

6.0 PRODUCTS & ASSEMBLY INFORMATION

This section of the manual describes in more detail the different materials used in the construction of the exterior building assemblies. This information is accompanied by photographs of specific areas of the building to assist owners in recognizing the different materials.

6.1 CONCRETE

The entire complex of The 501 has been constructed with cast-in-place concrete walls and slabs. Concrete is a strong, durable and versatile product, which is commonly used in the construction of modern buildings. It can be finished to give a variety of architectural appearances from patterned and coloured to exposed aggregate. The one thing common to all concrete is cracking, regardless of the surface finish or whether it is a wall or floor slab.

Cracking occurs during the curing process of the concrete and continues due to normal loading stresses and expansion and contraction brought on by climatic conditions. Very thin cracks (thinner than a hair) are common to all concrete and do not normally represent a defect, structural problem or otherwise. However, visible cracks in exterior concrete walls can contribute to water penetration and building leaks.

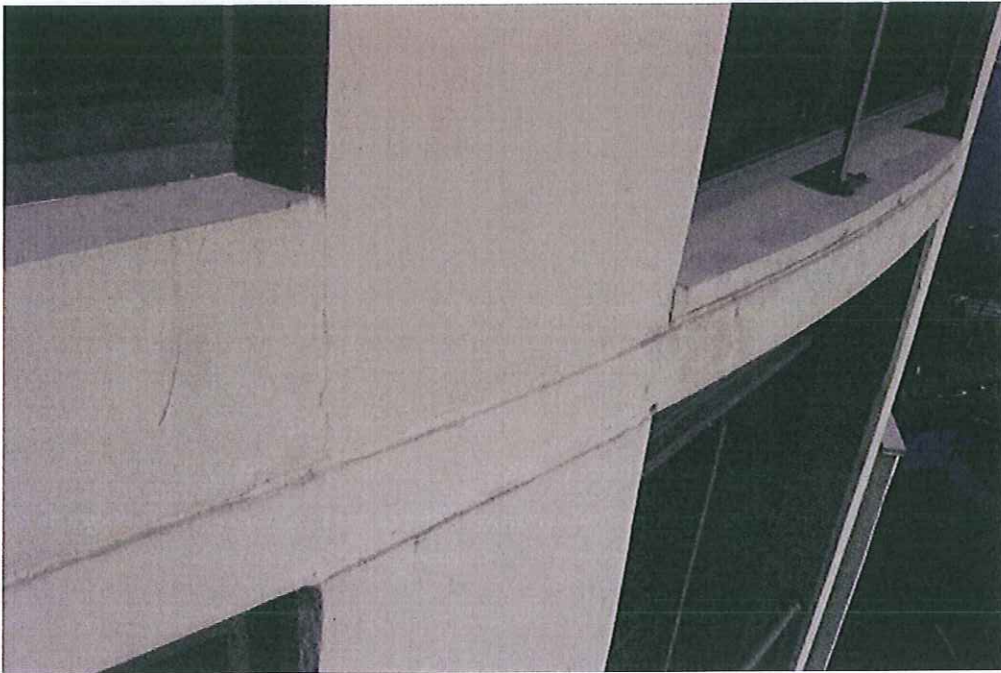
One of the more effective ways of dealing with the water tightness of concrete structures is through the use of exterior coatings which bridge minor cracks when they occur. Larger cracks need to be filled with a flexible sealant prior to re-coating. A grinder should be used to open the surface of the crack to a width and depth of at least $\frac{1}{4}$ " and provide a clean uniform joint to receive the caulking. A polyurethane sealant should be used along with a priming agent according to the manufacturer's recommendations. The sealant should be tooled into the joint to provide a flush surface with surrounding wall area and painted or coated only after it has been allowed to cure properly. The exterior concrete building components should be checked periodically for cracks and addressed as required.

Concrete walls that are not accessible on the exterior, such as below-grade foundation walls, can be repaired using injection methods. Common injection sealant materials include epoxy and urethane grout. Injection ports are inserted into holes drilled along the crack on the interior side of the wall. The sealant material is then injected into the backside of the crack until it is seen spilling out at the front. The material is allowed to cure, then the crack is checked for further signs of leaking. Once the leaking has been halted, the injection ports are removed, and the wall is cleaned and parged.

