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Our File No. GT-006-10-A May 18, 2010

Strata Plan BCS 2645 c/o Gateway Property Management Corporation #400 - 11950-80<sup>th</sup> Avenue Delta, BC V4C 1Y2 (Email: cviasceanu@gatewaypm.com)

Attention: Mrs. Cristiana Vlasceanu, CPM

Dear Madam:

Re: Strata Plan BCS 2645 - Tapestry

750 West 12th Avenue and 2851 Heather Street, Vancouver, BC

- Building Envelope Maintenance Review Report

#### 1. INTRODUCTION

- 1.1 VVV Engineering Ltd. was retained by the Owners of the Strata Plan BCS 2645 Tapestry located at 750 West 12<sup>th</sup> Avenue and 2851 Heather Street, Vancouver, BC to carry out a visual 3-Year Maintenance Review of the building envelope components. The review was conducted on April 14 and 15, 2010. Our review was generally conducted from the ground level. The upper wall areas were reviewed with a use of binoculars. The roofs on both buildings and underground parkade were also reviewed.
- 1.2 The Maintenance Manual and 2-Year Post-Construction Audit prepared by Morrison Hershfield submitted to our office were reviewed prior to the site assessment. The Architectural set of drawings provided for our review included only the Elevations and Floor Plan Drawings. The building envelope details were not provided for our review.
- 1.3 It is assumed that the Tapestry complex was designed and built in accordance with the permits and approvals and in compliance with Codes and By-laws applicable at the time of construction, and that all subsequent maintenance work was performed in an appropriate manner. No attempt has been made to analyze the design of the buildings or its components and no detailed zoning or Building Code review has been conducted.
- 1.4 A Building Envelope Questionnaire was provided by VVV Engineering Ltd. for the Owners to answer several questions and to list any concerns or deficiencies related to building envelope especially those that can be only observed from inside and/or from their balconies and decks of their units. Out of 230 units 70 Owners replied and out of these 33 had no problems to report while others stated that they have the following deficiencies:

- 1. Fourteen Owners reported various problems related to windows and exterior doors
- 2. Five Owners reported various problems related to exterior walls (cladding, gutters, vents, etc.)
- 3. Six Owners reported problems related to water ponding on balcony, deck or patio
- 4. Eleven Owners reported various problems related to cold drafts (around floor, wall, ceiling and windows)
- There were no reports of the water ingress from the exterior of the building. Water ingress related to the condensation on HVAC unit was reported by the Unit 2821 Heather building. This has been repaired.
- 6. Five Owners reported problems related to condensation on windows
- 7. There were no reports related to mould/mildew/fungi
- 8. Eighteen Owners reported other than above problems related to building envelope and/or problems related to the interior of their units.
- 9. Copies of the questionnaires provided to us are attached to this report under Appendix A.

Several Owners were contacted by phone to discuss the problems which were reported.

For the clarity of the report our observations and recommendations are grouped into several categories according to the type of building envelope component (walls, windows and doors, balconies/decks, roof, pavement, concrete curbs and landscaping, underground parkade). Observed deficiencies are illustrated by relevant photographs.



## 2. GENERAL DESCRIPTION

ITEM	DESCRIPTION	PHOTOGRAPH
2.1	Tapestry is a predominantly residential complex including a 10-storey high-rise (building address is 2851 Heather Street) and a six storey mid-rise (building address is 750 W 12 <sup>th</sup> Ave). Both buildings are constructed over a two level concrete parking garage. The amenity rooms are located on the first floor level. The Tapestry complex has 230 Units (136 in Heather building and 94 in W 12th Ave building). The Child Daycare Centre for 96 children is located at the Heather building.	
2.2	The exterior walls are mainly of poured concrete with some wall clad with brick and/or stone. Several sections of the building are window walls with spandrel panels. We can not comment how the wall assemblies were constructed and detailed because building envelope details were not provided for our review.	
2.3	Most of the Tapestry units have balconies/decks with aluminum and glass guardrails typically secured directly into the balcony/deck slab. Some of the aluminum and glass guardrails were mounted into the interior face of the parapet wall. The balconies are protected with a liquid applied membrane. Some units have decks over conditioned space, which are protected with roof membrane and pavers.	



