PROJECT

Long-term behaviour of waterproofing systems for cut-and-cover tunnels (LABSY) (Continuation of FA 91/98; AGB1998/106); AGB1998/202

Langzeitverhalten von Abdichtungssystemen für Tagbautunnels (LABSY) (Forts. von FA 91/98; AGB1998/106)

Funding: National (Switzerland)
Duration: Apr 2001 - Dec 2003
Status: Complete with results

Background & policy context:
In Project LABSY 1, 23 constructions built between 1970 -2000 were tested for their tightness over the period 1999-2000. For this, the sealing system was divided into 6 classes of materials: sealing materials made of bitumen, polymer-bitumen, plastics loose and bonded, liquid plastic, waterproof concrete and reactive bentonite. In a first evaluation of the tightness class 1 and 2 was distinguished whether the tunnel is leaking or not. 10 objects were leaking, 6 of which are to be checked. The causes of the leak were divided and assigned due to be provided for filing in 5 main groups and 18 defects categories. The most important data are summarized in a detailed report. From each object the complete records were stored in a database, which also includes the most important photo material.

The LABSY 2 project is an extension of LABSY 1 project, which is the technical basis. In the new LABSY 2 project the 6 categories of materials are numerically enhanced so that they are represented statically. General findings for the sealing of these constructions will be derived from the entire dataset.

Objectives:
Form the basis for the in-depth investigation of new sealing techniques such as liquid plastics and clay liners. The recommendations shall include new standards for achieving the tightness. For equivalent statistical support the findings of all material categories should be expanded to at least 8 objects.

Methodology:
Applied statistics on an extended database of road structures in Switzerland.

Parent Programmes:
ARAMIS - ARAMIS information system

Institute type: Public institution
Institute name: Swiss Government: State Secretariat for Education and Research
Funding type: Public (national/regional/local)

Partners:
Switzerland
Swiss Federal Roads Office

Eidg. Materialprüfungs- und Forschungsanstalt Abteilung

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Key Results:


Update database of road constructions in Switzerland and their damage.

The data of the new objects are integrated into the existing database including detailed description of the waterproofing system including photographs. Water-tightness performance was classified in five levels, with object class 1 (water-tight) and class 2 (few, minor humid spots) considered to be watertight for the report. A matrix was established that contains the data classified by building component and phase of construction.

Following results were obtained:

13 out of 63 objects are not water tight, even after several attempts at repair.

10 out of 28 objects, i.e. 35%, that were designed to withstand ground water pressure are not watertight.

3 out of 35 objects, i.e. 9%, built above ground water level pressure are not watertight.

Technical Implications

Leaking water from tunnels is drained either with special installations or even with simple troughs and continuously pumped out.

Other results

Of all investigated tunnel objects an over all quote of faults (19%) could be calculate.

The main faults are planning (design flaws, flawed planning of details), behaviour of the waterproofing material (no shear strength, temperature induced displacements, overestimated tactility of injection materials) as well as mechanical damage due to later work stages such as back-filling and extraction of sheet piling.

Documents:

3.9.1_Report.PDF (Final report)

STRIA Roadmaps: Vehicle design and manufacturing, Infrastructure
Transport mode: Road transport
Transport sectors: Passenger transport, Freight transport
Geo-spatial type: Other