
SEMINARIO INTERNACIONAL
TÚNELES DE
GRAN LONGITUD
INTERNATIONAL SEMINAR
LONG TUNNELS
Desafío para el Diseño, Construcción y Operación
Challenges for Design, Construction and Operation
Northern Ring Road Basel (Switzerland) –
Underground Construction Methods in Heavy City Traffic
Stefan Mützenberg
gruner
17, 18 y 19 de Octubre 2012
Santiago, Chile
PIARC CHILE

Underground Northern Ring Road Basel (CH)

1. Introduction
2. Project Data
3. Key predefined conditions
4. Construction methods
5. Special Challenges

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SEMINARIO INTERNACIONAL TUNELES DE GRAN LONGITUD: DESAFIOS PARA EL DISEÑO CONSTRUCCIÓN Y OPERACIÓN
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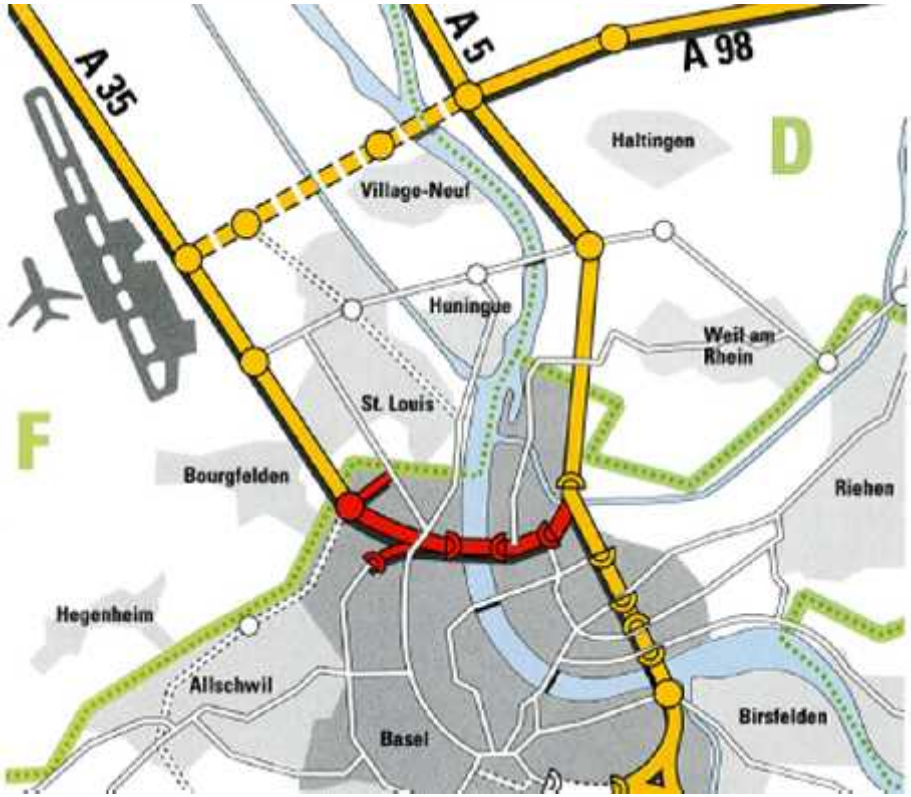
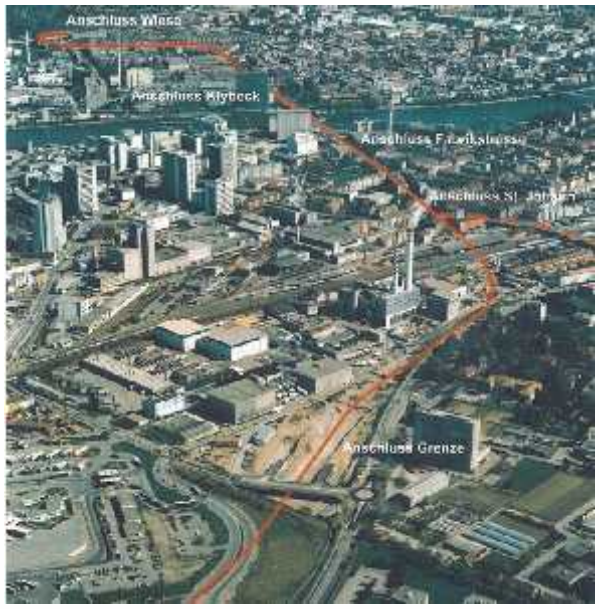
Santiago, Chile, October 17,18 and 19 2012

