Report

The Wall Claddings System

on the

Kidz First Building

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ATTACHMENT

- KIDZ FIRST drawing elevation showing panels inspected
- Photos of damages to the underlying wood frame

A. EXECUTIVE SUMARY

An inspection was commissioned to ascertain if there were problems with the Wall Claddings and the underlying wall frames on the Kidz First Building. The results of the inspection reflect that the current condition of the Cladding System for the whole building is suspect.

There was severe damage to the underlying panel frames caused by the prolonged persistent moisture ingress, and deemed a weather-tightness problem affecting the structural integrity of the building. Primarily the problem has been the result of decaying timber frames in some areas while most of other areas inspected have shown signs of mild dampness that could worsen and escalate into serious damage levels. To allow this, will further weaken the building structure, and possibly render it unsound unsafe and unhealthy to occupy.

In its present poor state this condition is likened to the 'Leaky Home syndrome' and in the course of time, if allowed to infest , will not be able to maintain its viability and its purpose.

Recommendations include:

- The overall modification to the existing Wall Cladding system
- Improvement to the installation and fixing methods

B. BACKGROUND

The inspection results show a much similar findings to those of recent damages that occurred at the AMC building, briefly referred to in this report for comparison purpose

The Kidz First building and the AMC building were built in 2001 by Hawkins Construction. The design and cladding systems used in both buildings are the same except for part of the east wing of the Kidz First Building which is of monolithic construction of proprietary plastered cladding. The contract agreement for the construction of these two buildings included amongst other things, a 10 year warranty. These buildings were handed over for occupancy following practical completion in early 2003.

AMC Building

During the occupancy of this building and while the 10 year warranty was and still in force, major problems arose that drew the attention of CMDHB particularly to the severe damages that had occurred to a large section of the cladding system on the north wall.

Assessment carried out on the damage, indicated the presence of moisture ingress, inadvertently caused by factors that include but not limited to; substandard material quality, ineffective workmanship and, lack of adherence to product installation specifications.

The remedial costs in addressing the problems were expensive. Of worrying concern were the notable signs that show the likelihood of increasing damages developing into major costly problems in the near future.

Kidz First building

The problems found at the AMC building accelerated moves to conduct an inspection of the Kidz First building. It is to be noted that before this inspection was carried out, there were signs that already exist which show that similar problems are rapidly developing and this inspection was directed to give emphasis to the Wall Cladding system to confirm these problems and how serious have they become.

C. METHODOLOGY

The assessment plan involved the removal of selected wall panels to examine the conditions of the underlying wall frames and other features on which the panels were attached.

In total, 12 sets of panels were randomly selected and there was no particular set pattern or order of selection (Refer to Appendix 1).

At the initial stage, the plan was set out to:

- Research and obtain the relevant contract documents and drawings located at the drawing and design office.
- Consult with engineering and drawing office personnel on site location details and, the layout of various services that connect to the Kidz First building.
- Hire of a maintenance contractor for the reinstatement work.
- Negotiate with the Kidz First Building stake holders, a work program and time frames with the provision to better manage public interference and noise control
- Consult with engineering staff on past records and history of maintenance and or improvement work carried out on this building.

Because the panel sets were located at extreme heights, the inspection work required scaffolding platforms. The time allocated for the inspection work was extended to accommodate the recurrence of erection, dismantling and relocation of the scaffolding platforms from one panel set to the other over the 12 chosen panel sets. The continual bad weather prolonged the inspection time contributing to a delayed completion date .

The inspection assessed the moisture content, the conditions of the building material, the existing fixing method and the standard of workmanship.

As each panel set was inspected, the findings was collated and recorded.

D. FINDINGS

D.1 Panel Set 1 (2 panels)

Moisture Reading (timber frames): Taken at 4 corners and middle of frame.12.5% average 14.7% highest

Condition of timber frame**:** Dry to standard

Type/condition of Cladding: 9mm Hardies Titan Façade Panel In good order

Condition of Accessories:

- Butyl Inseal Rubber: Intact but showing signs of wear
- Flashings: Well positioned. Profile well maintained
- Screws: Galvanised .In good order. Spacing well maintained
- Building paper: In fair order
- Thermal Insulation: loose packing between frames, more needed
- Sealant: Even application, good adhesion

General Comment: Internal moisture level acceptable. Panels and all other fixings damaged during removal were replaced new. This penal set was in good order

D.2 Panel Set 2 (1 panel)

Moisture Reading (timber frames): Taken at 4 corners and middle of frame.18.5% average 24.8% highest

Condition of Frame **:** Mildly damp at the bottom left corner

Type/condition of Cladding: 9mm Hardies Titan Façade Panel In good order

Condition of Accessories

- Butyl Inseal Rubber Properly installed. Hard and slightly damaged
- Allum Flashings /socket Good. Properly installed
- Screws Fair.
- Building Paper In good order
- Thermal Insulation loosely packed between frames. More needed.
- Sealant Thin application at damp area

General Comment: Moisture reading is above excepted level. Dampness occurred at left hand corner along the stud and bottom plate. Panel left open and shielded for 2 days to reduce moisture level. Affected area treated with a frame saver protective coat before sealing it off with all new material.

