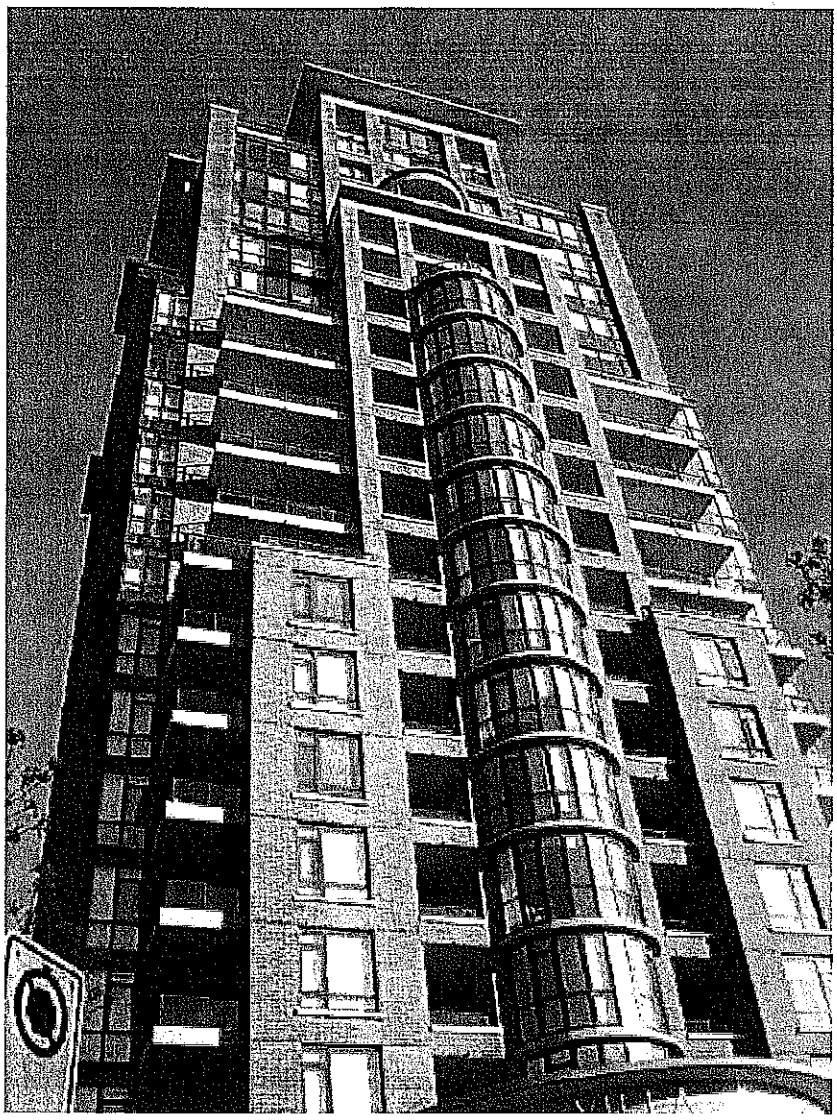
Design Development Report

Villa Jardin, 6833 Station Hill Drive, Burnaby, B.C.



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REPORT 3437.10

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1. Introduction

Strata Plan BCS 907 retained RDH Building Engineering Ltd. (RDH) to further review the building enclosure for the building known as Villa Jardin, located at 6833 Station Hill Drive, Burnaby, B.C.

The purpose of this Design Development Report (DDR) is to further document our findings and present prioritized conceptual remedial solutions for a maintenance and renewals program. Order of magnitude costs are presented for review and discussion with Strata Plan BCS 907 representatives.

As presented, these conceptual recommendations are not intended to provide a comprehensive maintenance and renewals program. Once the Owners have made decisions with respect to the specifics of the proposed remedial work, construction details and specifications will need to be generated and cost estimates further refined.

RDH submitted a Warranty Review report on June 18, 2008 identifying building enclosure concerns and has twice presented these findings to representatives from Strata Plan BCS 907.

This Design Development Report is intended for that audience familiar with Villa Jardin and our Warranty Review Report dated June 18, 2008.

This report is divided into individual building enclosure assembly components.

This section of the report provides a discussion of each building enclosure assembly component and includes:

- → Brief discussion of findings with reference photo(s) or figure(s);
- → Suggested recommendation(s) with options, where appropriate. Recommendations will be prioritized into an "A" or "B" category. The "A" category shall signify recommendations that represent a high risk of water ingress and should be addressed in a timely manner. The "B" category signifies recommendations that represent a lower risk of water ingress and may be deferred or phased into a pro-active maintenance and renewal program.

The final section provides a recommendation summary table with Order of Magnitude costs estimates.

2. Main and Elevator Machine Room Roofs

The upper main roofs are an inverted roof assembly consisting of an asphalt modified urethane roof membrane over structural concrete covered with insulation and gravel ballast. We observed water under the roof membrane at most main upper roof sections suggesting systemic failure of the existing roof membrane (Fig. 2.1). Our observations are consistent with those we have experienced at other buildings with this type of waterproof roof membrane.

Fig. 2.1. **Typical representation of water under existing roof membrane.**

There are large exposed painted concrete parapets surrounding the perimeter of the upper roofs. These parapets are cracked in many locations. The roof membrane is terminated vertically and covered with a gum lip flashing. In many locations the cracks observed in the concrete parapets extend behind the vertical roof membrane termination (Fig. 2.2). As a result, water entering into these cracks is likely entering behind the vertical termination of the roof membrane.

The inside face of the concrete walls at the mechanical well are cracked in many locations. Subsequently the same potential exists for water to enter into these cracks and penetrate behind the vertical termination of the adjacent roof membrane assembly (Fig. 2.3).

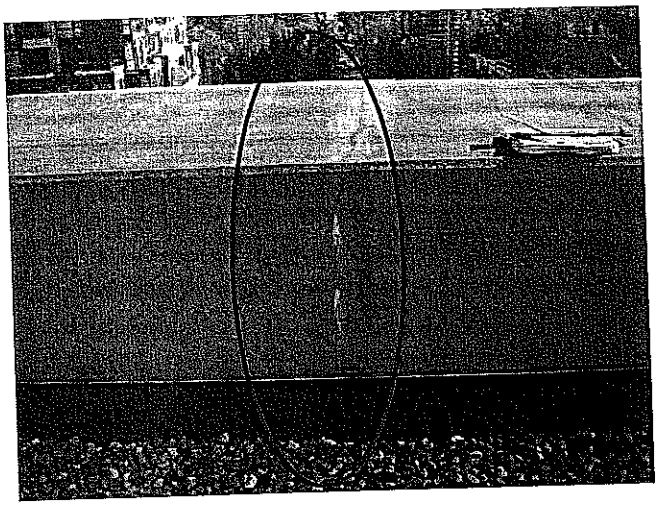


Fig. 2.2. **Typical crack in main roof concrete parapet.**

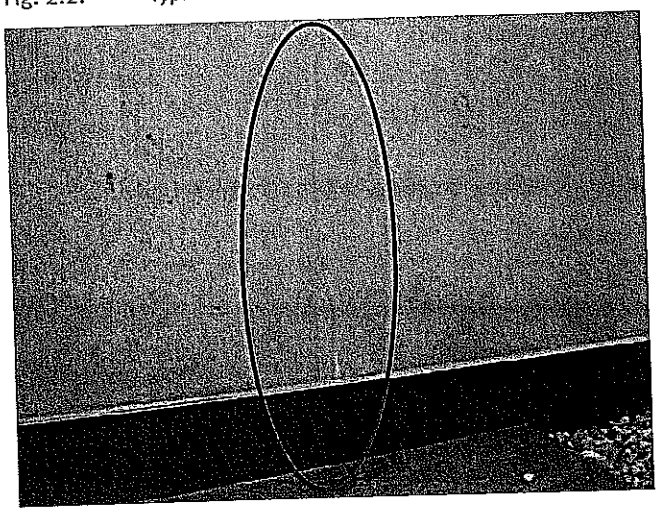


Fig. 2.3. **Typical crack at upper roof concrete wall.**

The exterior face of the concrete walls at the mechanical wells is clad with masonry. Each corner of this masonry cladding interfaces with the concrete parapets (see red ellipse on Fig. 2.6 for masonry to concrete parapet interface locations). The masonry at these locations is installed directly onto the concrete parapets (Fig. 2.4).

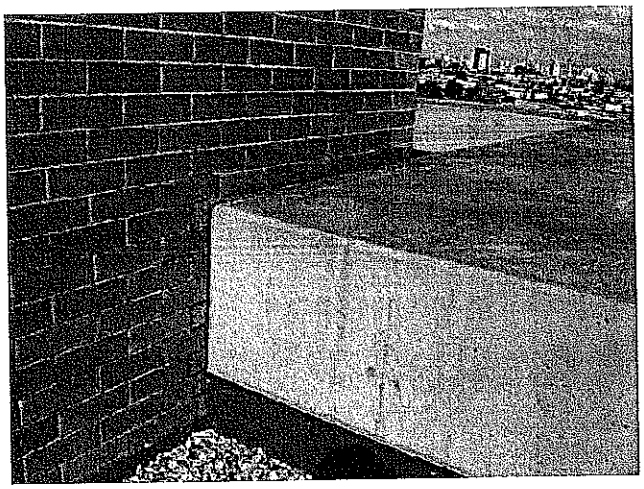


Fig. 2.4. Typical masonry to concrete parapet interface at main roof.

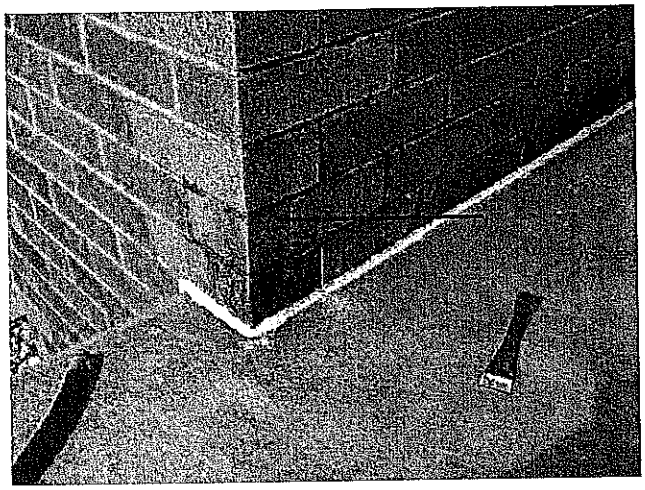


Fig. 2.5. Previous sealant repair above suite 2201. Red arrow shows weak joint location.

During our review we observed that the waterproof membrane on the concrete wall behind the masonry does not extend onto the concrete parapets and the base of the weep holes is located at the same plane as the top surface of the concrete parapets (Fig. 2.5). Subsequently, rain water can flow into the weep holes and enter behind the masonry. It is important to consider that the concrete walls located behind the masonry and the concrete parapets are placed at different times during construction. This results in a cold joint at the interface between these two concrete elements. Water that enters through the weep holes in the masonry can be drawn into the cold joint through capillary action and result in water ingress. This is likely a contributing factor to the water ingress observed in the ceiling of suite 2201 as the leak is located directly below this cold joint interface. As shown in Fig. 2.5, sealant has been installed at the location above suite 2201 to address the water ingress. However, this an ineffective remedial measure.

