Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

Building Commission

SUPPLEMENTARY REPORT

Perth Children's Hospital audit – fire walls

October 2017

BUILDING COMMISSION SUPPLEMENTARY REPORT

PERTH CHILDREN'S HOSPITAL AUDIT FIRE WALLS

An audit of contractor and product performance in the construction of fire walls at the new Perth Children's Hospital

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Contents

Glossary of terms, acronyms and parties

Acronym/term	Full title
BCA	Building Code of Australia as contained in the National Construction Code Volumes 1 and 2
BIM 360	Building Information Management (Modelling)
Building Commission	Department of Mines, Industry Regulation and Safety – Building Commission Division
CFMEU	Construction, Forestry, Mining and Energy Union
Commissioner	Building Commissioner
CRA	*Building Services (Complaint Resolution and Administration) Act 2011*
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Department of Health	Western Australian Department of Health – the Perth Children's Hospital asset owner
DFES	Department of Fire and Emergency Services
DTS	Deemed-to-satisfy is a compliance method within the National Construction Code, whereby if you meet the relevant provisions set out, you are 'deemed' to meet the relevant Performance Requirements in the National Construction Code
FRL	Fire resistance level
John Holland	John Holland Pty Ltd – the main building contractor for the Perth Children's Hospital
Knauf fire rated walls	Lightweight Knauf fire rated plasterboard fire walls
NCC	National Construction Code series comprising Volumes One and Two, the BCA, and Volume 3 of the Plumbing Code of Australia
NDY	Norman Disney and Young consulting engineers
PCH	Perth Children's Hospital
QEII	Queen Elizabeth II Medical Centre
RED	RED Fire Engineers Pty Ltd
Strategic Projects	Strategic Projects and Asset Sales division of the Western Australian Department of Treasury

Figures and photographs

Executive summary

From time to time the Building Commission examines various issues relating to the compliance of buildings.

In late April 2017, the Building Commission published its final audit report into a number of specific conformance issues at the Perth Children's Hospital (PCH) that included the discovery of asbestos in roof panels, lead contamination in water and other issues.

Shortly before the final report was released, the Building Commission received information from an anonymous source questioning the construction and inspection of the lightweight Knauf fire rated plasterboard fire walling systems (Knauf fire rated walls) at PCH.

The claims made in this anonymous document were not in sufficient detail to pinpoint specific locations to be examined.

Building Commission inspectors immediately commenced a preliminary assessment of the fire rated walls to establish whether there was any validity to the information received. This included auditing samples of quality assurance and quality checking records relating to the project to determine if reasonable processes were in place, and involved viewing records of inspections carried out on the fire rated walls when under construction.

The inspectors noted that an inspection regime for the fire walls was in place and continued to examine information about the anonymous claims being made.

Several weeks later the Construction, Forestry, Mining and Energy Union (CFMEU) raised claims via email directly with the Building Commissioner in relation to the Knauf fire rated walls at PCH.

After receiving more specific information from a worker introduced by the CFMEU, the Building Commission determined to commence a full audit of the Knauf fire rated walls at PCH.

Because of the potential impact that discovery of defective fire walls would have on the commissioning of PCH, the Building Commission kept the Department of Health informed of the progress of the audit.

The audit was carried out under the Building Commission's independent statutory powers. The claims considered and the summaries of findings are listed below.

The Building Commission is satisfied that there is no systemic problem with the fire walls and that any deficiencies have been or are continuing to be appropriately remedied.

Summary of claims and Building Commission findings

Building work

Claim 1: Defective fire doorsets

The Building Commission considers the fire doorsets matter to be satisfactorily resolved by John Holland.

Claim 2: Unsealed plasterboard edges

Building Commission inspections did not find any incidences where there was a need for sealing the edges of plasterboard. There was no observed evidence of dusty edges or porous surfaces that would require a binder-sealer, such as watered down BindEx, to be used. Further, the evidence from the inspections and the extent of the quality assurance processes suggests that, in respect to the claim, it is unlikely that there is any extensive non-compliance.

Claim 3: Passive fire wall expansion joints had not been installed correctly

Building Commission inspections did not find any incidences where there was a need for retrofitting or repairing the control joints.

Claim 4: Multi-layered fire rated Knauf plasterboard systems

Building Commission inspections did not find any incidences where there was a need for retrofitting or repairing the fire walls.

Claim 5: Extensive misuse of BindEx intumescent putty (fire mastic) as glue

Building Commission inspections found incidences of misuse of the intumescent putty in service risers 1 and 2 .These defects have been acknowledged by the builder and rectified.

Claim 6: Missing mechanical fasteners to some bulkheads, therefore glue or similar may have been used, for example fire mastic

Building Commission inspections found incidences where mechanical fasteners were missing. These defects have been acknowledged by the builder and are being rectified.

Claim 7: Improperly fitted wall braces to a fire rated plasterboard wall system which included a fire sprinkler protected glazing component

The Building Commission is satisfied that the wall bracing meets the design drawing details and the manufacturer’s recommendations.

Claim 8: Strips of plasterboard had been used without proper fixings to bulkheads in multi-service riser

The Building Commission is satisfied that identified beams encased with plasterboard do not require fire protection. Therefore the bulkheads meet the performance requirements of the National Construction Code (NCC).

Claim 9: Multi-layered plasterboard joints incorrectly staggered during installation

The Building Commission is satisfied that the multi-layered plasterboard staggered joints meet the design drawing details and the manufacturer’s recommendations.

Claim 10: Multi-layered plasterboard joints incorrectly staggered to bulkheads in multiple service risers 1 and 2Summ

Building Commission inspections found incidences of incorrectly staggered plasterboard joints in multiple service risers 1 and 2.

These defects have been acknowledged by the builder and are being rectified.

Claim 11: Non-fire rated fixings used in fire rated walls including wall toggles and wall mates

The Building Commission is satisfied, based on an independent professional fire engineer's review, that the non-fire rated fixings do not compromise the fire rating of the walls.

Supervision

Claim 12: Quality assurance and quality checking processes and photograph substitutions

The Building Commission is satisfied with the quality assurance and quality checking process (BIM-360) that is in place.

Claim 13: Various non-qualified personnel carrying out quality assurance activities related to fire walls

The Building Commission is satisfied with the quality assurance processes in place and of the explanations and supporting documents provided by John Holland and Norman Disney Young (NDY) consulting engineers.

Claim 14: Cheap (adhesive) labels and missing fire stencils (painted) on various fire rated walling components

The Building Commission confirmed from John Holland records that some adhesive labels had peeled and had been satisfactorily replaced.

The Building Commission conducted site inspections and viewed a number of stencils and generally found them to be satisfactory at the time of the audit.

Claim 15: Not all fire collars were in place

The Building Commission is satisfied that all required fire collars are in place.

Claim 16: Cheap back packer labourers used to apply fire stopping materials to low voltage alarm service cables penetrations through fire rated elements

Building Commission inspectors could not find evidence of non-qualified persons working unsupervised or performing poorly in the final analysis.

Claim 17: Possible missing fire protective measures over the main/ambulance entrance points

The Building Commission is satisfied that there are no missing fire protective measures over the main/ambulance entry points.

Claim 18: Possible defective or missing fire protective measures at the top of the atrium

The Building Commission is satisfied that there are no missing fire protective measures at the top of the atrium.

Claim 19: Possible defective service duct – fire protective measures over the shop

The Building Commission is satisfied that there are no defective service duct fire protective measures over the kiosk shop.

Additional defects identified by the Building Commission

Claim 20: Structural steel beam connection components – incomplete or missing application of intumescent paint

Structural steel beams connection points requiring intumescent paint have been rectified by John Holland and no further action is required.

Claim 21: Incorrect installation of several steel safety barriers in multiple services risers

The incorrect installation of safety barriers has been acknowledged by John Holland and will be rectified.

Claim 22: Inconsistent use of fire rated Knauf board and Promat Promatect-H fire protection board in specific areas of multi-service risers 1 and 2 protecting steel beams

John Holland has commenced rectification works for the Promat and Knauf board systems.

Claim 23: Fixture of saddle clamps for electrical conduits and similar products to the inside face of some Knauf shaft walls without evidence of system testing

The Building Commission is satisfied that the use of saddle clamps does not compromise the system integrity.

1. Introduction

The Perth Children's Hospital (PCH) will be the sole dedicated children's hospital for the State. It will have 298 beds and is designed to allow for future expansion. With a budget of $1.2 billion it covers 125,000m^2 across six treatment floors, two research floors and two basement levels. A helipad on the roof will service the Queen Elizabeth II Medical Centre campus.

The PCH is one of the largest and most complex construction projects of its type in Western Australia. As is common with recent building projects, some of the components and systems were sourced internationally due to innovation, cost and time constraints, and international specialist expertise.

The project manager was Strategic Projects and Asset Sales (Strategic Projects), a division of the Department of Finance. In 2009 Strategic Projects appointed John Holland to design and construct the PCH. John Holland appointed a number of specialist consultants to assist with the design and construct process for the project.

Construction began in 2011 and practical completion was achieved on 13 April 2017. Ownership of the PCH was immediately transferred to the Department of Health.

2. Background

On 24 April 2017 The Building Commission published a final report of its audit into the compliance and remediation of publically reported, or closely associated, incidents that arose during the construction of the PCH.

Anonymous email claims

Shortly before the release of the final report an anonymous document was given to the Minister for Health and subsequently forwarded by the Director General of Health to the Building Commissioner on 18 March 2017. The document contained allegations of poor supervision by the builder and allegations of defective construction of fire walls.

On 22 March 2017 the Building Commission met with Strategic Projects at its PCH site office to discuss the concerns raised in the anonymous document. Strategic Projects provided a detailed overview of the quality assurance processes used for all key milestones of the project as it progressed. This included a master document which identified the full list of fire wall issues and how they were addressed and/or rectified.

The building work at PCH was subject to stringent quality assurance and checking processes with John Holland and Strategic Projects each maintaining their own systems. The quality assurance process used at the PCH included progressive quality and compliance checks of construction work and when a defect was identified within the Strategic Projects process; John Holland was notified and then remedied the defect. The work was then documented and photographed for a 'defect report'. The Building Commission reviewed a representative sample of the defect reports to satisfy itself that the quality assurance system was consistent with the level of detail contained in documentation for other aspects of the PCH project.

Without specific information about where the alleged defective construction was located the Building Commission could not confirm whether the defects had been identified and remedied. The initial inspection and review of documents indicated that it was unlikely that there was a systemic problem as there was evidence of an effective quality assurance regime.

CFMEU emailed letter claims

On 10 April 2017, the Building Commission received a letter via email from the CFMEU that also contained allegations of poor supervision by the builder and allegations of defective construction of fire walls. It advised that their information came from on-site workers.

The Building Commission met with representatives of the Construction, Forestry, Mining and Energy Union (CFMEU) and an on-site worker on 1 May 2017. The meeting with the worker was subject to assurances of confidentiality and the worker is not identified in this report.

The worker

The worker who reported concerns to the Building Commission is experienced in commercial fire rated systems.

The Building Commission considers the worker to have acted in good faith and from concern for the safety of the general public and the future patients and staff of the PCH.

