted. Although intrusive to

owners, interior openings in the drywall under windows and at the wall-to-ceiling interface are a cost-effective approach to obtain the necessary information on the condition of the envelope. Approximately 15 to 20 interior openings would be made in the interior drywall in order to assess the condition of the stud framing (corrosion), wall cavity and the exterior gypsum sheathing. The number and location of openings will be determined once we have become familiar with the building.

The openings will be patched temporarily by MH. The Strata will require the assistance of a contractor to permanently close the exploratory openings after our review, which should be done under a separate retainer and fee.

Task 5: We will return to our office with all of the data obtained in the above tasks to determine the nature and condition of the building envelope. We will assess the current state of maintenance in order to identify where deferred maintenance activities may have occurred. We will identify maintenance items which need to be adjusted or added to the existing plan. We will also identify any observed deficiencies and will provide conceptual repair recommendations with preliminary cost estimates, as necessary.

Given the limited nature of this investigation, cost estimates will be preliminary in nature but will provide orders of magnitude and help focus future Strata decision making. These repairs and budgets will be based upon MH's extensive experience in this field over the past few years.

Task 6: We will develop a preliminary implementation plan for any identified repair project priorities. This will allow the Strata to plan and budget for these activities.

Task 7: We will prepare two copies of the final, professionally sealed report. We will also attend a Strata Council meeting to discuss our report and any related issues raised by Council. We would be happy to attend further meetings but these would be considered outside of the scope of this proposal.

1.3 Limitations

This assessment is based on a review of available documents, visual review, interior exploratory openings and sealant cut tests taken at a sample of building envelope elements. It is a basic assumption that any correspondence, material, data, evaluations and reports furnished by others are free of latent deficiencies or inaccuracies except for apparent variances discovered during the completion of this report.

The test openings were done at a sample of typical building details to confirm the construction. They do not represent a total listing of all locations with deficiencies nor do they imply all similar locations or items to be deficient.

This report documents the current condition of elements of the building envelope and may identify factors or mechanisms that lead to the current condition. The report is not intended to provide an opinion regarding responsibility of any party in causing or contributing to the found condition.

Any comments or conclusions within this report represent our opinion, which is based upon the documents provided to us, our field review of physical conditions, specifically identified testing and our past experience.

In issuing this report, MH does not assume any of the duties or liabilities of the designers, builders or owners of the subject property. Owners, prospective purchasers, tenants or others who use or rely on the contents of this report, do so with the understanding as to the limitations of the documents reviewed, the general visual inspection undertaken and understand that MH cannot be held liable for damages which may be suffered with respect to the purchase, ownership, or use of the subject property.

1.4 Documents Reviewed

MH was provided with, and reviewed the following documents to assist in our assessment of the condition of the building envelope systems:

| Document Description | Prepared By | Date |
|---|---|------------------|
| Architectural drawings A0.1 to A10.3 and details A51.01 to A55.01 | Davidson Yuen Simpson Architects (DYSA) | May 22, 1996 |
| Project Specifications | Davidson Yuen Simpson Architects | April 22, 1996 |
| Pre-cast Panel Shop Drawings | Panorama Building Systems | March 1997 |
| Construction trade warranty and maintenance manual | Bosa Construction | November 7, 1997 |
| Building Envelope Maintenance and Renewals Manual | RDH Building Engineering Ltd. (RDH) | January 15, 1999 |
| Annual Building Envelope Report | Allstar Holdings | n/a |

Levelton Engineering Ltd. (Levelton) was the original building envelope consultant. Mr. Marcus Dell, P.Eng., formerly of Levelton and now of RDH Building

Engineering Ltd. (RDH), was contacted by telephone to discuss the as-built construction of the building envelope system. Shop drawings of the window wall cladding were not received for review.

1.5 Details and History of Building

The Seastar is a five-year-old (completed in 1997 by Greystone Properties Ltd.) 21-storey high-rise building that has 105 residential units. The complex includes a four level below grade concrete parking garage. The following table provides general information about the buildings. Refer to Photos 1 to 4 for general views of the buildings.

| | |
|---|--|
| Building Address/Name | 1003 Pacific Street – The Seastar |
| Owner | Strata Plan LMS 2946 |
| Property Manager | Jason So, Gateway West Management Corp. |
| Building Type | High-rise |
| Type of Construction | Non-combustible, concrete framed construction. Exterior cladding primarily pre-fabricated panels and window wall. |
| Occupancy | Residential Strata |
| Date of Construction | Substantial completion on November 7, 1997. |
| Applicable Building Code | Vancouver Building By-Law No. 6134 as amended to the date of permit. |
| Sprinklered | Yes |
| Number of Suites | 105 residential units |
| Number of Storeys | Twenty-one. |
| Parking | 4-level reinforced concrete below grade |
| Adjoining Properties/ Exposure Condition | North east elevation – laneway at rear of building North west elevation – lowrise building South west elevation – Pacific Street facing English Bay South east elevation – Burrard Street |

2. ASSESSMENT METHODS

MH's assessment approach can be considered as a series of steps, which focus the investigation and sample areas addressed.

