C 63	Basement 2	South-east fire stairs to ground level	Water from the base of stair entering the adjacent storage area.	Install kerb and drain.
C 64	Basement 2	South-east fire stairs to ground level	The surface to the base of the stair is not only wet but very rough in the finish as such not fit for purpose as could cause slips and falls.	Install kerb to divert water as safety issue. Skim base of stair with commercial grade topping.
C 65	Basement 2	South-east fire stairs to ground level	Groundwater entering fire stair area and adjacent storage.	Install kerb and drain.
C 66	Basement 2	South-east fire stairs to ground level	The sarking tape used around the penetration.	Remove tape. Install no-shrink grout.
C 67	Basement 2	South-east fire stairs to ground level	Concrete slurry on treads.	Clean treads.
C 68	Basement 2	South-east fire stairs to ground level	Concrete hump poor workmanship.	Scabble off hump. Install topping.
C 73	Basement 1	North-east fire stairs to ground level	Void to the fire-rated concrete wall to fire stairs.	Fill with non-shrink grout.
C 75	Basement 1	North-east fire stairs to ground level	Void to concrete.	Fill with non-shrink grout.
C 77	Basement 1	North-east fire stairs to ground level	Sarking tape installed around the pipe.	Remove tape. Install no-shrink grout.
C 82	Basement 2	North-east – hydrant room	Pump not operational in fault mode.	Technician to inspect and advise.
C 83	Basement 2	North-east – hydrant room	Missing fixings throughout.	Plumber to install missing fixings.
C 84	Basement 2	North-east – hydrant room	Nail in the floor.	Remove nail.
C 85	Basement 2	North-east – hydrant room	Missing fixings.	Plumber to install missing fixings.
C 86	Basement 2	North-east – hydrant room	Water ponding under electrical back up batteries. Safety issue.	Remove equipment. Top floors to drain. Reinstall equipment.
C 88	Basement 2	North-east – hydrant room	Incomplete work.	Remove redundant items.
C 89.A	Basement 2	North-east – hydrant room	Hanging rod bending and corroded and installed instead of unistrut.	Remove and install Unistrut.

C 92	Basement 2	North-east – hydrant room	Slurry over diesel pump set may void the manufacturers' warranty	Clean slurry and equipment.
C 93	Basement 2	North-east – hydrant room	No Aust. Standard tags.	Hydraulic engineer to attend site and confirm compliance.
C 96	Basement 1	Main entry	Paper retained in the soffit.	Remove, clean, and install non-shrink grout.
C 97	Basement 1	Main entry	Power cable to be shortened and clipped to concrete.	Electrician to attend and shorten cable.
C 98	Basement 1	West wall	Builders set out has not been cleaned off.	Sand and clean marks off soffit.
C 100	Basement 1	South wall	Nails retained throughout the soffit.	Remove and patch with render.
C 102.A	Basement 1	South – over parking bay 18 (floor waste)	Nails to soffit parking bay 18	Remove and patch with render.
C 102.B	Basement 1	South – over parking bay 18 (floor waste)	Builders set out retained.	Sand and clean marks off soffit.
C 104	Basement 1	South	Nails retained throughout soffit.	Remove and patch with render.
C 105	Basement 1	South-east corner	Incomplete hydraulic work to the southeast corner and incomplete concreting.	
C 106	B1 and B2 ramp	Adjacent store	Nails retained in a store adjacent to B1 to B2 ramp.	Remove and patch with render.
C 108	Basement 1	Exist	The hump at lift exit.	Scabble hump and install screed.
C 109.A	Basement 1	Exist	Open conduit.	Electrician to cap off.
C 109.B	Basement 1	Exist	Formwork retained in the concrete.	Remove formwork.
C 109.C	Basement 1	Exist	Concrete patch not completed with due care and skill.	Remove and replace.
C 110.A	Basement 1	North-east floor waste	Duct tape to concrete.	Remove tape.
C 110.B	Basement 1	North-east floor waste	Concrete around the drain has not been completed with due care and skill.	Remove concrete and tape Install non-shrink grout.
C 112	Basement 1	Parking bay 2	Formwork retained to parking bay 2.	Remove formwork.
C 113.A	Basement 1	Parking bay 2	Nails retained in the soffit.	Remove and patch with render.

C 113.B	Basement 1	Parking bay 2	Builders setout retained on the soffit.	Sand and clean marks off soffit.
C 114	Basement 1	B1 and B2 ramp	6 open conduits to concrete.	Remove and patch with render.
C 115	Basement 1	Ceiling area	Builders' set out marks retained throughout	Sand and clean marks off soffit.
C 116	Basement 1	Ceiling clearance height	Note clearance of 2.2m required to the basement. Exit sign inside the basement is under 2100mm high.	Electrician to adjust exit light heights.
C 118.A	Basement 2	North wall	Saturated formwork to parking bay 30. Dish drain not draining as such not fit for purpose.	Jet blast drains. Remove for work. Top dish drain with screed for falls.
C 122	Basement 2	Behind parking bay 25	Dish drain incomplete behind parking bay 25. Restricted with the rock in way of water flow.	Jet blast drains. Scabble rock. Install concrete dish drain with screed for falls.
C 123	Basement 2	North of building - adjacent to the ramp	Exposed reinforcement bars adjacent to the ramp.	Cut off and treat exposed reinforcement.
C 124	Basement 2	North of building - adjacent to the ramp	Poor concreting works are adjacent to ramp.	Scabble back and install topping.
C 132	Basement 2	North of building - adjacent to the ramp	Retained formwork in the moist environment.	Remove formwork.
C 133	Basement 2	North of building - adjacent to the ramp	Concrete beam filled with the debris.	Scabble back and install non-shrink grout.
C 134	Basement 2	North of building - adjacent to the ramp	Concreting has not been completed with due care and skill.	Scabble back and install non-shrink grout.
C 137	Basement 2	North of building - adjacent to the ramp	Incomplete concreting.	Scabble back and install non-shrink grout.
C 138	Basement 2	North of building - adjacent to the ramp	Missing concrete.	Scabble back and install non-shrink grout.
C 139	Basement 2	Lift area	Open conduits.	Remove and patch with render.
C 151	Building L - roof	Concrete hob	Rough substrate not compliant with AS4654.2 and manufacturer's requirements.	Scabble back and install non-shrink grout.

C 159	Building U - roof	Adjacent to louvres	Render protection tape left in the position. Incomplete work.	Remove tape.
C 160	Building U - roof	Base of wall	Voids in render finish.	Clean and re-render.
C 162	Building U - roof	Concrete hob	Concrete hob formwork timber has created set down to the perimeter of the roof, allowing water to pond in recess.	Top and required along with roofing remediation.
C 163	Building U - roof	Concrete slab waterproofing	Rough substrate not suitable for waterproofing.	Top with roofing remediation.
C 164	Building U - roof	Concrete hob	Rough substrate not suitable for waterproofing.	Top substrate.
C 167	Building U - roof	Side open drain	Concrete hob formwork timber has created set down to the perimeter of the roof which will allow water to pond.	Top substrate.
C 169	Building U - roof	Overflow	Overflows were filed with render debris.	Clean out overflows.
C 170	Building U - roof	Open drain	Paper bags stuffed into drain outlets throughout the eave area.	Remove and clean.
C 171	Building U - roof	Open drain	Paper bags stuffed into drain outlets throughout the eave area.	Remove and clean.
C 172	Building U - roof	Open drain	Paper bags stuffed into drain outlets throughout the eave area.	Remove and clean.
C 175	Building L - roof	Entry access ladder	Domestic access ladder not to AS1657.	Replace with compliant ladder.
C 179	Level G lobby	Service riser	Missing screws to the door hinge.	Replace screws.
C 180	Level G lobby	Service riser	Incomplete plasterboard.	Complete plasterboard.
C 183	Level G lobby	Exhaust fan	Lobby area ventilation not operational.	Mechanical contractor to inspect.
C 184	Level G lobby	Service room	Missing floor finish.	Install floor finishes.
C 201	Level U4 lobby	Balcony – floor tiles	Adhesion failure of the waterproof membrane.	Repair.
C 215	Hydrant	South-east of site	Wiring not connected.	Electrician to connect.
C 216	Hydrant	South-east of site	Cardboard box covering elements.	Remove cardboard.

C 217	Hydrant	South-east of site	Temporary signage.	Replace with permanent signage.
C 220	Driveway	Pipe	Diesel pump vent pipe when running will blow smoke into habitable spaces (see balconies in the background).	Hydraulic engineer to advise new design.
C 222	Driveway	Plater box	Incomplete pipe in block wall.	Hydraulic engineer to advise.
C 223	Driveway	Concrete soffit	Timber sawdust to the concrete soffit.	Scabble back and install non-shrink grout.
U G05.3	Lounge room	Window glazing	Visible sealant smear to glass.	Clean.
U G05.4	Lounge room	Gyprock ceiling	Smoke detector cover retained.	Remove covers and test.
U G05.6	Kitchen	Intercom	Intercom has not been commissioned as an incorrect date and time.	Electrician to rectify.
U G05.9	Bathroom	Shower screen	Cement on the shower screen.	Clean.
U G05.10	Bathroom	Vanity (sink)	Void to under-mount sink.	Install sealant.
U G05.12	Bathroom	Vanity	Exposed melamine edges. Edging missing.	Edge joinery.
U G05.13	Ensuite	Vanity (sink)	Void to under-mount sink.	Install sealant.
U 304.9	Ensuite	Shower screen	The door can hit tiles. Possible damage glass door.	Install door stop.
U 306.2	Laundry	Clothes dryer	Instead of shortening the length of the cable, a twist tie has been used to retain the extra length of cable.	Electrician to shorten cable.
U 306.5	Bathroom	Shower screen	Glass not identifiable as safety glass.	Replace with safety glass.
U 306.8	Ensuite	Door striker	Poor painting works below door striker.	Repaint.
U 306.19	Main bedroom balcony	Top of FC cladding	No parapet cap to exposed FC blade wall.	Install Colorbond capping throughout.

U 306.24	Balcony	Sliding door threshold	The gap in tiles will allow moisture to enter the rear of tiles.	Install sealant or grout.

9. RECOMMENDED REMEDIATION WORKS

9.1 Conclusions

9.1.1 In the light of the above, some significant defects have been identified that require remediation by the Builder in order to attain compliance with the applicable codes and standards.

9.1.2 Some of the larger recurring defects will require investigation by specialist consultants (e.g.the cladding, fire rating and structural issues), as these require significant re-work.

9.1.3 In the interests of safety and industry credibility, it is advisable that the recommendations put forward in this report are duly considered by the Builder not simply in the context of retrospective action, that is, remediation, but also in terms of prospective building projects and compliance with statutory regulations and industry standards and requirements.

Signed:

Stan Giaouris
B.Build
Building Consultant

10. ATTACHMENTS

10.1 Attachment A - Home Building Act 1989

The following section of the *Home Building Act 1989* outlines the implied warranties in every contract to undertake residential building work.

PART 2C Statutory Warranties

18BWarranties as to residential building work

(1) The following warranties by the holder of a contractor licence or a person required to hold a contractor licence before entering into a contract, are implied in every contract to do residential building work:

(a) a warranty that the work will be performed with due care and skill and in accordance with the plans and specifications set out in the contract,

(b) a warranty that all materials supplied by the holder or person will be good and suitable for the purpose for which they are used and that, unless otherwise stated in the contract, those materials will be new,

(c) a warranty that the work will be done in accordance with, and will comply with, this or any other law,

(d) a warranty that the work will be done with due diligence and within the time stipulated in the contract, or if no time is stipulated, within a reasonable time,

(e) a warranty that, if the work consists of the construction of a dwelling, the making of alterations or additions to a dwelling or the repairing, renovation, decoration or protective treatment of a dwelling, the work will result, to the extent of the work conducted, in a dwelling that is reasonably fit for occupation as a dwelling,

(f) a warranty that the work and any materials used in doing the work will be reasonably fit for the specified purpose or result, if the person for whom the work is done expressly makes known to the holder of the contractor licence or person required to hold a contractor licence, or another person with express or apparent Authority to enter into or vary contractual arrangements on behalf of the holder or person, the particular purpose for which the work is required or the result that the owner desires the work to achieve, so as to show that the owner relies on the holder's or person's skill and judgment.

10.2 Attachment B - Expert Witness Code of Conduct

Schedule 7 of the Uniform Civil Procedure Rules 2005 – the "Code of Contact".

UNIFORM CIVIL PROCEDURE RULES 2005

SCHEDULE 7 – Expert witness code of conduct

(Rule 31.23) (cf SCR Schedule K)

1Application of code

This code of conduct applies to any expert witness engaged or appointed:

(a) to provide an expert's report for use as evidence in proceedings or proposed proceedings, or

(b) to give opinion evidence in proceedings or proposed proceedings.

2General duty to the court

(1) An expert witness has an overriding duty to assist the court impartially on matters relevant to the expert witness's area of expertise.

(2) An expert witness's paramount duty is to the court and not to any party to the proceedings (including the person retaining the expert witness).

(3) An expert witness is not an Adviser for a party.

3`Duty to comply with court's directions

An expert witness must abide by any direction of the court.

4 Duty to work co-operatively with other expert witnesses

An expert witness, when complying with any direction of the court to confer with another expert witness or to prepare a parties' expert's report with another expert witness in relation to any issue:

(a) must exercise his or her independent, professional judgment in relation to that issue, and

(b) must endeavour to reach agreement with the other expert witness on that issue, and

(c) must not act on any instruction or request to withhold or avoid agreement with the other expert witness.

5 Experts' reports

(1) An expert's report must (in the body of the report or in an annexure to it) include the following:

(a) the expert's qualifications as an expert on the issue the subject of the report,

(b) the facts, and assumptions of fact, on which the opinions in the report are based (a letter of instructions may be annexed),

(c) the expert's reasons for each opinion expressed,

(d) if applicable, that a particular issue falls outside the expert's field of expertise,

(e) any literature or other materials utilised in support of the opinions,

(f) any examinations, tests or other investigations on which the expert has relied, including

(g) details of the qualifications of the person who carried them out,

(h) in the case of a report that is lengthy or complex, a brief summary of the report (to be

(i) located at the beginning of the report).

(2) If an expert witness who prepares an expert's report believes that it may be incomplete or inaccurate without some qualification, the qualification must be stated in the report.

(3) If an expert witness who prepares an expert's report believes that it may be incomplete or inaccurate without some qualification, the qualification must be stated in the report.

(4) If an expert witness considers that his or her opinion is not a concluded opinion because of insufficient research or insufficient data or for any other reason, this must be stated when the opinion is expressed.

(5) If an expert witness changes his or her opinion on a material matter after providing an expert's report to the party engaging him or her (or that party's legal representative), the expert witness must forthwith provide the engaging party (or that party's legal representative) with a supplementary report to that effect containing such of the information referred to in subclause (1) as is appropriate.

6 Experts' conference

(1) Without limiting clause 3, an expert witness must abide by any direction of the court:

(a) to confer with any other expert witness, or

(b) to endeavour to reach agreement on any matters in issue, or

(c) to prepare a joint report, specifying matters agreed and matters not agreed and reasons for

(d) any disagreement, or

(e) to base any joint report on specified facts or assumptions of fact.

(2) An expert witness must exercise his or her independent, professional judgment in relation to such a conference and joint report, and must not act on any instruction or request to withhold or avoid agreement.

10.3 Attachment C - Curriculum Vitae of Stan Giaouris

Stan Giaouris is the Principal Building Consultant of The Construction Adviser. Specialising in construction advisory services, Stan acts as a building consultant for owners' corporations, clients' representatives and project manages on behalf of property developers, builders, and homeowners.

Stan also holds the positions of part-time lecturer at University of Technology, Sydney (Faculty of Design, Architecture and Building), Vice President Master Builders Association (St George division), and Councilor — Master Builders Association of New South Wales.

SPECIAL COMPETENCIES

- Construction detailing, products and code compliance, especially in regard to buildability and practical construction solutions
- Forensic and remedial building defect investigations across all aspects of construction
- Expert witness for defective building work with informed knowledge of the National Construction Code and Australian Standards

QUALIFICATIONS

- Bachelor of Building in Construction Management (UTS)
- Licensed Builder since 2006 #188343C
- Councilor – Master Builders Association of New South Wales
- Committee Member Master Builders – St George Division 2017/2018
- Member of Master Builders Association since 2010
- Master Builders Assoc. - Certified Building Consultant
- Australian Institute Project Managers #00017530
- HIA – Timber Framing Code Training Course
- MBA – Waterproofing Course
- TAFE NSW Apply OH&S
- Staff Delegation & Task Management
- Introduction to Termite Management Training Course
- WHS&R accredited course for Workplace Committees
- WHS&R accredited course for Supervisors and Managers
- WHS&R General Induction for Construction Work
- Explosive Power Tools Certificate
- Workcover Dogmans Certificate
- Security of Payments Act Training – Recoup 2014
- Experts Direct – Expert Witness Training Program 2019
- Aust Concrete Remediation Assoc – Concrete remediation training 2019
- UNSW Unisearch – Expert Witness Training and preregistered expert with Unisearch

Employment Summary

November 2018 — Present

The Construction Adviser

Principal Building Consultant

- Joint Reports (conclaves) completed include:
  - Townhouses – Blakehurst
  - Units – Bellevue Hill
  - Townhouses – Balgowlah
  - Construction Safety Accidents
  - Duplex - Sutherland
- Expert evidence at Tribunal:
  - Joint evidence twice
- Expert reports have been completed for the following properties (numbering is TCA in-house numbering):

  - 2018.057 – 13 free standing townhouses, selected defect response, including partial costings
  - 2018.060 – 6 luxury apartments (Double Bay) defect response, including costings and remediation design
  - 2019.044 – single home defects, including costings
  - 2019.045 – 100+ units, facade and waterproofing defects, including costings
  - 2019.065 – pre-school defects with costings
  - 2019.040 – individual home, defect response with costings
  - 2019.068 – cladding testing and remediation
  - 2019.048 – 6 luxury units defect response with costings
  - 2019.097 – construction methodology and process assessment
  - 2019.008 – duplex defects, including costings
  - 2019.086 – 21 units, defect response, including costings
  - 2019.055 – 90+ units, general defects and waterproofing;
  - 2019.072 – individual home – DA breaches – including costings
  - 2019.059 – 52 units general building and waterproofing defects including costings
  - 2020.012 – 122 units general building and waterproofing defects
  - 2020.014 – duplexes general building and waterproofing defects
  - 2020.023 – 123 units general building and waterproofing defects & remediation scope
  - 2020.036 – 6 luxury terraces, general building, and waterproofing defects including remediation scope and design details
  - 2020.045 – defective stone installation including costings
  - 2020.048 -unapproved changes to strata property including costings
  - 2020.056 – reasonableness of pre purchase inspection including costings
  - 2020.064 – Inspection of 20% of 288 units and common areas
  - 2020.069 – residential waterproofing defect inspection including remediation scope, tendering and tender recommendation
  - 2020.073 - Inspection of 20% of 300+ units and common areas
  - 2020.077 – Insurance fire damage expert report
  - 2020.083 – Residential defects
  - 2020.090 – Facade coating dispute between material supplier and Tier 1 builder.
  - 2020.092 – water ingress to terrace houses
  - 2020.093 – general building and waterproofing defects to 3 townhouses
  - 2020.102 – commercial retain counter top dispute
  - 2020.107 – scaffold accident
  - 2020.123 – commercial tiling installation to shopping centre
- Construction advisory services to developers and builders for the following properties:
  - 2018.061 – 15 luxury apartments
  - 2019.013 – 25 free standing luxury houses
  - 2019.019 – large home
  - 2019.028 – commercial construction advice
  - 2019.033 – Building classification advice
  - 2019.042 – water ingress from facade
  - 2019.048 – assisting with certification of building works
  - 2019.050 – roofing inspections
  - 2019.062 – luxury home, remediation scope
  - 2019.069 – dilapidation report
  - 2019.060 – facade and Hebel remediation scope
  - 2019.061 – material handling methodology
  - 2019.078 – defect remediation and mediation
  - 2019.057 - defect remediation and mediation
  - 2019.085 – dilapidation report of 3 terraces
  - 2019.098 – general and waterproofing defects to duplex
  - 2019.005 – 10 luxury over 55’s; design review, QA inspections and defects
  - 2019.016 – defect reporting, remediation and waterproofing design
  - 2019.047 – 400+ units general building and waterproofing defects report
  - 2019.092 – 6 luxury terraces, defects and ongoing advice
  - 2020.010 – 8 units, general building defects
  - 2020.016 - defect remediation and mediation
  - 2020.027 – carpark resurfacing design, detailing, waterproof selection and tendering

  - 2020.028 – ongoing contract advice and detailing
  - 2020.030 – water ingress inspection, advice and remediation details
  - 2020.037 – defects, remediation and detailing to 4,000m2 industrial roof
  - 2020.053 – design and construction advice to new luxury residence
  - 2020.054 – concept design and ongoing construction advice
  - 2020.055 – defect advice
- General building defect reports have been completed to the following properties
  - 2019.011 – unit water ingress
  - 2019.017 – concrete advice
  - 2019.021 – facade advice
  - 2019.035 – water ingress and cracking
  - 2019.039 – water ingress to rooftop terrace
  - 2019.041 – boutique block of 8 units, general defects
  - 2019.046 – neighbouring rights issues
  - 2019.049 – 34 units general and waterproofing defects
  - 2019.056 – kitchen and remediation defects
  - 2019.058 – water ingress to units
  - 2019.032 – 28 units, general building and waterproofing defects
  - 2019.073 – penthouse water ingress inspection
  - 2019.079 – commercial unit water ingress
  - 2019.080 – concrete failure
  - 2019.081 – 3 x unit block roof tops inspections for water ingress
  - 2019.082 – road failures and remediation
  - 2019.093 – boutique block of 4 units, structural defect and remediation
  - 2019.070 – water ingress and remediation design
  - 2019.090 – basement defects, remediation scope and design
  - 2019.051 – water ingress, remediation, scope design and tender
  - 2019.027 – general and stormwater defects, remediation scope and design
  - 2020.015 – terrace house, structural cracking and remediation scope
  - 2020.020 – units, water ingress and waterproofing, including remediation design
  - 2020.025 – water ingress and building classification dispute
  - 2020.029 – water ingress to individual lot, ongoing advice and details
  - 2020.032 – water ingress to select units out of 43 including remediation scope
  - 2020.034 – water ingress to unit remediation, ongoing advice and details
  - 2020.038 – individual house, general building and waterproofing defects
  - 2020.042 – 50 units, general building and waterproofing defects including Hebel
  - 2020.043 – water ingress to terraces, including remediation detailing
  - 2020.044 – numerous units, water ingress and defective remediation works
  - 2020.047 – individual home, stormwater, waterproofing and general defect inspection
  - 2020.058 – selected lots of 86 units for water ingress from precast concrete residential structure
  - 2020.060 – selected lots from 49 for water ingress and remediation design
  - 2020.063 – tiling installation and waterproofing defects

June 2018 — Present

University of Technology Sydney

Lecturer (Faculty of Design, Architecture and Building)

- Lecturing in Professional Practice — The subject covers construction contracts, liability, defects, compliance requirements.

June 2018 — November 2018

BDW Solutions Pty Ltd

Senior Associate & Building Consultant

- Specialising in the investigation and rectification of defective building work and designs, and expert witness and project management associated with defective building work.

