



2006

**Partial External Facade
Building Survey Report**

Of

Levels G.F – Lower Penthouse (& two private lots)

ABC Apartments
Strata Plan No 70XXX

Darlinghurst

For

O.C

Prepared By
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LEGEND

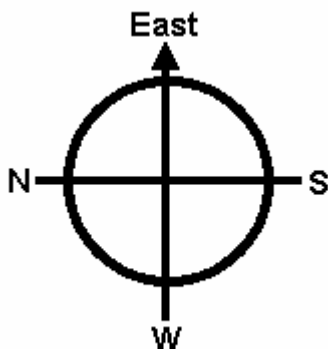
- Poor** = Inferior and in most cases requires significant repair / replacement.
Fair = Moderately good and in most cases either minor or smaller repairs will suffice
Good = Most advantageous, dose not require further work.

The **weather** just prior to and/ or during our inspections was;

- Dry Sunny** **Light Showers** **Raining**

PROPERTY DIRECTION

The Front St frontage of the property faces:



ABBREVIATIONS/ EXPLANATIONS LEGEND

A.C. = Asbestos Cement	H/wd = Hardwood
A/C = Air Conditioner	H.W.S. = Hot Water Service
AL = Aluminium	L.H.S. = Left Hand Side
Br/Wk = Brickwork	L.m. = Linear Metre
Co-ax = Coaxial Cable	M.D.F. = Medium Density Fibreboard
BCA = Building Code Of Australia	M.C. = moisture content (expressed as %)
C.I. = Cast Iron	M = Metre
C/W = Cold Water	m² = Square Metre
D/P = Down Pipe	mm = Millimetre
D.P.C. = Damp Proof Course	P/Brd = Plaster Board
D/W = Dishwasher	Perps = Perpends
E.L.C.B. = Earth Leakage Circuit Breaker	R.C.D. = Residual Current Device
F.C. = Fibre Cement	
FIB = Fire Indicator Board	R.H.S. = Right Hand Side <u>or</u> Rolled Hollow Section.
F.R.L = Fire Resistance Level	
F.F.L. = Finished Floor Level /Line	S.C. = Solid Core
F.R. = Fire Rated/ Resistance	S.H.S. = Square Hollow Section
F.W. = Floor Waste	S.t. = steel trowel
G.I. = Galvanised Iron	S/W = Stormwater
G.P.O. = General Purpose Outlet	W/M = Washing Machine
G.F. = Ground Floor. (L.G.F) = Lower Ground	W/P = Waterproof
H.C. = Hollow Core	P.V.C. = Poly Vinyl Chloride
H/W = Hot Water	F.I.B. = Fire Indicator Board



INTRODUCTION

I have undertaken a partial building survey of an accessible building facade and some balconies, for the client *O.C.* My brief was to inspect and report on defective external paint – evidence of water penetration. I am not expert in the area of paint coatings however I have a sound understanding of waterproof membrane systems and am a current member of A.S 3740 – 2004 Internal Wet Area Waterproofing for Australian Standards.

I first inspected the external facades of the subject building (from ground level using field glasses) in March 2004 and reported on same for the Owners Corporation in a report dated March 2004. Having regard to the substantial defects I observed, on the building façades at that time and which included moisture penetration, I made strong recommendations to carry out further inspections using a swinging stage to more closely identify the extent and causes.

I have included extracts from my March 2004 report as *Annexure 1* at the rear of this report.

As part of the execution of my brief for this report, I undertook two separate inspections and the weather was dry and sunny on both occasions. The first inspection was on **23.1.06** where I inspected the balconies of Units No1501 & 1105 and where two toughened glass balustrades had broken. On **3.2.06** I inspected both Penthouse lower level balconies and a central section of the eastern building façade (G.F – lower Penthouse Floor Level) from the builders swinging stage, with the builders formeman and a representative from remedial contractor Capps.

On both occasions I photographed many defects and have referenced these within this report.

This building inspection report complies with **AS 4349.1** (Inspection of buildings - residential) and is based on the inspection of accessible and visible structures only and does not include the condition of inaccessible or concealed areas of buildings, nor the existence of pests or asbestos.

No responsibility can be accepted for defects, which are latent or otherwise not reasonably detected on a visual inspection without interference with or removal of the structures, coverings or fittings of the building. I have not inspected woodwork on other parts of the structure which are covered, unexposed or inaccessible and I'm therefore unable to report that any such part of the structure is free from defects.

The vendor had previously advised me that the development was done as a 'design and construct' basis under an AS 4300 contract. The builder is BMC P/L.

In the preparation of this report I have read and/ or made reference to copies of the following documents;

- a) APS March 2004 Common Area Building Survey Report. (*Annexure 1*)
- b) Marchese+ Partners Architect P/L architectural detail **F. D 114B, 115** (Typical Balcony Detail L8-L14), **116 A** (balustrade rebate detail) & **117 A** as provided by the vendor (*Annexure 2*)
- c) Mel Roeder consulting Exterior Coatings report dated 7.6.05 completed for and on behalf of the builder (*Annexure 4*).
- d) James Hardie 01 HardiTex manual which was current in March 03 and emails from technical manager Mr. Jesper Jensen
- e) The various project waterproofing warranties as supplied to the Owners Corporation by the vendor.

