



## Training Course. Singapore - Monday 5 – Tuesday 6 November 2012 Seminar on Underground Space Use

**Objective:** Introduction for engineers, architects, planners and public administrators to the use of underground space to increase liveability and sustainability in urban areas and in other key public resource regions. The seminar will identify key issues that need to be considered when using underground space and will show how these key issues are dealt with on a worldwide basis.

### Monday, 5 November 2012

#### Welcome and Opening

09.00-09.45: **Welcome and Opening: ITA** and concerned country representatives. Han ADMIRAAL

*The opening session will include information on ITA, ITACUS and ITA-CET activities as well as information about underground space use issues in Singapore.*

#### Session I: General Overview

11.00-11.45: **A history of underground space use.** Ray STERLING

*The subject matter for this course will first be explored by looking at a few examples where underground space use has made a significant difference to a local area or a region together with a few examples where hindsight has indicated that a real opportunity was missed. These themes will then be returned to in greater detail in the rest of the course.*

09.45-10.30: **Solutions and missed opportunities.** Han ADMIRAAL

*This section is intended to give a historical perspective on underground space use and also to present a classification of uses. It will present the very wide range of types of underground facilities – from large-scale infrastructure to earth-sheltered homes and from shallow structures in soil to deep underground structures in rock*

11.45-12.30: **Brief overview of construction methods.** Ray STERLING

*For the non-specialist in underground construction or geotechnical engineering, this section will give the major categories of construction methods but it will try to also provide an indication of how the construction method influences what can be done, what the construction disturbance is, and some specific influences on design and/or cost.*

#### Session 2: Advantages and Disadvantages / Sustainability and Need for Planning

14.00-14:45: **Sustainability issues.** Han ADMIRAAL

*This section will examine underground space use in the context of sustainability and present some examples of how regions can use underground space to enhance sustainability*

14.45-15.30: **Detailed exploration of potential advantages and disadvantages: Part I.** Jean-Paul GODARD

*This section will provide a detailed examination of the potential advantages of underground space uses and how these may be assessed in comparison with other planning and construction alternatives.*

16.00-16.30: **Detailed exploration of potential advantages and disadvantages: Part II.** Jean-Paul GODARD

*For the non-specialist in underground construction or geotechnical engineering, this section will give the major categories of construction methods but it will try to also provide an indication of how the construction method influences what can be done, what the construction disturbance is, and some specific influences on design and/or cost.*

16.30-17:30: **Key planning and design issues for individual underground facilities.** Monique LABBÉ

*This section will look at the importance of design issues at a project level in terms of creating successful underground facilities that are accepted at the least as functional and safe solutions and at best as exciting and stimulating environments in their own right.*



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#### Session 3: Planning and cost-benefit issues for broad-scale underground space use

09.00-09.45: **Above or under-ground in the case of mass transit systems infrastructure ?** Jean-Paul GODARD  
*Because of their importance in the urban life of cities, the evaluation of when mass transit systems are (or should be) placed underground is examined in detail.*

09.45-10.30: **Legal and compensation issues for underground space.** Ray STERLING  
*This section will discuss issues regarding the legal ownership of underground space and how easements for the use of underground space for public infrastructure are handled around the world. Included will be a discussion on liability issues for underground space use and special situations such as the reuse of space after mineral extraction.*

11.00-11.45: **Human factors and risk.** Han ADMIRAAL  
*This section will present the framework for considering human factors and risk elements in design including psychological issues, physiological issues, fire and life safety and disaster protection.*

11.45-12.30: **Master planning for underground space use in Helsinki: Part 1.** Ilkka VÄHÄÄHO  
*In the first of three sessions, the presentations will cover the why and how of the underground space master planning in Helsinki. This is the most comprehensive and well developed underground master plan for a major city anywhere in the world.*

#### Session 4: Guidance for planning and design of underground spaces

14.00-14.45: **Master planning for underground space use in Helsinki: Part 2.** Ilkka VÄHÄÄHO  
*In the second of three sessions, the presentations will cover the why and how of the underground space master planning in Helsinki.*

