LIQUID RETAINING STRUCTURES DESIGN WORKSHOP

This full day workshop is primarily aimed at design engineers and anyone with a technical background who needs to be able to either perform simple structural designs or design checks on any form of liquid retaining structure whether it be water retaining or otherwise. The interest in desalination plants as well as the effects of prolonged droughts has focussed attention on tank design and ensuring that these tanks are designed and constructed correctly so that the needs of the community will be addressed for years to come.

The workshop is also appropriate for swimming pool construction as this type of structure needs to be able to withstand the extremes of prolonged drying conditions, high evaporation rates and the need to empty and fill tanks without the problems of crack initiation, efflorescence and other such durability issues during this period.

PROGRAMME

8.30 – 9.00 Registration

9.00 – 10.30 Concrete Properties & Durability Issues

This session deals with the various cement and concrete materials that are required to produce water tight & durable concrete structures. Materials such as low shrinkage cements, silica fume, flyash and slag blends, carbonation and chloride ingress into various concrete grades are all addressed. Causes for concrete cracking will be addressed in particular plastic shrinkage cracking, plastic settlement cracking and semi-plastic thermal cracking. Mix designs required for correct pumping or spraying of concrete (in accordance with Z12, EFNARC and ACI 506R) will also be addressed.

10.30 – 11.00 Morning Tea

11.00 – 12.30 Australian and Overseas Design Standards

The appropriate Australian and overseas Standards (including various State Water Authorities) will be addressed e.g. AS3735 (Liquid Retaining Structures Code), AS 2783 (Swimming Pool Code), CIRIA 91 and CIRIA C660 (Early Age Thermal Crack Control in Concrete), WSA (Water Services Association), BS8007 (previously incorporated in BS5337) and PCA-USA. Crack width criteria will be addressed in particular showing the reasons for certain maximum crack width sizes and the testing that has been done to establish these values. The effects of surrounding materials and environment will be considered including the quantification of these effects via indices such as the Ryzner Index and Langelier Saturation Index (as referenced in AS3735). Typical mix designs and minimum w:c ratios for water retaining structures will be covered (including state of the art admixtures e.g. polycarboxylate ethers)

12.30 – 1.30 Lunch - (*Sit down - Hot and Cold Buffet*)

1.30 – 3.00 Structural Design

This session will primarily address the methods of simple design to either hand check or carry out a simple structural design for circular and rectangular tank wall and floor design using h2/dt vs M charts and 'beam on elastic foundation' theory. Details such as hoop stress and hoop reinforcement, vertical stress and vertical reinforcement as well as maximum crack width and crack control will be explained. Methods of quantifying crack width using appropriate crack width formulas will be addressed as well as looking at cracking caused by excess heat differential in thick walls and floors (in accordance with the new CIRIA C660-2007 publication). Tutorial exercises will allow attendees to carry out quick hand checks on wall thickness and reinforcement required to satisfy tank actions (liquid loads), base conditions (rigid vs free) and soils.

3.00 – 3.30 Afternoon Tea

3.30 – 5.00 Construction Issues

This session will focus on key areas that should be addressed on site to ensure that cracking does not occur due to construction oversights. Issues such as correct choice of formwork (timber vs steel), blowhole minimization, formwork removal timing permeable form-liners, correct choice of vibrator, evaporation control, concrete testing regime, water-stops (both hydrophilic and hydrophobic) and joints (including dowelled and key joints) will all be addressed. Tank repair options if cracking does occur will be addressed including material choices (epoxy, polyurethane, vinyl ester).

5.00 - 5.15 Certificate of Attendance and Feedback sheets

CALCULATORS REQUIRED

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.

He was involved with structural design of water tanks whilst engaged with Boral Everlast Tanks and then with Transfield during his early design years. In the past 30 years he has been involved in design checking other engineer's tank designs as well as assessing the reasons for cracks in many existing or partially constructed concrete tanks. Construction companies in this area often engage him as an outside consultant to review all aspects of the specification, design and construction phases of tank construction.

REGISTRATION FORM

Please return to:
Cement & Concrete Services (Attn: Joanne)
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 **Liquid Retaining Structures Design Workshop** at

		tick
• Sydney (NSW)	Tue 11 May 2010	☐
• Melbourne (VIC)	Mon 21 June 2010	☐
• Brisbane (QLD)	Wed 7 July 2010	☐
• Perth (WA)	TBA	☐

	Number		Total
One Day Course (Includes Handouts & Meals)		@ $ 475	

Total Payment ☐ Cheque $
[Cheques payable to 'Cement & Concrete Services' note GST already included]

Name _____

Name _____

Company _____

Street / PO Box _____

Suburb _____ Postcode _____

Ph (___) _____ Fax (____) _____

Email _____

Person Handling Payment (please print) _____

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Expiry Date ____/____ Signature _____

NB A 20% processing fee applies to registration cancellations made earlier than 5 working days before the course date. Cancellations made 5 working days or less incur forfeiture of the entire registration fee. No discounts apply.

For more information on all courses download full brochure from www.cementandconcrete.com - NB A 20% processing fee applies to registration cancellations made earlier than 5 working days before the course date. Cancellations made 5 working days or less incur forfeiture of the entire registration fee. No discounts apply.