ELECTRONIC BLUEPRINT UPDATE

Architects, Engineers, Builders, Suppliers, Specifiers

Dear Building Professional
Thank you for receiving this bi-monthly ELECTRONIC BLUEPRINT, intended to keep architects, engineers, builders, suppliers, specifiers and certifiers informed of changes to the building regulations and standards, appropriate specifications and drawing details, and a range of building products that meet the particular requirements. Further detailed specifications and information are provided free-of-charge from our website, www.electronicblueprint.com.au. Please consult the website or contact us on http://electronicblueprint.com.au/wiki/tiki-contact.php

Sincerely,

Rod Johnston – Principal Author

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June 2009

Feature Articles		
	This Edition	Future Editions
Building Products – Manufacturers, Suppliers, Architects & Specifiers	New BCA Energy Efficiency Requirements – May 2010	• CodeMark Case Studies • BCA Structure • Alternative Solutions & DTS • Sustainability (LCA + Benchmarking) • Sustainability – Case Studies
Engineers & Architects – Design Considerations	Structural Framing	• Paving • Retaining Walls • Roofs, Walls, Cladding, Lining • Masonry • Concrete
Specifiers, Builders, Architects & Engineers – Specifications	Specifications for Reinforced Concrete Masonry Retaining Walls	• Paving • Structural Framing • Roofs, Walls, Cladding, Lining • Masonry • Concrete

Building Product Manufacturers, Suppliers, Architects & Specifiers
New BCA Energy Efficiency Requirements – May 2010

The ABCB (Australian Building Codes Board) has outlined its plans for increaseing the energy and greenhouse gas stringency of the BCA (Building Code of Australia). This article provides comment on only the principal points, and a more comprehensive presentation is available from the ABCB.

The scope of the BCA provisions will be extended from energy alone, to include greenhouse gas emissions, which are directly related to energy. In very broad terms, there will be a general increase in stringency:

- From 5 stars to 6 stars for housing
- From approximately 3 – 4 stars to 6 stars (average) and 5 stars (minimum) for other residential buildings
- A benefit/cost increase of 2 for other buildings.

The new provisions will not cover saving water, reducing resource depletion, minimizing land use, eliminating toxicity and the like. They will cover only the building operational energy and operational greenhouse gas liberation; they will not include considerations of embodied energy (or embodied greenhouse gas). This is quite a different approach from that of many other ecolabelling systems, which rely heavily on embodied characteristics, often ignoring operational energy effects; and place increased emphasis on other environmental factors (water, land, toxicity etc). Electronic Blueprint strongly supports the ABCB-BCA approach. See also the comment box below.

The proposed timetable for the new provisions is:

- Early June 2009 — BCA Text changes will be available
- Early September 2009 — RIS will be available
- Early December 2009 — The decision to proceed will be made
- January 2010 — Electronic BCA will be available
- February 2010 — Hard copy BCA will be available
- Early 2010 — Seminars etc
- 1 May 2010 — Formal adoption of revised BCA

Significant changes are:

- The DTS (Deemed-to-Satisfy) thermal resistance requirements have been increased to reflect the increased stringency. This may have a small effect on the DTS of some wall, roof and floor systems.

- The required thermal resistance tables for walls are now split in two – one for high thermal mass and the other for low thermal mass. This is a positive move, since it entrenches the thermal mass concept. However, it will still be affected by the general increase in required thermal resistance.

- There is to be a review of the requirements for the thermal break and colour of roofs and walls.

- There will be a review of Verification Method JV3.

- There will be “no trading” between various components. It is not yet clear what is intended here and what will be the effect.

- There will be a “tightening of exemptions and concessions”. It is not yet clear what is intended here, but it is likely to affect at least some of the heavy masonry concessions.

- There will be significant changes to the provision of hot water systems and air conditioning systems.

Why Do Building Product Suppliers Need CodeMark?

1. All building products must comply with the BCA (Building Code of Australia).

2. The first path to BCA compliance is via a relevant “deemed-to-satisfy” Acceptable Construction Practice or Acceptable Construction Manual, typically an Australian Standard.

3. If a DTS solution is not available, a second path to BCA compliance is via an “alternative solution”. This may be an “engineer designed” solution for each project, or via CodeMark.

4. Each state has regulations, ensuring that a CodeMark building solution cannot be rejected. For their own protection, local authorities are now insisting on either strict compliance with a relevant Australian Standard, or on CodeMark Certification.

5. The two principal requirements of CodeMark third-party certification are:
   - The manufacturer must have a properly functioning Management System (similar to ISO 9001), capable of delivering consistent product to predetermined specifications.
   - The nominated products must satisfy the nominated BCA clauses.

Why Must Ecolabels Be Benchmarked?

“…..there is a real danger that ecolabels may fail to provide enough precise data on the in-service performance for each product, under a range of applications and climates….. this could lead to poor decision-making and the selection of products, which appear to be environmentally friendly, but are, in fact, inappropriate for the actual application. ….“

“Benchmarking and Specification of Sustainable Building Products”, Johnston, R, Gogstad, P, & Woolcock, J, UAE, 2009

1. Environmental benchmarking is done by predicting the life-cycle environmental impact of a benchmark form of construction, predicting the life-cycle environmental impact of the proposed alternative, and comparing the two. A suitable benchmark is “….. the most-common form of construction satisfying the building regulations”.

