



**BUILDING ENVELOPE REVIEW
for
HAMPTON COURT AND CHURCHILL PLACE**

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Prepared for

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Attention: Mr. Roger Taylor

A handwritten signature in black ink, appearing to read "Randy Knight", written over a horizontal line.

**Randy Knight
Building Scientist**

A handwritten signature in black ink, appearing to read "Bruce McLeod", written over a horizontal line.

Reviewed by : Bruce McLeod, P.Eng.

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1.0 INTRODUCTION

Levelton has been retained by Strata Council to conduct a building envelope review, excluding the waterproofing of the parking garage, of the buildings at 545 Manchester Road (Hampton Court) and 520 Dunedin Street (Churchill Place). This report includes a list of deficiencies found, their probable causes, possible building code violations, suggested repairs and the associated estimated costs for the repairs.

2.0 BACKGROUND INFORMATION

The two buildings, completed in 1993, consist of four storeys of wood-frame construction over concrete substructure, built over one level of underground parking, with the exception of the southwest half of Churchill Place, which is founded on grade (ie. no basement). The exteriors are stucco clad with numerous decorative bands, cantilevered balconies and aluminum windows. The roof assemblies are flat, with a non-insulated, thermofusible 2 ply elastomeric membrane covering.

This building envelope review was prompted by concern over staining on the buildings exterior cladding.

3.0 EXISTING CONDITIONS

3.1 Roofing

A visual inspection of both roof assemblies was done on July 31, 1998. The weather on that day was warm and sunny as it had been for several weeks prior. Our assessment of the existing condition of the two building's roofs are summarized separately here.



Hampton Court

The roofing material on Hampton Court is a 2 ply modified bitumen thermofusable membrane with a granulated cap sheet. The workmanship of the original installation appears to have been poor as evidenced by short end laps, materials not laid straight and improperly bonded lap joints. Several built-up areas near the roof centre on the north and south sides, and over the elevator shaft, have been installed without curbs. This has allowed water to flow down the vertical surfaces causing degranulation and promoting plant growth. Plumbing stacks have been left long, with storm collars installed that have experienced caulking failures. At several areas around the exterior walls the cap sheet stripping is loose, with unbonded lap joints. At the firewall parapet, which extends from the north to the south walls, shrinkage of the building has caused tenting and tearing of the cap sheet stripping. In one area near the firewall a recent patch has water trapped under the cap sheet forming a large blister. Two drains were found without screens over their openings. A large area on the east side of the firewall and a small area on the west side show evidence of ponding. Around the elevator shaft several areas have developed openings and the membrane is tenting, possibly due to building shrinkage. The drain at the west location has the membrane stretched tight, eliminating the sump area provided. Two of the skylights have condensation between the layers of acrylic, indicating failed seals. The roof was installed without overflow protection. Perimeter wall cap flashings have areas that are without slope to the inside.

Churchill Place

The roofing material on Churchill Place is similar to Hampton Court. The workmanship appears the same but has a better roof design. Built-up roofs have curbs installed but drains have no splash pads underneath. Plumbing stacks have been left long with caulking failures at storm collars. The vertical walls of several raised roofs have loose membrane stripping. The side of one skylight curb also shows evidence of loosely bonded membrane. An open seam was noted on the northwest wall at the west built-up roof area. One dryer vent hood is damaged and those checked were partially plugged. Two drain openings were found without screens; one was located and replaced. The air conditioning unit ducting has support legs bearing directly on the cap sheet membrane and the electrical/gas jack flashing has a caulking failure. The cantilevered overhangs above four 4th floor balconies appear to be sagging. The roof was installed without overflow protection. Exterior wall cap flashings do not slope to the inside at most locations.



4.0 BUILDING EXTERIOR

The exteriors are clad with acrylic stucco with numerous decorative bands around the buildings over which painted metal flashings have been installed on the top horizontal surfaces. Flashings have a combination of standing and lapped seams which have had caulking applied. Parapet walls have cap flashings installed with wall connection upturns. Aluminum soffit under eaves and balcony floors is vented at Hampton Court but not at Churchill Place. The entrances have decorative stucco facades with domed, canvas covered awnings over brick paved walkways. Design and construction were to be done under the 1985 Building Code regulations.

4.1 Balconies

Balconies selected for inspection had visual indications of suspected deficiencies and are considered representative of all areas and levels of construction. Inspections were done visually and by moisture probing with a Delmhorst model BD-2000 moisture meter.