Although ultimately the Building Commission has not verified the majority of the claims of the worker, it is possible that the worker could have seen defects at a time before the internal rectification processes at PCH had been completed. Subsequently, after the departure of the worker, defects could have been rectified through the quality assurance process. The Building Commission considers the worker gave accurate information about what the worker saw at the time.

Building Commission inspections

The Building Commission, having considered the CFMEU letter and the information from the worker, determined that there was sufficient new evidence to commence a detailed audit of the fire rated walls.

While auditing the PCH for the claims made by the anonymous letter, the CFMEU and the worker, the Building Commission inspectors detected some additional potentially non-compliant building works. These are described in section 6.3 of this report.

3. Perth Children's Hospital supplementary audit

The PCH supplementary audit was commenced as claims and further information from the worker were not received in time for the Building Commission's findings to be included in the final report. This supplementary report analyses allegations of defective construction of fire walls and of poor supervision by the builder.

The Building Commission developed a scope for the supplementary audit that encompassed technical issues relating to fire safety including:

- the extent of any incidences of non-compliance and how it was rectified; and
- the quality control procedures of the building contractor John Holland.

This report examines:

- the matters of concern raised and identified in the supplementary audit scope;
- how they were addressed; and
- whether there is any ongoing concern for the operation of the PCH or the safety of its patients, staff or visitors.

It also considers information provided by John Holland and Strategic Projects in response to the claims and the inspections made by the Building Commission.

3.1.1. Scope

The Building Commission started investigating the lightweight Knauf fire rated plasterboard fire walls (Knauf fire rated walls) immediately following receipt of the anonymous document and carried out further, more targeted inspections following the CFMEU letter and a subsequent meeting with the CFMEU and the worker.

The purpose of the inspections was to assess whether the fire walls had been completed in accordance with the project's approved plans and specifications; if the manufacturer's recommendations had been followed to meet the deemed-to-satisfy (DTS) provisions of the NCC; and if the DTS provisions had not been met, whether the construction met the performance provisions of the NCC. Further information on how compliance with the NCC can be met is in section 5.1.1.

Where defects were found, follow up inspections and written certifications verified that repairs were affected. In carrying out this audit the Building Commission focused on the role of the registered building contractor, John Holland.

This report does not examine contractual or liability issues — its purpose is simply to establish the compliance or otherwise of the fire walls and several interrelated building fire safety features.

3.1.2. Fire walls

Fire walls are an integral aspect of fire safety provisions at the PCH. They are designed to confine a fire within a 'fire compartment' for a certain period of time. A fire compartment consists of walls, floors, doors, protected windows and other elements that limit the spread of fire to another compartment or part of a building.

The fire walls must meet the relevant prescribed fire resistance levels (FRL) as defined in the Building Code of Australia (BCA). These FRL requirements stipulate the amount of time a wall must contain a fire. Any gaps or construction defects may compromise a fire wall's integrity and thereby risk fire spreading to other fire compartments.

3.1.3. Claims of non-compliant fire walls

The claims, as well as defects identified by the Building Commission are discussed in detail in section 6 of this report.

3.1.4. Supplementary audit methodology

When the Building Commission became aware of the allegations about potentially defective fire walls, the Building Commissioner established a supplementary audit team to investigate the allegations. The supplementary audit was conducted from March 2017 to August 2017 and the supplementary report was finalised for release in October 2017.

The audit methodology involved reviewing and analysing documentation, conducting site inspections, interviewing stakeholders, and witnessing an area of demolition that acted as a sample destructive test for Building Commission audit purposes.

3.1.5. Stakeholders

The Building Commission consulted with the following stakeholders:

- John Holland (the builder);
- Strategic Projects;
- the CFMEU;
- the worker;
- Knauf Australia;
- manufacturer of hollow wall anchors and similar products; and
- Norman Disney and Young consulting engineers (NDY) via John Holland.

3.1.6. Review of documentation

Building Commission inspectors were provided with access to relevant documents from Strategic Projects and John Holland. The Building Commission analysed this documentation to determine whether John Holland had taken proper care to ensure the PCH meets applicable building standards.

The audit team reviewed documentation for each issue audited, including:

- correspondence including emails;
- plans and specifications;
- test certificates;
- compliance certificates and reports;
- inspection reports;
- product test results;
- technical building code reports from Philip Chun & Associates (consulting building surveyor to John Holland);
- performance building code reports from NDY; and
- manufacturer’s product information and recommendations.

3.1.7. Site visits

The audit team conducted a series of site inspection visits to the PCH building on:

- 3, 5 and 9 May 2017;
- 22 June 2017;
- 3 July 2017; and
- 9 August 2017.

The site visits enabled the audit team to examine the issues raised in the anonymous letter, the CFMEU letter and information from the worker in detail. It also gave the opportunity to further discuss the construction processes with relevant people on the site.

3.1.8. Expert opinion

For Claim 11 – non-fire rated fixings, the Building Commission engaged an independent fire engineer, RED Fire Engineers Pty Ltd. (RED), to provide expert advice on the use of proprietary wall mates, proprietary hollow wall anchors, and other proprietary mechanical fixings to the Knauf fire rated walls.

This expert advice and opinion included RED Fire Engineers representing the Building Commission in Sydney to witness a CSIRO laboratory test of a fire rated wall system. This system test included a range of typical hollow wall anchors and sundry attachments used at the PCH.

4. Building Commissioner's auditing powers

4.1. Building Services legislation

The *Building Services (Complaint Resolution and Administration) Act 2011* (CRA) enables the Building Commissioner to investigate the work and conduct of builders, building surveyors and plumbers (CRA s.86(i)).

A person authorised by the Commissioner may carry out an inspection of building compliance (CRA s.60). The Commissioner may authorise people to:

- monitor whether a builder or plumber is carrying out work with the required level of competency (CRA s.64); and
- inspect any building to ascertain:
    - how building services have been carried out; and
    - how building standards have been applied (CRA s.65).

The Commissioner may publish a statement identifying any building services carried out in an unsatisfactory or dangerous manner (CRA s.88).

4.2. Building Commission audit team

To carry out the inspection and an analysis of the PCH fire walls, the Building Commission utilised a team consisting of:

- building surveyors;
- support staff, and
- a specialist consultant.

The building surveyors are registered level 1 building surveying practitioners and have relevant experience in the assessment and approval of commercial and industrial buildings. One of the building surveyors has a trade background and experience in commercial and industrial dry wall plastering.

The audit was overseen by the Building Commission's Audit Branch Manager and the Director of Compliance.

5. Relevant laws

5.1. Building Act

The *Building Act 2011* (the Building Act), which came into effect on 2 April 2012, prescribes standards for the construction, demolition and occupancy of all buildings in Western Australia. Construction of the PCH began in January 2012.

As a state government building, under the repealed legislation, the builder of PCH was not required to obtain a building permit, and the owner is not required to obtain an occupancy permit. Notwithstanding these exemptions, the Building Commissioner's auditing powers under the CRA Act enable the Commissioner to investigate the PCH.

5.2. National Construction Code

The Building Act adopts the NCC as the primary applicable building standard for all new building work, new buildings and incidental structures. The NCC consists of three volumes. Volumes one and two form the BCA and Volume three is the Plumbing Code of Australia.

The 2011 edition of the NCC, and referenced Australian Standards, are the relevant measure for construction compliance for the PCH. The NCC is drafted so that performance requirements are the only section that must be met to ensure compliance.

There are various ways to meet the performance requirements, the most common being via the DTS provisions. These DTS provisions are a prescriptive set of requirements that, if followed, are 'deemed-to-satisfy' the performance requirements. The other way to meet the performance requirements is to use a performance solution, which needs to be appropriately verified. This allows for innovation, or non-typical building solutions to be used while still ensuring the building will perform to the required level.

NCC performance requirements CP2, CP3 and CP4 require that the PCH must be protected from the spread of fire and smoke to allow sufficient time for the orderly evacuation of the building in an emergency.

The corresponding DTS provisions are C1.8 and C3.12–C3.17. These provisions state that meeting the manufacturer's installation and use recommendations will meet the DTS provisions.

If the building work is not carried out to the manufacturer's recommendations, then it does not meet DTS. If the DTS is not met, then a suitable performance solution must be verified.
The manufacturer's recommendations are predominantly those of Knauf Australia as the supplier of the fire wall system. The relevant document is Knauf's 'Technical Manual – Plasterboard Systems' and Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information'.

6. Allegations and findings

The Building Commission visited the PCH to examine the specific claims within the anonymous letter and those of the CFMEU and the worker.

Each claim has been analysed and the findings of the Building Commission audit team with regards to its veracity and conformity with building requirements is detailed within this section. In addition, the Building Commission has analysed potentially non-conforming building work that its inspectors found whilst examining the claims.

Although the Building Commission audit did not examine all the fire walls in the PCH, the Building Commission is satisfied that there is unlikely to be a systemic problem with the PCH fire walls. This conclusion is derived from the extensive quality assurance processes that the Building Commission has viewed and the type and severity of the claims made.

This report quotes the specific allegations made. For transparency, these have been reproduced from the documentation the Building Commission received. It should be noted that these quotes have not been paraphrased or grammatically corrected from the written information provided to the Building Commission.

6.1. Building work claims

6.1.1. Claim 1: Defective fire doorsets

The anonymous email contained the following claims:
“Fire rated doors and frames:

- JH installed plastic door frame packers to the door frames, JH later identified that the plastic melts and could not be installed into fire rated door frames.
- JH were instructed how the door frame were to be installed to ensure compliance. JH felt they knew better, disregarded this information and proceeded to install the door frames as they saw fit. With testing of the split door frames coming at later date. The split door frames failed the fire test resulting in the door frames to be reinstalled.
- JH was instructed by Fire Technologies Australia specifically how to fire rate the cavity of a door frame, JH felt they knew better in this instance and installed it how they saw fit. This eventually gained enough attention and was rectified, resulting in 800+ frames being installed and reinstalled.
- “Haloing” been installed and uninstalled Multiple times the doors and frames where badly damaged resulting in a site wide repaint in situ fire door frames.”

The issue of non-compliant fire door sets was addressed in the final report into the PCH issued 24 April 2017.

The PCH final report found the fire doorsets initially supplied by Leaderflush-Shapland Ltd. did not comply with the relevant Australian Standards to meet the DTS provisions of the NCC. Philip Chun identified the non-compliance and John Holland engaged the CSIRO to report on how to gain compliance.

John Holland undertook appropriate actions to rectify the doorsets to meet the relevant standards. The PCH fire doorsets now meet the performance requirements of the NCC.

Summary

The Building Commission reviewed records and documents and considers the fire doorsets to be satisfactorily resolved by John Holland and Philip Chun as previously reported in the final report.

6.1.2. Claim 2: Unsealed plasterboard edges

The anonymous email made the following claim that:
"'Fire rated junctions – Plasterboard junctions due to the dusty edge of the Raw Plasterboard not being treated with an appropriate Acrylic Sealer and Binder. As a result, there was very poor adhesion of the Fire Mastic to the plasterboard. This is a critical detail and resulted in large areas cracking along the wall, floor and ceiling junctions. These junctions were remedied by applying more fire mastic to the edge, the failing junctions did not have the mastic removed, primed and reapplied correctly."