December 2009 — July 2018

CBS Builders & CBS Projects Pty Ltd

Construction Director / Construction, Defects and Design Manager

- Frasers Putney 4H – Design Manager
  D&C of 14 x 3-storey duplexes and 8 free standing homes. Sale prices of $2—4M each.
  Construction cost: $25 million
- Miranda Dental Hospital – Design and Construction Manager
  3-storey basement with automated car stacker and 7-storey PT concrete structure with glass and terracotta facade.
  Construction cost: $18 million
- Frasers Putney – Terraces – Project Manager
  D&C Construction of 22 terraces across two stages — second stage was 11 terraces completed in eight months.
  Construction cost: $11 million
- Coogee Terraces – Project Manager
  Construction of six, three-storey terraces over basement with a main stormwater culvert construction.
  Construction cost: $5 million
- Bellevue Hill Residence – Project Manager
  Renovation of leading Australian residential project.
  Construction cost: $17.5 million
- Bellevue Hill Units – Construction Director
  Construction of 10 luxury units on steep site.
  Construction cost: $10 million
- Biscuit Factory – Project Manager
  External facade remediation of 106 units.
  Construction cost: $4.5 million
- Walsh Bay Apartment – Project Manager
  Complete refurbishment of four penthouses for leading Australian businessmen.
  Construction Cost: $1—2 million each
- Frasers – Lumiere Apartments – Project Manager
  Fitout of 3 x three-story penthouse apartments
  Construction cost: $2 million
- Smartstone Factory – Project Manager
  Construction of 2100m2 factory and offices
  Construction cost: $2 million
- Australian Nursing Home Foundation - Lucy Chieng Gardens – Site & Project Manager
  34 apartment and bathroom refurbishment, including terraces rooftops water features
  Construction cost: $1 million
- Manly Vale Terraces – Project Manager
  D&C of 4 x terraces over basement car park
  Construction Cost: $1.8 million
- Tower Café – Project Manager
  D&C café fitout in CBD
  Construction cost: $0.3 million
- Australian Nursing Home Foundation - Burwood Aged Care – Project Manager
  Fire compliance upgrade
  Construction cost: $0.5 million
- Waverton two Residences – Construction Manager
  Heritage renovation of one residence and construction of new second residence.
  Construction cost: $5 million
- Frasers Display Apartments – Project Manager
  Three different sales and display apartments.
  Construction cost: $0.5 million each
- Anglican Retirement Village – Construction Manager
  Numerous $200k+ small works projects.
  Construction cost: $1 million

- UWS P13- P15 – Project Manager
  Refurbishment of three vintage houses
  Construction cost: $1 million
- Serkin Optometrist – Site & Project Manager
  D&C shop fitout.
  Construction cost: $0.1 million
- UTS IELTS - Site & Project Manager
  Structural Alteration and refurbishment of existing area
  Construction cost: $0.1 million
- 127 Kent Street Apartment - Site & Project Manager
  Refurbishment
  Construction cost: $0.3 million
- Rissalah College – Client Representative
  Client representative for construction of new school
  Construction cost: $5 million

January 2006 — December 2009

Farindon Constructions Pty Ltd

Project Manager

- St Paul's International College
  Construction of new accommodation, amenities, and activity building.
  Construction cost: $4 million
- Admission Building, City Quarter, Camperdown
  Refurbishment and extension of heritage building to create 10 luxury apartments, 3 commercial suites, lap pool, and gym.
  Construction cost: $8 million
- St Edmund's Special School, Wahroonga
  Extension and refurbishment of existing special school.
  Construction cost: $4 million
- Mosman Preparatory School
  Construction of new library and science building.
  Construction cost: $2.5 million
- UNSW Building F10 Laboratories
  Construction of new laboratories within existing building over two levels.
  Construction cost: $1.2 million
- Westpac Branch, 225 Forest Rd, Hurstville
  Commercial building refurbishment and fitout.
  Construction cost: $1.5 million
- Springfield Hotel, 23-31 Darlinghurst Rd, Kings Cross
  Refurbishment of existing building for new restaurant and nightclub over four levels, while maintaining accommodation in levels above.
  Construction cost: $2.5 million
- West End Mazda, North Parramatta
  Refurbishment of car showroom, and construction of administration building.
  Construction cost: $4 million

January 2004 — December 2006

Brisland Pty Ltd

Site Manager

- Bulahdelah Public School
  Construction of new classrooms, games court, and football fields.
  Construction cost: $4.7 million
- Department of Defence — Encan/Decan Facility, Orchard Hills
  Construction of new missile testing facility.
  Construction cost: $4 million
- Department of Defence — Victoria Barracks, Building 110
  Stage 1 – Refurbishment of Intelligence and Communications building.

Construction cost: $2.5 million

- Department of Defence — Steele Barracks, Bridging Yard
  Construction of bridge training facility.
  Construction cost: $2 million
- Department of Defence — Randwick Barracks
  Removal of asbestos and hazardous materials, re-instatement and staging of works to enable barracks to remain operational.
  Construction cost: $2.5 million

January 1999 — December 2004

Fugen Constructions Pty Ltd

Foreman

- Le Mer Apartments, Drummoyne
  Construction of seven luxury waterfront apartments, basement car park, and lap pool.
  Construction cost: $7.5 million
- Glasshouse Tavern, Maroubra Junction
  Refurbishment and fitout of commercial space for new tavern.
  Construction cost: $0.7 million
- Darlinghurst Medical and Dental Centre
  Construction of new multi-level medical centre including extensive facilities for GPs, specialists, dental, X-ray, CT scan, darkroom, and administration facilities.
  Construction cost: $7 million
- Golden Grove Tavern, Maroubra Junction
  Conversion of basement level into new tavern, including all services and facilities.
  Construction cost: $1 million
- Caringbah Medical Centre
  Construction of new multi-level medical centre, including basement car park, extensive medical facilities, and operating theatre.
  Construction cost: $6.5 million
- Sydney University – Fisher Library
  Fisher Library level 5 fitout, including offices.
  Construction cost: $0.5 million
- Sydney University – Institute School Building (Heritage Project)
  Refurbishment of meeting rooms and two-storey office and all amenities.
  Construction cost: $1.2 million

January 1998 — December 1998

Abi Group Constructions Pty Ltd

Site Cadet

- State Rail — Central, Townhall, and Wynyard Railway Stations
  Refurbishment of three major train stations for 2000 Olympics. Role included all site office activities and assisting site manager with day-to-day requirements.
  Construction cost: $55 million

10.4 Attachment D - Instructions

10.5 Attachment E – Testing Equipment

Both Tramex and Protemetre moisture meters are used to attain comparitive Moisture readings

Thermal Imaging Camera

Digital Water Level

Ultrasonic Coating Thickness Gauge

Laser Level & Plumb

Height Laser level

Digital Thermometer

Digital Spirit Level

Stud/Services locator

Laser measurer

TCA TESTING EQUIPMENT

10.6 Attachment F - Defects Schedule

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
Ground level entry area					
C 1	Landscape (north of site)	Storm water pit	Not fit for purpose.	 	Bark is washing down storm water pit.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 2	Ground floor north entry	Entry door threshold	See section 8.7 of this report.		Hebel external wall installed higher than internal habitable spaces.
C 3	Ground floor north entry	Floor tiles	See section 8.4 of this report.		Insufficient falls of 2mm per metre.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 4	Ground floor north entry	Hebel cladding	See sections 8.6 and 8.26 of this report.		Elevated moisture to base of Hebel wall.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 5	Ground floor south entry	Hebel cladding (weepholes)	Note		Some weepholes have been installed to the Hebel facade.
C 6	Ground floor south entry	Hebel cladding	See section 8.7 of this report.		Elevated moisture to wall outside of G05. No drainage to facade. Concrete hob not installed as per plans.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 7	Ground floor south entry	Hebel cladding	See section 8.26 of this report.		No pressure equalisation slots have been installed.
Common area (toilet)					
C 8	Common area	Toilet ceiling	See section 8.14 of this report.		Ceiling height is 2080mm.

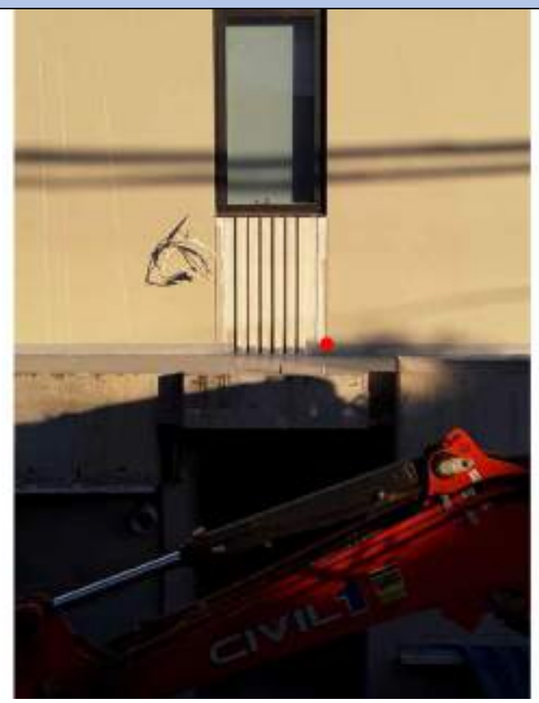
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
Facade					
C 9	East facade	Unit balcony	See sections 8.5 and 8.6 of this report.		Red - Waterproofing has been turned up base of FC sheets and Hebel.

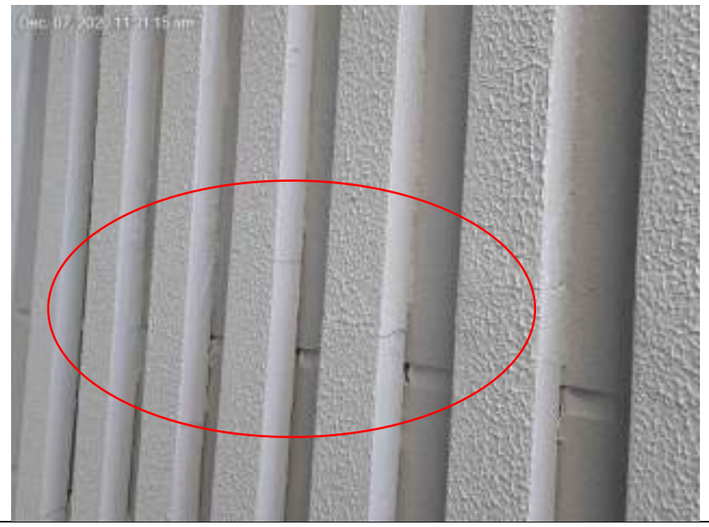
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 10	East facade	Cladding	See sections 8.5 and 8.6 of this report.		Red - waterproofing turned up base of FC sheets. Blue - Hebel with no cavity drains.
C 11	East facade	Hebel cladding	See sections 8.5 and 8.6 of this report.		No drainage to Hebel. Waterproofing has been turned up base of Hebel.

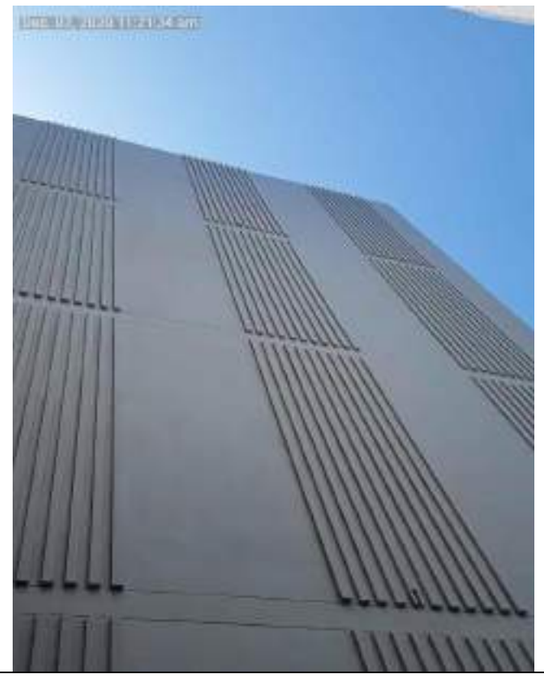
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 12	East facade	Unit balcony	See sections 8.6 of this report.		Red - waterproofing turned up base of FC sheets. Blue - No drip groove to soffit.
C 13	East facade	Hebel cladding	See section 8.26 of this report.		No pressure equalisation slots to wall. One weephole only visible.

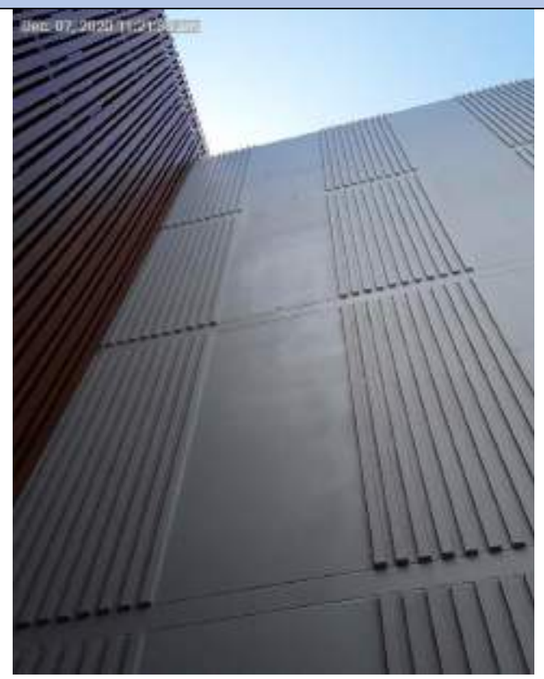
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 14	East facade	Hebel cladding	See section 8.26 of this report.		No visible pressure equalisation slots as required by Hebel manufacturer.
C 15	East facade	FC cladding	See section 8.5 and 8.6 of this report.		Base of FC sheets have been waterproofed up.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 16	East facade	Hebel cladding	See section 8.6 and 8.26 of this report.		Weephole has been waterproofed over, no drainage for Hebel.
C 17	East facade	Hebel cladding	See section 8.26 of this report.		Insufficient Hebel drainage.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 18	East facade	Hebel cladding	See section 8.26 of this report.		The single drainage provision has been waterproofed over.
C 19	East facade	Hebel cladding	Note		Some drainage provisions were identified at the Property.

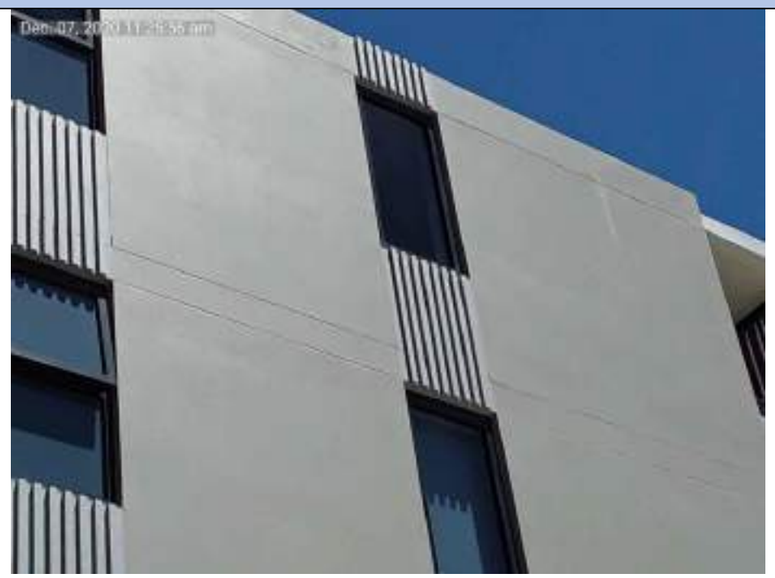
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 20	East facade	Textured Wall	See section 8.21 of this report.	 	Crack

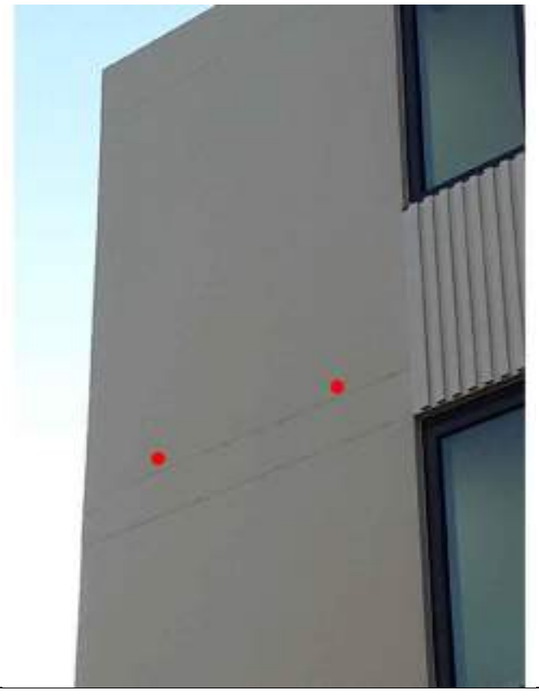
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 21	East facade	Hebel cladding	Works have not been completed with due care and skill.		Weepholes have been partly covered.
C 22	East facade	Hebel cladding	See section 8.26 of this report.		Drainage provisions are partly covered throughout the facade.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 23	East facade	Hebel cladding	See section 8.26 of this report.		Drainage provisions are partly covered throughout the facade.
C 24	East facade	Hebel cladding	See section 8.26 of this report.		Drainage provisions are partly covered throughout the facade.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 25	East facade	Hebel cladding	See section 8.26 of this report.		Drainage provisions are partly covered throughout the facade.
C 26	East facade	Privacy screen	Works have not been completed with due care and skill.		Render to aluminium track.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 27	East facade	Balcony slab edge	See section 8.9 of this report.		Efflorescence.
C 28	East facade	Balcony slab edge	See section 8.9 of this report		Efflorescence.

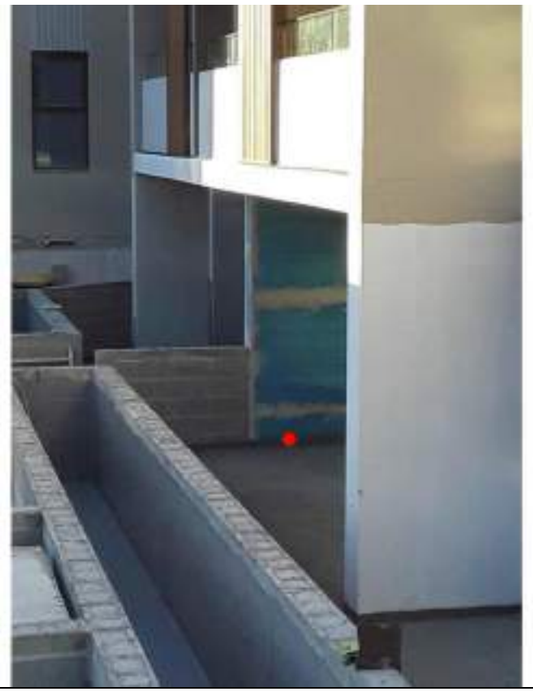
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 29	East facade	Hebel cladding	See section 8.26 of this report.		Drainage provisions are partly covered or missing throughout the facade.
C 30	West facade	Units balcony	See section 8.5 and 8.11 of this report.		Red - FC installed below water level. Blue - exposed edge of tile screed will result in efflorescence. Membrane has not been turned down edge as required by AS4654.2.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 31	West facade	Units balcony	See sections 8.3 and 8.5 of this report.		Red – FC installed below water level. Blue - set down height once tiled will not be compliant with AS4654.2.
C 32	West facade	Hebel cladding	See section 8.26 of this report.		Missing drainage provisions to Hebel.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 33	West facade	Hebel cladding	See section 8.26 of this report.		Missing drainage provisions to Hebel.
C 34	West facade	Hebel cladding	See section 8.26 of this report.		Missing drainage provisions to Hebel.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 35	West facade	Hebel cladding	Note.		Hebel drainage provision.
C 36	West facade	Hebel cladding	See section 8.26 of this report.		Drip from facade, as moisture has built up inside Hebel and escaping from control joint to Hebel and concrete junction.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 37	West facade	Hebel cladding	See section 8.26 of this report.		Missing drainage provisions to Hebel.
C 38	North Facade	Planter box	See section 8.4 of this report. Breach of 2.13 and 2.5.2 of AS4654.2 requiring falls to the base of the planter.		Water is ponding in base of planter. Breach of AS4654.2.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 39	North Facade	Planter box	Breach of 2.5.3.1 of AS4654.2 requiring a smooth substrate.		Blockwork has not been bagged prior to waterproofing. Smooth substrate required for waterproof application.
C 40	North Facade	Units balcony	See section 8.5 of this report.		FC sheet has been installed below water level.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 41	North Facade	Hebel cladding	See section 8.26 of this report.		Missing pressure equalisation slots to Hebel.
C 42	North Facade	Privacy screen	See sections 8.5 and 8.26 of this report.		Missing drainage provisions to walls under windows.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 43	North Facade	Hebel cladding	Works have not been completed with due care and skill.		Poor rendering work.
C 44	South Facade (Mitchell Avenue)	Hebel cladding	See sections 8.5 and 8.26 of this report.		No Hebel drainage. Blue - FC installed below ground level. Red - base of FC has been waterproofed up.

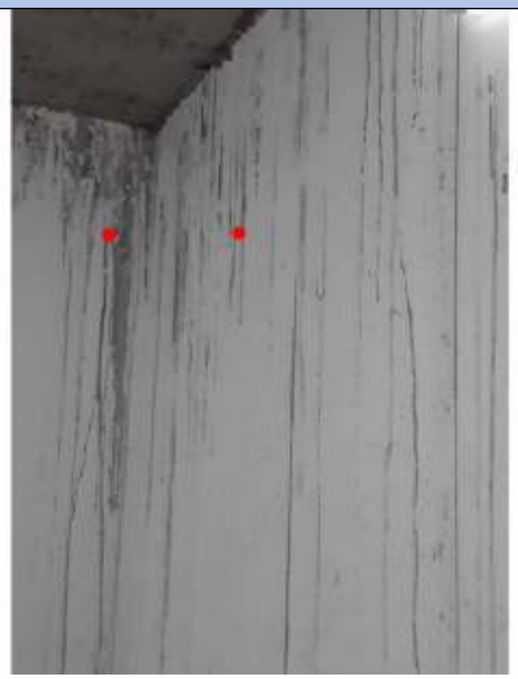
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 45	South Facade (Mitchell Avenue)	Cladding	See sections 8.5 and 8.26 of this report.		Red - base of FC waterproofed up. Blue - Hebel with no drainage.
C 46	South Facade (Mitchell Avenue)	Hebel cladding	See section 8.26 of this report.		No facade drainage.

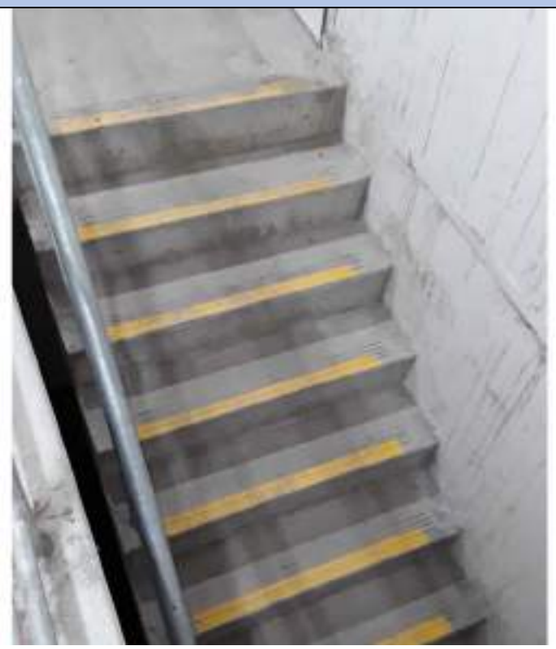
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 47	South Facade (Mitchell Avenue)	Hebel cladding	See section 8.5 of this report.		FC installed below water level.
C 48	South Facade (Mitchell Avenue)	Hebel cladding	Works have not been completed with due care and skill or as per manufacturer's details.		Parapet wall caps required if Hebel, FC or Dincel.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 49	South Facade (Mitchell Avenue)	Stair	Risk of trips and falls.		Water is ponding on steps presenting a trip hazard. Timber sleeper retaining walls typically have a maximum height of 600mm. Engineer to confirm structural adequacy.
C 50	South Facade (Mitchell Avenue)	Cladding	See section 8.9 and 8.24 of this report.		Eaves to be tested for combustibility. Efflorescence

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 51	South Facade (Mitchell Avenue)	Balcony slab edge	See section 8.9 of this report.		Efflorescence in this location is the result of failed waterproof membrane upturn.
Basement Stair					
C 52	Basement 1	South east fire stair to ground level	See section 8.15 of this report.		Missing nosing or compliant non-slip finish to steps.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 53	Basement 1	South east fire stair to ground level	See section 8.23 of this report. Incomplete work.		Gap to side of grated drain.
C 54	Basement 1	South east fire stair to ground level	Incomplete works. Works have not been completed with due care and skill.		A. Handrail cut off. B. Dincel off cut.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 55	Basement 1	South east fire stair to ground level	Works have not been completed with due care and skill.		Incomplete cleaning of concrete slurry.
C 56	Basement 1	South east fire stair to ground level	Works have not been completed with due care and skill.		Sawdust and debris in concrete.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 57	Basement 1	South east fire stair to ground level	See section 8.15 of this report.		No nosing or non-slip finish. Details of paint to be provided to identify if non-compliant and tested to AS4586.
C 58	Basement 1	South east fire stair to ground level	Works have not been completed with due care and skill.		Visible patching and slurry over pour from construction.

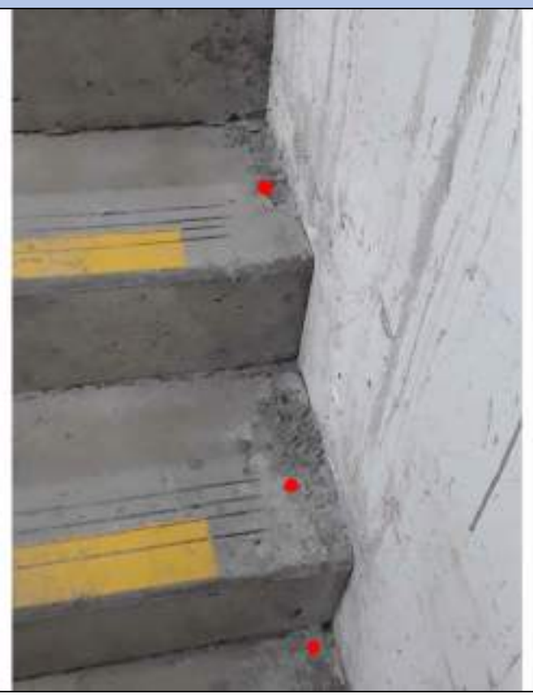
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 59	Basement 1	South east fire stair to ground level	Works have not been completed with due care and skill.		Sensor temporarily installed.
C 60	Basement 1	South east fire stair to ground level	See section 8.15 of this report.		No nosing or non-slip finish. Details of paint to be provided to identify if non-compliant and tested to AS4586.