Underground Northern Ring Road Basel (CH)

1. Introduction



Overview



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Underground Northern Ring Road Basel (CH)

1. Introduction

Function and objectives of the northern Ring Road:

- Closure of the gap in the high capacity road network between CH and F
- Transfer of traffic to and from industry and the Rhine Port from city streets to the highway
- Absorption of approximately 80% of average personal vehicle traffic
- Opening up of the city street level for public transport and an improved layout
- Relief of city streets and residential districts from heavy vehicle traffic

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Underground Northern Ring Road Basel (CH)

2. Project Data

Design speed:	80 km/h
Length:	Length 3.18 km, 87% underground
Deepest point:	approx. 22 m below surface
Open sections:	240 m and 150 m
Tunnel:	Two separate tubes with center wall
Roadways:	Two, each with two 3.5 m wide lanes
Junctions:	1 full junction, 4 partial junctions
Costs:	1.5 billion CHF
Construction Time:	1996–2009

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Underground Northern Ring Road Basel (CH)

3. Key predefined conditions

- Unrestricted transit and local traffic ensured at all times
- Unrestricted tram, bicycle and pedestrian traffic ensured at all times
- Ensure and allow sufficient time for archaeological investigations
- Maximum annual funding availability of CHF 100 million
- Taking into account the local planning and company capacities

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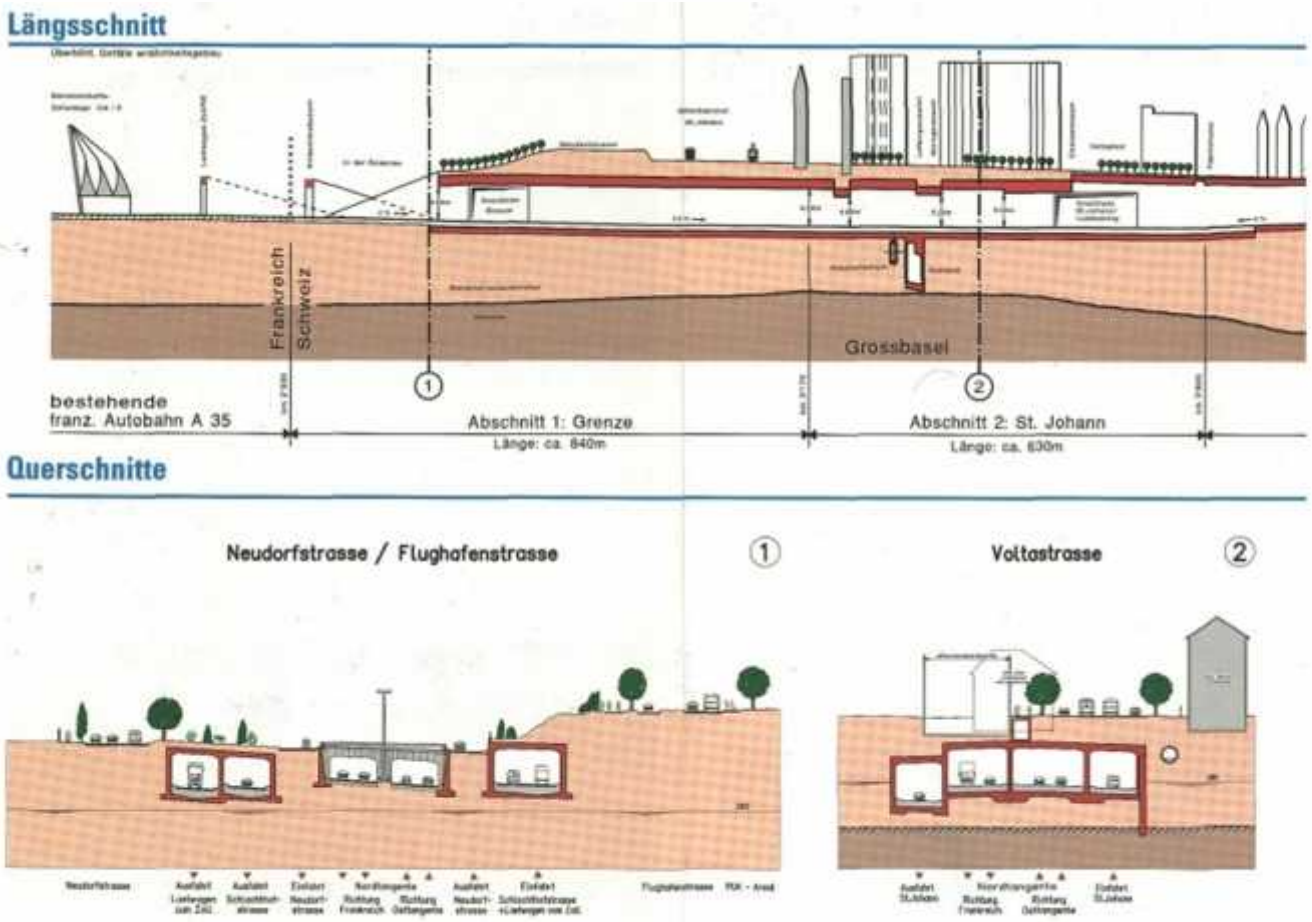
Underground Northern Ring Road Basel (CH)