The initial steps are a review of drawings, the occupant questionnaire survey and a visual review of a broad sampling of building elements. From this a focused sample of locations of concern is identified for closer review. In each section we provide a concise description of the issue, with comment on cause and our recommendation for further action. We have categorized each recommendation as follows:

| | | |
|-------------------|---------------|---|
| Type: | Investigation | Further investigation is required (this could include further evaluation, testing or destructive openings). |
| | Action | A remedial task has been identified for the Strata to address |
| Priority: | 1 | Immediate -- required because of codes, life safety issues, high liability or damage occurring |
| | 2 | Recommended by MH – good practice, to reduce risk of future damage |
| | 3 | Owner discretion is appropriate – low risk, immediate action not required |
| Timeframe: | I | Immediate – High risk of future damage |
| | II | Plan within 2 years -- Risk of future damage |
| | III | Timeframe is flexible – Preventative maintenance |

2.1 Occupant Questionnaire

MH issued a standard Occupant Questionnaire form on October 4, 2002, which was distributed and collected by the Strata. The deficiencies questionnaire was devised to identify the extent and location of the water leakage and building deterioration problems experienced by the occupants.

2.2 Site Work

Site inspections were made on October 8, November 1 and December 4, 2002. During the site visits we carried out an exterior and interior visual review of the building, including walls, roofs, balconies, windows and the parking garage.

We were provided access to the following suites: 401, 501, 602, 803, 905, 1205, 1401, 1406, 1705, 2005 and 2101. Steve Bains, AScT., and David Fookes, P.Eng. both of MH, performed the fieldwork.

The weather at the time of the fieldwork was overcast and cool, with temperatures ranging from 5°C to 12°C. Periods of dry weather preceded each day of fieldwork.

2.3 Interior Exploratory Openings

Exploratory openings consisted of cutting approximately 150 x 150mm sections of the interior gypsum board to view the condition of the wall framing and sheathing.

The interior openings were made in the drywall under windows and at the wall-to-floor interface as a cost-effective approach to obtain the necessary information on the condition of the envelope to assess the condition of the stud framing (corrosion), wall cavity and the exterior sheathing.

Once the opening was made, the insulation was reviewed for staining and, when touched, for moistness indicating previous water ingress into the wall assembly. After the batt insulation was reviewed it was moved aside within the wall assembly so that the steel stud framing and exterior sheathing could be reviewed. After examination, the gypsum board was temporary secured in place.

3. ASSESSMENT OF CURRENT CONDITIONS

3.1 Environmental Conditions

We would classify The Seastar as having a high exposure to wind driven rain because the building is a high-rise structure with walls that are not protected from rainwater by overhangs or adjacent buildings and it is in direct line of sight of a large body of water (English Bay). Refer to drawings in Appendix D for elevations of the building.

Each suite has a cold air supply vent that supplies outside air directly to the suite. Each suite is also equipped with a clothes dryer, bathroom fan(s) and a stove hood fan that are vented to the outdoors.

3.2 Building Envelope Condition Survey

As part of this report, we initiated an occupant questionnaire survey that provided information on specific areas of concern. The owners were asked to indicate which areas of their unit (walls, ceiling, floors, windows, etc.) leaks and other problems were occurring. Refer to Appendix E for a report summarizing the survey.

We received 52 out of a possible 105 response (50%). Of the 52 questionnaires returned, 10% of the respondents indicated some type of water penetration into their units. In total, 5 leak incidences were reported on the questionnaires, indicating an average of 0.1 leaks per unit (a relatively low incidence compared to other buildings we have surveyed).

Leaks in the ceiling were identified in suites 1401, 1406, 1705, 505 and 803:

- The leak in suite 1401 was at a light fixture in the bathroom and not attributed to a building envelope problem.
- The isolated occurrence of a leak in suite 1406 was at the hood fan over the stove. A hood over the stove exhaust vent at suite 1406 was installed to try and prevent wind driven rain from entering the venting system. It was reported that this has been successful in preventing further water ingress.
- The leak in suite 803 only occurred once. The source was not determined but is not believed to be a result of a building envelope problem.
- Leaks in suites 1705 and 505 are located at the exhaust vent detail at the exterior of the building. These leaks have been repaired once but have re-occurred (refer to section 3.4.5 and Photo 5).