The 7.6.05 exterior coating's inspection report, as prepared by Mel Roeder on behalf the builder, was a visual inspection conducted from street level only and the consultant does not confirm whether field glasses had been used. I have not been provided with a C.V. for Mel Roeder Consulting and as such I'm unable to comment on his expertise in this area. I made a 10.2.06 e-mail request of Mel Roeder Consulting to provide me with a copy of his C.V as part of the preparation of this report but had not been provided with same at the time of completion.

I attempted unsuccessfully on a number of occasions to discuss the noted defects with the project waterproofing applicator Poly Seal P/L prior to completing this report.



Penthouse Balcony Observations

1.0 Comments:

The client provided me access to the Penthouse unit on 23.1.06. I inspected both the eastern and western lower floor balconies of this unit in conjunction with O.C representative and builders foreman "Gary".

At the time of my inspection the builder was using the subject unit as a means to access a swinging stage that they had set up to gain access to the external building façade on both the East and West elevations.

I used visual inspection and a pin resistance type moisture meter as part of my inspection methodology. This unit is the uppermost unit and the balcony elements of same are of either masonry and/or concrete construction with no structures located above. In other words the balconies are open with no other influencing (for damp) structures above them.

The Mel Roeder Consulting Exterior Coatings report dated 7.6.05 (*Annexure 4*), states that the building facade has been coated with a high build acrylic paint system namely Dulux 'Arcashield' system.

The applied paint film is intended to act as a waterproof membrane and in my experience is typically warranted for a period of 10 years, however at the time of completing my March 2004 report the vendor/ builder had not provided the owners with a written warranty for same.

I was supplied with all waterproof membrane systems project warranties by the Owners Corporation. Having read these it would appear that the Penthouse roof, planter boxes and landscaped areas have been treated using 'Ardex' Shelterbit Mineral and Fibrepol 120 respectively ' and are warranted by a combined manufacturer (Ardex Building Products P/L) and applicator (Poly Seal) warranty, for a period of 10 years commencing 28.3.2003.

During my 3.2.06 inspection I inquired of the builder as to whether they had called the waterproof membrane applicator (Poly Seal) to site and inspect the present condition of the building and provide advice\input on same.

The builder advised me that Poly Seal had not been requested to inspect.

1.2 West Lower Level Penthouse Balcony;

Ogburn Observations & Noted Defects;

Very significant evidence of *seeming moisture related paint film delamination in a variety of locations including:*

At the *external face of balcony concrete pergola beam* (of lower floor unit), which I had previously observed in my March 2004 report – *Refer Photo No1* (this report).

In my professional opinion, moisture entry has been occurring in this location for near on two years and such paint film delamination, in such a location, is most likely to have occurred due to the ingress of water behind the protective paint film (supposed to resist all moisture entry) possibly through the horizontal top beam edge, which may not have adequate falls and allows ponding to occur.



Severe moisture related *paint bubbling\ballooning of paint film* on some external faces of vertical columns – *Refer example Photo No2*, located beneath the pergola beam.

In my professional opinion such paint film bubbling is most likely to have occurred due to the ingress of water from above via falling damp, and having been trapped behind the paint film would lead to either very high or saturated moisture content of the substrate, currently making it unsuitable for paint re-application.

Spot moisture meter testing revealed *saturated moisture content* in the lower sections of concrete balcony columns and the balcony hob upstand, in various locations – *Refer example Photos No3 & 4*.

In my professional opinion such high moisture gain is most likely to have occurred due to the ingress of water from above via falling damp and/or possibly due to differential movement cracking and having been trapped behind the paint film, this would lead to the saturated moisture content of the substrate, currently making it unsuitable for paint reapplication.

Moisture related *minor concrete spalling* at the pergola beam soffit – *Refer example Photo No5*.

In my professional opinion such minor spalling is most likely to have occurred due to the ingress of water from above and the presence of either reinforcement tie wire or a bar chair support legs near the soffit face of concrete pergola beam and also possibly due to the lack drip grooves on any of the pergola beams – *Refer example Photo No5*.

Evidence of *chalkiness* (powdery) between the concrete and delaminated paint film, which was most prevalent at bevelled concrete edges (but not limited to same) – *Refer example Photo No6*.

I note that Mel Roeders Consulting Exterior Coatings 7.6.05 report states “*it was evident some incorrect gypsum plaster had been used as attaching material*”. This observation was made without laboratory testing. *Refer example Photo No7*.

I’m not a paint expert however in my professional opinion the presence of said *chalkiness* might have occurred due to the possible use of a porous gypsum based non-exposure grade filler/ setting substance, applied to smoothen the formed up concrete, prior to the application of high build acrylic and I consider the formation of chalkiness and the paint film delamination to be predominantly due to the presence of high moisture gain within the substrate. – *Refer example Photo No7 of actual sample filler* that I obtained from site.

I say this because I immersed the same sample filler piece, in water over a period of three days (*Refer example Photo No7a*).

At the end of this period it was apparent that some reaction and break down of the material had occurred (*Refer example Photo No7b*), but the main consequence was the formation of chalkiness on the rear face, seemingly as a result of a reaction to the water (*Refer example Photo No7c*). The paint film had not lost adhesion to the filler.

I’m not expert in assessing the breakdown of fillers and paint film however in my professional opinion I consider that the long-term presence of moisture behind this material has probably caused partial breakdown and loss adhesion from the concrete substrate.



1.2A Recommendations;

The balconies of the penthouse and sub penthouse are the most exposed in the building and it is likely that the noted long-term moisture penetration into the structure, at these levels, is promoting falling damp into lower areas.