Concrete surfaces are also subject to attack from chemical agents and salts. Patterned concrete is especially vulnerable to damage because of the reduced aggregate near its surface. Sand can be used as an alternative to de-icing agents for areas prone to icing during the winter months.

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CONCRETE

6.2 DRAINS

Drains on flat roof areas (area drains) are typically protected from foreign material by a perforated cover similar to a shower drain cover. If area drains become clogged, water can build up and leak into areas not intended to accommodate water. Many flat roof areas incorporate scupper drains through the perimeter parapet walls. These scupper drains are installed at a level above the area drains and are intended to relieve excess water in the event of an area drain backup only. Water that drains through the scupper drains simply spills down the face of the building, which could cause long-term damage; therefore area drains should be kept clear so that the relief scupper drains are not utilized.

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DRAINS



6.3 ROOFING SYSTEMS

The basic principles of roofing are to eliminate the ability of water to penetrate the roof system. This is accomplished by either closing all the openings or neutralizing the driving force of the water. Most sloped roofs depend on gravity to offset the forces pushing water inward by moving the water downward and out. Flat or low sloped roofs depend on a continuous waterproof membrane to keep water out. Most roof systems depend on a combination of these two design principles.

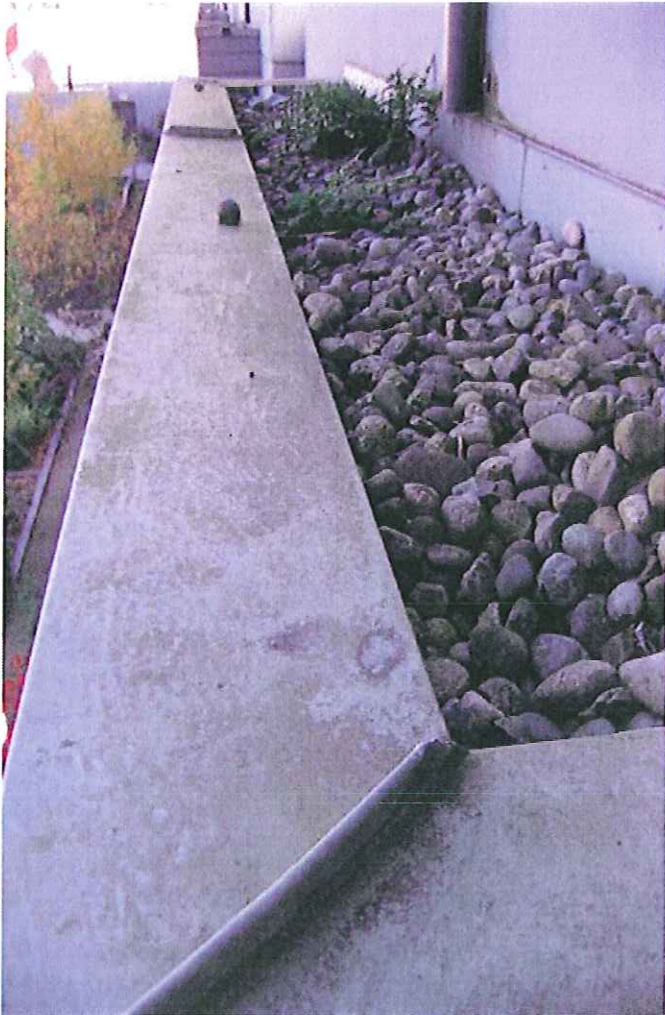
Leaks can occur when there is a gap in the waterproof membrane of a flat roof. The most vulnerable areas on a roof are the transition areas of differing materials such as at perimeter walls, equipment or drains. These areas often rely on flashings, sealant and caulking compounds to control movement and are prone to failure if not properly maintained.

The waterproof membrane applications typically turn up perimeter curbs or parapets to a point several inches above the level of the membrane surface and level of expected high water. Where an overlapping wall cladding does not protect the membrane, it is typically protected from UV exposure above the membrane surface by a flashing.

Inspection and maintenance of the flat roof system should focus on perimeter details, such as flashings and upturns of the membrane, inspection of drain penetrations and sealants. All waterproofing membranes used in roofing have a finite life expectancy and will eventually require complete replacement. Keeping the membranes in good and serviceable repair will prolong their life.