2. Environmental benchmarking enables designers and specifiers to determine, at the pre-design stage, the scale of the environmental effects of substituting one product for another.

3. Environmental benchmarking uses full Life Cycle Analysis, including both embodied impacts (raw material, transport, manufacture, construction etc.) and in-service impacts.

For further information on this topic, please refer to www.electronicblueprint.com.au
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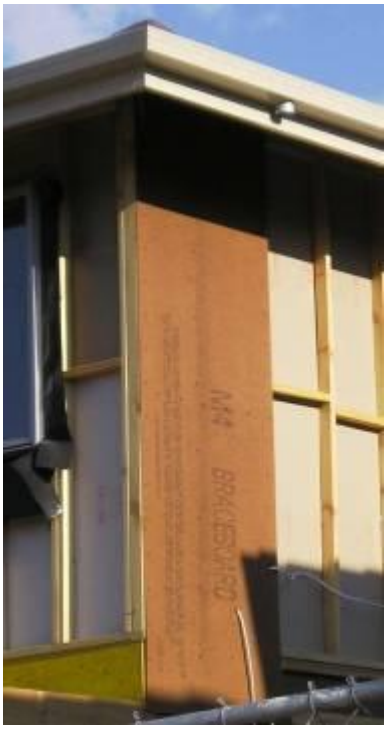
Engineers & Architects – Design Considerations
Structural Framing

Bracing
All buildings must be adequately supported against lateral wind loads, as specified in AS 1170.2 and AS 4055. In some cases, lateral earthquake loads may be a design criterion. The bracing requirements should be determined for the appropriate Region, Terrain Category, Topography and Shielding and recorded on the drawings by the design engineer.



The Engineer or Architect should ensure that all structural timber products comply with the relevant Standards, including the branding requirements, as specified in the BCA and in the specifications. As part of the quality management process, the Builder should provide documentation of such compliance and branding. There have been concerns raised in Australia over the compliance and branding of structural plywood. The relevant standards are AS 1720.1, AS 1684 and AS 2269, which set out requirements in respect of manufacture, grading, finishing and branding of structural plywood; as well as other properties for various stress grades. If structural plywood is not correctly branded, or if the branding indicates non-compliance with the specification, the plywood should not be used for structural purposes. Organizations accredited to certify such products, and the products certified to AS/NZS 2269, are listed on the JAS-ANZ website

References:

- Tasmanian Government Building Regulation Advisory Note 02/09, 1 June 2009 www.wst.tas.gov.au/building
- JAS-ANZ website: www.jas-anz.com.au
- Building Products Innovation Council www.bpic.asn.au

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Specifiers, Builders, Architects & Engineers – Specifications
Reinforced Concrete Masonry Retaining Walls

Further consideration should be given to the text highlighted yellow.

Australian Standards
All components and installation shall comply with the Building Code of Australia (BCA) and the relevant Australian Standards, including AS 4678, AS 3700, AS 3600 and the standards referred to therein.

Safety and Protection of Existing Structures
All excavations shall be carried out in a safe manner in accordance with the relevant regulations, to prevent collapse that may endanger life or property.

In the absence of regulations to the contrary, the following may be applied where

- Excavation is performed and remains open only in dry weather,
- There is no significant ground water seepage,
- The excavation remains open for no longer than two weeks,
- The back slope of the natural ground does not exceed 1 vertical in 6 horizontal,
- Bedding planes do not slope towards the cut, and
- There are no structures founded within a zone of influence defined by a line from the toe of the cut at 30 degrees for cohesionless material and 45 degrees for other material.

Natural material	Maximum height of cut, m	Maximum permissible unpropped batter, Vertical : Horizontal
Stable rock, sandstone, firm shale etc where bedding planes do not slope towards the excavation	0 to 3.2 m	1 : 0.4
	Over 3.2 m	Seek advice of Engineer
Materials with both significant cohesion and friction in its undisturbed natural compacted state	0 to 2.6 m	1 : 0.8
	Over 2.6 m	Seek advice of Engineer
Cohesive soils, e.g. clay, silts	0 to 2.0 m	1 : 1.2
	Over 2.0 m	Seek advice of Engineer
Cohesionless soils, e.g. Loose gravel, sand	0 to 1.4 m	1 : 1.6
	Over 1.4 m	Seek advice Engineer

In all other cases, the advice of the Engineer shall be sought.

Adjacent structures must be founded either beyond or below the zone of influence. Where there is risk of global slip around a slip plane encompassing the proposed retaining wall or other structures, or where there is risk of inundation by ground water or surface water, retaining wall construction shall not proceed until remedial action has been carried out.

Foundation and Bearing Pad
A qualified and experienced Geotechnical or Civil Engineer shall determine the capacity of the foundation material to resist global slip and to simultaneously support the horizontal and vertical loads, noted in the design schedule annexed to this specification. This shall be assessed when the excavation has revealed the nature and extent of the foundation material. If the existing foundation material does not have the specified properties or, has insufficient friction angle and cohesion to provide the requisite sliding and bearing capacity, it shall be removed and be replaced with an enlarged bearing pad with the following properties.