I consider significant quantities of moisture have gained entry into the external building elements of these balconies due to failures in the protective paint coating and /or waterproof membranes.

It should be noted that paint manufacturers do not warrant their protective paint systems against delamination when the substrate is moist or damp.

The 7.6.05 Exterior Coating's report, as prepared by Mel Roeder on behalf the builder, was a visual inspection and conducted only from street level.

The consultant does not confirm whether field glasses had been used. I have not been provided with a C.V. for Mel Roeder Consulting and as such I'm unable to comment on his expertise in this area.

I'm not expert in paint coatings and **recommend** that a specialist consultant inspect and report further on the likely causes of paint film failure from balconies and the swinging stage.

I **recommend** that that causes of all moisture entry be first rectified and all damp substrates be allowed to thoroughly dry out and that all rusted elements be appropriately replaced/ treated prior to the re application of a protective paint waterproof paint.

Prior to the re application of external paint coating I **recommend** that the builder provide a back-to-back manufacturer applicator warranty for the as applied paint system, which should be for 10 years.

I **recommend** that consideration be given to the installation of *drip grooves* on all exposed building elements such as balcony pergola beams and that the tops of these beams should resist ponding of water by having adequate falls to the external edges.

I **recommend** that original waterproofing contractor Polyseal and Ardex Building Products P/L be requested to inspect and provide comment on the noted moisture gain particularly at Penthouse planter.

1.3 East Lower Level Penthouse Balcony;

Very significant evidence of *seeming moisture related paint film delamination in a variety of locations including;*

At the external face of balcony edge, (as observed from swinging stage)– Refer Photo No8. In my professional opinion such paint film delamination in this location is most likely to have occurred due to the ingress of water behind the protective paint film (supposed to resist all moisture entry) possibly promoted by ponding and inadequate surface drainage.

Very significant paint film bubbling on the external face of the Penthouse upper floor planter box – Refer Photo No9.

In my professional opinion such paint film delamination in this location is likely to be caused either due to a failure in the planter box waterproof membrane behind or in the protective paint film, possibly due to glass balustrade installation detail– Refer Photo example No10 and more detailed explanations of same at Section 1.92 of this report.



Spot moisture meter testing revealed *saturated moisture content* in the lower sections of some concrete balcony columns and the balcony hob upstand, in various locations – *Refer example Photo11.*

In my professional opinion such high moisture gain is most likely to have occurred due to the ingress of water from above and via falling damp, and possibly due to differential movement cracking and having been trapped behind the paint film this would lead to the saturated moisture content of the substrate, currently making unsuitable for paint reapplication.

Very significant *paint film bubbling* on the internal face of the balcony southern end masonry wall – *Refer Photo No12.*

In my professional opinion such paint film delamination in this location is likely to be caused either due to a failure in the protective paint film, possibly from the horizontal surface above.

Very significant *rust staining and evidence of moisture seepage (at base)* of the seemingly *steel stud, fibre cement clad* service pipe enclosure at the southern end of this balcony – *Refer Photo No13 & 14* and which is fixed to a masonry wall

In my professional opinion such significant rusting and lower wall seepage, in this location, is likely to be caused either due to a failure in the protective paint film above, and/ or due to an inadequate waterproof detail (to accommodate differential movement) between the steel stud wall and masonry wall. The resultant rusting has occurred due to the presence of metal external setting edges been used when setting the fibre cement sheets.

If the balcony waterproof membrane has not been carried through beneath this stud framed enclosure, then the noted seepage would be gaining entry into the balcony slab.

Moisture related *minor concrete spalling \ rust staining* on the balcony slab soffit – (as seen from swinging stage) *Refer example Photo No15* located directly beneath a failed slab edge protective paint coating *Refer example Photo No16.*

In my professional opinion such minor spalling is most likely to have occurred due to the ingress of water from above and the presence of either reinforcement tie wire or a bar chair supports near the soffit face of concrete.

Moisture related *minor concrete spalling \ rust staining* on the balcony slab edge – (as seen from swinging stage) *Refer example Photo No17.*

In my professional opinion the most likely source of the above noted moisture entry would be due to a failed protective paint film on the balcony above however it is possible that moisture is entering the slab because the balcony waterproof membrane has not been carried through beneath the above noted stud wall.



1.3A Recommendations;

It should be noted that the balconies of the penthouse and sub penthouse are the most exposed in the building and it is likely that the noted long-term moisture penetration into the structure, at these levels, has promoted falling damp into lower areas.

I consider that significant quantities of moisture have gained entry into the external building elements of this balcony due to failures in the protective paint coating and/or inadequate waterproofing details.

It should be noted that paint manufacturers do not warrant their protective paint systems against delamination when the substrate is moist or damp.

I'm not expert in paint coatings and **recommend** that a specialist consultant inspect and report further on the likely causes of paint film failure.

I **recommend** that the front F.C panel of stud framed service enclosure be removed and that the presence of a waterproof membrane, on the balcony slab directly beneath, is verified.

I **recommend** that the junction of the steel stud enclosure and masonry wall incorporate an adequate waterproof expansion joint (including breaker bond) which accommodates differential movement and that all metal external angles and rusted screw fixings be removed and replaced with a rust resistant type (e.g. plastic external angles).

Refer also to **Section 1.93 Recommendations** of this report.

I **recommend** that the Penthouse upper floor eastern planter box waterproof membrane be checked for integrity.

