Trow

Water Leakage Investigation
7 King Street East
Toronto, Ontario

Prepared for:

MTCC #1170 – The Metropole
7 King Street East
Management Office
Toronto, Ontario
M5C 3C5

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1. Introduction

As requested by Menkes Property Management Ltd., Trow Associates Inc. carried out a water leakage investigation and exterior sealant review at 7 King Street East, Toronto. The intent of the investigation was to determine potential sources of water ingress into areas of the building, as reported by property management. These areas included; the suspended soffits for the balconies, and window areas, as noted. In addition, Trow conducted a random visual review of the condition of the exterior sealant at the east and south elevations. The project window shop drawings (dated July 17, 1996), were provided to Trow, and referenced where deemed pertinent.

Accordingly, site visits were conducted on; April 27, 2004 by [redacted] and [redacted] of Trow, with swing-stage access provided by a general contractor to review the suspended soffits at the balcony areas, June 3, 2004 by [redacted] and [redacted] to conduct water tightness testing of the window wall areas, as noted, and on June 4, 2004 by [redacted] and [redacted] to randomly review condition of the exterior sealant.

2. Procedure

Trow visually reviewed, the water damaged suspended soffit areas, and conducted localized water tightness testing with a spray pack to determine the potential source(s) of water penetration. Some of the areas which where water tested included; the balcony slab edge covers, which in some locations comprise the lower portion of the balcony guards, window wall flashings, metal closures at the balcony guard to window wall interface, and other various components of the building façade and associated balcony construction to determine the mechanism(s) for water entry to the soffit spaces. Test openings in the balcony soffit areas were made prior to the site visit by Trow.

For the water leakage reported in the window wall areas, Trow visually reviewed the areas and conducted water tightness testing with a suspended spray rack. The spray rack utilizes a matrix of nozzles to deliver a uniform flow of water over the exterior of the building. This, investigative testing procedure is intended to re-create the reported leak. It should be noted that the water tightness testing was carried out without an applied pressure differential (i.e. wind effects were not simulated).

3. Visual Review and Water Test Results

The following section summarizes observations made during the visual review and localized water testing.

3.1 Balcony Areas of Suites [redacted]

Trow accessed the exterior balconies of Suites [redacted] of the building to review the adjacent window wall area and balcony slab edge covers. The intent of the review and testing was to determine the source(s) of water entry into the suspended ceiling at the underside of the [redacted] floor, balcony slab. Trow carried out localized water testing at various locations which were considered to be potentially open to water penetration.

The following observations and test results were noted:

1) The sealant at the [redacted] floor slab, window wall flashing, was noted to be discontinuous for the portion which returns below the underside of the balcony slab. Controlled amounts of water introduced at this area, resulted in water entry into the soffit area in less than one minute (see Photographs 1 and 2).

Photograph 1

Photograph 2

2) Trow introduced water at the lower corner of the balcony slab edge cover and noted water entry into the soffit area. (see Photographs 1 and 3).

Photograph 3

3) Water was introduced at the top edge, of the inside metal corner closure, installed between the inside surface of the balcony slab edge cover, and the outside corner post

of the adjacent window assembly. Trow observed water entry into the suspended soffit area within a minute (see Photographs 4 and 5). The top edge of the aluminum closure was noted to be unsealed.

Photograph 4

Photograph 5

4) The metal slab edge cover is sealed to balcony, water-proof coating. It was observed that the sealant is discontinuous at the balcony guard rail, post locations. Trow introduced water behind the north post of the balcony guard, on the east elevation, and within one minute, water was observed entering the suspended soffit space below.

5) Trow observed, that the sealant installed between the top surface of the aluminum window wall flashing and the sill mullion of the spandrel panel at the [redacted] floor slab has failed cohesively (see Photographs 6 and 7)

Photograph 6

Photograph 7

6) It was noted, that the metal corner closures and vertical mullions couplers for the window wall system at the balcony areas of Suites [redacted] have been needle beaded with clear sealant. The sealant was noted to have adhesively failed, at several locations.

7) It was observed, that the sealant application is discontinuous at the underside of the window wall flashing installed at the [redacted] floor slab, right-angle change at the balcony area. (see Photographs 8 and 9).