In the email material supplied by the CFMEU the following claim was made:
"Fire rated junctions do not comply because the 'dusty edge' of the raw plasterboard were not treated with an appropriate acrylic sealer and binder. This has resulted in a sub-standard adhesion of the fire mastic to the plasterboard and a subsequent cracking along the walls, floors and ceiling junctions. The remedial work to the junctions was not done to standard. The original mastic was not removed, primed nor installed correctly."

The Building Commission also received information from a worker who advised:
"Non-primed plasterboard edges prior to BindEx application."

The concern is that without a sealer-binder applied to the plasterboard edges, the BindEx Fire and Acoustic Sealant may not adhere sufficiently to the plasterboard edges under fire conditions and come away from the plasterboard, compromising the fire rating.

Intumescent putty is designed to expand when exposed to heat and flame and fill any gaps that flame and smoke may otherwise penetrate.

BindEx intumescent putty is required to be installed with the Knauf fire rated plasterboard systems as it forms part of the tested fire rated Knauf plasterboard walling system.

To meet the DTS requirements of the NCC, the Knauf plasterboard edges need to meet the manufacturer's recommendations set out in Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information'.

The particular section of the document relevant to this claim is Appendix C. Under 'Tech Data', it states:

> All surfaces must be clean and free from dirt and grease. Use a brush to remove loose material. Lightly apply water or diluted BindEx Fire and Acoustic Sealant to porous materials to improve bonding.

The key issue is whether a 'dusty edge' from cut plasterboard is a porous surface that requires sealing.

The Building Commission wrote to John Holland to request the company's position in relation to these allegations. John Holland provided the following statement:
"In regards to fire walls constructed using Plasterboard and fire rated Bindex sealant. JHG ensured fire sealant was carried out in accordance with the manufacturer requirements following the JHG PCH QA BIM [John Holland, Perth Children's Hospital, Quality Assurance via Building Information Modelling] process."

The Building Commission reviewed the Knauf documentation for the project and spoke with Knauf technical representatives. Knauf advised that normal trade cutting and fitting of fire rated plasterboard will not usually require the use of a sealer-binder.

The Building Commission further inspected the PCH in both a targeted and randomised manner to examine the installation of Knauf plasterboard linings.

Building Commission officers were able to view a series of previously finished fire rated plasterboard walls that were not painted and therefore could observe the use of BindEx in that sample of building work.

These inspections included an area where there was access to some plasterboard fire walls being partly demolished to make way for a new tenancy fit out.

The Building Commission concluded that these fire rated walls were installed in accordance with the K-spec technical document.

Building Commission inspectors examined the Knauf plasterboard documentation related to John Holland's design and construct contract, including a review of sample relevant quality assurance and quality checking processes adopted by John Holland during the works stage. Building Commission inspectors also reviewed examples of the processes adopted by Strategic Projects in terms of their independent quality assurance and quality checking process for ensuring delivery of a fit-for-purpose asset.

The Building Commission inspections found that the claim was accurate in respect to there being no evidence of sealer-binder being applied to the exposed edges prior to BindEx. However, the claim was not accurate in respect to sealer-binder being required on the edges of plasterboard in the normal course of installation.

The wall and ceiling junctions, sheet edges inspected by the Building Commission did not reveal dusty edges or contact with porous materials that would require the use of diluted BindEx Fire and Acoustic Sealant prior to the main application of BindEx. The Building Commission is satisfied that the plasterboard junctions that were observed comply with the specifications for the use of BindEx and therefore meet the performance requirements of the NCC.

Summary

Building Commission inspections did not find any incidences where there was a need for repairs in relation to the use of BindEx on the edges of plasterboard. There was no observed evidence of dusty edges or porous surfaces that would require a binder-sealer such as watered down BindEx to be used. Further, the evidence from the inspections and the extent of the quality assurance processes suggests that, in respect to the claim, it is unlikely that there is any extensive non-compliance.

6.1.3. Claim 3: Passive fire wall expansion joints had not been installed correctly

The anonymous email made the following claim:
"Expansion joints of passive fire walls were not installed correctly:

- They were not installed at the correct intervals or spans across the passive walls.
- Expansion joints had a non-fire rated steel or plastic flush bead installed only, there was no framing separation, no fire rated baffle installed behind the non-fire rated bead.
- Expansion joints have also not installed correctly in service shafts resulting in the possibility of fire quickly travelling through multiple levels.
- The lack of expansion joints is going to pose a very big risk for the passivefire walls. This will require maintenance of passivefire wall systems."

In the email material supplied by the CFMEU the following claim was made:
"Expansion joints of passive walls were not installed correctly in respect of the following**:**

- The expansion joints were not installed at the correct intervals or spans across the passive walls.
- Subcontractors used non-rated steel and plastic flush beads in the installation of the fire rated walls.
- Subcontractors failed to install a fire rated baffle behind the non-fire rated plastic flush bead.
- There was inadequate or no framing separation, which has resulted in a reduction in the fire separating integrity of the passive fire walls.
- The non-compliant installation of expansion joints has also occurred in the service shafts, resulting in the increased probability of fire travelling quickly through multiple levels."

The Building Commission also received information from a worker who advised:
"A specified expansion joint was missing the baffle backing."

Control joints allow for any building movement resulting from influences such as moisture migration, loading, structural movement and foundation settlement. Potential cracks and distortions in plasterboard and plasterboard joints are managed by using control joints and to be fully effective correct installation techniques are important.

Knauf plasterboard manufacturer requirements provide for control joints to be installed in plasterboard walls and ceilings at:

- maximum 12 metre intervals;
- control joints in the structure; and
- any change in substrate material.

The distance between control joints may need to be reduced to less than 12 metres due to conditions such as large temperature or humidity variations.

If the control joints fail the fire resistance properties of the fire wall or ceiling may be compromised.

To meet the DTS requirements the control joints (often called expansion joints) need to meet the manufacturer's recommendations set out in Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information'. The particular sections of the document relevant to this claim are in Appendix C and D.

Knauf's 'Technical Manual – Plasterboard Systems' separately provides approved details for control joints (often called expansion joints) in fire rated walls on page 87.

The Building Commission wrote to John Holland to request the company's position in relation to this allegation. John Holland provided the following statement:
"Passive fire wall expansion joints have been constructed in accordance with the manufacturer requirements. Walls can span up to 12 lm, these important movement joints have be located where required during construction and can be visionally (sic) inspected around the site. Expansion joints are also located at structural seismic movement joints which are both in the wall and floor joints utilising a fire rated blanket allowing a flexible connection. Intumescent strips were also utilised when abutting different structure members. On further inspection we have not found evidence that these joints were not correctly installed. There has been no evidence of vertical cracking in the completed fire walls and nothing recorded in BIM. Please see attached sample photographs of assorted expansion joints attached with reference to previous correspondence."

The Building Commission inspectors examined project and manufacturer documentation related to the compliance of Knauf plasterboard expansion joints and how they were to be constructed. They also conducted five onsite inspections where officers were able to view typical expansion joints.

The spacing of control joints generally complied with manufacturer's requirements and Knauf's technical manual and therefore the claim relating to the spacing of the control joints was not confirmed.

On inspection there was no visual evidence of cracking or distress to the Knauf plasterboard control joint finishes. The control joints were finished and painted so the detailed construction within the joint could not be checked without destructive testing. The Building Commission could not find any evidence of cracking or distress to the control joint finishes and is satisfied that no further investigation is justified.

The documentation provided by John Holland and Strategic Projects provides sufficient assurance that the joints were constructed in accordance with the manufacturer's recommendations.

Summary

Building Commission inspections did not show any incidence where there was a need for retrofitting or repairs to the control joints.

6.1.4. Claim 4: Multi-layered fire rated Knauf plasterboard systems

The anonymous email made the following claim:
"There are multiple layers of fire rated plasterboard installed in some wall systems used on the PCH. Intumescent fire mastic (Knauf BindEx) has been installed outside of the manufacturer's tests, it has been used to flush the first layers. When fire mastic is heated it reacts and expands, because it is sandwiched between layers of plasterboard it pushes off the plasterboard from any mechanical fasteners (screws)."

In the email material supplied by the CFMEU the following claim was made:
"Multiple layers of fire rated plasterboard which were installed in some wall systems were not done in accordance with the manufacturer's specifications. The intumescent fire mastic (Knauf Bindex) was not installed in accordance with the manufacturer's requirements, which may void the warranty of the fire rating."

The Building Commission also received information from a worker who advised:
"Intumescent putty used in the layer joints of the plasterboard which is against the manufacturer's requirements."

There are a large number of fire walls installed at the PCH. Before being supplied for use, the walling systems are tested by the manufacturer and have specific product and installation manual fixing details in order to meet the fire protection requirements of the NCC. Intumescent putty is part of the tested system.

Intumescent putty is designed to expand when exposed to heat and flames. Under these conditions the putty expands and acts as a gasket restricting the passage of flames and or smoke that may otherwise penetrate the edges of fire rated plasterboard.

The worker's concern was that this expansion action could partially de-laminate the layers of fire rated plasterboard and cause premature failure of the fire walls. Delamination of the layers of plasterboard would affect the fire resistance of the wall and compromise its integrity.

To meet the DTS requirements the joints within the multi-layer plasterboard systems need to meet the manufacturer's recommendations set out in Knauf's 'Technical Manual – Plasterboard Systems' which provides approved details for multi-layer fire rated plasterboard systems.

Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information', under Appendix C, also provides that:

> BindEx Fire Sealant can be used instead of MastaBase and paper tape to joint sheets in multi-layer systems.

The Building Commission reviewed the technical documents to determine the requirements regarding the use of BindEx in a multi-layered fire rated plasterboard system.

The Building Commission then inspected areas onsite where there was access to fire walls that had been partly demolished. This made it possible to determine whether these fire walls were originally installed in accordance with the K-spec technical document with regards to the use of BindEx in the layers of the multi-layer fire wall system.

The claim is accurate in that BindEx had been used to flush the first layers of a multi-layer fire rated plasterboard system.

The claim is not accurate in stating that the use of BindEx in such a manner is outside of the manufacturer's recommendations.

The Building Commission is satisfied that the construction method used at PCH in relation to the use of BindEx meets the manufacturer's recommendations and as such meets the DTS provisions of the NCC.

Summary

Building Commission inspections did not show any incidences where there was a need for retrofitting or repairs to the fire walls.

6.1.5. Claim 5: Extensive misuse of BindEx intumescent putty (fire mastic) as a glue

The anonymous email made the following claim:
"Bindex was also being used extensively as an adhesive, again against the recommended and tested use of the product. All Knauf Fire Rated Systems require mechanical fixings only. The reaction (expansion) will begin as low as 200 Degrees Celsius. The centre of a candle burns at about 1400 Degrees Celsius."

The Building Commission also received information from a worker who advised:
"BindEx (intumescent putty) also used extensively as an adhesive against the manufacturers requirements, which requires the use of screw fixings."

The worker's concern was that without mechanical fixings (screws) premature failure of the plasterboard fire rated protective linings may occur.

