

BC Roof Inspections

Inspections, Maintenance Programs, Consulting

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July 31, 2019

Owners of Strata Plan LMS3990
c/o Bayside Property Services Ltd.
100 – 6400 Roberts Street,
Burnaby, BC
V5G 4C9

Email: cwong@baysideproperty.com

Attention: Charles Wong




Re: Residence at The Crystal
6028 & 2088 Willingdon Avenue,
Burnaby




As per your request we have completed a roof survey of the address noted above and offer the following recommendations.

The flat roof, garden roof as well as on the tower as well as the low rise residential building is what is known as an inverted roof system. A non-reinforced rubberized asphalt based membrane was applied to the bare concrete roof deck. Next the roof was covered with two layers of XPS rigid insulation; a 2" base layer followed by a layer of 4". This is followed by a layer of filter cloth which is then covered with 2" river rock to act as ballast. This roof system can last for a long time as the roof membrane is protected from UV radiation as well as the extreme weather and temperature that a traditional exposed roof assembly is subject to. The perimeters are protected in areas with metal flashing.

The roof vents and plumbing flashings are made from galvanized steel or aluminum which seen on most large construction projects. Roof flashings at the base of walls and chimneys consist of lightweight pre-painted flashings.

The attached pictures, along with the following report, highlight typical problem areas, and provide recommendations and solutions to the problems.

<p>1.</p>		<p>View of the building being inspected. Roof sections inspected are marked with a yellow dot (the townhouse decks, flat and slope roof were reviewed).</p>
<p>2.</p>		<p><u>Low Rise</u></p> <p>A view of the main flat roof on the low rise townhouse building. Access to the roof membrane in an inverted assembly is difficult as the gravel ballast needs to be removed, followed by the removal of the insulation.</p>
<p>3.</p>		<p><u>Low Rise</u></p> <p>The gravel ballast and the filter fabric were pulled back in a few locations in order to review the roof system.</p>

4.		<p><u>Low Rise</u></p> <p>The insulation consists of a base layer of 2” followed by a layer of 4” of Type 4 extruded polystyrene (XPS). This type of insulation is less hydroscopic than others and offers a better R value when compared to EPS insulation. XPS has an R-value of 5 per inch, though this will be reduced as the insulation absorbs water.</p> <p>Though less hydroscopic, it should be noted that the bottom layer is saturated with water.</p>
5.		<p><u>Low Rise</u></p> <p>The membrane exposed is an asphaltic based non-reinforced membrane.</p> <p>It should be noted that there is no protection sheet laid out over the rubberized asphalt. The insulation was set directly onto the roof membrane. This can cause issues as the insulation isn’t able to slip along the roof membrane, but will exert forces on the membrane as the insulation moves throughout the day.</p>
6.		<p><u>Low Rise</u></p> <p>The base of the galvanized flashings are heavily corroded. One drawback of an inverted roof assembly is that the roof stays wetter for longer. Today, vents are treated with a waterproofing coating that extends above the gravel to prevent this corrosion. When this roof was installed, no such action was ever taken.</p>

7.



Low Rise




Here is another location where the gravel was removed. In this area, the insulation was glued to the roof deck, which is not typical.




8.









Low Rise




Blisters were noted in the three locations where the membrane was inspected. The blistering is worse on the parapets. In all locations it was also observed that the membrane was applied unevenly; in some areas the membrane is 4mm thick while in others it is so thin that the rough concrete surface shows through. The membrane also appears to be deteriorating. When compressed, an oily fluid can be forced out from the membrane.

<p>9.</p>		<p><u>Low Rise</u></p> <p>In all locations that were checked, the insulation was fit back into place and the filter cloth with ballast re-applied.</p>
<p>10.</p>		<p><u>Low Rise</u></p> <p>The outer eyebrow roof doesn't have a typical roof membrane installed. Instead, a thin liquid membrane was applied, known in the industry as a traffic coating. This coating is notorious for leaking.</p>
<p>11.</p>		<p><u>Low Rise</u></p> <p>In all areas the traffic coating has deteriorated. Bare concrete is visible all along the perimeter. This coating has failed.</p>

12.		<p><u>High Rise</u></p> <p>The roof system on the high rise is the same as what was found on the low rise roof.</p>
13.		<p><u>High Rise</u></p> <p>The gravel and filter cloth were removed from select locations.</p>
14.		<p><u>High Rise</u></p> <p>The insulation consists of the 2" layer followed by a 4" layer, both of which are XPS.</p> <p>In this picture it is easier to see the uneven application of the roof membrane. The circled areas are very thin.</p>