Lean-mix concrete - Mass concrete with a compressive strength f'_c of not less than 15 MPa; or

Cement-Stabilized Crushed Rock -Crushed rock conforming with the specification below with an additional 5% by mass of GP Portland cement thoroughly mixed, moistened and compacted; or

Compacted Crushed Rock

- Compacted density such that a conservative estimate of the mean is at least 2000 kg/m^3
- Effective internal friction angle such that a conservative estimate of the mean is at least 35^o
- Effective cohesion such that a conservative estimate of the mean is at least 3 kPa.

A well-graded low plasticity crushed rock complying with the following specification is deemed satisfactory for this application.

Nominal Size	20 mm
AS Sieve	% Passing
26.5 mm	100
19.0 mm	95 -100
13.2 mm	78 - 92
9.5 mm	68 - 83
4.75 mm	44 - 64
2.36 mm	29 - 47
425 μm	12 - 20
75 μm	2 - 6

Liquid Limit not exceeding 20.
Plasticity Index not exceeding 6.

Compaction shall be by mechanical plate vibrator to a minimum of 100% Standard Compaction.

Where there are significant variations of foundation material or compaction, soft spots, or where there is ponding of ground water, the material shall be removed, replaced and compacted in layers not exceeding 150 mm at a moisture content within 2% of Optimum Moisture Content (OMC) to achieve 100% Standard Compaction.

Trenches and footing excavations shall be dewatered and cleaned prior to placement of drainage material or footings such that no softened or loosened material remains. Place and compact the material in layers not exceeding 150 mm, to make up the levels. The levels beneath the wall shall **not** be made up with bedding sand or other poorly graded granular material that may permit ground water to permeate under the base of the retaining wall, except where drainage material is specified and an adequate drainage system is designed.

Retained Soil

The retained material shall have the properties set out in the annexure to this specification. If the existing retained material, within an envelope at 45^o (1 : 1 batter) from a point 300 mm behind proposed heel of the structure, does not have these properties or has insufficient friction angle and cohesion to remain stable at the design batter, it shall be removed and replaced with a material that is stable. Material with the following properties is deemed to be satisfactory:

- Compacted density such that a conservative estimate of the mean is at least 1900 kg/m^3
- Effective internal friction angle such that a conservative estimate of the mean is at least 32^o
- Effective cohesion such that a conservative estimate of the mean is at least 3 kPa.

These properties may be achieved by modification of suitable site materials (as advised by a suitably qualified Geotechnical Engineer) provided the properties are not injurious to any of the other materials in the structure.

Concrete

Concrete in the footings shall comply with AS 3600, strength grade N20, and maximum aggregate size of 20 mm. Concrete shall be subject to plant control testing.

Reinforcement

Reinforcement shall comply with AS/NZS 4671 and shall be:

- Deformed bars - 500 MPa, normal ductility (N)

- Square fabric, rectangular fabric and trench mesh - 500 MPa, low (L) or normal (N) ductility ribbed wires
- Fitments -500 MPa, low (L) or normal (N) ductility ribbed wires
- Round bar (eg R250 N10 for dowels) - 250 MPa round

Bar Chairs

Bar chairs shall be such that:

- reinforcement is positioned in the top half of the concrete slab
- reinforcement in footings has 40 mm in concrete in contact with unprotected ground and 30 mm to a sealed vapour barrier

Formwork

Formwork shall comply with AS 3610. Starter bars shall be held in position by a timber hob form, and controlled within a tolerance of +,- 5 mm through the wall and +,- 50 mm along the wall.

Curing Compounds

Curing compounds shall comply with AS 3799 and shall be hydrocarbon, solvent-based acrylic, water-based acrylic or wax-based acrylic. Wax-based compounds shall not be used in areas requiring the subsequent application of curing adhesives**.**

Concrete Blocks for Reinforced Masonry Applications

Unless specified otherwise, concrete masonry units for reinforced masonry applications shall comply with AS/NZS 4455 and the following requirements:

- Dimensional category DW4
- Salt attack resistance grade shall be:
  - General Purpose except as listed below for Exposure Grade
  - Exposure Grade where the masonry is:
    - subject to saline wetting and drying; or
    - in aggressive soils; or
    - in a severe marine environment; or
    - subject to saline or contaminated water, including tidal spash zones; or
    - in especially aggressive environments. e.g. subject to attack by corrosive liquids or gasses, or within 1 km of industry in which chemical pollutants are produced.
- Minimum characteristic compressive strength shall be as nominated by the engineer and not less than 15 MPa.
  The required strength depends on the the particular application. Refer to the manufacurer's design literature for guidance.
- Dimensions and core configuration shall be such that:
  - If units are intended to incorporate both horizontal and vertical reinforcement and are not protected both sides by a waterproof membrane, they shall be "H" or "Double U" configuration;
  - Units may be fully grouted and may be reinforced both vertically and horizontally;
  - Grout may flow easily around and enclose the reinforcement in all cores; and
  - Cover is consistent with the requirements of AS 3700 for durability, strength and fire resistance as appropriate.
- Mean Coefficient of Residual Drying Contraction shall be not more than 0.6 mm/m.
- If intended for face applications and exposed to the weather:
  - Permeability shall be not more than 2 mm/minute
  - Efflorescence Potential shall be Nil or Slight
  - Colour and texture shall be within an agreed range.

