RESIDENTIAL BUILDING SPECIFICATION NEW SOUTH WALES

1 Preliminaries

1.01 - Scope

This Specification has been prepared for use with Class 1a and 10 buildings as determined by Part A6 - Building Classification, Volume Two of the National Construction Code.

The work shall be performed in accordance with:

- The approved plans, including the NSW Building Sustainability Index (BASIX) commitments in accordance with the BASIX Certificate and Section 4.55 changes;
- Any conditions of Development Consent or Complying Development Certificate;
- Conditions of the *Contract* of which this Specification forms part;
- The National Construction Code (NCC), Volume Two and the documents (e.g. Australian Standards) adopted by reference in the National Construction Code;
- Australian Housing Provision Standard (ABCB) used where there is no reference in the NCC; and
- Where such work and material is not appropriately detailed by the items above, it shall be performed or installed with regard to manufacturers' specifications and acceptable common building practices.

1.02 - Definitions

Owner/s - shall also mean Proprietor/s; Principal/s, the person having the benefit of development consent or a complying development certificate.

Builder/s - shall also mean contractor/s.

NCC - refers to the published edition of Volume 2 of the National Construction Code, Class 1 and Class 10 Buildings, applicable at the date of the granting of Development Consent.

Principal Certifying Authority (PCA) - shall also mean the Consent Authority; Accredited Council Certifier, Accredited Building and Development Certifier.

Completion - shall mean Practical Completion.

Proprietary - shall mean an item, product, material or colour identifiable by naming the manufacturer, supplier, trade name, brand name, and reference and/or catalogue number.

Contract - shall mean the Conditions of Building Contract, pursuant to Section 7 of the *Home Building Act 1989.*

Dimensions - figure dimensions take preference over scale.

1.03 - Statutory Requirements, Approvals, Fees and Inspections

All building and associated work shall comply with the relevant Acts & Regulations of Parliament and statutory requirements.

1.04 - Appointment of Principal Certifying Authority (PCA)

In accordance with Section 4.69 subsections (a) (b) (c), the *Environmental Planning and Assessment Act 1979,* the *Owner/s* is required to appoint the *PCA*. The *Owner/s* is responsible for providing the *Builder* a list of mandatory critical stage inspections as required by Clause 162A of the *Environmental Planning and Assessment Regulation 2000*.

1.05 - Materials

Materials shall be new, unless otherwise identified in the Schedule.

1.06 - Items Supplied by Owner

Items to be supplied by the *Owner/s* shall be identified in the Addendum. Where it is agreed that additional items are to be supplied by the *Owner/s* during construction, such agreement and a description of the items shall be set out in writing to the *Builder*.

It is the responsibility of the *Owner/s* to arrange payment, for delivery and protection against damage and theft of such items. All items, unless otherwise indicated in writing by the *Owner/s* shall be new and fit for their intended purpose.

If items are not available when required, the *Owner/s* shall be obliged to make an alternative selection.

1.07 - Work Health Safety (WHS) Management System

The Builder has statutory responsibilities in relation to the WHS Act 2011 (NSW) and WHS Regulation 2017. Regulation 309 states, all construction work costing $250k or more must have a written WHS Management Plan prepared by the Builder before works on the construction project commences.

1.08 - Site Access

The *Builder* has statutory responsibilities in relation to Work Health Safety. In order to assist the *Builder* in maintaining a safe work site, the *Owner/s* agree to comply with any directions and instructions of the *Builder/s* concerning site access and movement on and around the site.

1.09 - Site Sign

In accordance with WHS Regulation, regulation 308, before work commences, the *Builder* shall provide a signboard at least 600mm x 900mm, either landscape or portrait containing the following information: the Builders name and telephone (including an after hours telephone number), the location of the site office for the project, Builder license number and the words 'licensed contractor' or words to that effect.

The *PCA* is required to have a sign erected and maintained on the site for the duration of the project which provides their name, address and contact telephone number of the *PCA* and the name, address and day and after hours business telephone number of the principal contractor. The sign should also state that ***Unauthorised Entry to the Site is prohibited***.

Information relating to the builder and the *PCA* can be incorporated on a single sign.

1.10 - Site Fencing and Scaffolding

Unless otherwise stated, the *Builder* shall provide site fencing to secure the site and complying scaffolding necessary to undertake the building work, including work undertaken by trade contractors engaged by the *Builder.*

Scaffolding is High Risk Work and must comply with the WHS Regulation 2017, reg 225 – scaffold and to Australian Standards – AS/NZS 1576 (Scaffolding Requirements series).

1.11 - Site Services & Amenities

Temporary Toilet Accommodation: - shall be provided on site until the completion of the works.

Water Supply: - unless otherwise specified and where no reticulated water supply is available to the site prior to the commencement of construction, the *Owner/s* shall supply temporary water supply for use and as required at the direction of the *Builder*.

Power: - unless otherwise specified, 240 volt power is to be supplied to the site for construction and associated purposes. In the event power is not available and/or additional poles, service risers, underground wiring etc is required by the Electricity Authority, this additional cost, plus *Builder's* margin shall be a cost to the Owner/s.

1.12 - On Completion

The *Builder* upon completion will remove all surplus materials and construction debris from the site. The work shall be cleaned throughout.

1.13 - Geotechnical Investigation

An engineer qualified to investigate the soil conditions and classify the site in the area of the proposed building may be engaged by either the *Builder* or the *Owner/s*. Where possible, the engineer will certify that the site will support the proposed footings, slab and building design.

Costs of such consultation will be payable by the *Owner/s* as an additional cost not allowed for/or included in the contract sum, unless otherwise specified.

1.14 - Site Identification & Setting Out

The *Builder* is to visit the site and note the existing levels, site conditions and facilities. The *Builder* shall advise the *Owner/s* of any variation found at the site from the documentation or information provided.

The land shall be block and peg surveyed and a survey certificate provided before work commences. The cost of this survey shall be included in the price unless otherwise specified. Any additional survey shall be subject to the allowance in the PC Schedule.

2 Excavations, Foundations and Footings

2.01 - Protection of Services

Contact Before You Dig Australia on www.byda.com.au to identify the location of underground assets (pipe work, service lines and network insulations).