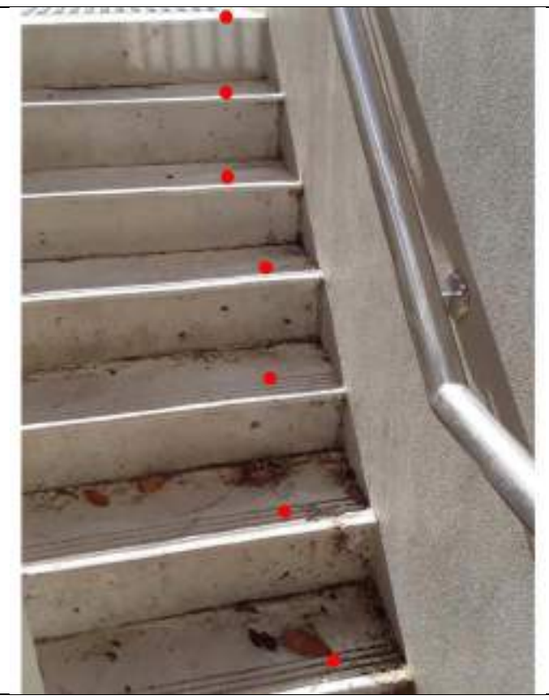
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 61	Basement 1	South east fire stair to ground level	Breach of D2.13 of the BCA. See section 8.17 of this report.	 	First riser is 179mm, adjacent riser is 185mm. Greater than 5mm difference in adjacent riser.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 62	Basement 1	South east fire stair to ground level	Works have not been completed with due care and skill.		Rough concrete edge.

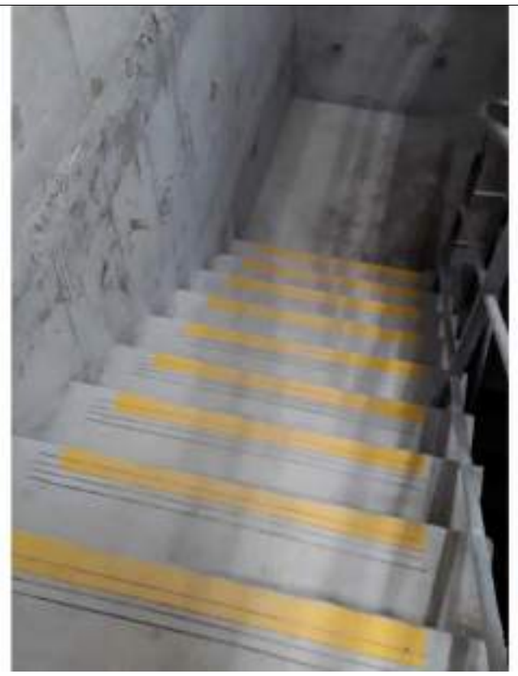
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 63	Basement 2	South east fire stair to ground level	Safety issue.		Water from base of stair entering adjacent storage area. Water ponding on the floor of the emergency exit is a potential slip hazard.
C 64	Basement 2	South east fire stair to ground level	Not fit for purpose.		The surface to the base of the stair is not only wet, but very rough in finish as such is not fit for purpose as it could cause slips and falls.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 65	Basement 2	South east fire stair to ground level	Not fit for purpose.		Ground water entering the fire stair area and adjacent storage. Water entering the adjacent storage areas restricts it from being used for its intended purpose. Water sitting on the surface of the emergency access stair is a safety hazard.
C 66	Basement 2	South east fire stair to ground level	Works have not been completed with due care and skill.		Sarking tape used around penetration.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 67	Basement 2	South east fire stair to ground level	Works have not been completed with due care and skill.		Concrete slurry on treads.
C 68	Basement 2	South east fire stair to ground level	Works have not been completed with due care and skill.		Concrete hump poor workmanship.

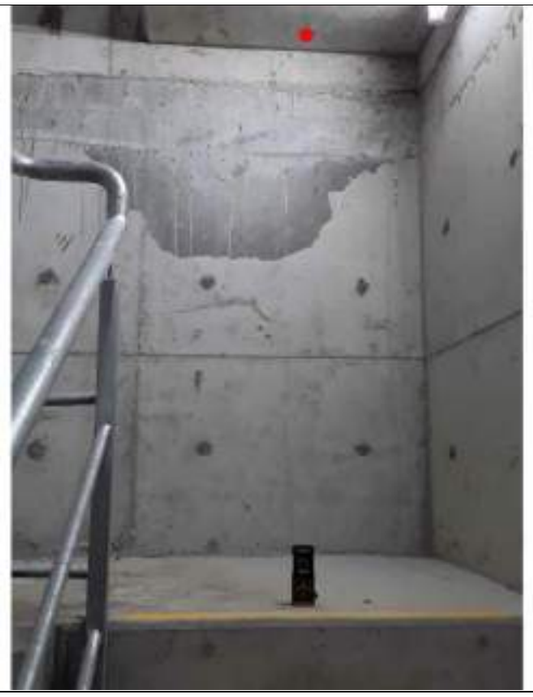
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 69	Basement 1	North east fire stair to ground level	See section 8.15 of this report.		No nosing or non-slip finish. Details of paint to be provided to identify if non-compliant and tested to AS4586.
C 70	Basement 1	North east fire stair to ground level	See section 8.15 of this report.		No nosing or compliant non-slip finish.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 71	Basement 1	North east fire stair to ground level	See section 8.23 of this report. Incomplete work.		Gap adjacent to grate. Water can enter under grated drain.
C 72	Basement 1	North east fire stair to ground level	Fire engineer to assess.		Hollow fire rated frame.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 73	Basement 1	North east fire stair to ground level	Incomplete work.		Void to fire rated concrete wall to fire stairs.
C 74	Basement 1	North east fire stair to ground level	See section 8.15 of this report.		No nosing or compliant non-slip finish. Details of paint to be provided to identify if non-compliant and tested to AS4586.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 75	Basement 1	North east fire stair to ground level	Works have not been completed with due care and skill. Fire engineer to assess.		Void to concrete. Moisture ingress. Possible fire defect.
C 76	Basement 1	North east fire stair to ground level	See section 8.19 of this report.		Corrosion.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 77	Basement 1	North east fire stair to ground level	Incomplete work.		Sarking tape installed around pipe.
C 78	Basement 1	North east fire stair to ground level	See section 8.20 of this report.		Insufficiently vibrated concrete.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 79	Basement 1	North east fire stair to ground level	See section 8.18 of this report.		Non continuous handrail.
C 80	Basement 2	North east fire stair to ground level	See section 8.14 of this report.		Ceiling height 1.95 metres.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 81	Basement 2	North east – hydrant room	See section 8.4 of this report.		Water ponding.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 82	Basement 2	North east – hydrant room	Not fit for purpose.		Pump not operational in fault mode. Pumps have not been commissioned.
C 83	Basement 2	North east – hydrant room	Incomplete work.		Missing fixings throughout.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 84	Basement 2	North east – hydrant room	Incomplete work.		Nail in floor. Trip and safety hazard.
C 85	Basement 2	North east – hydrant room	Incomplete work.		Missing fixings.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 86	Basement 2	North east – hydrant room	Not fit for purpose.		Water ponding under electrical back up batteries. Safety issue. When working on electricals to pump set, a worker will be standing in water.
C 87	Basement 2	North east – hydrant room	See section 8.4 of this report.		280mm water ponding in pit.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 88	Basement 2	North east – hydrant room	Incomplete work.		Incomplete work.
C 89	Basement 2	North east – hydrant room	Not fit for purpose. See section 8.19 of this report.		Hanging rod bending and corroded and installed instead of unistrut. Threaded rods are used for hanging not supporting.

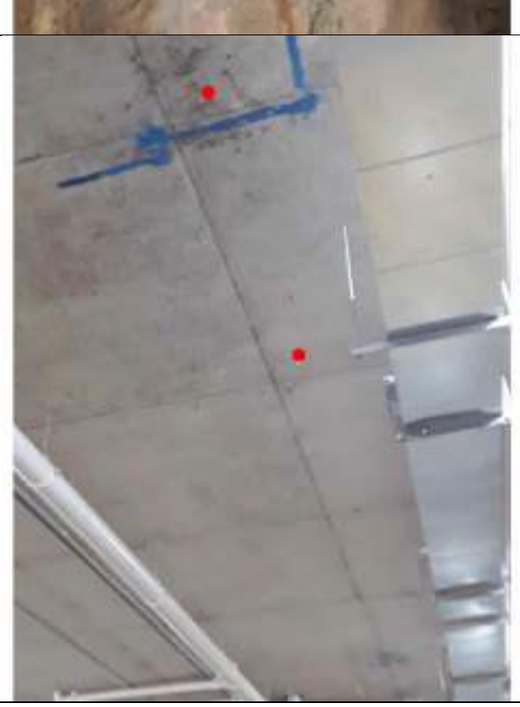
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 90	Basement 2	North east – hydrant room	Fire engineer to inspect.		Open void to fire rated wall.
C 91	Basement 2	North east – hydrant room	Fire engineer to inspect.		Void to fire rated wall.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 92	Basement 2	North east – hydrant room	Works have not been completed with due care and skill.		Slurry over diesel pump set may void manufacturer's warranty
C 93	Basement 2	North east – hydrant room	Works have not been completed with due care and skill.		Not Australian Standard tags.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 94	Basement 2	North east – hydrant room	Fire engineer to inspect.		Void in fire rated wall.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 95	Basement 1	Main entry	See section 8.19 of this report.		Localised waterproofing repairs. Corrosion.
C 96	Basement 1	Main entry	Works have not been completed with due care and skill.		Paper retained in soffit.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 97	Basement 1	Main entry	Works have not been completed with due care and skill.		Power cable to be shortened and clipped to concrete.
C 98	Basement 1	West wall	Incomplete work.		Builders set out has not been cleaned off.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 99	Basement 1	South wall	Structural engineer to assess. Not fit for purpose.		Block work wall, supporting Bondek has cracked.
C 100	Basement 1	South wall	Works have not been completed with due care and skill. Incomplete work.		Nails retained throughout the soffit.

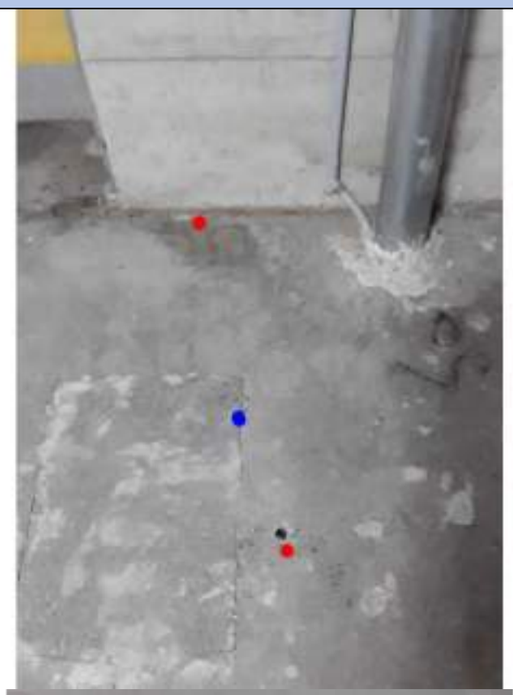
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 101	Basement 1 Visitor parking bay.	South (Column)	See section 8.20 of this report.		Insufficiently vibrated concrete.
C 102	Basement 1	South – over parking bay 18 (floor waste)	Works have not been completed with due care and skill.		Nails to soffit parking bay 18 Builders set out retained.

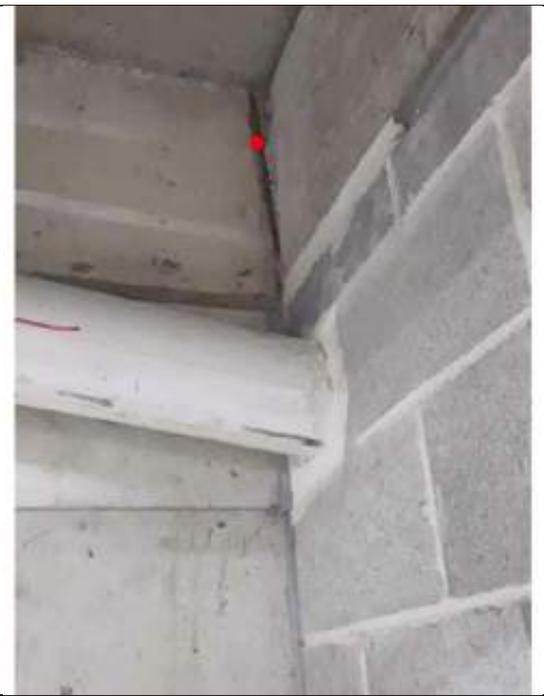
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 103	Basement 1	South – infront of parking bay 18 (floor waste)	See section 8.4 of this report.		Water ponding.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 104	Basement 1	South	Works have not been completed with due care and skill.		Nails retained throughout soffit.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 105	Basement 1	South east corner	Incomplete work.		Incomplete hydraulic work to southeast corner and incomplete concreting.
C 106	B1 and B2 ramp	Adjacent store	Incomplete work.		Nails retained in store adjacent to B1 to B2 ramp.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 107	Basement 1	East column	Structural engineer to inspect.		Cold joint in structural column adjacent to ramp.
C 108	Basement 1	Exit	Works have not been completed with due care and skill.		Hump at lift exit.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 109	Basement 1	Exit	Works have not been completed with due care and skill.		A. Open conduit B. Formwork retained in concrete C. Concrete patch not completed with due care and skill
C 110	Basement 1	North east floor waste	Works have not been completed with due care and skill.		A. Duct tape to concrete B. Concrete around drain has not been completed with due care and skill

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 111	Basement 1	North east fire stair	Incomplete work.		Missing coil tie plugs.
C 112	Basement 1	Parking bay 2	Incomplete work.		Form work retained to parking bay 2.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 113	Basement 1	Parking bay 2	Incomplete work.		A. Nails retained in soffit. Nails protruding from soffit are a safety hazard for maintenance plumbing work. B. Builders setout retained on soffit.
C 114	Basement 1	B1 and B2 ramp	Incomplete work.		6 open conduits to concrete.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 115	Basement 1	Ceiling area	Incomplete work.		Builders set out marks retained throughout.
C 116	Basement 1	Ceiling clearance height	Works have not been completed with due care and skill.		Note clearance of 2.2m required to basement. Exit sign inside basement is under 2100mm high.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 117	Basement 2	North wall	See section 8.4 of this report.		Stagnant water behind parking bay 30.
C 118	Basement 2	North wall	See section 8.4 of this report. Dish drain not draining as such not fit for purpose.		A. Saturated formwork to parking bay 30. B. Water ponding in dish drain.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 119	Basement 2	Parking bay 29	See section 8.20 of this report.		Insufficient vibration of concrete.
C 120	Basement 2	Parking bay 13	See section 8.20 of this report		Insufficient vibration of concrete.

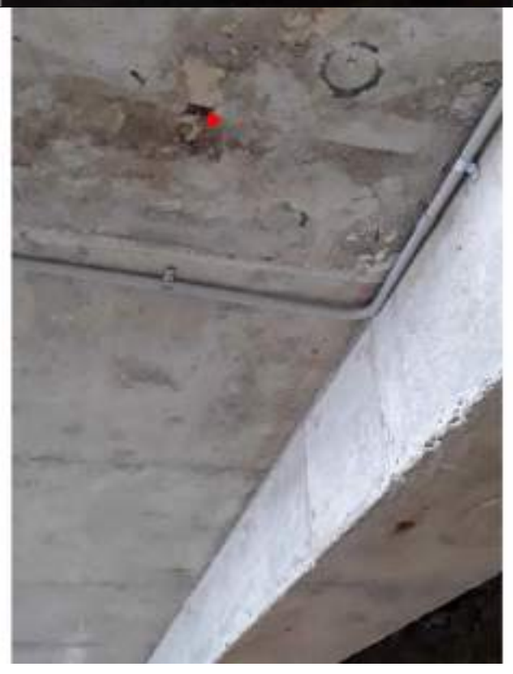
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 121	Basement 2	Parking bay 24	See section 8.20 of this report		Insufficient vibration of concrete.
C 122	Basement 2	Behind parking bay 25	Not fit for purpose.		Dish drain incomplete behind parking bay 25. Restricted with rock in way of water flow.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 123	Basement 2	North of building - adjacent to ramp	Works have not been completed with due care and skill.		Exposed reinforcement bars adjacent to ramp.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 124	Basement 2	North of building - adjacent to ramp	Works have not been completed with due care and skill.		Poor concreting works adjacent to ramp.
C 125	Basement 2	Parking bay 24 (Column)	See section 8.20 of this report		Insufficient vibration of concrete to parking bay 24.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 126	Basement 2	Parking bay 24	See section 8.19 of this report. Structural engineer to inspect.		Exposed reinforcement bar corroding.
C 127	Basement 2	Parking bay 24	See section 8.19 of this report. Structural engineer to inspect.		Exposed and corroding reinforcement.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 128	Basement 2	North of building - adjacent to ramp	See section 8.19 of this report. Structural engineer to inspect.		Corroding reinforcement.
C 129	Basement 2	North of building - adjacent to ramp	Structural engineer to inspect.		Shelf angle installed without fixings and not grout packed to support Bondek.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 130	Basement 2	North of building - adjacent to ramp	See section 8.19 of this report. Structural engineer to inspect.		Corroded reinforcements to base of ramp.
C 131	Basement 2	North of building - adjacent to ramp	See section 8.19 of this report. Structural engineer to inspect.		Exposed reinforcement to base of ramp.

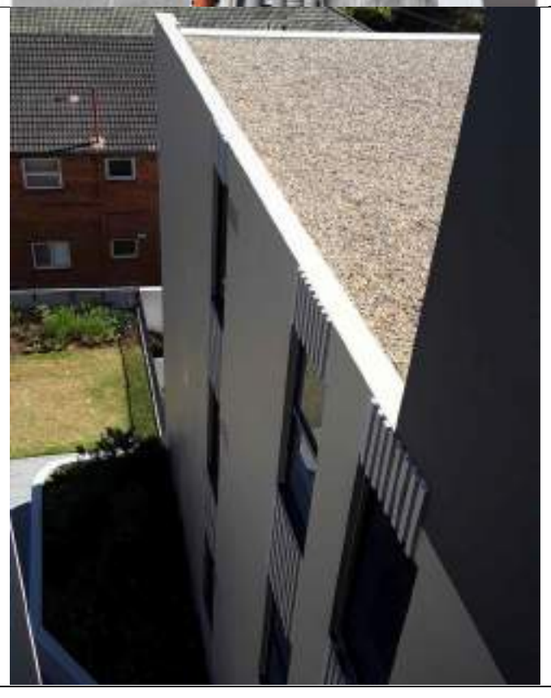
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 132	Basement 2	North of building - adjacent to ramp	Not fit for purpose. Incomplete work.		Retained formwork in moist environment. Will attract termites.
C 133	Basement 2	North of building - adjacent to ramp	Works have not been completed with due care and skill.		Concrete beam filled with the debris.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 134	Basement 2	North of building - adjacent to ramp	Works have not been completed with due care and skill.		Concreting has not been completed with due care and skill.
C 135	Basement 2	North of building - adjacent to ramp	See section 8.19 of this report. Structural engineer to inspect.		Corrosion to concrete soffit adjacent to ramp.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 136	Basement 2	North of building - adjacent to ramp	See section 8.19 of this report. Structural engineer to inspect.		Exposed reinforcement to soffit of concrete ramp.
C 137	Basement 2	North of building - adjacent to ramp	Works have not been completed with due care and skill.		Incomplete concreting.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 138	Basement 2	North of building - adjacent to ramp	Works have not been completed with due care and skill.		Missing concrete.
C 139	Basement 2	Lift area	Incomplete work.		Open conduits.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 140	Main switch room	Slab penetration	Fire engineer to inspect.		Open fire rated riser.
C 141	Main switch room	Slab penetration	Fire engineer to inspect.		Fire safety consultant to inspect fire rating.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 142	Main switch room	Slab penetration	Fire engineer to inspect.		No visible fire damper.
C 143	Building L - Roof	Facade	Note.		Roof covered with pebbles.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 144	Building L - Roof	Anchor bolt	Note.		Roof anchor points.
C 145	Building L - Roof	Anchor bolt	See section 8.11 of this report. Not fit for purpose.		Waterproofing is failing. Adhesion failure between layers.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 146	Building L - Roof	Anchor bolt	See section 8.11 of this report. Not fit for purpose.		Waterproofing is failing. Adhesion failure between layers.

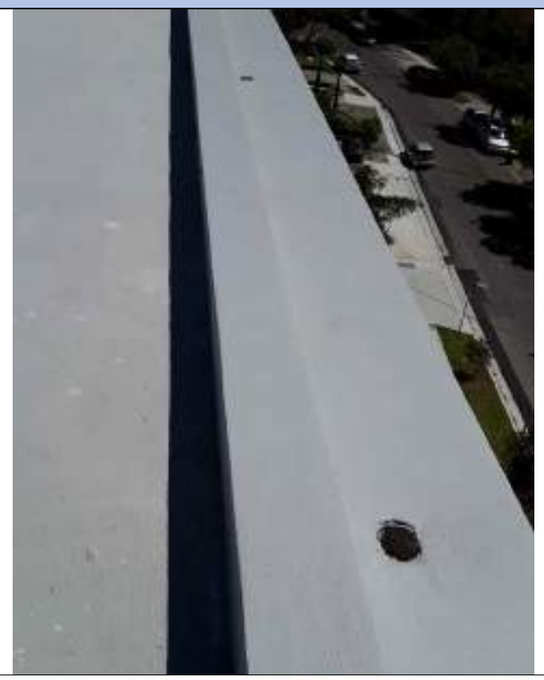
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 147	Building L - Roof	Cladding	See section 8.8 of this report.		Waterproofing does not extend into overflow.
C 148	Building L - Roof	Floor waste	See section 8.11 of this report.		A. Waterproofing not turned down into floor waste. B. Puddle flange has not been provided. C. Drain cover not installed as required by AS4654.2.

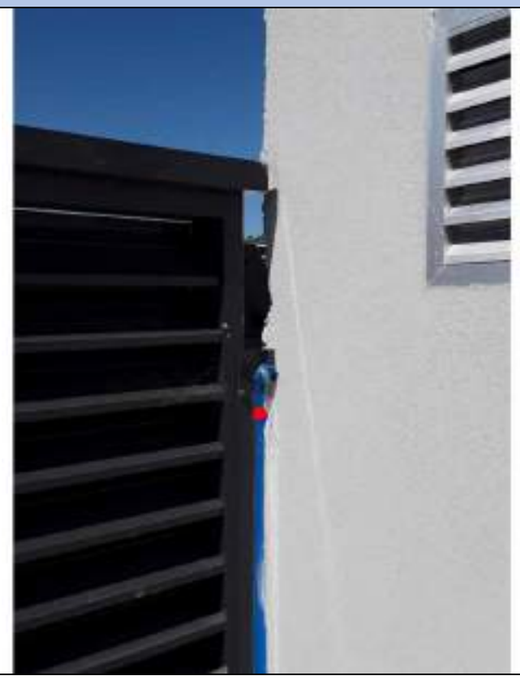
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 149	Building L - Roof	Floor waste	See section 8.11 of this report.		A. Waterproofing not turned down into floor waste. B. Puddle flange has not been provided. C. Drain cover not installed as required by AS4654.2.
C 150	Building L - Roof	Floor waste	See section 8.11 of this report.		A. Waterproofing not turned down into floor waste. B. Puddle flange has not been provided. C. Drain cover not installed as required by AS4654.2.