Cement

Cement shall be Type GP portland cement or GB blended cement complying with AS 3972.

Lime

Lime shall be hydrated building lime complying with AS 1672.1.

Water Thickener
Water thickener shall be methyl-cellulose based.

Sand
Sand shall be well graded and free from salts, vegetable matter and impurities. Sand shall not contain more than 10% of the material passing the 75 micron sieve. Sand within the following grading limits complies with this requirement and is deemed suitable for concrete masonry.

Sieve	Percent Passing
4.76 mm	100
2.36 mm	95–100
1.18 mm	60–100
600 µm	30–100
300 µm	10–50
150 µm	0–10
75 µm	0–4

Joint Material
Backing rod for control joints, expansion joints and articulation joints shall be expanded polystyrene tube or bead.
Expansion material shall be compressible.
Joint sealant shall be gun grade multi-purpose polyurethane sealant.
Control joints and articulation joints shall incorporate de-bonding tape.

Concrete Grout
Concrete grout shall comply with AS 3700 and have:
- a minimum portland cement content of 300 kg/cubic metre;
- a maximum aggregate size of 10 mm;
- sufficient slump to completely fill the cores; and
- a minimum compressive cylinder strength of 20 MPa.

Sub-surface Drainage
Sub-surface drainage shall be as nominated on the drawings by the designer. It shall consist of one of the following:
- Slotted PVC agricultural pipe, of diameter nominated on the drawings and not less than 100 mm.
- Polypropylene drainage cell, of diameter nominated on the drawings and not less than 30 mm.

Depending on the volume of groundwater expected, assessed by the Engineer at the time of construction, a geotextile sock may be required. If required, geotextiles shall comply with the specification “Geotextiles for Filters and Drains”.

Geocomposites
Geocomposites for filters and drains shall exhibit:
- Sufficient permeability to maximise the amount of water passing through the outer surface
- Sufficient void size, under load, to convey the required water flow to the stormwater system.
- Pore size small enough to block fine material from entering the drainage system, without compromising the permeability requirements
- Strength, toughness and abrasion resistance to resist damage during construction and service

Geocomposites shall comply with the specification “Geotextiles for Filters and Drains”.

Notes:
Permeability, Permittivity and Flow
The permeability properties of geotextiles are determined in accordance withAS 3706.9. This test measures the water flow through a sample of the subject geotextile under constant head

- Thickness of the sample t
- Head during test h = 100 mm
- Flow rate under 100 mm of head Q_{100}
- Permittivity $\psi = Q_{100} / h$
- Permeability $k = \psi t$

Flow may be unidirectional (only perpendicular to the geotextile) or may be multidirectional. This specification deals only with unidirectional flow and does not deal with problem soils. Several authors (Calhoun, Ogink, McKeand, Giroud, Schober and Teinol) provide recommendations for specifying the permeability, k, of a filter, ranging from 0.1 to 10 times the permeability of the soil. This will depend in part, on whether the soil is particularly coarse or particularly fine. In this specification, a value permeability, k, of the geotextile not less than 1 times the permeability of the soil has been adopted. In the case of important structures, or those where the permeability of the geotextile is critical, more precise methods and different specifications should be employed. This specification is not suitable for fine clay, and may not match the flow of water through coarse sands and gravels. The designer must consider variations to this specification in these circumstances.

Opening Size

Several authors provide recommendations for determining the maximum opening size of a filter. To prevent piping (drawing of fine soil particles into the filter), Calhoun recommends that the O_{95} of the geotextile filter should be not more than the D_{15} of coarse soils and not more than 200 µm of cohesive soils. The general limits adopted in this specification are as follows:

- For cohesive soil (D_{20} soil ≤ 75 µm), O_{95} geotextile should be between 150 µm and 250 µm.
- For non-cohesive soil (D_{20} soil > 75 µm), O_{95} geotextile should be between 80 µm and 250 µm.

To minimise clogging of a geotextile filter, the O_{95} opening size should be not less than 3 times the D15 of the soil. An alternative specification to minimise clogging is to require the Austroads G Rating (if available) to be less than 3.Design software available www.electronicblueprint.com.au/software.html

Geotextiles for Filters and Drains		
Geocomposites for filters and drains shall exhibit: • Sufficient permeability to maximise the amount of water passing through the outer surface • Sufficient void size, under load, to convey the required water flow to the stormwater system. • Pore size small enough to block fine material from entering the drainage system, without compromising the permeability requirements • Strength, toughness and abrasion resistance to resist damage during construction and service Geocomposites shall comply with the specification "Geotextiles for Filters and Drains".		
Function	Filter and drainage	
Typical location	Drain soil behind retaining walls and structures	
Protection to geotextile	The geotextile shall be protected against tear or puncture. Note 2	
Soil Type Note 1	Cohesive and other fine grained soils such as silts and some clays Note 3	Cohesionless soils such as some sands Note 3
Minimum Wide Strip Tensile Strength, in accordance with AS 3706.2, shall be as high as practical, but not less than ….. Note 2	7.5 kN/m	7.5 kN/m
Minimum Trapezoidal Tear Strength, in accordance with AS 3706.3, shall be as high as practical, but not less than .. .. Note 2	210 N	210 N
Minimum CBR Burst Strength, in accordance with AS 3706.4 ,shall be as high as practical, but not less than …….. Note 2	1,500 N	1,500 N
Pore Size O_{95} by dry sieving, in accordance with AS 3706.7, shall be in the range ……..	150 µm to 250 µm	80 µm to 250 µm