Photograph 8

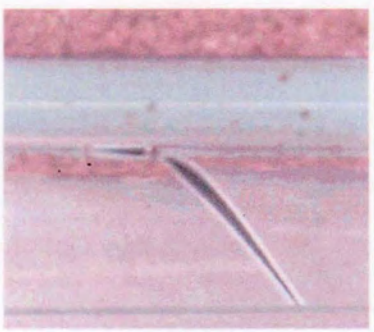
Photograph 9

3.2 Balcony Areas of Suites [redacted]

Trow accessed the exterior balconies of Suites [redacted] and [redacted] to review the local window wall system and balcony slab edge covers and conduct localized water tightness testing. The intent of the review and testing was to determine the source(s) of water entry into the suspended ceiling, at the balcony area of Suite [redacted]

The following observations and test results were noted:

1) Trow observed, 'oil-canning' of the slab edge covers on the west elevation of the balcony for Suite [redacted] (see Photograph 10)



Photograph 10

2) Water was introduced at the top edge, of the inside metal corner closure, installed between the inside surface of the balcony slab edge cover, and the outside corner post of the adjacent window assembly (Suite [redacted] Trow observed water entry into the suspended soffit area below, within one minute (see Photograph 5). The top edge of the aluminum closure was noted to be unsealed similar to that of Suite [redacted]

3) The interface between, the mounting plate of the balcony drain pipe and the exterior face of the balcony slab edge cover was noted to be unsealed. Trow introduced water

at the top edge of the mounting plate and noted water entry to the soffit space below (see Photograph 11).

Photograph 11

3.3 Water Testing and Visual Review of Suite [redacted]

In order to determine the source(s) of water entry, into the interior of the suite, Trow conducted; a visual review of the exterior cladding systems, and water tightness testing.

Observations made during the visual review, and the results of the water testing were as follows:

1) Trow carried out water tightness testing at the head of the dining room window on the east elevation and within three minutes noted water entry below the sill stops of the upper fixed unit.

3.4 Water Testing and Visual Review of Suite [redacted]

In order to determine the sources of water entry, into the interior of the suite, Trow conducted; a visual review of the exterior cladding system and associated sealant joints, and carried out water tightness testing.

Observations made during the visual review, and the results of the water testing were as follows:

1) Trow observed an unsealed metal closure strip installed at the head mullion of the window above the reported leak.

2) Water tightness testing was conducted, however the leak could not be not re-created.

3) Trow noted that the pre-cast, panel-to-panel sealant joint, at the sill of the kitchen window of Suite [redacted] above, has cohesively failed.

3.5 Exterior Sealant Review on the East and South Elevations

Trow conducted a visual review of the exterior sealant condition from a Bosuns chair, and accessible balconies and terraces, to determine the current condition on the south and east elevations.

Observations made during the review are as follows:

1) Cohesive failure was noted at the pre-cast concrete panel to window sealant joints.
2) The sealant, installed between the top surface of the window wall slab flashing and the sill mullion above, was noted to have failed adhesively at multiple locations.
3) Trow noted locations were the sealant has failed, as it appears that there was insufficient sealant applied.
4) The installed sealants were typically noted to be hard, and non pliable.

4. Discussion and Recommendations

The following sub-sections are intended to provide a course action, designed to mitigate the risk of water leakage into the noted Suites and suspended ceiling areas. The associated exterior sealant problems are discussed at the end of the section.

4.1 Balcony Areas of Suites [redacted] and [redacted] South East Corner

Based on the noted observations, the balcony slabs which have been water-proofed and sealed at the perimeter guards are not functioning to exclude water from the suspended soffit below. Trow demonstrated numerous sources of water penetration into this space, and currently, the sealant applied between the balcony topping (water-proofing) has typically de-bonded and could likely, never have been sealed effectively in this configuration. The movement at this joint location cannot be accommodated by the sealant as configured. As designed, and constructed it could be quite complicated and costly to modify the balcony guards, drainage and method of sealing at the slab to prevent water from migrating to the soffit space below. For the balcony areas which experienced water penetration into the suspended soffit areas, Trow would suggest the following course of action be taken to prevent further water penetration problems.

A metal flashing should be provided. This flashing would be sealed to the underside of the [redacted] floor, balcony slab. The flashing would extend below the suspended soffit level and project beyond the exterior face of the cladding. The intent of this angle would be to direct

any water which enters, through any of the potential sources demonstrated by Trow, to the exterior and not into the soffit space. The angle would need to be end-dammed (i.e. capped), and continuous for the exterior portion of the balcony perimeter. In addition, Trow would recommend that another 25 mm x 25 mm angle, also sealed to the underside of the slab, outside of this new flashing, to act as a drip edge to prevent water migrating across the underside of the slab and reaching the new flashing where it meets the concrete. The flashing would be left open (i.e. not sealed) at the lower exterior edge to provide free drainage to the exterior.

In addition to the above, Trow would also recommend that the demonstrated sources of water entry be sealed to reduce the number of potential sources. The suspended soffit, could then be repaired or fully replaced with an appropriate exterior gypsum board.

The approximate cost for the noted repairs would be between, $6k - $10k per balcony.

4.2 Balcony Areas of Suites [redacted] and [redacted] South-West Corner

The water penetration problem associated with the soffit of Suite [redacted] is similar to that of Suite [redacted] as noted in Section 4.1. As such, Trow would recommend the same repair procedure be implemented to prevent water penetration to the suspended soffit.

The approximate cost for the noted repairs would be between, $6k - $10k per balcony.

