

Building Envelope Maintenance Report

January 2010

**Sample Building
Sample St
Vancouver, BC**

LMS 1111

Conducted by:



We have conducted a building envelope maintenance review of the Sample building located at Sample Street in Vancouver BC. The review was conducted on January 19th and 20th 2010, in order to evaluate the current condition of exterior materials and assemblies, and as the basis for the following observations and recommendations. This review was not invasive, and did not include the removal or destructive testing of any areas of the building. For the purposes of inspecting the hi-rise building, drops from a boson chair were conducted. The drop locations were selected in order to maximize accessibility to details or components of interest.

The review is intended to report the condition of materials visible at the time of inspection. It should be noted, that while every effort has been made to identify defects, we do not guarantee that every potential problem has been itemized in the inspection. When the maintenance work is conducted on this building any additional issues that might be discovered should also be attended to.

Overview

The Sample building is a 29 story 90 unit residential high-rise building constructed circa 2002. The concrete framed building includes three townhouse units and was constructed over a 3 level underground parkade. The exterior walls of the building have been predominantly clad with window wall system that includes metal panels in some areas. Mass concrete walls also act as the exterior cladding where present around the building.

Low sloped roofing throughout the project includes inverted roofs and roof decks which have been finished with rock ballast or concrete paving stones. Balconies have been waterproofed with a liquid applied polyurethane membrane.

From a maintenance perspective, there are issues that should be dealt with at this time in order to enhance the long term performance of the exterior materials and systems. During our review, we noted all conditions we observed which require attention, including matters that go beyond what would typically be considered maintenance issues.

The following information outlines the general condition of particular materials, as well as noting specific areas of concern. Photographs and elevation drawings are included in the appendix. Photographs give an example of particular items noted in the report, and are not correlated with a specific area of the building unless otherwise noted. Situations where a given condition is common throughout the building will be noted in the appropriate material section of this report.

Roof

The low slope concrete roof sections of the building have been waterproofed using an inverted roof design. The roofing consists of a waterproof membrane applied directly to the concrete. The membrane is then covered with rigid insulation and gravel ballast. The membrane is protected from physical damage by the placement of the insulation and rock ballast above. The roofs drain into surface drains located in the field of the roof. At the perimeter of the roofs, concrete upstand walls have been capped with metal flashing, and in some locations a gumlip flashing has been installed to protect the top edge of the waterproof membrane.

Due to the nature of the inverted roof, a full inspection of the membrane condition is not practical however observations regarding drainage and protection were made. Generally, the roof appeared in good condition with the ballast well dispersed, penetrations in good condition and the drains clear and free of debris. The perimeter cap flashings and where present gumlip flashings also appeared in good condition with no signs of physical damage. Sealant was noted as missing in some gumlip flashing areas. In some locations, a gumlip flashing has not been installed to protect the top edge of the roofing membrane. In some locations at the perimeter of the ancillary townhouse roofs, perimeter flashings have not been installed, and the waterproof membrane is exposed. Flashing should be installed in these areas.

Small amounts of moss were noted in some flat roof areas (Photo1). The moss should be removed in a timely manner.

It is recommended that the roof areas be visibly inspected regularly, and any debris removed and drainage problems rectified and / or reported to the appropriate personnel.

Roof Decks

The term roof deck refers to those exterior platforms or decks that occur over a habitable space, and are accessible for use as a deck. Roof decks make up the majority of the roof top area at the Sample. As with the main roof areas, the roof decks have been constructed using rigid insulation installed over a waterproof membrane. In the roof deck locations, concrete paving stones, or slate have been installed over the rigid insulation as opposed to the rock ballast used in roof areas. Roof decks are located on both the hi-rise and townhouse portions of the building.

The roof decks drain through surface drains located in the field of the decks. In all those areas reviewed, the drains appeared clean and free flowing. Flashings and railings in the roof deck areas also appeared in good condition at this time. Moss was present in a number of locations between the concrete pavers (Photo 2). The moss should be removed as soon as practical, and a program implemented to regularly remove organic growth from the roof deck areas.