I **recommend** that all causes of moisture entry be first rectified and that all damp substrates be allowed to thoroughly dry out and that all rusted elements be appropriately treated prior to the re application of a protective paint waterproof paint.

I **recommend** that consideration be given to the installation of drip grooves on all exposed building elements such as balcony pergola beams and that the tops of these beams should resist ponding of water by having adequate falls to the external edges.

Prior to the re application of external paint coating I **recommend** that the builder provide a back-to-back manufacturer applicator warranty for the as applied paint system, which should be for 10 years.





Photo No1



Water filled paint

Photo No2





Saturated lower balcony wall

Photo No3



Saturated lower concrete column

Photo No4





Moisture related
rust spalling &
lack of drip
grooves

Photo No5



Delaminated paint
and chalky
substrate

Photo No6





Photo No8



Saturated upper penthouse level external planter box

Photo No10





Photo No14

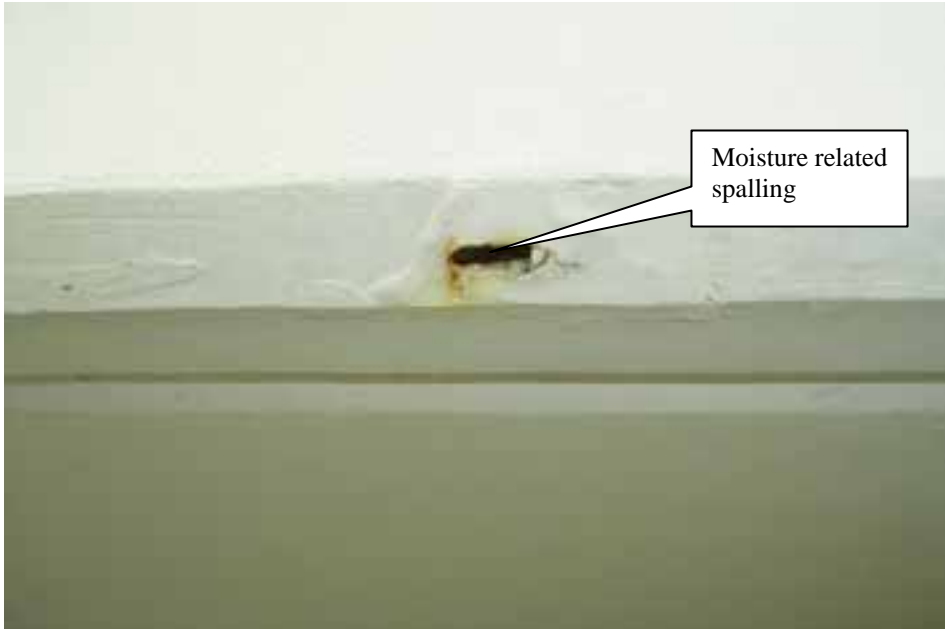


Photo No17



Sub Penthouse Balcony (East) Observations

1.4 Comments:

In my 23.1.06 inspection of the Penthouse balconies I was able to partially observe a section of the sub penthouse eastern balcony beneath. I was able to inspect the eastern sub penthouse balcony from the swinging stage. The sub penthouse balconies are significantly open and exposed and incorporate a concrete pergola structure over.

N.B* I'm advised that the sub Penthouse internal fit out and external balcony waterproof membrane/ tiling was completed by others (i.e. not Barclay Mowlem) however I'm advised that Barclay Mowlem completed all balcony columns including fibre cement clad stud walls. I'm advised that the builder responsible for the sub penthouse fit out and balcony works was "Built" and that they completed the balconies after the construction of all balcony walls\columns by Barclay Mowlem.

1.5 Eastern Sub Penthouse Balcony;

Ogburn Observations & Noted Defects;

Very significant evidence of *moisture related rust staining* of external edges of fibre cement (F.C.) clad columns, along with seepage at base.

These columns/ walls are located beneath a concrete pergola structure similar to that on the penthouse level—*Refer example Photo No18*. This photo also shows some evidence of water pooling on the balcony slab adjacent to column.

I was unable to determine whether the subject balcony waterproof membrane continues beneath these stud columns/ walls.

I was unable to determine whether the pergola beam soffit incorporates a drip groove.

In my professional opinion such moisture entry in behind these columns and consequential rusting and lower wall seepage, in this location, is likely to be caused by one or all of the following;

- * failure in the protective *paint film* above and/or moisture entry from Penthouse balcony slab over (for reasons previously stated),
- * possible lack of *drip grooves* (as per penthouse level) – *Refer example Photo No5*
- * possible *defective waterproofing detail (flashing)* between concrete beam \drip groove and head of stud walls, to accommodate differential movement allowing moisture to enter in behind same
- * *inadequate waterproof detail* (to accommodate differential movement) between the steel stud upper wall/concrete beam and the possible non compatibility (through lack of a breaker bond) between polyurethane sealant filled joint at F.C cladding/ concrete and the *acrylic* exterior coating.

In my professional opinion the resultant F.C column rusting has occurred due to water entry and the presence of metal external setting edges. If the balcony waterproof membrane has not been carried through beneath this stud framed wall, then the noted moisture would be gaining entry into the balcony slab, becoming entrapped by the exterior waterproof coating system on all exposed faces. Refer following comments.

From my eastern balcony facade inspection (from swinging stage) I determined that the F.C clad columns /walls have been constructed from *lightweight steel studs* and that non- rust resistant *screw fixings* have been used to fix the F.C. cladding.