4. Construction Methods



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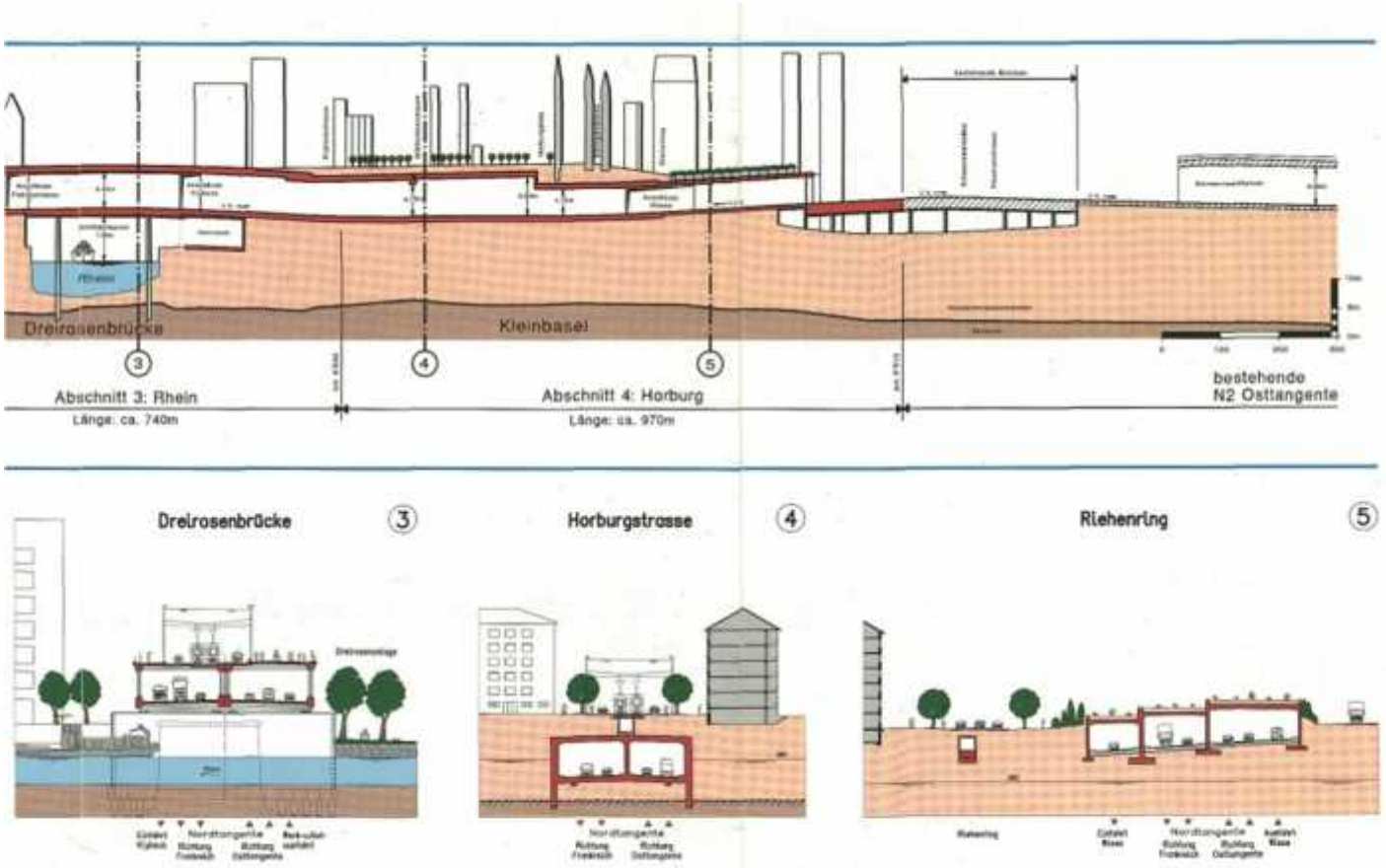
4. Construction Methods