Fig. 2.6 and Fig. 2.7 below represent affected roof and concrete parapet areas.

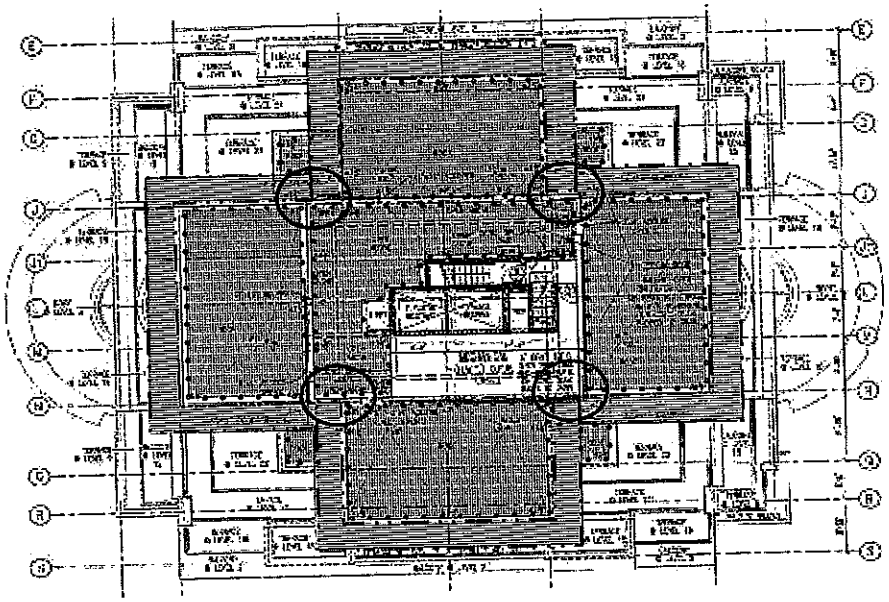


Fig. 2.6. Blue shading represents main upper roof area. Orange shading represents concrete parapet areas. Red ellipses denote masonry to concrete parapet interface locations.

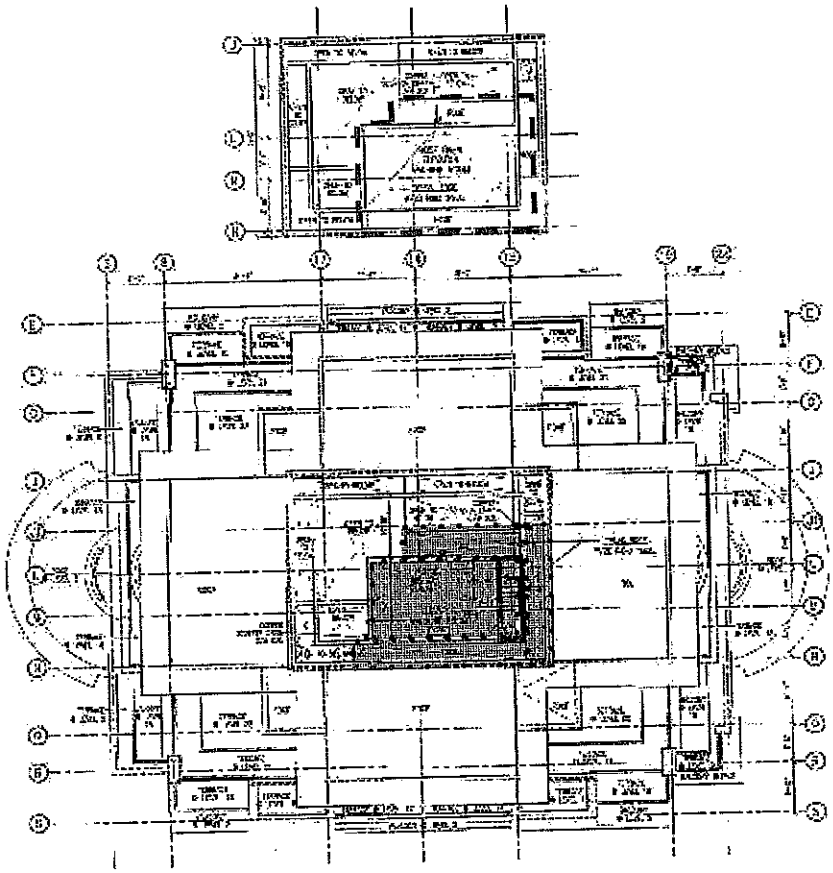


Fig. 2.7. Blue shading represents elevator machine roof areas

2.2. Recommendations for Main and Elevator Machine Roof Areas

Fig. 2.2.1. Main and Upper Roof Areas

CATEGORY	RECOMMENDATION(S)
(A)	Replace existing main roof membrane with a 2-ply SBS roof membrane with improved interface detailing.
(A)	Replace existing elevator machine roof membrane with a 2-ply SBS roof membrane.
(A)	Repair cracks and install urethane roof membrane onto concrete parapets at main upper roof.
(A)	Repair cracks in concrete walls adjacent elevator machine roof areas.
(A)	Provide a contingency allowance to remove and further investigate existing masonry at the interface with the main upper roof concrete parapets to develop and implement improved interface detailing.

3. Deck Assemblies

The deck membrane assemblies are located on various levels at Villa Jardin. These assemblies consist of an asphalt modified urethane deck membrane over structural concrete covered with insulation and pavers. The deck membrane type is the same as that used at upper roof locations documented in Section 2.

For discussion purposes, the decks at Villa Jardin shall be considered as fully exposed or partially exposed. Partially exposed decks are those protected from above by overhangs or balconies.

We randomly removed the pavers at one location on the fully exposed level 22 deck adjacent to suite 2201 (Fig. 3.1) and observed water beneath the modified asphalt deck membrane. We recommend the deck membrane at level 22 be replaced. We removed the pavers at the partially exposed deck at suites 1602 (Fig. 3.2) and 201 (Fig. 3.3) and observed no damage to the underlying deck membrane. However, we observed two small blisters at the suite 901 partially exposed deck membrane assembly (Fig. 3.4). These observations of more significant damage at fully exposed locations and random areas of minor damage at partially exposed locations are consistent with our findings at similar buildings with this deck membrane type.

Fig. 3.1. Suite 2201 – Exposed deck membrane; damage observed.

Fig. 3.2. Suite 1601 – Partially exposed deck membrane; no damage observed.

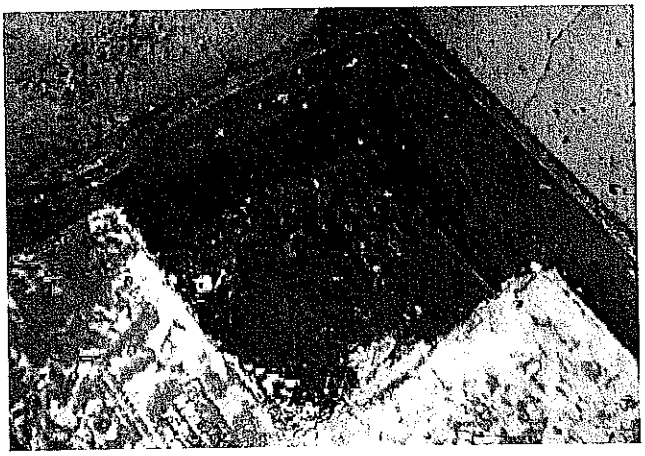


Fig. 3.3. Suite 201 – Partially exposed deck membrane; no damage observed.

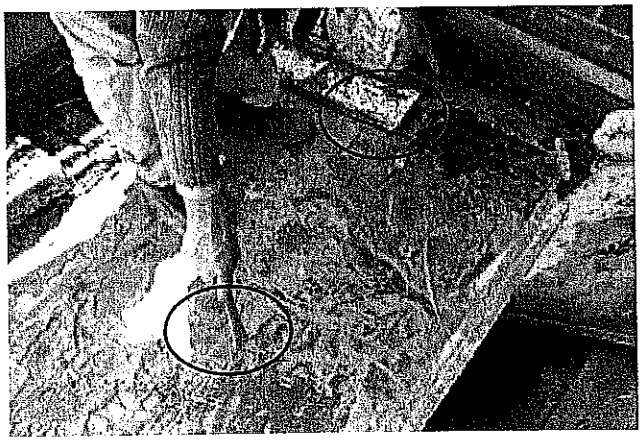


Fig. 3.4. Suite 901 – Partially exposed deck membrane; two small blisters observed. Red ellipse denotes blister locations.

The red shaded areas in Fig. 3.5 show the location of a fully exposed deck membrane assembly location at level 22. The decks at levels 2, 9, 16, and 21 are partially exposed (Fig. 3.6, Fig. 3.7, Fig. 3.8, and Fig. 3.9).

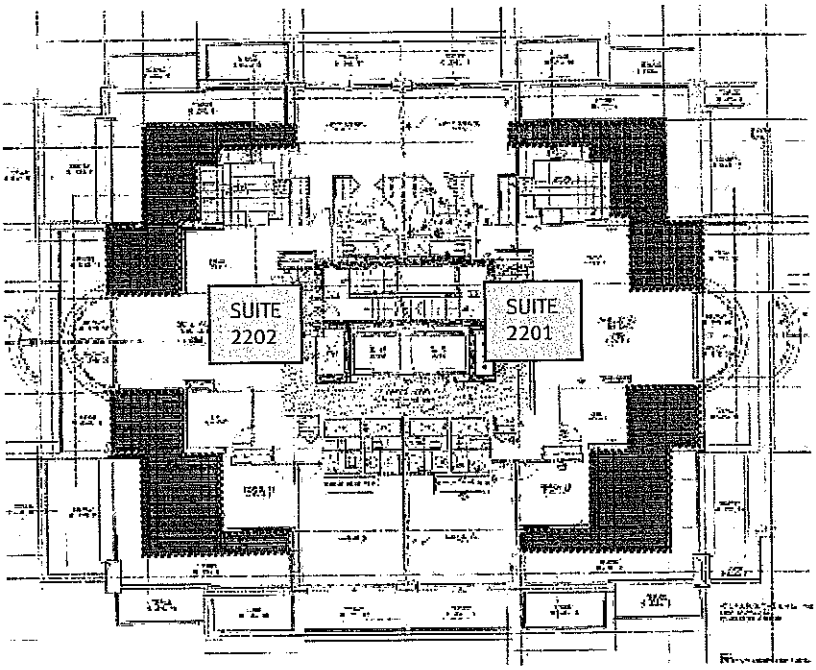


Fig. 3.5. Red shading shows fully exposed deck membrane assembly at level 22.

