



## PAUL UNO

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

- Over 40 years of experience in design & construction.
- Part-time Senior Lecturer – UNSW & The University of Sydney.
- Inspected structures and written reports on why structures have failed.

Recommended Text:  
**Reinforced Concrete:  
The Designers  
Handbook**  
(2015 Revised Edition)  
*Beletich, Hymas, Reid & Uno*



Live streamed  
via  


## WORKSHOP SUMMARY

This one-day workshop is primarily aimed at civil and structural engineers who wish to design retaining walls. These can be either gravity walls (eg solid block, crib wall, hollow core or concrete filled masonry block) or reinforced walls (eg reinforced concrete cantilever, reinforced masonry and/or soil reinforced geo-fabric). The software **FINE GEOS** will be addressed.

Australian Design Standards such as AS3700, AS3600 and AS4678 and their requirements as well as Eurocode provisions will be addressed.

All sessions provide worked examples, tutorial exercises and solutions.

## PROGRAMME (8.30 - 9.00 Zoom invite link will be emailed)

### 9.00 - 11.00 Session 1

#### - SOIL CLASSIFICATIONS, TESTS & SOIL MECHANICS

- Soil Basics – Bulk vs Dry vs Saturated vs Submerged Density
- Angle of Repose vs Angle of Internal Friction
- Cohesion vs Shear Strength
- Proctor Density Test vs HILF Density Classification
- Clay vs Sand Basic Soil Type Classification to AS1726
- Shear Box Test vs Oedometer Test vs Triaxial Test
- Soil Parameters in AS4678 (Earth Retaining Structures)
- Unit Weights of Various Soils
- Cracked vs Uncracked Soils
- Australian Standards vs Eurocode
- Active vs Passive Pressure
- Coulomb vs Rankine Theory
- Pore Pressures
- Drained vs Undrained Soils
- Friction Angle vs Grading vs SPT values
- Atterberg Limits (LL PL PI) vs Friction Angle
- Factors of Safety – Ultimate vs Serviceability
- AS4678 Six (6) Retaining Wall Failure Modes
- Tutorial



### 11.00 - 11.15 Morning Break

### 11.15 - 1.00 Session 2

#### - RETAINING WALL DESIGN I (Mass/Gravity Structures)

- Types of Gravity Structures eg Hollow vs Solid Masonry, Woven Mesh and Gabion walls
- Crib Block Wall Design Principles
- Timber Retaining Walls Design Principles
- Australian and Overseas Examples of Gravity Retaining Wall Failures
- Modes of Failure eg toe vs base vs slope
- Causes of Retaining Wall Failures eg Rainfall, Incorrect Drainage, Soil Properties, Wall Slope
- Applied Bearing Pressure vs Ultimate Bearing Capacity
- Bearing Capacity Theories eg Terzaghi vs Meyerhof vs Vesic vs Hansen
- Design Methods addressing Bearing Capacity and Failure by Overturning, Slip and Rotation
- Tutorial

**CALCULATORS REQUIRED**

### 1.00 - 1.30 Lunch Break

#### COURSE COST

- 1 day course – \$820 pp

#### DATES, VENUES & REGISTRATION

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

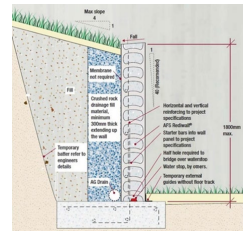
#### FURTHER INFORMATION

- Office (02) 9899 7447
- Mobile 0413 998 031
- Email [registrations@etia.net.au](mailto:registrations@etia.net.au)

### 1.30 - 3.00 Session 3

#### - RETAINING WALL DESIGN AND DETAILING II (Reinforced Structures)

- Types of Reinforced Retaining Wall Structures eg In-situ Concrete, Reinforced Masonry Block
- Australian and Overseas Examples of Reinforced Retaining Wall Failures
- Australian Standards vs Eurocode requirements for Reinforced Retaining Walls
- Full Design of Cantilever Wall Systems including Stability Checks
- Estimating Dimensions of Reinforced Concrete Retaining Walls & Footings (Rules of Thumb)
- Curtailment of Reinforcement (where needed)
- PVC formwork systems (eg CSR Rediwall)
- Shear Key Design (if required)
- Retaining Wall design using **FINE Software**
- Tutorial



### 3.00 - 3.15 Afternoon Break

### 3.15 - 5.00 Session 4

#### - RETAINING WALL DESIGN AND DETAILING III (Reinforced Walls using Geofabrics)

- Types of Geofabric materials used in Reinforced Retaining Wall Structures
- Use of Geofabrics as Horizontal Wall Reinforcement
- Australian and Overseas Examples of Reinforced Retaining Wall Failures using Geofabrics
- Australian Standards vs Eurocode requirements for Geofabric Reinforced Retaining Walls
- Full Design of Cantilever Wall Systems using Geofabrics including Stability Checks
- Estimating Dimensions of Geofabrics for Reinforced Concrete Retaining Walls
- Wedge vs Pullout Failure using Geofabrics
- Geofabric reinforcement layout
- Tutorial

Certificate of Attendance will be emailed

Download **FINE GEOS** demo version via the link

[www.etia.net.au/geo5-demo-version](http://www.etia.net.au/geo5-demo-version)



Walls and Gabions

Complex design of gravity, cantilever and prefab retaining walls



Abutment



Cantilever Wall



Earth Pressures



Gabion



Masonry Wall



MSE Wall



Nailed Slope



Prefab Wall



Redi-Rock Wall



Rock Stability