D.3 Panel Set 3 (1 panel)

Moisture Reading (timber frames):	Taken at all corners and at middle of the frame. Readings fluctuated above normal with 24 % at maximum
Condition of Frame:	Slightly damp at the right outside end of the diamond frame
Type/condition of Cladding:	9mm Hardies Titan Façade Panel In fair order

Condition of Accessories :

- Butyl Inseal Rubber — Intact hard and worn
- Allum Flashing/SocketFair
- Screws — Fair
- Building Paper — In good order
- Thermal Insulation — Thinly packed between studs space and insufficient
- Sealant — Well applied - good bond

General Comment: Dampness seen at places where moisture reading is above normal. No rot visible. Panel left opened, shielded and ventilated over nite to bring down moisture level before sealing it off with new material.

D.4 Panel Set 4 (1 panel)

Moisture Reading (timber frames):	Taken at all corners and at middle of the frame. Max moisture reading of 44% recorded below diamond panel
Condition of Frame:	Rotten timber above and below diamond panel
Type/condition of Cladding:	9mm Hardies Titan Façade Panel In fair order

Condition of Accessories :

- Butyl Inseal Rubber — Intact but hard on the outer edge
- Allum Flashing/Socket — In fair order
- Screws — Fair. Spacing uneven
- Building Paper — Fair. Well attached to frame
- Thermal Insulation — Fair. Thinly packed
- Sealant — Damaged - Loose bond where rot occurred

General Comment: Rotted timber replaced. Rubber seal at bottom of diamond panel loose and sealant poorly applied. Panel resealed with new material and fixings

D.5 Panel Set 5 (1panel)

Moisture Reading (timber frames): Taken at all corners and at middle of the frame. Max Reading 16.2%

Condition of Frame: Dry to standard

Type/condition of Cladding: 9mm Hardies Titan Façade Panel In fair order

Condition of Accessories;

- Butyl Inseal Rubber — Fair hard intact
- Allum Flashing/Socket — Fair
- Screws — Fair – uneven spacing
- Building Paper — Fair- well attached
- Thermal Insulation — Dusty, thinly packed between frame spaces
- Sealant — Fair. Intact

General Comment: Internal moisture level acceptable. Panels and all other fixings removed were replaced new.

D.6 Panel Set 6 (8 Panels)

Moisture Reading (timber frames): Fluctuating readings from 12.6% to 42.% max

Condition of Frame:	Poor. Wide spread rot under 8 panel area
Type/condition of Cladding:	All panels in good order before removal
Condition of Accessories	
• Butyl Inseal Rubber	Worn, loose and partly damaged
• Allum Flashing/Socket	Fair well secured
• Screws	Fair. Poorly inserted in areas where rot occurred
• Building Paper	Fair
• Thermal Insulation	Fair but thinly packed between frame spaces
• Sealant	Damaged, no bond on affected areas
General Comment:	This is the worst affected of all panels inspected. Severe rot was present. 65% of timber frames were replaced. Poor workmanship is a contributing factor.

D.7 Panel Set 7 (4 Panels)

Moisture Reading (timber frames):	Fluctuating readings. 40.% max reading
Condition of Frame:	Poor. Rot on corner frames detected
Type/condition of Cladding:	Proprietary plastered system on 4.5 plaster cement backing board and profiled close cell polystyrene layer
Condition of Accessories	
• Butyl Inseal Rubber	Not applicable
• Allum Flashing/Socket	“
• Screws	“
• Building Paper	“
• Thermal Insulation	“
• Sealant	“

General Comment: Rot occurred largely at the corner frames and window reveal where plaster cover was too thin. This exposed metal V flashing corner brackets that developed rust, breaking up plaster and allowing for moisture to ingress.

D.8 Panel Set 8 (1 Panel)

Moisture Reading (timber frames): Taken at corner, middle, and centre of frames. Average reading 14.4% Max 16.8%

Condition of Frame: Dry to standard

Type/condition of Cladding: 9mm Hardies Titan Façade Panel In fair order

Condition of Accessories :

- Butyl Inseal Rubber — Fair. Hard and flat at outside edge
- Allum Flashing/Socket — Fair
- Screws — Fair
- Building Paper — Fair – well attached
- Thermal Insulation — Fair, dusty and thinly packed between space
- Sealant — Fair and intact

General Comment: Acceptable moisture levels recorded. Satisfactory over all. All panels removed were replaced new including underlying fixings

D.9 Panel Set 9 (1Panel)

Moisture Reading (timber frames): Taken at corners, middle, and centre of frames. Average reading 19% Max 26.8%