The cantilevered balconies have stucco cladding applied to both the interior and exterior wall surfaces with glazed railing enclosures installed on raised perimeter walls. The glazed railing enclosures are fastened to the building exterior through their side rails. Fasteners are installed through drilled holes in the stucco cladding with no caulking or gaskets provided and show signs of corrosion. The decks have plywood floors covered with a vinyl membrane extending up the walls under the cladding. Drains are round, one and a half inch copper flashing jacks, installed through the exterior walls approximately one quarter inch above the floor level. Balconies on the fourth level, without overhanging roofs, have flush mounted floor drains that have drain leaders protruding through lower level balcony floors that join patio drains under the concrete floors. Metal flashings have a combination of standing seam, lap and drive cleat joints with caulking applied randomly. The flashings appear to have been installed flat (no slope), with upturns at the wall connections.



4.2 Windows

The windows of both condominiums are residential grade, extruded aluminum, double glazed sealed units with baked enamel finishes. Information stamped on the window assemblies indicate that they were manufactured in 1992 by Almetco Windows.

Over all windows, aluminum head flashings have been installed. At the first floor level it was observed that some head flashings slope negatively (ie back towards the building). This can direct water captured to the back of the flashing and into the back of the stucco cladding from off the ends of the flashings. The water then depends on the building paper to shed it from the wood framing before finding a way out. Structural damage can occur if the moisture cannot escape by penetrating the building's wood framing.

Windows in three units were reported to have had problems. In Hampton court mold was reported to be forming on window frames in unit #101; water ingress was reported at one window and at the patio door in unit #104; and a leak over the living room window, reported to have been stopped by caulking, was previously noticed in unit #117.

5.0 PRELIMINARY INVESTIGATION

5.1 Building Exterior

At the entrance to Hampton Court, in the south east corner, there is a large, efflorescence covered, water stain under an overhanging wall. Moisture probing was done to determine if moisture was still present during the current long, hot spell of weather. Moisture readings were relatively high (28 to 30 percent), indicating an active water leak in the wall cavity. In reviewing the drawings it was noted that 2nd, 3rd and 4th floor units have their kitchen sinks directly over this area.

In the area of the decorative bands around both buildings, several deficiencies were noted. On the lowest level band, at the 2nd floor balcony level, the flashings were noted to be negatively sloped in most locations. This is typically the result of building shrinkage combined with the weight of the stucco cladding and windows exerting downward pressure on the flashings. This negative slope, along with poor flashing details and caulking failures, can lead to water ingress into the building structure through openings in the flashing joints. At one flashing joint, which is typical of both building's flashing details at this level, a



moisture probe test was done. The test revealed moderately high levels of moisture but no evidence of decay. (This area was where water spray testing was performed two days previous). At higher levels the decorative band flashings do not appear to be negatively sloped but joints have open seams and caulking has failed. Various cracks in the stucco exterior finish were noticed, primarily at terminations, where water ingress can occur; the largest being at the upper level firewall connection of the south wall at Hampton Court. Dryer vents on the exterior walls were noted to be partially plugged at most locations.

5.2 Balconies

Suite #410 Churchill Place

This balcony was found to have heavy staining on the stucco cladding at several flashing terminations. A cap flashing upturn at the base of the south wall is inadequate in that a large void is allowing water ingress at the wall connection. A moisture probe reading, taken just below this area, did not indicate the presence of moisture, however, due to the recent long period of warm, dry weather, this was not unexpected. The probe, when inserted into the holes drilled through the stucco, penetrated the underlying sheathing relatively easily, indicating possible wood decay. A hole, drilled into the flashing void, revealed dry, decayed wood. In the southeast corner a two inch long cut in the membrane was noted and the occupant indicated that ponding occurs in that corner when it rains. Around the floor drain opening the membrane was found to be unbonded and loose. The cap flashing drive cleat joints, on top of the outside walls, were not caulked.

Suite #204 Hampton Court

This balcony was found to have water ingress problems when the patio door underneath was investigated for water leakage, two days earlier. The water ingress was found to originate at flashing joints where the decorative band intersects the balcony. Moisture probing at recently observed areas of water egress failed to turn up any moisture retention or areas of decay. Around the perimeter, flashings are negatively sloped, with open joints visible.