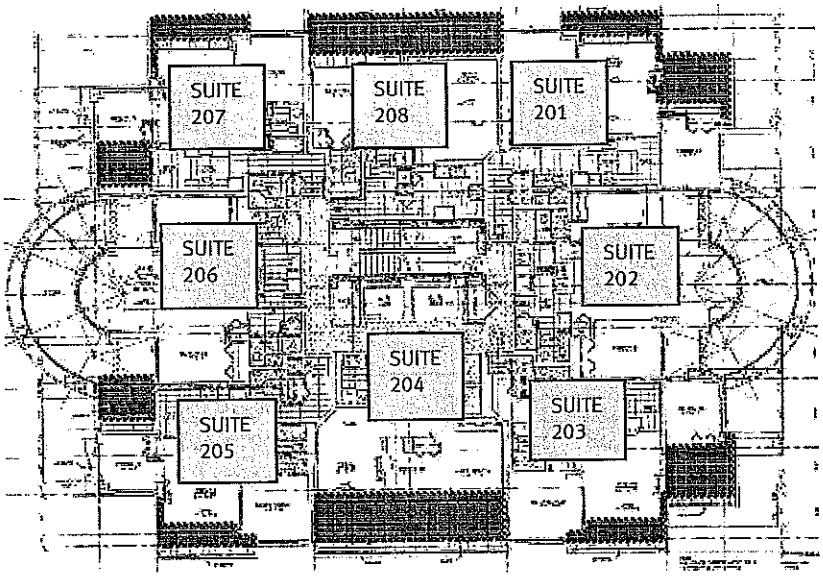


Fig. 3.6. Red shading shows partially exposed deck membrane assembly at level 2.

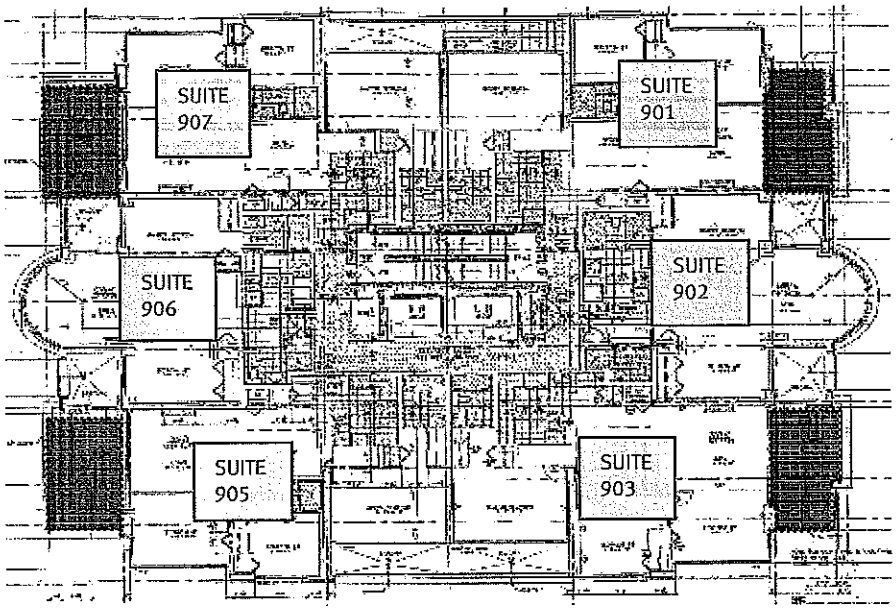


Fig. 3.7. Red shading shows partially exposed deck membrane assembly at level 9.

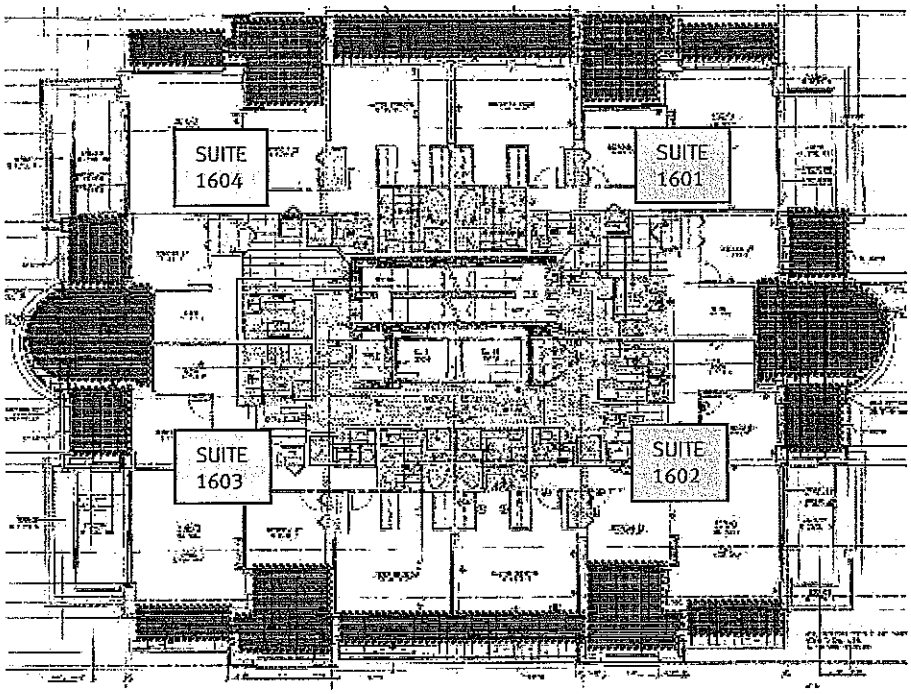


Fig. 3.8. Red shading shows partially exposed deck membrane assembly at level 16.

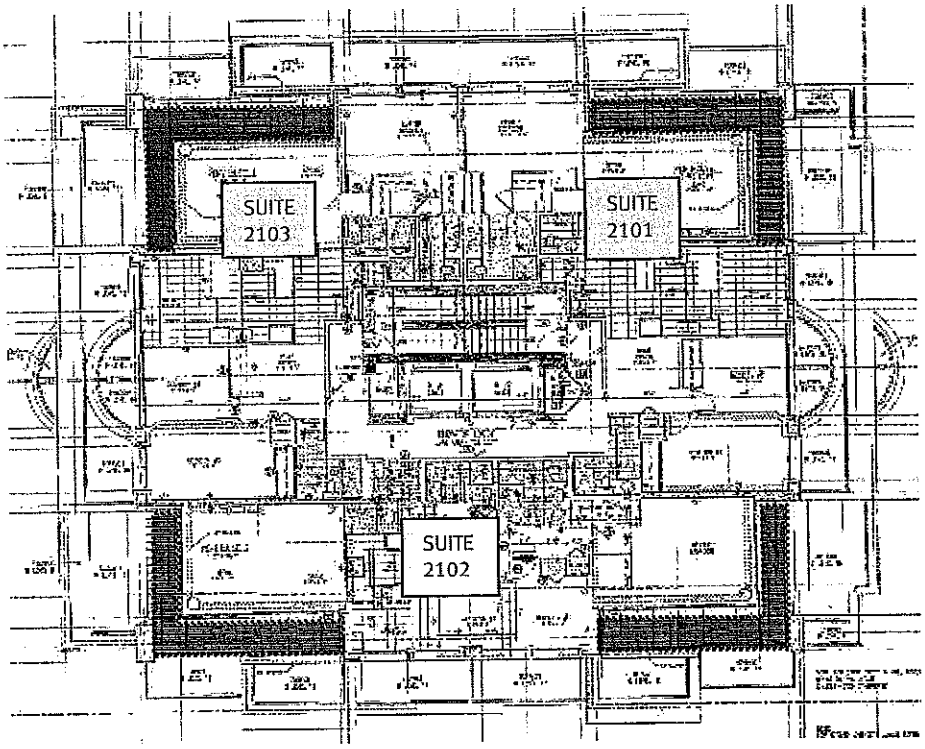


Fig. 3.9. Red shading shows partially exposed deck membrane assembly at level 21.

At all deck locations, the deck membrane terminates vertically on the concrete perimeter curbs and parapets. The remaining vertical and horizontal portions of the concrete curbs or parapets have been painted. This does not conform to good practice because cracks in the concrete may result in water penetration behind the deck membrane.

Additionally, there are numerous poor interface details associated with the deck membrane installation. The following is a brief pictorial representation of typical interface details.

Fig. 3.10. Typical crack in concrete. May allow water to enter behind the deck membrane assembly.

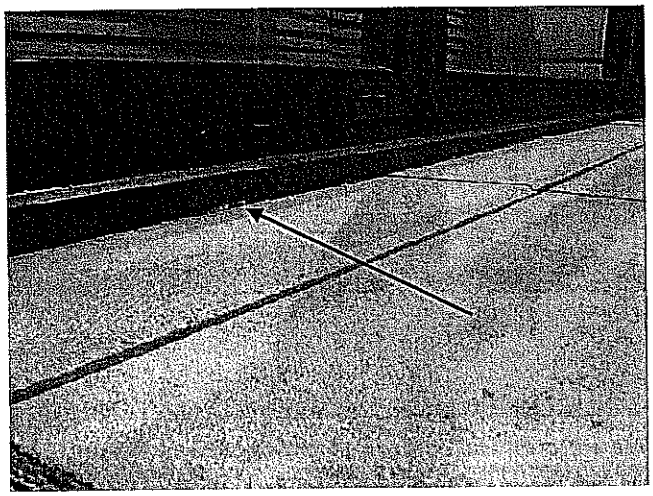


Fig. 3.11. Typical deck membrane to window interface detail. The deck membrane terminates below the height of the pavers at the window locations. As a result, the concrete curb is fully exposed. This condition is highly susceptible to water ingress to the interior through any cracks in the concrete curb. This does not conform to good practice.

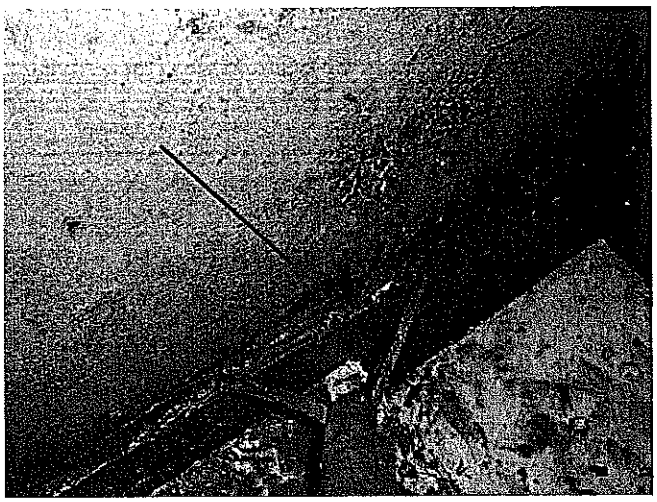


Fig. 3.12. Typical gum lip flashing and sealant. The failed sealant increases the potential for water ingress behind the deck membrane

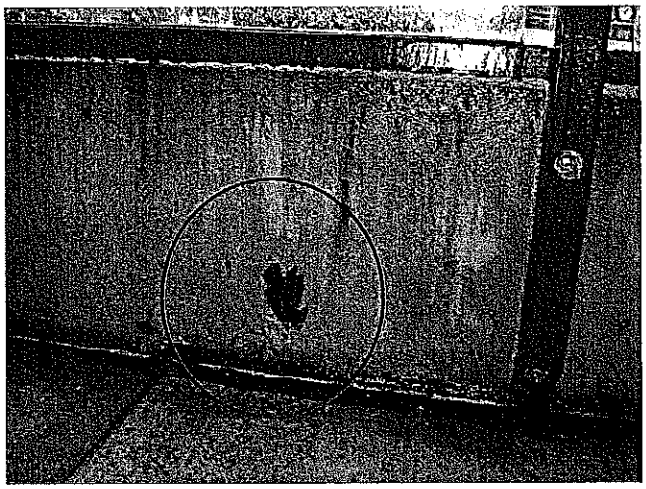


Fig. 3.13. Typical painted concrete deck perimeter curb. The paint is blistered and/or poorly bonded at numerous locations.