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Underground Northern Ring Road Basel (CH)

4. Construction Methods

Grossbasel	Cut-and-cover tunnel, length 1'432 m
Luzernerring Junction	Underground tunnel, length 650 m
Dreirosen Bridge	Two level bridge over Rhine River Length 266 m
Kleinbasel	Cut-and-cover tunnel, Length 1'092 m
Horburg section	

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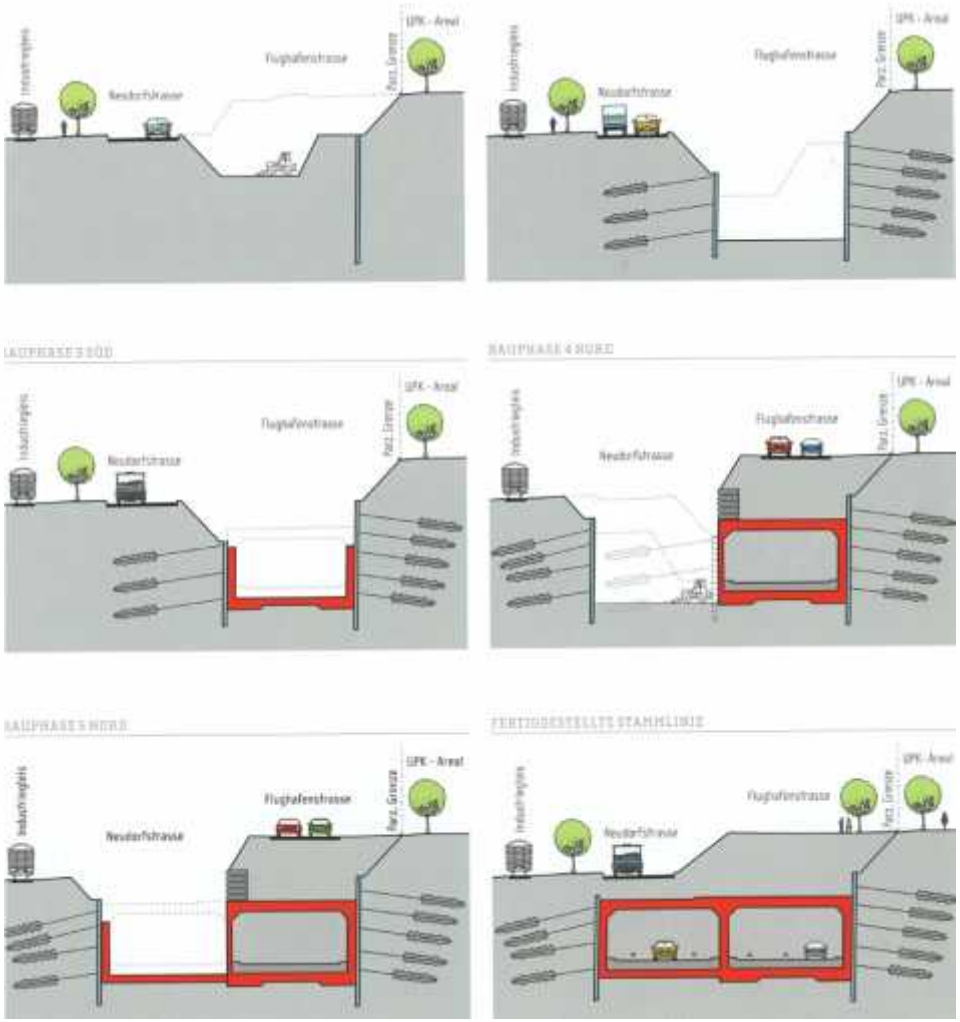
Underground Northern Ring Road Basel (CH)