Recommendation 1

Review and repair exhaust vent detail going through the pre-fabricated panels at the head of windows. To include the addition of a vent hood and repair to deficient moisture seals to prevent water ingress. *Can be conducted systematically to all exhaust vents to prevent possible future leaks or on an as-required basis to address current active leaks.*

Type: Action**Priority:** 1**Timeframe:** I (Immediate)**3.3 Review of Documentation**

Detailed descriptions of building envelope principles and specific components and assemblies used at the Seastar are identified on pages 37 to 48 of the RDH Maintenance Manual. Our discussion with Marcus Dell, P.Eng. of RDH (formerly of Levelton) confirmed specific detailing of assemblies used.

Recommendation 2

Review and update annual maintenance and renewals manual provided by RDH.

Type: Action**Priority:** 2 (Rec. by MH)**Timeframe:** II (Within 2 years)

Architectural details of the building are illustrated on drawings A51.01 – A55.01 by Davidson Yuen Simpson Architects (DYSA). The exhaust vent detail A53.06 is a specific detail that has shown to be problematic and requires further review and modification. Refer to **Recommendation 1**.

The window wall detail A54.01 is not the same as the as-built conditions observed (refer to section 3.6.2). There is a head flashing installed at the top of the deflection header that is caulked at the top and the bottom of the flashing. This was not indicated on the drawings (refer to Appendix D for copies of detail drawings discussed). This needs to be further reviewed to determine the water management approach intended for this potentially vulnerable detail.

The construction trade manual by Bosa Construction identified Hydrotech 6125, Gacoflex and Elasto-deck 5000 as waterproofing membrane materials used. Typically, Hydrotech is used for roof and slab-on-grade waterproofing, Gacoflex is used for waterproofing exposed balcony surfaces and Elasto-deck is used as a parkade waterproofing traffic membrane.

Almetco windows were installed on the building.

The envelope report by Allstar Holdings identified several deficiencies requiring maintenance, including; various sealant joints, isolated concrete damage, penthouse roof leak investigation, planter waterproofing, balcony waterproofing and parkade waterproofing.

Recommendation 3

Review recommendations made by Allstar Holdings and update unresolved issues related to waterproofing, sealant and concrete repair.

Type: Action

Priority: 2 (Rec. by MH)

Timeframe: II (Within 2 years)

3.4 Walls

There are several different wall assemblies used as envelope elements for The Seastar including; pre-fabricated masonry and concrete panels, stucco, brick veneer, cast-in-place concrete and various types of glazing assemblies (refer to section 3.7 for glazing assemblies). The majority of the exterior cladding on the building is pre-fabricated concrete and masonry panels. A detailed discussion of the wall assemblies is provided on pages 37-48 of the RDH Maintenance Manual.

3.4.1 Pre-Fabricated Panels

The use of pre-cast concrete wall panels on the majority of the walls at The Seastar provides a higher level of protection from the negative effects of water penetration than is typically observed with some other cladding systems common in the Lower Mainland. Pre-fabricated panels tend to have higher quality control when constructed, making them more consistent in form. There were very few cracks noted in these panels and none of the interior openings at pre-cast panel wall sections revealed evidence of water leakage.

Our experience with concrete wall panel systems in the Lower Mainland is that they generally have the ability to manage the moisture load when well detailed. The continuity of the sealant between the panel joints is critical because failure of the sealant between the panel joints can allow water ingress into the wall assembly. A waterproof self-adhering membrane was identified at the concrete slab edge onto the top of the concrete panel below (detail drawing A53.02) which provides additional protection should the sealant joints fail. When water ingress occurs in concrete wall panel systems, we typically find localized problems that can be traced back to localized sealant failures and membrane deficiencies, as opposed to systemic failures requiring full rehabilitation of the wall system.

The panel assembly relies upon a two-stage sealant joint to prevent the penetration of water into the wall. This two-stage joint consists of an exterior sealant joint, which deflects the majority of the water, and an interior (of the panel) sealant joint which provides the air barrier continuity for the system. Intermittent weep holes in the exterior joint provide a location for any water which passes the first joint to escape to the outside before it can enter the interior of the wall (refer to Photo 6).

According to the panel shop drawings, it would appear that the intent of the self-adhering membrane applied at each floor level is to direct moisture within the stud cavity to the exterior.

Recommendation 4

Review, maintain and replace exterior sealant as required. *Expect localized replacement after five years (now) and complete replacement after 10-15 years (in 5-10 years).*

Type: Action **Priority:** 3 (discretion) **Timeframe:** III (maintain)

At The Seastar, we found no evidence of moisture ingress (such as mold or staining) and no deterioration of the framing elements (such as corrosion) at any of the interior exploratory openings behind the concrete panels (refer to section 3.4.4 and Appendix B).