2.4 The residential windows are aluminum frame, thermally broken punched windows with double glazed sealed units manufactured by Starline Windows. The window walls with spandrel are present at many wall sections. Prefabricated metal flashing is installed at the sill. At the head sealant joint was provided at the window and wall interface. storefront windows are installed at the ground floor areas. 2.5 There are two type of roofs in Tapestry complex: 2851 Heather Street building is covered with a torch membrane 750 W 12<sup>th</sup> Ave building is covered with a green roof. Various buildina vents projecting above the roof surface. Most of the vents discharges are located on exterior walls. 2,6 The Tapestry buildings (mid-rise and high-rise) are constructed over the concrete underground parkade. Sprayed insulation is applied underneath the concrete slab below the occupied areas of the buildings.



## 3. OBSERVATIONS AND RECOMMENDATIONS

## 3.1 WALLS

ITEM DESCRIPTION	PHOTOGRAPH
3.1.1 OBSERVATION Based on our random review of exterwalls they appear to be general properly maintained. No major deferwere observed or reported to us the require immediate attention. Deficience related to the maintenance are list below under relevant sections of the report. Some of the deficiencies are rejust a maintenance items but they must be related to the possible design and/construction problems.  RECOMMENDATION The deficiencies not related to the maintenance will require furthe investigation and review before the proper solution to rectify and/eliminate them is implemented.  3.1.2 OBSERVATION The above grade floors consist reinforced concrete slabs, columns and walls. Horizontal and vertical reversionits are used for architectural purposs and to control cracking. Concrete slab projections were used as a protective overhang at various wall areas and the roof level. No major cracks in the concrete wall were observed or reported to us. Some cracks were observed in the underside of concrete slab projections.  RECOMMENDATION Regular review of the concrete walls are other types of the exterior cladding including review of the window detail at the floor level and review of the sterior of the concrete walls are other types of the window detail at the floor level and review of the window detail at the floor level and review of the concrete walls.	



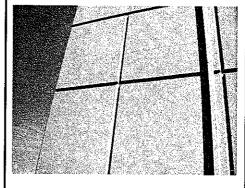
#### 3.1.3 | OBSERVATION

Several small cracks were observed at the elevator shaft walls at the mid-rise building at the roof level.

#### RECOMMENDATION

(Maintenance)

All cracks should be monitored. They should be repaired if they are 3mm wide or more to prevent water ingress into the wall assembly. Even small cracks can cause the water ingress which may not manifest itself inside the building for extended period of time.



#### 3.1.4 OBSERVATION

Various types of staining, algae and moss growth were observed on the stone cladding by the main entrance to 2851 Heather Street building. The types of staining and their severity is an indication of the moisture presence in and possibly behind the stone cladding.

Because of lack of the wall assemblies'

Because of lack of the wall assemblies' descriptions and details we can not confirm if the stone cladding was installed as a rainscreen system.

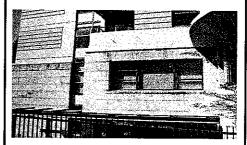
We did not observe weep holes at the window head to allow for drainage of the accidental moisture that can enter past the cladding surface. It is quite possible that the stone tiles were applied directly over the concrete walls.

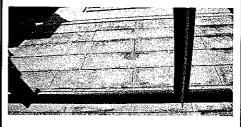
It is not known to us if the sealer was applied over the stone cladding at the original construction.

It was not confirmed if the protective ledge is properly sloped and sufficiently projected over the stone cladding to deflect the rain water away from the stone clad walls. It appears that there is a lot of staining present directly below the subject ledge which can be a part of the problem. Presence of the drip edge was also not confirmed.

#### RECOMMENDATION

Further investigation and review of the building envelope details specifically related to this location is required to identify the cause of the staining.