There was evidence of significant rusting to both of same from the limited inspection area available - *Refer example Photo No19.*

In my professional opinion *significant rusting* is likely to be present in many of these concealed structural elements (steel studs and screw fixings) and failure to adequately rectify same is likely to lead to future rust staining after the new exterior coating is applied.

Severe evidence of *moisture related paint film bubbling, staining delamination and calcification* on the sub penthouse balcony rearward slab *soffit*, at three locations along its length, in near proximity to F.C clad columns *Refer Photos No20, 21 & 22.*

In my professional opinion this moisture related paint film damage and calcification has occurred due to the presence of *very high moisture content within the balcony slab* and which is entrapped by the exterior coating.

The noted calcification (lime leaching) is heavy and in my opinion has occurred because of long-term saturation of the slab.

In my professional opinion such high moisture gain is most likely to have occurred due to the one or all of the following possible causes;

- * prior noted moisture entry behind F.C clad columns \ walls above and the possible lack of waterproof membrane on the balcony slab directly beneath, resulting in falling damp.
- * inadequate waterproofing detail of the sub penthouse glass balustrade hob rebate and the junction, with end walls
- * failure of the protective exterior coating on the building elements above
- * possible failure of the balcony waterproof membrane

1.5A Recommendations;

It should be noted that the balconies of the penthouse and sub penthouse are the most exposed in the building and it is likely that the noted long-term moisture penetration into the structure, at these levels, will most likely have promoted falling damp into lower areas. I **recommend** an inspection of the sub Penthouse balconies (both East and West) and various components after sections of the concealed F. C. clad columns have been opened up (by the builder) to permit inspection of the internal framing so as to determine if the balcony slab waterproof membrane continues beneath and for any rust damage.

I **recommend** that consideration be given to the installation of drip grooves on all exposed building elements such as balcony pergola beams and that the tops of these beams should resist ponding of water by having adequate falls to the external edges.

I **recommend** all heavily rusted metal components including steel studs and screw fixings be either replaced and/or rust paint treated, depending on severity and that all metal external setting angles be replaced with a rust resistant type (e.g. plastic external angles). James Hardie technical manager Mr. Jesper Jensen (blue board manufacturers) recommends use of stainless steel screw fixings and plastic setting external edges for their blue board F.C.

I **recommend** that all the moisture damaged exterior coating on the sub Penthouse balcony soffit/s be thoroughly stripped back and the slab allowed to dry.

I **recommend** that all causes of moisture entry into the building fabric and F.C clad columns be rectified and that all damp substrates be allowed to thoroughly dry out prior to the re-application of a protective paint waterproof paint. Refer also later recommendations for balcony balustrade rebates and at junction of balcony slab soffits \ walls \ columns.





Photo No19



Photo No20



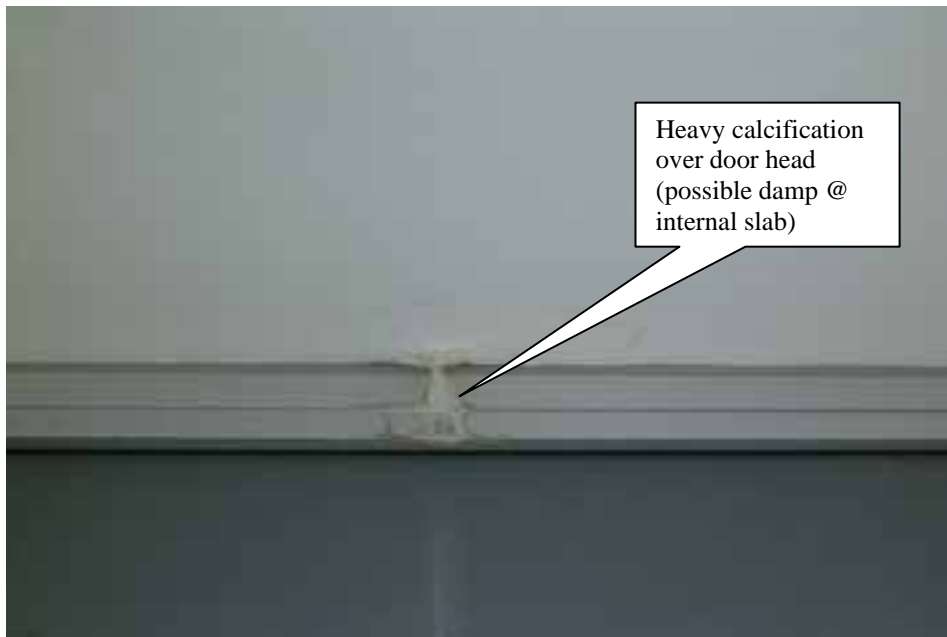


Photo No22



Typical Balcony Observations

1.6 Comments:

In my 23.1.06 inspection of Units **1501 & 1105** (from within these private lots) I also inspected the buildings **western façade** from ground level using field glasses and a high zoom camera and took a number of photos.

As part of my 3.2.06 inspection I inspected **all central eastern balconies**, from the builder swings stage and took many photos.

The eastern balconies below sub Penthouse level are significantly protected by overhanging slabs.