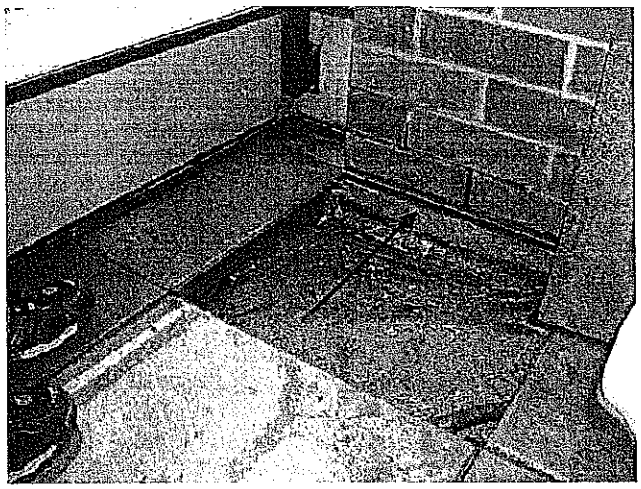


Fig. 3.14. Typical deck membrane to masonry interface detail. The deck membrane terminates below the height of the pavers at the masonry locations. As a result, the concrete curb is fully exposed. This condition is highly susceptible to water ingress to the interior through any cracks in the concrete curb. This does not conform to good practice.

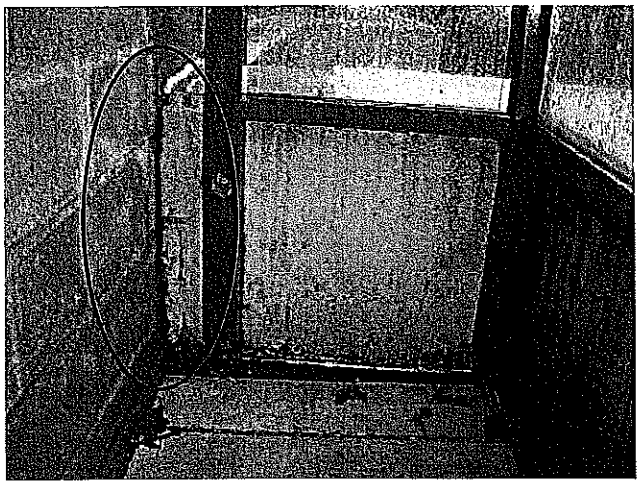


Fig. 3.15. Concrete parapet to masonry interface. The self-adhered deck membrane is fully exposed and has been painted. The deck membrane is sensitive to UV exposure and paint does not provide suitable protection from UV rays. Additionally, the deck membrane is poorly bonded. This condition is susceptible to water ingress behind the masonry cladding. Typically, self-adhered deck membrane should be fastened with a termination bar and covered with a flashing.

The existing conditions and interface detailing at partially exposed deck locations at levels 2, 9, 16, and 21 create several detail challenges and significant costs with respect to implementing improved interface detailing and water shedding.

Although only minor blistering was observed at level 9, it is important to consider that our observations are based on findings at reviewed locations only. Water blisters may be present beneath the deck membrane at other hidden locations. The presence of water blisters in the partially exposed level 9 deck suggests the existing deck membrane at partially exposed locations will likely not provide acceptable long-term service and replacement will likely be required within the next 3 to 5 years.

3.1. Recommendations for Fully Exposed Deck Area

Table 3.1.1 Fully Exposed Deck Area at Level 22

RECOMMENDATION(S)	
(A)	Replace existing deck membrane at level 22 with a 2-ply SBS membrane with improved interface detailing.

3.2. Recommendations for Partially Exposed Deck Areas

Table 3.2.1 Partially Exposed Deck Areas at Levels 2, 9, 16, and 21

RECOMMENDATION(S)	
(B)	Retain existing deck membrane at levels 2, 9, 16, and 21. Provide waterproof deck membrane up and over all concrete curbs and parapets with improved interface detailing and water shedding improvements. Budget for deck membrane replacement in 3 to 5 years.

4. Balconies

The balconies at Villa Jardin consist of a structural concrete slab covered with a urethane balcony membrane. In general, the urethane balcony membrane on the balcony field surface at locations reviewed is in reasonable condition. The perimeters of the balconies consist of various concrete curb and parapet configurations. At all locations the urethane balcony membrane terminates vertically on the concrete perimeter curb or parapet. The existing concrete curbs and parapets are painted and there is no flashing to protect the top surface. This does not conform to good practice. Water can migrate through the concrete slab or past the balcony membrane through cracks in these concrete curb and parapet assemblies. The urethane balcony membrane should extend up and over all concrete curbs and parapets.

The following is a brief pictorial representation of the existing conditions at various balcony locations.

Fig. 4.1. Balcony parapet at level 3, east. The paint is delaminating from the concrete parapet.

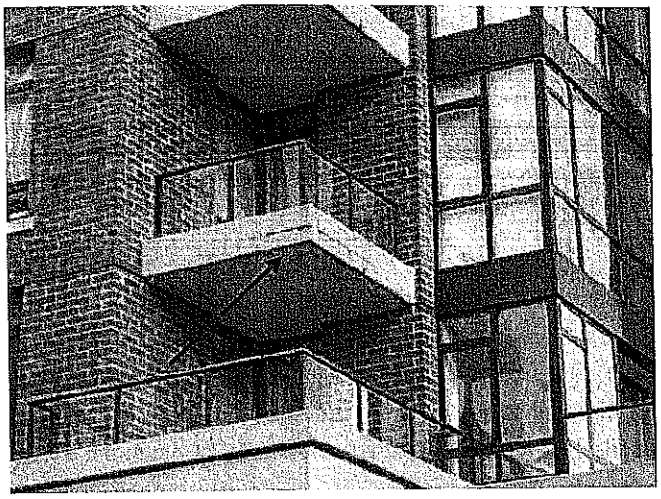


Fig. 4.2. Northeast corner at level 3. There is water staining at the cold joint between the concrete structural slab and perimeter curb.

Fig. 4.3. Balcony drain assembly. The balcony membrane is discontinuous around drain assembly.

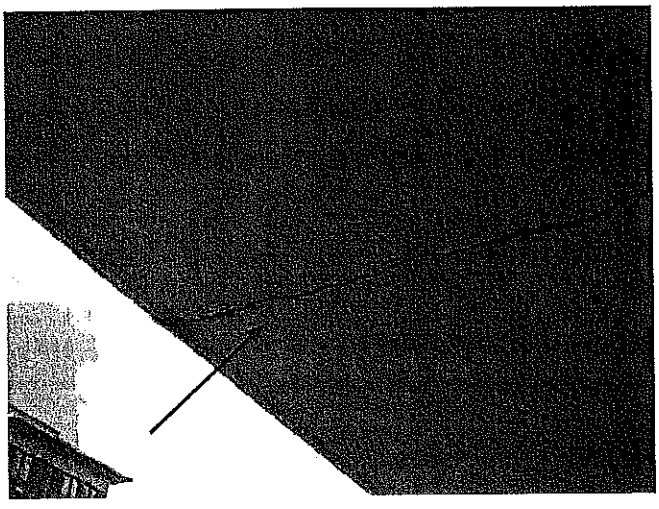


Fig. 4.4. Typical crack in balcony structural slab. View of water ingress through crack in line with drain pipe at suite 1702. The crack is likely the result of insufficient cover of concrete over in-slab drain pipe.

Fig. 4.5. **Typical drain pipe extension at balconies on the north and south elevations. The pipe project is too short.**

Fig. 4.6. **Concrete curb to masonry interface. The sealant installation at the interface is discontinuous as it does not extend vertically down the inside face.**

There are four balcony assembly types currently experiencing water penetration through the balcony assembly (refer to Fig. 4.7 for representative locations of balcony types). The concerns with each of these balcony types are discussed below.

The first balcony type is the centrally located side by side balcony stack on the north and south elevation at levels 3 through 17. At these locations the underside of the structural concrete balcony slab is cracked and water is entering into the crack from above (Fig. 4.4). The cracking is likely the result of insufficient concrete cover over the in-slab drain pipe. The observed cracking is not a structural concern at this time; however, water ingress into the concrete structural slab may result in deterioration of the steel reinforcing bars. At these locations, additional water proof balcony membrane should be installed to extend the existing balcony membrane up and over the concrete curbs down to the drip edge beneath the structural concrete slab. The existing drain pipe extensions at most locations are too short and allow water to track to the underside of the structural balcony slab. The existing drain pipe should be extended to improve rainwater management (Fig. 4.7, dotted red line).

The second balcony type is located at the northeast, northwest, southeast, and southwest corners at levels 10 through 15 (Fig. 4.7, yellow section). The conditions observed at these locations are similar to those at the side by side balconies on levels 3 through 17. Therefore, the same remedial work should be implemented.

The third balcony type is located at the southeast and northeast corners at levels 3 through 8 (Fig. 4.7, green section). There is water staining at the concrete cold joint at the base of the concrete balcony curb suggesting failure of the balcony membrane. The cold joint at the concrete perimeter curb to concrete slab interface should be routed and sealed. The remaining conditions observed at these locations and the recommendations provided are similar to those described for the side by side balconies on levels 3 through 17.

The fourth balcony type experiencing water ingress is the radial balcony at level 3 on the east elevation (Fig. 4.7, blue ellipse). This leakage is associated with drain detailing (Fig. 4.3). The existing balcony membrane is significantly stained. Performing localized urethane repairs on an older, heavily stained balcony membrane is generally unsuccessful over the long-term. We recommend the comprehensive urethane balcony membrane renewal at this location. The new urethane balcony membrane should extend up and over the concrete parapets.