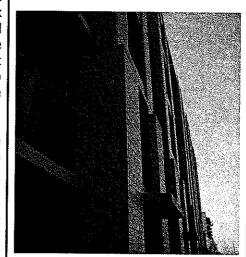


#### 3.1.5 | OBSERVATION

Moss growth and efflorescence staining was observed at the brick and the mortar joints at various wall areas clad with brick. The protective concrete ledge appears to be not sufficiently projecting over the brick to allow for diverting rain water from the brick cladding.

#### RECOMMENDATION

The building envelope detailing at the top of the parapet wall should be confirmed before any maintenance program is implemented. If there is no sufficient deflection provided at the top of the wall water ingress into the mortar joints, brick cladding and possibly behind will continue to occur. Once the proper deflection and detailing at the top of the wall is provided the moss and efflorescence should be cleaned and the brick, mortar joints and the concrete should be protected penetrating sealer to repel the water from the wall surface.



## (Warranty/Maintenance)

### 3.1.6 OBSERVATION

Moss growth was observed at the brick mortar joints at the wall base at various wall areas. The moss growth may be an indication of the moisture presence at the wall base and at the cavity behind the brick.

### RECOMMENDATION

The proper spacing of the weep holes should be confirmed. All weep holes should be checked and cleaned if necessary. The moss should be removed and penetrating sealer applied at the brick and mortar joints (if it was not applied at the original construction). (Warranty/Maintenance)





#### 3.1.7 OBSERVATION

Sealant was not applied between brick and concrete wall at various location of the wall base at the building perimeter. The mortar joint was cracked and separated from the concrete wall. Water ingress behind the cladding can occur at those locations. Unsealed cracks were typically observed at those interfaces.

#### RECOMMENDATION

Sealant joint should be applied at the original construction at all joints and cladding interfaces to prevent water ingress behind the cladding. Proper sealant joint supported by backer rod should be provided at the interfaces between different types of cladding and their penetrations.

(Warranty/Maintenance)



#### 3.1.8 **OBSERVATION**

The sealant joint between the louver vent and concrete was deteriorated at elevator shaft wall at 750 W 12<sup>th</sup> Ave building.

#### RECOMMENDATION

New sealant joints must be applied at the locations where the sealant was missing and/or has failed.

(Maintenance)



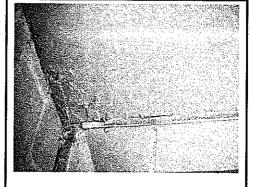
#### 3.1.9 OBSERVATION

The sealant joint between at the gum lip detail between concrete wall and the base flashing at few locations.

#### RECOMMENDATION

New sealant joints must be applied at the locations where the sealant was has failed.

(Maintenance)





#### 3.1.10 | OBSERVATION

Staining and splashed dirt was observed on the base of the wall in a few locations.

#### RECOMMENDATION

All the causes of the splashing of the water from the upper wall decks or projecting eyebrows should be eliminated. The wall should be cleaned and repainted if necessary.

### (Maintenance)

#### 3.1.11 OBSERVATION

Staining on the face of the concrete eyebrows was observed in several locations throughout the project.

#### RECOMMENDATION

The stains should be cleaned and the face of the eyebrows re-painted if necessary to provide durable surface that will not allow for moisture ingress.

## (Warranty/Maintenance)

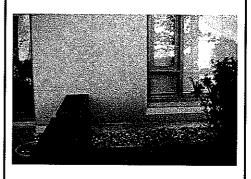
## 3.1.12 OBSERVATION

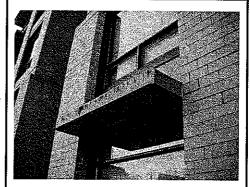
The efflorescence staining was observed at the cracks located at corners of the louver vents in the concrete eyebrows underside at the upper wall areas. The efflorescence staining is an indication of the moisture presence in the concrete eyebrows. The moisture possibly enters from the duct discharge and/or may be result of water ingress at the top of an eyebrow.