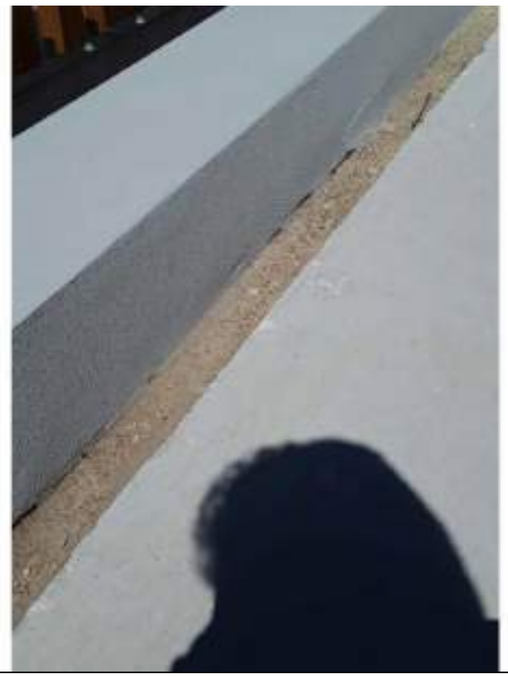
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 151	Building L - Roof	Concrete hob	Works have not been completed with due care and skill.		Rough substrate not compliant with AS4654.2 and manufacturers requirements.
C 152	Building L - Roof	Concrete hob	See section 8.11 of this report.		A. Waterproofing not turned down into floor waste. B. Puddle flange has not been provided. C. Drain cover not installed as required by AS4654.2.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 153	Building L - Roof	Floor waste	See section 8.11 of this report.		A. Waterproofing not turned down into floor waste. B. Puddle flange has not been provided. C. Drain cover not installed as required by AS4654.2.
C 154	Building L - Roof	Floor waste	See section 8.11 of this report.		A. Waterproofing not turned down into floor waste. B. Puddle flange has not been provided. C. Drain cover not installed as required by AS4654.2.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 155	Building L - Roof	Floor waste	See section 8.11 of this report.		A. Puddle flange has not been provided. B. Drain cover not installed as required by AS4654.2.
C 156	Building L - Roof	Overflow	See section 8.8 of this report.		Waterproofing does not turn into overflow.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 157	Building L - Roof	Overflow	See section 8.11 of this report.		A. Waterproofing not turned down into floor waste. B. Puddle flange has not been provided. C. Drain cover not installed as required by AS4654.2.
C 158	Building L - Roof	Floor waste	See section 8.11 of this report.		Removal of plug will result in tearing of the waterproof membrane.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 159	Building U - Roof	Adjecent to louvres	Works have not been completed with due care and skill.		Render protection tape left in position. Incomplete work.
C 160	Building U - Roof	Base of wall	Works have not been completed with due care and skill.		Voids in render finish.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 161	Building U - Roof	Overflow	See section 8.8 of this report.		Waterproofing has not been turned into overflow.
C 162	Building U - Roof	Concrete hob	Works have not been completed with due care and skill.		Concrete hob formwork timber has created set down to perimeter of roof which will allow water to pond in recess.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 163	Building U - Roof	Concrete slab waterproofing	Works have not been completed with due care and skill.		Rough substrate not suitable for waterproofing. AS4654.2 requires a smooth substrate.
C 164	Building U - Roof	Concrete hob	Works have not been completed with due care and skill.		Rough substrate not suitable for waterproofing. AS4654.2 requires a smooth substrate.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 165	Building U - Roof	Concrete slab waterproofing	Structural engineer to inspect. See section 8.19 of this report.		Corrosion.
C 166	Building U - Roof	Pipe pentration	See section 8.11 of this report.		Waterproofing has not been turned up services pipe as required by AS4654.2.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 167	Building U - Roof	Side open drain	Works have not been completed with due care and skill.		Concrete hob formwork timber has created set down to perimeter of roof which will allow water to pond in recess.
C 168	Building U - Roof	Open drain	See section 8.11 of this report.		Open drains throughout rooftop. Waterproofing not turned down into floor waste.

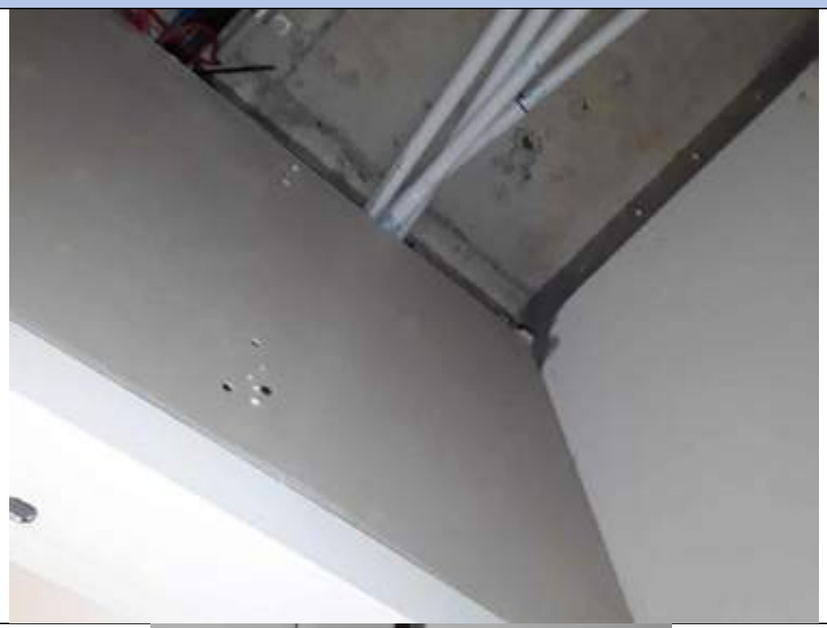
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 169	Building U - Roof	Overflow	Works have not been completed with due care and skill.		Overflows were filled with render debris.
C 170	Building U - Roof	Open drain	Works have not been completed with due care and skill.		Paper bags stuffed into drain outlets throughout eave area.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 171	Building U - Roof	Open drain	Works have not been completed with due care and skill.		Paper bags stuffed into drain outlets throughout eave area.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 172	Building U - Roof	Open drain	Works have not been completed with due care and skill.		Paper bags stuffed into drain outlets throughout eave area.
C 173	Building U - Roof	Floor waste (spot 1)	See section 8.11 of this report.		A. Waterproofing not turned down into floor waste. B. Puddle flange has not been provided. C. Drain cover not installed as required by AS4654.2.

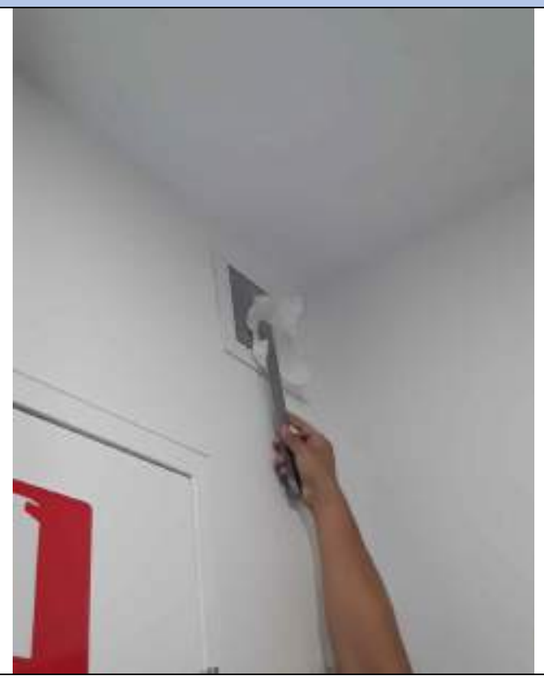
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 174	Building U - Roof	Floor waste (spot 2)	See section 8.11 of this report.		A. Waterproofing not turned down into floor waste. B. Puddle flange has not been provided. C. Drain cover not installed as required by AS4654.2.
C 175	Building L - Roof	Entry access ladder	Not fit for purpose.		Domestic access ladder not to AS1657.

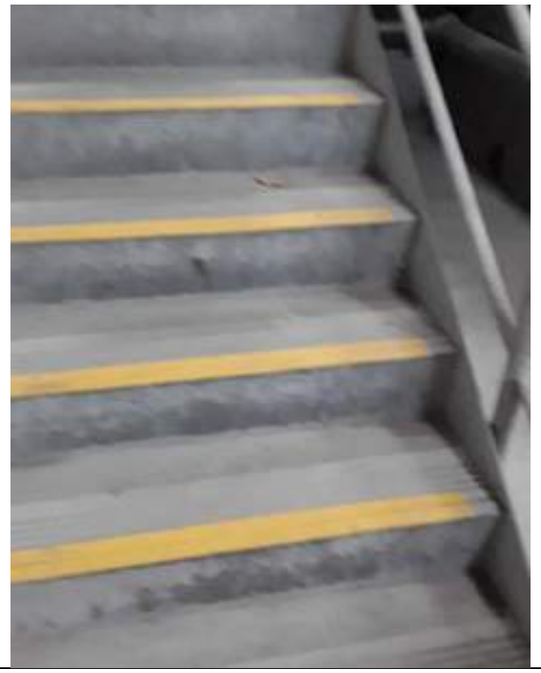
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 176	Level G lobby	Service riser	Fire engineer to inspect.		Possible non-compliant fire rating.
C 177	Level G lobby	Service riser	Fire engineer to inspect.		Possible non-compliant fire rating.

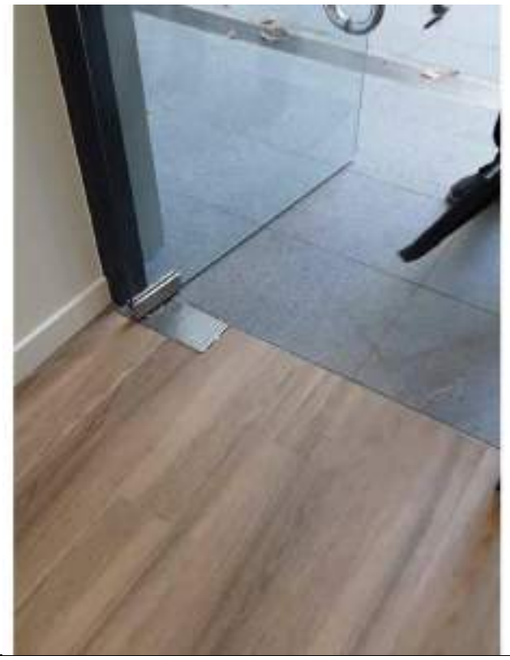
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 178	Level G lobby	Service riser	Fire engineer to inspect.		Possible non-compliant fire rating.
C 179	Level G lobby	Service riser	Works have not been completed with due care and skill.		Missing screws to door hinge.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 180	Level G lobby	Service riser	Incomplete work.		Incomplete plasterboard.

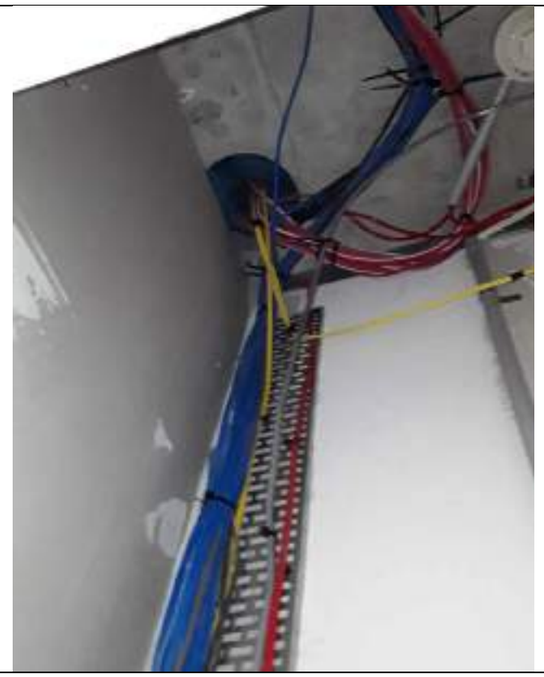
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 181	Level G lobby	Service riser	Fire engineer to inspect.		Possible non-compliant fire rating.
C 182	Level G lobby	Service riser	Fire engineer to inspect.		Possible non-compliant fire rating.

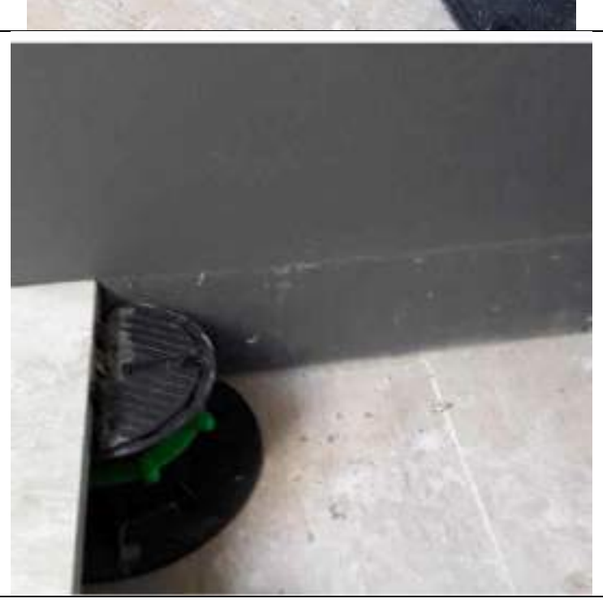
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 183	Level G lobby	Exhaust fan	Not fit for purpose.		Lobby area ventilation not operational.
C 184	Level G lobby	Service room	Incomplete work.		Missing floor finish.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 185	Fire stair south of lift	Stair case nosing	See section 8.15 of this report.		No nosing or compliant non-slip finish. Details of paint to be provided to identify if non-compliant and tested to AS4586.
C 186	Upper ground level	Entry door threshold	See section 8.3 of this report.		No compliant threshold detail.

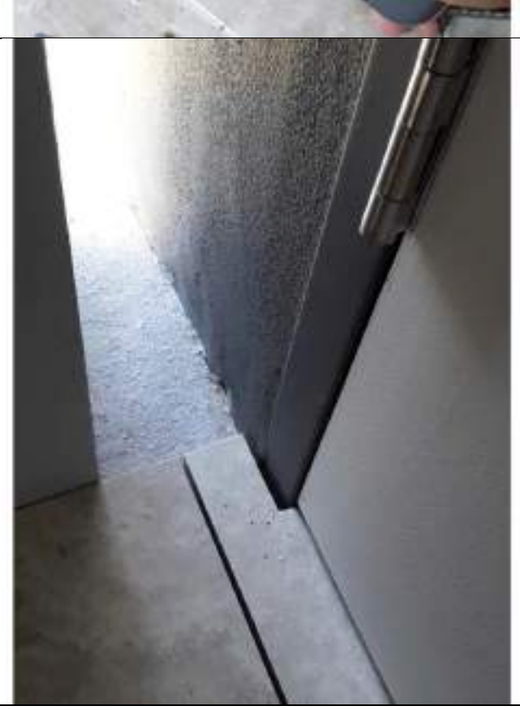
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 187	Upper ground level	Entry door threshold	See section 8.3 of this report.		No compliant threshold detail.
C 188	Upper ground level	Service riser	Fire engineer to inspect.		Missing fire rating to hydraulic pipe work.

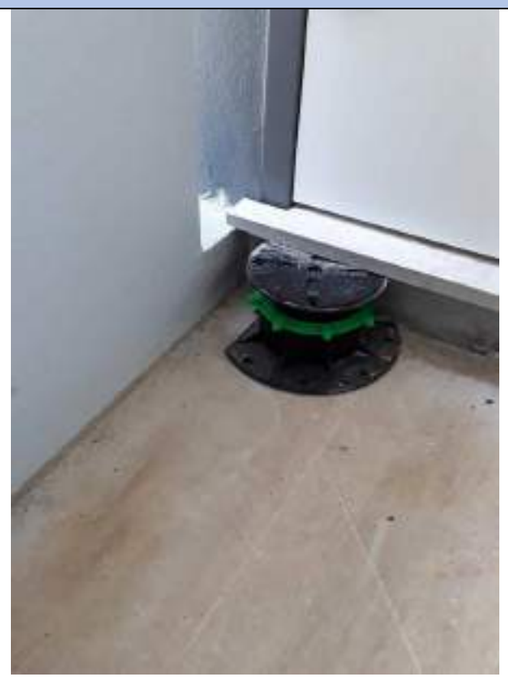
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 189	Upper ground level	Service riser	Hydraulic engineer to inspect.		No insulation to hot pipes.
C 190	Upper ground level	Service riser	Fire engineer to inspect.		Incomplete plasterboard.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 191	Upper ground level	Service riser	Fire engineer to inspect.		Services penetrations in service riser.
C 192	Upper ground level	Service riser	Fire engineer to inspect.		Services penetrations in service riser.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 193	Level U4 lobby	Balcony – door threshold	Note.		Paving pedestals installed over tiled surface.
C 194	Level U4 lobby	Balcony - handrail	See sections 8.5 and 8.26 of this report.		Crack at line of possible DPC. No visible DPC.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 195	Level U4 lobby	Balcony – door threshold	See section 8.3 of this report.		No waterstop. Aluminium in contact with cement which will cause deterioration.
C 196	Level U4 lobby	Balcony – door threshold	See section 8.3 of this report.		No waterstop. Aluminium in contact with cement which will cause deterioration.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 197	Level U4 lobby	Balcony - handrail	See sections 8.5 and 8.26 of this report.		Elevated moisture to base of rendered wall.
C 198	Level U4 lobby	Balcony – overflow	See section 8.8 of this report.		No visible waterproof membrane to overflow.

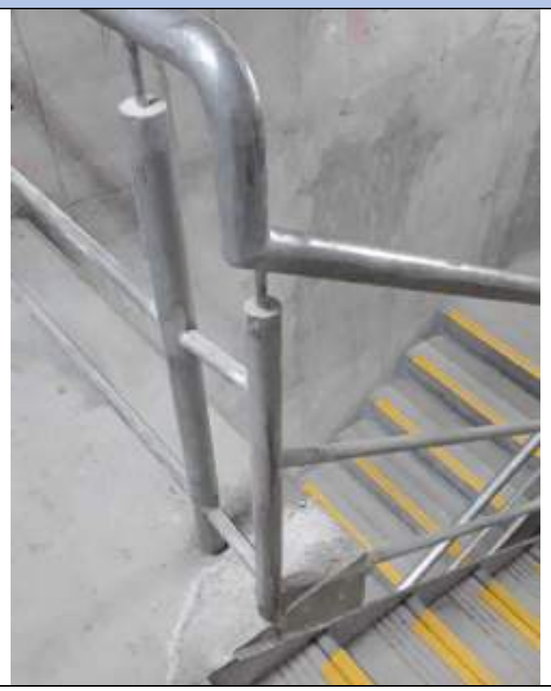
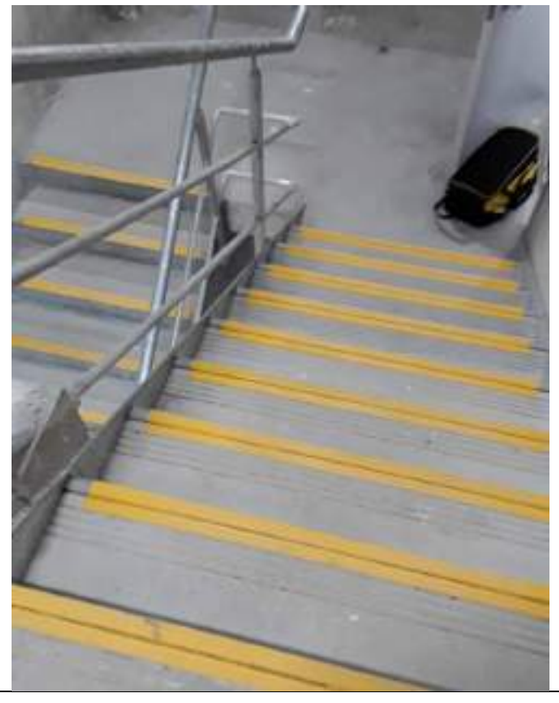
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 199	Level U4 lobby	Balcony – floor tiles	See section 8.4 of this report.		Fall of 3mm per m in tiled substrate.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 200	Level U4 lobby	Balcony – door threshold	Note.		Visible upturned waterproof membrane.
C 201	Level U4 lobby	Balcony – Floor tiles	Not fit for purpose.		Adhesion failure of waterproof membrane.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 202	Level U4 lobby	Balcony – door threshold	Note.		Membrane thickness of 1164 microns to upturn.
C 203	Level U4 lobby	Service risers	Fire engineer to inspect.		Fire pillow installation.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 204	Level U4 lobby	Service risers	Fire engineer to inspect.		Fire pillow and wrapping.
C 205	Level U4 lobby	Service risers	Fire engineer to inspect.		Black sealant used as fire rating.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 206	Level U4 lobby	Service risers	Fire engineer to inspect.		Poly pipes to be inspected by fire engineer.
C 207	Level U4 lobby	Service risers	Fire engineer to inspect.		Moisture resistant plaster used to services riser. Fire consultant to inspect and advise.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 208	Fire stair level U4	Handrail	See sections 8.15 and 8.18 of this report.		A. Handrail not continuous. B. No nosing or compliant non-slip finish. C. Details of paint to be provided to identify if non-compliant and tested to AS4586.
C 209	Fire stair level U4	Stair nosing	See section 8.15 of this report.		A. No nosing or compliant non-slip finish. B. Details of paint to be provided to identify if non-compliant and tested to AS4586.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 210	Level 4 Lobby	Service risers	Fire engineer to inspect.		Services over wall.
C 211	Level 4 Lobby	Service risers	Fire engineer to inspect.		Black sealant in Hebel wall.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 212	Level 4 Lobby - balcony	Door threshold	See section 8.3 of this report.		A. No waterstop. B. Sliding door installed in contact with cement.
C 213	Level 4 Lobby - balcony	Cladding	See sections 8.5 and 8.26 of this report.		Elevated moisture to wall below tile pedestals.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 214	Hydrant	South east of site	Incomplete work.		Hydraulic engineer to inspect hydrant assembly.
C 215	Hydrant	South east of site	Incompete work.		Wiring not connected.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 216	Hydrant	South east of site	Incomplete work.		Cardboard box covering elements.
C 217	Hydrant	South east of site	Not fit for purpose.		Temporary signage.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 218	Drive way	Storm water pit	See section 8.4 of this report.	 	Water ponding in base of driveway pit.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 219	Drive way	Concrete slab	See section 8.20 and 8.21 of this report.	 	Cold joint or crack to concrete driveway.

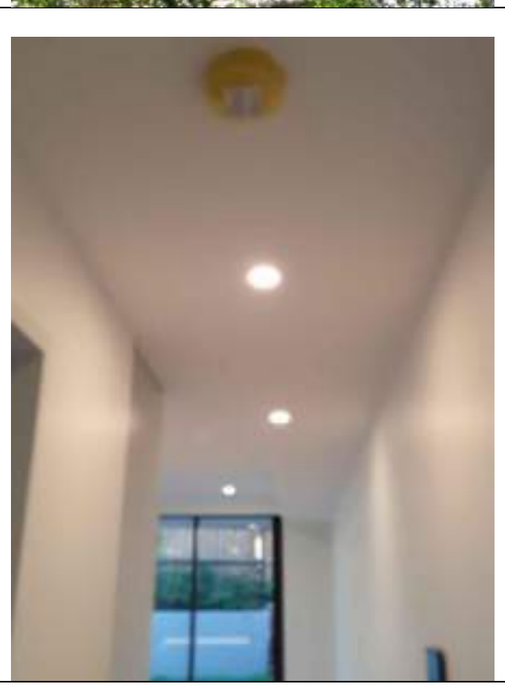
DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
					
C 220	Drive way	Pipe	Not fit for purpose.		Diesel pump vent pipe when running will blow smoke into habitable spaces (see balconies in back ground).

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 221	Drive way	Strip drain	Hydraulic engineer to confirm capacity.		Hydraulic engineer to confirm capacity of strip drain.
C 222	Drive way	Planter box	Works have not been completed with due care and skill.		Incomplete pipe in block wall.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
C 223	Drive way	Concrete soffit	Works have not been completed with due care and skill.		Timber saw dust to concrete soffit.

DEFECT NO.	LOCATION	AREA	BREACH	PHOTOGRAPH	DEFECT DESCRIPTION
Unit G05					
U G05.1	Lounge room	Ceiling space (access panel)	See section 8.2 of this report.	 	Fire rating between SOC not installed to slab soffit. Fire engineer to inspect and advise.

U G05.2	Lounge room	Sliding door threshold	See section 8.3 of this report.	 	A. No waterstop. B. Sliding door installed in contact with cement.

U G05.3	Lounge room	Window glazing	Works not completed with due care and skill.		Visible sealant smear to glass.
U G05.4	Lounge room	Gyprock ceiling	Incomplete work.		Smoke detector cover retained.

U G05.5	Kitchen	Benchtop	Electrical engineer to advise.		GPO installed in close proximity to water supply.
U G05.6	Kitchen	Intercom	Incomplete work.		Intercom has not been commissioned as incorrect date and time.

U G05.7	Laundry	Mechanical exhaust	See section 8.25 of this report.		Exhaust not operational.
U G05.8	Bathroom	Floor waste	See section 8.12 of this report. Works not completed with due care and skill. Inadequate substrate preparation.		Adhesion failure of waterproofing in drain.

					
U G05.9	Bathroom	Shower screen	Incomplete work.		Cement on shower screen.
U G05.10	Bathroom	Vinity (Sink)	Water entering concealed space is a breach of FP1.7 of the BCA.		Void to under mount sink.

U G05.11	Bathroom	Mechanical exhaust	See section 8.25 of this report.		Mechanical exhaust not operational.
U G05.12	Bathroom	Vanity	Incomplete work. Edging missing.		Exposed mellamine edges.

U G05.13	Ensuite	Vanity (Sink)	Water entering concealed space is a breach of FP1.7 of the BCA.		Void to under mount sink.
U G05.14	Ensuite	Mechanical exhaust	See section 8.25 of this report.		Mechanical exhaust not operational.

U G05.15	Main bedroom	Sliding door threshold	See section 8.3 of this report.		A. No waterstop. B. Sliding door installed in contact with cement.
U G05.16	Main bedroom	Carpet smooth edge rear to balcony	See section 8.7 of this report.		Elevated moisture to base of wall.