Cut-and-Cover



Bottom-up method

Construction phases

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Underground Northern Ring Road Basel (CH)

Cut-and-Cover

Two levels of shoring

<u>Upper section:</u>
sheet pile walls
soldier pile walls

<u>Deeper areas:</u>
Mainly secant pile walls
diaphragm walls
Jetgrouting walls.

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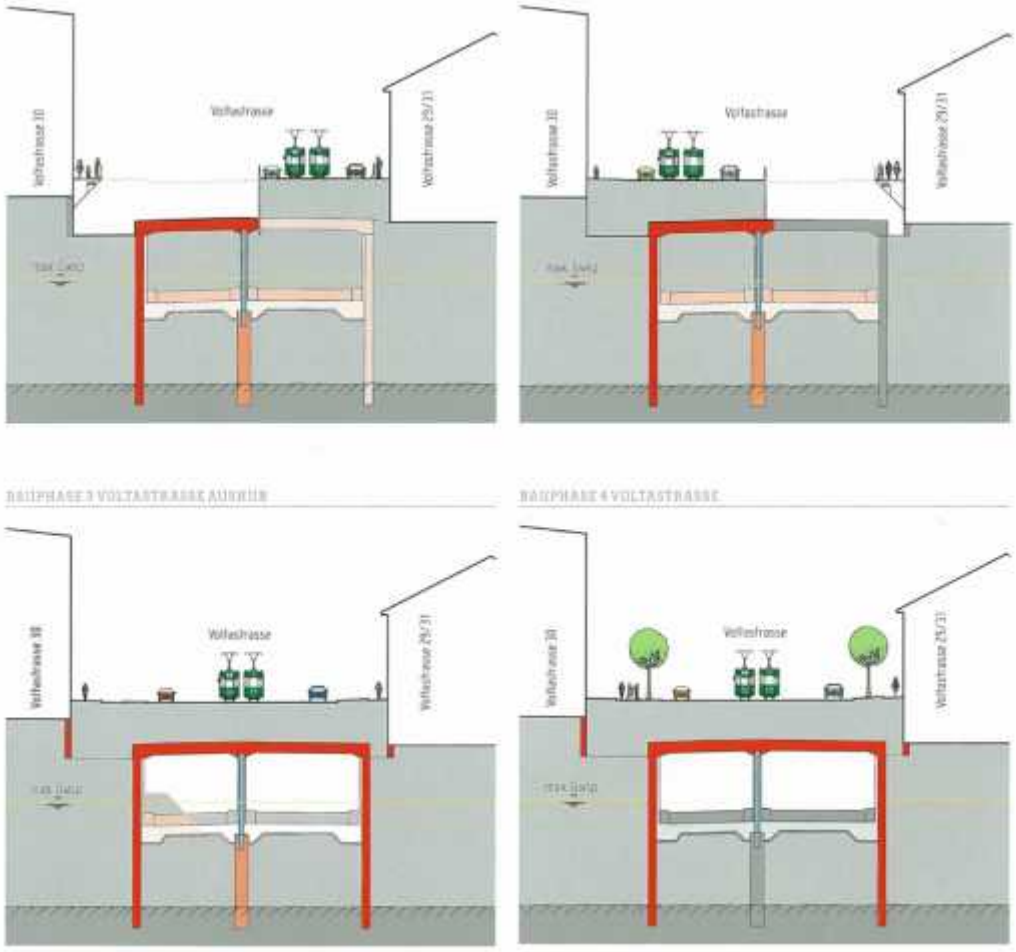
Top-down Method