3.4.2 Stucco Walls

Stucco walls were identified at the penthouse and balcony locations. The stucco assembly installed at the Seastar is often referred to as a concealed barrier as provision for drainage is provided at the base of the walls. Concealed-barrier walls are considered to be a higher risk to water ingress when compared to other drained or "rain-screen" wall assemblies. As the balcony walls are generally sheltered from the elements, by the overhang of the balcony on the floor level above, the use of stucco in these areas is considered to have a low risk for potential water ingress. However, the use of stucco on the penthouse walls, which have a high exposure to wind driven rain, would be considered to be a high risk for water penetration. Water ingress was found at suite 2101 (refer to review of suite 2101 in section 3.5 and EO# 1 and 2 Appendix B).

Recommendation 5

Investigate further to determine the source of the leak causing damage at the base of the stucco wall at the northeast corner of Suite 2101. Repair as required. *May require lifting concrete pavers and flashing and conducting flood test.*

Type: Investigation **Priority:** 1 **Timeframe:** I (Immediate)

At the base of the stucco walls the architectural drawing AS2.07 identified cement board to be used on the bottom 16 inches of the wall. The waterproofing membrane of the balcony or roof was then to be applied up the base of the wall. There was no concrete curb indicated at the base of the wall at the balcony locations.

3.4.3 Cast-in-place Concrete Walls

Exposed concrete walls with an exterior finish coating were identified at the penthouse and street levels of the building. The function of the coating on the

concrete is to provide the building with aesthetics and protection from weathering. The coatings require periodic maintenance and re-application in order to maintain the performance of the exposed concrete. The paint applied to the concrete walls of the penthouse is significantly eroded and has very poor adhesion to the concrete (refer to Photos 7 and 8). The loose and flaking paint requires removal with re-application of a new coating to the exposed concrete.

Small cracks in the concrete parapet walls at the penthouse and ground levels were observed in various locations (refer to Photos 9 and 10).

Recommendation 6

Prepare surface and apply new coating of paint (elastomeric) to the concrete walls of the penthouse.

Type: Action **Priority:** 2 (Rec. by MH) **Timeframe:** II (Within 2 years)

Recommendation 7

Maintain concrete wall coating and seal cracks as necessary.

Type: Action **Priority:** 3 (discretion) **Timeframe:** III (maintain)

3.4.4 Exploratory Openings

Seven (7) exploratory openings were made in the wall assemblies to confirm the construction and condition of materials in the walls. The only opening that showed evidence of water ingress was at suite 2101. We did not observe corrosion of the steel framing or evidence of moisture ingress, such as mold or staining, at the any of the other six exploratory openings.

The opening locations and detailed observations recorded at each opening are included in Appendix B, complete with an identifying photo.

3.4.5 Exterior Vents

As was identified in the occupant survey, and from the interior review of the suites, the dryer exhaust vents are a source of water ingress into the building at a few isolated locations. The exhaust vent detail through the concrete panels, at the head of windows, has been modified in some locations through the installation of a hood over the opening (refer to Photos 11 and 12). The vent detail shown in detail drawing A53.06 shows self-adhesive (SA) membrane lapped onto the deflection channel. Should this critical seal be deficient, water ingress would occur in locations evident in suites 1705 and 505.

While the installation of a hood at the exhaust vent location will shelter the detail from rain and reduce the risk for water ingress, the deficient seals at known locations should be repaired and other locations reviewed to reduce the

risk of future water ingress at these typical locations. Refer to **Recommendation 1**.

Dryer vents require routine cleaning to ensure that they do not become blocked with lint. Should a dryer vent become blocked, the warm, humid air that is produced by the dryer will not be properly discharged to the building exterior. When this occurs, there is a possibility that the air may penetrate discontinuities in the ducts and moist air will be forced into the building interior or into the exterior wall assemblies or, will condense within the slab. Condensation is likely to occur, which may result in deterioration of wall or slab components. If drying time increases this could be a sign of blockage.

Recommendation 8

Clean and remove lint from screens and ensure dryer lint traps work properly.

Type: Action

Priority: 3 (discretion)

Timeframe: III (maintain)

3.5 Interior Visual Review

The property and the building manager arranged for the interior review of the following suites at locations where the owner's reported water ingress or building envelope concerns.

Suite 905

Evidence of staining of the perimeter of the carpet was reported and found (refer to Photo 13). The staining of the perimeter of the carpet is due to air leakage under the dividing wall. The air being supplied to each suite and the hallways contains particulate matter (exhaust from the high volume of traffic nearby) which is passing under the walls and being deposited in the carpet, likely causing the dark stains.