The concrete pavers are made of concrete, and as such are subject to efflorescence. Efflorescence is a whitish deposit that is created by the salts in the cement being carried to the surface of the stone or brick, by migrating water. Efflorescence in patio pavers is an expected, temporary occurrence, and as such, should generally be left alone. It most commonly occurs in the fall and winter months when drying rates slow and pavers stay damp for extended periods. Efflorescence can often be removed with a water wash and scrubbing. Unlike treating efflorescence on masonry walls, **DO NOT** use an acid wash on the patio stones as this can damage the rigid insulation and membrane below.

Residents should clean and inspect the roof deck areas on a regular basis. Plants and other organic materials should be removed from between pavers and at deck perimeters.

In some upper floor areas, wood decking has been constructed over the concrete pavers. Wood used to construct the deck walking surface is a natural product that may experience some warping and or cracking based on exposure to the elements. This is an unavoidable phenomenon that will vary from area to area. Any boards that do become cracked or warped to the extent that they become a hazard should be replaced immediately.

Balconies

The term balcony refers to those areas that do not occur over habitable space, and should not be confused with roof decks as described above. Concrete balconies occur throughout the building. The concrete balconies have been finished on their surface with a liquid applied urethane membrane. The balconies slope away from the building, and drain over their outside edge to the ground below.

In the majority of locations, the balcony coatings appeared in good condition with no signs of cracking, blistering or peeling noted. There were, however, a number of areas where the balcony membrane was noted as blistering, peeling, or as missing (Photo 3 - 4). The balcony membrane in these areas should be repaired or replaced in a timely manner. Varying amounts of dirt were observed in some balcony locations, and should be cleaned as required.

Residents should regularly clean the balcony surface, checking the condition of the coating for any cracks, blisters, cuts or burns. Damaged areas should be repaired in a timely manner.

It is recommended that plants and planters be kept from direct contact with balcony surfaces, as they tend to retain moisture and increase the rate of deterioration. Also, mats that hold water can increase the growth of mold or mildew on the deck surface. Mats that are open or breathable are less likely to facilitate organic growth. It is important for owners to inspect the balcony surface beneath mats or carpets on a regular basis.

Windows

The windows at the Sample Building are thermally broken aluminum framed double glazed units. The aluminum framed window wall systems has been used to clad the majority of the building exterior. The system runs between slabs, and has been flashed at the sill, and sealed to adjacent materials with a bead of caulking. Inspection of the window systems includes visually observing the condition of seals, fasteners, sealed units and metal panels.

In general the window units all appeared in good condition. Sealant was noted as missing or failed in some window locations. Broken glazing was observed in some areas, and in some locations, gaps were noted at the junction of metal panels with the window framing. The window glazing gasket was noted as hanging loose in one location on the East elevation of the building (Photo 5). All of the noted conditions should be rectified as soon as practical.

Residents should check their windows on a regular basis looking for things such as fogging between glazing panes, as well as moisture or air leaks. Also, the window hardware should be checked, to ensure of proper function, on a regular basis.

Concrete

As previously noted, in some areas the exterior walls at the Sample Building have been constructed using poured in place reinforced concrete. Concrete is a versatile building material with a history of good performance. As with all materials, concrete has inherent strengths and weaknesses. While concrete is strong, it is also relatively rigid. In spite of concrete's inherent durability, it can, and often does develop cracks in areas. Most cracks occur early in the life of a building and are usually a result of settlement, or drying shrinkage. Thermally induced expansion and contraction can also cause cracking throughout the building life. These cracks are generally superficial and easily repaired. Minor cracking is not an indication of structural failure, and should not be assumed to be of catastrophic proportions. As the concrete is the weather barrier portion of the wall, it is important to review its condition on a regular basis, and seal any cracks before moisture ingress leads to oxidization of the steel reinforcing.

Cracks were noted in the exterior concrete walls at the Sample Building in a number of locations around the building (Photo's 6 - 9). As noted on the elevation drawings, cracking was common to some details, and was present in these areas at each floor. The concrete was also noted as chipped in a few areas (Photo 10). In all locations, cracks in the concrete should be repaired as soon as practical.

