UNDERGROUND CONSTITUTION
DEEP URBAN (SWITZER) LAND
INVERSION

Geologists are familiar with the term obduction, where oceanic crust overthrusts continental crust at a convergent plate boundary. This is part of the process which formed the Alps and explains why the Swiss Alps once lay at the bottom of the sea. Swiss topography invites an exploration of above and below, exposure and concealment, inside and outside, solid and void, not only because of its geological origins, but also because of more recent developments. The Swiss mountains are known to be porous and conceal vast areas carved out for defensive purposes.

As architects, we are trained to think in three, if not four dimensions including time. But our initial research has revealed that an understanding of the third dimension, the vertical, has inevitably concentrated on its upward portion only. Western society has an ambiguous relationship with the underground. Although housing valuable resources, nourishing agriculture and offering protection from climatic extremes, it seems that the underground has been culturally stigmatised and dedicated to the disposal of waste and the installation of infrastructure. However, as increasing pressure on resources below ground is matched by spatial pressure above ground, the lower portion of the vertical dimension comes into focus and an opportunity to investigate this relatively uncharted territory is presented.

The underground also contains many architectural challenges. Apart from the coordination of a complex of existing installations, underground space represents an inversion of the classical figure and ground, solid and void relationship. The constructed object as such does not exist, rather the architectural act is the creation of space itself. This leads to further questions of defining zones such as inside/outside and public/private within an underground space. Here, certain senses are heightened, making the quality of the spatial articulation critical, in particular in terms of light and orientation. Laba, (laboratoire Bâle) of the EPFL, will investigate these issues.
Switzerland’s settlement patterns reflect the global urbanization trend—the world’s urban population is expected to increase to 61% by 2030. During the last fifty years in Switzerland, the urban population has increased from 45% to 73%. Within the same period the total urban surface grew by a factor of four (Kuster and Meier, 2003, cited by Parriaux et al, 2010). This increase in overall sealed surface and general congestion makes the speed of Swiss urbanization processes particularly visible. In a relatively small country with a challenging topography and heavily protected agricultural zones, the constructible land then becomes a limited resource requiring effective management. The lack of surface space demands a strict legal framework and planning tools which clearly define land uses and foresee future development needs.

In the 2012/13 academic year, laba investigated the development of Switzerland under the premise of rapid demographic growth. Extrapolating the immigration growth from the past three years would result in a population increase from 8 million to roughly 14 million by 2048. Would it be possible to house these additional 6 million inhabitants and maintain or even improve the spatial qualities of the territory? The laba project “CH2048 – an urban portrait revisited” was based on the study “Switzerland: an urban portrait” carried out by the ETH Studio Basel and which defined five zones in Switzerland: Metropolitan Regions, Networks of Cities, Quiet Zones, Alpine Resorts, and Alpine Fallow Lands. Our results revealed that the demographic development will increase in the urban centres and decrease in the rural areas. Growth will primarily occur in the Metropolitan Regions Zurich, Basel and the Arch Lémanique, which attract diverse social groups and economic activities. The Networks of Cities are the second area of growth. These are regional centralities which are not under the influence of the Metropolitan Regions and which constitute a specifically Swiss type of urbanity: small to medium-sized towns form a network of strand? or field-like constellations, interspersed with agricultural land and forests. These results provide the basis for our current project.

Demographic growth is exerting pressure on both housing and infrastructure, therefore an increase in logistical facilities will be required in order to sustain the needs of a growing society and to maintain levels of quality. In light of the limited constructible area in Switzerland, a critical evaluation of each project’s function, cost, size, level of priority and public accessibility needs to be made. To what extent must it be realised as a “conventional” building above ground?

Storage, production halls, shopping and data centres without need for daylight consume a lot of space over ground.
SWITZERLAND BELOW GROUND

Labo’s 2013/14 academic year is again dedicated to Switzerland- to the yet unexploited potentials of underground urbanism in the Helvetic territory. Our project “Deep Urban (Switzer) Land”, seeks to reveal the hidden opportunities that lie underground, both in terms of the spatial experience and to relieve above-ground pressure.