Top-down method

Construction phases

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Top-down construction

Top-down construction roof formwork

After excavation

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Top-down construction

Double top-down construction at exit

Crossing underneath roads

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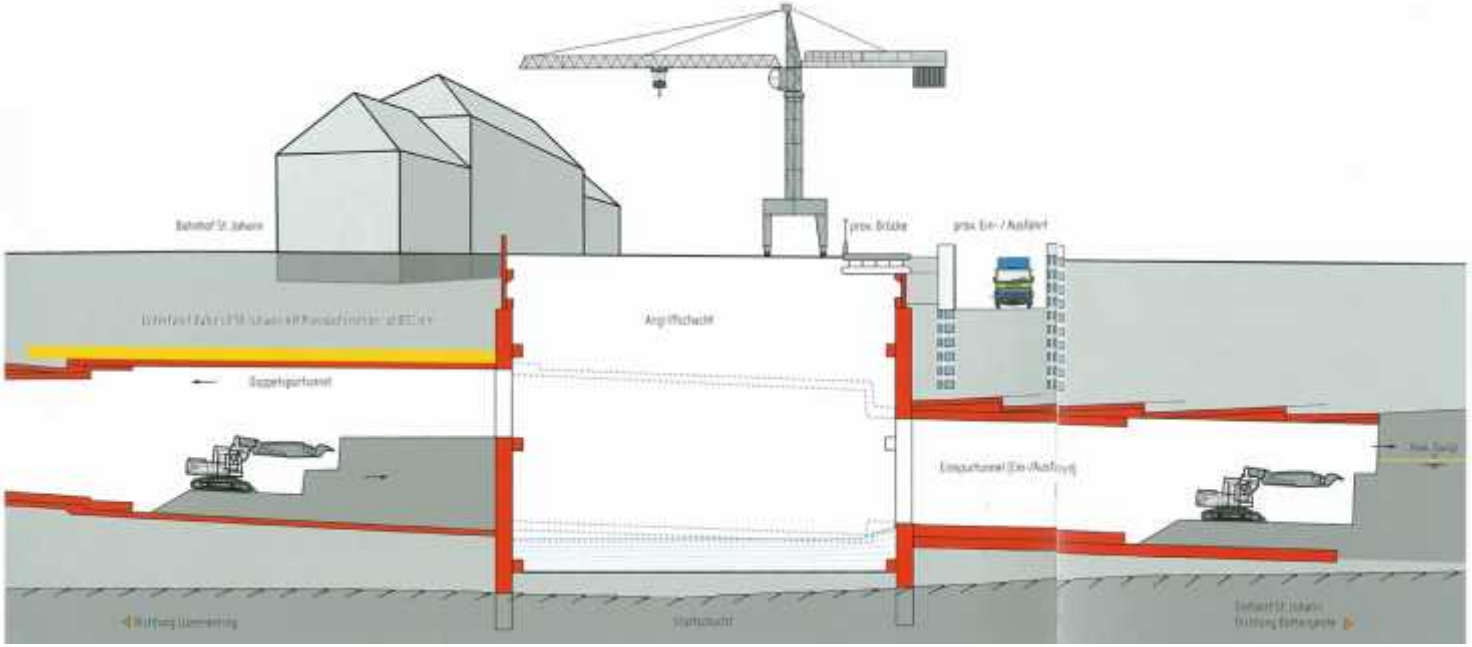
Underground tunneling



Construction progress

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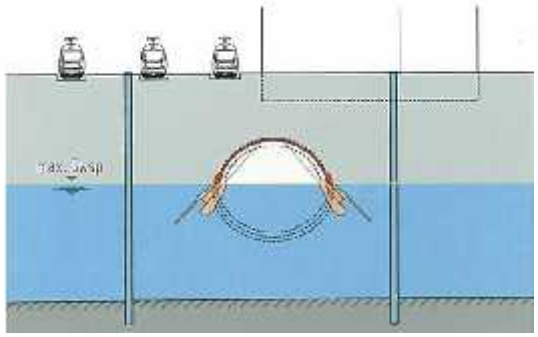
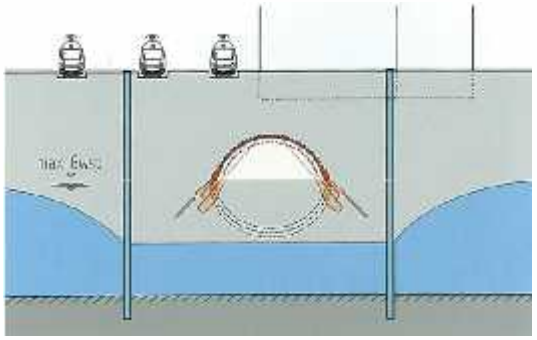
Underground tunneling