Suite #215 Hampton Court

As previously found at other balconies, flashings at some wall connections have minimal upturns and openings visible. At one cap flashing wall connection, the flashing is right adjacent to the window frame, leaving an area for possible water ingress. There is staining at the base of the wall under this intersection. At the flashing upturns, below the stucco cladding "J" mould, a growth of moss has accumulated, together with a collection of stucco debris, blocking the drainage path.

Suite #317 Hampton Court

We found similar conditions at this balcony although problems appeared minor. A small opening was noticed at the end of the raised perimeter wall cap flashing which is possibly allowing water ingress behind the stucco cladding.

Suite #308 Churchill Place

This balcony has indications of some ponding, possibly due to the wall drain being slightly above the floor level. The areas between the cap flashing upturns and the stucco "J" mould have stucco debris blocking the drainage path.

Suite #405 Churchill Place

At this balcony the sliding glass door was found to be slightly misaligned. Water was ponded in a small area at the outside corner and the wall mounted drain was partially plugged. Cracks in the stucco cladding were noted radiating from the top corner of the door and window. Corresponding cracks were present on the interior walls in the gypsum board.



5.3 Windows

Suite #101 Hampton Court

We inspected reported problems with the west side windows and found that a black coloured residue was present on the inside window frames. This was most prevalent on the kitchen window but appeared on all the west side windows. This residue appears to be the result of condensation which reportedly forms regularly on these windows. The presence of mould and mildew is very common in this situation and can leave a residue similar to that observed. The occupants informed us that this builds up over a period of approximately six months, at which time they remove it by wiping the window frames off. Windows in the north east corner of the unit reportedly do not need this frequent of a cleaning as the build- up is not as prevalent. No other water leaks were reported or evidenced.

Suite #104 Hampton Court

Levelton investigated the sliding patio door and kitchen window of unit #104 for reported water ingress problems. A caulking job on the exterior flashings, reported to have been done in late fall of 1997, had apparently stopped the leak over the kitchen window but not the leak over the patio door.

A water spray was applied at the outside of the kitchen window for a period of approximately 10 minutes to try and determine if the window assembly leaks. Minor water ingress was observed into the condensation track below the sliding window. The water was then directed to the surrounding wall area and flashings, including the flashing on the decorative band directly above the window. No water ingress was observed to occur.

A water spray was then directed to the floor of the balcony directly above the patio door, near where past water ingress had occurred, as indicated by peeling paint on the wood trim. No water ingress occurred at the exposed door header (the aluminum soffit had been pulled away from the balcony floor exposing the wood structure over the door). We then directed a water spray to the flashing on the decorative band on either side of the balcony, at the building intersection. Water ingress occurred within one minute into the balcony structure and wept out through the stucco cladding. A stream of water was observed flowing from the balcony floor tongue and groove plywood joints onto the patio door header directly over the noted leak area.



Suite #117 Hampton Court

This balcony was not inspected.

6.0 DISCUSSIONS AND RECOMMENDATIONS

6.1 Roofing

The two buildings' deficiencies are summarized separately here.

Hampton Court

Several areas of the roof are in need of repair and are outlined as follows:

- ▶ areas with no curbs should have the plant growth removed (inspect membrane after for damage)
- ▶ plumbing stacks should be cut off and vent caps installed
- ▶ all loose cap stripping should be removed and replaced
- ▶ all unbonded lap joints should be properly bonded
- ▶ in all areas of tenting, the membrane should be removed and new membrane installed
- ▶ in the patched area where the water bubble is present, the patch should be removed, the source of water ingress identified and repaired and the patch replaced
- ▶ the roof drains should have new aluminum screens installed with positive attachments
- ▶ the area around the east roof drain should have the membrane removed and a new relaxed membrane installed conforming to the sump area
- ▶ the roof should have overflow scuppers installed as per B.C. plumbing code regulations
- ▶ the perimeter wall cap flashings should all be sloped to the inside
- ▶ the two skylights with failed seals should be replaced
- ▶ all dryer vents should be inspected and cleaned



Churchill Place

Several areas of the roof are in need of repair and are outlined as follows:

- ▶ drains from the raised roof areas should have splash pads installed
- ▶ plumbing stacks should be cut off and vent caps installed
- ▶ all loose cap stripping should be removed and replaced
- ▶ the void in the open lap joint should be repaired
- ▶ the damaged dryer vent hood should be repaired and all dryer vents cleaned
- ▶ the roof drains should have new aluminum screens installed with positive attachments
- ▶ the feet supporting the air-conditioning unit ducting should have a layer of roofing membrane installed underneath
- ▶ the air conditioning unit gas/electrical line lead flashing should be re-caulked
- ▶ the roof should have overflow scuppers installed as per B.C. plumbing code regulations
- ▶ the perimeter wall cap flashings should all be sloped to the inside
- ▶ a Structural Engineer should be engaged to assess the structural integrity of the cantilevered balcony roof overhang. (Levelton would be pleased to recommend a Structural Engineer with experience in this kind of work).