Permittivity, in accordance with AS 3706.9, shall be as high as practical, but not less than ……	2.0 sec^{-1}	0.7 sec^{-1}
Flow Rate under 100 mm Head, in accordance with AS 3706.9, shall be as high as practical, but not less than ……	100 $l/m^2/sec$	70 $l/m^2/sec$
Coefficient of Permeability, in accordance with AS 3706.9, shall be as high as practical, but not less than ……. Note 3	0.00001 m/sec (1×10^{-5} m/sec)	0.003 m/sec (3×10^{-4} m/sec)

Notes

1. This specification does not apply to "problem soils", defined as exhibiting one or more of the following:
   - Silty soils with hydraulic gradients greater than 3
   - Widely graded or gap graded particle size distribution
   - Dispersive clays and silts
   - Uniform silts and sands with a coefficient of uniformity under 3

2. The geotextile shall be protected against tear or puncture by either :
   - Avoiding fill with sharp angular aggregate, heavy compaction (over 95% standard) and fill depths over 3.0 m, or
   - Providing a protective layer of drainage aggregate not less than 50 mm thick

If these criteria are not met, the specified strength properties must be at least doubled.

3. In this specification, permeability, k, of the geotextile not less than 1 times the permeability of the soil has been adopted.
In the case of important structures, or those where the permeability of the geotextile is critical, more precise methods and different specifications should be employed. This specification is not suitable for fine clay, and may not match the flow of water through coarse sands and gravels. The designer must consider variations to this specification in these circumstances.

Drainage Fill

Drainage fill material shall be GP (poorly graded gravel) single sized gravel of nominal size 10 mm to 20 mm complying with the following specification.

Sieve	Percent Passing
26.5 mm	100
19.0 mm	70 - 100
13.2 mm	0 - 100
9.52 mm	0 – 0

Surface Sealing Material

The material used to seal the surface of the fill shall be compacted clay.
Alternatively, a 0.2 mm thick PVC membrane or a needle-punched bentonite liner overlaid by at least 150 mm of bulk fill material may be used in lieu of the clay.

Bulk Fill Material

Bulk fill material shall be uniform and of maximum particle size of 100 mm.

Positioning Reinforcement

Starter bars shall be tied into position to provide the specified lap above the top surface of the footing. The starter bars shall be held in position by a timber hob form and controlled within a tolerance of +,- 5 mm through the wall and +,- 50 mm along the wall.

Bar chairs shall be placed at one metre centres both ways to give the following clear cover. Chair bases shall be used to prevent sinking of the chairs. Unless specified otherwise on the drawings, structural laps and cover shall be as follows.

Required Cover

- 40 mm in concrete in contact with unprotected ground
- 40 mm in concrete exposed externally
- 30 mm to a sealed vapour barrier
- 20 mm to the internal surface

Reinforcement	**Required Laps**
Bars	500 mm
Fabric	2 cross wires overlapping
Trench mesh	500 mm

Two N12 corner bars 1.0 metre long shall be placed at all re-entrant corners.

Placing And Finishing Concrete

Unless noted otherwise on the drawings, reinforced concrete footings for retaining walls shall include a level concrete hob (or up-stand), through which vertical starter bars are placed and on which the masonry is built. Horizontal 50 mm diameter weep holes shall pass through the hob at 1.2 m maximum centres. The top of the footing immediately behind the hob shall be sloped at 1 in 100 to provide for the drainage pipe. All concrete shall be compacted by immersion vibrator. All concrete shall be cured using a sprayed curing compound.

Concrete surfaces shall be finished as noted below unless specified otherwise.

- Floor slabs - Steel float
- External paths, driveways and parking areas at less than 10% slope - Fine broomed steel float
- External paths, driveways and parking areas at greater than 10% slope - Coarse broomed steel float
- Vertical surfaces exposed in the completed building – All voids filled and rubbed back to provide a smooth surface
- Vertical surfaces not exposed in the completed building - Off form finish.

Drainage System

The drainage system shall consist of:

- Horizontal 50 mm diameter weep holes passing through a hob (or the reinforced masonry stem if appropriate) at 1.2 m maximum centres.
- A permeable drainage layer not less than 300 mm wide adjacent to the stem of the wall.
- A 100 mm slotted PVC agricultural pipe with geotextile sock, or equivalent system, draining to the storm water system
- For applications with high water table, 200 mm wide geocomposite strips at 2.0 m centres at the existing 1 : 1 batter, connected to the agricultural pipe drainage system.

Constructing Drainage Fill

Drainage fill shall be:

- Placed and compacted, by mechanical plate vibrator, to a minimum of 95% Standard Compaction
- Above and beside the drainage pipe with a minimum cover of 150 mm
- Behind the wall to a minimum width of 300 mm to within 300 mm of the top
- Protected by a geotextile envelope that completely isolates the drainage fill from the retained fill
- Adequately drained away from the retaining structures by the drainage system.