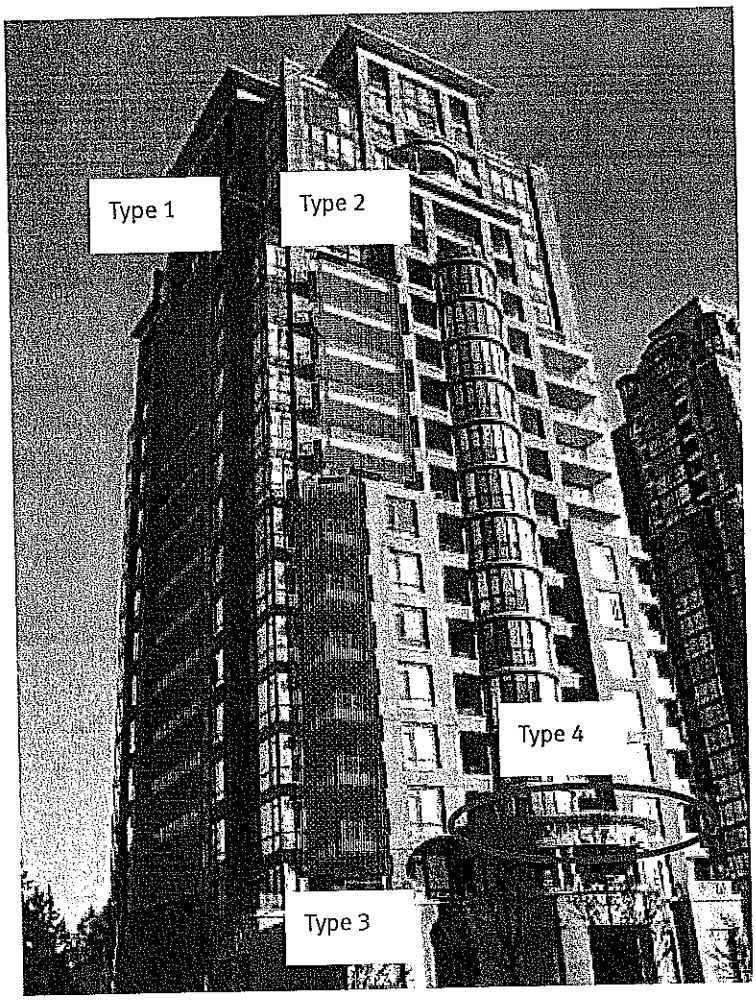


Fig. 4.7. Southeast Elevation View of Balcony Layout.

Fig. 4.8 to Fig. 4.12 illustrate plan views of various balcony areas from levels 3 to 17 at Villa Jardin. (Refer to Fig. 4.7 for colour referencing)

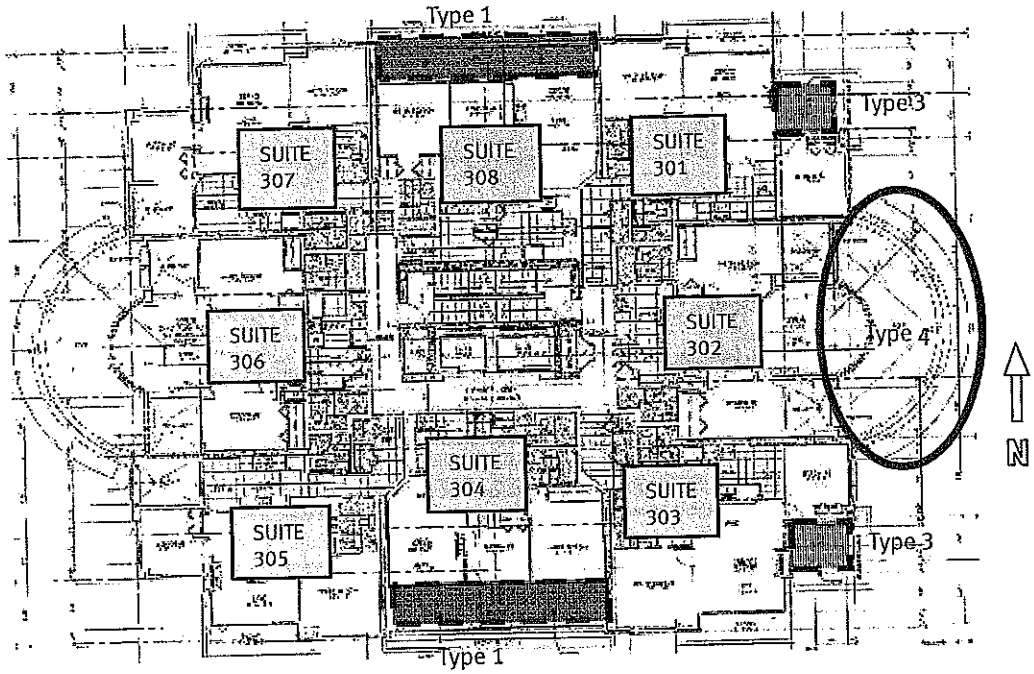


Fig. 4.8. Level 3 Floor Plan.

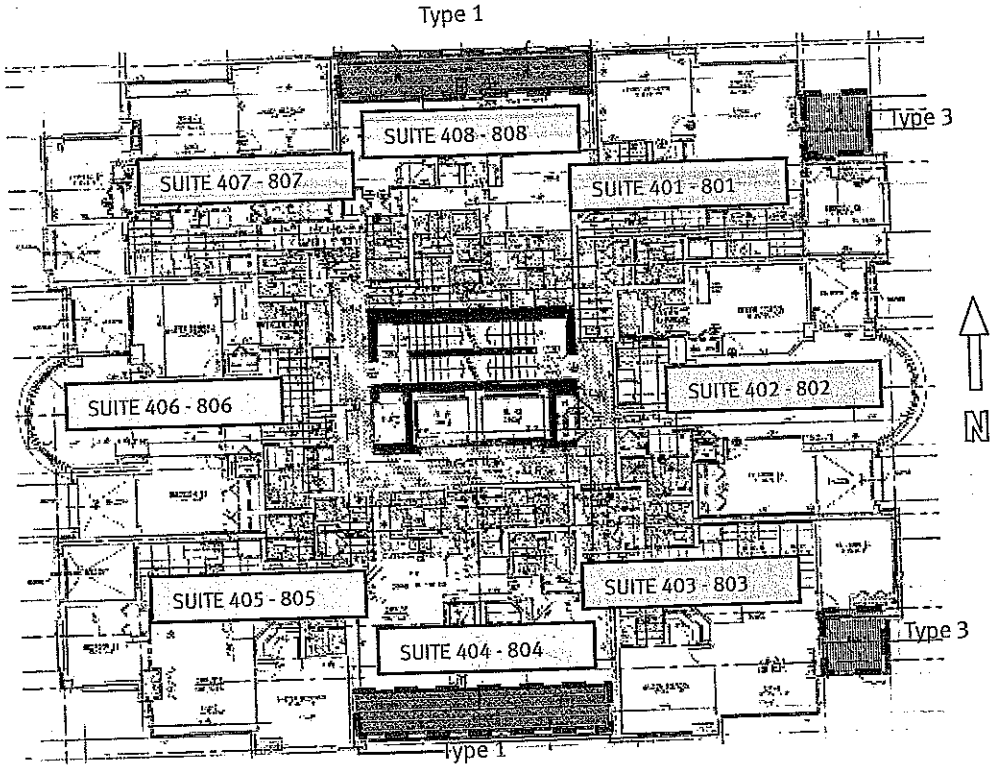


Fig. 4.9. Levels 4 – 8 Floor Plan.

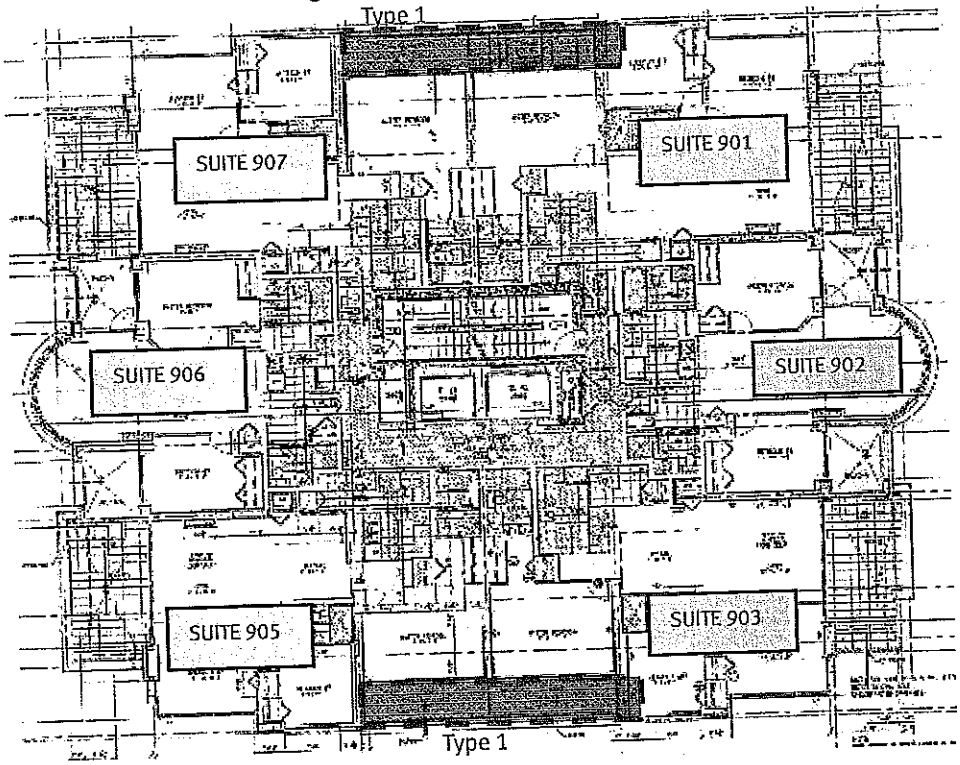


Fig. 4.10. Level 9 Floor Plan.

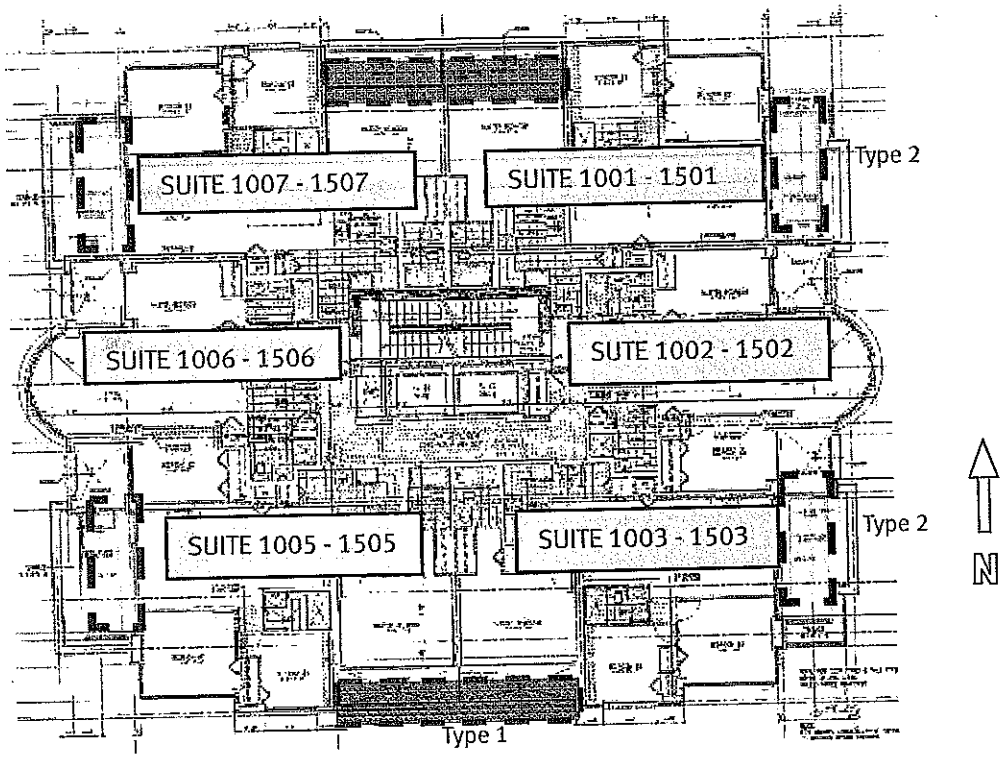


Fig. 4.11. Levels 10 to 15 Floor Plans (level 13 omitted).