Corrosion of screws in the operable window units in the bedroom was observed (refer to Photos 14 and 15).

Recommendation 9

Clean or up-grade air-supply filtration system to reduce particulate matter in the air being supplied to the building. System filters may require replacement at a shorter than normal duration to handle the heavier loading of this location. Prevent air leakage under the walls by sealing (caulking) the base of the wall to the concrete floor slab.

Type: Action

Priority: 3 (discretion)

Timeframe: III (Maintain)

Recommendation 10

Monitor corrosion of screws in all windows. Replace damaged screws, and plan for replacement of others, with stainless steel corrosion resistant screws.

Type: Action

Priority: 3 (discretion)

Timeframe: III (Maintain)

Suite 1705

Water ingress was reported and found the head of the window at the west living room wall above the fireplace at the exhaust vent location (refer to Photo 5). The dryer exhaust vent detail had been previously repaired (approximately one year ago), but leakage has re-occurred. Refer to **Recommendation 1**.

Suite 2101

Evidence of water ingress was reported and found at the sloped glazing (curtain-wall) skylight roof on the second floor of the suite outside the bathroom (refer to Photo 16) and outside the closet of the bathroom at the floor (refer to Photo 17). Water staining was found on the drywall at the top and bottom of the skylight and on the laminate hardwood floor. The flashing at the wall to skylight transition (refer to Photo 18) was lifted and a moisture seal was not found between the pressure plate and the head flashing. Screws are installed through the flashing and sealed with caulking (refer to Photo 19). The horizontal curtain-wall pressure plates are causing water to pond on the assembly (refer to Photo 20).

Recommendation 11

Review and repair/modify the sloped curtain-wall glazing assemblies on the penthouse to correct the deficiencies in the moisture seal and improve drainage of the system.

Type: Action **Priority:** 1 **Timeframe:** 1 (Immediate)

Water ingress and deterioration was also found in the bedroom at the base of the wall at the northeast corner (refer to Photos 21 and 22). Exploratory openings (EO #1 and #2) were made at the northeast corner of the bedroom (refer to Appendix B). Mold on the outside surface of the interior drywall (on the interior side of the vapour barrier) was evident at EO #1. EO #2 was made to determine if the leak was coming from the wall above or from the wall base detail at the slab. EO #2 was clean and dry suggesting that the water ingress was occurring at the base of the wall. Further investigation to determine the source of water ingress causing the damage to the building, is required (refer to **Recommendation 5**).

At the balcony off of the living-room on the first level of the suite, efflorescence was noticed on the concrete panel below the saddle at the return of the roof deck parapet wall above (refer to Photo 23).

Caulking around the base of the swing door at the second floor roof deck is showing signs of weathering and is starting to dry and crack (refer to Photo 24). Refer to **Recommendation 4**.

Recommendation 12

Review and repair the saddle waterproofing detail at the parapet wall/concrete panel transition at suite 2101. *May require lifting concrete pavers and flashing. Other typical details showing similar staining should also be reviewed*

Type: Action **Priority:** 2 (Rec. by MH) **Timeframe:** II (Within 2 years)

Suite 401

There were corroded screws at the operable windows in the master bedroom. Refer to **Recommendation 10**. Three failed window insulated glazing units (IGU's) were noticed on our first review (refer to Photo 25); however, during our second review of the suite, failed IGU's were not evident. This discrepancy could be a result of different climatic conditions at time of review. An exploratory opening (EO #6) was made at the east corner of the south wall in the living loom (refer to Appendix B). All materials within the opening were clean and dry.

Recommendation 13

Replace failed insulated glazing units (IGU's) as required.

Type: Action **Priority:** 2 (Rec. By MH) **Timeframe:** III (Maintain)

Suite 602

A random opening, EO #3, was made in this suite at the southeast corner of the living room wall below the window (refer to Appendix B). All materials in the opening were clean and dry.

Suite 2005

Window gaskets at the transoms of the balcony sliding doors are short and not tightly secured in all locations (refer to Photo 26). This can easily be corrected by pushing the gasket seal into the window stop. The gasket is not the primary weather seal and water ingress is not expected as a result of the deficiency.

Recommendation 14

Remove and reinstall window gaskets as required.

Type: Action **Priority:** 3 (discretion) **Timeframe:** III (maintain)

The tops of the open balcony parapet walls are coated with a textured acrylic coating (refer to Photo 27). It can be expected that over time extended dirt pick-up and staining will occur due to water runoff from the horizontal surface. Good practice would be to have a waterproofing membrane with a protective layer or flashing (that is smooth and easily sheds water) covering the membrane.