Failure of the plasterboard fire wall would allow a fire to spread beyond the fire compartment. To meet the DTS requirements the multi-layer plasterboard systems need to meet the manufacturer's recommendations set out in Knauf's 'Technical Manual – Plasterboard Systems' which provides approved fixing details for single and multi-layer fire rated plasterboard systems. These fixing details provide that only screws must be used.

Section 1.2 of Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information' also provides that internal steel wall partitions (single or multiple layers) are to be fixed using a 'screw only method' and not glue of any kind.

The Building Commission wrote to John Holland to request the company's position in relation to this allegation. John Holland provided the following statement:
"With reference to this claim, JHG have been unable to locate plasterboard fixed in this manner, this was addressed through the construction process."

The Building Commission reviewed the technical documents to determine the requirements regarding the use of fire rated single and multi-layered fire rated plasterboard systems and their required fixings.

The Building Commission inspected areas onsite where there was access to fire walls that had been partly demolished and could therefore determine whether these fire walls were originally installed in accordance with the manufacturer's fixing requirements.

Additionally, Building Commission officers were able to view a series of previously finished fire walls, that were not painted, and therefore could observe the spacing of fixings used in the final layer of plasterboard in that sample of construction work.

The Building Commission inspectors found that fire walls in most areas of the hospital were properly fixed with mechanical fixings (screws) in accordance with the manufacturer's recommendations.

The Building Commission did observe the limited use of BindEx or a similar product as an adhesive, as claimed, in bulkheads in multi-service risers 1 and 2. This aspect is addressed in Claim 8.

The claim was accurate in limited instances within the multi-service risers 1 and 2.

The claim was not accurate in most areas of the hospital where the fixings observed were in accordance with the Knauf technical requirements.

Fire walls in most areas of the hospital are fixed in accordance with the manufacturer's recommendations.

Bulkheads in service risers 1 and 2 were not fixed in accordance with the manufacturer's recommendations. These have now been rectified as explained in Claim 5.

Summary

These defects in service risers 1 and 2 have been acknowledged by the builder and rectified.

6.1.6. Claim 6: Missing mechanical fasteners to some bulkheads therefore glue or similar may have been used, for example fire mastic

The Building Commission also received information from a worker who advised:
"Some of the plasterboard bulkheads are located in such a way as to not allow the required mechanical fixings to be installed and therefore likely used BindEx as a glue in multiple service risers 1 & 2."

These particular bulkheads were designed to have a fire rated plasterboard or Promatect sheet coverings which require mechanical fixings not glue.

Failure of the bulkheads may allow the effects of a fire to spread beyond the fire compartment by adversely affecting the steel beams.

For plasterboard to meet the DTS requirements the multi-layer plasterboard systems need to meet the manufacturer's recommendations set out in Knauf's 'Technical Manual – Plasterboard Systems' which provides approved fixing details for single and multi-layer fire rated plasterboard systems. These fixing details provide that only screws must be used.

Section 1.2 of Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information' also provides that internal steel wall partitions and bulkheads (single or multiple layers) are to be fixed using a screw only method.

For Promat Promatect-H board to meet the DTS requirements the system needs to meet the manufacturer's recommendations set out in Promat's 'Technical Manual – Passive Fire Protection Systems – Application and Technical Manual: Structural Steel Fire Protection'.

The Building Commission wrote to John Holland to request the company's position in relation to this allegation. John Holland provided the following statements:

- "With reference to this claim, it is possible to pre-fabricate plasterboard bulk heads when access is restricted. JHG were unable to locate fire rated plasterboard bulkheads that had been constructed in this manner after further recent inspection. Note: Steel Beams have been protected using promat fire rated systems in these areas.
- With reference to this claim, JHG PCH have been unable to locate plasterboard fixed in this manner, this was addressed through the construction process. Further recent inspections have also shown that Promat board was used in these locations and not fixed with Bindex glues as suggested."

The Building Commission reviewed the technical documents to determine the requirements regarding the use of fire rated single and multi-layered fire rated plasterboard systems and their required fixings. The Building Commission carried out inspections of the service risers 1 and 2 and found that Promatect board had been used in the construction of the bulkheads.

The Building Commission found that the Promatect was not fixed in accordance with the manufacturer's recommendations. Fixing Promatect with screws placed vertically varies from the tested system which requires fixings with screws placed horizontally.

Some aspects of the pre-fabrication did not meet the manufacturer's recommendations and John Holland has carried out detailed inspections and remedial works where required.

The claim was not accurate in respect to the use of glue in place of fixings in difficult locations.

The claim was accurate that installation did not meet manufacturer's recommendations in some cases.

The Building Commission is satisfied that the bulkheads meet the manufacturer's recommendations.

Summary

These defects have been acknowledged by the builder and are rectified.

6.1.7. Claim 7: Improperly fitted wall braces to a fire rated plasterboard wall system which included a fire sprinkler protected glazing component

The Building Commission also received information from a worker who advised:
"A number of wall braces had penetrated a fire rated plasterboard wall system including a large glazed component, above the ceiling line to a level 5 location, this being against the Knauf manufacturer's recommendations."

The hospital is generally constructed with concrete floors supported by concrete reinforced columns and enclosed with a curtain wall system. The majority of the internal walls are constructed with steel stud partitions lined with plasterboard, some of which incorporates the use of wall bracing above the ceiling line.

The wall braces are designed to face fix to the fire rated plasterboard so that the wall maintains its required structural stiffness without compromising the design FRL.

To meet the DTS requirements the single and multi-layer plasterboard systems need to meet the manufacturer's recommendations set out in Knauf's 'Technical Manual – Plasterboard Systems' which provides approved fixing details for single and multi-layer fire rated plasterboard systems.

Section 1.2 of Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information' also provides that internal steel wall partitions (single or multiple layers) are in general required to be fully sheeted with Knauf fire rated plasterboard. Exceptions can be when intersecting with a plasterboard ceiling system required to have an FRL.

The wall braces that are attached to this fire wall are subject to design drawings details which require the plasterboard to be fixed first and then the lateral braces face fixed to the wall frames over the plasterboard finish via screws.

Fixing the wall brace to the face of the fire rated plasterboard wall maintains the integrity of the wall in terms of its FRL.

The Building Commission conducted inspections of this section of walling through electrical access panels (co-inspected with John Holland and Strategic Projects).

The Building Commission was able to view and photograph the wall braces and determine if they were fitted correctly.

The Building Commission was provided with quality assurance and quality checking documents from 2014 undertaken by Strategic Projects, which shows the braces fitted correctly.

The claim was not accurate in respect to the wall braces penetrating the fire rated plasterboard layers. The wall braces were fixed to the face of the fire rated plasterboard consistent with the drawings and good industry practice.

The Building Commission is satisfied that the wall bracing meets the design drawings details and the manufacturer's recommendations.

Summary

No remedial work is required.

Photograph 1: Wall brace fitted to a plasterboard wall

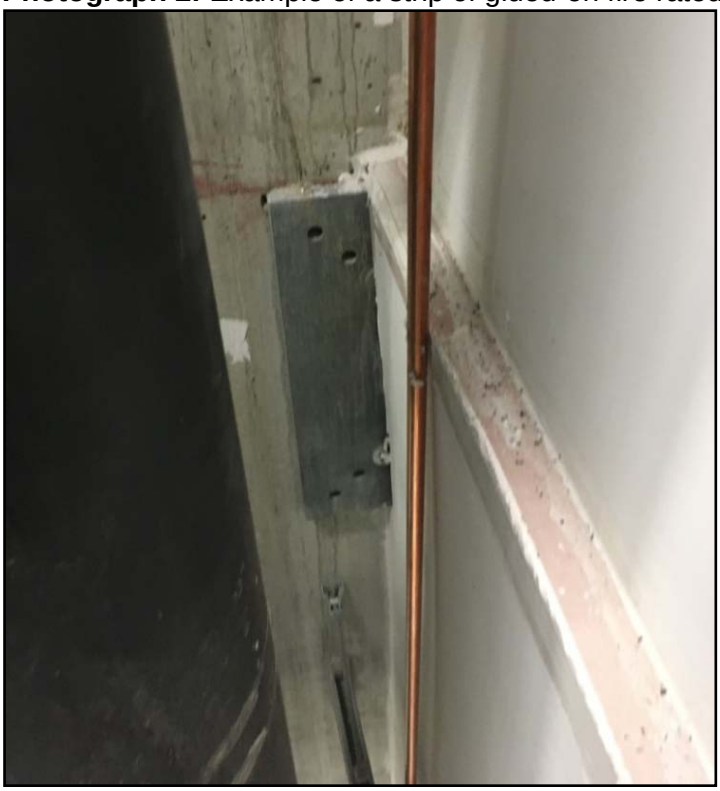
6.1.8. Claim 8: Strips of plasterboard had been used without proper fixings to bulkheads in multi-service riser

The Building Commission also received information from a worker who advised:
"Several strips of fire rated plasterboard bulkhead had been used without proper fixings in multi-service riser 1. Strips of fire rated plasterboard appear to be glued on to steel beams and not fixed with screws as required by the manufacturer."

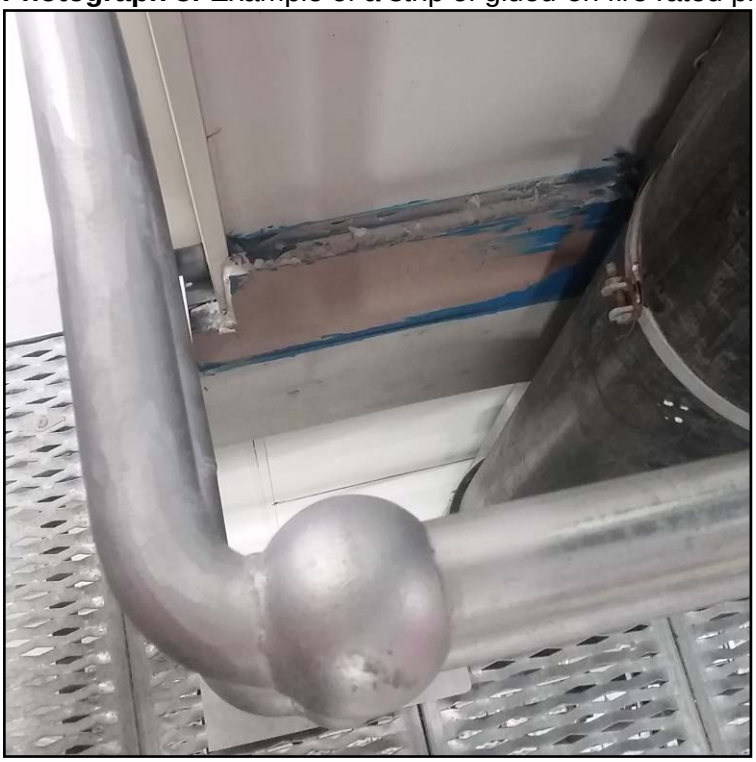
The manufacturer's recommendations are that fire rated plasterboard bulkheads are to be mechanically fixed with screws.

Under fire conditions the strips of glued plasterboard could delaminate, resulting in premature failure of the fire protected bulk head.

Photograph 2: Example of a strip of glued-on fire rated plasterboard



Photograph 3: Example of a strip of glued-on fire rated plasterboard



To meet the DTS requirements the multi-layer plasterboard systems need to meet the manufacturer's recommendations set out in Knauf's 'Technical Manual – Plasterboard Systems' which provides approved fixing details for metal stud single and multi-layer fire rated plasterboard systems. These fixing details provide that only screws must be used.