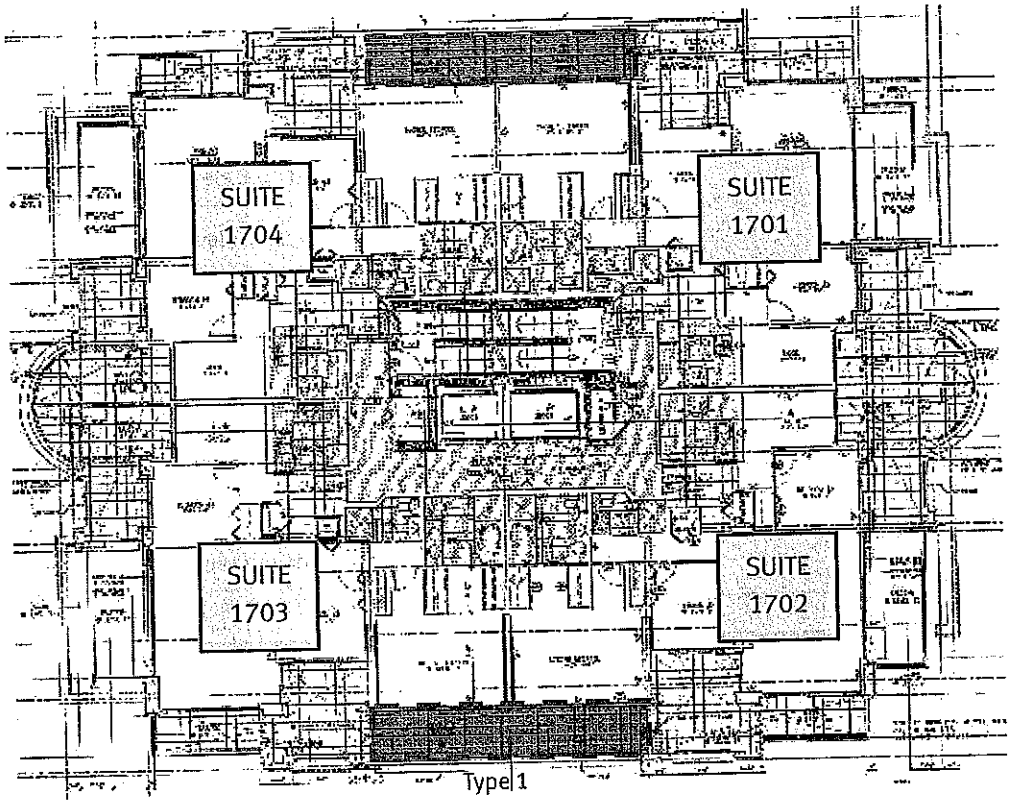


Fig. 4.12. Level 17 Floor Plan.

No problems were observed or reported at the remaining balcony locations. However, the Owners should consider installing a waterproof balcony membrane up and over all remaining balcony concrete curbs and parapets with improved interface detailing to reduce the potential for future water ingress related issues and promote improved water shedding continuity.

4.2. Recommendations for Balcony Areas

Table 4.2.1 Balcony

RECOMMENDATION(S)	
(A)	(Type 1) Provide new urethane balcony membrane up and over concrete curbs at north and south elevation side by side balcony areas on levels 3 to 17 with improved interface detailing.
(A)	(Type 2) Provide new urethane balcony membrane up and over concrete curbs with improved interface detailing at the northeast, northwest, southeast, and southwest corners at levels 10 through 15.
(A)	(Type 3) Provide new urethane balcony membrane up and over concrete curbs and parapets at corner balcony assemblies from levels 3 through 8.
(A)	(Type 4) Replace existing Level 3 east elevation radial balcony membrane with a new urethane balcony membrane with improved interface detailing that extends up and over concrete parapets.
(B)	Install a new urethane balcony membrane up and over remaining balcony concrete curbs and parapets with improved interface detailing to promote improved water shedding continuity and reduce the potential for future water ingress related issues.

5. Aluminum Window Assemblies

The windows consist of thermally broken aluminum frames with double pane, sealed units. There are several window configurations at Villa Jardin (Fig. 5.1). At each corner of the building there is a coupled punched window corner glazing assembly with slab panel assembly. On the central part of the east and west elevation there is a full height, coupled radial window system. There are punched windows set into masonry cladding on all elevations.

The aluminum framed sliding glass doors present at deck and balcony locations are generally located in protected areas.

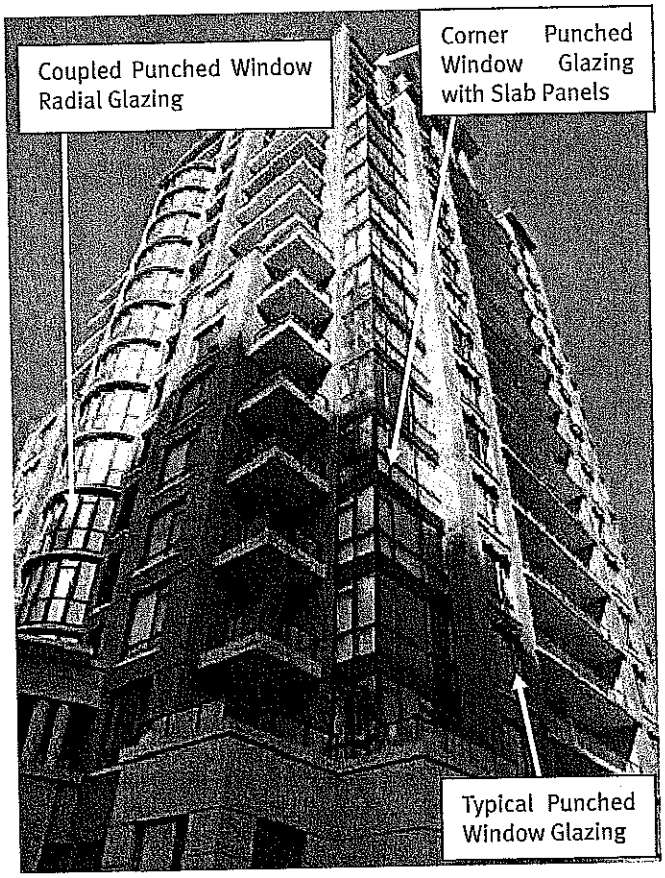


Fig. 5.1. Elevation showing typical glazing assemblies.

5.2. Punched Window Glazing With Slab Panels

The Owner at suite 901 indicated that the living room drapes move during wind events. This corner punched window glazing assembly at suite 901 was tested for air tightness using a smoke generator and a pressure difference of 75Pa. Smoke penetrated past the glazing assembly at the slab band panel interface and at operable vent locations (Fig. 5.2.1 and Fig. 5.2.2). This result suggests water may also penetrate past the glazing assembly. Other Owners also reported drafts through the window assemblies.

There are no weep holes in some metal slab panels while others have weep holes on the vertical face of the panel which can potentially allow water to enter into the system. Weep holes should be provided at the bottom the metal slab panels to enable moisture that may penetrate past the glazing assembly to drain.

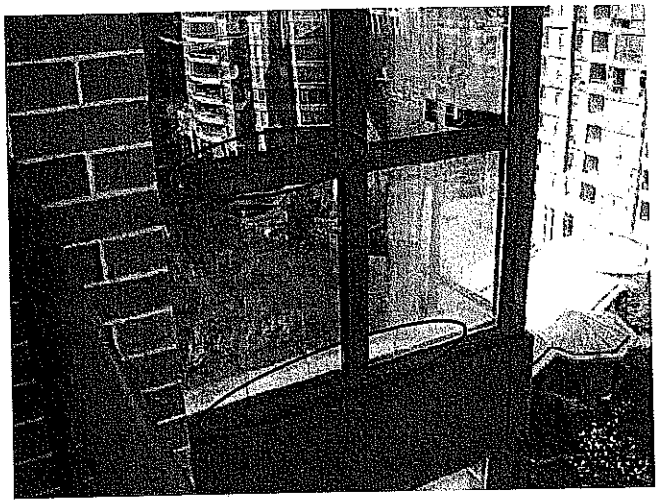


Fig. 5.2.1. Corner glazed punch window assembly. Red ellipse shows locations of smoke leakage during air leakage testing at suite 901.

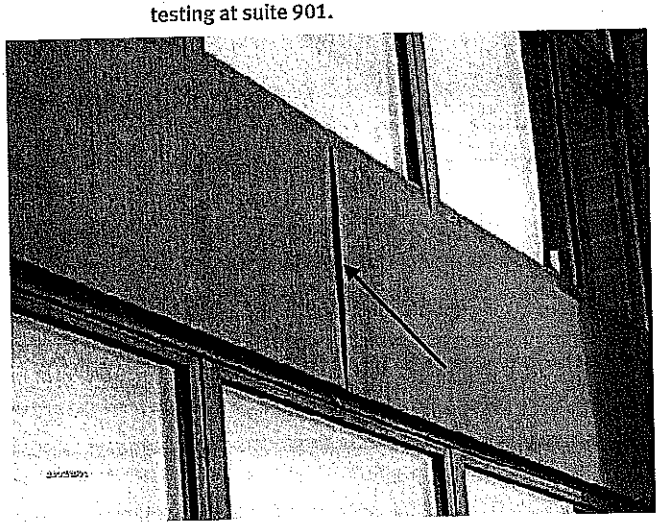


Fig. 5.2.2. Metal slab panel. Red arrow denotes open joint in slab panel.

Table 5.2.1 Punched Window Glazing with Slab Panels

RECOMMENDATION(S)	
(A)	Implement a sealant program for all windows to improve air barrier continuity and water shedding characteristics. This may include sealing all slab panel joints and providing the appropriate weephole configurations for drainage purposes.