4.3 Water Leakage into Suite [redacted]

Based on the results of the water tightness testing and visual review Trow would recommend, that the fixed unit of Suite [redacted] noted to leak be re-glazed. The sealed unit should be removed, new glazing tape provided and the butt joints in the glazing leg and butyl tape wet sealed. The window in question is the upper fixed unit, on the south side of the balcony on the east elevation.

The approximate cost for the noted work would be $1k for this suite.

4.4 Water Leakage in Suite [redacted]

Based on the results of the water tightness testing and visual review Trow would recommend, that the metal closure installed at the head of the kitchen window of Suite [redacted] be sealed water tight. The sealant for the metal closures at the window heads, and the pre-cast panel joint at the sill of the window above was noted to have failed should be replaced as part of an upcoming sealant replacement project.

Repair costs would be included in an upcoming sealant replacement project.

4.5 Exterior Sealant on the East and South Elevations

The exterior sealant, for the pre-cast to pre-cast panel joints appears to be a single stage joint (i.e. one exterior bead only), applied over the exposed aggregate finish. Based on Trow's experience, applying exterior sealants over an exposed aggregate finish is often problematic with respect to water penetration. The number of cohesive sealant failures noted on the south and east elevations indicate that the existing sealants are no longer functional, in terms of accommodating differential movement between the cladding components. Applying exterior sealants on top of exposed aggregate is considered a risk with respect to water penetration. As such, the sealants are considered to have reached the end of their useful service life and replacement considered warranted. Accordingly, based on the observations Trow would recommend that the sealant on these elevations be replaced at this time.

The approximate cost of sealant replacement for the south and east elevations would be in the order of $200K – $250K.

4.6 General Comment

It should be clearly noted that the recommendations provided in this report are considered minimal in terms of the level of effort required to attempt to reduce the potential for water penetration into the occupied spaces of the building (including balcony areas). As this building façade is considered a "face-sealed" system, it relies solely of the ability of its exterior surfaces to prevent water penetration. The inherent problem with this approach is two-fold: 1) it is near impossible to achieve a perfect seal in the first place and 2) all of the seals are in the most vulnerable location, being exposed to the elements and thus susceptible to premature failure.

If it were desired to significantly reduce the potential for water leakage over the longer term, Trow would recommend a more extensive program of remediation that would include the transformation of the existing face-sealed system to a partial[1] "rain screen" system. The performance advantages of this type of system have been well documented and would entail fully sealing and covering the existing opaque portions of the cladding (including balcony areas) with fully vented and drained rain screen panels. This approach has been successfully employed by Trow in the past and offers many advantages over the reapplication of sealants including: reduced risk of water penetration, increased service life of the primary air and water seals, improved energy performance and, the ability to positively impact the aesthetic quality of the building.

At this point Trow has not provided a budget estimate for this approach. However, based on previous projects, Trow has found this approach to be cost effective and should the board wish to pursue this route, a rough budget estimate could be procured.

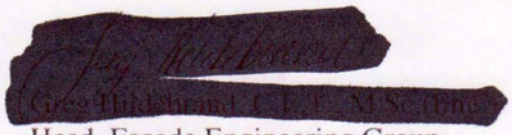
[1] Only the fixed windows would remain face-sealed.

We trust the above is sufficient for your purposes. Should you have any questions please do not hesitate to contact the undersigned.

Trow Associates Inc.

Façade Engineering Group
Building Engineering Team (BET)

Building Science Engineer
Building Engineering Team (BET)



Head, Façade Engineering Group
Building Engineering Team (BET)

Profile Project

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Façade Engineering Group

Client:	Halton Condominium Corporation No.
Location:	7 Gale Street, St. Catherines, Ontario
Description:	Façade repair, waterproofing and installation of new cladding.
Project Value:	$900,000.00
Scope:	Water leakage and façade damage investigation. Design of repair. Preparqation of specification and tender documents. Contract administration and construction review.

7 Gale Street, St. Catherines

7 Gale Street in St. Catherines was a window wall and stucco-clad building suffering chronic water damage and penetration problems, particularly at the slab locations. Trow conducted an extensive review of the building façade including all of the water damaged components and established a comprehesive restoration strategy. All of the damaged exterior wall components were either repaired or replaced and the resultant exterior cladding surfaces waterproofed. The opaque portions of the building were then clad with new architectural metal rainscreen panels. The not only had a significant impact on the water resistance attributes of the façade but the repairs had a significant impact on the aesthetic quality of the building.

Owing to the magnitude of the project from both a financial and aesthetic perspective, Trow had to liase with the property manager and condominium executive to effectively communicate the technical items requiring action while respecting the aesthetic demands of the condominium owners.

Trow prepared the specification and tender documents, analyzed the bids, managed the contract and conducted the construction reviews through start to finish of the project.
According to the condominium owners and property manager, the project was considered a huge success, eliminating water leakage and radically improving the appeal of the building.

50 BEST MANAGED COMPANIES

Trow