MASONRY STRUCTURES DESIGN WORKSHOP (to AS3700-2011)

DAY 1

8.30 – 9.00 Registration

9.00 - 10.30 Session 1 – Masonry Materials for Clay, Concrete & AAC Units

Raw Materials
This session deals with the materials that are used to construct clay, concrete and AAC masonry structures. This includes cement types (GP, GB and Masonry cement), lime, SCM's (eg flyash), sand types and grading (beach, brickies and river sand), aggregates (eg basalt, scoria), water thickeners, admixtures (eg air entraining agents). It will also cover the various requirements for grouts used in hollow core masonry construction. A quick overview of how these materials are manufactured (eg clay vs concrete vs calcium silicate vs AAC) to give attendees a better understanding of the engineering properties of the various types of masonry available in the marketplace (including adobe earth bricks).

Masonry Units
This second part of this session deals with the various type of masonry units that are in the marketplace, their function and code identification (eg 20.01 hollow blocks vs 20.42 Notch vs 20.48 H block). These include extruded vs pressed clay bricks vs hollow unit clay bricks, concrete bricks and hollow core concrete masonry blocks (including the different types of units available in various Australian states). The session explains how masonry unit strength is different to masonry wall strength.

Morning Tea 10.30 – 11.00

11.00 - 12.30 Session 2 – Mortars & Renders, Durability, Testing, Cleaning

Mortars, Renders, Oxides
The session looks at the various mortar mixes required to satisfy AS3700-2011 (ie M1, M2, M3, M4) and the factors affecting the choice of these mortar classifications. Factors such as exposure to the elements (protected, general purpose, exposure (Mild, Moderate, Marine, Industrial) is addressed. The session then focuses on the various types of render mixes that are recommended (eg CIA publication "Render Finishes") including problems that can occur when the incorrect mix is used especially under adverse dry weather conditions. Colour oxides used in both mortars and renders will be outlined (ie colour vs quantity). The session will cover the various methods available for cleaning brickwork. Mortar restoration methods (eg pointing) will also be shown.

Durability & Moisture
This topic looks at the various exposure classifications (eg industrial, marine) and how they dictate the choice of mortar class used (eg M4), component class (eg R4) and cover to reinforcement (all in accordance with Table 5.1 AS3700-2011). Parameters such as masonry unit suction and moisture absorption plus salt crystallisation and attack, waterproofing options and masonry cleaning will be covered.

Testing & Failures
The third part of this session deals with a few of the tests carried out on mortar and masonry units eg scratch test (vs chemical analysis), masonry compression tests, bond wrench tests, modulus of rupture. Test results of concrete unit shrinkage vs clay unit expansion will also be outlined.

Lunch 12.30 – 1.30 (provided at venue)

1.30 – 3.00 Session 3 – Joints (slip, articulation, mortar), Wall Ties, DPC, Flashing, Lintels

Joints, Wall Ties & DPC
Topics covered include mortar joints (raked vs flush); brick bond patterns (eg stretcher vs stack bond), corbelling, perpends, articulation joints (in accordance with Table 4.3 AS3700-2011). The spacing and choice of wall ties (L, M, H) will be covered with respect to their strength and durability requirements to satisfy AS2699 and AS3700 (eg R1-R4 class, plain vs galvanised vs stainless). Damp Proof Course and Slip Joint materials (in accordance with AS/NZS 2904) will also be addressed.

Lintels
Steel and reinforced masonry lintels will be covered including topics such as load distribution, arching, galvanising, safe load lintel tables, composite action, propping, angle vs T-beam vs flat bar choices, lintels for various construction systems (Type A -M/Veneer, Type B -Cavity, Type C -Metal Roof, Type D -Tiled Roof).

Afternoon Tea 3.00 – 3.30

3.30 - 5.00 Session 4 – Acoustic and Thermal Properties of Masonry Walls

Acoustic Properties
The first part of this session addresses basic acoustic properties of masonry walls and enclosures. The basics of mass vs frequency, sound transmission class (STC), sound transmission levels (STL) and sound reduction index (R w and C tr), absorption coefficients, will be explained. Other factors such as flanking, impact, openings and the effectiveness of double glazing will be explained.