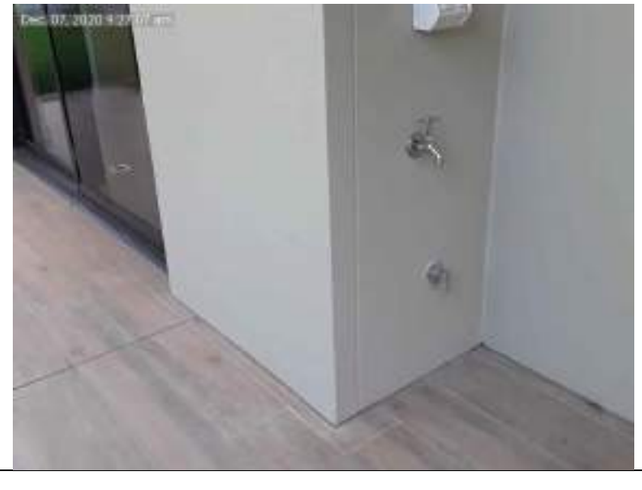
U G05.17	Main bedroom	Top of door	See section 8.16 of this report.		Top of door has not been sealed.
U G05.18	Bedroom 2	Top of door	See section 8.16 of this report.		Top of door has not been sealed.

U G05.19	Bedroom 2	Wall (South east corner)	See section 8.7 of this report.		Moisture entering habitable spaces.
U G05.20	Bedroom 2	Wall (South east corner)	See section 8.7 of this report.	 	Moisture entering habitable spaces.

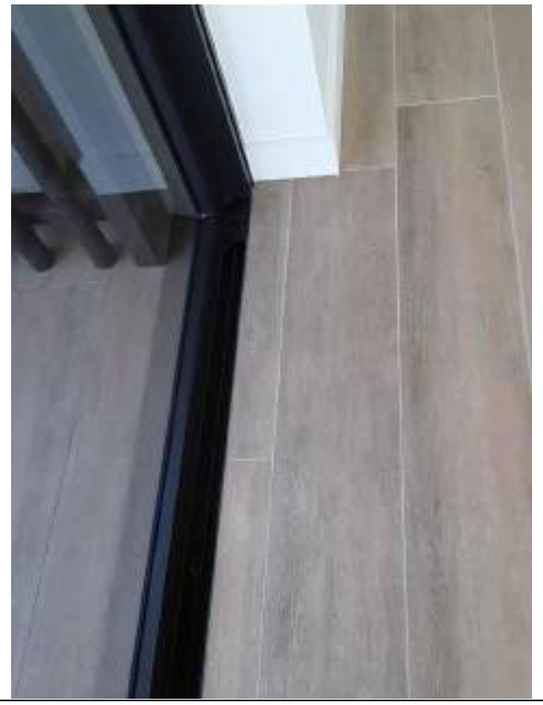
					  	

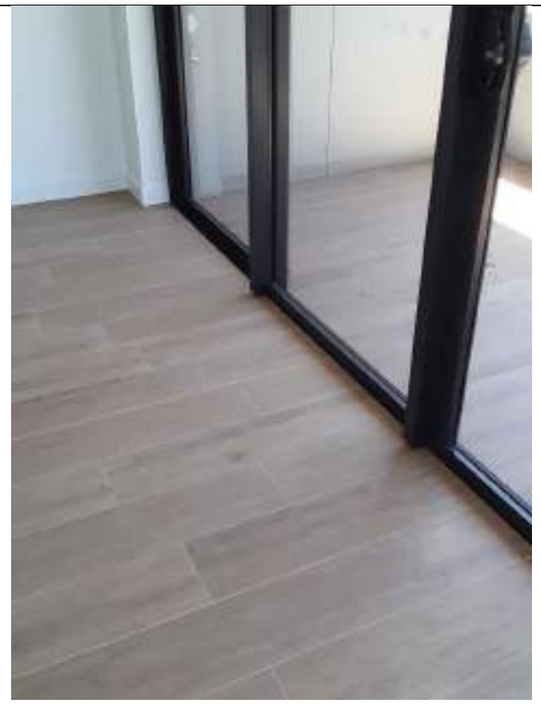
U G05.21	Bedroom 2 wall outside	Ground floor south entry	See section 8.7 of this report.		External face of unit G05 wall. 500mm higher and elevated moisture to base of wall.
U G05.22	Balcony - South (Mitchell Avenue)	Hebel cladding	See section 8.6 of this report.		Hebel wall missing pressure equalisation slots.

U G05.23	Balcony - South (Mitchell Avenue)	Stairs	See section 8.15 of this report.		No nosing or non-slip finish to stairs.
U G05.24	Balcony - South (Mitchell Avenue)	Hebel cladding (North wall)	See section 8.6 of this report.	 	Elevated moisture to base of Hebel wall.

U G05.25	Balcony - South (Mitchell Avenue)	Hebel cladding (West wall)	Note.		Base reading to Hebel of 14.2%.
U G05.26	Balcony - South (Mitchell Avenue)	Floor waste	No waterproofing as required by AS4654.2.		No visible waterproofing has been turned down the floor waste.
U G05.27	Balcony - South (Mitchell Avenue)	Hebel cladding	See section 8.6 of this report.		No drainage provision to facade.

U G05.28	Balcony - South (Mitchell Avenue)	Air conditioning condenser	See section 8.10 of this report.		AC condenser is not fixed in position.
Unit 304					
U 304.1	Lounge	Sliding door threshold	See section 8.3 of this report.		A. No waterstop. B. Sliding door installed in contact with cement.

U 304.2	Lounge	Sliding door threshold	See section 8.3 of this report.		A. No waterstop. B. Sliding door installed in contact with cement.
U 304.3	Kitchen	Ceiling space	See section 8.2 of this report.		Fire rated wall. Sheet joint not set. Fire consultant to inspect and advise.

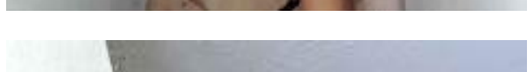
					
U 304.4	Laundry	Mechanical exhaust	Note.		Exhaust operational.

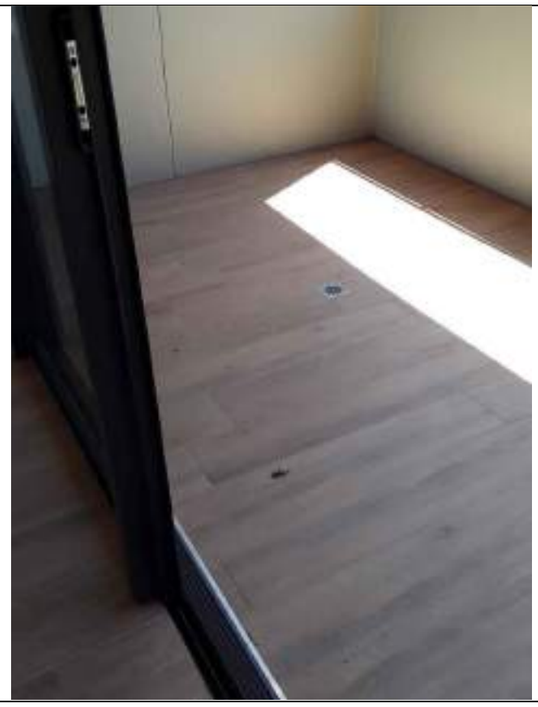
U 304.5	Bathroom	Mechanical exhaust	Note.		Exhaust operational.
U 304.6	Bathroom	Top of door	See section 8.16 of this report.		Top of door has not been sealed.

U 304.7	Ensuite	Floor tile	See section 8.4 of this report.		Water is ponding
U 304.8	Ensuite	Mechanical exhaust	See section 8.25 of this report.		Mechanical exhaust not operational.

U 304.9	Ensuite	Shower screen	Safety issue. Install door stop.		Door can hit tiles. Possible damage to glass door.
U 304.10	Ensuite	Top of door	See section 8.16 of this report.		Top of door has not been sealed.

U 304.11	Bedroom 2	Door threshold	See section 8.3 of this report.	 		A. No waterstop. B. Sliding door installed in contact with cement.

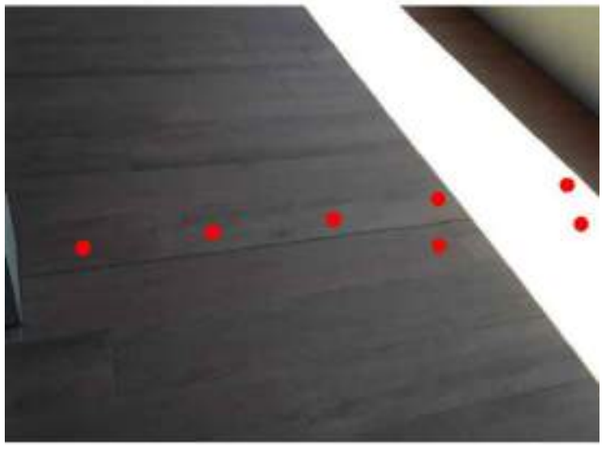
U 304.12	Bedroom 2	FC Cladding	See sections 8.5 of this report.	  		Cladding does not have a drainage provision.

U 304.13	Balcony	Floor tiles	See section 8.3 of this report.		A. No waterstop. B. Sliding door installed in contact with cement.
U 304.14	Balcony	Sliding door threshold	See section 8.3 of this report.		A. No waterstop. B. Sliding door installed in contact with cement.

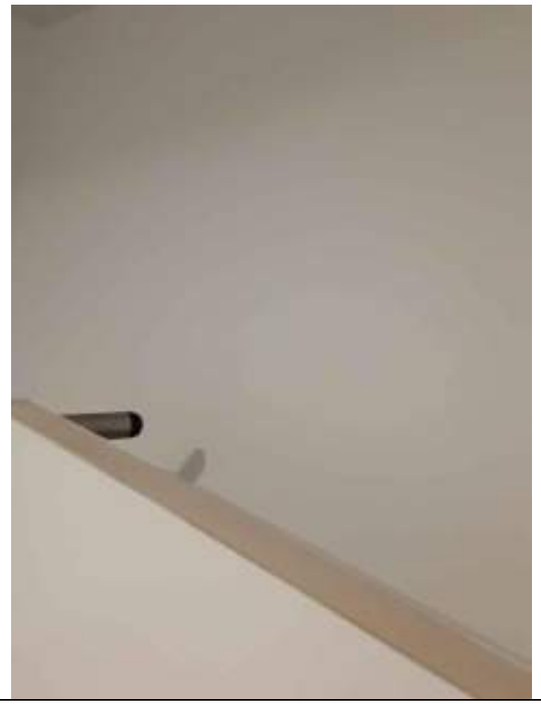
U 304.15	Balcony	Hebel cladding	See section 8.3 of this report.		Tile installed vertically proud of subsill. Subsill will restrict water from weepholes.
U 304.16	Balcony	Floor tiles	See section 8.8 of this report.		No overflow provision.
U 304.17	Balcony	Air conditioning condenser	See section 8.10 of this report.		AC condenser has not been mechanically fixed into position.

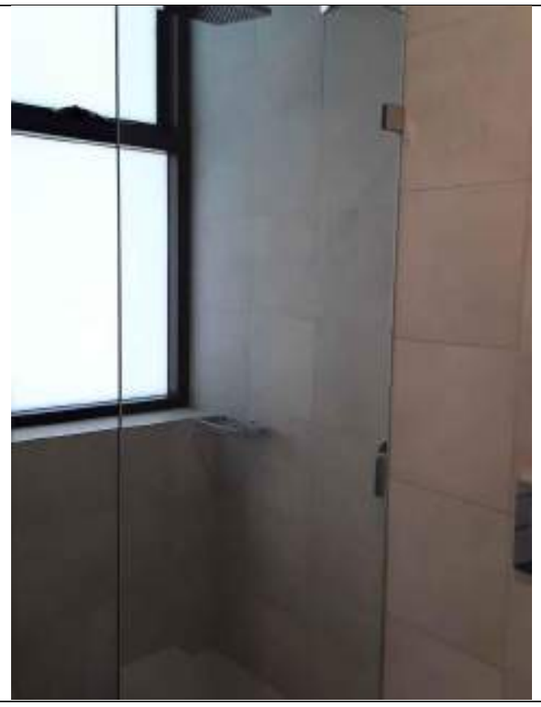
U 304.18	Balcony	Floor waste	See section 8.6 of this report.		No cavity drain has been provided for Hebel cavity drain.
U 304.19	Balcony	Control joints	See section 8.13 of this report.		Expansion joint does not continue through the tile screed.

U 304.20	Balcony	Base of Hebel facade	See section 8.5 and 8.6 of this report.	 	Elevated moisture to base of wall.

U 304.21	Balcony	Ceiling	See section 8.24 of this report.		Timber look eaves to be tested for combustability.
U 304.22	Balcony	Floor tiles	See section 8.4 of this report.		Insufficient falls of 3mm per metre. AS4654.2 requires 10mm per metre.
U 304.23	Balcony	Floor tiles	See section 8.13 of this report.		Drummy tiles.

Unit 306					
U 306.1	Lounge	Sliding door threshold	See section 8.3 of this report.		A. No waterstop. B. Sliding door installed in contact with cement.
U 306.2	Laundry	Clothes dryer	Works have not been completed with due care and skill.		Instead of shortening the length of the cable, a twist tie has been used to retain the extra length of cable.

U 306.3	Laundry	Mechanical exhaust	See section 8.25 of this report.		Mechanical exhaust not operational.
U 306.4	Laundry	Top of door	See section 8.16 of this report.		Top of door has not been sealed.

U 306.5	Bathroom	Shower screen	Breach of AS/NZS 2208. Works are not fit for purpose.		Glass not identifiable as safety glass.
U 306.6	Bathroom	Top of door	See section 8.16 of this report.		Top of door has not been sealed.

U 306.7	Bathroom	Mechanical exhaust	See section 8.25 of this report.		Mechanical exhaust is not operational.
U 306.8	Ensuite	Door striker	Works have not been completed with due care and skill.		Poor painting works below door striker.

U 306.9	Ensuite	Top of door	See section 8.16 of this report.		Top of door has not been sealed.
U 306.10	Ensuite	Mechanical exhaust	See section 8.25 of this report.		Mechanical exhaust is not operational.

U 306.11	Main bedroom balcony	Door threshold	See section 8.3 of this report.	 	A. No waterstop. B. Sliding door installed in contact with cement.

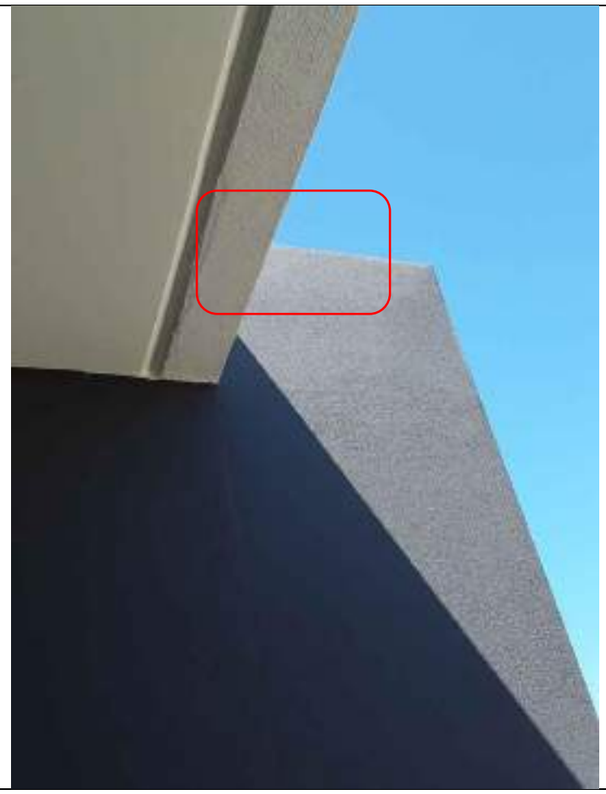
U 306.12	Main bedroom balcony	Floor tiles	See section 8.3 and 8.9 of this report.		A. No waterstop. B. Sliding door installed in contact with cement. C. Efflorescence.
U 306.13	Main bedroom balcony	Sliding door threshold	See section 8.3 of this report.		Tile installed proud of subsill not behind as detailed by AS4654.2.

						Crack sealant will allow moisture from weepholes to enter behind tiles.

U 306.14	Main bedroom balcony	Base of Hebel	See section 8.5 and 8.6 of this report		Elevated moisture to base of wall due to a failure to install a drainage provision.
U 306.15	Main bedroom balcony	Floor waste	See section 8.6 of this report.		No cavity drain provided for Hebel.

U 306.16	Main bedroom balcony	Floor tiles	See section 8.4 of this report.		No falls provided to external tiled balcony.
U 306.17	Main bedroom balcony	Base of Hebel cladding	See section 8.5 and 8.6 of this report.		Elevated moisture to base of wall.

					
U 306.18	Main bedroom balcony	Base of Hebel wall	Works have not been completed with due care and skill.		Paint adhesion failure.

U 306.19	Main bedroom balcony	Top of FC cladding	Works have not been completed with due care and skill or to manufacturer's specifications.		No parapet cap to exposed FC blade wall.
U 306.20	Main bedroom balcony	Overflow	See section 8.8 of this report.		The subsill is 45mm high and overflow is 58mm. Top of the tile is reliant upon sealant for the vertical termination against the subsill.

					
U 306.21	Bedroom 2	Top of door	See section 8.16 of this report.		Top of door has not been sealed.

U 306.22	Bedroom 3	Top of door	See section 8.16 of this report.		Top of door has not been sealed.
U 306.23	balcony	Sliding door threshold	See section 8.8 of this report.		Weepholes in glazing are same height as overflows.

					
U 306.24	Balcony	Sliding door threshold	Incomplete work.		Gap in tiles will allow moisture to enter rear of tiles.
U 306.25	Balcony	Floor waste	See section 8.6 of this report.		No visible cavity drain for Hebel.

10.7 Attachment G - Supporting Documents

AS 3740—2010
(Incorporating Amendment No. 1)

AS 3740—2010

Australian Standard®

Waterproofing of domestic wet areas

SECTION 3 INSTALLATION

3.1 SCOPE OF SECTION

This Section sets out details for the installation of waterproof and water-resistant materials to be used in domestic wet areas of a building.

3.2 GENERAL

Where a tile bed or screed is used, the waterproof membrane shall be installed above or below the tile bed or screed.

NOTES:

A1

1 For the purposes of this Standard, some figures given in this Section illustrate the membrane below the tile bed or screed; however, where applicable, the membrane may be installed above the tile bed or screed.

2 Guidelines for extent of waterproofing for showers and wet areas are given in Figures C1 and C2, Appendix C.

3.3 FALLS IN FLOOR FINISHES

Where required, falls in floor finishes shall allow all surface water to drain without ponding except for residual water remaining due to surface tension.

For general bathroom floor area, the minimum fall to the waste shall be 1:100.

NOTES:

1 For information on falls in the floor finishes, see Appendix B.

2 For information on the laying of tiles to enable them to drain without retaining water, see AS 3958.1.

3.4 SHOWER FLOORS

Falls in shower floors shall be sufficient to prevent—

(a) surface water from being retained on the shower floor (except for residual water remaining due to surface tension); and

(b) water from discharging outside the shower area.

For shower areas with a vertical separation between the shower area and the wet area, such as a shower screen, hob, step-down or water stop, the fall to the waste shall be 1:100.

As a minimum for other shower areas, the fall shall be a minimum of 1:80.

3.5 CURING OF MATERIALS

Materials shall be cured adequately for their intended use.

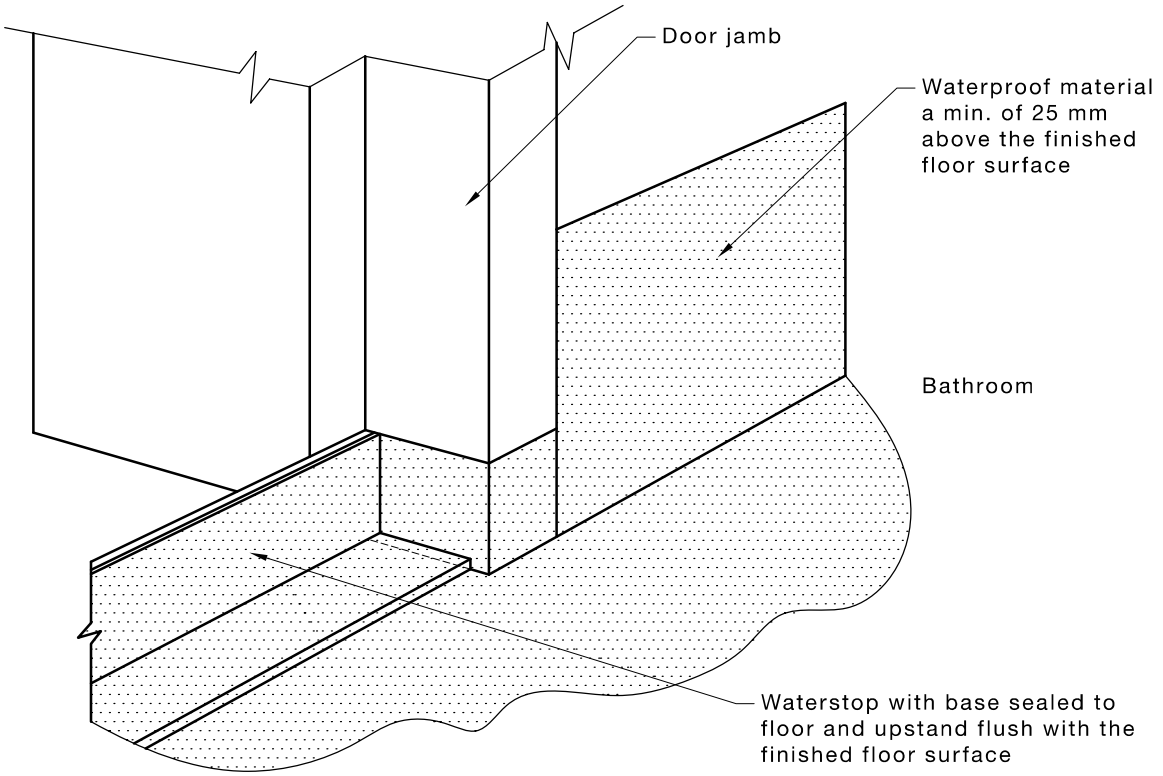
NOTE: The membrane should be protected from physical and/or chemical damage until covered by the finished surfaces.

3.6 PREFORMED SHOWER BASES

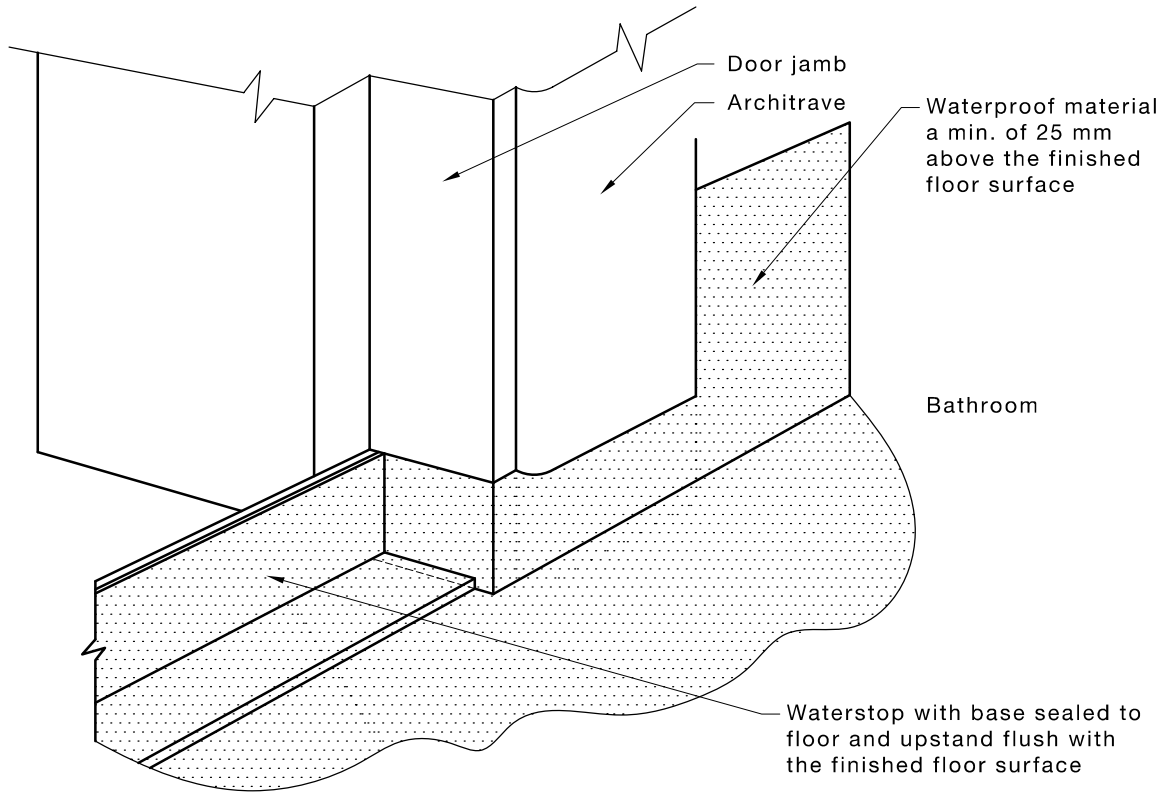
Preformed shower bases shall be supported to prevent distortion or cracking, and shall be sufficiently recessed into the wall to allow the water-resistant surface materials to pass down inside the perimeter rebate over the upstands of the shower base.