2.02 - Environmental

2.02.1 - Soil Erosion and Sediment Control

Measures shall be taken to manage the effects of stormwater run-off to avoid erosion, sedimentation, contamination of the site, surrounding areas and drainage systems. Apply all site management requirements which are a Condition of Consent.

2.02.2 - Tree Protection

Protect any tree/s identified for retention on the drawings or as a condition of consent. Mark all trees and shrubs to be retained with visible tape or other means. Where necessary, provide physical barriers to protect marked trees and shrubs. Limit excavation within the drip-line.

The *Owner/s* shall advise the *Builder* of any vegetation protection orders related to the site.

2.03 - Site Preparation (NCC H1D3 Site preparation)

Rubbish, top soil and any vegetation within 1 metre of proposed building/s shall be cleared and removed.

2.04 - Excavation

Excavation work is to be completed in accordance with the WHS Act 2011 and the WHS Regulation 2017, division 3 – Excavation work, Regulation 304, 305 and 306. And relevant Australian Standards.

2.04.1 - Scope

Excavate and backfill as required for all work shown on the drawings. The excavation and placement of fill shall be undertaken in accordance with NCC H1D3 Site preparation.

Footings

Excavate trenches to Engineer's design or the approved footing design.

3 Concrete

3.01 - Termite Risk Management (NCC H1D3 Site preparation)

Termite barriers shall be installed in accordance with NCC H1D3 Site preparation.

Prior to the commencement of the works, the site shall be inspected for evidence of termite activity. Where termite nests are found on the site, treatment of the nests shall be carried out by a competent and qualified contractor.

It is recommended that the *Owner/s* is provided with a copy of Master Builders *Home Owner's Guide for Termite Management.*

3.02 - Damp-proofing Membrane NSW (NCC H1D4 Footings and slabs)

Damp-proofing membrane installed under slab-on-ground construction shall be in accordance with the NSW Variation NCC H1D4 Footings and slabs.

The vapour barrier and damp-proof membrane shall be 0.2mm nominal thickness polyethylene film of medium impact resistance and branded continuously: "*AS 2870 Concrete underlay, 0.2mm Medium impact resistance*".

3.03 - Formwork

Quality formwork shall be used to provide shape, line, true positioning and dimension to carry all imposed loads. Brace sufficiently to prevent bowing or buckling while concrete is being poured and cured.

Where the slab edge is to be exposed for termite management, the exposed edge shall be off-the-form, smooth and without honeycomb. Honeycomb in concrete is caused by the mortar not filling the spaces between the coarse aggregate particles.

3.04 - Reinforcement (AS 2870) Residential Slabs and Footings

Steel reinforcement shall comply with AS 2870 Residential slabs and footings and the Engineers details.

Bar chairs shall be placed to give the following clear cover:

- 40mm to unprotected ground;
- 30mm to a membrane in contact with the ground;
- 20mm to an internal surface;
- 40mm to an external surface.

3.05 - Premixed Concrete

Premixed concrete shall be supplied to comply with AS 3600 Concrete Structures.

Unless otherwise specified, concrete shall have default strength at 28 days of not less than 20Mpa (Grade N20) and have a nominal aggregate size of 20mm.

Unless otherwise specified, a default slump of 100mm will apply to residential slabs and footings.

3.06 - Placement

Trenches and footings shall be dewatered and cleaned of loose and softened material prior to concrete placement.

3.07 - Curing

Concrete shall be cured by covering with plastic sheeting, the application of a suitable curing compound, by keeping continually damp, or in accordance with AS 3600 Concrete Structures.

Where adhesives to the slab surface in conjunction with floor coverings are to be used strict care should be exercised in the use and compatibility of curing compounds.

3.08 - Footings and Slab on Ground

Concrete slabs and footings shall not be poured without the approval of the Engineer and the *PCA*.

3.09 - Pier and Beam Footings

Where nominated, pier and beam footings shall be constructed to the Engineers design and shall not be poured without the approval of the Engineer and the *PCA*.

3.10 - Screw in Foundations

Screw in foundations and *proprietary* brand flooring systems based on composite design with pre-cast beams and in situ concrete shall be installed in accordance with the manufacturers recommendations and/or consulting Engineer.

3.11 - Concrete Paths

Concrete paths shall be shown on the drawings and unless otherwise specified, shall be at least 75mm thick and if unreinforced laid in sections not more than 1800mm in length. If reinforced, the maximum length of each section shall not exceed 3000mm.

Unless otherwise specified in the Addendum, a wood float or other non-slip finish shall be provided.

Provide falls away from the building of 1:50 for 900mm. Slope concrete up and around overflow relief gullies and set inspection openings etc. flush with the surface.

Ensure weep-holes to adjacent structure are not obstructed.

3.12 - Tolerances for Concrete Floors

Shrinkage cracking can be expected in concrete floors.

Concrete floors can also be damaged by foundation movement caused by localised drying and wetting. The *Builder* is not responsible for foundation movements caused by the *Owner/s* failure to maintain drainage systems and the overwatering and misuse of watering systems to gardens located adjacent to slabs and footings. *Reference: CSIRO Publication BTF18, Guide to Home Owners on Foundation and Footing Performance.*

Classification of Damage to Concrete Floors

Description of typical damage	Approx. crack width limit in floor	Change in offset from 3m straight edge placed over defect	Crack category
Hairline cracks. Insignificant movement of slab from level	< 0.3mm	< 8mm	0
Fine cracks. Slab reasonably level.	< 1.0mm	< 10mm	1
Distinct cracks. Noticeable curve in slab or change in level.	< 2.0mm	< 15mm	2
Wide Cracks. Obvious curvature or change in level.	2mm to 4mm	15mm to 25mm	3
Gap in slab. Disturbing curvature or change in level.	4mm to 10mm	>25mm	4

For further reference and Notes to Table: AS 2870, Table C2: Classification of drainage.

4 Retaining Walls

4.01 - Retaining Walls

Retaining walls shall be constructed as identified by the approved plans.

Retaining walls shall be constructed of a material or *proprietary* system identified in the Schedule. *Proprietary* retaining wall systems shall be constructed to the manufacturer's requirements.

The location of retaining walls to boundaries shall be confirmed by a qualified Engineer prior to construction.