Thermal Properties
The second part will address the properties of clay and concrete bricks and blocks and AAC that need to satisfy both thermal resistance (R values) and capacitance for energy efficiency. Topics such as thermal mass, thermal lag, heat flow, conductivity and resistivity will be explained. Following the outline on acoustic and thermal properties, the various masonry brick and block systems (Clay vs Concrete vs AAC) which satisfy BCA requirements will be outlined.

DAY 2

9.00 – 10.30 Session 5 – Unreinforced Masonry Design (including Masonry Veneer & Cavity Walls)

Structural Design
This session addresses the structural design of grouted and ungrouted masonry walls for vertical compressive loads, concentrated loading, one way bending (vertical and horizontal) and two-way bending, in plane and out of plane shear. The effects of modes of failure, slenderness for walls will be covered for both 'simple rule' requirements and 'refined methods' as outlined in section 7 of AS3700-2011. Parameters such as effective and minimum eccentricity, lateral instability and local crushing, perpend spacing, wall stiffening effects using engaged piers (in accordance with table 7.2 from AS3700-2011) will be addressed.

Masonry Veneer & Cavity Walls
This session specifically looks at masonry veneer and cavity (double brick) design and construction in the various Australian states including the relevant AS3700-2011 code requirements for these forms of construction.

Tutorials will follow (with worked solutions).

Morning Tea 10.30 – 11.00

11.00 - 12.30 Session 6 – Reinforced and Prestressed Masonry Design

Reinforced Masonry
The session will start by addressing the basics of reinforced concrete design then apply this to reinforced masonry design. All the formulas in the AS3700-2011 code will be explained with worked examples. This includes reinforced clay, concrete and AAC masonry subjected to Compression, Bending and Shear. Detailed worked examples will be provided during the session followed by a 15 min tutorial exercise on reinforced masonry design at the end of the session (with worked solutions)

Prestressed Masonry
The last part of this session will briefly address basic prestress design of both solid units and hollow masonry units post-tensioned with 1870 MPa grade tendons. Topics include losses, design of members in compression, tension, bending, in plane and out of plane shear. The properties of prestressing strands will also be covered.

Lunch 12.30 – 1.30 (provided at venue)

1.30 – 3.00 Session 7 – Concrete Blockwork Masonry Retaining Wall Design

Soil Parameters
It will start by explaining the basics of soil properties (eg cohesive vs cohesionless soils, angle of internal friction, cohesion values, effective vs undrained stress, active vs passive loads. It will then go through the various design models (eg Rankine-Bell vs Coulomb) and then address the limit state failure modes (eg sliding vs overturning vs slip vs translation vs bearing) as well as load factors for both effective and undrained soil properties.

Retaining Wall Design
This session will outline the basic principles of designing a masonry wall to retain soil loads as well as dead and live loads. It will deal specifically with the design of masonry retaining walls in accordance with AS4678-2002. Detailed worked examples will be provided during the session followed by a 15 min tutorial exercise at the end of the session (with worked solutions)

Afternoon Tea 3.00 – 3.30

3.30 – 5.00 Session 8 – Masonry Design addressing Fire and Earthquake

Fire Design
The first part of this session deals with the design of clay, concrete and AAC masonry for the effects of fire. This will include an explanation of how the % of basaltic aggregate affects the maximum slenderness ratio of unreinforced vs reinforced masonry. It also deals with basic fire design and masonry wall construction in particular addressing the use of scoria and flyash in masonry units.

Topics such as temperature vs time, fire rating period and fire resistance levels (ie Structural Adequacy, Integrity, Insulation) will be explained and compared to the Fire Resistance requirements of Section 6 of the AS3700-2011 code. The effects of chases and recesses on masonry and fire will also be outlined.