Paint

Paint, like sealant, has a life span that will vary based on its exposure to the elements. There can be a substantial reward in detecting paint problems before they become more costly. Paint that has deteriorated to the point of exposing the substrate can substantially increase the amount of surface preparation required before recoating. As labour is generally the largest portion of painting costs, allowing the substrate to deteriorate can be very costly.

Paint is adversely affected throughout the year regardless of the seasons. In the winter, rain, snow and freeze thaw cycles can easily damage the paint. In the summer, high temperatures and ultraviolet exposure can be detrimental. The most cost effective means of maintaining paint is to monitor it regularly and follow up with spot painting of any areas showing minor wear. This procedure of inspection and repair will reduce the frequency of a full paint renewal program.

Paint coatings should be cleaned whenever they show signs of dirt, or organic growth buildup. This condition can attract and retain moisture, which can eventually cause the coating to deteriorate. The method of cleaning can range from a garden hose and soft bristled brush, to the use of cleaning agents, and a pressure washer. It is generally advisable to use as little force as is required by a given job.

At the Sample Building, the paint over the concrete was observed to be missing in a few locations, and was noted as blistering or peeling in others (Photo 11). In all of these areas, the substrate should be cleaned, and a new paint coating applied.

Corrosion was noted on the decorative metal rails on the South elevation of the roof tower. The metal in this area should be cleaned, primed, and a new coat of paint applied.

Sealant

Sealant is a generic term for materials used on the interior or exterior of a building to seal joints, junctures or gaps against uncontrolled moisture or air infiltration. The life expectancy of sealant can vary greatly and is affected by numerous factors. Joint design, material selection, substrate preparation, service requirements and exposure levels, all affect the longevity of a sealant material. As sealants can play an integral roll in the overall performance of the building exterior, it is important that they be monitored on a regular basis. Regular inspection of sealants is an important component of any exterior maintenance regimen.

In general the exterior sealant at the Sample Building appeared in good condition, however sealant was noted as separating in some locations, and missing in other areas (Photo's 12 – 14). Sealant separations are not common to any particular detail or location around the building.

In all areas, sealant should be installed where missing, and repaired where failures have occurred.

Flashings

The flashings around this complex appeared in good condition. Where applied the cap flashings that protect the concrete roof curb walls were in good condition. As previously noted, flashing was noted as missing in some locations including ancillary roof perimeters, and gumlip flashing at roof deck perimeters (Photo 15). Flashing should be installed in all locations where required to direct water or protect waterproof membranes or other building components.

Vents

The exterior vents were clear and free of lint in some locations, however there were a number of areas observed where vents were plugged or partially plugged (Photo 16). There were also a number of locations noted where the vent cover is loose (Photo 17) or is missing (Photo 18). In one location, a birds nest was present in the ducting as the vent cover was missing.

It is important that a regular program be implemented to remind residents to clean the exterior vent covers, as well as to arrange for professional cleaning of the dryer ducting. A poorly maintained dryer vent can lead to moisture problems and staining within the building. Where accessible, exterior vent covers should be vacuumed by residents quarterly, and professionally cleaned annually. Dryer lint traps should be cleaned regularly to help minimize the build up of lint in the ducts as well as at the exterior vent.

Miscellaneous

Parkade

A 3 level below grade parkade services the Sample building. The concrete floors have been finished with a urethane base traffic coating. As is common, cracks were noted in the ceilings and walls of the parkade (Ceiling at ramp between stall 22 and 49 (Photo 19) / Ceiling at stall 64). None of these cracks appeared to be active at this time. All cracks should be visually monitored to determine if they are active. If moisture is seen emanating from the area of a crack, the area must be further investigated, and the crack sealed.

Site Specific Observations

We were requested to make observations at the following locations around the building:

Unit 2801:

- Cracks are present in the exterior concrete wall and ledge above the kitchen window (Photo 20)
- Staining at interior window head (Photo 21)
- Cracks are present in the concrete balconies (Photo 5)
- The waterproof membrane has peeled off on one balcony (Photo 5)

Townhouse 1

- Moisture staining on interior ceiling above front entrance

Townhouse 2

- Paint blistering on interior concrete stairway wall (Photo 22)
- No gumlip flashing at roof deck perimeter (Photo 23)
- Minor gap at electrical outlet in exterior concrete wall

Townhouse 3

- Paint blistering on interior concrete stairway wall (Photo 24)

In all locations, the townhouse walls and ledges are dirty with organic growth present in a number of areas. Cracks are also present in the concrete at various townhouse locations.