6.2 Building Exterior

The water leak in the entrance to Hampton Court appears to be plumbing related and should be traced to the appropriate source by first investigating the kitchen plumbing on the 2nd floor units and proceeding upwards, if necessary.

The decorative band flashings at the lower level should be replaced with proper through wall flashings installed over new sloped sills. This repair would entail removing a strip of stucco above all affected flashings to a level that will allow proper layering of the underlying building paper and then replacing the stucco over the new flashings, matching the colour as close as possible to the original. This would tie into the balcony repairs described below.

The higher level decorative band flashings should also be replaced as described above. However, due to better existing conditions, a properly done caulking repair may allow for the replacement to be delayed for a period of time.

All cracks in the stucco cladding have the potential to allow water ingress and should be repaired along with flashing or other details that trap moisture in areas where, due to poor construction details, there is no way to properly shed trapped water. We noticed several fireplace vents and decorative stucco details that have the potential for this problem to occur.

Around both buildings, but most prevalent on the north side of Churchill Place, the backfilled garden area has had soil placed within 200 mm vertical distance from the finished grade. This is contrary to B.C. Building Code Article #9.29.1.4 (1985), that states: "Stucco shall not be less than 200mm above finished ground level except when it is applied over concrete or masonry".

In our previous report on the waterproofing membrane of the parking garage a perimeter drain was exposed and found not to have a layer of drainage medium over it. This contravenes the B.C. Building Code Article #9.14.3.5 (1985) which states, "The top and sides of drain pipe or tile shall be covered with not less than 150mm of crushed stone or other coarse clean granular material containing not more than 10 per cent of material that will pass a 4mm sieve".

The aluminum soffit is designed to supply ventilation to the roof and balcony floors via the perforations in its surface. At Hampton Court this appears to be adequate. At Churchill Place the soffit material has been installed without benefit of ventilation holes. B.C. building code, Article #9.19.1.5 (1985) states: "Where insulation is placed below the roof sheathing in roofs having a slope of less than 1 in 6 or in roofs that are constructed with roof joists, the unobstructed vent area shall be not less than 1/150 of the insulated ceiling area". Further to this, Article #9.19.1.6 states: "Vents described in Article 9.19.1.5 shall be uniformly distributed to ventilate each roof space". This ventilation does not appear to have been provided at Churchill Place. Also, at balconies in Churchill Place, good building practice would have been to install this ventilated soffit material under the decks.



6.3 Balconies

At all balconies inspected, some problems were found. Many of these were minor and can be repaired with little expense. The metal flashings, however, are a cause for concern; they may allow water ingress to the building structure due to their inferior design. A proper repair would be to remove all the metal flashings and install a membrane flashing in their place. New metal flashings would then be re-installed over the membrane sloped to the balcony interior. These should be installed with a minimum number of seams and be all standing seam or "S" locked style. Soldered wall upturn and saddle flashing joints will help ensure a waterproof installation, and should be provided. This repair, as described above, would entail removing a strip of stucco above all balcony flashings to a level that will allow proper layering of the underlying building paper and then replacing the stucco over the new flashings, matching the colour as close as possible to the original.

The attachments of the glazed railing assemblies are also a concern. These fasteners do not appear to be of a non-corrosive type and therefore will eventually deteriorate and could cause failure of the railings. The method of attachment should also be reviewed as penetration through the stucco cladding may lead to water infiltration if not properly detailed.

The floor vinyl membrane should be built up, where necessary, possibly with a liquid poured membrane covering to provide a positive slope to drain, to avoid possible problems that may develop from water ponding.

6.4 Windows

The tested windows showed no problems within their structure and all windows observed appeared to be reasonably well maintained. The west side windows, in Hampton Court unit #101, showed signs of heavy condensation but no visible signs of seal failure. This condensation problem appears to be temperature/humidity related and is considered to be problematic of the window design.

