

Dear Members of Council,

Given the long history of leaks in various parts of our suite over the 25 years we have been living in it and what was revealed when the living room window wall was opened earlier this year, you will understand our interest in the WSP report entitled *Harbour Cove Moisture Content Survey* and dated 29 August 2017. **Unfortunately it gives us no new useful information for our own suite and there are serious questions about its value to all owners in terms of meeting the stated objectives in the Scope of Work and information needed by owners for deciding on actions.** Below we detail our reasons for the most disappointing conclusion that the WSP report is deeply flawed.

#### Pictures from our Suite 211-1450



1450-Unit 211 - Corrosion on steel stud

This picture is taken from p. 2 in Appendix D of the WSP report. You will recognize it as showing the leak damage to plaster, steel and carpeting that was found when Ciprian had Vlad open the wall in our **sitting room** on 16 February 2017. Not shown in this summer photo by WSP is the fact that water was streaming down the concrete when it was opened during the rainy season and such events have clearly been going on long enough for the rust to eat completely through the steel in places.

This second picture also appears on p.2, next to the one above, and shows the 3" examination hole cut by WSP in a similar location below the window in the adjacent **dining room** wall. The hole cut in the styrofoam is only 1.5" wide and 2" high. The concrete wall exposed for inspection at the back is even less, about 1.5" square.



1450-Unit 211 - XPS rigid insulation

### Information in Report Specific to 211-1450

There are several very problematic errors in what the WSP report says in relation to our suite.

Given the clip-board evident on the **sitting room** floor in the picture above taken by the WSP investigator and the inclusion of that photo in Appendix D, we were very surprised to find there is **no data or comments** recorded in the Appendix A tables devoted to “New Exploratory Openings” about this highly visible leak damage beneath our **sitting room** window. We expected to find the sitting room window information under this heading because it was not done for the BECA 2014 study and the opening was newly created in February this year by Ciprian at our request.

Elsewhere in Appendix A, in the section headed “Existing Exploratory Openings” there is an entry for our suite referred to as “Dining Room Window” **BUT it is not the dining room and there was no existing opening in that room;** the accompanying observation “Corrosion on steel stud (see Appendix D)” indicates that they can not be **referring to the Dining Room but are speaking about the Living Room**. This is a major recording error either by the investigator or writer of the report.

This series of errors in the reporting for our suite introduce substantial confusion and doubt about what is to be concluded about moisture damage in the two locations identified in the photos. Given these errors, whether or not the reported Moisture Content (MC) reading of 0.2% applies to the Living Room or the Dining Room is completely unknowable.

Since the new hole cut in the **Dining Room** wall only exposes a 1.5” square of concrete, the comment in the Observation column, “Corrosion on steel stud”, **cannot be referring to the studs in the dining room wall as they cannot be seen**. Again, it obviously refers to the large opening in our **sitting room** that we have had to look at for the last 8 months.

If, as seems very likely, it is a reference to the condition of the studs in the **Living Room** wall the statement “Corrosion on steel stud” seems a **major understatement** given there is **substantial rusting and places where the rust has completely eaten through the steel, indeed enough to create a series of holes**. This is readily obvious to the naked eye. To say less is to seriously misrepresent the condition of the steel and mislead HC owners who read the report as to the extent of the problem in our suite **and** quite possibly hidden behind the walls of others (a potential problem that our RJC consultants have cautioned owners to anticipate since the BECA Report 2014 and the Depreciation Report 2016).

If the basic identification and descriptive information in just one suite is so riddled with errors and confusion what faith can we have in the validity of any of the information on the other suites and therefore the WSP report’s conclusions and recommendations?

## Methodology and Measurements

Below I comment on the information provided in section **1.3 Methodology**, proceeding through it paragraph by paragraph. Quoted words are shown in italics and comments on them follow immediately in non-italics.

*“The openings were made at locations considered to be susceptible to water ingress,”*  
What criteria were used to identify and ensure consistency in selecting areas “susceptible to ingress”? Were previous owner and consultant reports reviewed?  
Were these areas mapped/recorded in a standard way so the reader knows precisely where they come from and their location is known with certainty for future check monitoring, a major purpose of the study?