Summary

There are components on the exterior of the building, which at this time require remedial work in order to perform as originally planned.

In general, the following items should be reviewed with regard to future work:

- Replace failed sealant
- Install sealant where missing
- Repair cracks and chips in concrete
- Repair balcony membrane where breached
- Apply paint or balcony coating where missing
- Remove pavers and investigate leaks from roof decks on townhouse units 2 and 3
- Replace or repair vent covers where missing
- Replace broken window glazing
- Clean exterior dryer vents where required

Appendix

- **Homeowners Inspection List**
- **Photographs**
- **Elevation drawings with notes**

Photographs

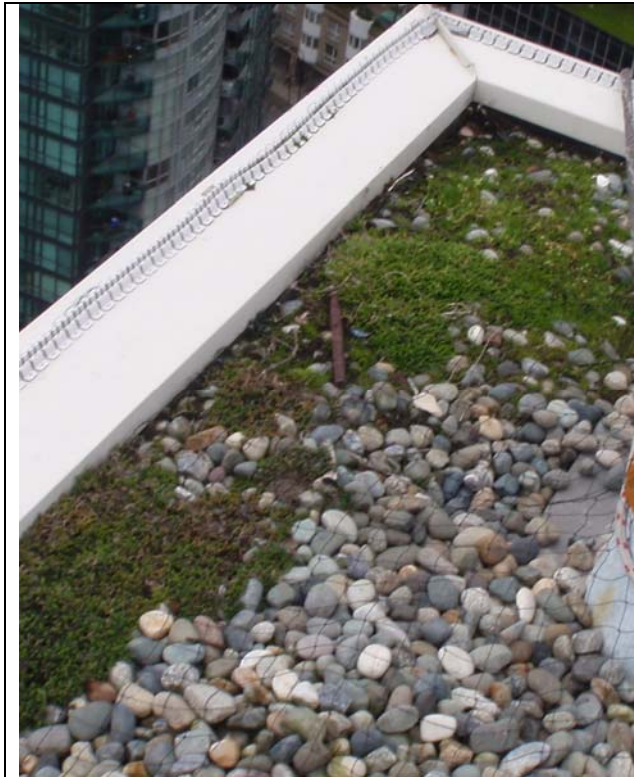


Photo # 1 – Moss on roof



Photo # 2 – Organic growth on roof deck



Photo # 3 – Missing membrane

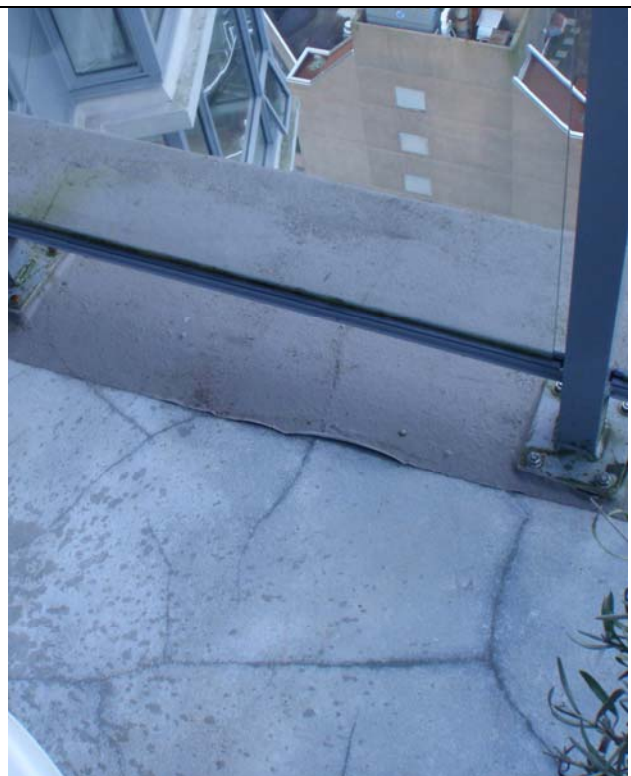


Photo # 4 – Missing membrane and cracks on balcony

Photographs



Photo # 5 – Loose window gasket



Photo # 6 – Cracks in concrete



Photo # 7 – Horizontal crack in concrete



Photo # 8 – Crack in concrete

Photographs



Photo # 9 – Horizontal crack in concrete



Photo # 10 – Chipped concrete



Photo # 11 – Paint peeling and missing sealant at vent cover



Photo # 12 – Missing sealant at window head

Photographs



Photo # 13 – Missing Sealant



Photo # 14 – Sealant separation at window jamb

