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.

Background: This course outline has been developed by the ITA Committee on Underground Space (ITACUS) in conjunction with the ITA Committee on Education and Training (ITA-CET).

Tentative Programme

Day 1

Session 1: Introduction and Overview
   09.00-09.45: Welcome and Opening: ITA and concerned country representatives
      Registration
      Opening
      Information on ITA, ITACUS and ITA-CET activities
      Information on projects in the host country
   09.45-10.30: Solutions and missed opportunities
      Presentation of 2-3 international projects that highlight how underground space can address infrastructure and new facility needs while maintaining or improving liveability
      Presentation of 2-3 international projects where a lack of prior appreciation for underground space use either precluded or greatly increased costs for underground projects
   10.30-11.00: Coffee Break
   11.00-11.45: A history of underground space use
      Transportation
      Other infrastructure uses
      Building uses
      Rock cavern uses
   11.45-12.30: Classification of underground space uses by geometry and type of use / Brief overview of construction methods
      Cut-and-cover structures
      Tunnelled and mined structures
   12.30-14.00: Lunch

Session 2: Advantages and Disadvantages / Sustainability and Need for Planning
   14.00-14.45: Detailed exploration of potential advantages and disadvantages
      Location
      Isolation
      Topography
      Human factors
      Safety
      Life-cycle cost
   14.45-15.30: Sustainability issues
      Preserve opportunities for future generations
      Environmental impact
      Reusability
      Maintenance and replacement
   15.30-16.00: Coffee Break
   16.00-16.45: Key planning and design issues for individual underground facilities
      Tunnels
      Buildings
      Mined space
      Utilities and common utility tunnels
      Pedestrian networks
   16.45-17.30: Example(s) on assessing key issues for underground facilities
   17.30-18.00: Questions and Answers
Day 2

Session 3: Planning issues for broad-scale underground space use
- 09.00-09.45: Focus on initial and life cycle cost examples
  - Infrastructure projects
  - Building projects
  - Pedestrian networks
  - Importance of land value
- 09.45-10.30: Legal and compensation issues for underground space (international examples)
  - Depth of ownership / easement practices and costs
  - Mineral rights
  - Liability issues
  - Special situations (e.g. reuse of space after mineral extraction)
- 10.30-11.00: Coffee break
- 11.00-11.45: Human factors and risk
  - Psychological issues
  - Physiological issues
  - Fire and life safety
  - Disaster protection
- 11.45-12.30: International examples of master planning for underground space use
  - Finland
  - Norway
  - Sweden
  - Netherlands
  - USA
- 12.30-14.00: Lunch

Session 4: Guidance for planning and design of underground spaces
- 14.00-14.45: International examples of master planning (continued)
  - France
  - Japan
  - China
  - Singapore
- 14.45-15.30: A practical approach for underground space use planning
  - Stage of urban development
  - Key geographical, topographical and geological features
  - Matching planning effort to urban conditions
  - Public input
- 15.30-16.00: Coffee Break
- 16.00-16.45: Practical approach to planning (continued)
  - Master planning components
  - Utilities and common utility tunnels
  - Tunnelling for transportation and other infrastructure
  - Pedestrian networks
  - Open-cut developments
  - Mined space developments
  - Multi-functional opportunities
- 16.45-17.30: Assessment of examples and opportunities
  - Attendees assess good and bad examples
  - Attendees identify opportunities in real and/or hypothetical case studies
- 17.30-18.00: Closing Remarks