*“...and consisted of 3” holes through the dry wall to expose the exterior wall assembly.”*  
It is not clear what the specific intent was in cutting 3” holes in terms of precisely the observations about the “exterior wall assembly” that were being sought. The picture above for the 3” hole cut into the dining room window illustrates what **can and can not** be identified by the chosen method as it was implemented. The hole as cut through the drywall and the styrofoam is adequate to identify the material layers (i.e. drywall, styrofoam, concrete). **But** is not large enough to observe anything more about “the exterior wall assembly” than the very small 1.5” square of concrete. No view to left or right or up and down is possible. Given the problems revealed by opening our **adjacent sitting room** wall, it is very surprising that the investigator did not see reason to make a more careful examination of what has happened over time behind the **dining room** wall. All it required was an enlargement of the hole for visual inspection and/or use of a video camera.

*“A moisture content reading was taken at the exterior sheathing, where possible...”*  
Are we correct in assuming that “exterior sheathing” refers to the interior face of the exposed concrete, as seen in the above photo for the dining room hole, an area of 1.5” square? This detail on location is essential for interpreting the significance of the measurements recorded. As reported the reader has no idea whether the measurements recorded came from the “exterior sheathing” or somewhere else. The investigator’s choice could have major implications for interpreting the Moisture Content recorded.

*“...or from the back side of the drywall.”*  
Was this always the back of the removed drywall plug? Or did they also test adjacent drywall that was exposed?

*“The openings allowed a visual review so that any evidence of moisture or prior water ingress could be recorded.”*

As explained above, the small access created would **not** enable them to detect “**any** evidence of moisture or prior water ingress”, **only** that within the small 1.5” square. The report makes a seriously misleading over-statement.

*“This [referring to their testing of the previously created exploratory holes by BECA 2014] allowed for a visual review of the wall assembly within the openings to compare with the original findings from 2014.”*

In addition to the problems (identified above and following) with the present WSP study that limit any comparison, there is nowhere a discussion of the methods and results obtained by the BECA report from 2014 and its own strengths and weaknesses and comparability.

*“Moisture content readings and visual review at select locations on the exterior walls of the remaining units where no exploratory openings were made or were previously existing.”*

How was this done? Presumably with the use of the pronged meters. But how deep did they go? Where were the measurements located? Have they been recorded/mapped systematically for future reference? etc.

*“In all methods described above, a visual review of the interior walls and windows (on exterior wall areas) was performed to access [sic] the current condition and determine if previous water ingress had occurred.”*

What was the checklist to ensure a systematic approach? How did it draw on previous reports to identify what to look for and where, including the BECA 2014 and the Depreciation Report 2016? Did they map/record the location of tests for future monitoring? To the extent these steps were not taken, the project and report falls short of what owners need for making informed decisions now and being able to do check monitoring in the future.

## **Meters and Measures**

Earlier this year when debate began about the merits of different approaches to a further water damage study at HC I did some research on meters for measuring moisture in building walls so that I could better understand what was available and the pros and cons of alternative instruments and methods. I soon found that Delmhorst is a major producer of meters of varying specialized designs and they are widely used. Their web site has excellent materials for self-education beginning with the basics and going on to complex issues relating to making measurements in different materials under varying conditions and interpreting results.

**Based on what I learned it seems to me that the two Delmhorst meters that WPS indicate using would be suitable to the work we needed undertaken. The problems, as indicated above and further elaborated below, lie primarily in the way in which the field investigation was designed and undertaken and the resulting data analyzed and reported.**

## **“Dry” or “Wet”? And What Do Measurements Imply for Living Within HC Walls?**

The WSP report establishes a terminology for ease of communication of “Dry”, “Moderate” and “Wet” and links each to a range of Moisture Content (MC) percentages, respectively “below 1%”, “between 1.1% and 2%” and “equal to or above 2.1%”. **But there is no discussion of what the MC% values imply for living within HC walls.** This is immensely important for knowing how owners should correctly interpret the numbers. Once again the report’s authors could have drawn on previous HC studies including BECA (2014) and Depreciation Report (2016).

They could also have used very useful explanations on the Delmhorst web site (<http://www.delmhorst.com/>). For example Delmhorst has a page entitled **ABC’s of Measuring Moisture in Drywall** (<http://www.delmhorst.com/blog/bid/360619/abc-s-of-measuring-moisture-in-drywall>). I was particularly interested in the following paragraph:

***How Wet is “Too Wet?”***

*Depending on the RH [Relative Humidity] of the environment in which the drywall is installed, drywall can be considered “moisture-compromised” when its %MC exceeds 1%.*

Thus if we adopted the terminology and standard used by the expert company, Delmhorst, that built the meters that WSP employed, we would say that any Harbour Cove suite where the MC % is found to exceed 1% should be categorized as “moisture compromised”. This language induces a very different reaction in the reader than merely categorizing it as “moderate”.