14.45-15.30: **Master planning for underground space use in Helsinki: Part 3.** Ilkka VÄHÄÄHO  
*In the third of three sessions, the presentations will cover the why and how of the underground space master planning in Helsinki.*

16.00-16.45: **Other underground space use planning issues and examples.** Ray STERLING  
*Following the detailed presentation on the master planning of Helsinki, this session will provide a summary of other examples of mined space planning around the world – including such issues as the geological impact on planning approaches and the difficulties of initiating planning efforts in smaller cities.*



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### Lecturers of the seminar *(in the order of their intervention during the training session)*



**Han ADMIRAAL** >> Han Admiraal (1959) works as an independent consultant for Enprodes Management Consultancy B.V. in Rotterdam. Admiraal founded Enprodes in 2008 after being Executive Director of COB for 10 years.

From his own company he continues his activities at University as part time professor of Underground Space Use, his international activities as well as consulting on project enabling and the use of underground space.



**Ray STERLING** >> Dr. Sterling is Professor Emeritus at Louisiana Tech University. From 1995 to 2009 he was the Contractors' Educational Trust Fund Professor of Civil Engineering and Director of the Trenchless Technology Center at Louisiana Tech University. Previously, from 1977 to 1995, he was the founding director of the Underground Space Center at the University of Minnesota. His research interests are in underground space utilization, trenchless technology, underground construction and geomechanics. He is a Past Chairman of both the North American and the International Society for Trenchless Technology and a Past Chairman of the U.S. National Committee on Tunneling Technology. In 2003, he received the Stephen D. Betchel Award for pipeline engineering from ASCE and in 2009 he

received the ISTT Gold Medal for exceptional contributions to the field of trenchless technology. He is a Senior Editor of the journal Tunnelling and Underground Space Technology.



**Jean Paul GODARD** >> Jean-Paul Godard, civil engineer, graduate of the « Ecole Nationale des Ponts et Chaussées » in France. Honorary Senior Executive of the « Paris Transportation Authority » (RATP) He has been working for 36 years in this company in different positions: construction of new metro lines and stations, study department, foreign metros, and project management. He has been involved in the French and International Tunnelling and Underground Space Associations activities as soon as the 70's. He has been Vice President of these two associations from 1995 to 2004. Currently Member of the Steering Boards of the French and International Committees on Underground Space (AFTES-COMES and ITACUS)



**Monique LABBÉ** >> Monique Labbé is an architect and works with about fourteen colleagues in her own company « Les Ateliers Monique Labbé » near Paris, in France. The company is specialized in public substructures, environmental substructures of waste and water treatment and recycling, and in industrial buildings. Monique Labbé devotes an important part of her work to increase awareness of underground spaces. Since 2005, she is President of the “Underground Spaces Committee” of the French Tunneling and Underground Space Association which is a member of the ITA. Besides, Monique Labbé has initiated and managed a National Research Project “Ville d'idées-Ville I0D”, composed by several developer contractors, engineers, companies and universities, in order to promote a wider and better use of underground space.



**Ilkka VÄHÄÄHO** >> Mr. Ilkka VÄHÄÄHO was born in 1954. Married to Birgit, adult educator in English, they have five children and three grandchildren. He graduated from Helsinki University of Technology, Finland in 1979. He has over 30 years of experience at the Geotechnical Division of the City of Helsinki first as a Geotechnical Engineer then as an Engineering Manager and now 15 years as the Head of Geotechnical Division. Mr. Vähäaho has been engaged in the work of numerous National and European Standards and has a strong engagement in the Finnish Tunnelling Association and Finnish Geotechnical Society. At present he is Chairman of the Finnish Tunnelling Association International Activity Group and also Chairman of the Ground Improvement Committee of the Finnish Geotechnical Society. Among others he is a member of the Steering Board of ITA International Committee on Underground Space

(ITACUS) and a “Global Perspective Ambassador” to promote the usefulness of Underground Resources.