Suite 1401

Minor corrosion of the screws at operable windows was noted. Refer to **Recommendation 10**. The operable window in the bedroom did not seal tightly when closed and a build-up of dust was observed in the frame of the window. Excessive air leakage and noise was evident when the window was closed. Water staining was evident in the condensation track of the window (refer to Photo 28). EO #4 was made below the windowsill. All materials were clean and dry with no evidence of moisture (refer to Appendix B).

Recommendation 15

Adjust and re-align operable windows as required. Replace window gaskets and seals where necessary.

Type: Action

Priority: 3 (discretion)

Timeframe: III (Maintain)

Suite 1406

Modifications to the hood fan exhaust vent detail have successfully prevented further water ingress into the suite. Minor corrosion of the screws in the operable windows was observed. Refer to **Recommendation 10**.

Suite 1205

A previous leak in the ceiling resulting from a blocked drier exhaust vent duct has been successfully repaired. Darkening of the ceiling texture in proximity to the exterior air supply was observed (refer to Photo 29). Minor corrosion of screws in the operable windows was evident. Refer to **Recommendation 9 and 10**.

Suite 803

A random opening (EO #5) was made under a window in the enclosed balcony (refer to Appendix B). Materials were clean and dry with no staining evident. The balcony membrane was clean and dry with no apparent deficiencies.

Suite 501

A random opening (EO #6) was made below a window jamb in the bedroom (refer to Appendix B). Materials were clean and dry with no staining evident.

3.6 Windows, Doors and Skylights

The following table identifies the primary glazed assemblies used in the project.

| Window Type / Use | Punch windows and window wall | Storefront windows |
|-------------------|-------------------------------|--------------------|
| Manufacturer | Almetco | Not Confirmed |

| Window Type / Use | Punch windows and window wall | Storefront windows |
|-------------------------|--|--|
| Frame Material | Thermally broken aluminum | Thermally broken aluminum |
| Corner construction | Butt-framed with sealant | |
| Mounting method | Deflection head at window wall Sill angle at punch window | Rebate |
| Drainage | Drained Glazing Cavity. | Self-adhering membrane detail |
| Type of Operator | Casement and Awning | None |
| Glazing installation | Exterior - dry seal Interior - dry seal | Exterior - dry seal Interior - dry seal |
| Glazing | Insulated Glazing Unit (IGU) | Insulated Glazing Unit (IGU) |
| IGU seals | Aluminum | Aluminum |
| Flashing | Sill flashing | Sill flashing |
| Perimeter seal and trim | Concrete Panel with sealant | Concrete Panel with sealant |

3.6.1 Punched Windows

There are punch windows installed at the pre-manufactured panels (refer to Photo 30). The punch windows have a deflection header at the head of the window and the drawing (A53.08) indicates that SA membrane covering the slab edge laps onto the deflection header. At the sill of the windows SA membrane extends into the interior opening protected by sloped metal flashing.

Weep tubes were installed into the condensation track of the windows that were not always installed flush with the bottom of the condensation track (refer to Photo 31). If water does enter the condensation track, a small amount may remain in the bottom of the track because it is not able to drain. Water staining in the condensation track was identified (refer to Photo 28). Should the seal on the mitred corners of the condensation tracks fail, deterioration of the window stool may result (refer to Photo 32).

Recommendation 16

Review and maintain sealant at window mitres as required. *Expect localized repair after five years (now) and complete repair after 10-15 years (in 5-10 years).*

Type: Action

Priority: 3 (discretion)

Timeframe: III (maintain)

3.6.2 Window Wall

The enclosed balcony areas of The Seastar are clad with a "window wall" system consisting of a combination of windows and metal panels in a metal frame assembly (refer to Photo 33). Shop drawings were not available for the window wall assembly.

Metal spandrel panels are installed in the assembly at each floor level, with the fixed and operable window units installed above the panels. The metal panel extends over the edge of the floor slab to the head of window wall on the floor below. The window wall is attached to the underside of each floor slab with a deflection header track. A head flashing was installed at the top of the deflection channel and was caulked at the top and underside of the flashing (refer to Photo 34). The head flashing was not indicated on Architectural drawing A54.01.

The window wall assembly installed at the Seastar is often referred to as "face-sealed" as provisions for drainage to the exterior is not provided. Face-sealed assemblies are considered to be a higher risk for water ingress when compared to other drained or "rain-screen" assemblies. Water ingress through a failed window seal or sealant joint can become trapped within the panel assembly. The installation of weep holes in the caulking at the top of the head flashing, above the deflection header, would permit incidental water trapped in the panel assembly (should a window or sealant joint fail) to drain reducing the risk of potential water ingress.

Recommendation 17

Further review the window wall assembly at the enclosed balconies and install weep holes in the sealant joint at the head flashing above the deflection header, as appropriate.