The roofs of The 501 are "inverted", indicating that the membrane is situated below the expanded polystyrene insulation. A ballast of river rock holds the insulation in place. These types of roof structures are robust as the membrane is protected from both U.V. degradation and severe heat fluctuations. During the condition survey, the roofing membrane was observed to be fabric-reinforced urethane, which in this configuration can have a life expectancy of 30 to 40 years.

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ROOFING SYSTEM

6.4 WINDOWS

All windows at The 501 incorporate hermetically sealed, insulated glazing units (IGU) often referred to as double-glazing. This is a system where two glass panes are sealed together with a thermal separation between them. This airtight seal prevents moisture accumulation between the glass panes so the unit does not fog up. The thermal separation improves the insulation properties of the glass, which reduces the probability of condensation forming on the interior during cold weather. These sealed units typically carry a 10-year guarantee from the manufacturer against failure of the seal, which have a normal life expectancy of between 20 and 40 years, depending on the size of the window and its exposure conditions.

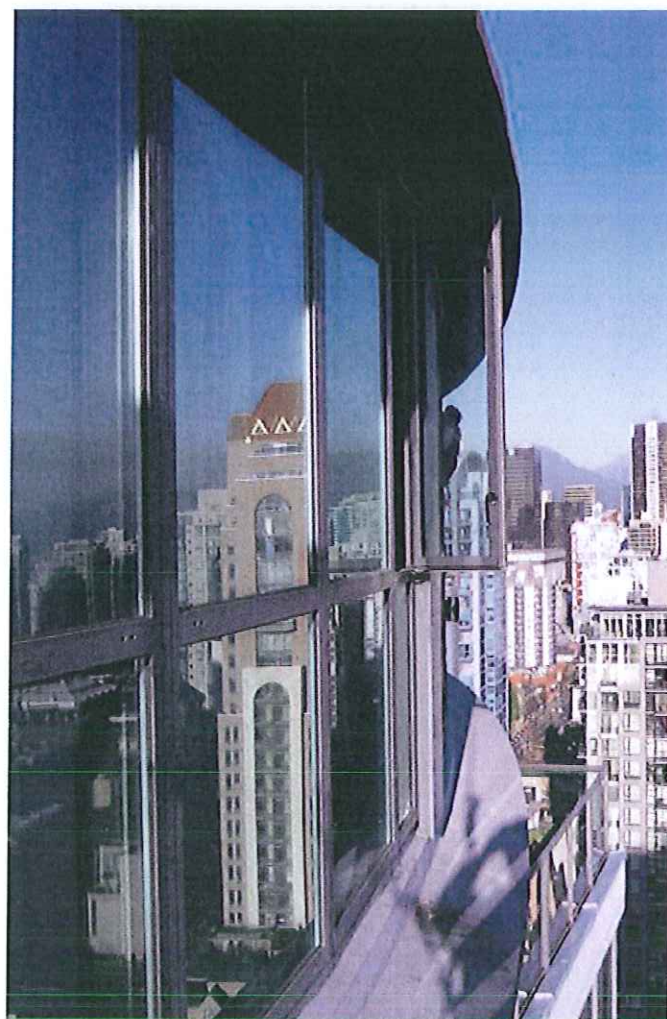
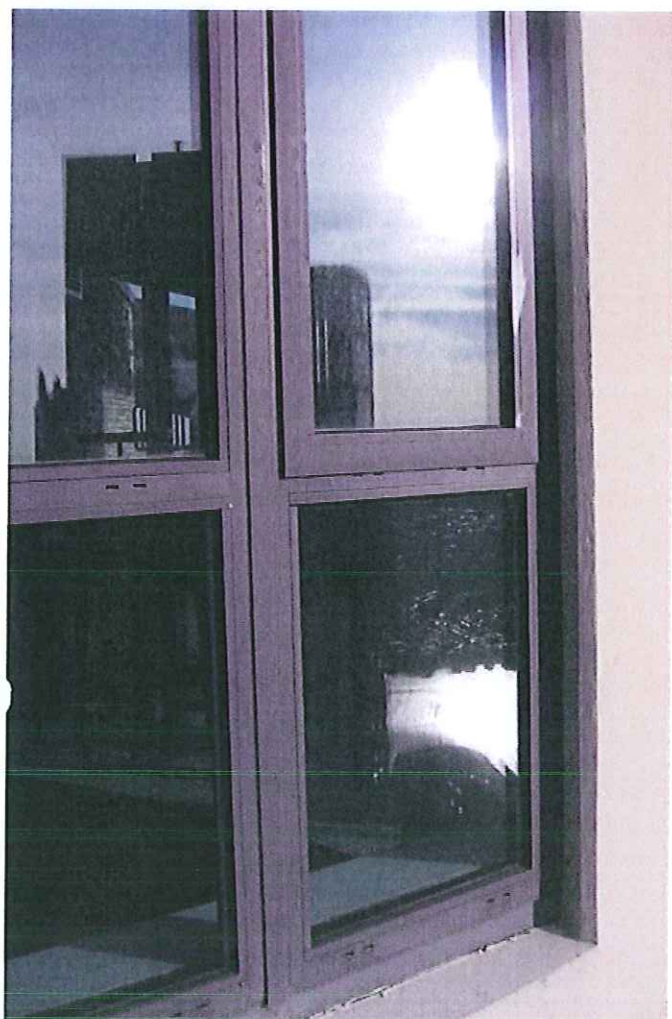
The window frames at The 501 are of the aluminium thermally broken type. Aluminium window frames are generally joined together at their corners in a mitre joint and intermediate frame members held in place by screw fasteners through the perimeter frame. These areas are usually sealed at the time of manufacturing to prevent leaking.

