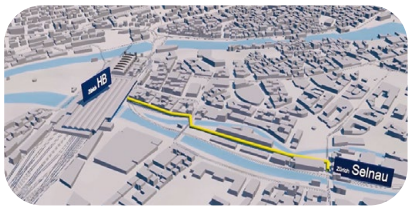
MASTER® BUILDERS SOLUTIONS

MasterGlenium® SKY 770
MasterAir® 9040
MasterSuna® RCA 3055

Renewal of roadway tunnel lot 1, Zurich



The project

The 1,400 meter-long Sihltunnel was brought into service in 1990. After 30 years, the slab track had reached its service life and had to be renewed. The new track system will be Low Vibration Track-Low Profile (LVT LP) which meant that 800 meters of the existing rails, sleepers and concrete had to be removed. To do this, the line between Zurich Hauptbahnhof (main) station and Zurich Selnau station had to be closed in both directions for 7 weeks.

The task

Since the concrete could only be placed from two points (at the main station near the Postbrücke and at the Selnau station), a concrete pump was the only possible solution, with pumping lengths of up to 250 m. The distance and traffic volumes between the concrete plant at Glattbrugg and the construction site also had to be taken into account, as did the expected temperatures during paving from the end of July to the end of August.

For the fresh concrete, the focus was on maintaining the consistency, pumpability and air void content.

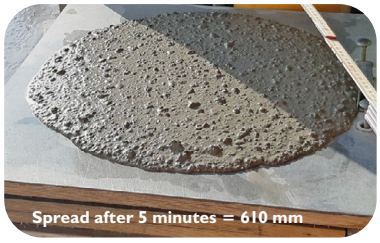
Proposed solution

After our customer Holcim (Switzerland) AG described the problem to us, our technical experts recommended the use of our new MasterSuna® RCA 3055 admixture to maintain the consistency of the concrete. Concrete tests were carried out at the Glattbrugg plant at an early stage. For the fresh concrete, the focus was on maintaining the consistency, pumpability and air void content. For the hardened concrete, the challenge was to achieve 5.5 N/mm^2 tensile strength in bending after 4 days. However, after a few trials, the right mix was found.

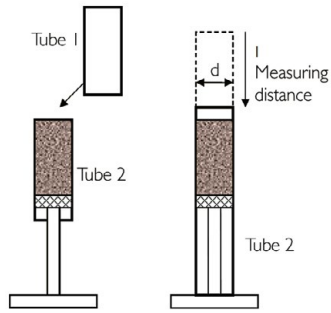
The result

At the start of the works, the concrete consistency had to be adjusted, as there were sometimes long interruptions during paving which made it difficult to pump the concrete. The concrete pump company used a Sliding Pipe Rheometer (SLIPER) on site to estimate the pumpability of the concrete and the pipeline pressure. The fresh concrete was constantly checked at the Walo Bertschinger AG concrete laboratory. With these controls in place, the placement of around 1,000 m^3 of track concrete was completed smoothly and to the satisfaction of all parties involved. The railway line re-opened at the beginning of September 2019.

Concrete and air temperatures 30 °C



Measuring principle of the SLIPER



Added value

- Expert support to develop and optimise the concrete mix and its production
- Requirements and specification consistently met
- Reliable service

Master Builders Solutions® – a plus for your project

- Optimal combination of products
- Interdisciplinary and interregional cooperation
- Experience gained worldwide
- In-depth knowledge of local building requirements
- Use of innovative and economical technologies

Information about the mix

Concrete type:	D46ITL
Compressive strength class:	C30/37
Exposure class:	XC4, XD1, XF2, XF3
Maximum aggregate size:	D_{max}16 mm
Consistency:	F4
Additional requirement flexural strength:	f_{ct} > 5.5 N/mm² after 4 days
Cement:	Robusto 4R-S
Superplasticizer:	MasterGlenium® SKY 770
Air-entraining agent:	MasterAir® 9040
Consistency retainer:	MasterSuna® RCA 3055

Project partners

Client	Sihltal Zürich Uetliberg Bahn SZU AG, 8045 Zurich
Contractor	ARGE SZU Sihltunnel ▪ Walo Bertschinger AG, 8953 Dietikon 1 ▪ Carlo Vanoli AG, 6405 Immensee
Concrete supplier	Holcim Kies + Beton AG, 8152 Glattbrugg
Concrete pump company	a3 Betonpumpen AG, 8910 Affoltern am Albis

Picture credits

- Sihltal Zürich Uetliberg Bahn SZU AG
- Holcim Kies + Beton AG
- Master Builders Solutions Schweiz AG

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