

## Underground Space: Q&A

Worldwide there is a quest for more urban space. A quest that is driven by the fact that now more than half the world's population lives in urban areas. Maintaining liveability in urban areas is proving to be a major challenge for city governments. But also keeping the city moving and thereby supporting the local economy is proving to be an enormous task. How does the use of underground space fit in? Can the use of underground space really help in solving these problems? Seven vital questions on the use of underground space are discussed in this white paper. The one all encompassing question seems to be: can you really afford not to use underground space?

### Why is the development of underground space important?

"Population growth and the advent of mega cities are increasing the pressure on sensitive areas. The underground has enormous potential for realizing spatial benefits. You could say that one of the greatest challenges facing mankind is to achieve higher density while at the same time improving urban existence."

*Lord Norman Foster  
British Architect*



A tunnel in hard rock preserves a historic monument in Monte Carlo, Monaco

## **What are the technological possibilities for underground space use?**

In the past ten years many advancements have been made in underground space construction. Larger and larger diameter tunnels are being constructed. Tunnelling is possible in both hard rock and soft soil conditions. From a technology point of view there is a wide range of possibilities for underground space use creation.

## **Underground construction, isn't that tunnelling?**

Yes and no. Tunnelling is a very important construction method for building in underground space. It provides corridors along which people can move. Large tunnel projects have been undertaken in the last years. In the European Alps the Gotthard Base Tunnel is being constructed, over 50 km long through the base of the Alps. In China many tunnels are being constructed both for transportation and water management. But there is more to underground space than tunnelling. Worldwide there are good examples of museums, shopping centres, theatres, discotheques and other commercial properties being built underground. Both architects and urban planners are now starting to see the possibilities that underground construction offers them in terms of new space to create with.



Underground Shopping Centre, Toronto, Canada

## **So the technology is available, but is there a need for all this?**

Yes most certainly. Because of the lack of urban space on the surface for development, more and more developments are including the underground or taking place exclusively underground. Not only city authorities are seeing this but property developers and private investors are becoming aware of the possibilities. Through effective use of the underground and the combination

of functions, more return per square meter of development can be realized. Both city governments and property developers can create value if they can collaborate in integrated development solutions. Both parties can profit from their separate investments. In the coming years this mix of public and private spaces and functions will become more and more common.

**“The most important thing is to try and place the right functions underground.”**

*John Carmody  
Underground Space  
Use pioneer*

### **Is underground construction expensive?**

Underground construction often leads to extra investments, but these more often than not are met by extra benefits. Choosing underground solutions leads to less construction nuisance on the surface. Especially in cities this can lead to big savings in terms of compensation and claims. The extra investments can often also be met by developing on top of the underground development, thereby using the same space twice. Constructing underground means that the surface remains free for other developments.



The Madrid M30 motorway was brought underground creating 1 million m<sup>2</sup> of public green space for the city

### **How sustainable is the use of underground space?**

Underground space use can be part of sustainable development. To be sustainable means that a balance needs to be struck between the need to preserve the subsurface as foundation for life above the surface and the need to exploit underground space for spatial purposes. In many ways the construction of a tunnel is evidently beneficial to the living environment. As such tunnelling can contribute to keeping urban areas and even rural areas liveable for future generations. Underground water storage basins can prevent mega cities from flooding and so contribute to the climate proofing of cities.



## What is ITA's role in all this?

The International Tunnelling and Underground Space Association is based in Lausanne, Switzerland and was created more than thirty years ago. The ITA counts more than 50 member nations and meets annually during the World Tunnelling and Underground Space Congress. ITA is the forum for experts to meet, share experiences and share knowledge. Working groups prepare reports on common practices and ITA has over the years produced many publications. Three committees focus on the three key issues which Underground Space Use is faced with worldwide. The need for operational safety is being addressed by ITACOSUF, the need for education is being addressed by ITACET and ITACUS has specifically been setup to address the need for awareness and planning.

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## Can you really afford not to use underground space?

The answer is of course: no. Well you should at least consider it. Worldwide the numerous advantages and benefits of underground space use are acknowledged. But to wait till there's no more space left and then develop further underground is not a sound strategy. Incorporating underground space use in the plans for now and the future makes much more sense. It has been shown that this often leads to surprising combinations and innovative solutions creating even more added value. So consider the use of underground space in your urban development plans and create value through doing so.

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### About ITACUS

ITACUS sees it as its mission to advance the awareness and thinking on the use of underground space through the creation of a worldwide dialogue. The committee will fulfil its mission in a pro-active manner, furthering the cause of underground space use within the context of societal needs, environmental concerns, sustainable development and climate change

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