5.3. Coupled Punch Window Radial Glazing

The full height coupled radial glazing is fully exposed and extends from a low concrete curb to the underside of the structural slab above on the east and west elevation from levels 3 through 15. The structural concrete floor slab projects beyond the plane of the windows to form an eyebrow below each window section. The eyebrows are painted and the paint is delaminating in numerous locations (Fig. 5.3.1). The application of paint on horizontal concrete surfaces does not conform to good practice. Horizontal concrete surfaces should be coated with a waterproof membrane to prevent water from entering through the cold joint present between the structural concrete slab and bottom of the concrete curb.

During our review we observed poorly fitting couplers (Fig. 5.3.2), open butt joints at vertical to horizontal mullion interfaces (Fig. 5.3.3), and evidence of water staining to the interior of butt joints (Fig. 5.3.4). Based on these observations, the radial glazing system has marginal resistance to water penetration, which is not consistent with good practice.

Fig. 5.3.1. Concrete eyebrow at radial glazing. Paint is delaminating at numerous locations.

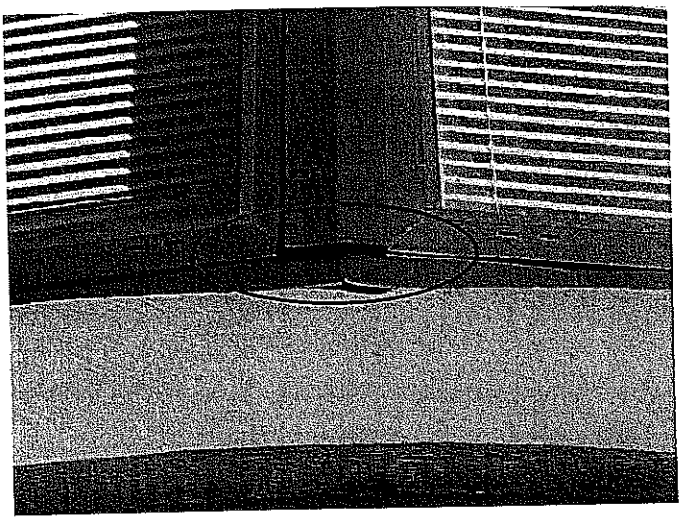


Fig. 5.3.2. Radial punch window glazing. Red ellipse denotes poorly fitting coupler joint.

Fig. 5.3.3. Radial punch window glazing. Staining on window frame suggests minor leakage occurring at some butt joints.

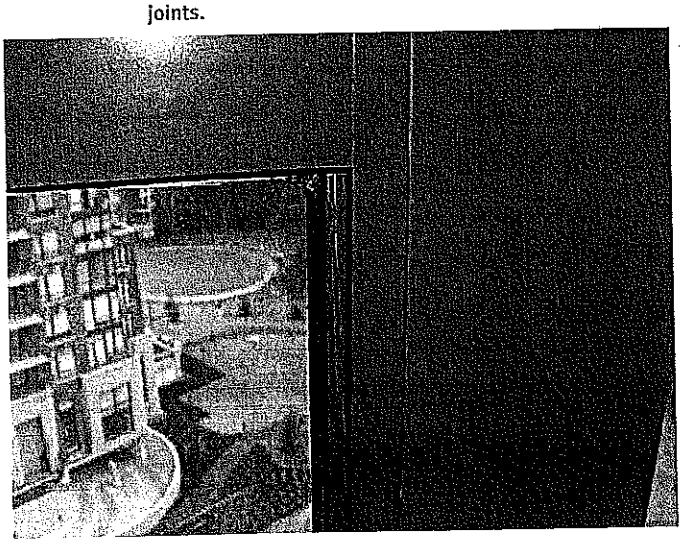


Fig. 5.3.4. Radial punch window glazing. White residue staining on interior of window frame is indicative of water ingress through the glazing assembly.

Table 5.3.1 Coupled Radial Window Glazing

RECOMMENDATION(S)	
(B)	Provide a urethane membrane with improved interface detailing over concrete eyebrows at radial glazing areas.
(B)	Provide water shedding improvements at radial glazing areas. This may include silicone strip, glazing spline replacement, and sealant installations to reduce the potential for water to migrate past the glazing assembly.

5.4. Punched Window Glazing

There are punched aluminum framed windows set in masonry cladding at various levels on each elevation. Typically below each punched window is a pre-cast concrete sill. In some locations the precast sill is continuous; at other locations the sill consists of two sections with a centrally located mortar joint. The interface between the pre-cast sill and the masonry cladding and central mortar joint between precast elements is not sealed in some locations, resulting in a discontinuity of the water shedding surface.

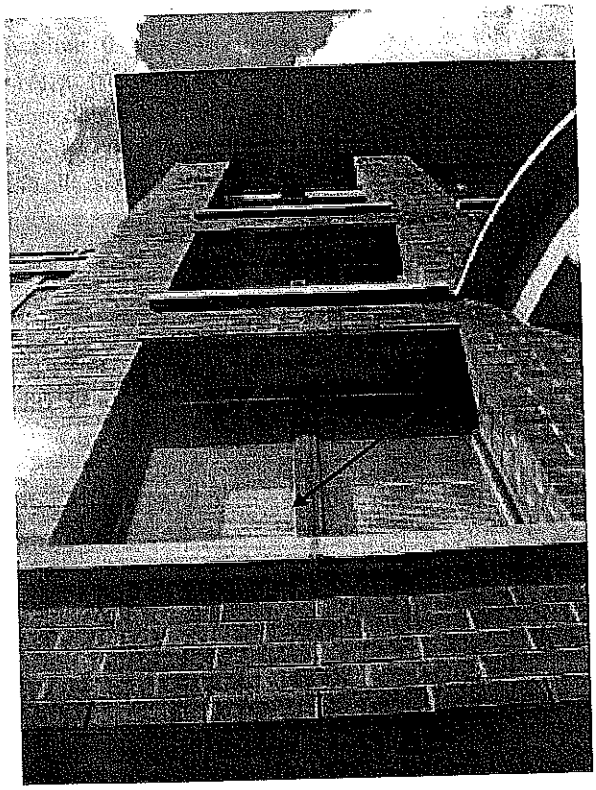


Fig. 5.4.1. Typical punched window assembly. Red arrow shows mortar joint between precast elements. Note that the joint is not sealed.

Fig. 5.4.2. Punched window sill at grade.

Table 5.4.1 Punched Window Glazing

RECOMMENDATION(S)	
(B)	Provide an allowance to install sealant at precast sill interfaces with masonry and central mortar joints to promote continuity of the water shedding surface, as required.

5.5. Masonry Wall Assembly

Based on our review the masonry wall assembly is in reasonable condition and generally meeting performance expectations. We observed minor damage to the masonry in a few locations that should be addressed. Correction of these conditions is not critical.

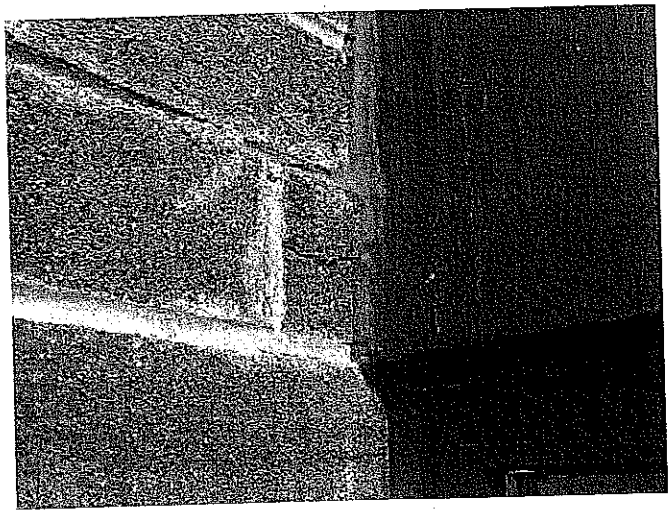


Fig. 5.5.1. Representation of observed minor damage to masonry cladding.

Table 5.5.1 Masonry Wall Assemblies

RECOMMENDATION(S)	
(B)	Provide an allowance to repair masonry as required ensuring continuity of the water shedding surface.

5.6. At-Grade and Parkade

There is leakage at some locations at the base of wall to parkade roof slab interface (Fig. 5.6.1). There are also several areas of leakage through the parkade roof slab and the vertical concrete parkade wall (Fig. 5.6.2 and Fig. 5.6.3). Although leakage into the parkade does not directly affect interior living space, it is an inconvenience and over time can lead to corrosion of the reinforcing steel within the concrete.

Repair of the membrane over the parkade is difficult and costly. Prior to suggesting that invasive repairs be implemented to address parkade leakage, we have arranged with the Re-Systems Group to provide injection services at three locations within the parkade area at no cost to the Owners. This work is tentatively scheduled for late October at the commencement of the wetting season. The intent is to monitor the repairs for effectiveness during the upcoming wetting season.

The parkade traffic membrane is debonded in numerous locations (Fig. 5.6.4). Traffic membranes of this type should have a 10 to 15 year performance life and should not be debonding at this early stage. It is important to understand that a comprehensive repair of the parkade membrane is difficult and can have significant costs.