Type: Investigation **Priority:** 2 (Rec. by MH) **Timeframe:** II (within 2 years)

3.6.3 Skylights

Water ingress at the sloped curtain-wall glazing skylights was reported and found during our interior review of suite 2101. Refer to **Recommendation 11**. The box skylight of the penthouse had back-sloped flashings with ponding water; however, no leaks were identified or reported (refer to Photos 35 and 36). The skylights should be reviewed and maintained as required in accordance with regular roof maintenance.

3.6.4 Storefront Glazing

At the entrance and common rooms, a storefront window assembly has been installed. Building overhangs protect the storefront glazing assembly from rainwater exposure. No visual deficiencies were observed.

3.7 Roofs, Decks and Balconies

There are fundamentally three different roof, deck and balcony assemblies used at The Seastar. We did not conduct exploratory openings to confirm the roof assemblies.

3.7.1 Flat Roof (used for main roof areas) and Roof Decks (over living space)

The main roofing assemblies on the building consist of Hydrotech, "Hot Rubber", modified asphalt, waterproofing membrane protected with a drainage composite, rigid insulation and aggregate ballast or concrete pavers (refer to page 48 of the RDH report for further discussion on the roofing assembly).

Water ingress under the roofing assembly has not been reported or observed. The perimeter of the roofing membrane is terminated at the concrete parapet wall with a gum-lip flashing and sealant (refer to Photo 37). The sealant at the wall transition between the cap flashings and the concrete has failed in some locations at the penthouse level (refer to Photos 38 and 39). Refer to **Recommendation 4**. The roof drains have grass growing through the screen in several locations and should be reviewed and cleaned. (refer to Photo 40).

The roofing membrane is protected with insulation and ballast or concrete pavers (in traffic areas) and is not exposed to UV. This type of roof assembly should have a service life of approximately 20 years or more, when well maintained.

Recommendation 18

Maintain roofing membrane as necessary. Clean out debris from drain strainers/hoppers annually. Maintain sealant of roof flashing as required.

Type: Action

Priority: 3 (discretion)

Timeframe: III (maintain)

3.7.2 Balconies (not over living space)

The balcony surface has been protected with a liquid membrane (GacoFlex) embedded with granules to form a non-slip coating. We did not see evidence of water leakage such as staining of the balcony ceiling, at the areas reviewed. At the balcony/wall transition, the waterproofing membrane appears to have been lapped under the window and doorsills (refer to Photo 41).

The liquid applied membrane used on the balconies can typically have an expected lifetime of seven to ten years when properly installed and adequately maintained. Failure of the membrane can allow water to penetrate through cracks in the concrete. Over the course of several years, water leakage may cause deterioration of steel reinforcements and spalling of the concrete, which should be addressed in the long-term maintenance of the building. Re-application of the balcony membranes as they fail is appropriate and should be a regular activity.

Recommendation 19

Maintain balcony membranes as required. Clean debris from balcony surface annually.

Type: Action **Priority:** 3 (discretion) **Timeframe:** III (maintain)

3.8 Parking Garage

A liquid membrane (Elasto-deck 5000) embedded with granules to form a non-slip coating was applied on the suspended slab at levels P1 to P3. There was no membrane applied over the concrete slab on grade at the P4 level.

Efflorescence was observed at a few isolated locations at the walls or ceilings near parking stalls 10, 14, 30, 87, 123 and at the car wash bay on P4 (refer to Photos 42 and 43). Cracks in the concrete slab and membrane were observed in a few isolated locations and should be repaired as required in accordance with regular parkade maintenance (refer to Photo 44).

Substantial corrosion of a copper pipe was observed at parking stall 10 (refer to Photos 45 and 46). Further review of the cause of the corrosion on this pipe should be conducted.

Recommendation 20

Investigate cause of corrosion of copper pipe in parkade and repair as necessary.

Type: Investigation **Priority:** 2 (Rec. by MH) **Timeframe:** III (maintain)

Evidence of water ingress at air vents into the bike storage area and generator room was observed (refer to Photos 47 and 48).

Based on our visual review, we did not see conditions that indicate structural distress at the present time. In our climate, water leakage can cause deterioration of steel reinforcements and spalling of the concrete over the course of several years, which should be addressed in the long-term maintenance of the building. Leaks into below-grade structures are often difficult to trace and may be costly to repair. Because of the time that it takes for corrosion of the reinforcing steel in the concrete to occur due to water ingress, leaks into parkades often cause more of a nuisance than a concern regarding occupant health or safety.

Recommendation 21

Maintain waterproofing membrane in the parkade and repair cracks in the concrete as necessary.