According to studies into building envelope failures in coastal climates of British Columbia, many of the building envelope problems that have been experienced in recent years have been attributable in part, by leaking in and around window frames. Without a means of draining this water to the exterior, it can become trapped beneath the wall cladding and absorbed by the sheathing materials.

Maintenance requirements for the aluminium windows at The 501 will involve regular inspection to identify such things as evidence of water penetration at window sill areas. Water stains at the bottom corners of the window frames is a good indication that leaking is occurring.

Other maintenance requirements for windows include replacing worn or damaged weather-stripping on opening vents, replacing failed sealant around the frame perimeter or installing sealant where none exists. Ensuring adequate slope on the head flashings and that the small drain holes on the exterior called weep holes are maintained free of blockages are also necessary.

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WINDOWS

6.5 FLASHINGS

Flashings refer to sheet metal or other material used in roof or wall construction, which is designed to deflect water at interfaces and joints on and between wall and roof assemblies. They play an important role in the water management of a building exterior by directing moisture to controlled or designated areas. Different types of flashing include; cap, saddle, head or sill, base, step, through-wall and gum-lip flashings.

Metal flashings have a relatively large coefficient of thermal expansion and are required to accommodate expansion and contraction associated with large temperature fluctuations. The correct slope of a flashing is crucial to its ability to perform properly. Flashing slope is not static, but can be altered by building movement or physical damage, such that water is redirected to unwanted or vulnerable areas of the building exterior. Since flashings are generally located in those areas of a building most susceptible to moisture ingress, it is important that they be inspected annually for indications of performance problems.

Flashings installed at The 501 are segmented and are connected with standing seam or 'S' lock joints. Joints, ends and edges of the flashings commonly utilize a sealant to assist with the control of moisture by providing a seal to adjacent materials. Many building failure problems are attributable in part to flashing problems, which allow concentrated amounts of water to penetrate the wall surfaces due to incorrect slope or inadequate seal to adjacent materials. For this reason it is critically important to the integrity of the roof and wall systems that the flashing slopes and sealant be maintained.

Annual maintenance of flashings should include inspection and replacement of failed sealant and a review of the slope to ensure that water is being directed or redirected accordingly.

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FLASHING

6.6 SEALANT

Sealant is a material used for caulking cracks and joints. It is a generic term for a multitude of materials used on the interior and exterior of buildings to seal joints, junctures, gaps and cracks. It is often referred to as just 'caulking' and is relied on to provide a variety of functions including air and moisture barriers in addition to an esthetic finish to a detail. Caulking is generally installed in areas on the building most vulnerable to water penetration and therefore **maintaining caulking is the most important exterior maintenance function.**

The life expectancy of sealants can vary greatly because it is affected by numerous factors. Joint design, material selection, substrate preparation and exposure conditions all affect the longevity of a sealant material. Because sealants provide an integral function in the overall performance of the building exterior, it is important that they be monitored and repaired on a regular basis. Sealant material is prone to failure in part because of UV exposure and because it is generally installed at dynamically moving joints between dissimilar materials. Therefore, frequent inspections (semi-annually) should be carried out on original wall areas and repairs made immediately to deficient areas.