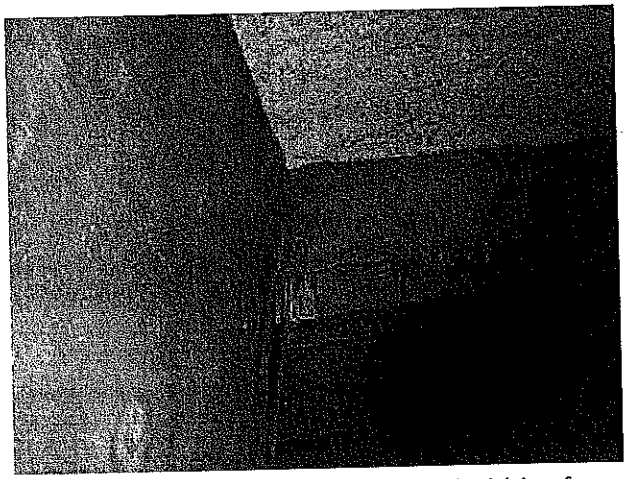


Fig. 5.6.1. **Leakage at base of wall to parkade slab interface.**

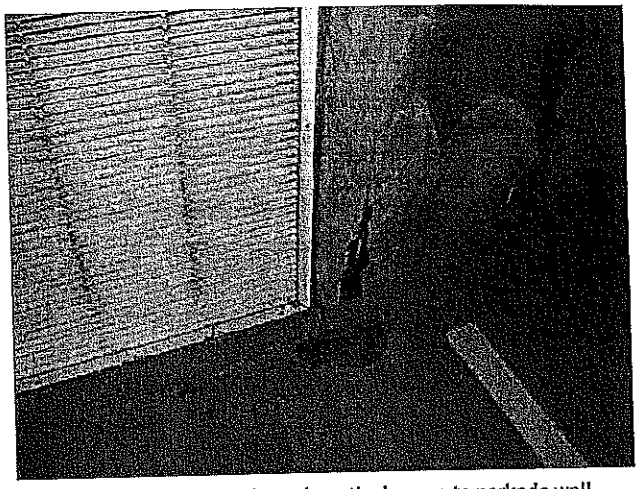


Fig. 5.6.2. **Leakage through vertical concrete parkade wall.**

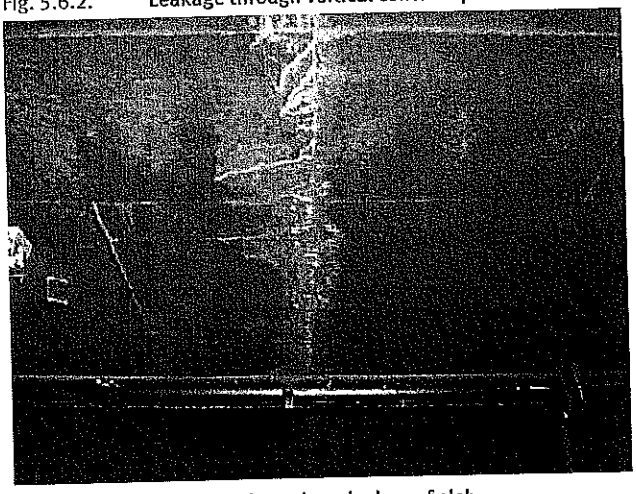


Fig. 5.6.3. **Leakage through parkade roof slab.**

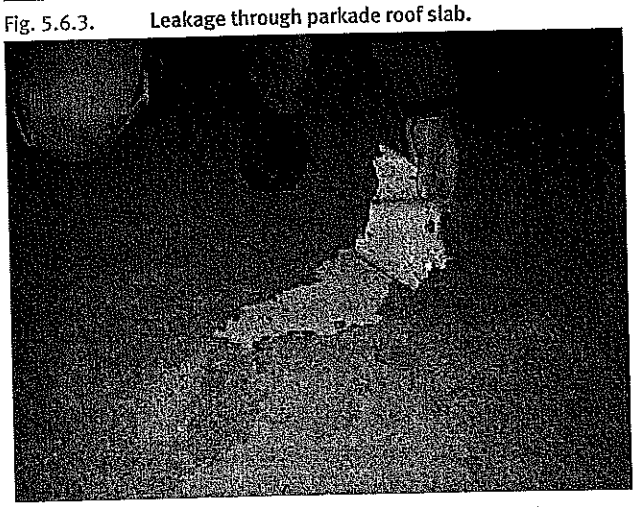


Fig. 5.6.4. **Delaminating parkade membrane top coat.**

Table 5.6.1 At Grade and Parkade

RECOMMENDATION(S)	
(B)	Re-Systems Group to provide injection services at three locations within the parkade area at no cost to the Owners. This work is tentatively scheduled for late October at the commencement of the wetting season. The intent is to monitor the repairs for effectiveness during the upcoming wetting season.

6. Recommendation Summary Table

The table below lists the building enclosure rehabilitation and renewals tasks that were identified in this report. To summarize, recommendations are prioritized into an "A" or "B" category. The "A" category shall signify recommendations that represent a high risk due to water ingress and should be addressed in a timely manner. The "B" category recommendation signify recommendations that represent a reduced risk of water ingress and may be deferred or phased into a pro-active maintenance and renewal program.

Table 6.1	Summary of Recommendations
CATEGORY	RECOMMENDATION(S) FOR MAIN AND ELEVATOR MACHINE ROOM ROOF AREAS
(A)	Replace existing main roof membrane with a 2-ply SBS roof membrane with improved interface detailing.
(A)	Replace existing elevator machine roof membrane with a 2-ply SBS roof membrane.
(A)	Repair cracks and install urethane waterproof membrane onto concrete parapets at main upper roof.
(A)	Repair cracks in concrete walls adjacent elevator machine roof areas
(A)	Provide a contingency allowance to remove and further investigate existing masonry at the interface with the main upper roof concrete parapets to develop and implement improved interface detailing.
CATEGORY	RECOMMENDATION(S)FULLY EXPOSED DECK AREAS AT LEVEL 22
(A)	Replace existing deck membrane at level 22 with a 2-ply SBS deck membrane with improved interface detailing.
CATEGORY	RECOMMENDATION(S)PARTIALLY EXPOSED DECK AREAS AT LEVELS 2, 9, 16 AND 21
(B)	Retain existing deck membrane at levels 2, 9, 16, and 21. Provide water proof deck membrane up and over all concrete curbs and parapets with improved interface detailing and water shedding improvements. Budget for deck membrane replacement in 3 to 5 years.
CATEGORY	RECOMMENDATION(S) FOR BALCONY AREAS
(A)	(Type 1) Provide new urethane balcony membrane up and over concrete curbs at north and south elevation side by side balcony areas on levels 3 to 17 with improved interface detailing.
(A)	(Type 2) Provide new urethane balcony membrane up and over concrete curbs with improved interface detailing at the northeast, northwest, southeast, and southwest corners at levels 10 through 15.
(A)	(Type 3) Provide new urethane balcony membrane up and over concrete curbs and parapets at corner balcony assemblies from levels 3 through 8.
(A)	(Type 4) Replace existing Level 3 east elevation radial balcony membrane with a new urethane balcony membrane with improved interface detailing that extends up and over concrete parapets.
(B)	Install a new urethane balcony membrane up and over remaining balcony concrete curbs and parapets with improved interface detailing to promote improved water shedding continuity and reduce the potential for future water ingress related issues.
CATEGORY	RECOMMENDATION(S) FOR PUNCH WINDOW GLAZING WITH SLAB PANELS
(A)	Implement a sealant program for all windows to improve air barrier continuity and water shedding characteristics. This may include sealing all slab panel joints and providing the appropriate weephole configurations for drainage purposes.

Table 6.1	Summary of Recommendations
CATEGORY	RECOMMENDATION(S) FOR COUPLED RADIAL PUNCH WINDOW GLAZING
(B)	Provide a urethane membrane with improved interface detailing over concrete eyebrows at radial glazing areas.
(B)	Provide water shedding improvements at radial glazing areas. This may include silicone strip, glazing spline replacement, and sealant installations to reduce the potential for water to migrate past the glazing assembly.
CATEGORY	RECOMMENDATION(S) FOR PUNCHED WINDOW
(B)	Provide an allowance to install sealant at precast sill interfaces with masonry and central mortar joints to promote continuity of the water shedding surface, as required.
CATEGORY	RECOMMENDATION(S) FOR MASONRY WALLS
(B)	Provide an allowance to repair masonry, as required, ensuring continuity of the water shedding surface.
CATEGORY	RECOMMENDATION(S) FOR AT GRADE AND PARKADE
(B)	Re-Systems Group to provide injection services at three locations within the parkade area at no cost to the Owners. This work is tentatively scheduled for late October 2009 after the commencement of the wetting season. The intent is to monitor the repairs for effectiveness during the upcoming wetting season.

7. Order of Magnitude Costs

It is important to understand that the budget construction costs are based on our experience with similar projects; they are presented as probable costs for the recommendations listed in the previous section and are based on approximate unit rates without a complete design developed. A more precise overall figure can only be obtained as the design is undertaken and when contractors actually bid on the project. The construction industry pricing environment can vary significantly, and is dependent to a certain extent on factors external to the actual project.

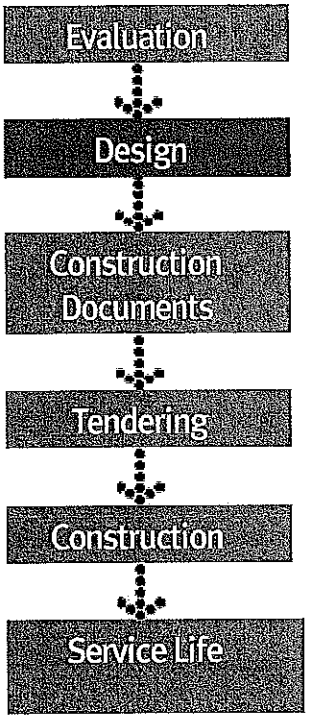
The construction cost estimate does not include project costs such as consultant fees, permits, and owner contingencies. In order to assist you in planning and to advise on the relative magnitude of other project costs, the following table identifies preliminary budgets for the recommendations for work required within the near future. Allowances for consulting fees, and owner contingency (10%) have been included. At this stage it is not possible to know whether a Homeowner Protection Act mandatory warranty or a permit will be required. An owner contingency is essential in rehabilitation construction to account for costs that may arise in the event of unforeseen damage or issues not directly related to the enclosure rehabilitation project. An owner contingency is included in the order of 15% of construction value.

Table 7.1 Order of Magnitude Costs for Villa Jardin

CATEGORY A	COST
Construction Costs Roofing (Includes Masonry Allowance) Level 22 Membrane Renewal Install Membrane at Balcony Parapets → Levels 3-8 → Levels 3-17 → Levels 10-15 Watershedding Improvements at windows with Slab Panels	$900,000
Consultant Fees	$130,000
Contingency Allowance	$90,000
Total (Excluding GST)	$1,120,000
CATEGORY B	**COST**
Construction Costs Install Membrane at Deck Parapets → Levels 2, 9,16 and 21 Membrane at Balcony Parapets → Levels 3, 18, 19, and-20 Watershedding Improvements at Radial Glazing Masonry Cladding Repair Allowance Pre-cast Sill Watershedding Improvements	$430,000
Consultant Fees	$65,000
Contingency Allowance	$45,000
Total (Excluding GST)	$540,000

8. Next Steps

The design development report presents conceptual level recommendations with respect to rehabilitation and renewal activities. It is important to understand that these recommendations do not provide a basis for implementing remedial work. Conceptual recommendations need to be developed, refined, and documented in detail before the construction work can be tendered to contractors or a building permit obtained.



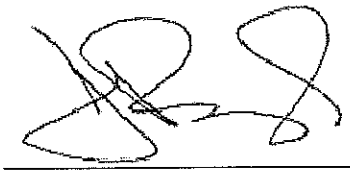
The next step typically begins with the design process where the consultant considers alternative ways of addressing existing problems, and assists you in making decisions with respect to specifics of the rehabilitation program. Once decisions are made, the selected design is developed and documented in greater detail in the form of drawings and specifications. These documents indicate the exact extent and nature of the remedial work, materials to be used, etc.

The drawings and specifications are used to obtain bids from pre-qualified contractors, a building permit to carry out the work, and as the basis to carry out the rehabilitation work. Once a contractor has been selected, usually on the basis of the lowest submitted bid, the project can move into the construction phase. During this phase, the remedial work program that has been designed by the consultant is implemented, and repair and reconstruction takes place on-site. The consultant administers the construction contract and undertakes field review of construction as the work proceeds. It is usual for the consultant to provide a maintenance and renewals plan (or update an existing plan) for the rehabilitated enclosure assemblies upon completion of the construction.

We are pleased to assist the Owners in addressing the building enclosure issues at Villa Jardin.

Do not hesitate to contact the writer if you wish to discuss or have any questions regarding the content of this report

RDH Building Engineering Ltd.



James Bourget

Marcus Dell, P.Eng.