Section 1.2 of Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information' also provides that internal steel wall partitions (single or multiple layers) are to be fixed using a 'screw only method' not glues.
Plasterboard bulkheads are often constructed with proprietary metal framing substrates to support the plasterboard fire protective covering.

Intumescent fire rated mastics are not designed to be used as an adhesive in fire rated plasterboard applications.

In this case, mechanical fixings into a framed substrate, would meet the manufacturer's recommendations.

The Building Commission wrote to John Holland to request the company's position in relation to this allegation. John Holland provided the following statement:
"On further inspection in the South Block risers the multi-layered Gyprock patches (glued on strips of plasterboard) are not required and have been removed."

The Building Commission reviewed the technical documents to determine the requirements regarding the use of fire rated single and multi-layered fire rated plasterboard systems and their required fixings.

The Building Commission conducted onsite inspections and was able to identify a number of instances where strips of plasterboard were affixed with what appeared to be intumescent mastic. Mechanical fixings such as screws were clearly not evident as the plasterboard was unpainted.

The Building Commission considered the location of the steel beams in relation to the fire isolated services riser shaft and determined whether the beams were required to be fire rated. Building Commission building surveyors formed the view that these particular beams did not require a fire protective covering.

The claim was accurate in that the glued strips of fire rated plasterboard were found, however, the particular beams were identified as not requiring fire rating.

The Building Commission is satisfied that these particular beams, encased with plasterboard, do not require fire protection, therefore the bulkheads meet the performance requirements of the NCC**.**

Summary

No remedial work is required.

6.1.9. Claim 9: Multi-layered Plasterboard joints incorrectly staggered during installation

The Building Commission received information from a worker who advised:
"Plasterboard multi-layer joints may not been staggered when installed, which is against the manufacturer's recommendations. This is thought to be a potential site wide problem."

Knauf fire rated walls are tested with staggered sheet joints when more than one layer is required to achieve certain fire resistance levels. A fire rated plasterboard system has one or more layers of fire rated plasterboard.

The joints are staggered to avoid weak points in the fire wall system and should be installed to the manufacturer's recommendations to ensure the integrity of the wall.

To meet the DTS requirements the multi-layer plasterboard systems need to meet the manufacturer's recommendations set out in Knauf's 'Technical Manual – Plasterboard Systems', which provides the approved layout for single and multi-layer fire rated wall systems.

Section 1.2 of Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information' also provides that internal steel wall partitions (multiple layers) are to use the staggered joints.

The Building Commission wrote to John Holland to request the company's position in relation to this allegation. John Holland provided the following statement:
"On further inspections JHG have been unable to identify any plasterboard fire rated walls or bulkheads that have been constructed incorrectly. During recent inspections with the State and BC the areas identified we actually promat board systems, on further investigation it was found that some promat board installed was lapped incorrectly i.e. the soffit board should be fixed between the side boards. JHG are addressing this issue currently with attaching a 100mm laminate strip over the horizontal joints. This has been approved by the Manufacturer please see details attached. The required remedial works will be recorded in BIM and closed out."

The Building Commission inspectors conducted a series of inspections to identify instances of non-staggered sheet joints, and with the exception of Promatect sheets discussed in Claim 6, examples of non-staggered plasterboard were not observed.

These inspections included an area where there was access to some plasterboard fire walls being partly demolished to make way for a new tenancy fit out. The Building Commission concluded that these fire rated walls were installed in accordance with the K-spec technical document.

The Building Commission viewed a sample selection of fire rated plasterboard at PCH and investigated the claims with Strategic Projects and John Holland.

The Building Commission was provided with samples of quality assurance and quality checking process documents for the approval and installation of the fire rated plasterboard walling system.

The walling systems viewed were within the manufacturer's recommendations and the processes examined satisfied the Building Commission that the walls and joints were satisfactory.

The claim relating to the multi-layered plasterboard joints being incorrectly staggered could not be exhaustively checked without destructive testing.

The Building Commission could not find any evidence to suggest the Knauf multi-layered plasterboard staggered joints were incorrectly installed and is satisfied that no further investigation is justified.

The Building Commission is satisfied that the multi-layered plasterboard staggered joints meets the design drawings details and the manufacturer's recommendations.

Summary

No remedial work is required.

6.1.10. Claim 10: Multi-layered plasterboard joints incorrectly staggered to bulkheads in multiple service risers 1 and 2

The Building Commission also received information from a worker who advised:
"Some fire rated plasterboard bulkheads constructed with non-staggered sheets in multiple service risers1 & 2."

Knauf fire rated walls are tested with staggered sheet joints when more than one layer is required to achieve certain FRLs. A fire rated plasterboard system is made up of one or more layers of fire rated plasterboard.

The joints are staggered because joints between sheets could otherwise provide weak points in the fire wall system. Joints are to be installed to the manufacturer's recommendations to ensure the integrity of the bulkhead or wall.

The joints are also staggered to avoid weak points in the fire rated plasterboard bulkhead system.

To meet the DTS requirements the joints within the multi-layer plasterboard bulkhead systems need to meet the manufacturer's recommendations set out in Knauf's 'Technical Manual – Plasterboard Systems' which provides approved details for single and multi-layer fire rated plasterboard bulkhead systems.

Appendix C of Knauf's specification document, 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information' also provides that sheets joints are to be staggered.

The Building Commission identified the non-staggered sheet joints in the fire rated plasterboard bulkheads, located mainly within multiple service risers 1 and 2, which are fire isolated from the main hospital floors.

The Building Commission discussed these non-staggered sheet joints to the plasterboard bulkheads with John Holland on-site and they agreed and advised that rectification works would commence immediately.

On commencing the rectification works, John Holland identified that these bulkheads were in fact sheeted with Promatect board and provided the following statement:
"On further inspection it was found the bulkheads were not constructed using fire rated plasterboard, Fire rated 40mm & 15mm Promat board has been used and joints can be butted."

On receipt of the Promat Promatect H-board advice, the Building Commission then reviewed the approved drawings and determined that Knauf plasterboard or Promatect H-board was approved for use on the bulkheads.

The Knauf and Promat systems are tested by the manufacturer and have specific product and installation manual fixing details in order for the products to meet the fire protection requirements of the NCC.

The Building Commission determined that the Promatect H-board was not staggered in accordance with the manufacturer's installation system requirements.

Summary

John Holland is currently addressing this issue by attaching a 100mm laminate strip over the horizontal joints. This joint detail has been approved by the manufacturer.

John Holland will document the required remedial works, record the remediation in the BIM system and then it will be closed out.

6.1.11. Claim 11: Non-fire rated fixings used in fire rated walls, including wall toggles and wall mates

The anonymous email made the following claim:
"Non-Fire Rated Components used: Non-fire Rated fixings have been used in Fire Rated Walls, these include Wall Toggles and Wall Mates. These fixings are hollow Fasteners which provide an opening for fire to ingress. No testing exists for any of these components to be installed in the Passivefire wall."

In the email material supplied by the CFMEU the following claim was made:
"Non-fire rated fixings have been used in fire rated walls (including the use of wall toggles and wall mates). These fixings are hollow fasteners and provide an opening for fire to ingress."

The Building Commission also received information from a worker who advised:
"Non-fire rated wall mates have been used in the Core Service Risers (CSR), to secure to allow for the face fixing of electrical conduits and other similar services. These wall mates penetrate the fire rated plasterboard system, this is not a tested system."

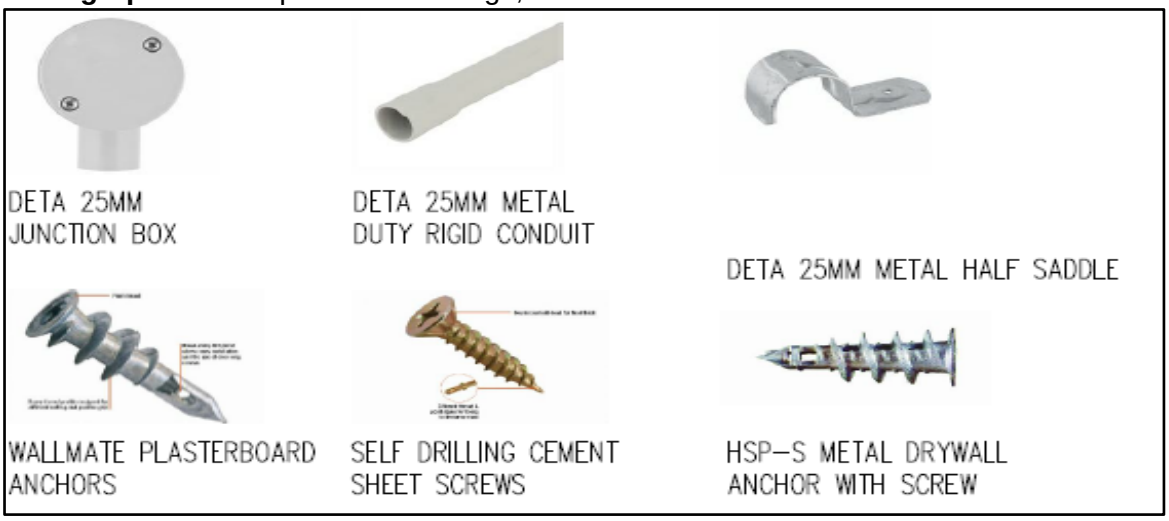
The Knauf plasterboard manufacturer recommendations do not include tested system results for the face fixing of conduits and the like with various proprietary hollow wall anchors.

Photograph 4: Example of hollow wall non-fire rated fixings in a fire rated wall

Photograph 5: Example of wall mates showing hollow core with central screws

Photograph 6: Examples of hollow wall anchors

Photograph 7: Examples of wall fixings, anchors and attachments



The fire rated walls with these additions may not achieve the fire resistance levels that would otherwise be achieved based on the manufacturer's tested system results.

To meet the DTS requirements single and multi-layer plasterboard systems need to meet the manufacturer's tested recommendations set out in Knauf's 'Technical Manual – Plasterboard Systems' which provides approved fixing details for single and multi-layer fire rated plasterboard systems.

Appendix C, pages 102 and 103 of 'K-spec – John Holland – New Children's Hospital – Partition and Ceiling Information' also provides limited information for the use of wall toggles and wall mates in drywall systems.

The Building Commission assessed Knauf's 'Technical Manual – Plasterboard Systems and the K-spec document to apply to fasteners in non-fire rated walling systems only.

The Building Commission found that manufacturer's installation system requirements for plasterboard fire rated wall systems to not contain detail or advice on the use of wall fixings other than those needed to fix the fire rated plasterboard.

The Building Commission wrote to John Holland requesting the company's position in relation to this allegation. John Holland provided the following statement:
"JHG agree that the light weight fixings do not have a fire rating. Wall and ceiling system material suppliers refer builders to the fixing manufacturer details note: gyprock fixings are also not fire rated. Wall and Ceiling Material system suppliers also state that light weight fixings can be attached to fire rated walls (one sided) these fixings are not through fixings and are also staggered. Care must be taken to ensure these fixings are sealed. JHG will undertake CSIRO testing to resolve. [Testing completed at time of publication]."