15.		<p><u>High Rise</u></p> <p>Blisters were noted along the walls at the first area investigated.</p>
16.		<p><u>High Rise</u></p> <p>A large water filled blister was discovered against the wall in the second location.</p>
17.		<p><u>High Rise</u></p> <p>Large water blisters were also discovered in the field at the second location as well. The thick concrete roof deck will usually keep water out until the water reaches a crack or a penetration, which is then when a roof leak will occur.</p>

18.		<p><u>High Rise</u></p> <p>Insulation joints should be staggered to prevent thermal bridging. The joints were not offset in one location.</p>
19.		<p><u>High Rise</u></p> <p>Repairs have been made in areas of the high rise roof. Some of these repairs were not properly carried out; in this example the reinforcing scrim is missing in the liquid membrane.</p>
20.		<p><u>High Rise</u></p> <p>Deep cracks in the stucco were noted. These cracks can allow water to leak in and onto the building wrap behind the stucco. Over time, this can deteriorate, allowing water to leak in behind the roof system if there are issues with the membrane at the wall.</p>

21.		<p><u>Garden roof</u></p> <p>Two leaks were reported on the garden roof. Due to the overburden, it is not possible to review the membrane as it was on the other roofs.</p>
22.		<p><u>The following are typical to all buildings</u></p> <p>The filter fabric must be completely buried to prevent it from fluttering in the wind, which would displace the ballast. If large enough areas become bare of the ballast, there is the possibility of the insulation blowing off the roof.</p>
23.		<p>Debris was noted on the roof and should be cleaned up. Old, broken equipment should not be left on the roof.</p>

24.



Many of the penetrations in the roof deck do not exit through proper roof flashings. Instead they rely on a great deal of the roof membrane poured all around. Movement and vibrations can break this bond, leading to water leaking in under the roof membrane.

25.



The caulking at the flashing joints on the parapets has failed.

26.



Moss and other plants were noted to be growing on the roof. These plants can impede the flow of water towards the drains, and can cause the drains to plug up.

Conclusions and Recommendations

The rubberized asphalt roof membrane installed on the low rise is starting to show signs of deterioration. Small blisters were noted against the walls. The rubberized asphalt roof membrane installed on the tower is in poor condition where checked. The membrane is heavily deteriorated at the perimeter. It is pulling away from the walls and roof deck in areas, indicating that the surfaces were not adequately prepared before the membrane was installed. Blisters were also noted to have developed.

On both roofs, the membrane coating is very inconstant in thickness, indication a poor application. In addition, a protection or slip sheet was not installed on top of the roof membrane, causing the insulation to bond to the roof membrane. This forces the membrane to be pulled when the insulation moves, causing it to tear up from the roof deck or from the walls. Much of the caulking has deteriorated as can be expected. All exterior caulking, particularly at the roof level, needs to be periodically re-applied due to the constant exposure. Some of the galvanized vents are rusting due to the amount of ponding water on the low rise roof deck.

Repairs have been noted in areas, and they have been carried out using a liquid membrane that is compatible with a rubberized asphalt roof system, though in some cases the repairs have not been made correctly.

The traffic coating on the low rise eyebrow roof has failed. The caretaker indicated that leaks have been reported in these areas. Cracks will develop in the concrete, and when the coating fails, water will leak into these cracks.

Due to the poor condition of the rubberized asphalt roof membrane on the high rise roof, it is recommended to carry out a full membrane replacement in 2020. At this time, the traffic coating on the low rise eyebrow roof should be upgraded. The owners should plan on replacing the roof system on the low rise in 2021 or sooner if leaks develop.

Due to the intense landscaping on the garden roof, a full review is not possible unless greater forces are mustered to carry out an investigation. Typically, heavily vegetated roofs are replaced when they start leaking as exploratory investigations can be quite costly. If leaks persist, or multiple leaks have occurred over a short period of time, the owners should consider replacing the membrane.

For budgetary purposes, please consider the following: The cost to install the new roof system to the low rise roof can be estimated at \$1,000,000.00 - \$1,150,000.00 plus GST. The cost to install a new roof system to the high rise roof can be estimated at \$675,000.00 - \$750,000.00 plus GST. This would include removing roof membrane, replacing the wet insulation, installing a new 2 ply SBS membrane followed by new insulation, filter fabric and re-using the existing gravel ballast. The cost to replace the traffic coating with a proper waterproofing membrane can be estimated at \$65,000.00 - \$80,000.00 plus GST.

These prices are only budget numbers and should not be relied on for raising any funds. For raising funds it is recommended that a full scope of work be developed and put out to tender so hard numbers can be used.

Should you have any questions regarding this report or require specification and tendering on this complex please do not hesitate to call at 604-539-2510.

Sincerely,

Sincerely,



Ted Neef, RRO
BC Roof Inspections