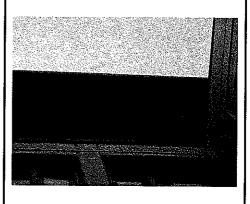
#### RECOMMENDATION

The cracks should be sealed and underside of the concrete eyebrows repainted to eliminate possibility of water ingress. Those locations should be monitored because the moisture presence in the concrete can cause premature deterioration of the membrane applied on the top of concrete eyebrows.

#### (Warranty/Maintenance)









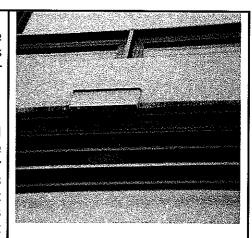
#### 3.1.13 OBSERVATION

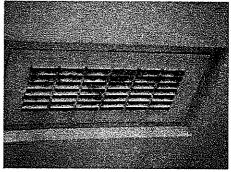
The dryer vents plugged with lint were observed in many locations. Those vents are typically located at the slab level or at the balcony underside.

#### RECOMMENDATION

The dryer screens inside the unit and vent screens on the outside must be cleaned regularly to allow for proper moisture removal. Accumulated lint is also a fire hazard. Review of the sealant applied at the vent hood and windows located below is highly recommended at the time of lint removal.

### (Maintenance)





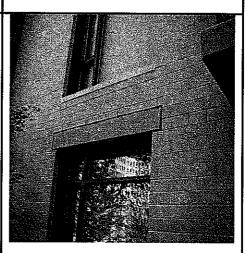
#### 3.1.14 | OBSERVATION

The staining at the base of the brick cladding above the concrete ledge installed at the window head was observed. The ledge was installed at the face of brick cladding

#### RECOMMENDATION

The weep holes should be regularly cleaned to allow for moisture drainage from the cavity behind the brick. The waterproofing detailing at this location must be confirmed.

## (Warranty/Maintenance)



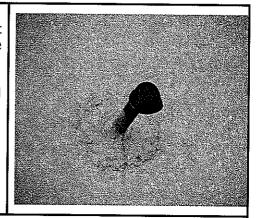
### 3.1.15 OBSERVATION

The rust staining on the concrete wall at the roof level was observed below the corroded pipe.

## RECOMMENDATION

The pipe must be cleaned and protected with rust proof paint.

(Maintenance)



## 3.2 WINDOWS AND DOORS

ITEM	DESCRIPTION	PHOTOGRAPH
3.2.1	OBSERVATION The residential windows are aluminum frame, thermally broken punched windows with double glazed sealed units manufactured by Starline Windows. The window walls, windows and doors appear to be functioning as intended with the exception of some windows and doors that have difficulties with opening and closing. This deficiency was reported by several Owners.  RECOMMENDATION Further investigation and adjustment of the windows and doors which are difficult to open is required.  (Maintenance)	

## 3.2.2 **OBSERVATION** Prefabricated metal flashing was observed at the sill. At the head sealant joint was provided at the window and wall interface. RECOMMENDATION Regular review and renewal of the sealant joints is required as specified in the Building Maintenance Manual. (Maintenance) 3.2.3 **OBSERVATION** White staining and observed at the window and sill flashing interface, This is an indication of the water presence for an extended period of time. RECOMMENDATION The staining should be cleaned and those locations further investigated and monitored. (Maintenance) 3.2.4 **OBSERVATION** Staining and condensation on the exterior window glass surface below the dryer vent discharge was reported by some of the Owners. We observed more staining on the windows where the louver blades were directed towards the window. Some of the owners reported the staining and/or dust presence inside the sealed unit. The discharge of the moist air towards



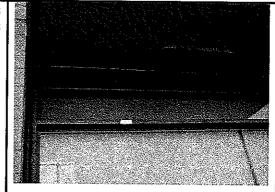
sealed glass units. **RECOMMENDATION** 

the window can cause the premature deterioration of the sealant and /or

The regular review of the sealant joint

and clean-up of the vent screens is required to prevent moist air ingress into the wall and floor assemblies. The direction of the louver blades away from the window and building wall is recommended.

