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

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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