Constructing the Drainage System

The drainage pipe shall be positioned in the drainage fill at a minimum uniform grade of 1 in 100 over a length not exceeding 15 metres. It shall be connected to the storm-water system at the lower end of each run and shall drain positively away from base of the retaining wall. The drainage pipe shall be brought to the surface at the upper end of each run to facilitate future flushing, capped and its positioned marked.

Mortar

For general applications (except as listed for M4), Type M3 mortar shall be used, and shall consist by

volume of:

1 part GP or GB cement, 1 part lime, 6 parts sand (water thickener optional)
1 part GP or GB cement, 5 parts sand plus water thickener
1 part masonry cement, 4 parts sand (See Note 1)

For the applications listed below, Type M4 mortar shall be used, and shall consist by volume of:

1 part GP or GB cement, 0.5 part lime, 4.5 parts sand (water thickener optional)
1 part GP or GB cement, 4 parts sand plus water thickener
1 part GP or GB cement, 0-0.25 parts lime, 3 parts sand (water thickener optional)
1 part masonry cement, 3 parts sand (See Note 1)

- Elements in interior environments subject to saline wetting and drying
- Elements below a damp-proof course or in contact with ground in aggressive soils
- Elements in severe marine environments
- Elements in saline or contaminated water including tidal splash zones
- Elements within 1 km of an industry producing chemical pollutants.

Constructing the Reinforced Masonry Stem

The first course of a reinforced masonry wall shall consist of clean-out blocks (with only one face shell) to permit the subsequent removal of debris and mortar fins. The opening of the clean-out blocks shall face the soil embankment, except where there is insufficient access.

The blocks shall be positioned to provide 55mm cover from the face of the bar to the rear face of the blockwork. (This will allow 35 mm for the face shells of upper courses and 20 mm of cover within the grout).

Provide drainage throught the stem of the wall by;

- Horizontal 50 mm diameter weep holes at 1,200 mm maximum centres through a hob, or
- Horizontal 50 mm diameter weep holes at 1,200 mm maximum centres through the reinforced masonry stem.

Subsequent courses shall consist of H Block or Double U Block. Horizontal reinforcement placed centrally on the webs during the laying of the blockwork.

If blocks with webs flush with the ends are to be used, horizontal reinforcement shall be suspended above the webs on 15 mm mortar pack on the centre web only.

Mortar joints shall be 10 mm thick and shall be face shell bedded and ironed (unless a flush joint is specified for aesthetic reasons). Control joints shall be built into the masonry at joints in the footing, at significant changes in wall profile or at centres not exceeding 16 metres.

If the retaining consists of two leaves of cavity construction, suitable cavity ties shall be built in at centres such that the wet grout pressure does not cause spreading of the cavity. Ties shall incorporate 100 cogs at each end that shall bear snugly against the rebate in the blocks and shall be securely fixed by embedment in mortar. The following combinations are deemed to meet this requirement:

Maximum grout height	Tie	Maximum Spacing (Vertical x Horizontal)
2.0 metres	R6 (Grade 250)	400 mm x 400 mm

Where a retaining wall consists of a single leaf stem supported by a cavity stem, links shall be provided in the first joint below the junction of cavity stem and single leaf stem to prevent widening of the cavity. The following reinforcement is deemed to meet this requirement:

Maximum height	Shear reinforcement of single leaf stem
2.0 metres	SL62 Fab

Debris and mortar fins shall be removed by rodding and hosing out the cores.

Vertical steel reinforcement shall be positioned towards the rear of the cores to provide the cover noted above.
Vertical steel reinforcement shall be tied through clean-out openings with wire ties to the steel starter bars and fixed in position at the top of the wall by plastic clips before the placing of any grout.

When cleaning out and tying of steel are complete, the opening shall be blanked off with a timber form suitably propped to prevent movement. Alternatively blocks which incorporate purpose designed blanks may be used.

Concrete grout shall be placed in the cores either by pumping or, for small projects, by bucket. Grout shall be compacted so that there are no voids, using either a high frequency pencil vibrator or by rodding. (The main vertical bars shall not be moved to compact the grout.)

On completion of the grouting, capping blocks shall be installed (if required) and any control joints finished.

Constructing Bulk Fill Material
Bulk fill material shall be uniform and of maximum particle size of 100 mm.

Constructing Bulk Fill Material
Bulk filling material shall be placed and in layers not exceeding 200 mm at a moisture content within 2% of Optimum Moisture Content (OMC) to achieve 85% Standard Compaction.

At the end of each day's construction, the infill material shall be sloped such that any rainwater is directed away from the face of the retaining wall and to a temporary (or permanent) drainage system.

Constructing Surface Sealing Material And Catch Drain
The whole of the disturbed fill surface shall be sealed and drained by compacting a layer of surface sealing material at least 300 mm thick and in accordance with AS 4768. The drainage shall shed water away from the back fill and away from the toe of the retaining wall.