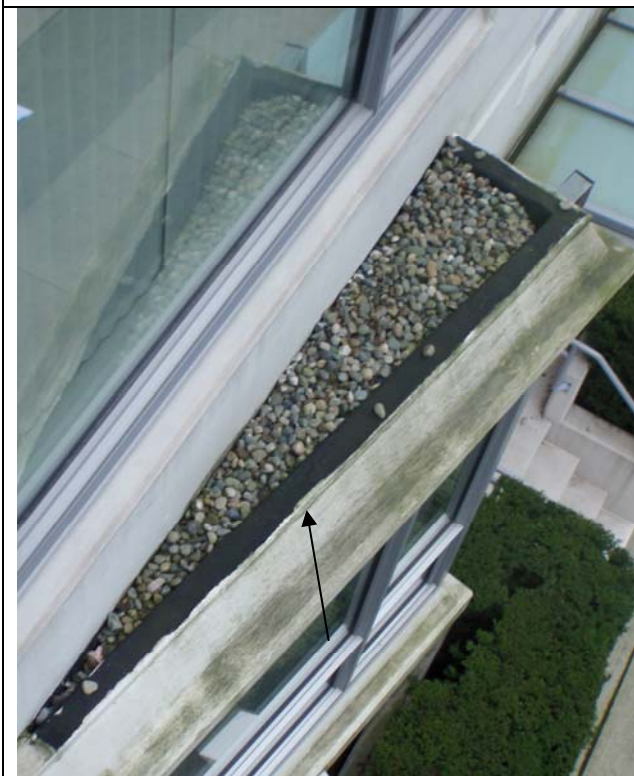


Photo # 15 – Missing flashing at ancillary roof



Photo # 16 – Plugged vent screen

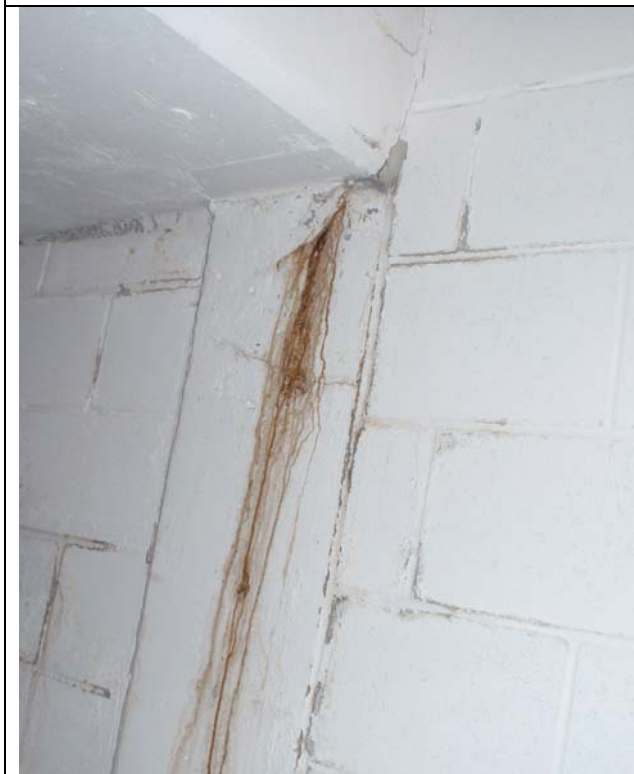
Photographs



Photo # 17 – Loose vent cover



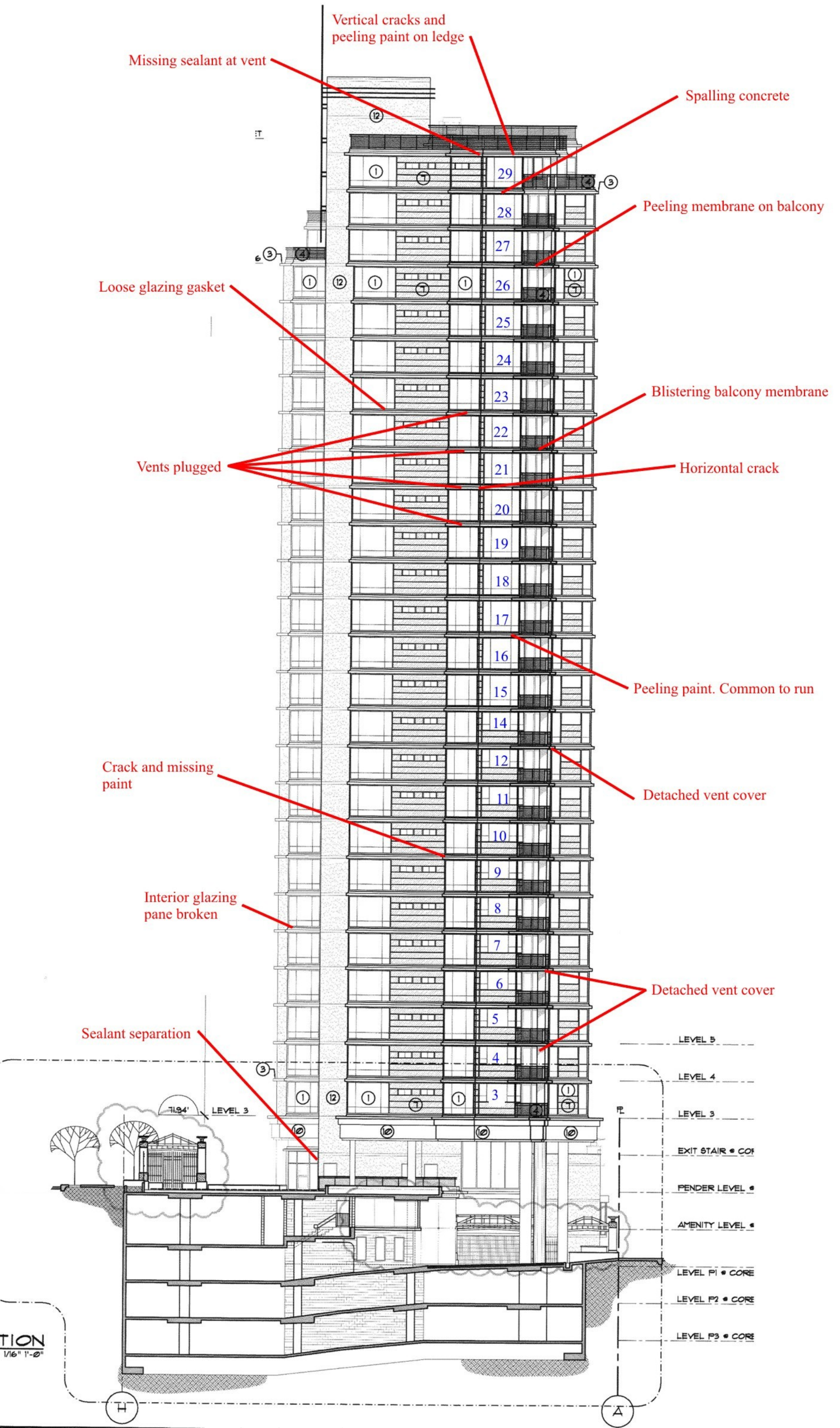
Photo # 18 – Missing vent cover



**Photo # 19 – Moisture and staining on wall at
parkade ramp**



Photo # 20 – Cracking at unit 2801



Vertical hairline cracks.
Common to run.

Missing vent cover.
Birds nest in vent.

Moss on roof deck

Vent plugged

Balcony very dirty

Vent detached. Cracks
with efflorescence.

Vent plugged

Vent detached

White gravel on deck membrane

Roof deck membrane
exposed

Vertical crack

Missing cap
flashing