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THE USE OF TREATED WOOD IN THE RESTORATION OF RESIDENTIAL BUILDINGS IN SOUTHWESTERN BRITISH COLUMBIA

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1. Introduction

Water damage repairs to residential buildings are a big business in southwestern British Columbia and those that live here are aware of our "leaky condo" crisis. Recent estimates of the value of the repairs are over $1.5 billion, including low rise and high rise buildings and this affects approximately 65,000 homes. The provincial Homeowner Protection Office has approved loans of approximately $300,000 to date and for qualified owners in 700 buildings. The affected area officially includes the Lower Mainland (Greater Vancouver), southern Vancouver Island and the Sunshine Coast although other areas are also affected.

The term "Leaky Condo" is more often used by owners and the media. Consultants and the Homeowner Protection Office use the term, "Premature Building Envelope Failure". Basically, when any building has water damage to the structure, including the wall sheathing, it is considered "damage". The "premature" period is defined by the consultant of each project. At the upper boundary, the Homeowners Protection Office now excludes any buildings over 25 years old from their program. Most of the affected buildings are approximately seven to 15 years old.

Most of the problems stem from the choice of cladding system rather than the cladding itself. It is difficult to make a face sealed building water tight as the system relies on the caulking details and its condition. As the entire face of the building must be sealed for this system to work, when water gets in, it cannot drain out. What may look like a relatively good detail can still have severe decay behind. If water cannot drain at the base of the wall, it remains trapped and decays the wall plates, studs, and floor joists.

Water damage is not restricted to wood frame buildings. High rise and medium rise buildings can have water damage to the light gauge steel members, exterior gypsum board sheathing, and the wood sill liners, usually for the same reasons.

Three are other factors related to the premature envelope failure. Wood framed balconies are more exposed to the elements and tend to decay more quickly. Poorly connected air ducts allow moist air to escape behind the cladding or into the framed wall cavity. Air exhaust vents terminate near the balcony soffit. Water ingress at the

bottom corner of a window can be caused by leaking mitred joints in the window frame. Poor flashing details can direct water into the wall system like a funnel.

2. Methodology

Restoration by its very name indicates something has to be repaired. In the case of premature building envelope failure, many structures require a full reclad. Exactly which materials are replaced and which framing members are treated usually depends on the wisdom of the consultant, typically a Professional Engineer.

A project manual is prepared that provides details and drawings indicating which materials have to be replaced. Plywood is typically shown as a new material with the assumption that all the original Oriented Strand Board (OSB) or plywood will be removed and discarded. During construction, a visual review is completed and an effort is made to retain the undamaged sheathing, particularly in covered areas. Studs and other framing members are shown in the tender documents as materials to be retained. After a visual review during construction, the decayed members are marked by the consultant for replacement.

The specifications state what type of treatment is required. Typically, anything inside of the sheathing membrane is Borate treated and anything outside the sheathing membrane is CCA or ACQ treated. Sheathing under waterproofing membranes is left untreated.

3. Results and Discussion

During demolition, the sheathing is examined to ensure it warrants replacement. The consultant must also consider the purpose of the sheathing and whether the wall was intended as a shear wall. A pick test or scratch test is required to determine if the strength loss of the plywood is significant enough to warrant replacement. It is a good idea to test the sheathing in several areas to “calibrate” your awl before assessing all the wood on the site. Dimensional lumber also requires a pick test to determine the structural strength. In most cases, the discolouration of the wood is enough to indicate strength loss. Sometimes the plywood or structural members are so badly decayed that the awl is not required and the material can be removed with finger pressure or it simply crumbles away.

When decay is observed, the challenge is to determine where to stop the replacement process in the vicinity. Whenever possible, removal will continue for 24 inches beyond the visible staining. Sheathing is typically removed and reinstalled in full sheets as it is not cost effective to cut and remove small areas.

Joists are often difficult and expensive to remove and replace completely. For example, the decayed end of a balcony joist is commonly cut off and the remaining length is wire brushed and field treated with preservative. A new joist is then sistered if the remaining splice length is long enough. Usually at least three or four feet is required for the lap plus consideration must be made for decay that is not visible. A structural assessment of the loads is required before this type of repair can be made.

When new dimensional lumber members are cut on site, the cut ends are treated with a field (brush) applied preservative treatment, which is typically coloured for visual confirmation.