Sealant failure is not necessarily something that can be positively identified by a visual inspection. A caulk joint must often be subjected to an adhesion test to determine if it has lost its bond with the substrate. Caulking joints may appear to be failed to someone conducting a visual inspection because of a dark line at the edge of the sealant bead. This dark line results as dirt and/or mildew collects in the small gap that is formed by separation of the caulking from the substrate. This is a good indication that a failure is beginning, or has taken place.

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SEALANT

6.7 PAINT

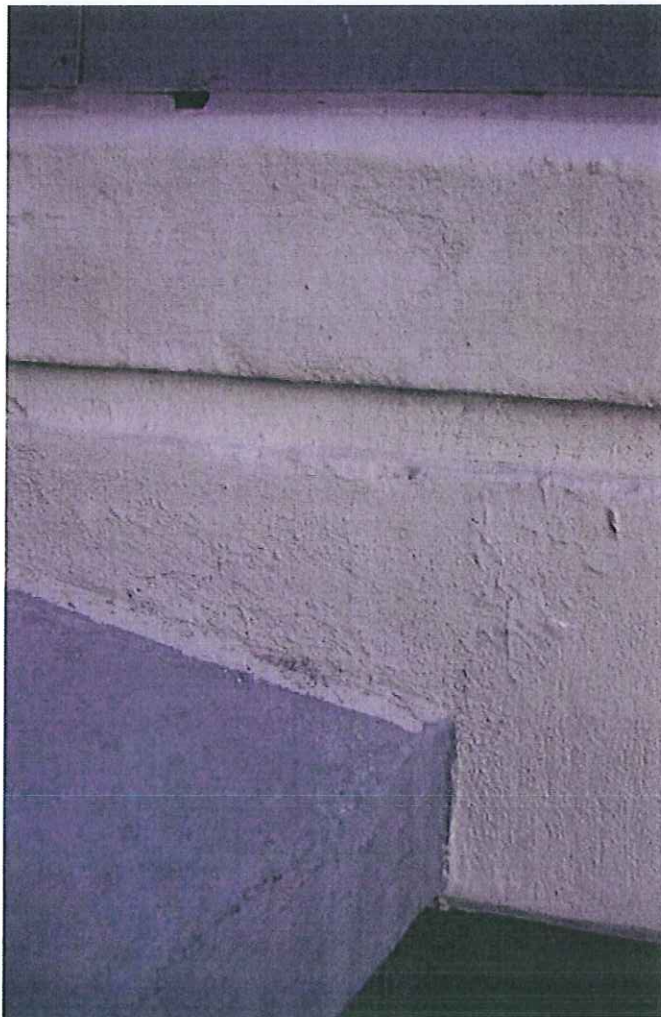
Exterior acrylic latex paint has been used as the exterior coating of the cast in place concrete walls, balconies/soffits and eyebrow/slab-bands. This type of coating does not have the necessary physical properties to protect horizontal elements. As has been indicated in our Building Envelope Condition Survey, all such surfaces should be coated with a fabric reinforced urethane membrane.

Paint, like sealants, has a life expectancy that will vary depending on its exposure conditions however; paint on concrete surfaces generally has a life expectancy of 6 to 9 years. Paint is adversely affected throughout the year by weather elements and UV exposure.

Paint should be inspected as a part of the regular maintenance review. There can be a substantial reward for detecting paint problems early. Paint that has deteriorated to the point of exposing the substrate can substantially increase the amount of surface preparation required before repainting. As labour is generally a large portion of the cost of a painting project, minimizing preparation work will prove to be a cost-effective means of controlling maintenance budgets.

Cleaning painted surfaces of dirt and/or mildew buildup will not only improve the appearance of the building it will also increase the life of the paint coating. The method of cleaning can range from a low-pressure spray of water to high-pressure washing with proprietary cleaning agents. It is generally advisable to use the least amount of pressure and cleaning agents as necessary for the job at hand. Abrasive materials should always be avoided when cleaning painted surfaces.