5 Drainage and Waste Water/Sewage Treatment

5.01 - General (NCC H2D2 Drainage)

All drainage work shall be carried out by a licensed plumber. Stormwater drainage shall be carried out in accordance with NCC H2D2 drainage and AS/NZS 3500 Plumbing and Drainage series.

5.02 - Onsite Wastewater Treatment Systems

Wastewater onsite treatment systems shall be installed in accordance with the manufacturer's requirements and the requirements of the *Local Authority.*

Following commissioning of the onsite wastewater treatment system the *Owner/s* will be responsible for the maintenance requirements of the wastewater system provided.

6 Masonry (NCC H2D4 Masonry)

6.01 - Masonry Units

Masonry units are to be as selected and as identified in the Schedule. Masonry units produced from clay, concrete and calcium silicate shall comply with AS/NZS 4455 Masonry units, pavers, flags and segmental retaining wall units - Masonry units.

Masonry units exposed to salt attack shall comply with the durability requirements of AS 3700 Masonry Structures.

Autoclaved Aerated Concrete (AAC) blocks shall be selected and installed to the manufacturer's specification.

6.02 - Workmanship

Masonry construction shall comply with AS 4733.1 Masonry in small buildings Part 1 and 2 and NCC H2D4 Masonry. Set out masonry as shown on the drawings, build to gauge to suit masonry units, maintain chosen bond with full mortar joints to a nominal 10mm (+/- 3mm).

Mortar joints shall be finished to the type nominated in the Schedule. Where the Schedule nominates raked joints, the rake must not extend into reveals and sills beyond the line of the storm moulds.

The cleaning of masonry should take place as work progresses and upon completion in a manner so that the work is not damaged. Pressure cleaning and acid wash should not be carried out without the prior approval of the *Builder.*

Where masonry is to be high pressure cleaned, the following restrictions shall apply:

a) Maximum pressure shall be 7000 kpa;

b) Use a wide fan spray nozzle of 15º to 20º;

c) Keep the nozzle about 500mm from the wall and never closer than 300mm;

d) Test the procedure first on a section of wall that is less noticeable.

6.03 - Mortar

Mortar mixes shall comply with AS 3700 Masonry Structures.

Mortar shall consist of a mixture of cement, sand and water, with the addition of lime and admixtures. Where water thickener is used, it shall be cellulose-based product, suited for its application according to the manufacturer's and supplier's directions.

Mortar for reinforced masonry shall be of mortar class either M3 or M4.

6.04 - Cavities and Weepholes

In brick veneer construction, the minimum cavity width shall be 25mm, measured clear of any conduit, insulation or services placed within the cavity. In cavity masonry walls, the minimum cavity width shall be 35mm, measured clear of any conduit, insulation or services placed within the cavity.

Remove mortar droppings from wall ties and cavity flashings progressively during construction and upon completion of the work.

Weepholes shall be created by open perpends, free of mortar and other materials, at centres not exceeding 1200mm centres and in accordance to AS 4773.1 Masonry in small buildings Part 1 and 2.

6.05 - Wall Ties

Wall ties are to comply with AS 4773.1 Masonry in small buildings Part 1 and 2, wall ties and shall be manufactured in accordance with AS/NZS 2699.1 Built-in components for masonry construction Part 1: Wall ties and installed to AS 4773.2. Masonry in small buildings, Part 2: Construction.

Wall ties shall suit the exposure conditions of the site. Ties shall be spaced at a maximum of 600mm apart in both directions and at 300mm around openings and edges of brickwork, at bearer level where a timber floor is provided and control joints.

Wall ties are to be built in as work progresses, and to a minimum of 50mm into the mortar joint, with the other end secured to the frame with approved galvanised fixings. (Note: - Clouts are not acceptable for fixing brick ties).Ties shall be installed in a manner that prevents moisture travelling along their length to the inner leaf.

6.06 - Lintels

Lintels shall comply with AS 2699 Part 3 Built-in components for masonry construction, lintels. Brick work over openings may be supported by steel lintel, reinforced masonry lintel or reinforced concrete member complying with AS 3600 Concrete structures.

Where steel lintel are used over openings, they shall be hot dip galvanised mild steel angles or flat bars complying with AS 4100 Steel structures/AS/NZS 4600 Cold formed steel structures.

For lintels with a clear span of 1m or more, each end of the lintel is to have a minimum bearing length of 150mm. For shorter spans the minimum end bearing is to be 100mm.

Not less than three (3) courses of brick must be used above steel lintels and brickwork shall not overhang the lintel by more than 25mm. Prop lintels until mortar has reached its design strength. Props should be no more than 1.2 metres apart. The long leg of angle lintels must be vertical.

6.07 - Damp Proof Courses (DPC) and Flashings

Flashings and damp proof membrane shall be manufactured to AS/NZS 2904 Damp-proof courses and flashings. Flashings shall be a flexible material compatible with the adjacent materials to prevent electrolytic action.

Install damp-proof courses in all masonry walls between 150mm and 250mm from finished ground level and to the full width of the wall. Step damp proof course on sloping ground to maintain the height above ground level.

At timber floors, install not higher than the bottom of the floor bearers. Damp course material shall be run in long lengths, lapping a minimum of 200mm at joins and to the full width of courses at all intersections. Flashing extending the full width of the masonry course may also be used as a DPC.

6.07.1 - Cavity Flashing

In brick veneer construction the flashing shall extend the full width of the brick wall, across the cavity and turned up not less than 150mm and fixed to the frame. For slab-on-ground, provide approved flashing one course below main floor turned up cavity and fixed to frame. Flashing to extend to external face of outer leaf and be visible.

In masonry cavity construction, the flashing shall extend the full width of the external masonry wall, across the cavity and turned up not less than 150mm and built a minimum of 30mm into the inner masonry wall.

6.07.2 - Head and Sill Flashing, Stepped Flashings and Flashings at Roof/Wall Junctions.

Sill and Head Flashings shall be installed in accordance with NCC H1D5 Masonry.

Stepped flashings shall be installed in accordance with NCC H1D5 Masonry.

Flashings at roof and wall junctions shall be installed in accordance with NCC H1D5 Masonry.