The Building Commission conducted inspections of areas identified to contain examples of this services fixing methodology (conduits, saddle clamps etc) in conjunction with key staff from Strategic Projects and John Holland.

Building Commission inspectors were able to view a series of finished fire walls within multi-service risers and observe the fixings used in the single or multiple layers of plasterboard in that sample of construction work.

The Building Commission observed the use of non-fire rated fixings, otherwise known as hollow wall fixings, wall toggles or wall mates, into plasterboard fire walls while undertaking onsite inspections.

The Building Commission determined that the Knauf manufacturer's installation system requirements do not contain details or advice on the use of proprietary hollow wall fixings in fire walls.

The Building Commission reviewed the technical data available from several leading manufacturers that supply various hollow wall fixings to the market and could not find any hollow wall fasteners that were approved to be used in a fire rated plasterboard wall system.

In addition, the Building Commission wrote to a long-established manufacturer of hollow wall fixings and was advised that they had no certified product for this particular type of use.

The Building Commission wrote to Knauf in relation to the use of hollow wall fixings within their fire rated walling systems. Knauf stated:
"Knauf have no fire assessments or tests approving the use of fasteners carrying a load fixed into the plasterboard of fire rated walls. It is possible that a screw just pinning conduit in place but not carrying load is fine but we have no approvals in place for this."

The Building Commission arranged to have the matter of fixings in plasterboard fire walls independently evaluated by RED fire engineers. The advice provided by RED was in the form of a consultants advice note.

The Building Commission received written advice and details of the proposed John Holland CSIRO laboratory testing of wall samples fitted with like fixtures and fittings found at PCH.

The testing aimed to establish if the fire walls at the PCH would perform properly under fire conditions, when wall mates or other similar fixings were used.

John Holland invited the Building Commission to witness this CSIRO testing in Sydney. The Building Commission requested that RED fire engineers attend on its behalf and John Holland agreed to this request.

The use of non-fire rated proprietary hollow wall fixings in fire rated plasterboard walls is not covered by the manufacturer's recommendations or by the manufacturer of the wall fixings.

The Building Commission found that manufacturer's installation system requirements for plasterboard fire rated wall systems do not contain detail or advice on the use of wall fixings in fire rated plasterboard systems other than those needed to fix the fire rated plasterboard.

John Holland has provided telephone advice that the testing showed no adverse effect on the fire rating of the walls from the fixings.

RED provided summary telephone advice following the test, and in a written consultant advice note, pending verification in the full CSIRO report that there is no adverse effect on the fire rating of the walls from the fixings.

The full CSIRO report confirms this advice.

Summary

No remedial work is required.

6.2. Supervision claims

6.2.1. Claim 12: Quality assurance & quality checking processes and photograph substitutions

The Building Commission also received information from a worker who advised:
"QA & QC process used for identifying and rectifying defects related to fire rated walling systems were subject to photographs of alleged corrected work but were inconsistent with the defective photos. This is thought be a general site wide issue."

The PCH is a very large and complex building project and to manage the quality assurance and quality checking processes, administered via the BIM-360 software platform, John Holland and Strategic Projects established an internal inspection and certification process before works could proceed to the next stage.

This checking system intrinsically has points where work can be stopped if a defect is identified. Any defect is then captured with photographs and described on the system. The system would automatically generate a written rectification notice to the relevant work supervisors.

The supervisors action this and then submit their completed defect rectification notice, which includes the original photographs along with new photographs as proof of rectification.

The PCH project is subject to agreed quality assurance and quality checking processes between all parties, including dispute resolution.

The Building Commission wrote to John Holland requesting the company's position in relation to this allegation. John Holland provided the following statement:
"The works were inspected by appropriate qualified personnel engaged by both JHG and the relevant engineering consultants. (NDY Consultant).

A separate email has been forwarded with samples of BIM documentation confirming the types of inspections carried out by our consultants following due process. Additional samples can be provided if required.

Subcontractors were also required to provide sign off prior to ceiling closure including Knauf material and application details of the type of wall construction used. BIM samples have been provided in prior emails, all this history is recorded in BIM.

On reaching completion and with new additional works under way on behalf of the State, JHG engaged independent fire contractors to monitor and carry out additional inspections to ensure all penetrations were sealed and labelled, these works were carried out utilising BIM and closed out.

During construction, walls and ceilings were supervised by Subcontractors supervisors, JHG including in-house engineers and heavily scrutinised by the State during the progressive works to a level not seen on similar projects.

Please refer to previous correspondence showing samples of this process including JHG PCH QA flow chart. All items raised in BIM were closed out by the consultants, JHG and the State. Based on physical inspections not reliant on photos. Items in BIM were re-opened if all parties were not aligned. Again this is fully documented in BIM."

The Building Commission requested and received the relevant quality assurance and quality checking process documentation and a number of examples of the system in use and determined that this was satisfactory when used properly.

The Building Commission met with representatives of Strategic Projects who confirmed that this practice of photo substitution had been occurring and once Strategic Projects became aware of this practice it was stopped.

Summary

The Building Commission is satisfied that photo substitution initially occurred but that this practice was stopped.

6.2.2. Claim 13: Various non-qualified personnel carrying out quality assurance activities related to fire walls

The anonymous email made the following claim:
"For the most part university students were charged with inspecting the passivefire walls on behalf of the State through Norman, Disney & Young. They lacked the appropriate knowledge and experience to inspect the fire walls, from time to time, a JH representative would accompany NDY to aid in the inspections. During the passive fire inspection walks, JH would, from time to time, be successful in applying pressure to have non-compliance issues not noted and therefore not required to be remediated.

As it currently stands, passivefire walls can be installed by anybody claiming to know how, there is no accountability, no licencing or regulations. Builders typically don't understand the implementations of them to the degree required to be compliant, the NCH is no different."

In the email material supplied by the CFMEU the following claim was made:
"Further to these issues, 'the report' alleges a number of failings on the part of the Principal Contractor – JHG in ensuring the installation of fire walls was carried out correctly by the ceiling fixing subcontractors. This includes the following:

- The inspection of passivefire walls on behalf of the State was predominately undertaken by people who may be non-qualified and inexperienced personnel employed by NDY, and
- JHG management regularly applied undue and inappropriate pressure to NDY inspectors to ensure non-compliance notices were not issues (in cases where defects were identified)."

Large scale projects, such as the PCH require qualified and experienced building professionals and building trade supervisors to be present at all times.

The checking and quality assurance systems require assessment of compliance with standards, drawings and manufacturer's details, which require expert knowledge and experience.

The PCH project is subject to an agreed project management process between all parties, including dispute resolution and the NCC Volume One 2011.

The Building Commission requested John Holland confirm the company's position in relation to this allegation. John Holland provided the following statement:
"JHG PCH engaged adequate supervision with the required qualifications following a high level QA system and process adopted over the design, construction and transition (DLP) period of the project. With total transparency through the BIM documented process from Conception – Completion that fully involves the Design, Builder, Consultants, Subcontractors, suppliers, client (state) and end users. Please refer to samples provided prior. Please also see attached PCH Project Organisation charts confirming the structure in place.

The works were inspected by appropriate qualified personnel engaged by both JHG and the relevant engineering Consultants. (Please find attached confirmation from NDY consultants). I have also forwarded on a separate email samples of BIM documentation confirming the types of inspections carried out by our consultants following due process. Additional samples can be provided if required. Subcontractors were also required to provide sign off prior to ceiling closure including Knauf material and application details of the type of wall construction used. BIM samples have been provided in prior emails, all this history in recorded in BIM. On reaching completion and with new additional works under way on behalf of the state JHG engaged independent Fire contractors to monitor and carry out additional inspections to ensure all penetrations were sealed and labelled, these works were carried out utilising BIM and closed out. During Construction walls and ceilings were supervised by Subcontractors supervisors JHG including in house engineers and heavily scrutinised by state during the progressive works to a level not seen on similar projects. Please refer to previous correspondence showing samples of this process including JHG PCH QA flow chart. All items raised in BIM were closed out by the consultants, JHG and the state. Based on physical inspections not reliant on photos. Items in BIM were re – opened if all parties were not aligned. Again this is fully documented in BIM.

With reference to item 9 above, JHG PCH engaged adequate supervision with the required qualifications following a high level QA system and process adopted over the design, construction and transition (DLP) period of the project. With total transparency through the BIM documented process from Conception – Completion that fully involves the Design, Builder, Consultants, Subcontractors, suppliers, client (state) and end users. Please refer to samples provided prior. Please also see attached PCH Project Organisation charts confirming the structure in place."

The Building Commission requested and received (in confidence) the PCH Operational Organisational Chart from John Holland. This is a breakdown of the John Holland staff for the project with roles and responsibilities, qualifications, expertise or specialties, numbers of staff, etc.

The Building Commission met with senior representatives from John Holland and NDY to discuss the claim of inadequate quality assurance. The representatives provided information on the roles their respective staff played and of their qualifications, expertise and experience. The representatives denied that students were used for this purpose.

The Building Commission cannot confirm that students were inappropriately used. However, Building Commission inspections were unable to find any significant latent defects not already addressed.

Summary

The Building Commission is generally satisfied with the quality assurance process in place and of the explanations and support documents provided by John Holland and NDY.

6.2.3. Claim 14: Poor quality adhesive labels and missing painted on fire stencils on various plasterboard fire rated components

The Building Commission received information from a worker who advised:

- "Cheap stickers used for registering service penetrations through fire rated elements and in a number of cases obscuring them with intumescent putty.
- Not all the painted on fire stencils were in place."

Suitable durable adhesive labels and painted on fire stencils are important to the ongoing maintenance of PCH by providing workers and building managers with key information for the life of the building.

Labels and stencils provide important building data and if the stickers were to peel off or are obscured from view, or the fire stencils were missing, problems may occur maintaining the services and fire walls in the future.

Photograph 8: Example of labels and fire stencils

The Building Commission requested John Holland confirm in writing the company's position in relation to this allegation. John Holland provided the following statement:
"With reference to item 1 stickers and stencils have been used to identify and record works regarding the sealing and monitoring of all fire penetrations which are recorded on a project register and through BIM. Please see sample attached. Damaged stickers and stickers that have de- laminated have been replaced as required. Over and above the responsibility of the individual subcontractors JHG have engaged Fire Scope and independent subcontractor to monitor this work and to carry out replacement.

Painted stencils were used to identify all fire rated walls within plant rooms, risers and ceiling spaces to ensure works after construction were conducted correctly and certified. JHG are unaware of any outstanding areas that have not been properly stencilled and there are no open outstanding items on BIM that needs be addressed."

The Building Commission conducted site inspections to determine whether the durable stick on labels were in fact peeling off or obscured from view and confirmed that this had been the case, but had been rectified by John Holland with new adhesive labels.

Building Commission inspectors were able to view a number of stencils and found them to be satisfactory at the time of the audit.

Summary

As a result of Building Commission enquiries, including review of the JHG QA system records and on the evidence of its own limited checks, the Building Commission is satisfied that adhesive labelling and fire stencil markings are properly installed throughout the hospital.

