



**PAUL UNO** BE MBdgSc MIE(Aust) CPEng NER RPEQ APEC Engineer IntPE(Aus)

- Over 40 years of experience in the design and construction industry.
- Part-time Senior Lecturer – UNSW and University of Sydney
- Inspected many concrete and clay masonry structures and written numerous reports on why masonry structures have failed.



## PROGRAMME (8.30 - 9.00 Registration)

### 9.00 - 10.30 Session 1

- **MASONRY MATERIALS**
- **CLAY, CONCRETE, AAC, MORTARS, RENDERS**

#### Raw Materials

- Materials used to make clay, concrete and AAC masonry structures.
- 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).
- Requirements for grouts used in hollow core masonry construction.
- How these materials are manufactured (eg clay vs concrete vs calcium silicate vs AAC)

#### Masonry Units

- Types of masonry available, their function and code identification (eg 20.01 hollow blocks vs 20.42 Notch vs 20.48 H block).
- 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).
- How masonry unit strength is different to masonry wall strength.

#### Mortars, Renders, Oxides

- Mortar mixes required to satisfy AS3700-2018 (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)]
- Recommended types of render mixes (eg CIA publication "Render Finishes")
- Problems that can occur when the incorrect mix is used especially under adverse dry weather conditions.
- Colour oxides used in mortars and renders (ie colour vs quantity).
- Methods for cleaning brickwork and mortar restoration (eg pointing)

### 10.30 - 11.00 Morning Tea

### 11.00 - 12.30 Session 2

- **DURABILITY, TESTING, CLEANING, JOINTS, WALL TIES, DPC, FLASHING, LINTELS**

#### Durability & Moisture

- 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 (in accordance with Table 5.1 AS3700-2018).
- Masonry unit suction and moisture absorption plus salt crystallisation and attack, waterproofing and masonry cleaning.

#### Joints, Wall Ties & DPC

- Mortar joints (raked vs flush); brick bond patterns (eg stretcher vs stack bond), corbelling, perpends, articulation joints (in accordance with Table 4.3 AS3700-2018).
- 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).

#### Testing & Failures

- Tests 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.

#### Lintels

- Steel and reinforced masonry lintels.
- Load distribution, arching, galvanising, safe load lintel tables, composite action, propping, angle vs T-beam vs flat bar choices, lintels for various construction systems.

### 12.30 - 1.30 Lunch (Provided at Venue)

### 1.30 - 3.00 Session 3

- **UNREINFORCED MASONRY DESIGN**  
(including Masonry Veneer & Cavity Walls)

#### Structural Design

- 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, and joint articulation.
- The effects of modes of failure, slenderness for walls for both 'simple rule' requirements and 'refined methods' as outlined in section 7 of AS3700-2018.
- Effective and minimum eccentricity, lateral instability and local crushing, perpend spacing, wall stiffening effects using engaged piers (in accordance with table 7.2 from AS3700-2018).

#### Masonry Veneer & Cavity Walls

- Masonry veneer and cavity (double brick) design and construction in the various Australian states including the relevant AS3700-2018 code requirements for these forms of construction.
- Tutorials will follow (with worked solutions).

### 3.00 - 3.30 Afternoon Tea

### 3.30 - 5.00 Session 4

- **REINFORCED MASONRY DESIGN**

- Reinforced concrete design applied to reinforced masonry design.
- Explanation of all the formulas in the AS3700-2018 code (with worked examples).
  - This includes reinforced clay and concrete masonry subjected to Compression, Bending and Shear.
- Tutorial exercise on reinforced masonry design at the end of the session (with worked solutions).

### 5.00 - 5.15 Certificate of Attendance & Feedback sheets



**CALCULATORS REQUIRED**

#### COURSE COST

- 1 day course – **AUD\$760 pp**

#### DATES, VENUES & REGISTRATION

- Registration form (back of catalogue)
- Visit our website [www.etia.net.au](http://www.etia.net.au)

#### FURTHER INFORMATION

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