1.7 Western External Façade & Unit 1501 and 1105 Balconies;

Ogburn Observations & Noted Defects;

Refer Photo No 23 & 24 showing evidence of very significant **moisture related paint film bubbling and delamination particularly at junction of balcony slabs and dividing end walls**
Refer also prior noted comments relating to Photo No 1 (of this upper elevation)

Refer Photos No25, 26,27 & 28 (of unit **1501**) west facing balcony showing significant **moisture related paint film bubbling and delamination** to the external/ internal balcony painted hob slab edge. *Refer Photos No29 & 30* (of unit **1501**) and moisture related rust staining to F.C clad columns.

Photo No 27 shows hairline cracking in the protective paint film at junction of slab and lower wall, which would permit moisture entry.

In my professional opinion if this joint had been filled with polyurethane sealant and no breaker bond was installed between the two different materials, then differential movement cracking can occur because the two materials do not like each other.

Refer Photo No31 (of unit **1105**) east facing balcony and showing significant **moisture related paint film bubbling and delamination** to the external/ internal balcony painted hob slab edge

Refer Photos No32 & 33 (of unit **1105**) showing very **significant moisture related paint film bubbling** on the external face of solid North end wall (of the balcony over) and in the upper North wall (of subject unit) just beneath slab soffit and drip groove.

In my professional opinion such moisture entry in these locations, is likely to be caused by one or all of the following;

- * failure in the protective **paint film** above and/or moisture entry from above and the possible lack of breaker bonds between sealant filled movement joints and the applied paint finish
- * inadequate flashing provision at junction of slab soffit and columns particularly where slab drip grooves run in and behind F.C clad columns
- * prior noted moisture entry behind F.C clad columns\ walls above and the possible lack of waterproof membrane on the balcony slab directly beneath, resulting in falling damp.
- * inadequate waterproofing detail of glass balustrade hob rebate and the junction, with end walls both top and bottom

1.7A Recommendations;

Refer Sections **1.92A & 1.93A** Recommendations.





Photo No1



Photo No25





Hairline crack @ sealant filled junction of balcony hob and F.C column

Photo No27

Moisture related exterior paint delamination



Moisture damaged acrylic coated internal hob (little falls)

Broken glass balustrade

Photo No28



Photo No29





Photo No31



Severe water filled paint bubble @ junction of balcony slab and concrete wall

Photo No32



water filled paint bubble @ balcony slab soffit below balcony balustrade

Photo No33



1.8 Eastern External Façade Typical Balconies;

1.9 Comments:

On 3.2.06 I inspected *all central eastern balconies*, from the builder's swinging stage and took many photos.

The eastern balconies below sub Penthouse level are significantly protected by overhanging slabs, however both the Penthouse and sub Penthouse levels are significantly exposed and would be subject to a high terrain category rating.

At the time of my inspection the builder (and their remedial contractor Capps) had commenced destructive investigative and remedial works to some balcony slab edges on this elevation including removal of filler and substantially excavating out the glass balustrade rebates in a variety of locations.

I was advised that these works have been completed using a needle gun and epoxy.

Harrington Properties supplied me with the following project architects (Marchese & Partners) architectural details

* *FD114B, FD115 B* (typical balcony detail L8-L14),

* *FD 116 A* (balustrade rebate detail), and

* *FD126A*

All of which are copied in **Annexure 2**.

I presume these architectural details were for construction when undertaking my assessment for this report.

I was supplied with all waterproof membrane systems project warranties by the Owners Corporation.

Having read these it would appear that balconies may have been treated using 'MBT HLM 5000' membrane system and are warranted by a combined manufacturer (M. B. T. Australia P/L) or Super Flex and the applicator (Poly Seal) warranty, for a period of 10 years commencing 31.3.2003.

From the warranties supplied I was unable to determine the exact extent /scope of waterproofing on each balcony.

During my 3.2.06 inspection I inquired of the builder as to whether they had called the waterproof membrane applicator (Poly Seal) to site and inspect the present condition of the building and provide advice\input on same.

The builder advised me that Poly Seal had not been requested to inspect.

1.91 Eastern External Façade Balconies;

1.92 Typical Balcony Balustrades

Ogburn Observations & Noted Defects;

The architectural details FD 115 B (typical balcony detail L8-L14), *FD 116 A* (balustrade rebate detail), and *FD 126A*, show 10mm thick toughened glass balustrading recessed into balcony slab hobs (rebate = 100mm * 40mm * min 90 mm deep) on a rubber mounting block. The balustrade recess was to be filled with epoxy grout and the top edge filled with an approx 10mm * 10mm sealant filled joint (both sides of glass).

FD126A does not detail any specific waterproof membrane to either the balcony or hob.

In my professional opinion the sealant filled joint was designed to take up any differential movement cracking that might occur between the glass and epoxy grout and to act as a water resistant joint.



None of the balcony balustrades I inspected had been constructed in accordance with this design, as in all instances they lacked the sealant filled joint and had been filled flush to the top of hob with a non-shrink grout (and other materials) and which had then been topped with a seemingly gypsum based filler to achieve a smooth finish. *Refer example Photos No 34, 35 and 36.*

The external face of balcony hobs, are painted with the W/P exterior coating taken up to the edge of glass balustrade.

The internal face of balcony hobs appear to have been filled with gypsum based filler and painted over with a thin acrylic coating.

In some instances the external hob height was significantly higher than the internal hob.

In most instances the hobs had little falls to the external edge and therefore may allow water to pond on same and possibly allow moisture to enter into the inadequately waterproofed openings between glass panels (*Refer example Photos No39 & 44*).