Negatively sloped head flashings may lead to water ingress problems and should be replaced with properly sloped head flashings. This would entail a similar detail as other flashing replacements but with a layer of peel and stick membrane added for extra protection. This would only apply to windows not protected by existing overhangs.



Heavy loading on the flashings below the 2nd level windows may be relieved if flashings and sill are replaced as per our recommendations. We do not anticipate this to negatively impact the window structures, however, disturbing them may bring other related problems to our attention that can be dealt with at the time of construction.

7.0 CONCLUSIONS

7.1 Roofing

Loose and tented membranes are an indication of ongoing failures. Voids and caulking failures are obvious sources of water ingress. Poorly bonded lap joints and stretched membranes will eventually lead to leaks. Loose and missing drain screens can cause plugged drains and flooding. Lack of overflow scuppers can cause roof deformation or leakage at low walls and vents. Improperly sloped flashings can cause staining to the exterior cladding. Dirt, moss and other plant growth will cause drainage problems and membrane breakdown if left in place. Water constantly draining onto one concentrated area may degranulate the membrane, reducing its ultraviolet protection. Mechanical units, installed directly onto the roof membrane, will eventually cause membrane failure.

Due to problems detailed above and the conditions of the roofs as mentioned in the previous discussions, Levelton recommends that specifications be prepared and repairs contracted to a Roofing Contractor in good standing with the Roofing Contractors Association of BC (RCABC).

7.2 Building Exterior

The reported water ingress into the building and subsequent investigation has led us to conclude that replacement of the decorative band flashings is imperative in retaining your buildings integrity. The lower band flashing should be replaced as a minimum requirement with caulking repairs to the other levels being done in conjunction. Replacement of flashings at higher levels is recommended for future consideration. Areas that require deflection of water around poorly constructed details should be considered as high priority and done with first stage repairs.

The unvented aluminum soffit material may need to be replaced with vented style to provide

the proper level of ventilation.

7.3 Balconies

Water ingress into balconies has begun to deteriorate the underlying sheathing in some areas due to water ingress. Repair of the balcony flashings is imperative to ensure the structural integrity. At the second level balconies, the lower wall flashings coincide with the decorative band and can be replaced as part of that repair. At other areas, and at other levels, the flashings should be replaced as described. This could be done in a staged manner with some work done each year. In the interim, obvious points of water ingress should be temporarily caulked or repaired as necessary.

The balcony railing attachments should have non-corrosive fasteners installed and the points of attachment sealed to protect against water ingress.

7.4 Windows

Negatively sloped window and door head flashings can cause water infiltration into the exterior wall structure and be the cause of decay to building elements. All improperly installed head flashings should be removed and replaced. As the 3rd and 4th floor windows have protection provided near the head flashings we anticipate that only 1st and 2nd floor window head flashings may have to be replaced at this time.



8.0 REPAIRS AND RELATED COSTS

For the purpose of this preliminary report, we have estimated budgets for the repairs described above. A more accurate estimate may be provided after the contract specifications are prepared.

8.1 Roofing

Contractor costs to conduct the repairs described are estimated to be.....\$12,000.00

8.2 Building Exterior

Contractor costs for the building exterior repairs are estimated to be:

▶ To replace decorative band flashings at 2nd level	\$22,000.00
▶ To provide caulking repairs as recommended	\$13,000.00
▶ To repair obvious poor details and replace soffit aluminum	\$17,000.00
▶ To provide scaffolding for the entire project	\$15,000.00
Total estimated	\$67,000.00

8.3 Balconies

Contractor costs for the balcony repairs are estimated to be:

▶ To repair balcony railings as recommended	\$9,000.00
▶ To replace flashings as recommended	\$18,000.00
Total estimated	\$27,000.00



- ▶ To provide and install liquid membrane to provide proper slope to drain \$2.50 per square foot

- If all balconies were done, total estimated cost would be.....\$6000.00

8.4 Windows

To replace head flashings at 1st and 2nd floor windows contractor costs are estimated to be\$15,000.00

Total contractor estimated costs	\$127,000.00
Contingency at 40%	\$50,800.00
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Total estimated cost for budgetory purposes	\$177,800.00

8.5 Levelton Engineering Ltd.

- ▶ Preparing specifications \$8000.00
 - ▶ Tendering Contracts \$600.00
 - ▶ Project managment / Inspections @ 15% of contract value \$26,700.00
- | | |
|--|-------------|
| <hr/> | |
| Total estimated fees (excluding GST) | \$35,300.00 |