Tolerances
Unless specified otherwise for reasons of aesthetics or by the client or architect, all construction shall be within the following tolerances:

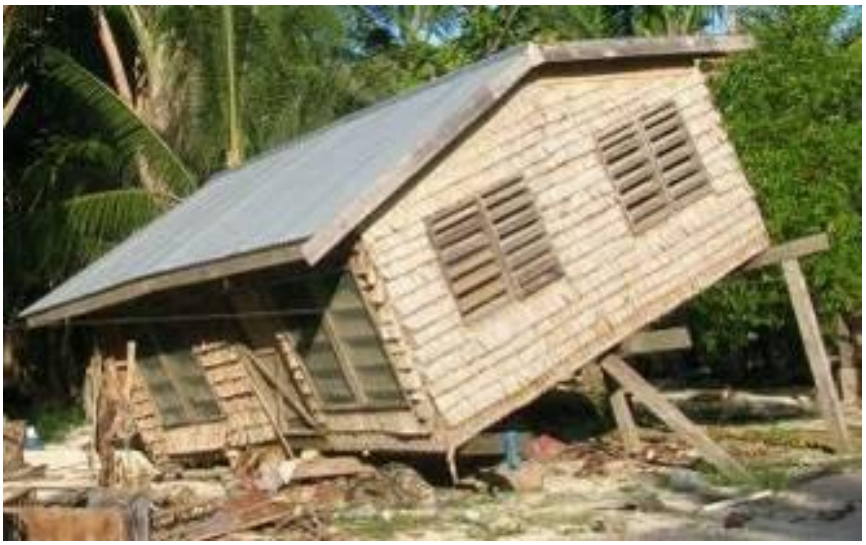
Element	Vertical Position	Horizontal Position	Vertical Alignment	Horizontal Alignment
Soil surface	± 100 mm	-	-	-
Facings and wall structures	± 50 mm	± 50 mm	± 20 mm in 3 m	± 20 mm in 3 m
Footings and supports	± 50 mm	± 50 mm	± 20 mm in 3 m	± 20 mm in 3 m

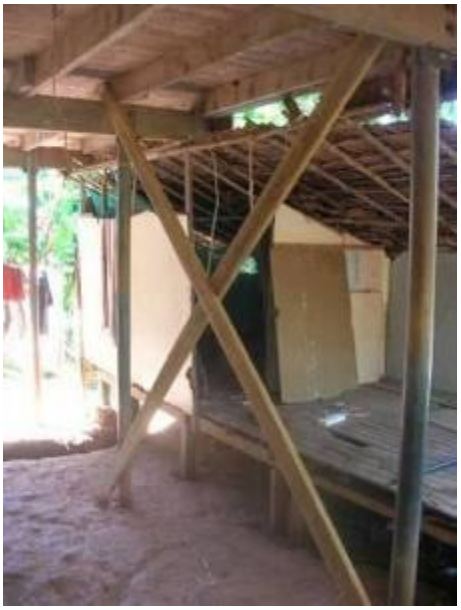
Additional reference: Concrete Masonry Association of Australia MA51 www.cmaa.com.au
For further information on this topic, please refer to www.electronicblueprint.com.au
Continuing Professional Development - Distance Learning Packages, rod@electronicblueprint.com.au

Partner Housing – Assisting Developing Communities in the Asia-Pacific Region

Electronic Blueprint is proud to support the voluntary work of Partner Housing Australasia (Building) Incorporated, a charitable organisation that provides pro-bono architectural, engineering and building services to developing communities throughout the Asia-Pacific region. Previous projects have involved design, documentation, help-desk, construction-auditing, proposal-preparation and construction for other NGOs and Governments; in Australia, India, Sri Lanka, Indonesia, Thailand, Solomon Islands, Kiribati, Timor Leste and other locations.

Client or Partner NGO	Current Projects and Activities
Emergency Architects – Solomon Islands 2009 – Current	Water and sanitation project for Ranongga, Solomon Islands
Divya Shanthi Trust 2009 – Current	Structural design of Baby Clinic Lingarajapuram (Bangalore, India)
Republic of Kiribati 2009 – Current	Mentoring of Kiribati engineer.
Emergency Architects 2008 – Current	Solomon Islands school reconstruction in Gizo - Design calculations and advice provided on roof trusses. Help desk service under way.





If you are an architect, engineer or builder, and you would like to assist our neighbours in less developed countries by providing pro-bono professional assistance; or to make a donation, please email partnerhousing@electronicblueprint.com.au or check the website www.phab.org.au .

Corrections

In the article, “House Construction in Bushfire-Prone Areas” in last Electronic Update, there were two small errors, which we wish to correct:

- ACT has adopted the latest version [of AS 3959]
- 1,090 K is equivalent to 817^{o}C.

Distance Learning Training for Builders, Designers, Principal Certifiers, Architects, Engineers

This two-year structured distance learning program (delivered in 12 modules), has been written and compiled to ensure practical, hands-on and relevant learning outcomes with a focus on:

- Design considerations
- Relevant standards and regulations
- Problems and solutions
- Specifications
- Suitable products
- Site control checklists
- Sustainability

The package consists of comprehensive notes, specifications, details and inspection schedules with full text, voice-over and illustrations on a CD ROM. The trainee may log onto the Electronic Blueprint website for additional information during the training session if preferred. The trainee may communicate with an expert tutor for further information, and must submit an assignment by on completion. This will be assessed by the tutor.