### (Warranty/Maintenance)



#### 3.2.5 OBSERVATION

Misaligned, shrunken, or loose gaskets were observed at various spandrel panels during Two Year Post-Construction Audit prepared by Morrison Hershfield. During this review some other deficiencies were also observed, but all the deficiencies were rectified by the Developer according to the submitted report.

#### RECOMMENDATION

The detail review of the windows and window wall and spandrel panels is recommended from swing stage.



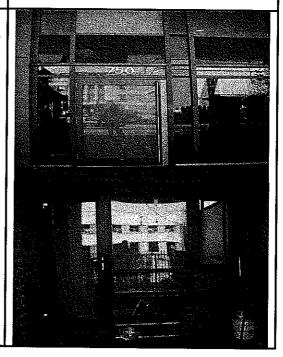
#### 3.2.6 OBSERVATION

The doors appear to function as intended with the exception of some of the doors which are difficult to open/close and lock.

#### RECOMMENDATION

The review and adjustment of the problematic doors should be done by manufacturer maintenance service department.

#### (Maintenance)



## 3.3 BALCONIES/DECKS

ITEM	DESCRIPTION	PHOTOGRAPH
3.3.1	OBSERVATION The balcony railings are constructed out of aluminum frame with glass panels. They are typically topmounted on the balcony/deck slab. Some of the railings are mounted to the interior face of the deck concrete curb.  RECOMMENDATION Regular renewal of the sealant joint at the railing attachment bracket and on the top of the screws is recommended.  (Maintenance)	
3.3.2	The lack of the gutter and downspout system at the perimeter of approximately 4' wide eyebrows at the roof level is resulted with direct water drainage from those surfaces and sometimes also overflow scuppers from the roof level on the balcony/deck below. This condition is causing the lack of enjoyment of the balcony/deck of the residents of the affected units. Water pooling on the eyebrows was observed in some locations, but this will be discussed under a roof section of this report.  RECOMMENDATION The installation of the gutter and downspout system or implementation other solution is recommended to rectify the above listed problem.  (Warranty/Maintenance)	



3.3.3	Observation Staining on the balcony edges was observed in a few locations. Pooling of the water on the balcony/deck was only reported by few Owners.  RECOMMENDATION The regular review and clean-up of the membranes is recommended in order to maximize their performance.  (Maintenance)	
3.3.4	OBSERVATION Paint peeling of from the underside of 750 W 12 <sup>th</sup> Ave building. RECOMMENDATION The cause of peeling paint should be identified and rectified. (Warranty/Maintenance)	

## 3.4 Roof

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ITEM	DESCRIPTION	PHOTOGRAPH
3.4.1	OBSERVATION The roof at 2851 Heather Street building is covered with a torch on membrane Various building vents are projecting above the roof surface. We did not observe any water pooling on the roof surface during our review. RECOMMENDATION The regular review and maintenance is recommended. (Maintenance)	



#### 3.4.2 OBSERVATION

The water pooling on the eyebrows was observed at several locations. This is an indication that the eyebrows are not properly sloped.

There was no drainage system (gutters and downspouts) provided at the eyebrows edges despite the large width of the eyebrows and the fact that the overflow scuppers from the roof surface were designed to discharge on the eyebrows level.

The pooling water for extended period of time will cause premature deterioration of the membrane. The pooling water was present in the observed locations for more than 24 hours.

### RECOMMENDATION

The above deficiency should be rectified.

## (Maintenance/Maintenance)

#### 3.4.3 OBSERVATION

The small accumulation of the debris around the drain was observed.

### RECOMMENDATION

The regular review and clean-up of the membranes is recommended in order to maximize their performance. (Maintenance)

#### 3.4.4 OBSERVATION

Localized ridging of the membrane was observed in few locations. The ridging can cause premature deterioration of the membrane.