I was unable to establish the presence of any waterproof membrane on the top internal edge of balcony hobs.

In most instances (internal and external hob edges) there was very significant evidence of moisture related paint film break *Refer example Photos No 39, 40, 41, 42 and 43* indicative of moisture related damage, at the balcony hob/edge and lower sections of end wall (abounding glass balustrades).

A number of the *balustrade rebates* had been partially excavated by the builder prior to my inspection. Upon inspecting these rebates, particularly at the junction with end walls, it was apparent that the rebate continues across slab and under the F.C. clad columns bases.

Numerous lower balustrade rebates were highly moist and the gypsum filler in some instances were saturated. *Refer example Photos No 37 and 38* showing junction of balustrade rebate and rusted F. C. clad column and/or concrete\masonry blade wall.

The builder advised me that part of the intended remedial works was to scrape back all filler on both sides of the glass balustrade and top the hob with an epoxy grout.

On at least one balcony this work had commenced—*Refer example Photo No38a*.

The builder did not confirm whether they intended to provide any provision for differential movement or waterproofing at the junction of same and glass balustrade, and at end walls.

In my professional opinion the as constructed balcony **balustrades/ hobs are not adequately waterproofed** and do not provide adequate **provision for differential movement cracking** between the glass and non-shrink grout in which they are embedded.

In my professional opinion as a result of the lack of same, significant quantities of water would travel down the face of glass through hairline differential cracks and between gaps in glass and into the rebate.

Moisture could also possibly enter through the *handrail end fixings*, many of which were loose with a single screw fixing (*Refer example Photo No 45*).

Once moisture enters this inadequately waterproofed balustrade rebate, (which would act as a channel/ gutter) it would most likely travel across the slab into and underneath the various building elements including F. C. clad columns and concrete blade walls, manifesting itself as penetrating\falling damp and then travel into lower areas *Refer example Photos 39 – 41*.



1.93 Typical Balcony Column Head / Base Details

Comments:

I was unable to obtain any 'for construction' architectural details of the *F.C clad columns/ blade walls* and in particular the junction of same and balcony slabs/ soffits.

I note that the contract was a Design & Construct by the builder Barclay Mowlem.

Ogburn Observations & Noted Defects;

Photo No19 shows a reasonably typical as built *F. C. clad column head at the junction with slab soffit* (sub Penthouse level), at an external corner, with severe moisture related damage.

Architectural detail *F.D 126A* shows a *20 mm wide drip groove* formed in all balcony slab soffits, as per good building practice.

It was apparent from my inspection that the *drip grooves* which have been formed in balcony slab soffits were installed prior to the construction of the F. C. clad columns and run in underneath the F.C column heads, in contravention of good building practice. - *Refer example Photo No46* and also abut concrete blade walls.

The junction between F.C columns and concrete has been sealant filled with a sealant material similar to polyurethane and in some instances there was evidence of joint\exterior coating failure by way of differential cracking – *Refer example Photo No42*.

Refer example Photo No47 of a joint where the sealant has been removed and showing a bevelled concrete slab edge sloping back into same.

Beyond the provision of a sealant filled joint I saw no evidence of a *breaker bond* or a *head flashing* – *Refer example Photos No46 & 47*.

There was some significant evidence of *rust* occurring to sawn tops of internal *steel stud framing* (of unknown protective finish) and screw fixings, most of which are concealed.

Refer example Photos No48 & 49 showing significant moisture related damage to the external faces of said columns and which is extensive throughout.

In my professional opinion a similar inadequate waterproof flashing detail seems evident at the *base of all inspected F.C columns*, which appear to incorporate only a polyurethane sealant filled joint between bottom edge of cladding and balcony slab - *Refer example Photos No 37 and 40*. I saw no evidence of a *breaker bond* and note that polyurethane joints are not compatible with acrylic coatings as they move differently.

In my professional opinion significant moisture entry is occurring into these F.C clad columns for one or all of the following reasons;

- * drip grooves run in behind F.C clad columns (poor building practice), promoting tracking of water to heads of columns and placing significant moisture related stress on same
- * lack of adequate column head and base flashings and waterproof detail, potentially allowing moisture entry through capillary and hydrostatic pressure
- * lack of breaker bond between polyurethane sealant and non compatible acrylic coating, which could lead to differential hairline cracking of the exterior coating and potentially result in moisture entry



1.92A & 1.93A Recommendations;

The balconies of the penthouse and sub penthouse are the most exposed in the building and it is likely that the noted long-term moisture penetration into the structure at these levels, will most likely have promoted falling damp into lower areas.

My ground level visual inspection of the **western building façade** revealed that the majority of same is suffering from similar moisture ingress and building element deterioration, as has occurred on the east elevation however the deterioration is not as advanced.

I **strongly recommend** that a more detailed survey of Western elevation be undertaken from a swinging stage as in my professional opinion similar remedial works are likely to be required on this elevation.

Typical Balustrade Rebate/ Handrails;

I **recommend** that a waterproofing detail similar to that which I have sketched under **Annexure 3 "Suggested W/P Detail @ Typical Balcony Balustrade Rebate \Handrail"** be adopted by the builder, subject to review and agreement by a waterproof specialist.

This would necessitate complete removal of all gypsum based filler across the top of hobs and exposing bear concrete.

Every attempt should be made to recess the noted angle upstands, such that their overall height does not impede the emergency *stormwater overflow function* of the gaps between the glass balustrade.