6.08 - Access & Sub-Floor Ventilation

Sub-floor ventilation shall provided in accordance with NCC H2D5 Subfloor ventilation.

Provide cross ventilation to the space between the ground and the underside of the timber floor by installing brick or *proprietary* brand vents to external walls enclosing the space.

The air-flow through the vents must be unobstructed and where external walls are of cavity brick construction,

internal openings shall be provided adjacent to the vent. Openings will also be provided to internal sub-floor walls to ensure cross-ventilation.

Provide access to sub-floor area where identified on the plans or as instructed. Opening is/are to be approximately 600mm wide in from corners unless otherwise specified.

6.09 - Clearances

In masonry veneer construction generally leave the following clearances between window frames and brick sills and the roof structure and masonry veneer:

- 5mm at sills of lower or single storey windows;
- 8mm at roof overhangs of single storey buildings;
- 10mm at sills to two storey buildings;
- 12mm at roof overhangs of two storey buildings.

Clearances should be increased to accommodate expected timber shrinkage e.g. unseasoned hardwood.

6.10 - Tolerances in Masonry Construction

Masonry work is not considered defective if it is within the following tolerances:

Item	Structural Tolerances	Non-structural Facework Tolerance
Horizontal position of any masonry element specified or shown in plan at its base or at each storey	+ 15mm	+ 15mm
Relative displacement between load bearing walls in adjacent storeys intended to be in vertical alignment.	+ 10mm	+ 10mm
Maximum deviation from plumb within a storey from a vertical line through the base of the member.	The lesser of + 10mm per 3m of height or 0.05 times the thickness of the leaf.	+ 10mm
Maximum deviation from plumb in the total height of the building (from the base)	+ 25mm	+ 25mm
Maximum or horizontal or vertical deviation of a surface from a plane surface (bow) in any 2m length.	+ 5mm	+ 3mm
Deviation of bed joint from horizontal, or from the level specified or shown in elevation.	+ 10mm in any 10 m length, + 15mm in total	+ 10mm in any 10 m length, + 15mm in total.
Deviation from specified thickness of bed joint	+ 3mm	+ 3mm
Minimum perpends thickness	5mm	5mm
Deviations from specified thickness of perpend.	+ 10mm max.	+ 5mm average
Maximum difference in perpend thickness in any wall.	No limit	8mm
Deviation from specified width of cavity.	+ 15mm	+ 15mm

For further reference: Table 12.1 AS 3700.

Efflorescence is a crystalline deposit of salts that forms on or near the surface of concrete, masonry and cemetitious products. All masonry materials can be susceptible to efflorescence and often occurs during or after construction. Efflorescence is particularly affected by temperature, humidity and wind and is a common occurrence in winter. Primary efflorescence will decrease over the passage of time and is not considered a defect.

7 Carpentry (NCC H1D6 Framing)

7.01 - Timber Generally.

Refer to the Schedule for Species, Grade & Durability to be used.

All timber used shall be of the durability and stress grade specified and/or comply with the provisions of AS 1720 Timber structures and AS 1684 Residential timber framed construction. All structural timber used will be of a durability class appropriate to the expected service life and exposure conditions. All structural timber used will be stamped or otherwise identified in respect of stress grade. Sizes of timber for constructional purposes to be the nominal size mentioned with allowable tolerances as provided by the relevant supplement of AS 1684. Scantlings to be in long lengths, accurately cut and fitted and securely fixed.

7.02 - Engineered Timber Products

Fabricated glue-laminated timber beams are to conform to AS 1328 Glued laminated structural timber, Part 1: Performance requirements and minimum production requirements. Fabricated I-beams, laminated veneer lumber (LVL) beams are to be designed in accordance with AS 1720.1 Timber structures, Part 1: Design methods.

7.03 - Handling and Storage

Timber and timber products delivered to the site shall be stored at least 150mm off the ground, stored level, evenly supported, well ventilated and protected from the rain and sun. Pre-fabricated trusses should be handled in a vertical position to avoid distortion and overstressing of the timber and connecting plates. Where pre-fabricated roof trusses are required to be handled horizontally, provide intermediate support. Do not site repair damaged trusses and report them to the truss fabricator immediately to avoid delays in rectification.

7.04 - Corrosion Protection

All connectors, fixing plates, brackets and general fixings and related components shall suit exposure level and be compatible to avoid galvanic or electro–chemical action.

7.05 - Floor Framing

All floors not specified to be concrete are to be framed at the level shown. Floor structure sizes and spacing are to be in accordance with AS 1684 Residential Timber Framed Construction or otherwise specified by a Practising Structural Engineer. Bearers, joists and plates shall be laid true and level.

7.05.1 - Bearers and Joists

Span and spacing of bearers & joists is to conform to AS 1684 Residential Timber Framed Construction series of Standards in conjunction with supporting supplements relevant to the applicable wind classification and stress grade.

7.05.2 - Blocking

Where the depth of floor joists is equal to or exceeds 4 times their width, herringbone strutting or solid blocking must be provided between the outer pairs of joists and between intermediate pairs of joists at not more than 1.8 m centres, or continuous trimming joists can be provided to the ends of joists above external bearers or wall plates.

Trimmers or solid blocking may be 25mm less in depth than the joists and solid blocking shall be a minimum thickness of 25mm.

7.05.3 - Joists Under Walls

Provide double joists under all external walls running parallel with the floor joists under the wall. Where a joist is not provided directly under an internal tie-down or bracing wall provide nogging or bridging between adjacent joists at all required fixing points.

7.06 - Flooring

7.06.1 - Strip flooring

Note: The Schedule to identify species, grade, cover width and finish.

Flooring is to be clear finished and shall not be laid until the building is weather tight. Check supplier certificate for species, grade size and moisture content prior to laying.

Where machine nailing is to be used, ensure boards are in contact with the joist as this type of nailing cannot be relied upon to pull board down to joist.

All fitted floors require a 12mm expansion gap between the floor boards and any internal or external wall structures.

7.06.2 - Plywood Structural Flooring

Structural plywood must be manufactured in accordance with AS/NZS 2269 Plywood - Structural - Specifications and sheets stamped with the manufacturer's name or trademark.

Sheets shall be installed in accordance with AS 1684 Residential Timber Framed Construction. Plywood face grain must run at right angles to the joists and shall be continuous over at least two spans. Where possible, panel ends shall be staggered.