NOTE: For typical base junction, see Figures 3.1(a) and 3.1(b).

When installing preformed shower bases, the integrity of the structure shall be maintained.

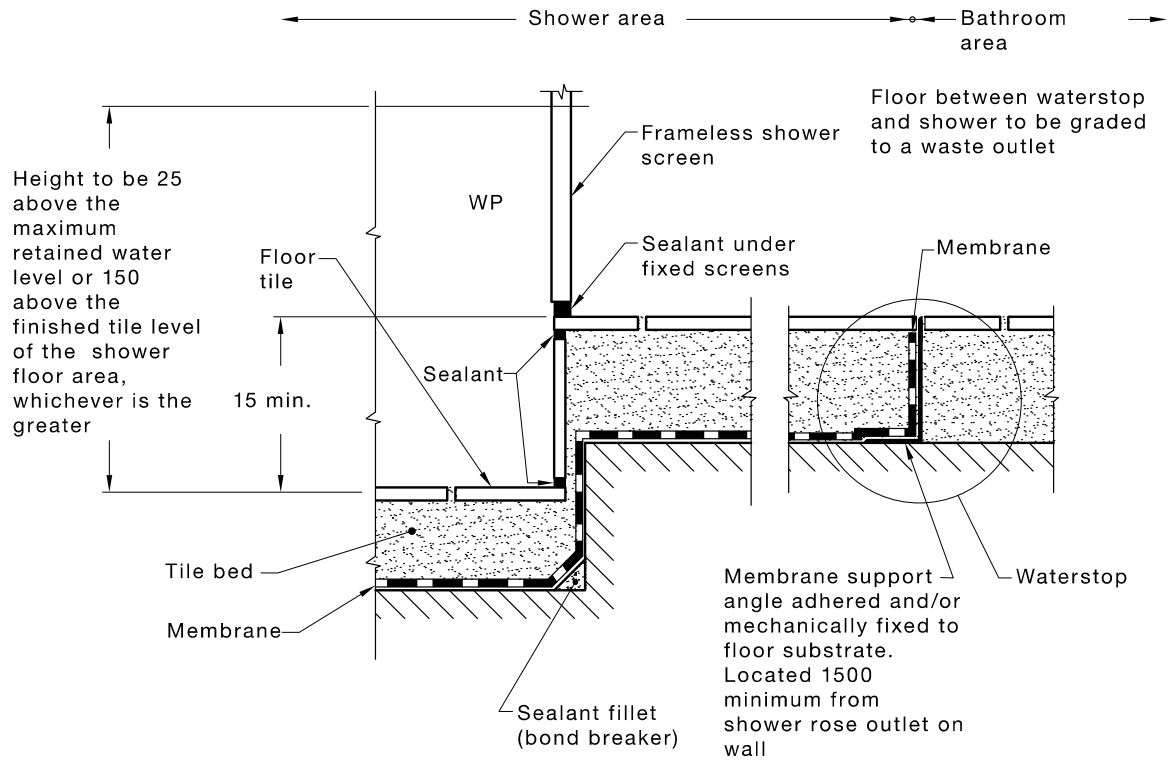


(a) Prior to installation of architrave

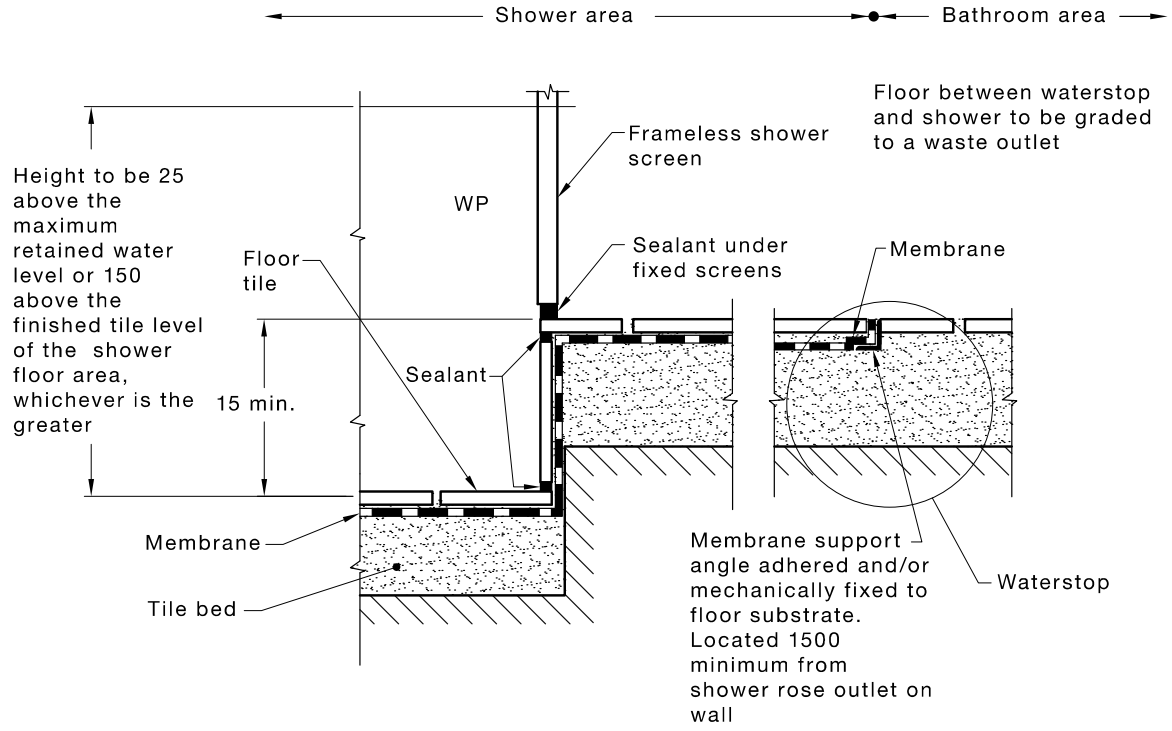


(b) After installation of architrave

FIGURE 3.3 TYPICAL BATHROOM DOOR DETAIL FOR WHOLE BATHROOM WATERPROOFING



(c) Unenclosed shower—Membrane below tile bed



(d) Unenclosed shower—Membrane above tile bed

DIMENSIONS IN MILLIMETRES

FIGURE 3.5 (in part) TYPICAL STEPPED DOWN SHOWER CONSTRUCTION

AS 3958.1—2007
(Incorporating Amendment No. 1)

AS 3958.1—2007

Australian Standard®

Ceramic tiles

Part 1: Guide to the installation of ceramic tiles

(g) Fully bed all trim units, moulded or shaped pieces, nosings, covers and other accessories with an appropriate bedding material. Do not bed these accessories in more than 3 mm of neat cement.

(h) Fix accessories in tile work level, plumb and true to the designated projection. Where specified, install accessories at the appropriate locations and heights.

Finished tile work should be clean and free of pitted, chipped, cracked or scratched tiles resulting from the fixing operation.

NOTE: A limited number of tiles with defects such as those noted above may be found in batches of tiles that comply with AS 4662. Such tiles are normally used where cut tiles are required.

5.4.4 Lighting

Where possible, the lighting at the time of applying the tiles should not be appreciably different from the ultimate permanent lighting, as minute differences of plane between adjacent tiles can be highlighted significantly by some forms of oblique lighting.

5.4.5 Movement joints

5.4.5.1 *General*

Movement joints are discontinuities in the tiled surface, filled with permanently deformable material, which are intended to perform the following functions:

(a) Separation of the tiled surface from fixed elements such as columns and walls.

(b) Subdivision of large areas of tiled surface into smaller sections to compensate for induced strain from various causes.

(c) To interrupt the tiled surface to match discontinuities in the substrate such as construction joints and movement joints.

It is essential that movement joints be carried through the tile and the bedding.

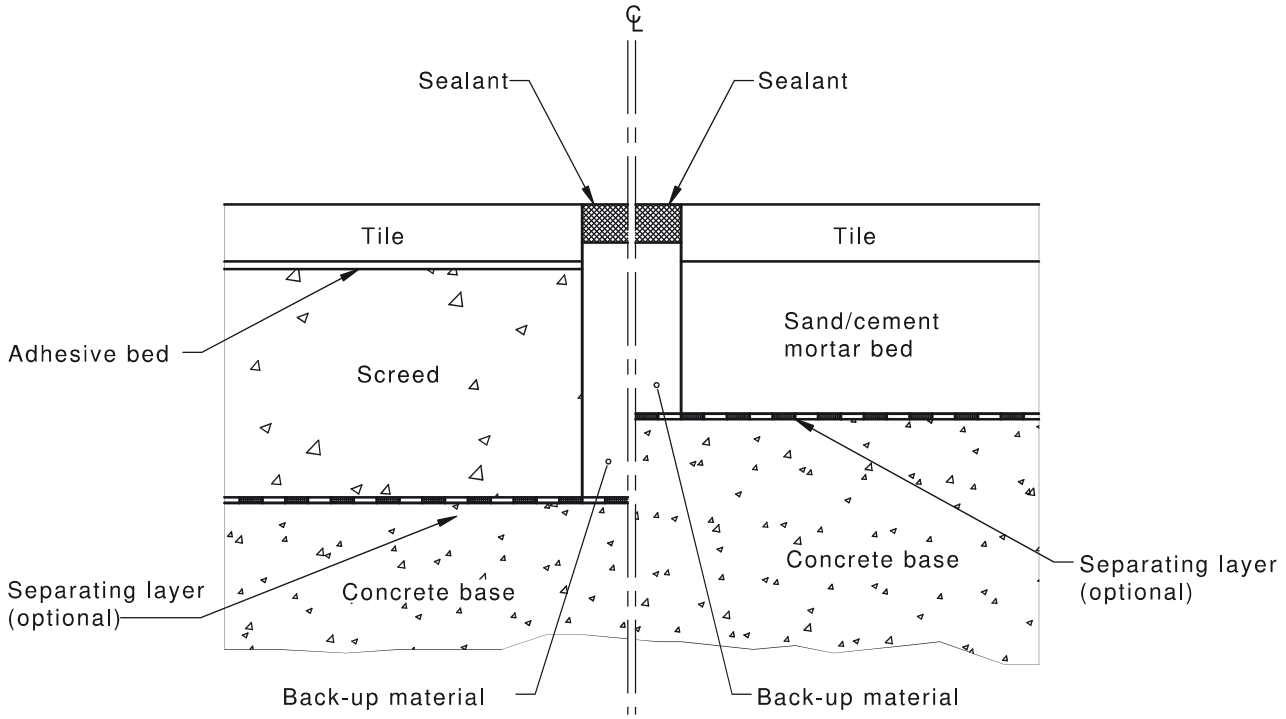
Movement joints should be filled with permanently deformable materials, such as polystyrene, and sealed with materials that are equally deformable as well as resistant to chemical and physical attack.

All joints should be rectangular in section with firm, straight, smooth edges, free from cavities and irregularities. When forming the joints it is useful to insert a fillet to ensure smooth clean faces to the joints, and remove it only when the cladding is sufficiently firm. Care should be taken to avoid grout or other materials becoming trapped in the joint cavity, as these will prevent the proper application of the back-up and sealant.

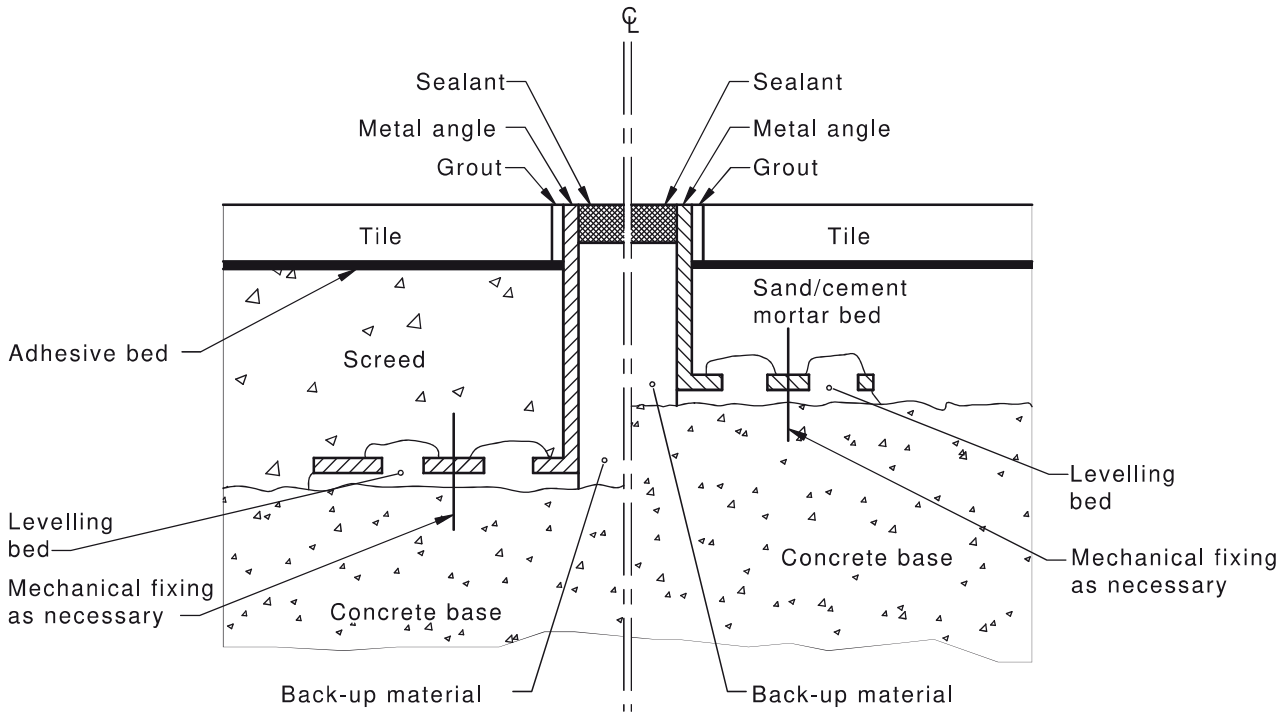
Unless otherwise specified, movement joints should be constructed as shown in Figures 5.1 and 5.2 and as detailed in Clauses 5.4.5.2 and 5.4.5.3. Where it is essential that the watertightness of the movement joint and tiling system be maintained, specific guidance should be sought with regards to width to depth ratio, priming and special nature of sealant materials.

5.4.5.2 *Floors*

In floors that have to withstand hard-rimmed wheel traffic or the dragging of heavy loads, the position of movement joints should, where possible, be planned so that they do not occur in the traffic area. Where this is not practicable the joints should be of types having their edges reinforced with metal or rigid plastics sections (see Figure 5.1 (a), (b), (d) and (e)).



(c) Flexible joint in bed, with or without separating layer



(d) Joint aligned to structural movement joint

FIGURE 5.1 (in part) TYPICAL MOVEMENT JOINT SYSTEMS FOR FLOORS

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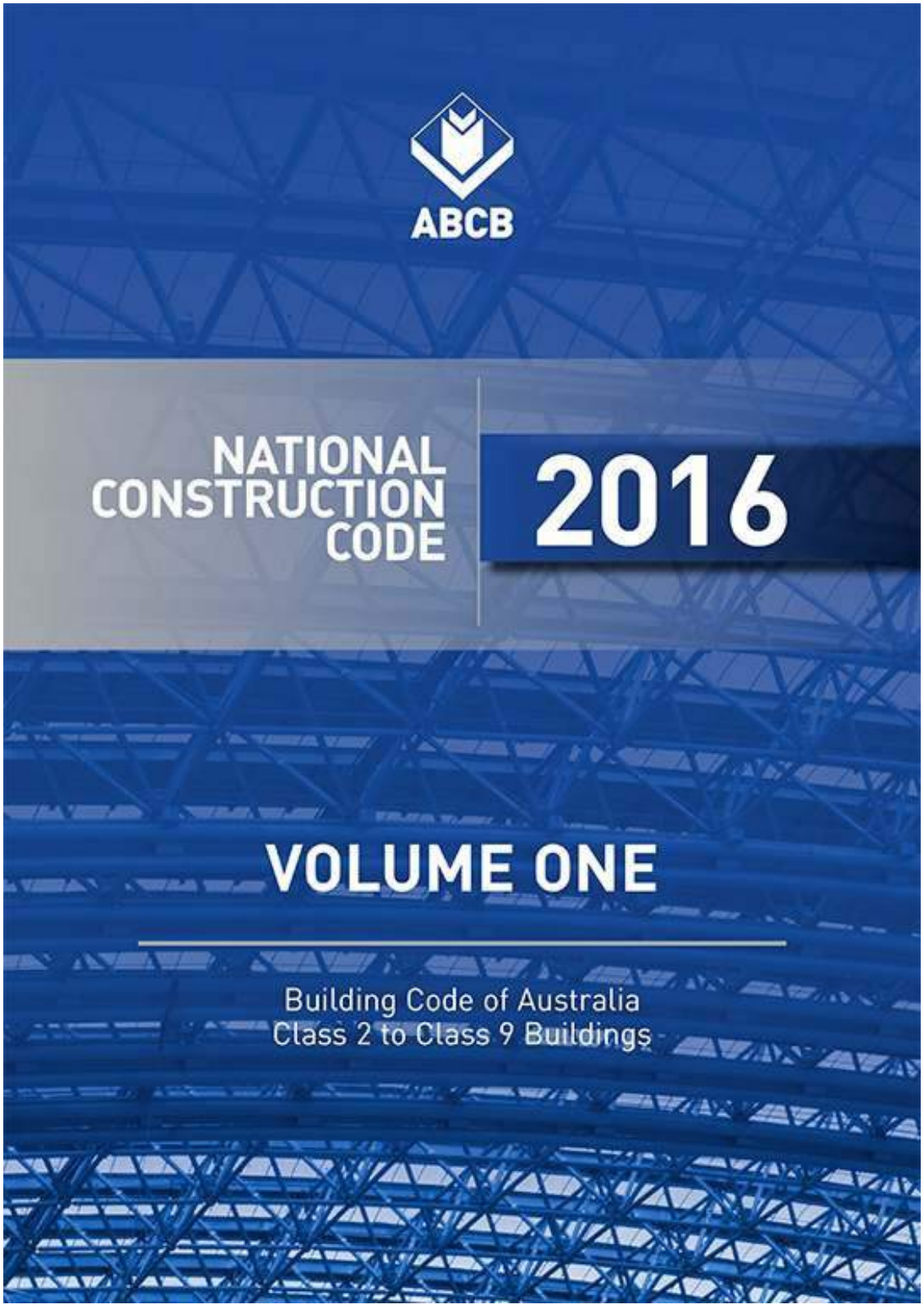

ABCB
NATIONAL CONSTRUCTION CODE
2016
VOLUME ONE
Building Code of Australia
Class 2 to Class 9 Buildings

PART A0 APPLICATION

A0.1 Compliance with the NCC

Compliance with the NCC is achieved by satisfying the *Performance Requirements*.

A0.2 Meeting the Performance Requirements

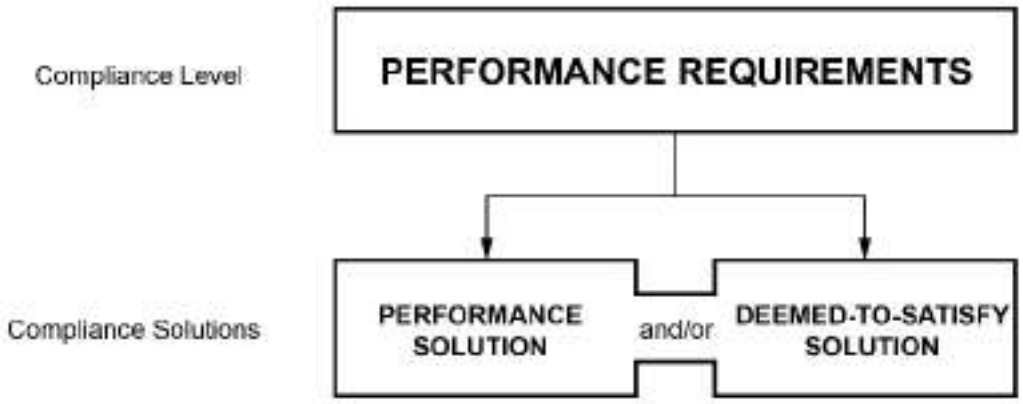
The *Performance Requirements* can only be satisfied by a—

(a) *Performance Solution*; or

(b) *Deemed-to-Satisfy Solution*; or

(c) combination of **(a)** and **(b)**.

Figure A0.2
NCC COMPLIANCE STRUCTURE



Note:

1. The term *Performance Solution* was formerly known as *Alternative Solution*.
2. The terms *Performance Solution* and *Deemed-to-Satisfy Solution* were formerly used under the term *Building Solution.*

A0.3 Performance Solutions

(a) A *Performance Solution* must—

(i) comply with the *Performance Requirements*; or

(ii) be at least *equivalent* to the *Deemed-to-Satisfy Provisions*,

and be assessed according to one or more of the *Assessment Methods*.

(b) A *Performance Solution* will only comply with the NCC when the *Assessment Methods* used satisfactorily demonstrate compliance with the *Performance Requirements*.

A0.4 Deemed-to-Satisfy Solutions

(a) A *Deemed-to-Satisfy Solution* which complies with the *Deemed-to-Satisfy Provisions* is deemed to comply with the *Performance Requirements*.

(b) A *Deemed-to-Satisfy Solution* may be assessed according to one or more of the *Assessment Methods*, as appropriate.

A0.5 Assessment Methods

The following *Assessment Methods*, or any combination of them, can be used to determine that a *Performance Solution* or a *Deemed-to-Satisfy Solution* complies with the *Performance Requirements*, as appropriate:

(a) Evidence to support that the use of a material or product, form of construction or design meets a *Performance Requirement* or a *Deemed-to-Satisfy Provision* as described in **A2.2**.

(b) *Verification Methods* such as—

  (i) the *Verification Methods* in the NCC; or

  (ii) such other *Verification Methods* as the *appropriate authority* accepts for determining compliance with the *Performance Requirements*.

(c) *Expert Judgement*.

(d) Comparison with the *Deemed-to-Satisfy Provisions*.

A0.6 Defined terms

Words with specific meanings are printed in *italics* and are defined in **A1.1**.

A0.7 Relevant Performance Requirements

In order to comply with the provisions of **A1.5** (to comply with Section A and the NCC *Performance Requirements*) the following method must be used to determine the *Performance Requirement* or *Performance Requirements* relevant to the *Performance Solution*:

(a) Where a *Performance Requirement* is satisfied entirely by a *Performance Solution*:

  (i) Identify the relevant *Performance Requirement* from the Section or Part to which the *Performance Solution* applies.

  (ii) Identify *Performance Requirements* from other Sections or Parts that are relevant to any aspects of the *Performance Solution* proposed or that are affected by the application of the *Performance Solution*.

(b) Where a *Performance Requirement* is satisfied by a *Performance Solution* in combination with a *Deemed-to-Satisfy Solution*:

  (i) Identify the relevant *Deemed-to-Satisfy Provisions* of each Section or Part that is to be the subject of the *Performance Solution*.

  (ii) Identify the *Performance Requirements* from the same Sections or Parts that are relevant to the identified *Deemed-to-Satisfy Provisions*.

  (iii) Identify *Performance Requirements* from other Sections or Parts that are relevant to any aspects of the *Performance Solution* proposed or that are affected by the application of the *Deemed-to-Satisfy Provisions* that are the subject of the *Performance Solution*.

(v) the number of *storeys* in the building; and

(vi) its proximity to *other property*; and

(vii) any active *fire safety systems* installed in the building; and

(viii) the size of any *fire compartment*; and

(ix) *fire brigade* intervention; and

(x) other elements they support; and

(xi) the *evacuation time*.

CP3

A building must be protected from the spread of fire and smoke to allow sufficient time for the orderly evacuation of the building in an emergency.

Application:

CP3 only applies to—

(a) a *patient care area* of a Class 9a *health-care building*; and

(b) a Class 9c building.

CP4

To maintain tenable conditions during occupant evacuation, a material and an assembly must, to the degree necessary, resist the spread of fire and limit the generation of smoke and heat, and any toxic gases likely to be produced, appropriate to—

(a) the *evacuation time*; and

(b) the number, mobility and other characteristics of occupants; and

(c) the function or use of the building; and

(d) any active *fire safety systems* installed in the building.

Application:

CP4 applies to linings, materials and assemblies in a Class 2 to 9 building.

CP5

A concrete *external wall* that could collapse as a complete panel (e.g. tilt-up and pre-cast concrete) must be designed so that in the event of fire within the building the likelihood of outward collapse is avoided.

