RESIDENTIAL SLABS & FOOTINGS DESIGN WORKSHOP

ENGINEERING TRAINING INSTITUTE AUSTRALIA

PAUL UNO *BE (Syd) MBdgSc (Syd) MIE(Aust) CPEng NER RPEQ*

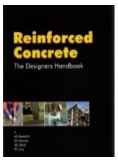
- Over 40 years of experience in the design and construction industry (eg CCAA, Dept Housing, ASI, Boral)
- UNSW Sessional Senior Lecturer–Construction Mgt (prev P/T Snr Lecturer, Civil Engineering - Uni of Sydney)
- Inspected many concrete slabs & footings. Written numerous reports for lawyers on why slabs have failed.
- Presented engineering training courses around Australia since 1998 and now also presenting in NZ

Recommended Text:

Reinforced Concrete: The Designers Handbook

(2015 Revised Edition)

Beletich, Hymas, Reid & Uno



WORKSHOP SUMMARY

This course is aimed at civil and structural engineers who wish to design residential slabs and footings by basic engineering principle or to the current Australian Standard AS2870-2011 (which is referenced in NZS 3604 Section 17, Expansive Soils, Building Code B1).

This workshop will cover many relevant topics relating to domestic concrete slabs and footings over the full day period.

Registration (8.30 - 9.00)

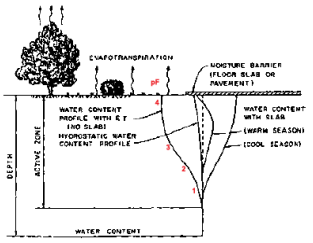
9.00 - 10.45 Session 1
- SOIL PROPERTIES AND SOIL SUCTION
(including the effects of Shrink-Swell)

- Clay mineralogy and swelling potential (Kaolinites, Illites, Montmorillonites)
- Clay cracking potential eg 2:1 vs 1:1 clay types
- Expansive clays distribution map for Australia
- Soil Salinity vs Soil Sodicity and effect on Soil Swelling vs Concrete Degradation
- Soil Suction parameters (Matric vs Osmotic suction) vs Total Soil suction (pF scale)
- Effects of Sulphates in soil
- Soil Electrical Conductivity Extract Ece (dS/m) vs Osmotic Suction values (kPa)
- Cation Exchange Capacity (CEC) & Activity ratios (AR) for the various clay types
- Thornthwaite Moisture Index (TMI) vs Soil Suction Change Design Depth (H_s)
- Atterberg Limit Tests vs Shrink vs Swell Tests (as per AS/NZS 1289)
- Correlation regression: Shrink-Swell Test vs Atterberg limits (eg LL, PL, PI & LS)
- Shrink-Swell Index (I_{ss}) Soil properties
- Soil Classifications (S, M, H1, H2, E)
- Site Classifications (including P sites)
- Tutorial 1 (Soil Properties)

10.45 - 11.00 Morning Tea

11.00 - 12.30 Session 2
- SITE CLASSIFICATION AND SWELLING POTENTIAL
(including effect of Trees and Cut/Fill)

- Determination of Site Classifications (including P sites), Soil Suction Change Design Depth (H_s), and Characteristic Surface Movement (y_s)
- Example on calculating the surface movement y_s using soil shrinkage index values, suction values, soil layer thicknesses to then achieve a site classification (eg M, H1, H2, E)
- Determination of Surface Movement (y_s) and Suction Design Depth due to Trees (y_t) & (H_t)
- Design suction change profiles
- Determination of Crack Depths
- Effect of Cut and Fill
- Effect of Trees on y_s and H_s
- Tutorial Exercise 1 (Soil suction only)
- Tutorial Exercise 2 (Soil suction including effect of trees)
- Tutorial Exercise 3 (Soil suction including cut and fill effects)



12.30 - 1.30 Lunch (Provided at Venue)

1.30 - 3.15 Session 3
- DOMESTIC CONSTRUCTION CONSIDERATIONS *(as per AS2870)*

- Clad frame vs articulated masonry veneer vs masonry veneer, vs articulated masonry full vs full masonry (ie double brick), and the footing systems that are appropriate for those construction types
- Categories of cracks in residential slabs (eg plastic shrinkage & settlement)
- Requirements of articulation in masonry walls
- Compaction of fill (rolled, controlled, sand, clay) according to AS2870
- Drainage issues (eg leaking pipes, poor drainage, pavement slope)
- Footing systems eg raft slab, waffle pod raft slab, and strip footing
- Incorrect usage of waffle pod system and potential litigation
- Properties of the polystyrene pods and VPM
- Pros and cons of using a waffle pod slab system
- Requirements of Steel Reinforcement and Articulation Joints in masonry walls
- Tutorial Exercise

CALCULATORS REQUIRED

3.15 - 3.30 Afternoon Tea

3.30 – 5.00 Session 4
- SLAB DESIGN: Standard Method *(Deemed to Comply)* vs AS2870 Figure 4.1 *(to determine engineered value of I)*

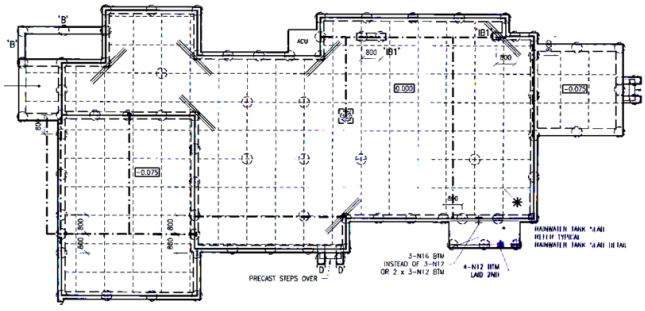
- Use of Chart 4.1 in Section 4.0 of AS2870 (and its derivation) in order to determine the footing beam depth based on engineering design principles
- Effective Slab Widths applicable to slabs in domestic construction
- Uncracked vs Cracked Second Moment of Area calculations (ie MOI)
- Beam depth, spacing and minimum reinforcement, trimmer bars
- Suspended slab and beam design using either bored piers or screw piles
- Tutorial Exercise

5.00 – 5.15 Certificates of Attendance and Feedback sheets

Differential mound movement (mm), $y_m = 0.7\, y_s$

Edge distance from centre-heave (m), $e = \frac{H_s}{8} + \frac{y_m}{0.036}$

Edge distance from edge-heave (m), $e = 0.2\,L \le 0.6 + \frac{y_m}{0.025}$



HOW TO REGISTER

- *Register online at*

www.etia.net.au

- Scan the QR Code for the online registration details

COURSE COST

- 1 day course – **AUD $750 pp**

DATE

- Tuesday 18 June 2019

VENUE

- Waipuna Conference Centre – *58 Waipuna Rd, Mount Wellington, Auckland 1060, NZ*

FURTHER INFORMATION

- *Office* 00 61 02 9899 7447
- *Mobile* 61 413 998 031
- *Website* www.etia.net.au
- *Email* registrations@etia.net.au

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.