7.06.3 - Particleboard Flooring

Particleboard flooring shall be laid and fixed in accordance with AS 1860.2 Particleboard flooring, Part 2: Installation.

Sheets shall span not less than two floor joist spacing's. Square edges and ends of sheets shall by butted over joists and trimmers

7.07 - Wall Framing

Wall frame, sizes and spacing shall be in accordance with AS 1684 or as specified by a Practising Engineer.

7.08 - Wall Sarking

Provide wall sarking as noted on the drawings and/or noted in the Schedule and in accordance with AS 4200 Pliable building membranes and underlays.

Provide vapour permeable sarking under cladding material that does not provide a permanent weather proof seal (such as unpainted fibre cement, sawn weatherboards).

Fix sarking on the outside of the studs from the bottom plate (lapped over flashing if any) up to at least the level of the underside of the fascia. Allow a gap at the top plate for wall ventilation.

7.09 - Timber Stairs

Timber stairs are to be designed and constructed to riser, going and balustrade dimensions and comply with NCC H5D2 Stairway and ramp construction and AS/NZS 1657 Fixed platforms, walkways, stairways and ladders.

7.10 - Roof Trusses

Roof trusses shall be fabricated in accordance with designs prepared by a practising structural engineer, AS AS 1720.1 Timber structures, Part 1: Design methods and AS 1720.5 Timber structures, Part 5: Nail plated timber roof trusses.

7.11 - Roof Bracing

Provide roof bracing in accordance with truss manufacturer's detail and Section 8 of AS 1684 Residential Timber Framed Construction.

7.12 - Access to Roof Space

Where the space between the roof and ceiling exceed 900mm in height, trim as required between roof trusses for a manhole, line the opening and provide a suitable cover.

7.13 - Verandah Posts

Verandah posts unless otherwise specified shall be a minimum of 100mm x 100mm or as required by AS 1684 Residential timber framed construction, checked at the top plate and secured to the floor structure. Where fixed to concrete the base of the verandah posts shall be supported by galvanised shoes, stirrups or similar supports.

7.14 - Eaves Soffit

Where overhang is less than 600mm support linings on 45mm x 32mm soffit bearers at not more than 450mm centres. Where overhang is between 600mm and not more than 1500mm support soffit linings on 70mm x 35mm soffit bearers at not more than 450mm centres.

7.15 - Ventilation of Roof Spaces

Ventilate the roof space at the ridge, gable and/or eaves to effectively cross ventilate the whole of the roof space as described in the ABCB Part 10.8.3 ventilation of roof spaces ventilation of roof spaces.

7.16 - Hot Water Storage Tank Support

Where solar water heaters incorporating a roof storage tank are installed, ensure additional loading has been incorporated into the roof design.

7.17.1 - Tolerances

7.17.1 - Timber Shrinkage

Timber shrinkage shall be no more than 3% for seasoned timber and no more than 10% for unseasoned timber.

7.17.2 - Vertical and Horizontal Deviation of Frames and Posts

Wall frames and posts (timber/steel) must not deviate from plumb by more than 4mm within any 2m of height, measured from the underside of the bottom plate and the base of the post.

Frames shall not deviate from the horizontal plane by more than 4mm within any 2m length of wall.

7.17.3 - Floors

Timber is a natural product that responds to changes in weather conditions. The overall movement and rate of movement varies depending upon the timber species and cutting pattern on individual boards. Gaps between individual tongue and grooved boards can be expected as the floor accommodates seasonal changes. Exposure to sunlight, cooling and heating appliances is likely to cause localised shrinkage of timber that cannot be allowed for at the time of construction.

Except for gaps occurring due to exposure to sunlight and heating and cooling appliances and the like, gaps up to 2mm between adjacent boards that extend for more than 1m is acceptable and not considered a defect.

Timber strip flooring to be supplied to a seasoned moisture content of 10-15%.

Some finishes of feature floors have the potential to bond board edges together at the tongue and groove joint. With seasonal moisture changes in the floor, this bonding or 'gluing effect" may produce a pattern across the floor where there are four or five boards followed by a large gap. In some instances the bonded joint is of sufficient strength that board may split. It is therefore recommended that finishes and finish systems are used that do not promote gluing.

8 Steel Framing (NCC H1D6 Framing)

8.01 - General

Steel framing will comply with NCC H1D6 Framing. Steel framing shall be designed and constructed to either:

a) AS 4100 – Steel Structures

b) AS/NZS 4600 – Cold-formed steel structures

c) NASH – Residential and low-rise steel framing – Part 1 Design criteria.

The frame is to be assembled with fixings as per the design, or in accordance with the manufacturer's recommendations.

8.02 - Corrosion Protection

The steel frame must be protected from corrosion in accordance with NCC H1D6 Framing.

Hole cutting or cutting of members should be done in a way which does not leave swarf. Compatible materials and fixings to be used to avoid galvanic or electro–chemical action. Direct contact with CCA treated timber is to be avoided. For slab on ground, use damp-proof course under wall frame bottom plates, to prevent corrosion

The frame is to be permanently earthed.

Channels should be clean of any swarf and mortar droppings.

Electrical wiring, water pipes and other services passing through the frame are to be isolated from it by rubber grommets or other suitable material.

9 Roofing (NCC H2D6 Roof and wall cladding and NCC H1D7 Roof and wall cladding)

9.01 - General

All roof cladding shall comply with NCC H2D6 Roof and wall cladding and NCC H1D7 Roof and wall cladding and one or more of the following referenced documents relevant to the work:

a) AS 2049 – Roof tiles

b) AS 2050 – Installation of roof tiles

c) AS 1562.1 – Design and installation of sheet roof and wall cladding – Metal

d) AS/NZS 4256 Pts 1, 2, 3 and 5; and AS/NZS 1562.3 Plastic sheet roofing.

Ensure the risk off falls are address in accordance with WHS Regulation 2017 part 4.4 Falls, regulations 78, 79 and 80. Prior to the commencement of roofing work.

9.02 - Roof Tiles

Provide roof tiles as shown on the drawings. Roof tiles shall be of a colour, profile and material noted in the Schedule and comply with NCC H2D6 Roof and wall cladding and NCC H1D7 Roof and wall cladding.