Summary of Structured Distance Learning Program			
Module 1	Site establishment & preliminaries	Module 7	Sustainability (Water Conservation) Drainage & plumbing Roof cladding Roof plumbing
Module 2	Masonry	Module 8	Paving Public kerbs, gutters, footpaths etc
Module 3	Sustainability (Energy Efficiency) Windows, doors & glazing Insulation	Module 9	Sustainability (Air quality & toxicity) Painting & coatings Cleaning
Module 4	Earthworks & site drainage	Module 10	Concrete
Module 5	Retaining walls Fencing Landscaping	Module 11	Loading Standards Structural steelwork Wall, roof & floor framing Carpentry, Joinery, Cladding & Floor Ceiling & wall lining
Module 6	Slip Resistance Floor & wall tiling Resilient floor coverings Carpets & soft furnishings	Module 12	Electrical installation Mechanical ventilation & services Kitchen Vehicular doors Window & door shutters Metalwork & balustrades

For further information in training packages, http://www.electronicblueprint.com.au/training.html or rod@electronincblueprint.com.au

Product Directory
Set out below are the suppliers, whose products are listed in the Electronic Blueprint specification. For further details on each product, http://www.electronicblueprint.com.au/proddirectoryhome.html

Alpha Coating Solutions	Denis.A@alphacoat.com.au
Astec Paints	peter@asteccoat.com.au
Nanovations	info@nanovations.com.au
Concrete Colour Systems	sarita@riversands.com.au
Connolly Key Joints	dsmith@connollykeyjoint.com
Duralok	steve@durlok.com.au
Elmich Australia	david.oliver@elmich.com
Ford Timbers	stuartmadill@fordtimbers.com.au
One Stop Building and Hardware	gina@osbh.com.au
Resene	gael@resene.com.au
Timbercrete	peter@timbercrete.com.au
Viridian	pcocker@csr.com.au
RAVEN Door & Window	neil.raven@raven.com.au
Root Barrier	rootbarrier@rootbarrier.com.au
Smartflo	billsanderson@smartflo.com.au
Nuplex Construction	stevent@nuplex.com.au
Cultured Stone	nick@cultured-stone.com.au
Fletcher Insulation	jbarnard@insulation.com.au
Matrix Industries	info@matrixindustries.com.au
Stramit Building	george.nickolas@stramit.com.au
Austech t/a Foamular	mnagle@austech.com.au
Adbri Masonry (C&M Brick Pty Ltd)	peter.hurley@adbri.com.au
Helifix (Australia)	sales@helifix.com.au
Origen Australia	choward@enduroshiled.com
Brunswick Sales	robertm@brunswicksales.com.au
Ensystex Australasia	sbroadbent@ensytex.com
Galvanisers Association	rosemary@agaa.com.au
NRG Greenboard	scott@nrggreebnoard.com
Advanced Concrete	hep@ecobrick.com.au
All Purpose Protection	(can not find this client)
Cossett Industries	Atownsend@cossett.com.au
Glassfence.com	manfred@glassfence.com.au
Matrix Industries	info@matrixindustries.com.au
Pasco	info@pasco.net.au
Rynat Industries	leonaparamor@rynat.com
Shamrock Stone Walls	colm@shamrockstonewalls.com
Slopmop Recycling	spraak@ozemail.com.au
Style FLooring	ian@styleflooring.com.au
Universal Anodisers	anodise@bigpond.com
Skydome Skylight Systems	mbonello@skydome.com.au
Matrix Industries Pty Ltd	info@matrixindustries.com.au
Ellem Centravac	ellem@netspace.net.au

Who's working for you? III

Independent Product Development Alliance

"Most building product manufacturers do not understand the purpose of CodeMark, or, more importantly, do not know how to efficiently implement the management and production controls that enable them to achieve CodeMark certification. Promotion of technically complex products also presents an often unmet challenge."

The Integrated Product Development Alliance has been formed to keep your product at the forefront of complex changes to Building Regulations and Australian Standards with a comprehensive approach to all aspects of product development, specification, certification and marketing of building products.

Expertise covering the following areas;

- ❑ Market assessment and technical specification
- ❑ Product development and testing
- ❑ Codemark certification
- ❑ Targeted marketing

The Integrated Product Development Alliance draws on the expertise of the following field leaders;

* CMS (Construction Marketing Services)
19 years in the business of strategic marketing and representation of suppliers' building products

* ELECTRONIC BLUEPRINT
CodeMark Consulting, Specifications & Details, Compliance Planning, Electronic Manual and Training

* Quasar Management Services
Specialist Consulting Engineer (ACEA Member) drawing on over 35 years experience

* Global-Mark
Third Party Quality Assurance Cerification; Product Certification, CodeMark Cerification

* Mahaffey Associates Pty Ltd
Construction materials technology & testing; NATA accredited laboratory

WHO we are...

CMS (Construction Marketing Services)
Contact Buddy Warner on 02 9906 1466
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ELECTRONIC BLUEPRINT
Contact Karen Bloomfield on 02 4360 2255
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Quasar Management Services
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