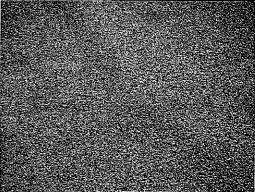
#### RECOMMENDATION

The ridging should be monitored for cracking of the membrane and/or any other signs of premature deterioration.

#### (Warranty/Maintenance)







#### 3.4.5 | OBSERVATION

Staining on the underside of the mechanical room ceiling was observed. This staining appears to be a result of moisture presence. The caused of this staining was not identified.

#### RECOMMENDATION

The further investigation of the water ingress problem at this location is recommended.

### (Warranty)

#### 3.4.6 | OBSERVATION

Staining and cracking of the plaster on the underside of the stairwell ceiling was observed. This staining can be a result of moisture presence. The caused of this staining was not identified.

#### RECOMMENDATION

The cause of the staining and cracking should be identified.

## (Warranty)

#### 3.4.7 OBSERVATION

The roof at 750 W 12<sup>th</sup> Ave building is covered with a green roof. The type of roofing membrane was not confirmed.

#### RECOMMENDATION

The regular maintenance and review and early detection is very important on the green roofs since the membrane is not exposed for the review.

## (Maintenance)

#### 3.4.8 OBSERVATION

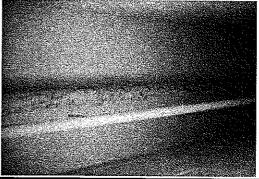
Vegetation growing at the perimeter drainage areas filed with drain rock was observed.

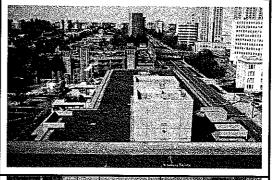
#### RECOMMENDATION

The vegetation should be removed regularly to allow designed roofing system to perform as intended.

#### (Maintenance)









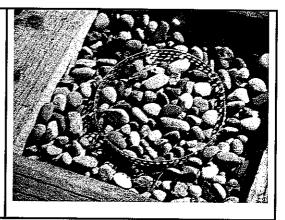
#### 3.4.9 | OBSERVATION

The drain pit areas appeared to be generally free from any debris.

## RECOMMENDATION

The regular review and maintenance of the roof drains is required to allow designed roofing system to perform as intended.

(Maintenance)



## 3.5 PAVEMENT, CONCRETE CURBS AND LANDSCAPING

ITEM	DESCRIPTION	PHOTOGRAPH
3.5.1	OBSERVATION Uneven surface of the pavers on the ground floor patios was observed at several locations. This condition is a tripping hazard.	
	RECOMMENDATION The deficiencies related to the uneven surface of the patios should be eliminated. (Warranty/Maintenance)	
3.5.2	OBSERVATION The rust on the metal cover by the main entrance and at some other locations was observed. RECOMMENDATION The metal cover should be protected with unty corrosive primer and paint. (Warranty/Maintenance)	



## 3.6 UNDERGROUND PARKADE

ITEM	DESCRIPTION	Рнотодкарн
3.6.1	OBSERVATION We did not observe any active leaks at the slab level at the time of our review. RECOMMENDATION The regular review for any problems at the slab level is recommended. (Review/Maintenance)	
3.6.2	OBSERVATION Diagonal crack previously repaired was observed at the wall of parking stall #9. RECOMMENDATION The regular review of the repaired areas and of the parkade walls and slab for any active leaks is recommended. (Maintenance)	9
3.6.3	OBSERVATION The efflorescence staining was observed in several locations throughout the parkade. RECOMMENDATION The effloresce staining should be cleaned and those walls should be monitored for re-occurrence of the staining or active leaks. (Maintenance)	
3.6.4	Observation The cracks in the suspended slab were observed in several locations. RECOMMENDATION The regular review of the slab especially at the cracks and high traffic locations is recommended.	