Roof tiles shall be fixed in accordance with the NCC and referenced Standard and the nominated design wind speed for the project.

Leave 10 tiles at site for future use.

9.03 - Metal Roofing

Provide metal roofing as shown on the drawings. Metal roofing shall be of a profile and colour as provided in the Schedule. Metal roofing and accessories shall be installed to the manufacturer's recommendations and requirements set out in NCC H2D6 Roof and wall cladding and NCC H1D7 Roof and wall cladding.

Metal roofing must be corrosion resistant in accordance with NCC H2D6 Roof and wall cladding and NCC H1D7 Roof and wall cladding. Where different metals are used they must be compatible in accordance with Table ABCB Part 7.2.2 Corrosion protection and compatibility requirements for roofing.

Use only sealants recommended by the manufacturer of the sheet material to be joined.

9.04 - Battens

Roof battens may be of timber or steel.

Timber battens shall be sized and installed in accordance with AS 1684.2 Residential timber-framed construction, Part 2: Cyclonic areas. Part 2 covers design and construction details for non-cyclonic areas. Four wind classifications are covered including N1, N2, N3 and N4 and AS 1684.3 Residential timber-framed construction. Part 3 is similar to Part 2 except that it covers design and construction details for cyclonic areas. Wind

classifications covered are C1, C2 and C3. Where battens are joined in a run, they shall be butt jointed at the centre of the truss or rafter.

Metal battens shall be corrosion resistant and fixed to the manufacturer's recommendations. Metal battens are to be joined over trusses with a minimum lap of 40mm. Advice should be obtained from the manufacturer on the use of metal battens in high corrosive areas.

9.05 - Sarking

Reflective foil sarking shall comply with AS 4200.1 Pliable building membranes and underlays, Part 1: Materials and be installed in accordance with AS 4200.2 Pliable building membranes and underlays, Part 2: Installation requirements.

Sarking shall be provided for all roofs where the design wind classification is greater than N3. The requirement for sarking will be influenced by roof pitch, length of rafter and bushfire prone areas. ABCB Part 7.3.4 Sarking.

For tiled roofs at a slope below 20º, provide sarking and anti-ponding board at the eaves.

Where a gutter discharges onto a tile roof through a spreader, irrespective of the roof slope, sark the roof from the point of discharge over a width of 1800mm down to the gutter. Where one section of roof fully discharges onto a lower section, fully sark the lower section.

Fix sarking over rafters/trusses to ensure the discharge of water without ponding into the eaves gutter. Secure sarking at the top edge of the fascia and dress down 25mm into the gutter.

Extend sarking over the bead of valley gutters and turn up neatly along valley. Keep folded joints clear of valleys.

Where tiles abut a wall, turn the sarking neatly up behind flashing a minimum of 50mm.

9.06 - Roof Flashings

Flashings shall be installed in accordance with ABCB Part 7.2.7 Flashings and capping's.

Lead flashings must not be used with aluminium or zincalume roofing or rainwater plumbing, or anywhere where water supply is by rainwater storage.

9.07 - Gutters and Downpipes

Gutters and downpipes shall be designed and installed in accordance with NCC H2D6 Roof and wall cladding and NCC H1D7 Roof and wall cladding.

Where high front gutters are installed, attention is required to prevent overflow back into the roof or building.

The homeowner is advised that gutters will require periodic cleaning to maintain their efficiency.

10 Internal Linings

10.01 - Walls

Walls shall be fixed in accordance with the manufacturer's recommendations. Provide recessed edge gypsum plasterboards of 10mm thickness or greater to all internal walls, except as required for wet areas, or other type of panelling as indicated in the Schedule and plans.

10.02 - Wet area linings

Wet area linings shall be of water resistant material for full wall height in accordance with NCC H4D2 Wet areas and NCC H4D3 materials and installation.

10.03 - Ceiling Linings

Ceiling linings shall be 13mm gypsum plasterboard or 10mm high–density plasterboard

The junction of walls and ceilings shall be set as required. Fix suitable cornice as identified in the Schedule, neatly mitred and set at all angles.

Provide back-blocking where three (3) or more consecutive recess joints are present in ceilings.

10.04 - Tolerances

Industry standards have established six (6) levels of acceptable finish for gypsum plasterboard. Unless otherwise specified in the Schedule, a Level 4 finish shall apply to all gypsum plasterboard surfaces.

Level 4 finish

Typical finish for domestic construction. It is used where smooth textured finishes and satin/flat/low sheen paints are used and illuminated by non-critical lighting. Gloss and semi-gloss paint finishes are generally not suitable over a Level 4 finish.

Tape to be embedded in joint compound and two separate coats of jointing compound to be applied and finished over joints angles and fasteners.

In critical lighting conditions, surface imperfections may still be apparent in a Level 4 finish.

Critical lighting is defined as natural or artificial light projected across a surface at a low incidence angle.

Non-critical lighting occurs when the light that strikes the surface is diffused and not parallel to that surface.

Level 5 finish

A Level 5 finish is for use in areas of severe or critical lighting and gloss or semi-gloss is used or where critical lighting conditions occur on flat or low sheen paints.

Level 5 finish is identical to Level 4 finish except for the addition of a skim coat; or finish coat towelled or sprayed with airless equipment over the entire surface to achieve a smooth finish.

11 Waterproofing

11.01 - General

From the drawings, identify the areas to be waterproofed.

Waterproofing to internal wet areas and balconies over habitable areas shall be in accordance with NCC H4D2 Wet areas and NCC H4D3 Materials and installation of wet area components and systems and AS 3740 Waterproofing of wet areas within residential buildings.

Improved waterproofing outcomes can be achieved by installing waterproofing to internal wet areas by following the Master Builders Association of NSW, *Guide to Internal Wet Area Waterproofing.*

Improved waterproofing outcomes can be achieved by installing waterproofing to external balconies by following the Master Builders Association of NSW, *Guide to External Waterproofing: Balcony Decks.*

Improved waterproofing outcomes can be achieved by installing waterproofing to planter boxes by following the Master Builders Association of NSW, *Guide to Planter boxes Waterproofing*

11.02 - Waterproofing System Selection
The waterproofing system should be selected according to the project requirements and the manufacturer's specification, taking account of product suitability, and compatibility with surface materials

11.03 - Compatibility of Materials
The waterproofer is to ensure component to component compatibility.