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PAINT

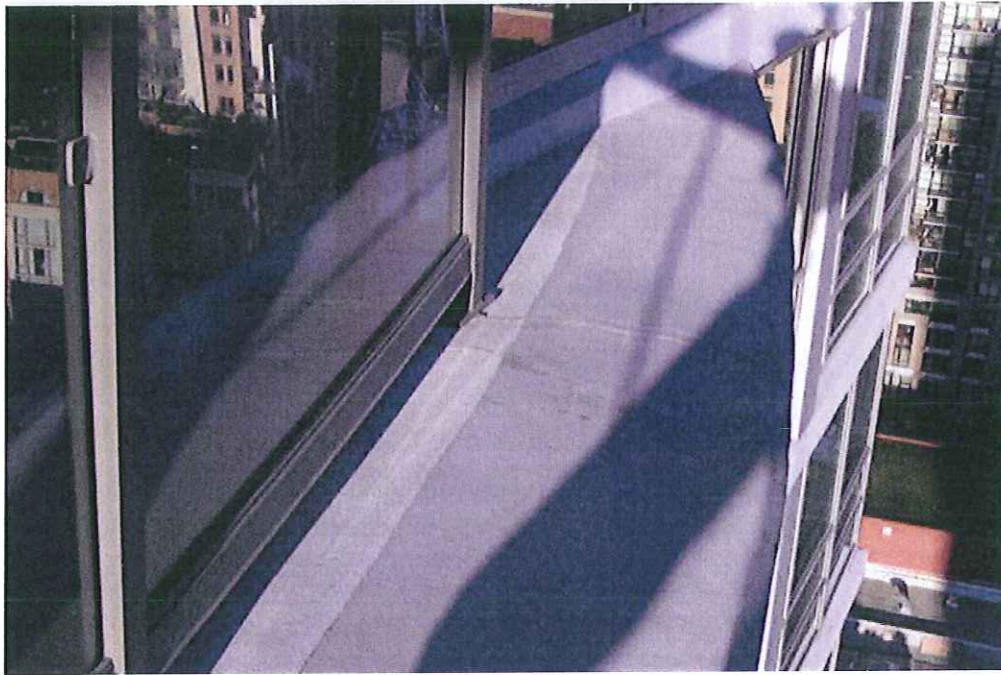
6.8 BALCONIES AND EYEBROWS

Spratt Emanuel Engineering Ltd. has recommended in our Building Envelope Condition Survey, that all balcony and eyebrow surfaces be protected with a new liquid applied urethane traffic membrane. Similarly to all other components of the building envelope, the new membrane will also require regular maintenance.

The word membrane typically refers to a continuous waterproof material used to prevent water penetration. This membrane will be adhered directly to the concrete substrate, which is sloped towards the outer edge.

On the decks, the membrane surface is vulnerable to damage because it is exposed to foot traffic and outdoor furniture. Because this membrane is adhered directly to the concrete beneath, a single penetration could allow moisture to contact the concrete. If the concrete absorbs moisture, the membrane will begin to delaminate and bubbles or wrinkles in the membrane surface will likely appear. Regular inspections will have to be carried out on the balcony and eyebrow surfaces to look for signs of damage or delamination. Because of the limited access to balconies, individual suite occupants should perform these inspections. Any deficiencies identified should be reported to the head of the building maintenance committee immediately.

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BALCONIES AND EYEBROWS

6.9 BALCONY/DECK GUARDRAILS AND PRIVACY SCREENS

Although the balcony/deck railings, or guardrails, and the privacy screens are not part of the building envelope, they are an exterior component of the building that will benefit from regular maintenance. Hence, it is important to bring attention to this particular item.

The guardrails are fastened through the top of the cantilevered balcony slabs, while the deck dividers are fastened through cap flashings, into concrete curbs.

The aluminum railings have an electrostatically applied paint finish, often referred to as a 'powder coating', which is installed by the manufacturer in a controlled environment. This type of paint finish resists cracking, chipping or peeling better than other types of paint finishes on aluminum products and is therefore commonly used on manufactured products. Tempered glass panes have been installed in the railings, which are supported by a rubber gasket or spline on the top and bottom. The glass panes can be easily removed by lifting them straight up and then pulling out at the bottom. The glass should be stored on a cushioned surface to protect against breakage. Tempered glass is susceptible to shattering if struck on its edge.

Maintenance of the aluminum railing should consist of cleaning to remove any mold, mildew or foreign matter. A visual inspection should also be done whenever deck areas are being cleaned in order to assess the condition of the sealant used around the screws, fastening plates which secure the top mounted privacy screens of the townhouses. Proper replacement of failed sealant may necessitate removal of the railings.

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BALCONY/DECK GUARDRAILS AND PRIVACY SCREENS