I am not necessarily arguing that we adopt the term “moisture compromised” but I am saying we need the report to provide owners with a basis for understanding the implications of the numbers reported by WSP as MC%. If more than 1% is moisture compromised then we need to know how seriously compromised is it for us if we want to continue living within those walls. At what values can we be confident that there are no ill-effects we should be concerned about? What values indicate the likelihood of ill-effects that should be of concern?

**Weather Conditions Before and During The Measuring**

Major questions were raised by owners on several occasions about the value of undertaking this project during summer months when there is significantly less rain and strong winds that drive moisture into the building are less frequent. The reality of this was well illustrated by conditions in our own suite. When the wall was first opened on 16 February, following a period of heavy rain and strong winds driving it on to our window walls, the inside concrete wall was running wet with water. When the present WSP study was being conducted our concrete wall interior must have shown no sign of running water or it surely would have been reported by the WSP investigator? Unfortunately we do not know whether the investigators even measured the MC value at the surface of the exposed concrete.

As illustrated by the information and discussion on the Delmhorst site, weather and atmospheric conditions preceding and during MC measurements are crucial determinants of the numbers obtained. This is well-developed and widely recognized science. As recorded in Council Minutes (15.8. 2017) owners have expressed substantial reservations about the timing and the design of the study. In this context it is extraordinary that the report does not address these issues. It is not until the bottom of the last page of the report that this issue is even mentioned. Their statement is mind-blowing:

“Our survey was conducted during the dry season, therefore our opinion is based on our observations and exploratory openings. We recommend that further review be performed on any units that report window leaks during the wet season.”

Did not WSP warn the Council of the major limitations of undertaking the study in the dry season? If not, they should have. If they did and Council ignored it and insisted on going ahead anyway then the primary responsibility for this flawed report must be Council's. Even so I have to wonder why an apparently reputable company operating worldwide, would agree to do the project in the circumstances.

### **Additional Comments on Data Contained in Appendices.**

There are three points in addition to those already made that I would raise from looking at the data contained in the Appendices A, B and C.

The information contained in the columns for "Description of Location" and "Observations" is uneven in its specificity (e.g. defining location of testing) and detail (e.g. how do we interpret blank cells vs those having extensive notes?). As mentioned earlier, checklists and criteria would have guided systematic data collection and reporting that would be more informative now and help lay the foundation for future check monitoring.

Nowhere is there any discussion of the error margins for the MC measurements, which is standard practice in good research in all fields. Given the instrument, how it was used and the varying conditions under which the work was performed, what is the margin of error in the numbers reported? (e.g. are they accurate within + or - 0.1% or 1.0%, or 10.0%). This is essential information if we are to make valid use of the numbers reported. RJC's 2014 BECA report exemplifies what should have been provided (see Appendix B of BECA Report).

How can an MC reading of **10.0%** (906-1450) be reported and not receive any comment other than the observation "Staining on sill"? If this is not a faulty meter reading then what did the investigator conclude was the cause of such a very high value? Maybe this is just another typo.

### **Comments on Discussion and Recommendations**

Based on all I have said above, I could obviously raise all kinds of questions with the very brief and general **Discussion and Recommendations** provided on p.6. But what I would say should by now be obvious. In summary, the report is seriously flawed and the discussion and recommendations are open to all kinds of challenges.

When I had finished reading this report I went back to the BECA 2014 report to refresh my memory of what it had said. This left me with one major conclusion and 2 key questions.

- RJC's 2014 BECA report demonstrates the quality of work we can and should expect.
- Given what BECA (together with the subsequent 2016 Depreciation Report) gave us:
  - Why did we undertake the project proposed by WSP?
  - And if we felt further work was needed, why didn't we ask RJC to undertake it?

I went back to review the Council Minutes at which the decision to undertake the WSP study was taken but regrettably there is no record of the reasoning for accepting their proposal over the earlier one by RJC and how the concerns raised about its efficacy were to be met.

I hope this will be useful to Council in considering what to do next. Please feel free to give a copy of my comments to anyone you think should see it.

If it would be helpful, I would be pleased to discuss my comments with you or any owner.

Sincerely,  
Tony Dorcey