Condition of Frame: Damp. No rot detected

Type/condition of Cladding: 9mm Hardies Titan Façade Panel In fair order

Condition of Accessories

- Butyl Inseal Rubber — Worn and hard at the outside edge of vertical joint
- Allum Flashing/Socket — Fair
- Screws — Fair and well spaced
- Building Paper — Fair
- Thermal Insulation — Slightly stained. Thinly packed between frame spaces
- Sealant — Broken and loose

General Comment: Moisture readings were slightly above acceptable levels. Panel frames exposed overnight, shielded and ventilated to lower moisture level before sealing it off. New panel and fixings installed

D.10 Panel Set 10 (1 Panel)

Moisture Reading (timber frames): Taken at corners, middle, and centre of frames. Average reading 16.2% Max 19 %

Condition of Frame: Dry to standard

Type/condition of Cladding: 9mm Hardies Titan Facade. In good order before removal

Condition of Accessories

- Butyl Inseal Rubber — Fair. Well bonded to panel frames
- Allum Flashing/Socket — Fair. Dented after removal of panel. Replaced with modified allum flashing
- Screws — Fair. Some broke during removal of panels and were replaced
- Building Paper — Fair. Well secured
- Thermal Insulation — Loosely packed
- Sealant — Fair. Intact

General Comment: Panel in fair condition

D.11 Panel Set 11 (1 Panel)

Moisture Reading (timber frames):	Taken at corners, middle and centre of frames. Max 43% Average 24.2%
Condition of Frame:	Rot detected at lower right cross vertical and horizontal members
Type/condition of Cladding:	9mm Hardie Titan Facade Panel in fair condition before removal for inspection

Condition of Accessories

• Butyl Inseal Rubber	No adhesion where rot occurred
• Allum Flashing/Socket	Fair. properly fitted
• Screws	In fair order. Spacing uneven and skewed
• Building Paper	Fair. Well secured
• Thermal Insulation	Loosely packed
• Sealant	Broken and loose
General Comment:	Panel lost adhesion where rot occurred so was butyl rubber seal and sealant detached and broken. Screws were in skewed position.

D.12 Panel Set 12 (1 Panel)

Moisture Reading (timber frames):	Taken at corners, middle and centre of frames. Max 25.2 % Average 20.4
Condition of Frame:	Damp noggings below concrete beam
Type/condition of Cladding:	9mm Hardie Titan Facade Panel in fair condition before removal for inspection

Condition of Accessories

• Butyl Inseal Rubber	In fair order.
• Allum Flashing/Socket	Fair
• Screws	Fair. Well spaced and driven in

- Building Paper — Good. Properly secured
- Thermal Insulation — Thinly packed
- Sealant — Bond broken

General Comment: Moisture reading above 20%. Frame slightly rotting below diamond frame. Damp on noggins below beam

E. ANALYSIS

- In total, four set panels (panel 4, panel 6, panel 7and panel 11,) out of 12 set panels inspected showed significant damage requiring immediate attention. The underlying frame work for these 4 sets had developed rot and, moisture reading taken on these frames were well over 40% moisture level. In panel sets 6 and 7 the rot was severe and wide spread ,and more surrounding panels had to be removed
- Except for panel sets 1 ,5 8, 10, which were intact and structurally sound, panel sets 2,3,9,12 showed identical signs of mild dampness from moisture ingressing the panel joins and in to the frame work. Moisture readings in these areas were slightly above the acceptable level between the 20% and the 25% . Rot has not developed in these affected parts of the frame to really weaken its structural strength.
- The results shows more panel sets out of the 12 sets inspected , that have been affected by dampness and rot and if this result is to resemble on the overall condition of the rest of the panels, more damages will be expected
- External moisture ingresses pass the panels mostly through the joints by capillary action and ,investigation has revealed that this happened through loss of bond between the aging inseal rubber , the sealant and the wood work through building movement. However the wrong positions of the holding down screws carelessly driven through the panels directly into the joints of the frame or near the edge of the wood splitting it, thereby losing its holding power, is a contributing cause to the damage.
- The existing design method used for the underlying timber frame work is considered inadequate and lacks provision for effective barriers and air space between the panels and the frame work .These help to negate moisture penetration. The existing arrangement while using the Hardies Titan Panels fails to follow the product installation requirement which specifies solid air barriers and air space to be used. The existing fixing arrangement allows panel to be fixed directly on to the framework

separated only by building paper, butyl rubber seal and sealant. When any of these fails, moisture easily comes in direct contact with the frames, hence the severe rot that had been seen occurring.

F . RECOMMENDATION

In view of the findings and above analysis, the following is recommended

- That the whole building is progressively reclad as this would allow all rotting timber frames to be exposed and replaced.
- Recladding to include modification of the existing framing arrangement tby strictly following the Hardies Titan Panel product installation and its specification.

G. APPENDIX

Appendix 1	Plan and section of Kidz First Building showing inspected panel
Appendix 2	Photos showing damages to the underlying timber

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