> Overburden 4 m to max. 13 m
> Excavation in loose rock (gravel)
> partially in groundwater
> Tunneling below railway station and railway tracks
> Tunneling below streets, public squares and utility pipes



Roof excavation



Groundwater lowering

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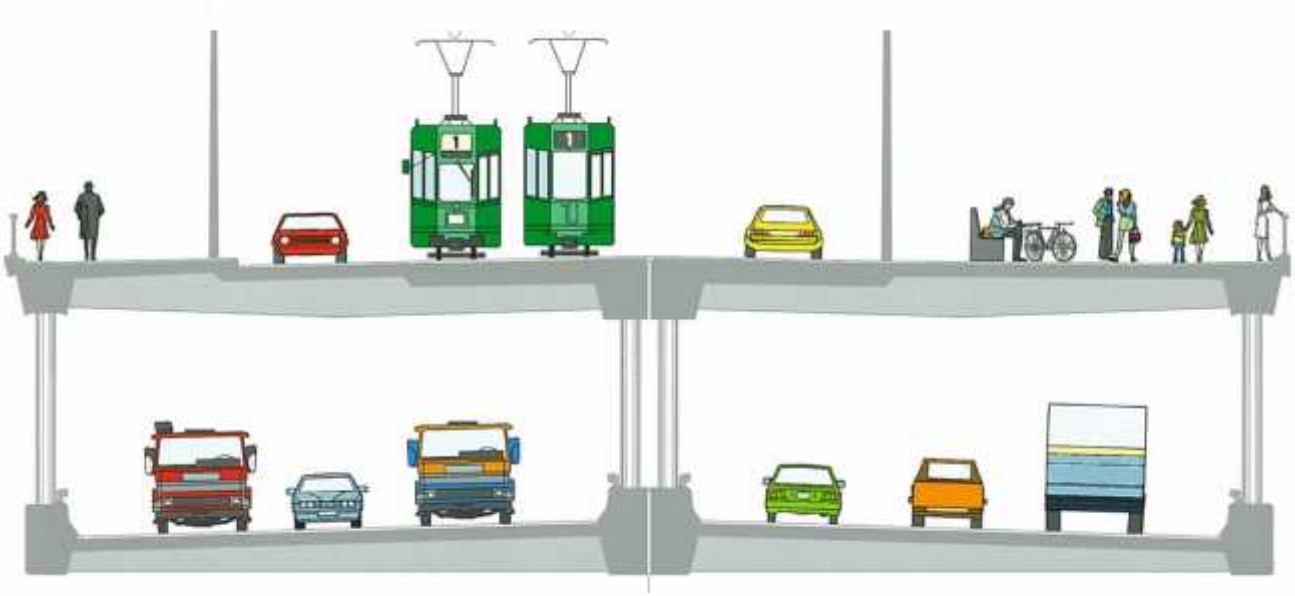
Bridges



> Double level load-bearing framework
> Separate twin bridges
> Staged execution through use of the existing bridge and maintaining operational traffic route throughout the entire construction period
> Integration of the piers from the existing bridge

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Transportation and Placing of the new steel construction

After completion

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Underground Northern Ring Road Basel (CH)

5. Special Challenges

'Horburg': inexpensive apartment buildings

> to be passed underground

> not possible to demolish and rebuild

> remain and be continuously habitable

Every house had to be analyzed structurally and responded to in an individual load-bearing system