Type: Action **Priority:** 3 (discretion) **Timeframe:** III (maintain)

4. SUMMARY OF RECOMMENDATIONS

The following recommendations are based on visual observations and interior openings through the drywall. This condition assessment provides a review of the overall condition or status of the building envelope and components and focuses on specific locations where deficiencies or water ingress were noted. Locations requiring further investigation or maintenance were also noted.

4.1 Immediate Action (First Priority)

| No. | Recommendation | Type | Priority | Timeframe |
|-----|--|---------------|----------|-----------|
| 1 | Review and repair exhaust vent detail going through pre-manufactured panels at window head. | Action | I | I |
| 5 | Conduct further investigation to determine the source of the leak causing damage at the base of the stucco wall at the northeast corner of Suite 2101. Repair as required. | Investigation | I | I |
| 11 | Review and repair/modify sloped curtain-wall glazing assembly at suite 2101. | Action | I | I |

4.2 Highly Recommended (Second Priority)

| No. | Recommendation | Type | Priority | Timeframe |
|-----|--|--------|----------|-----------|
| 2 | Renew and update annual maintenance and renewals manual provided by RDH. | Action | 2 | II |
| 3 | Review recommendations made by Allstar Holdings and up-date any unresolved issues related to waterproofing, sealant and concrete repair. | Action | 2 | II |
| 6 | Prepare surface and apply new concrete coating to concrete walls at the penthouse | Action | 2 | II |
| 12 | Review and repair saddle waterproofing detail at the parapet wall/pre-fabricated panel transition at suite 2101. | Action | 2 | II |

| No. | Recommendation | Type | Priority | Timeframe |
|-----|---|---------------|----------|-----------|
| 17 | Review window wall assembly at the enclosed balconies and install weep holes in the sealant joint at the head flashing above the deflection header, as appropriate. | Investigation | 2 | II |
| 20 | Investigate cause of corrosion of copper pipe in parkade and repair as required. | Investigation | 2 | III |

4.3 Maintenance Work (Third Priority)

| No. | Recommendation | Type | Priority | Timeframe |
|-----|---|--------|----------|-----------|
| 4 | Review, maintain and replace exterior sealant as required. | Action | 3 | III |
| 7 | Maintain concrete wall coating and seal cracks as necessary. | Action | 3 | III |
| 8 | Clean and remove lint from drier screens. | Action | 3 | III |
| 9 | Clean or up-grade air-supply filtration system. | Action | 3 | III |
| 10 | Monitor corrosion of screws in the operable windows. Replace screws, and plan for replacement of others, with stainless steel screws. | Action | 3 | III |
| 11 | Replace failed IGU's as required. | Action | 3 | III |
| 12 | Remove and reinstall window gaskets as required. | Action | 3 | III |
| 15 | Adjust and re-align operable window units as required. Replace window gaskets and seals where necessary. | Action | 3 | III |
| 16 | Review and maintain sealant at window mitres as required. | Action | 3 | III |

| No. | Recommendation | Type | Priority | Timeframe |
|-----|--|--------|----------|-----------|
| 18 | Maintain roofing membrane as necessary. Clean and remove debris from drains strainers/hoppers annually. Maintain sealant of roof flashing as required. | Action | 3 | III |
| 19 | Maintain balcony membranes as required. Clean debris from balcony surface annually. | Action | 3 | III |
| 21 | Maintain waterproofing membrane in the parkade and repair cracks in the concrete as necessary. | Action | 3 | III |

Our review found very little evidence of water penetration and deterioration through the envelope of The Seastar. The few problems noted appear to be associated with specific elements or isolated details of the construction. However, as the building ages, it should be expected that maintenance and renewals of building envelope components will increase.

Maintenance of the building envelope is a critical component of the long-term water management performance of the building. It cannot be stressed strongly enough that the Strata must continue careful and regular maintenance of the building envelope components to ensure the expected long-life of the building is reached.

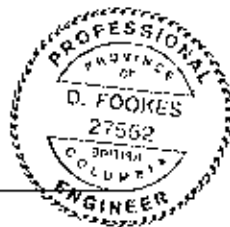
Maintenance requirements shortly after construction tend to be less, increasing as time passes and the service life of materials and systems are approached. Building envelope maintenance items should be budgeted for by the strata and re-assessed on a regular basis to reflect cost of living increases and the age of the various building elements.

In addition, there comes a point in the life of a system when maintenance is no longer practical and renewal is appropriate and more cost effective. The future renewal costs of the various building envelope components should also be established by the Strata Corporation. This information is usually provided in a reserve fund study.

MORRISON HERSHFIELD LIMITED



David Fookes, P.Eng.
Project Engineer




David G. Kayll, FMA, P.Eng., BEP
Sr. Project Engineer