Earthquake Design
The second part of this session addresses the basic requirements for masonry to satisfy the earthquake provisions of the AS3700-2011 code (Section 10) and AS1170.4. The basics of earthquake design such as structural ductility factor (μ) and performance factor (Sp) will be explained. Other basics such as Hazard factor (acceleration) and soil classification will be outlined. This session will then look at basic earthquake design of masonry addressing the 'deemed to comply detailing' of buildings up to 15m high

5.00 - 5.15 - Feedback sheets and Certificates of Attendance will be handed out.

SPEAKER

Paul J. Uno BE MBdgSc MIE(Aust) CPEng

Director - Cement and Concrete Services

Paul Uno has over 30 years experience in the design and construction industry. He has worked for companies such as CSR Readymix, Transfield, Boral, Dept. of Housing, Australian Institute of Steel Construction, HH Robertson and the Cement and Concrete Association of Australia.

As a consultant he has been involved in many inspections over the years and written numerous reports on why structures have failed.

He has been a member of the American Concrete Institute since 1992 and a member of the Concrete Institute of Australia since 1982. At present he is a consultant, a presenter for Cement and Concrete Services as well a University senior lecturer.

He currently lectures in Properties of Materials (Concrete) at Civil Engineering, Sydney University as well as lecturing at UNSW in the faculty of Built Environment in both Construction Science (Materials) and in Building Structures (Concrete & Structural Steel Design).

Who should attend

Engineers (Structural/Civil/Environmental), Project & Maintenance Managers, Local Council & State Government staff handling tender-contract documentation in this area, Concrete Suppliers, Repair Contractors, Suppliers & Builders.

Material Provided

Powerpoint course notes and other papers will form the course notes. Registrants are also encouraged to purchase a copy of the Masonry Structures Code as this document will also be referred to during the course of the seminar.

Professional Development

Attendees may be credited towards IE Aust Continuing Professional Development (CPD) requirements. Members of IE Aust are required to undertake a minimum of 150 hours of equivalent CPD every 3 years.

Further Information

Contact Joanne from Cement & Concrete Services on mobile 0413-998-031 or Phone (02) 9899-7447 or Fax (02) 9899 5995 for further information regarding this course.

Email: info@cementandconcrete. com
Website: www.cementandconcrete.com

Calculators Required

VENUE

* Brisbane	Mercure Hotel cnr Ann St & Nth Quay, Brisbane QLD (07) 3237 2300
* Melbourne	Hotel Grand Chancellor, 131 Lonsdale St, Melbourne VIC Ph: (03) 9656-4000
* Sydney	Stamford Grand, cnr Herring & Epping Rd, North Ryde NSW Ph: (02) 9888-1077
* Perth	Comfort Inn Wentworth Plaza, 300 Murray St, Perth WA Ph: (08) 9338-5000

REGISTRATION FORM

Please return to:
Cement & Concrete Services (Attn: Joanne)
Masonry Design Workshop
PO Box 913 Baulkham Hills NSW 1755
Tel: 02 9899 7447 Fax: 02 9899 5995 Mob: 0413 998 031
Email: info@cementandconcrete.com

I / We wish to attend the **Masonry Design Workshop at**

		tick
• Brisbane QLD	Mon 12 + Tue 13 March 2012	☐
• Melbourne VIC	Wed 21 + Thu 22 March 2012	☐
• Sydney NSW	Wed 28 + Thu 29 March 2012	☐
• Perth WA	Wed 5 + Thu 6 September 2012	☐

	Number		Total
Two Day Course		@ $1,150	
AS3700 Masonry Structures Code		@ $210	

Total Payment ☐ Cheque $

[Cheques payable to 'Cement & Concrete Services' note GST already included]

Name _____

Company _____

Street / PO Box _____

Suburb _____ Postcode _____

Ph (__) _____ Fax (___) _____

Email _____

Person Handling Payment (please print) _____

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Cardholders Name _____

Expiry Date ____/____ Signature _____

NB: Cancellations made more than 5 working days prior to a course will incur a 20% processing fee of the full registration amount. Cancellations made 5 working days or less will incur forfeiture of the full registration fee.

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