Limitation:

CP5 does not apply to a building having more than two *storeys* above ground level.

CP6

A building must have elements, which will, to the degree necessary, avoid the spread of fire from service equipment having—

Deemed-to-Satisfy Provisions

(i) the path of travel from the room concerned to that *exit* is through another area which is a corridor, hallway, lobby, ramp or other circulation space; and

(ii) the room is smoke-separated from the circulation space by construction having an FRL of not less than 60/60/60 with every doorway in that construction protected by a tight fitting, *self-closing*, solid-core door not less than 35 mm thick; and

(iii) the maximum distance of travel does not exceed 40 m within the room and 20 m from the doorway to the room through the circulation space to the *exit*.

D1.5 Distance between alternative exits

Exits that are *required* as alternative means of egress must be—

(a) distributed as uniformly as practicable within or around the *storey* served and in positions where unobstructed access to at least 2 *exits* is readily available from all points on the floor including lift lobby areas; and

(b) not less than 9 m apart; and

(c) not more than—

(i) in a Class 2 or 3 building — 45 m apart; or

(ii) in a Class 9a *health-care building*, if such *required exit* serves a *patient care area* — 45 m apart; or

(iii) in all other cases — 60 m apart; and

(d) located so that alternative paths of travel do not converge such that they become less than 6 m apart.

D1.6 Dimensions of exits and paths of travel to exits

In a *required exit* or path of travel to an *exit*—

(a) the unobstructed height throughout must be not less than 2 m, except the unobstructed height of any doorway may be reduced to not less than 1980 mm; and

(b) the unobstructed width of each *exit* or path of travel to an *exit*, except for doorways, must be not less than—

(i) 1 m; or

(ii) 1.8 m in a passageway, corridor or ramp normally used for the transportation of patients in beds within a *treatment area* or *ward area*; and

(iii) in a *public corridor* in a Class 9c building, notwithstanding **(c)** and **(d)**—

(A) 1.5 m; and

(B) 1.8 m for the full width of the doorway, providing access into a *sole-occupancy unit* or communal bathroom; and

(c) if the *storey*, *mezzanine* or *open spectator stand* accommodates more than 100 persons but not more than 200 persons, the aggregate unobstructed width, except for doorways, must be not less than—

(i) 1 m plus 250 mm for each 25 persons (or part) in excess of 100; or

(ii) 1.8 m in a passageway, corridor or ramp normally used for the transportation of patients in beds within a *treatment area* or *ward area*; and

Deemed-to-Satisfy Provisions

(ii) any access doorway to the enclosed space is fitted with a *self-closing* –/60/30 fire door.

D2.9 Width of required stairways and ramps

A *required* stairway or ramp that exceeds 2 m in width is counted as having a width of only 2 m unless it is divided by a handrail or barrier continuous between landings and each division has a width of not more than 2 m.

D2.10 Pedestrian ramps

(a) A *fire-isolated ramp* may be substituted for a *fire-isolated stairway* if the construction enclosing the *ramp* and the width and ceiling height comply with the requirements for a *fire-isolated stairway*.

(b) A ramp serving as a *required exit* must—

(i) where the ramp is also serving as an *accessible* ramp under **Part D3**, be in accordance with AS 1428.1; or

(ii) in any other case, have a gradient not steeper than 1:8.

(c) The floor surface of a ramp must have a slip-resistance classification not less than that listed in **Table D2.14** when tested in accordance with AS 4586.

D2.11 Fire-isolated passageways

(a) The enclosing construction of a *fire-isolated passageway* must have an FRL when tested for a fire outside the passageway in another part of the building of—

(i) if the passageway discharges from a *fire-isolated stairway* or *ramp* — not less than that *required* for the stairway or ramp *shaft*; or

(ii) in any other case — not less than 60/60/60.

(b) Notwithstanding **(a)(ii)**, the top construction of a *fire-isolated passageway* need not have an FRL if the walls of the *fire-isolated passageway* extend to the underside of—

(i) a *non-combustible* roof covering; or

(ii) a ceiling having a *resistance to the incipient spread of fire* of not less than 60 minutes separating the roof space or ceiling space in all areas surrounding the passageway within the *fire compartment*.

D2.12 Roof as open space

If an *exit* discharges to a roof of a building, the roof must—

(a) have an FRL of not less than 120/120/120; and

(b) not have any rooflights or other openings within 3 m of the path of travel of persons using the *exit* to reach a road or *open space*.

D2.13 Goings and risers

(a) A stairway must have—

(i) not more than 18 and not less than 2 risers in each *flight*; and

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(ii) going (G), riser (R) and quantity (2R + G) in accordance with **Table D2.13**, except as permitted by **(b)** and **(c)**; and

(iii) constant goings and risers throughout each *flight*, except as permitted by **(b)** and **(c)**, and the dimensions of goings (G) and risers (R) in accordance with **(a)(ii)** are considered constant if the variation between—

(A) adjacent risers, or between adjacent goings, is no greater than 5 mm; and

(B) the largest and smallest riser within a *flight*, or the largest and smallest going within a *flight*, does not exceed 10 mm; and

(iv) risers which do not have any openings that would allow a 125 mm sphere to pass through between the treads; and

(v) treads which have—

(A) a surface with a slip-resistance classification not less than that listed in **Table D2.14** when tested in accordance with AS 4586; or

(B) a nosing strip with a slip-resistance classification not less than that listed in **Table D2.14** when tested in accordance with AS 4586; and

(vi) treads of solid construction (not mesh or other perforated material) if the stairway is more than 10 m high or connects more than 3 *storeys*; and

(vii) in a Class 9b building, not more than 36 risers in consecutive *flights* without a change in direction of at least 30°; and

(viii) in the case of a *required* stairway, no winders in lieu of a landing.

NSW D2.13(a)(ix),(x),(xi)

(b) In the case of a non-*required* stairway—

(i) the stairway must have—

(A) not more than 3 winders in lieu of a quarter landing; and

(B) not more than 6 winders in lieu of a half landing; and

(ii) the going of all straight treads must be constant throughout the same *flight* and the dimensions of goings (G) is considered constant if the variation between—

(A) adjacent goings, is no greater than 5 mm; and

(B) the largest and smallest going within a *flight*, does not exceed 10 mm; and

(iii) the going of all winders in lieu of a quarter or half landing may vary from the going of the straight treads within the same *flight* provided that the going of all such winders is constant.

(c) Where a stairway discharges to a sloping public walkway or public road—

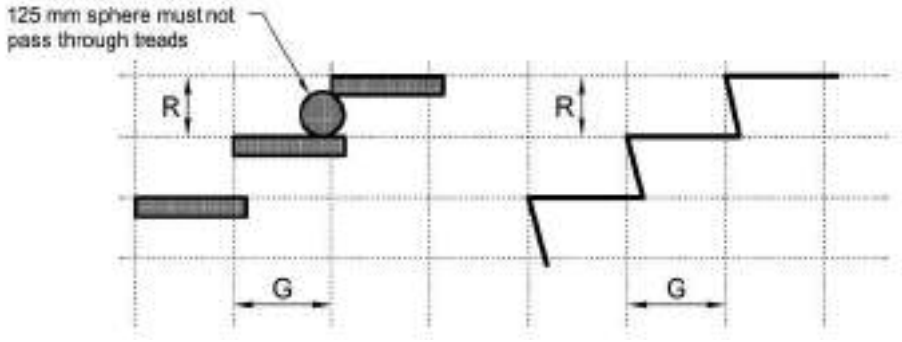
(i) the riser (R) may be reduced to account for the slope of the walkway or road; and

(ii) the quantity (2R+G) may vary at that location.

Deemed-to-Satisfy Provisions

Table D2.13 RISER AND GOING DIMENSIONS (mm)

	Riser (R)		Going (G) [2]		Quantity (2R+G)	
	Max	**Min**	**Max**	**Min**	**Max**	**Min**
Public stairways	190	115	355	250	700	550
Private stairways[1]	190	115	355	240	700	550



Notes:

1. Private stairways are—
   (a) stairways in a *sole-occupancy unit* in a Class 2 building or Class 4 part of a building; and
   (b) in any building, stairways which are not part of a *required exit* and to which the public do not normally have access.
2. The going in tapered treads (except winders in lieu of a quarter or half landing) in a curved or spiral stairway is measured—
   (a) 270 mm in from the outer side of the unobstructed width of the stairway if the stairway is less than 1 m wide (applicable to a non-*required* stairway only); and
   (b) 270 mm from each side of the unobstructed width of the stairway if the stairway is 1 m wide or more.

D2.14 Landings

In a stairway—

(a) landings having a maximum gradient of 1:50 may be used in any building to limit the number of risers in each *flight* and each landing must—
   (i) be not less than 750 mm long, and where this involves a change in direction, the length is measured 500 mm from the inside edge of the landing; and
   (ii) have—
      (A) a surface with a slip-resistance classification not less than that listed in **Table D2.14** when tested in accordance with AS 4586; or
      (B) a strip at the edge of the landing with a slip-resistance classification not less than that listed in **Table D2.14** when tested in accordance with AS 4586, where the edge leads to a *flight* below; and

(ii) if natural light of a standard equivalent to that *required* by **F4.2** is not available, and the periods of occupation or use of the room or space will create undue hazard to occupants seeking egress in an emergency, in—

(A) Class 4 parts of a building — to *sanitary compartments*, bathrooms, shower rooms, airlocks and laundries; and

(B) Class 2 buildings — to *sanitary compartments*, bathrooms, shower rooms, airlocks, laundries, common stairways and other spaces used in common by the occupants of the building; and

(C) Class 3, 5, 6, 7, 8 and 9 buildings — to all rooms that are frequently occupied, all spaces *required* to be *accessible*, all corridors, lobbies, internal stairways, other circulation spaces and paths of egress.

(b) The artificial lighting system must comply with AS/NZS 1680.0.

(c) The system may provide a lesser level of illumination to the following spaces during times when the level of lighting would be inappropriate for the use:

(i) A theatre, cinema or the like, when performances are in progress, with the exception of aisle lighting *required* by **Part H1**.

(ii) A museum, gallery or the like, where sensitive displays require low lighting levels.

(iii) A discotheque, nightclub or the like, where to create an ambience and character for the space, low lighting levels are used.

F4.5 Ventilation of rooms

A *habitable room*, office, shop, factory, workroom, *sanitary compartment*, bathroom, shower room, laundry and any other room occupied by a person for any purpose must have—

(a) natural ventilation complying with **F4.6**; or

NSW F4.5(b)

(b) a mechanical ventilation or air-conditioning system complying with AS 1668.2 and AS/NZS 3666.1.

F4.6 Natural ventilation

(a) Natural ventilation provided in accordance with **F4.5(a)** must consist of openings, *windows*, doors or other devices which can be opened—

(i) with a ventilating area not less than 5% of the *floor area* of the room *required* to be ventilated; and

(ii) open to—

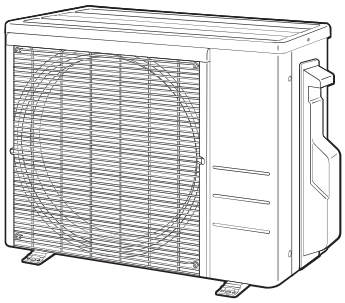
(A) a suitably sized court, or space open to the sky; or

(B) an open verandah, carport, or the like; or

(C) an adjoining room in accordance with **F4.7**.

(b) The requirements of **(a)(i)** do not apply to a Class 8 *electricity network substation*.

DAIKIN



DAIKIN ROOM AIR CONDITIONER

INSTALLATION MANUAL

R410A Split Series

INVERTER

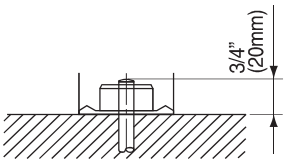
Installation manual
Manuel d'installation
Manual de instalación

MODELS

RX09NMVJU	**RK09NMVJU**	**RXL09QMVJU**
RX12NMVJU	**RK12NMVJU**	**RXL12QMVJU**
RX18NMVJU	**RK18NMVJU**	**RXL15QMVJU**
RX24NMVJU	**RK24NMVJU**	
RXN09NMVJU	**RKN09NMVJU**	
RXN12NMVJU	**RKN12NMVJU**	
RXN18NMVJU	**RKN18NMVJU**	
RXN24NMVJU	**RKN24NMVJU**	

Precautions on Installation

- Check the strength and level of the installation surface so that the unit does not cause any operating vibrations or noise after installation.
- Fix the unit in place securely using foundation bolts, as in the figure. (Prepare 4 sets of 5/16 inch (M8) or 3/8 inch (M10) foundation bolts, nuts and washers; all separately available.)
- It is best to screw in the foundation bolts until their ends are 3/4 inch (20mm) from the foundation surface.



Outdoor Unit Installation Diagram

		RX09/12* RK09/12* RXL09/12*	RXN09/12* RKN09/12*	RX18*, RXN18* RK18*, RKN18* RXL15*	RX24*, RXN24* RK24*, RKN24*
	Max. allowable piping length	65-5/8ft (20m)	49-1/4ft (15m)	98-1/2ft (30m)	
**	Min. allowable piping length	10ft (3m)			
	Max. allowable piping height	49-1/4ft (15m)	39-3/8ft (12m)	65-5/8ft (20m)	
*	Additional refrigerant required for refrigerant pipe exceeding 32.8ft (10m) in length.	0.21oz/ft (20g/m)			
	Gas pipe	O.D. 3/8 inch (9.5mm)		O.D. 1/2 inch (12.7mm)	O.D. 5/8 inch (15.9mm)
	Liquid pipe	O.D. 1/4 inch (6.4mm)			

*Be sure to add the proper amount of additional refrigerant. Failure to do so may result in reduced performance.
**The suggested shortest pipe length is 10ft (3m), in order to avoid noise from the outdoor unit and vibration. (Mechanical noise and vibration may occur depending on how the unit is installed and the environment in which it is used.)

Wrap the insulation pipe with finishing tape from bottom to top.

⚠ CAUTION

Keep the piping length between 10ft (3m) and 65-5/8ft (20m) (for RX09/12, RK09/12, RXL09/12), 10ft (3m) and 49-1/4ft (15m) (for RXN09/12, RKN09/12), 10ft (3m) and 98-1/2ft (30m) (for 15/18/24 class).

Allow 11-13/16" (300mm) of work space below the ceiling surface.

	X	Y	Z
09/12 class	18-1/2 inch (470mm)	12-1/8 inch (308mm)	3-13/16 inch (97mm)
15/18/24 class	23-5/8 inch (600mm)	13-5/8 inch (346mm)	4-15/16 inch (125mm)

Stop valve cover

■ **How to remove the stop valve cover**
1) Remove the screw on the stop valve cover.
2) Slide the stop valve cover downward to remove it.

■ **How to attach the stop valve cover**
1) Insert the upper part of the stop valve cover into the outdoor unit.
2) Tighten the screw.

9-13/16" (250mm) from wall

Y (Foot bolt-hole centers)

X (Foot bolt-hole centers) Z (From unit's side)

In sites with poor drainage, use block bases for the outdoor unit.
Adjust foot height until the unit is level. Otherwise, water leakage or pooling of water may occur.

Allow space for piping and electrical servicing.

Where there is a danger of the unit falling, use foot bolts, or wires.

Appearance of outdoor units may differ from some models.

GUIDE TO STANDARDS & TOLERANCES 2007

C

APPLICATION OF THE GUIDE

The *Guide to Standards and Tolerances* is intended to inform parties to domestic building contracts and those involved in disputes arising from domestic building contracts. It should be noted that builders, subsequent owners and those purchasing from owner-builders or developers can also use this *Guide* to resolve possible disputes, irrespective of whether or not they were a party to the original building contract.

This edition of the *Guide* is valid from 1 January 2007 and is applicable to domestic building contracts entered into from that date.

D

THE MEASUREMENT OF TIME

Any time period mentioned in the *Guide* is to be taken to start at the date of completion of the building work as it is legislated in the State or Territory where the building work is located.

Generally, the date of completion is the day when the work carried out under the contract is completed in accordance with the terms of that contract, or the day the building owner is given the statutory permit or certificate that authorises the occupation of the building. A more precise definition should be given in the contract associated with the building work.

E

THE MEASUREMENT OF TOLERANCES

The tolerances in this *Guide* apply up to and including the length over which each tolerance is stated to apply. It is not intended that tolerances will be interpolated or proportioned to the actual length of building element measured. For example, where the *Guide* specifies a 4 mm maximum deviation measured over a 2 m length of wall surface, the *Guide* means that the same 4 mm deviation is to be applied over a 1 m wall surface or a 500 mm wall surface. The tolerance cannot be interpolated to mean a 2 mm deviation over a 1 m wall surface or 1 mm deviation over a 500 mm wall surface. Similarly, deviations over longer wall surfaces would be defects if the deviation exceeded 4 mm within any 2 m length of that surface.

Horizontal, vertical and diagonal surface tolerances are to be interpreted in the same way.

Horizontal surfaces

Deviations from a horizontal surface are to be measured from a datum nominated in the contract documents or inferred, if none is nominated. Where there is a nominated or inferred datum, the maximum deviation from that datum will not exceed the deviation stated in the *Guide*. Where no datum is nominated and a datum cannot be inferred, a datum level will be taken to be at the highest or lowest points in the building element, room or area being measured. Refer to diagram E (i), (ii) and (iii).

Vertical surfaces

Deviations of a vertical surface from a true vertical plane are to be measured from a plumb line through a plan position or reference point nominated in the contract documents or inferred if none is nominated. The maximum deviation of a vertical surface from that plumb line will not exceed the deviation stated in the *Guide*. Refer to diagram E (iv), (v) and (vi).

Where diagrams are provided for the clarification of details, the diagram shows only detail relevant to the issue and is not intended to be used as general details for construction.

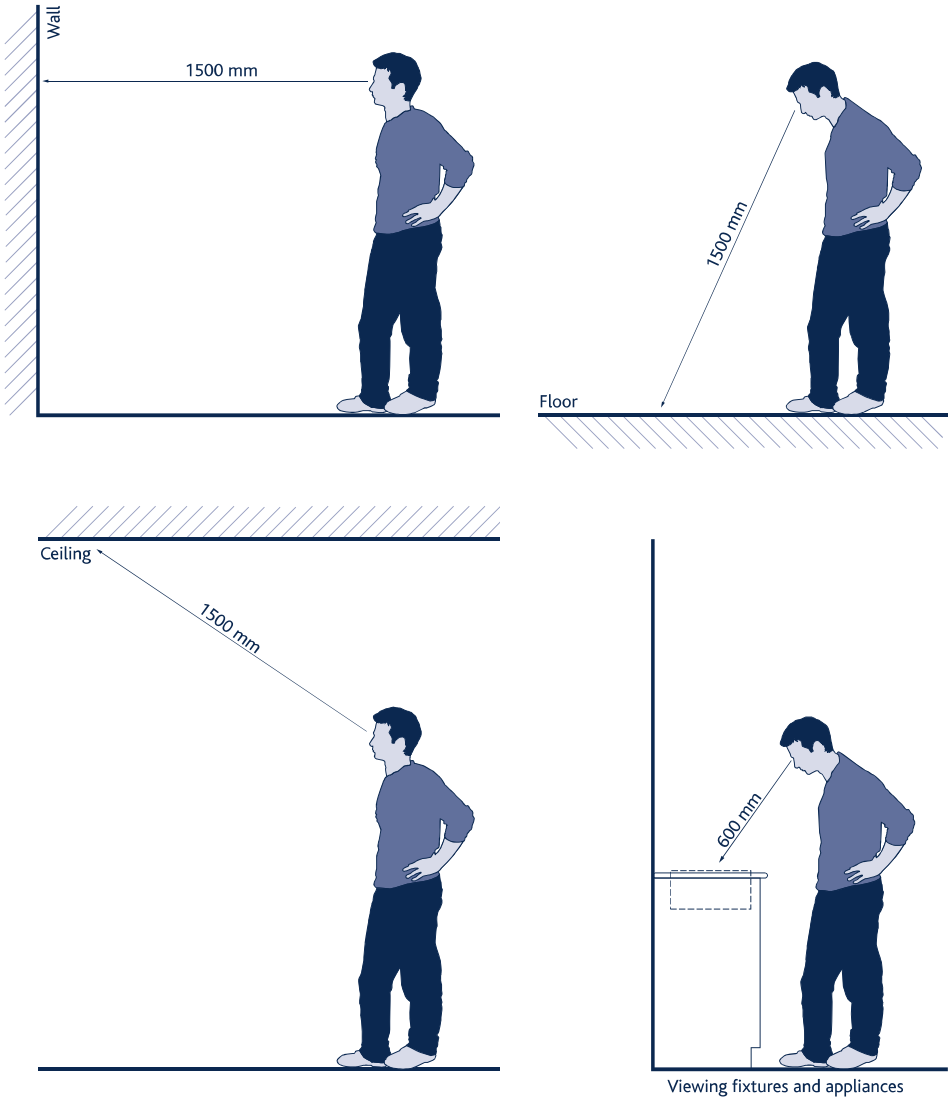
F

INSPECTING SURFACES FROM A NORMAL VIEWING POSITION

Generally, variations in the surface colour, texture and finish of walls, ceilings, floors and roofs, and variations in glass and similar transparent materials are to be viewed where possible from a normal viewing position. A normal viewing position is looking at a distance of 1.5 m or greater (600 mm for appliances and fixtures) with the surface or material being illuminated by "non-critical light". "Non-critical light"[2] means the light that strikes the surface is diffused and is not glancing or parallel to that surface.

Slight variations in the colour and finish of materials do not always constitute a defect.

DIAGRAM F
NORMAL VIEWING POSITIONS



2 Non-critical light is defined in s.6.7(4) Australian Standard AS/NZS 2589.1: Gypsum linings in residential and light commercial construction – Application and finishing, Part 1:Gypsum plasterboard.
Refer also to *CSIRO Division of Building Research Report No TR 90/1: Illumination and Decoration of Flat Surfaces.*

GUIDE TO STANDARDS & TOLERANCES 2007

RENOVATIONS, ALTERATIONS AND EXTENSIONS

The standards and tolerances in this *Guide* only apply to the work covered in the relevant domestic building contract.

It is recommended that before starting new work, the builder informs the owner of any potential circumstances and conditions of the existing building that may have a detrimental effect on the standard of the new work. For example, the builder should advise the owner if the substructure of an existing building may be deteriorated in a way which could affect the new work.

The builder and owner should agree as part of their domestic building contract, or as a written variation to that contract, on the extent of any necessary replacement works that may be required to be carried out to the existing building before commencing that work.

RECYCLED MATERIALS

The standards and tolerances in this *Guide* may not apply to construction with second-hand or recycled materials and products.

CARE OF SITE AFTER COMPLETION

It is recommended that owners consider the information on site drainage and foundation maintenance in CSIRO document BTF18, *Foundation Maintenance and Footing Performance: A Homeowner's Guide*. This and other similar documents discuss soil movement and its effects on buildings, including the effects of tree planting and site drainage. Owners can reduce the risk of cracking and damage to building structures by adopting the landscape care suggestions in that document. Refer also to clause 2.01 of this *Guide* – Foundation and site drainage – maintenance after occupation.

AUSTRALIAN STANDARDS AND OTHER REFERENCED MATERIAL

Where this *Guide* refers to Australian Standards, CSIRO Division of Building Research Reports and other similar material, the edition referred to is the one that was current at the time the *Guide* was published and applicable to the relevant building contract. In many cases this will be a document referred to in the *Building Code of Australia* that was current at that time.

SCHEDULE OF REFERENCES USED IN THIS GUIDE

2006	*Building Code of Australia*
AS 1684 – 2006	Residential timber-framed construction
AS 1860 – 1998	Installation of particleboard flooring
AS 2047 – 1999	Windows in buildings – Selection and installation
AS 2783 – 1992	Use of reinforced concrete for small swimming pools
AS 2870 – 1996	Residential slabs and footings – Construction
AS 3598.1 – 1991	Ceramic tiles – Guide to the installation of ceramic tiles
AS 3598.2 – 1992	Ceramic tiles – Guide to the selection of a ceramic tiling system
AS 3700 – 2001	Masonry structures
AS 3727 – 1993	Guide to residential pavements
AS/NZS 1839 – 1994	Swimming pools – Premoulded fibre-reinforced plastics – Installation
AS/NZS 2311 – 2000	Guide to the painting of buildings
AS/NZS 2589.1 – 1997	Gypsum linings in residential and light commercial construction – Application and finishing, Part 1:Gypsum plasterboard 1997
AS/NZS 3500.3 – 2003	Plumbing and drainage - Stormwater drainage
CSIRO document BTF18 – 2003	Foundation Maintenance and Footing Performance: A Homeowner's Guide
CSIRO TR 90/1 Report No. L8 – 1992	CSIRO Division of Building Research Report No TR 90/1: Illumination and Decoration of Flat Surfaces – 5th Edition (Revised)

SITEWORKS

1.01 Cracking in concrete paving

Cracking in concrete is common and is not always attributable to unsatisfactory workmanship. Common causes of cracking include shrinkage stress, stress due to trees, commercial or heavy vehicle traffic, soil movement due to changes in the moisture content due to garden watering or drainage problems.