11.04 - Flood Testing
On completion and after the membrane has fully cured, floor waste outlets should be sealed and the area flooded with water to test for water leaks.

The height of the water should be 5mm below the overflow levels of the waterstops

11.05 - Protection
Membrane area shall be protected by barriers or signage until the membrane is fully cured.

12 Joinery

12.01 - Generally
All fixing out timber to be seasoned and free from defects which might affect appearance or durability. All timbers used are to be Dressed All Round (DAR), accurately cut and machined. Fixed mouldings and trims are to be properly mitred or scribed and secured. All surfaces must be free of machine marks and ready for painting. External joinery to be inherently durable and primed prior to fixing.

12.02 - Door Frames
Door frames shall be solid rebated frames, packed plumb and true and fixed securely to door opening studs or masonry. Metal door frames shall be installed to manufacture's recommendations.

12.03 - Doors
External doors are to be solid core or framed and glazed and not less than 2040 x 820 x 40mm thick. Front and rear external doors shall be hung with three 88mm (min) butt hinges of suitable finish and durability. Where external doors are sheeted with plywood, only waterproof plywood which is to be used. Top and bottom door edges are to be painted or similarly sealed prior to hanging.

Internal doors shall be not less than 35mm thick fitted with suitable door furniture and be installed with a clearance off the floor of 30mm unless otherwise specified. Double doors and sliding doors to be installed where shown on the drawings. Doors shall swing in the direction shown on the drawings.

12.04 - Windows
Aluminium and timber windows shall be manufactured and installed in accordance with AS 2047 Windows and external glazed doors in buildings. Windows are to be supplied with Performance Label attached confirming compliance with AS 2047 Windows and external glazed doors in buildings.

Windows shall be protected from mortar droppings.

Window flashings - Refer to 6.07 "Damp Proof Courses (DPC) and Flashings".

12.05 - Glazing
All glazing shall comply with NCC H1D8 Glazing, NCC H2D7 Glazing and AS 1288 Glass in buildings - Selection and installation. Glazing shall meet the BASIX commitments where identified on the drawings or in the drawing block.

12.06 - Storm Moulds
Provide storm moulds to external doors and windows and other openings.

12.07 - Architraves
Provide architraves to all window, door and other openings where necessary and of a type, finish and size as identified in the Schedule.

12.08 - Skirtings
Provide skirtings where required of a type, finish and size as identified in the Schedule.

Note: where skirtings are to be fixed over tiled floors, the skirting shall not be fixed down hard on the tile so as to restrict the movement joint.

12.09 - Kitchen Cupboards
Provide kitchen cupboards as included on the drawings and/or included in the Schedule.

Kitchen cupboards and bench tops shall be fabricated from water resistant materials.

12.10 - Linen/Storage Cupboards
If shown, to be constructed as detailed on the drawings.

12.11 - Tolerances

12.11.1 - Joints in Internal Fixings
All join in at mitre joints, butt joints and junctions of architraves, skirtings and mouldings shall be filled and sanded flush. Gaps whether filled or otherwise shall not exceed 1mm. After the first 12 months following handover and within the statutory warranty period, gaps exceeding 2mm are not acceptable.

12.11.2 - Bench tops

12.11.2.1 - Laminate
Scratches that cannot be seen from a normal viewing position that is at a distance of 600mm, viewed in non-critical light are considered acceptable. Notable scratches or chips should be reported on walk-through or within 10 days after occupation. Non–critical light means the light that strikes the surface is diffused and is not glancing or parallel to the surface.

12.11.2.2 - Natural Stone or Manufactured Stone
In natural stone, variations in colour, veining pattern and minor blemishes are acceptable if within the samples selected. In slabs with obvious veining, the slabs shall be installed with the vein trend running in the same direction unless otherwise specified.

Natural stone products supplied with a sealer coating will require resealing periodically.

Natural stone products should not be subjected to excessive weight, stress and extreme temperatures. Small areas at the front and rear of sinks, cook tops and the like should not be subjected to excessive weight or stress.

Scratches that cannot be seen from a normal viewing position that is at a distance of 600mm, viewed in non-critical light are considered acceptable. Notable scratches or chips should be reported on walk-through or within 10 days after occupation. Non–critical light means the light that strikes the surface is diffused and is not glancing or parallel to the surface.

13 Plumbing

National Construction Code Volume 3 – Plumbing Code of Australia

13.01 - General

All plumbing work is to be in accordance with the Plumbing Code of Australia and comply with the requirements of the Plumbing and Drainage Regulator or Local Authority.

All plumbing and drainage works must be carried out by a licensed plumber.

Ensure all inspections are carried out and certificates issued, including a Certificate of Compliance upon final inspection.

13.02 - Water Service

Unless otherwise specified, copper tubing shall be used for all internal plumbing work.

Where Polyethylene or similar approved piping products are specified, pipes and fittings are to be used and installed to the manufacturers' recommendations.

Taps and tap sets are to be selected by the owner and a Prime Cost (PC) amount is allowed for in the PC Schedule. Water saving devices shall achieve the BASIX commitments outlined in the BASIX Certificate.

13.03 - Hot Water Service

An approved water heater is to be installed in accordance with the manufacturers' instructions and located to ensure ease of maintenance.

The selection of hot water service shall comply with the BASIX commitments provided for water heating in the BASIX Certificate.

Where a solar system is specified, the solar collectors shall be position as identified on the drawings. Where storage tanks are located to the roof, the roof design will account for point loading.

13.04 - Stormwater Drainage

Guttering shall be designed and installed in accordance with NCC H2D6 Roof and wall cladding, NCC H1D7 Roof and wall cladding and AS 3500 Plumbing and drainage.

Locate downpipes as shown on the drawings. The number, size and location of downpipes shall be in accordance with AS 3500 Plumbing and drainage.

Stormwater pipes are to be a minimum of 90mm in diameter of unplasticized polyvinyl chloride material, and where not feeding rainwater tanks, shall drain to the street gutter or alternative retention device constructed to approval of the Regulator or Local Authority.