To achieve this, the external hob heights should not be higher than the internal hob height.

The gap between the angle upstands and glass balustrading could be filled with a waterproof sealant that is compatible with the exterior waterproof coating.

The detail shows that a compatible waterproof membrane is to be applied to the internal hob edge and connected to what I assume is an existing MBT HLM 5000 waterproof membrane beneath the balcony tiling.

This may require partial removal of tiles and the sealant filled joint between tiles and hob.

In my professional opinion it would be necessary to install a similar angle upstand where the glass balustrade \hob abut end walls and run some 20mm each side of glass.

I also **recommend** that the *handrail fixing screws* be W/P sealant filled.

Typical F.C Clad Balcony Column Head/Base;

I **recommend** that a waterproofing detail similar to that which I have sketched under **Annexure 3 "F.C Balcony Column/Wall Head/Base Suggested W/P Detail"** be adopted by the builder, subject to review and agreement by a waterproof specialist.

This would necessitate **complete removal of all F.C cladding**, full perimeter of columns \walls and the installation of appropriately sized flashing angles at both the head and base of columns \walls and possibly at the junction of same and unit external walls, where they are exposed - **Refer example Photo No19.**

The angles should be filled with a waterproof sealant that is compatible with the exterior waterproof coating and/or a breaker bond installed over same, prior to the application of high build external coating.

A special W/P detail (not noted on sketch) would need to be incorporated at the junction of said **head angle** and existing slab soffit **drip grooves**, which would be above same, so as to prevent drip groove water tracking across.



The *base flashing angle upstand* would need to be significantly higher than the finished level of the balconies, so as to resist hydrostatic water pressure, with a breaker bond over a waterproof sealant filled joint.

The *joints in F.C cladding at external slab edge faces* would require special detailing (to prevent long-term moisture entry) by either incorporating a concealed flashing and/or a breaker bond over a waterproof sealant filled joint.

I **recommend** the builder confirm the type of *protective finish* that has been applied to the F.C column steel stud framing, as they might be Zinc finished and therefore not suitable for exterior use.

I **recommend** that subject to above suitability confirmation, all significantly F.C column rusted components, including stud framing and screw fixings be replaced with a rust resistant type and that mildly rusted components are rust paint treated.

1.94 Miscellaneous Eastern External Façade;

Ogburn Observations & Noted Defects;

1.95 *High build external protective paint finish; I 'm not expert in commenting on protective exterior paint finishes however I recommend that upon removal of all defective paint film, patching and allowing all damp building elements to fully dry out and prior to the application of any new exterior coating, that an independent paint expert be engaged to provide recommendations as to the specification, scope and extent of all painting works.*

1.96 *Lower eastern central facade; Refer Photo No 50 showing evidence of moisture related paint film bubbling on a lower external concrete column.*

Refer Photos No50 & 51 showing lack of external storm moulds and/or sealant filling between the window frame and adjoining concrete column.

In my professional opinion moisture entry has most likely occurred due to water entry at a high level, possibly above balconies and/or due to the lack of adequate whether ceiling between the noted window frame and concrete column.

Refer Photo No 51 of a lower level exposed balcony division wall, showing differential movement cracking at the junction of masonry and concrete column, where in my professional opinion rainwater is entering and causing damp related damage to the exterior paint film beneath .

1.96 Recommendations;

I **recommend** that all defective paint film be removed and the sources moisture entry above be identified and rectified. The damp substrate should be allowed to dry out prior to any repainting.

I **recommend** that all window frame perimeter gaps be sealant filled so as to prevent moisture entry.

I **recommend** that and adequate waterproof expansion joint be installed atop noted balcony division wall and that a breaker bond be installed over the top of same prior to the application of exterior coating.





Photo No35



Base of F.C
column sealant
filled no
flashing



Photo No37

New epoxy
filler hard up to
glass balustrade
and end wall



Photo No38a



Photo No40





Photo No41



Cracking @ sealant filled joint of external F.C cladding (no breaker bond between sealant & external coating)

Photo No42





Drip groove running behind sealant filled F.C column head (no flashing or breaker bond)

Photo No46





Evidence of rust seen in sawn tops of steel stud framing and fixing screws

Photo No48





Photo No50



2.0 CONCLUSION

With respect to the builders works, based on what I have seen and discovered and given my building experience, it is my professional opinion that most 'as-built' balustrades, some pergola beams and the external F.C. clad elements, (constructed by the builder), were either executed poorly or not in accordance with good building practice.

The severe moisture entry of both the eastern and western external façades, together with noted rusting, minor spalling and very significant exterior paint film delamination deterioration, is deemed a potentially major defect.

More investigative work is required in some instances including an inspection of the western façade from a swinging stage.

Based on my more than 25 years experience in the construction industry, the standard of works (as executed by the builder) was one of the poorest I have ever witnessed for a refurbished multi unit residential property.

The works necessary to complete repairs will be very substantial, lengthy and potentially very disruptive for owners, particularly the penthouse owners, from where the builders are currently accessing the external facades.

Given the above the builder should be provided with a copy of this report and requested to undertake their own investigations using the expert advice of their remedial waterproofing contractors and then provide a comprehensive details response, proposed remedial works methodology and the timeframe involved to rectify. Given the implications associated with access to the works from the penthouse and that works from swinging stages can be significantly delayed by wind I recommend that consideration be given to scaffolding the external façade.