#### 4. CONCLUSIONS

- 4.1 In general the majority of the building envelope components perform as intended for its age and exposure; however several deficiencies were reported by the Owners and/or observed by VVV Engineering Ltd. during our site reviews. They are grouped into several categories based on the type of building envelope component (walls, windows and doors, balconies/decks, roof and underground parkade). Pavement, concrete curbs and landscaping were also reviewed.
- 4.2 The major and the most serious problems are related to the staining algae and moss growth on the stone cladding by the main entrance to 2851 Heather Street building. The types of staining and their severity is an indication of the moisture presence in and possibly behind the stone cladding. Further investigation and review of the building envelope details specifically related to this location is required to identify the cause of the staining.
- 4.3 There were also various miscellaneous deficiencies related to building envelope reported by the owners or observed by VVV Engineering Ltd. We provide the following recommendations for those problems:
  - Doors and/or windows not closing properly or hard to close were reported by many owners. All doors and windows which don't function properly should be checked and adjusted by the window and door manufacturer/installer.
  - Unusual cold draft around floor, walls and/or doors was reported by 11
    Owners. The cold areas should be checked and the problem should be
    rectified as required.
  - Problems due to lack of the gutter and downspout system at the perimeter
    of approximately 4' wide eyebrows at the roof level is resulted with direct
    water drainage from those surfaces and sometimes also overflow scuppers
    from the roof level on the balcony/deck below. This condition is causing the
    lack of enjoyment of the balcony/deck of the residents of the affected units.
    The installation of the gutter and downspout system or
    implementation other solution is recommended to rectify the above
    listed problem.
  - For more specific information regarding observed deficiencies and required action please see previous Section 3 -"Observations and Recommendations" and Appendix A -problems reported by the Owners. Since not all of the Owners participated in the survey one cannot guarantee that all defects were identified at this point of time. We recommend that the Owner/Occupant questionnaire is distributed once a year.



- All the above listed problems and any unresolved deficiencies reported in Two Year Post-Construction Review Report prepared by Morrison Hershfield should be rectified.
- 4.5 The Architectural set of drawings provided for our review included only the Elevation and Floor Plan Drawings. The building envelope details were not provided for our review. The full set of architectural drawings including detailed description and detailing of all wall assemblies should be provided for the Owners record.
- 4.6 Building Envelope Maintenance Manual should include the details of the wall and roofing assemblies and the name of the installed components including the maintenance instructions for the Strata and Individual Owners.

#### 5. LIMITS OF LIABILITY

- 5.1 The building envelope maintenance review undertaken by VVV Engineering Ltd. was based on rather limited and superficial visual observations.
- 5.2 Only two site visits were made, with no attempt to review every element or portion of the building to ascertain the quality or sufficiency of any particular aspect of the building. As such, our opinion cannot be extended to elements and portions of the building not reviewed, or situations reasonably beyond the control of VVV Engineering Ltd.
- 5.3 The building envelope review undertaken was a visual unobtrusive maintenance review to identify areas of obvious deterioration and maintenance items and actions required. We cannot guarantee that all defects were identified, but every reasonable effort was made to identify potential problems within the scope of the review. As such, our opinion cannot be extended to elements and portions of the buildings not reviewed, or situations reasonably beyond the control of VVV Engineering Ltd. During the visual building condition review, no attempt has been made by VVV Engineering Ltd. to analyze the design of the building and its components and no detailed zoning or Building Code review has been conducted.
- 5.4 Our comments are not a guarantee or warranty of any aspect of the condition of the buildings whatsoever. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. VVV Engineering Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

If you have any questions regarding the contents of this report, please do not hesitate to contact us.



Engineering Ltd.

Prepared by: **VVV ENGINEERING LTD.** 

Per:

Elizabeth Pytlewski, P.Eng. Project Engineer ela@vvvengineering.com

EJP/ep

MAY 18 2010 Valentin Varga,

Principal

val@vvvengineering.com

# **APPENDIX A** OWNER AND/OR OCCUPANT QUESTIONAIRE