Exterior floor joists are often treated with borate if they are cantilevered from the interior or CCA/ACQ if they are strictly outside the sheathing membrane. Consideration of the fasteners is required as deck sheathing is usually installed with coated screws and these may penetrate a new ACQ treated joist.

Interior floor joists are not typically treated when replaced as the likelihood that they will get wet is low. We are also concerned with the warping of treated woods like Hem-Fir which makes installation difficult.

The placement of treated wood in restoration projects is based on the condition of the original wood framing after several years in service. If we are to assume the original cladding details on a building are the same around the entire perimeter, then the most damaged areas would have the highest incidence of wind driven rain. These areas will be decayed and the repair process will ensure treated wood is used. When the building is completed with a rainscreen system, the owners will have untreated wood where the exposure is less and treated wood where the exposure is highest.

In the future (hopefully in the distant future), when the new rainscreen wall system begins to weather due to lack of maintenance or renewals, the areas with treated wood framing will likely become wetted first but will not decay quickly. Over time and without maintenance, some less exposed areas will also become wetted and start to decay. The intent is that the treated and untreated areas would require repair at the same time. Presumably this will be far into the future and the building will likely be outdated at that time. Demolition rather than recladding is then likely.

All treated materials should be verified for conformance with the specifications before being installed on the building. Occasionally, the materials delivered to the site are not what was specified or ordered. Verification can be completed by reviewing the treatment stamps found on most treated products. Where a stamp exists, verification is quite quick and easy. Where there is no stamp, verification is much more difficult as you have no way of knowing the level of treatment that was provided. Sometimes the material delivered is not only missing the treatment stamp but is also the wrong species of wood.

Consultants need to provide their clients with an assurance that the project was constructed in accordance with the project documents upon which the contractor has provided his bid price. If the wood is not adequately stamped, the contractor should be requested to provide a certificate of treatment from the treatment facility indicating the method of treatment, retention density, and the wood type.

The verification process can be quite difficult and time consuming for both the consultant and the contractor. Some items to consider that would greatly reduce the time taken to complete this process are:

- A requirement for a CSA standard treatment stamp on all sizes of lumber, similar to that found on plywood or larger dimensional lumber.

- If the material is too small to physically stamp, the ends should have a small plastic tag stapled to it.

- If all certified treatment facilities agree to follow the marking standards, then the consultants will be more likely to check the materials and lower grade substitutes from non-conforming or uncertified facilities will be more readily rejected.

- Lumber yards can play their part by always stocking the CSA marked materials and not substituting without permission.

- Consultants can contribute by more carefully reviewing the materials being installed on the project.

- Contractors can deliver project specifications to the suppliers and verify the materials on delivery.

With the use of CCA or ACQ pressure treated materials one must consider the hardware that will be contacting these members. The manufacturers and distributors have been very proactive at warning the users that special hardware is required. We had been using different types of stainless steel fasteners with the CCA lumber and will certainly continue to do so with the ACQ treated wood. Local metallurgists have warned that galvanized fasteners may not be good enough in CCA wood and the same will apply for ACQ. Contact with other accessories such as stucco stops and insect screen also has to be considered.

Simpson Strong Tie's web site provides test results indicating that ACQ is twice as corrosive as CCA and they have produced a line of hot dip galvanized hardware. As consultants, we must heed the warnings of the manufacturers and protect our client's buildings.

4. Conclusions

Treated wood is used throughout the condominium restoration industry in locations identified with previous decay. Fasteners and hardware require special attention as ACQ treated woods are introduced into the structure. Proper identification will go a long way in making the properly treated materials easier to review on site.

5. Literature

1. 2001, Woodframe Envelopes in the Coastal Climate of British Columbia – Best Practice Guide, CMHC.

2. 2001, Building Envelope Rehabilitation – Consultant's Guide, CMHC

3. circa 1998, P.I. Morris, Understanding Biodeterioration of Wood in Structures, Forintek Canada Corp.

Figures

Photograph 1: Decayed balcony column.

Photograph 2: Decayed sill plate.

Photograph 3: Decayed plywood.

Photograph 4: Wood framing marked for replacement.

Photograph 5: Replaced wood framing. Treated wood is visible.

Photograph 6: New wood framing at the balcony column.

Photograph 7: Preservative treatment stamp.