Cracking not attributable to the workmanship of the builder (e.g. trees planted too close to paving, commercial or heavy duty vehicle traffic, use of sprinkler system, etc.) is not a defect.

Cracking in concrete verandahs, garages, carports, paving, patios, driveways etc. where the builder did not make allowances for shrinkage or general movement of the concrete (e.g. slip joints where required around penetrations such as verandah posts, pipes etc), shall be assessed in accordance with table 1.01 and is defective where the limits in that table are exceeded.

TABLE 1.01
CRACKS IN CONCRETE PAVING

Condition	Measure	Limit
Cracking	Crack width	1.5 mm
Subsidence	Heave or slump under 2 m long straight edge (See Note 2 below)	15 mm
Stepping	Relative surface level of adjacent paving elements within the expanse of the main pavement	5 mm

Based on: AS 3727 – Guide to residential pavements: Table:1 Performance criteria

Notes to table 1.01

1. The straight edge is centred over the defect and supported at its ends by equal height spacers. The heave or slump is then measured relative to this straight edge.
2. The stepping criteria apply only to steps within the surface of the main pavement. It shall not be applied where the main pavement abuts other structures such as edging, drainage pits, service pits, minor pavements (such as a pathway adjacent to a driveway) and pavements constructed with materials of a different type.

1.02 Finish to external concrete paving

Concrete paving finish is defective if it is not consistent in colour, texture and general appearance. Minor variations in finish may occur and may not be considered to be defective.

FOOTINGS, SLABS AND SETTING OUT

2

2.01 Foundation and site drainage – maintenance after occupation

The builder is not responsible for foundation movements caused by activities that were not documented at the time of entering into the contract or as variation to that contract, or that are undertaken by the owner. These include paving, landscaping, planting trees and drainage works after the site is handed over to the owner.

The builder is not responsible for foundation movements caused by the owner's failure to maintain drainage systems after the site is handed over to the owner.

Refer to the CSIRO publication *Guide to Home Owners on Foundation Maintenance and Footing Performance*.

2.02 Footings and slabs generally

Slabs and footings are defective if they fail because they are not designed and constructed in accordance with the *Building Code of Australia* or *AS 2870 – Residential slabs and footings – Construction*.

Slab and footing failures are defects when they are caused by foundation movements that are the result of localised drying and wetting caused by such factors as the effects of trees, excessive wetting or lack of site drainage when these factors were present during construction.

2.03 Setting out the site

A building set out is defective where the set out has failed to comply with the requirements of the approved drawings, the allotment Certificate of Title, planning or development approval, relevant planning overlays and schemes, and building regulations.

The set out for a building is defective if the building is more than L/200 from its correct position or 5 mm, whichever is the greater, where L is the correct setback or distance from the boundary to the exterior face of the building.

2.04 External building dimensions

Departures from documented external dimensions of buildings are defects if they exceed L/200 where L is the documented overall length of wall, or 5 mm, whichever is the greater.

2.05 Measuring internal building dimensions

Unless shown otherwise, dimensions shown on drawings for internal walls always refer to the structure's dimensions. Structure means masonry and timber framing and does not include finishes such as plasterboard, render and skirtings. The internal room sizes will be different when thicknesses of internal finish materials are taken into account.

Unless shown otherwise, clear room height dimensions shall be provided in accordance with the requirements of the *Building Code of Australia*.

2

FOOTINGS, SLABS AND SETTING OUT (CONT)

2.06 Building dimensions

Departures from the documented set out for service rooms such as bathrooms, toilets, laundries, kitchens etc. are defects if they exceed L/200 or 5 mm, whichever is the greater, where L is the documented dimension.

Departures from the documented set out for habitable rooms and areas, such as bedrooms, dining rooms, lounge and living rooms, family rooms, studies, halls, entries and stairways are defects if they exceed L/100 or 5 mm, whichever is the greater, where L is the documented dimension.

Departures from documented set out for external elements such as garages, car ports, verandahs, decks, patios, etc. are defects if they exceed L/100 or 5 mm, whichever is the greater, where L is the documented dimension. Masonry work shall comply with table 3.04.

The set out is defective where a specific fixture or feature is required to be accommodated, and such documented dimensions to accommodate that fixture or feature are not provided.

2.07 Finished Floor Levels

Finished Floor Levels (FFL) or Reduced Levels (RL) are defective where:

- they do not comply with planning and building requirements, for example minimum levels in flood prone areas; and
- they depart from the documented RL or FFL by more than 40 mm; or
- floors that are documented to be on the same plane but are constructed on different planes; or
- the building work is an extension or addition and new floor levels do not match the existing building floor levels. Also refer to clause H of this *Guide*.

2.08 Levelness of timber and concrete floors

Except where documented otherwise, new floors are defective if within the first 24 months they differ in level by more than 10 mm in any room or area, or more than 4 mm in any 2 m length. The overall deviation of floor level to entire building footprint shall not exceed 20 mm. Refer to clause I of this *Guide* where the new floor is to join an existing floor.

2.09 Dimensions of building elements

Deviations from the documented height or cross-sectional dimension of building elements such as beams and posts are defective if they exceed L/200 where L is the documented dimension or 5 mm, whichever is the greater.

2.10 Cracks in concrete slabs

Refer to table 2.10 for descriptions of categories of cracks.
Category 3 and 4 cracks to slabs are defects.
Category 1 and 2 cracks to slabs are to be monitored for a period of 12 months.
At the end of the monitoring period, cracks rated at greater than category 2, are defects.

FOOTINGS, SLABS AND SETTING OUT (CONT)

TABLE 2.10
CLASSIFICATION OF DAMAGE TO CONCRETE FLOORS

Description of typical damage	Approx. crack width limit in floor	Change in offset from 3 m straight edge placed over defect (See Note 4)	Crack category
Hairline cracks, insignificant movement of slab from level	< 0.3 mm	< 8 mm	0
Fine but noticeable cracks. Slab reasonably level	< 1.0 mm	< 10 mm	1
Distinct cracks. Slab noticeably curved or changed in level	< 2.0 mm	< 15 mm	2
Wide cracks. Obvious curvature or change in level	2 mm to 4 mm	15 mm to 25 mm	3
Gaps in slab. Disturbing curvature or change in level	4 mm to 10 mm	> 25 mm	4

Based on: AS 2870 Residential slabs and footings – Construction Table C2: Classification of damage with reference to concrete floors

Notes to tables 2.10 and 3.02

1. Crack width is the main factor by which damage to floors and walls is categorised. The width may be supplemented by other factors, including serviceability, in assessing category of damage.
2. In assessing the degree of damage, account shall be taken of the location in the building or structure where it occurs and also of the function of the building or structure. In smaller spaces with dimensions less than 3 m, the allowed offset may be used proportionally.
3. Where applicable, account shall be taken of the past history of damage in order to assess whether it is stable or likely to increase.
4. The straight edge is placed over the defect, and supported at its ends by equal height spacers. The change in offset is then measured relative to this straight edge.

2.11 Finish to concrete slabs

The finish to a concrete slab is defective if it is not suitable for the documented applied finishes such as tiles, polished concrete, carpet or sheet flooring, including set downs where required.

2.12 Repairs to exposed concrete slabs

Repairs, where failure has been due to cracking and/or movement, may involve the removal of the affected area. The repair is defective if it does not, as closely as practicable, match the existing work in appearance, colour and texture. Minor variations in finish may not be considered to be defective.

High Rise Facades

Design and Installation Guide

hebel®
The better way to build

Contents

This Design Guide has been prepared as a source of information to provide general guidance to consultants – and in no way replaces the services of the professional consultant and relevant engineers designing the project.

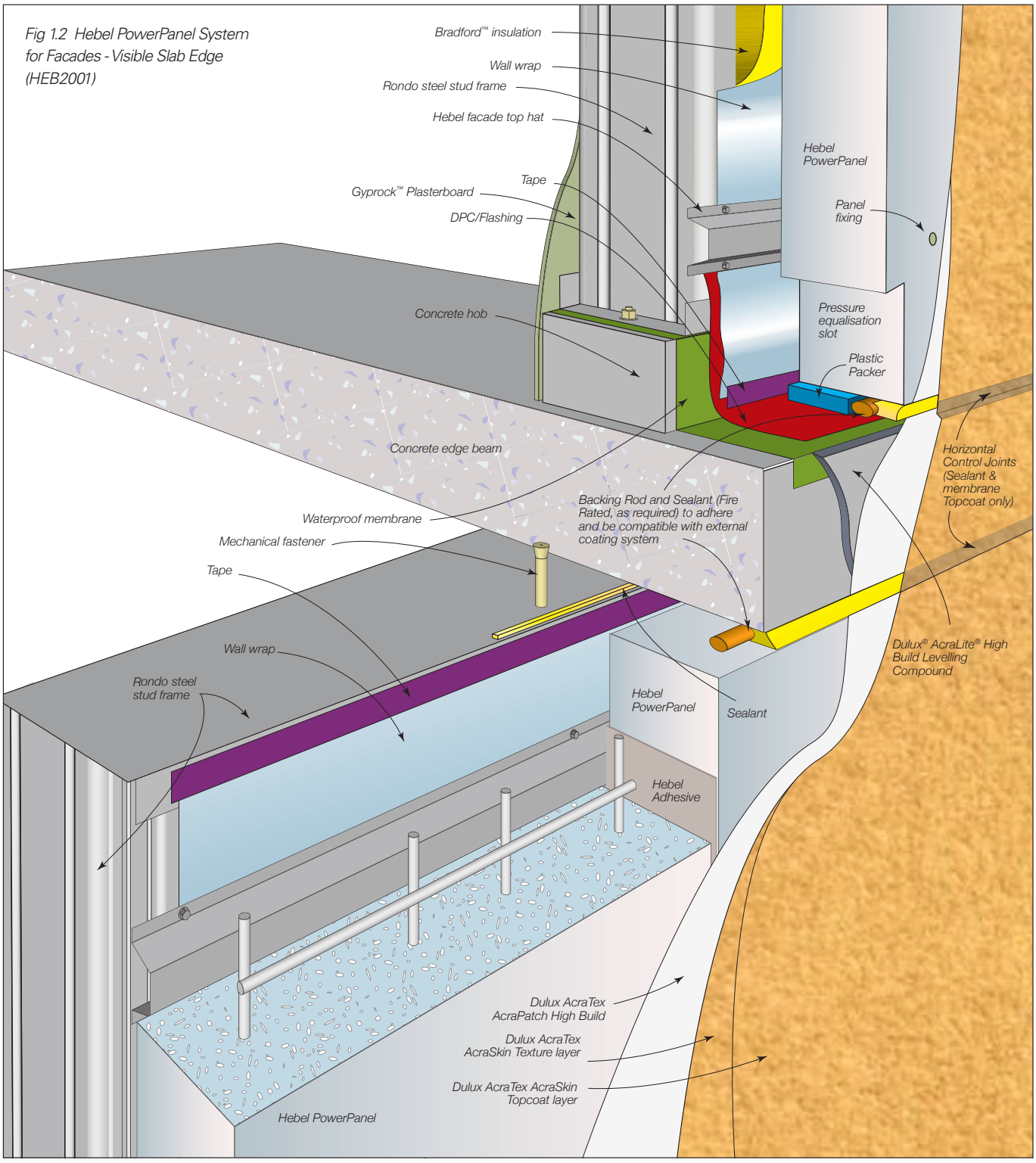
It is the responsibility of the architectural designer and engineering parties to ensure that the details in this Design and Installation Guide are appropriate for the intended application.

The recommendations of this guide are formulated along the lines of good building practice, but are not intended to be an exhaustive statement of all relevant data.

1.1 Typical applications

Hebel PowerPanel System for Facades - Visible Slab Edge

This offers a conventional system to edge beam detailing where the panel is positioned on the slab edge providing excellent performance.

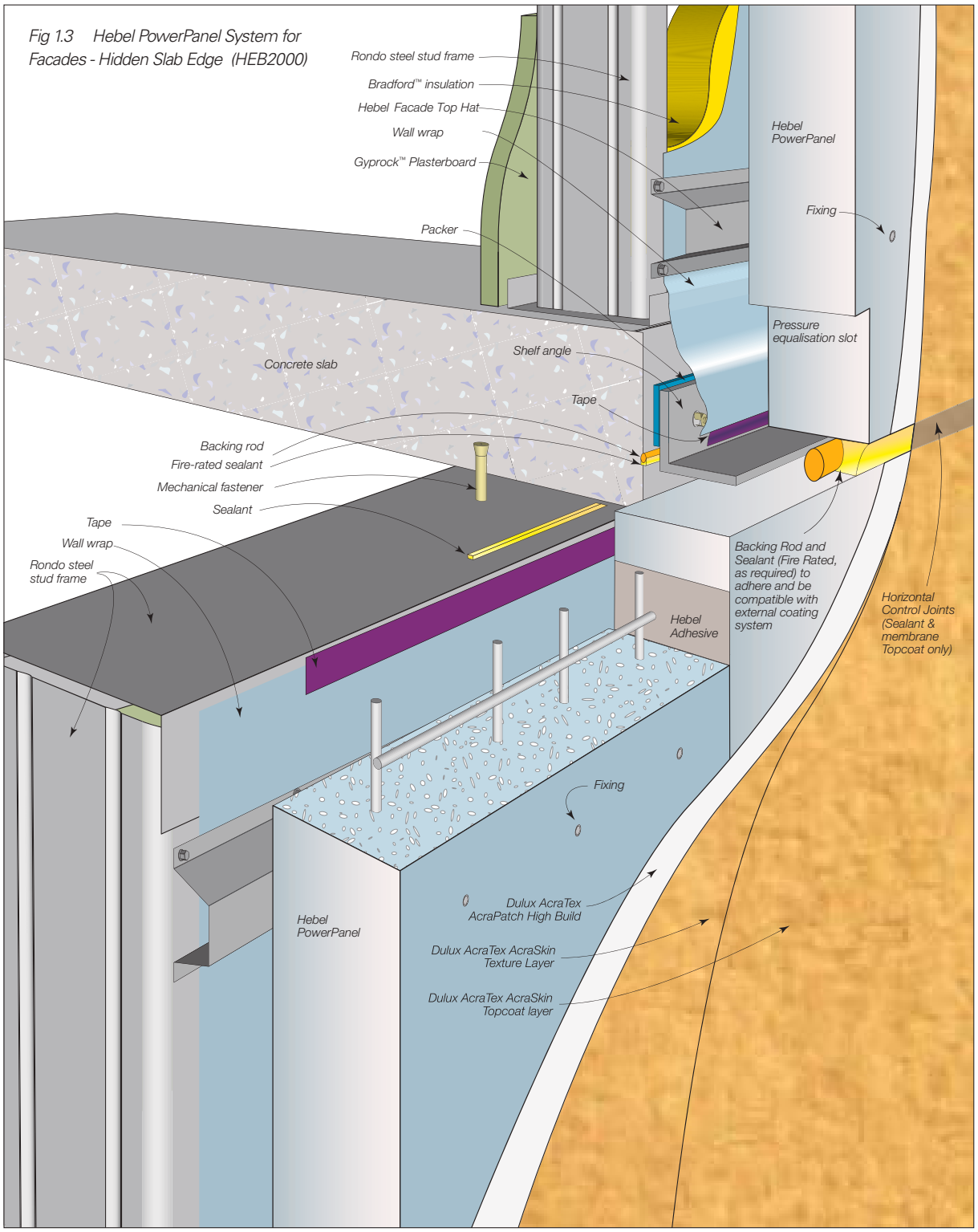


IMPORTANT NOTE: Always refer to current details available in the AutoCAD and pdf versions on the website: www.hebel.com.au

Hebel PowerPanel System for Facades - Hidden Slab Edge

This is an alternative system to edge beam detailing where the panels are positioned in front of the slab edge. Locating the panels proud of the slab edge produces a single rebated external line at slab level, and provides a more flexible slab edge tolerance.

Fig 1.3 Hebel PowerPanel System for Facades - Hidden Slab Edge (HEB2000)



IMPORTANT NOTE: Always refer to current details available in the AutoCAD and pdf versions on the website: www.hebel.com.au

Hebel PowerPanel. Better by design

1.2 System design

How to Design a Hebel Facade Wall

STEP 1. Determine edge beam location: visible edge beam (HEB2001) or hidden edge beam (HEB2000)

STEP 2. Determine the distance between supporting members (slab to soffit) to optimise the supporting structure (Top Hats and stud framing). Note that panels are one-way spanning vertically and supported by the horizontal Top Hats

STEP 3. Design Criteria. Identify the BCA Performance Requirements, and any additional project requirements.

- Purpose of structure (Class and importance).
- Imposed design actions (wind, local pressure regions).
- Damp and Watertightness.
- Fire Resistance Level (FRL).
- Sound insulation performance (R_w, C_{tr} values).
- Energy Efficiency (R-Value).
- Durability.

STEP 4. Select spacing for the Top Hats and studs, (to be determined by stud frame manufacturer or project engineer) and construction tolerances.

STEP 5. Specify Bradford Enviroseal ProctorWrap™ or DuPont™ Tyvek® HomeWrap® as the wall wrap for condensation control, weatherproofing and improving the thermal insulation performance.

STEP 6. Check adequacy of structural support framing, sound insulation, fire resistance level, and construction tolerances.

STEP 7. Check the Performance Requirements of the Design Criteria (deflection criteria, damp and watertightness, fire resistance level (FRL), sound insulation performance (R_w, C_{tr} values), energy efficiency (R-Value), and durability

STEP 8. Complete detailed design and documentation.

IMPORTANT: A facade engineer must be involved in the selection, detailing and integration of a Hebel PowerPanel System for Facades into all projects.

IMPORTANT NOTES

1. A significant benefit of the pressure equalisation slots is a point of egress for water which may access the cavity space should a failure occur in an element of the facade.

   However the cavity should not be used as a means of draining other building elements such as openings and penetrations.

2. Earthquake loading has not been considered in this Design Guide.

Compliance with the Building Code of Australia (BCA)

All building solutions, such as walls, floors, ceilings, etc. must comply with the regulations outlined in the Building Code of Australia (BCA) or other authority.

The BCA is a performance based document, and is available in two volumes which align with two groups of 'Class of Building':
Volume 1 – Class 2 to Class 9 Buildings; and
Volume 2 – Class 1 & Class 10 Buildings – Housing Provisions. Each volume presents regulatory Performance Requirements for different Building Solutions for various classes of buildings and performance provisions. These Performance Provisions include:

- Structure
- Fire Resistance
- Damp & Weatherproofing
- Sound Transmission & Insulation
- Energy Efficiency
- Durability

This Design Guide presents tables, charts and information necessary to design a Hebel PowerPanel System for Facades that complies with the Performance Requirements of the BCA. The designer must check the adequacy of the building solution for Performance Requirements outlined by the appropriate authority.

1.3 Design & detailing considerations

Building Tolerances

During the construction of a building, there are tolerances to control the accuracy of the building dimensions and locations to an acceptable standard.

Additionally, movement joints are required in the facade to tolerate and accommodate the movement of the structure (see 'Movement Joints'). These tolerances are nominated in the appropriate specification for the project.

The Hebel PowerPanel System for Facades is flexible and accommodating of the variations that occur during the construction of the support structure (building), such as variable slab to soffit heights and location of the slab edge.

The Hebel panels and lightweight structural steel framing can be fabricated to suit the on-site conditions.

The Hebel PowerPanel System for Facades with the panels beyond the slab edge accommodates the variability in slab position in the space behind the panel cladding. This system also eliminates the need for rendering a finished slab edge and the associated difficulties in coordinating labour and producing a quality finish slab edge (joint detailing and surface finish).

Importantly, the height of the panels is not affected by the slab to soffit heights, so that panels of similar lengths can be installed floor-to-floor, which gives a controlled, uniform set-out of horizontal jointing in the facade.

The construction process of the Hebel PowerPanel Systems for Facades provides a wall that can be accurately located. For concrete elements that are located beyond the finished surface plane, this will require rectification of the concrete.

Refer to Figs 2.7 & 2 .8 (page 27) for recommended alignment. The same considerations should be made for columns.

CSR Hebel recommends that tolerances are specified in the project documents to ensure that in-situ concrete elements, such as columns and slab edges, are produced within the finished surface plane. This will minimise the area that requires rendering.

Movement Joints

During the life cycle of a building, the building and the materials that it is constructed from will move. These movements are due to many factors working together or individually, such as support structure movement (lateral sway or vertical deflection), thermal expansion and contraction and differential movements between materials. This movement, unless relieved or accommodated, will induce stress in the materials, which may be relieved in the form of cracking. To accommodate these movements and relieve any induced stresses, which could potentially crack the wall, movement joints need to be installed. There are two categories of joints:

- Articulation Joints (A.J.) are provided to relieve induced stresses due to support structure movement. The joints make the walls more flexible by breaking the wall into a series of small panels. Differential movement between the facade and adjacent structural elements need to be accommodated with articulation joints.
- Control Joints (C.J.), (one type is an expansion joint), are provided to relieve the induced stresses resulting from thermal expansion or contraction of the AAC, or differential movement between the AAC and another material or structure, such as abutting walls or columns of concrete or brickwork. Control joints can also delineate coating shrinkage breaks. A joint may perform the function of either an articulation joint or control joint or both.

IMPORTANT: There are restrictions provided to the maximum length of Hebel Facade wall between control joints. Control joints must be provided at:

- *6 metres maximum for continuous runs of walls.*
- *At all external and re-entrant corners. (unless otherwise approved by CSR Hebel)*
- *At control joints in the primary support structure.*
- *For windows/door openings ≤ 2400mm a control joint is to be provided to one side of the window/door opening*
- *For windows/door openings > 2400mm control joints are to be provided either side of the opening*

Hebel can offer a guide on locations of control joints if required.

Vertical control joints should coincide with control joints in the supporting structure and anywhere that significant structural movement is expected, where the wall abuts a vertical structure, such as a column, or adjacent to large openings.

This Design Guide proposes minimum widths for the movement joints.

The project engineer shall determine if the joints are sufficient to accommodate the movement of

the specific project building. Typically, the vertical joint is a minimum 12mm wide and filled with an appropriate flexible sealant. A horizontal control joint is required beneath slabs or angles to accommodate any expected deflection. The magnitude of the deflection must be verified by the building designer. Typically, the horizontal joint is 15 - 20mm wide.

Sealants

All movement joints and gaps between the panels and infill framing or penetration framing must be filled with an appropriate flexible sealant. The sealant should be designed and installed in accordance with the sealant manufacturer's specifications. The specifications must provide information regarding priming the surface, geometry of sealant (width/depth ratio with width greater than depth), sealant surface profile (concave), substrate preparation, etc. Note: where different types of sealants come in contact, the designer must ensure the sealants are compatible.

Typically a backing rod is used to control the depth of sealant and ensure the sealant is bonded on two sides only. Note, the surface may require some preparation depending upon the type of sealant.

Condensation

Condensation is a complex problem, and can occur under a variety of conditions, not just cold conditions. Literature on this subject is available from ABCB Condensation in Buildings Handbook /CSIRO/BRANZ/ASHRAE and must be consulted when building in areas where condensation is likely to occur.

In these cases, the appropriate use of a wall wrap as a vapour barrier or as thermal insulation, or both, can be effective in controlling condensation.

Panel Layout

Modular construction

Hebel Facade is essentially a flexible modular construction system. By adopting a few simple rules, significant savings can be gained in time and cost. This is achieved by the following:

- On-site width cuts – resulting in time loss, increased waste and treatment of cut reinforcement.
- Maintaining windows – ensuring 300mm multiples above and 600mm multiples wide for wall areas between windows and doors.

Planning the panel layout with special attention to the locations of openings and penetrations can significantly reduce the amount of on-site cutting.

At openings (windows and doors), it is recommended that a 600mm width panel be installed adjacent to the opening. For large openings, it may be necessary to provide additional structural steel to support the loads shed from the opening.

'Good Practice' and 'Poor Practice' layouts for vertically installed panels with various penetrations are illustrated in Figure 1.2 and Figure 1.3.

Penetrations

Small service penetrations through the panel of the Hebel PowerPanel System for Facades must allow for differential movement between the panel and the service. All penetrations are a potential source for water ingress and should be sealed with an appropriate flexible sealant.

NOTE: The external sealant in the control joints adjacent to windows should be extended to the inside face of the wall, beyond the sealant line of the windows. No gap should exist between both sealants. This sealant configuration is recommended at similar detailing issues.

IMPORTANT: The detailing of penetrations through any facade is critical. An incorrect sealant detail could have a detrimental effect on the systems performance characteristics. For example, a penetration through the drained system with only the external surface being sealed would allow air to flow into the building, defeating the pressure equalisation behaviour.

Wet area wall construction

All wet area walls shall be lined and waterproofed in accordance with Australian Standards and to BCA requirements. Gyprock Aquachek™ or Cemintel™ Wallboard are suitable lining materials for wet area applications.

Cavity Baffles

Used vertically at the major corners of the building to limit the air flow within the cavity (typically 4 per level).

Pressure Equalisation Slots

PE Slots (Weepa) allow pressure equalisation to the wall cavity and permit drainage of any water from the cavity. Ideally located at control joints (CJ) and at no greater than 3 metre spacing.