6.2.4. Claim 15: Not all fire collars were in place

The Building Commission also received information from a worker who advised:
"That not all fire collars were in place."

As explained by Promat:
"Fire collars are designed to maintain the integrity of the fire resistant element through which plastic pipes, combustible insulation, cables or fibre optic facilities etc. pass. Fire collars are suitable for installation in the various types of floors, walls and ceilings in which they have been tested."

Fire collars prevent the spread of fire from one fire compartment to another.

Promat explains:
"Plastic pipe (uPVC) will start to deform at a temperature of approximately 70°C. Once the pipe starts to deform, the intumescent material in the fire collar expands, closing off the plastic pipe or combustible insulation, and thus forming an insulating barrier. This intumescent compound continues to expand throughout the fire and forms a char which prevents flame and hot gases passing into adjacent compartments."

The Building Commission requested John Holland confirm in writing the company's position in relation to this allegation. John Holland provided the following statement:
"Fire collars have been installed where required. There have been recorded instances in BIM where collars have been missed during the build, these were retro fitted and BIM items close out. Please see samples of this process attached."

The Building Commission conducted site inspections, however given the largely completed nature of the building works; observations were limited to plant and service rooms and riser shafts. In addition, the Telethon Kids Institute levels eight and nine, were available for inspection at the time as tenancy fitting out works were underway, therefore exposing the fire collars for ease of inspection. The pipes, cables and other services viewed by the Building Commission appeared to be satisfactory, fitted with fire collars and tagged.

The Building Commission reviewed supporting documentation (recorded in BIM 360) from John Holland and Strategic Projects with before and after photographs, confirming date, time and rectification of works.

The Building Commission interviewed staff from Strategic Projects, John Holland and NDY in regard to the checking and sign off procedures for fire collars. Building Commission officers could not find a case of missing fire collars at the time of the audit.

Building Commission inspectors were able to view a number of fire collars that were accessible. These fire collars were all in place in general accordance with manufacturer requirements.

Summary

Based on Building Commission enquiries, including review of the JHG QA system records and on the evidence of its own limited checks, the Building Commission is satisfied that fire collars are properly installed throughout the hospital.

6.2.5. Claim 16: Cheap back packer labourers used to apply fire stopping materials too high and low voltage cable penetrations through fire rated elements such as fire walls

The Building Commission also received information from a worker who advised:
"Unqualified labourers in the form of back packers were employed by a subcontractor to John Holland to apply/install intumescent putty to high and low voltage cable penetrations i.e. cables passing through fire walls."

To avoid risk of defects, this type of work should be performed by suitably qualified and experienced persons trained in the correct use of fire stopping materials.

Intumescent putty is intended to stop fire spreading from one fire compartment to another and should only be applied by suitably qualified passive fire installers.

The Building Commission requested John Holland confirm in writing the company's position in relation to this allegation. John Holland provided the following statement:
"The Service Subcontractors engaged on PCH are some of the largest in Australian and the World. They were individually responsible to ensure there fire rated penetrations were sealed labelled and registered and closed out in BIM, following the PCH project QA process. As mentioned prior JHG engaged Fire Scope to further inspect and carry out any remedial works if required to ensure that BIM items raised were completed and closed out to the satisfaction of JHG, Consultants and the State. All services penetrations are still accessible. BIM samples of the process has been forwarded prior."

The Building Commission interviewed staff from Strategic Projects, John Holland and NDY in regard to the checking and sign off procedures for penetrations. Building Commission officers could not find evidence of non-qualified persons working unsupervised or performing poorly. It is possible that some isolated incidences of this practice could have occurred at earlier times.

The Building Commission conducted site inspections, however given the largely completed nature of the building works; observations were limited to plant, service rooms and riser shafts..

The Telethon Kids Institute levels eight and nine, at the time of these inspections, were in the fitting out works stage, therefore exposing the cable service penetrations for ease of inspection.

The cables and other services viewed by the Building Commission appeared to be satisfactory, sealed and tagged.

Summary

The Building Commission is unable to determine whether back packers were used as a labour force on fire wall penetrations. The Building Commission is satisfied that the service penetrations have been appropriately fire stopped and meet the performance requirements of the NCC.

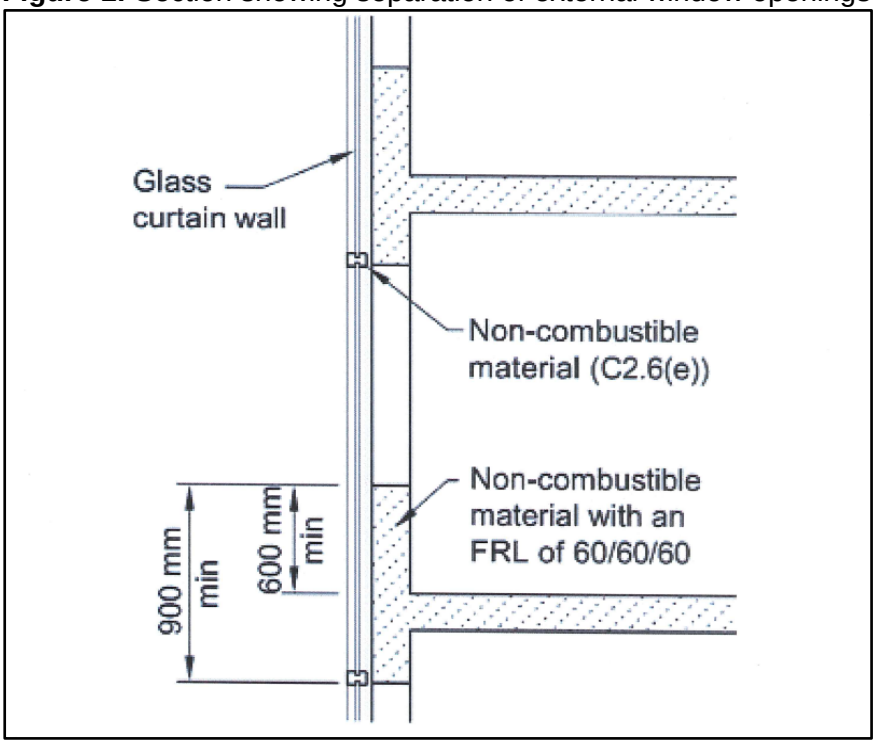
6.2.6. Claim 17: Possible missing fire protective measures over the main/ambulance entrance points within the fabric of the curtain wall system

The Building Commission also received information from a worker who advised:
"Possible defective or missing fire protective measures behind the Curtain wall ACP sections located over the main entry way and/or ambulance area entry way."

If the external wall of the building is a curtain wall, NCC Provision Part C2.6(a)(iii) contains specific provisions to stop or limit the spread of fire and smoke between the glass and the edge of the concrete floor.

This fire protective measure is important to inhibit the spread of fire and smoke between floors in a Class 9a building (Hospitals).

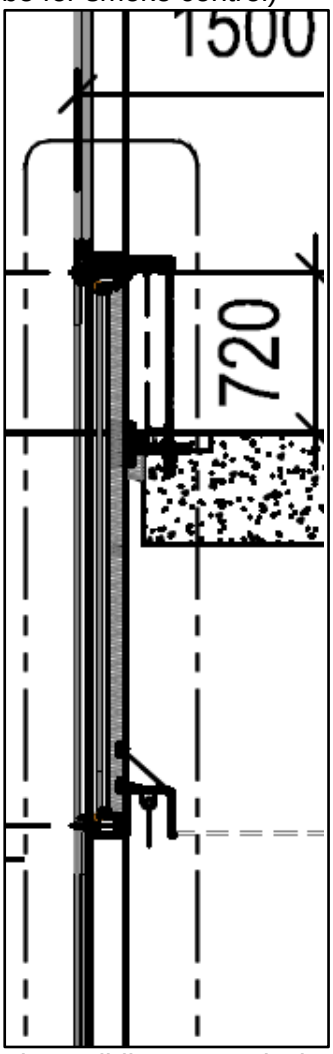
Figure 1: Section showing separation of external window openings in a curtain wall



The Building Commission determined the relevant parts of the BCA Volume One 2011 for this circumstance to be:

- NCC Volume One, Section C – Fire Resistance, Part C2 Compartmentation and Separation. Clause C2.6(a)(ii)(iii) Non-sprinklered and C2.6(b)(iii) Sprinklered.
- National Construction Code Volume One, Section C Specification C2.5 Smoke proof walls in health care buildings.

Figure 2: Typical extract of building plans showing non-combustible material (assessed to be for smoke control)



The Building Commission requested John Holland confirm in writing the company's position in relation to this allegation. John Holland provided the following statement:
"This specific area was visited recently by the State, JHG and BC representatives. The claim was found to be invalid because concrete suspended slab and wall that supports the slab is concrete with fire sprinklers installed within the ceiling space."

The Building Commission conducted site inspections, however given the largely completed nature of the building works, observations were limited. The worker's concern was that there may be a gap in the fire/smoke protection materials between floors adjacent to the curtain wall, which may allow fire and smoke to travel to the floor above.

As there are sprinkler systems in place NCC C2.6(b)(iii) provides that there is no requirement to fill the gap with fire protective material, however, smoke separation is still necessary. Project approved plans reviewed by the Building Commission with extract shown in figure 2 demonstrate this gap is intended to be stopped up. (Assessed by the Building Commission to be for smoke control.)

The Building Commission was also provided with information that the sprinklers are located above and below the ceiling line and are generally throughout the whole building.

Summary

The Building Commission is satisfied with the review of documents, results of inspection and explanations provided by Strategic Projects and John Holland.

6.2.7. Claim 18: Possible defective or missing fire protective measures at the top of the atrium

The Building Commission also received information from a worker who advised:
"Possible defective or missing fire protective measures behind the louvres/grills and above the lower ceiling line at the top of the atrium."

These louvres/intake grills form part of the smoke extraction system and if not properly constructed may not work as intended under emergency conditions.

Fire protective measures are important to inhibit the spread of fire in buildings and control smoke. (NCC Volume One, Section E – Services and Equipment, Part E2 – Smoke Hazard Management.)

These NCC requirements have the effect of managing the smoke and hot gases produced from a fire emergency in terms of air quality and tenability. This enables, amongst other things, sufficient time for evacuation and fire fighter interventions to be effective.

The Building Commission wrote to John Holland to request the company's position in relation to this allegation. John Holland provided the following statement:
"JHG, State and BC representatives inspected this area. JHG unaware of any defective fire protection measures in this area, a two way fire rated bulkhead has been constructed in casing the smoke exhaust plenum behind the louvres and sheet metal plenums have been fire rated with vermiculite."

The Building Commission conducted inspection of this area with key staff from Strategic Projects and John Holland and were shown quality assurance and quality checking drawings and photographs of how this area was designed and built.

Photograph 9: High level louvre air intakes and partly constructed air duct

Summary

The Building Commission is satisfied that no further action is required.

6.2.8. Claim 19: Possible defective service duct – fire protective measures over the shop

The Building Commission received information from a worker who advised:
"That the service duct may have defective fire protective measures in relation to services."

Services penetrations such as pipes and electrical cables are required to be fire stopped (with intumescent putty) when passing from services ducts to other parts of the building.