13.05 - Sanitary Plumbing and Drainage

Sanitary plumbing and drainage shall be undertaken in accordance with the Plumbing Code of Australia and the requirements of the Regulator or Local Authority.

Sanitary plumbing and drainage work shall be undertaken by an appropriately licensed person.

13.06 - Rainwater Tank

Rainwater tank shall be of a size to meet the BASIX commitment as identified on the BASIX Certificate. The rainwater tank shall be located as shown on the drawings.

Rainwater tank to be used for toilets and washing machines shall be connected by a licensed plumber. All tank outlets and pipes carrying rainwater must be appropriately labelled.

13.07 - Gas

All gas-fitting work is to be installed and connected in accordance with the supply authorities' requirements.

Gas plumbing shall be provided as detailed on the plans and to all fixtures requiring gas service from the point of supply.

Test all pipe work before concealment and securely fix pipe work to prevent movement.

In-ground gas lines shall be identified with plastic warning tape 300mm above and for the full length of the line while backfilling.

14 Electrical

14.01 - General

All electrical work shall be undertaken by a licensed electrician. Compliance with AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules) is a legal requirement.

A *Certificate of Compliance Electrical Work* shall be provided at the completion of the electrical work.

Confirm the position of the meter box. Single-phase power is to be provided unless otherwise noted in the Schedule.

Install all lights, power outlets and electrical fixtures nominated in the Schedule.

14.02 - Smoke Alarms

Smoke alarms shall be installed in accordance with NCC H3D6 Smoke alarms and evacuation lighting and comply with AS 3786 Smoke alarms using scattered light, transmitted light or ionisation.

Photo-electric smoke alarms should be the preferred type for installation in the path of travel between sleeping areas and exits.

14.03 - Solar PV

Installation must be compliant with AS/NZS 5033 Installation and safety requirements for photovoltaic (PV) arrays and AS3000 Electrical installations (known as the Australian/New Zealand Wiring Rules).

PV modules shall be compliant with IEC/EN61730 and either IEC/EN61215 or IEC/EN61646.

Grid connect inverters shall be compliant with AS 4777 Grid connection of energy systems via inverters, Part 2: Inverter requirements.

Solar panels are to be installed by either the licensed builder or licensed electrician. All electrical wiring and connections of the solar PV system must be undertaken by an appropriately licensed electrician.

Meters are to be installed by an Authorised Service Provider.

Where the location of PV modules is not shown on the plan, it will be the responsibility of the accredited installer to undertake an onsite assessment and identify the precise location for the modules. The assessment is to identify any overshadowing or other influences which may affect the operation of the installation.

A *Certificate of Compliance* for electrical installation work is to be issued upon completion and commissioning of the work.

15 Wall and Floor Tiling

15.01 - General

Provide wall and floor tiles as shown on the drawings and/or included in the Schedule.

15.02 - Surface Preparation

All tiling substrates shall be dry and free of dust, debris and deposits.

Very smooth trowel finishes on slabs; with slabs inadequately cured, releasing agent and curing compounds can lead to tile adhesion problems. Care should be taken where there is paint overspray on floors adjacent to walls.

The preparation of smooth trowel floors and floors which are contaminated should be undertaken in consultation with the builder, tiler and adhesive supplier and/or manufacturer.

Adhesive manufacturers' recommendations on surface preparation should be followed.

15.03 - Compatibility

Ensure tile adhesives are compatible with the waterproofing membranes used. Waterproofing membranes to be properly cured prior to tile laying.

Tile adhesives, primers and related products must be compatible. The use of mixed brand products is not recommended.

Selections of tile adhesives in wet areas are to be made in consultation with the builder, floor tiler and adhesive supplier and/or manufacturer.

15.04 - Movement Joints

Movement joints are to be provided in accordance with AS 3958.1 Ceramic tiles, Part 1: Guide to the installation of ceramic tiles to:

- Separate the tiled elements from fixed elements such as walls and columns;
- Over movement joints in the substrate; and
- In large tiled areas, immediate movement joints at evenly spaced locations at approximately 4.5 metres.

15.05 - Falls in Wet Areas

Grade floor tiles to floor wastes and elsewhere as required.

NCC 10.2.12

Where a floor waste is installed:

(a) the minimum continuous fall of a floor plane to the waste must be 1:80;

and

(b) the maximum continuous fall of a floor plane to the waste must be 1:50.

15.06 - Tolerances

15.6.1 - Australian Standard AS 3958.1 "Guide to the installation of ceramic tiles".

The installation of ceramic tiles is covered by Australian Standard AS 3958.1 Ceramic tiles, Part 1: Guide to the installation of ceramic tiles. This Standard is not referenced by the NCC and this Specification places no obligation that work and materials must comply with the Standard.

15.6.2 - Floor and wall tiles supplied by the owner

Faults and imperfections in tiles are the responsibility of the owner.

Installer is to discard any cracked or pitted tiles. The installer is responsible for defects related to poor workmanship.

Installer is responsible for the selection of adhesives and grouts and is not obliged to accept materials supplied by the owner.

16 Painting

16.01 - General

All paint and related products such as primers, sealers and fillers shall be compatible, suitable for purpose and used in accordance with the manufacturer's recommendations and the manufacturer's safety data sheets.

16.02 - Colour Selection

Unless specified elsewhere, colours are to be selected by the owner and shown in the Schedule.

16.03 - Preparation

All surfaces shall be prepared to the manufacturer's product recommendations. Final preparation shall be the responsibility of the painter/applicator.

16.04 - Spraying

Spray application to plasterboard is to be "backrolled"

If floor surfaces are to be tiled, ensure floor surface is protected from overspray.

16.05 - Completion

The contractor shall remove empty paint tins and associated waste from site and is to ensure the clean–up of equipment does not contaminate the site.

Where removed for painting, all fittings, door furniture, switch plates and the like to be refixed or re-installed.

Paint splashes, runs and drips are preferably to be removed during the course of the work or removed and repaired upon completion.

16.06 - Tolerances

16.06.1 - Quality Inspections

Paint finish inspections shall be undertaken in well-lit, natural or artificial light conditions, comparable to final anticipated light conditions. Inspections shall occur at a distance from the painted surface of 1.5 to 2 metres.