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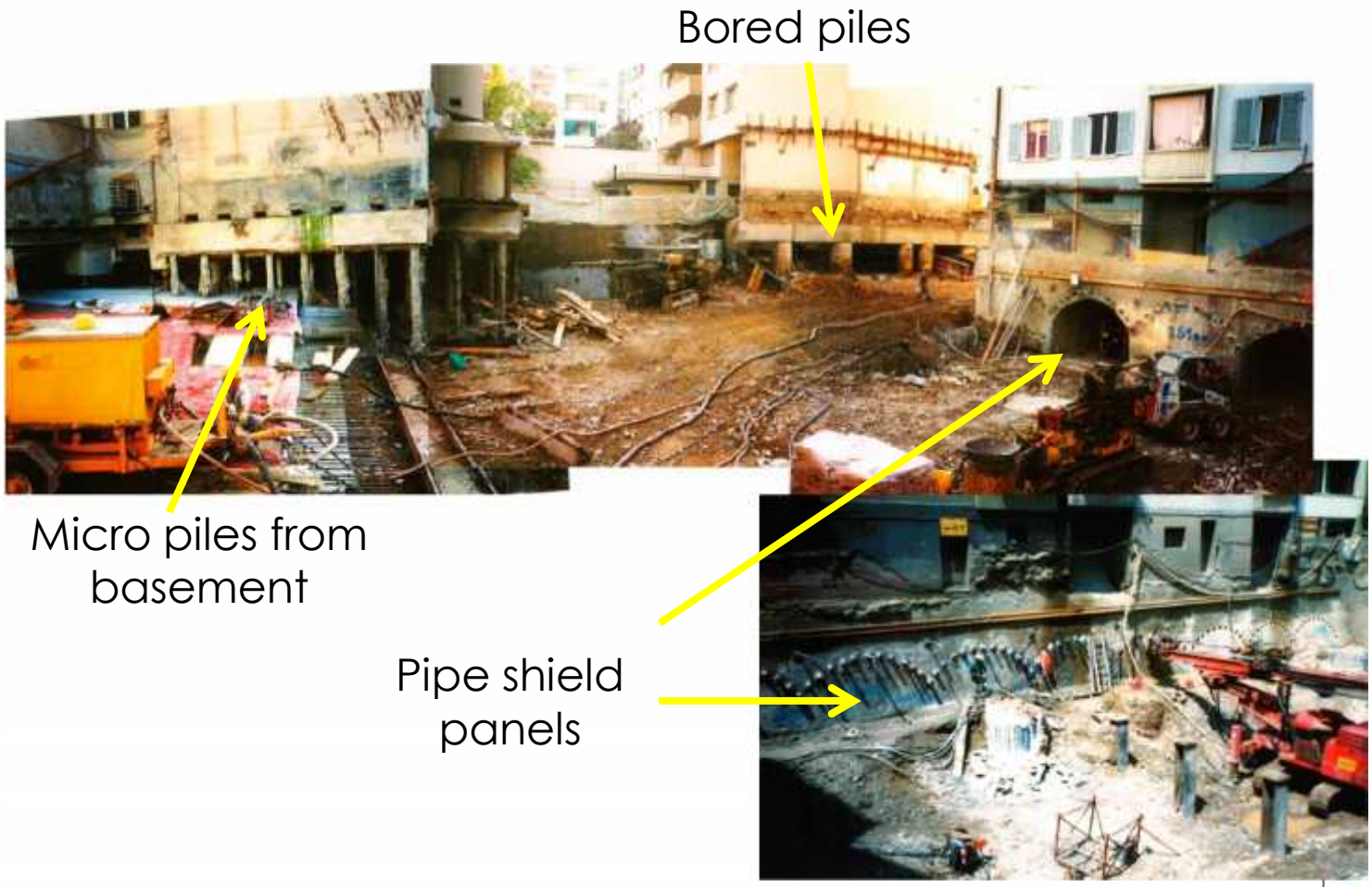

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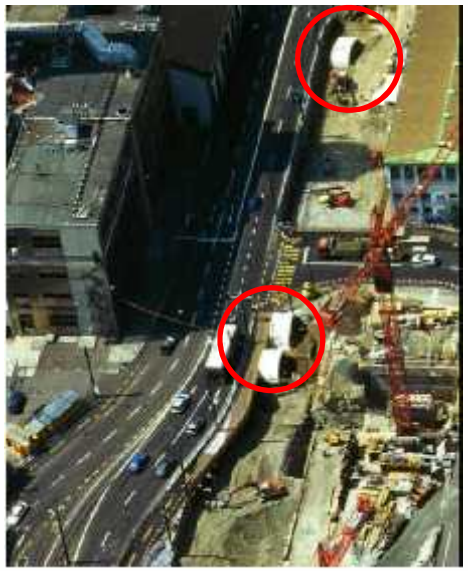
5. Special Challenges

Archeological soil research

History of Basel at Bronze Age 2'000 y B.C.



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1996–2009

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THANK YOU !

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