Fire protective measures are important to inhibit the spread of fire in buildings. (NCC Volume One, Section C – Fire Resistance, Part C2 –Compartmentation and Separation. Clause C3.15)

The Building Commission wrote to John Holland to request the company's position in relation to this allegation. John Holland provided the following statement:
"The state installed Coffee Kiosk is installed within the open Atrium area."

The Building Commission conducted site inspection of this area and found the kiosk shop to be a kiosk type without a services riser duct as an enclosed shop may have. It was found to have its services through the concrete floor via conduits and pipes.

Summary

No action required.

Photograph 10: PCH Atrium view with kiosk shop in foreground

6.3. Additional defects identified by the Building Commission

6.3.1. Claim 20: Structural steel beam connection components – incomplete or missing application of intumescent paint

Building Commission officers in the course of inspections observed some structural steel beam connection components to have an incomplete or missing application of intumescent paint in multi-service risers 1 and 2.

Intumescent paints are used in the construction industry to provide fire resistance to certain structural steel components and if found to be missing or inadequate may cause component failure. It provides an additional level of fire protection to the structural steel beams and the connections to the concrete shaft wall system of the service riser.

The Building Commission requested John Holland clarify its NCC position in relation to these beams and they provided the following statement:
"JHG also recently engage Fire Scope to carry out an independent inspection in all service risers and plant rooms and to carry out any defective work and repair damage as required (please see a copy of the Fire Scope inspection certificate attached) NDY have also explained that some beams in risers 1&2 did not require fire rating. JHG have asked NDY to fully clarify the actual requirement for future reference. JHG have also carried out an inspection with the project BCA consultants, a copy of there (sic) report will be forwarded to the Building Commission when received."

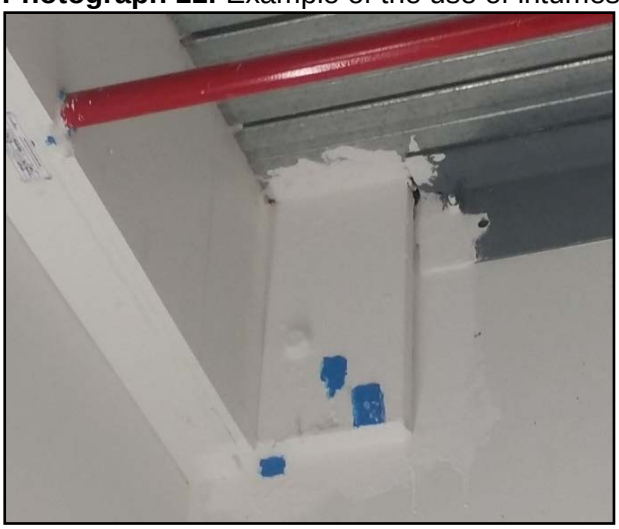
The Building Commission determined the relevant parts of the BCA Volume One 2011 for this circumstance to be NCC Volume One, Section C – Fire Resistance, Specification C1.1 – Fire Resisting Construction – 3. Type a Fire Resisting Construction. The Building Commission reviewed the plans and specifications to NCC provisions and determined that some beams did not require fire protection but some did.

Remedial work on beams that were required to be fire rated was carried out as required by John Holland. The Building Commission is satisfied the structural steel beams and their connections in terms of intumescent paint are now in accordance with the NCC for fire resistance construction requirements.

Summary

Structural steel beams connection points requiring intumescent paint have been rectified by John Holland and no further action is required.

Photograph 11: Example of the use of intumescent paint on steel beam connection plate



6.3.2. Claim 21: Incorrect installation of several steel safety barriers in multi-services risers

Building Commission inspectors found several steel safety barriers, of the AS1657 type, to have penetrated fire rated Knauf or Promat Promatect-H board bulkheads.

The Building Commission further reviewed the NCC provisions and the manufacturer's recommendations in detail and determined that these particular penetrations compromise the integrity of the fire rated bulkheads.

Penetrations of the bulkheads do not meet the DTS requirements without rectification works. The Building Commission determined the relevant parts of the BCA Volume One 2011 for this circumstance to be:

- Section C – Fire Resistance, Specification C1.1 – Fire Resisting Construction – 3. Type a Fire Resisting Construction.
- Section D – Access and Egress. Part D2 – Construction of Exits, Clause D2-18 – Fixed Platforms, walkways, stairways and ladders.

The Building Commission requested John Holland clarify its BCA position in relation to these steel safety barriers and they provided the following statement:
"The handrail will be cut back braced and supported back to the internal platform steel work."

Summary

These defects have been acknowledged by John Holland and will be rectified.

Photograph 12: Example of incorrect installation of steel safety barrier through a fire rated bulkhead

6.3.3. Claim 22: Inconsistent use of fire rated Knauf Plasterboard and Promat Promatect-H fire protection board in specific areas of multi-service risers 1 and 2 protecting steel beams

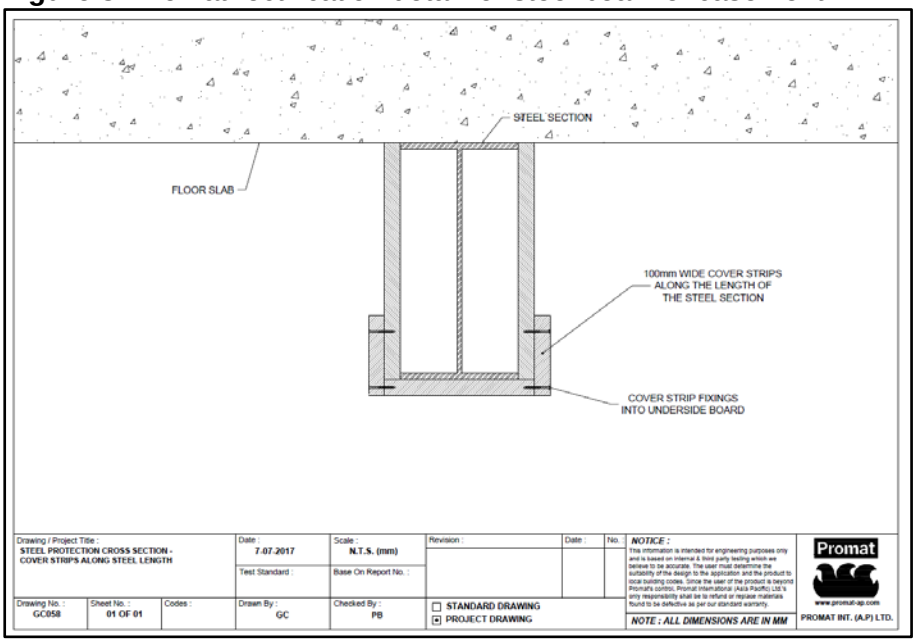
The Building Commission observed that some beams were not fully sheeted with either fire rated Knauf or Promat Promatect-H board and others were not sheeted at all. Potentially, compromising the integrity of the adjacent and related fire rated floor and wall systems in a number of locations (ie levels) within multi-service risers numbers 1 and 2.

The Building Commission determined the relevant parts of the BCA Volume One 2011 for this circumstance to be NCC Volume One, Section C – Fire Resistance, Specification C1.1 – Fire Resisting Construction – Table 3 Type A Construction.

The Building Commission determined the bulkheads to have incorrectly staggered sheeting joints. The manufacturers of the Promat and Knauf fire rated walls both provide specific manufacturer details for protecting bulkheads. The works observed were not installed as per these manufacturer's details. The bulk heads observed were found to be mainly sheeted with Promat product but some were also Knauf product. Both products were approved for use in the project drawings.

The Building Commission requested John Holland clarify its NCC position in relation to these beams and they provided the following statement:
"Originally thought to be layered plasterboard in fact was Promat board, the supplier has said that the directional corner laps are incorrect where the bottom board should be installed between the two side boards. The board supplier is investigating if the system has been tested this way and if not will assist JHG to come up with a solution that can be implemented over the coming weeks. All beams are accessible. This item will be recorded in BIM and closed out following due process. Please see attached manufacturer resolution, works are currently underway."

Figure 3: Promat rectification detail for steel beam encasement



They do not meet the DTS requirements for fire resistance without rectification works.

Summary

John Holland has commenced rectification works for the Promat and Knauf board systems. No impact to PCH is expected as this is a relatively straight forward matter to resolve.

6.3.4. Claim 23: Fixture of saddle clamps for electrical conduits and services to the inside face of some Knauf shaft walls without evidence of system testing

Building Commission officers were able to view a series of finished Knauf shaft walls within multi-service risers and observe the fixings used in the plasterboard in that sample of construction work.

The service riser shafts generally contain smoke detection and alarms as well as fire sprinklers. The area or floors around them also contain smoke detection and alarm systems and fire sprinklers. They are constructed with the Knauf fire rated plasterboard shaft system. The purpose of the shafts is to facilitate efficient delivery of building services such as power, water, medical gases, communications etc, and prevent the spread of fire from floor to floor.

Knauf recommendations do not contain detail or advice on the use of these fixings, other than those specified to fix the fire rated plasterboard shaft wall sheets in place.

The Building Commission wrote to John Holland requesting the company's position in relation to this allegation. John Holland provided the following statement:
"JHG agree that the light weight fixings do not have a fire rating. Wall and ceiling system material suppliers refer builders to the fixing manufacturer details note: gyprock fixings are also not fire rated. Wall and Ceiling Material system suppliers also state that light weight fixings can be attached to fire rated walls (one sided) these fixings are not through fixings and are also staggered. Care must be taken to ensure these fixings are sealed. This is and has been a normal work practise on construction projects and during occupancy i.e. light weight services attached to fire walls. JHG have discuss (sic) this at length with fire consultants and material suppliers and no test results could be sourced. JHG Consultants did not believe that the light weight fixings used would compromise the integrity of the fire rated wall but could not verify unless it was tested. JHG have now engaged CSRIO with the material supplier Knauf to carry out a fire test to close this item out." (See Claim 11 for further information).

The Building Commission researched fire rating of hollow wall fasteners, including saddle clamps commonly used for face fixing of conduits. Fire rated fixings of this type could not be found. The fixings observed, are not necessarily problematic as there are construction practices that have existed in some cases for many years without adverse outcomes.

The Building Commission engaged RED fire engineers to review the use of fixings in fire rated walls and to provide written advice. This advice and the CSIRO testing observed by RED and addressed in Claim 11 satisfies the Building Commission that these fittings and fixings do not adversely affect the fire rating of the wall.

Photograph 13: Saddle clamp fixings to inside face of Knauf shaft wall

6.4. Conclusions

The Building Commission is satisfied that there is no systemic problem with the fire walls and that any deficiencies have been or are continuing to be appropriately remedied.

6.5. Rectifications

The Building Commission is generally satisfied that John Holland Group (as the builder) has successfully remediated identified problems.

7. Referenced Acts and Regulations

Government of Western Australia, *Building Act 2011*
Government of Western Australia, Building Regulations 2012
Government of Western Australia, *Builders' Registration Act 1939*
Government of Western Australia, *Building Services (Complaint Resolution and Administration) Act 2011*
Government of Western Australia, *Building Services (Registration) Act 2011*

These documents can be downloaded from the State Law Publisher website at www.slp.wa.gov.au.