Swiss topography is a constant engineering challenge and the Swiss are renowned for their expertise in tunnel and bridge construction. Military facilities built in the mountains, “the reduit”, are veritable underground infrastructures for protecting military equipment and troops. According to the Swiss military, maintaining these empty bunker spaces costs 1 million CHF/day. Since the period of the cold war, over 300 000 underground civilian air raid shelters were also provided at a cost of 10 billion Euros. They could host more than Switzerland’s total population. After Fokushima, the law to maintain them was renewed. Judging from these examples, one would expect the Swiss to be experts, but beyond infrastructure for defence and transportation, there is as yet no general framework for the underground.

We believe there are a number of reasons for this:
- Mining: there is no mining history in Switzerland due to the lack of significant mineral resources below ground. Of minor importance are the Bex and Rheinfelden salt mines.
- Climate: Switzerland lies within the moderate middle European climate zone. Cities with long, harsh winters, however, such as Montreal or Helsinki, have already established underground master plans in reaction to the climatic constraints.
- Urban expansion: until recently lack of space above ground was not an issue in Switzerland. This last factor, however, is changing rapidly due to the urbanisation processes described above. In particular on the fringes of the Metropolitan Regions and the Network of Cities, industrial and commercial zones have engulfed large expanses of territory. Here, storage, production halls, shopping and data centres are all typically housed in large-scale industrial sheds, where planning concerns are reduced to easy access for private motorized transport. Could these programmes not potentially be accommodated underground, providing space for other urban functions? The ground surface is a scarce resource which needs to be re-valued accordingly.
Historical city centres are faced with different problems, for which underground urbanism may provide valid solutions; the classification of historical buildings can often prevent the accommodation of large infrastructures, resulting in either urban inertia or urban sprawl. A successful example of underground urbanism within a Swiss city centre is Zurich’s main station. Between the late 1960’s and the early 1990’s, the 19th century complex above ground has been complemented by an underground extension, which accommodates not only additional tracks and related services, but also the river and a shopping mall of 17000 m$^2$. Zurich’s “Shop Ville” profits from the tourist and commuter flows that converge on one strategic, trans-regional destination in the city centre. Due to extended opening hours and the diversification of tenants, such as medial services and banks, it has also become an independent destination for the citizens of Zurich.

labala seeks to investigate what a strategic development plan for the Swiss underground would entail on a fundamental level. So far there have been no federal regulations established for its use, but the exploitation of the Swiss underground is increasing. Answers to the rising need for alternative energy sources for example, can be found underground; groundwater can be used to run a building’s heat pump and geothermal power stations [are becoming more common/ are on the increase]. However, the exploitation of underground resources also raises questions of ground ownership and the allocation of concessions. Exploiting the underground requires advanced technology and high investment; the results are often irreversible and of limited flexibility. A project’s feasibility study should therefore include the consideration of its underground potential- deep ground rights as well air rights.
LABA GOES UNDERGROUND

Lab’a’s objective is to address the underground from a territorial planning and architectural perspective. One of the architect’s most important skills is the coordination of different disciplines in order to achieve a coherent and sustainable roadmap for the future development. We believe this skill should be exercised within the complex inter-disciplinary field of underground urbanism. Until now the underground has been primarily engineered as a series of mono-functional infrastructural entities. If we think of underground urban space, however, quality and diversity become crucial issues. Architects can provide valuable design research in underground synergy- which combinations of programmes suited to subterranean locations could result in vital multifunctional amalgamates below ground? It will be part of the architects’ task to investigate how to create liveable underground environments and to increase their acceptance. During the EPFL academic year 2013/14, around 25 students of architecture will develop an underground constitution for Switzerland.

During the course of the past eight years laba was able to implement and constantly enhance its teaching methodology by investigating a broad range of urban and territorial entities where particular critical phenomena are strongly manifest; EPFL Campus, Havana, London, Geneva, Bahrain, Athens, the Barents Sea and Switzerland. In each case we encountered very individual drawbacks and challenges of the particular urban condition but also very specific potentials and assets to enhance. The profound understanding gained through research formed the basis for the formulation of an Urban or Territorial Constitution. The following gives an outline as to how the teaching methodology will be applied to the underground in Switzerland.