

German Bridge Monitoring System, an Overview

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Some Objectives for the regulations for bridge Inspections:

The acute need for save infrastructure buildings causes some regulations for the organization and execution of the inspection, the protection of the involved stuff (traffic and test personnel) during the inspection, the comparability of the inspection results and the preparation and planning of measures. All these needs caused a national bridge management system.

Two different main aspects are the basics of the German Bridge Management System.

1 Legal aspects

Responsible Administration

The responsible administration is named in different laws. In the constitution of the Federal Republic of Germany (Grundgesetz) the federal states are responsible in behalf of the federation. In the "Bundesfernstraßengesetz" all tasks concerning to building and maintenance of federal highways are regulated. In all federal states the road laws contain similar regulations for the federal highways and the own state roads.

The federal road construction authority (one in each federal state) is responsible for the infrastructure. All maintenance is task of these bodies, can also transfered to third party of qualified experts. The responsibility for stability and safety still remains with the highway department.

Execution of the inspection

In DIN 1076 the main inspections are terminated every six years. It must be done by a qualified engineer, including all construction units and close to the building (hand-near). Three years after the main inspection a simple inspection had to be done. It is a visual check on the basis of the former main inspection, executed by a qualified engineer. Additional inspections once a year and constantly observations by road attans are the basics of the bridge management.

Safety of Inspection Stuff

In the social legislation, the industrial safety law, the rules of prevention of accidents and different safety regulations and guidelines the different safety aspects are regulated.

Safety of traffic

Working in traffic area, the personal behavior and sign-posting at the building site are regulated in the road traffic regulations (StVO) and the guidelines for the safety of working at road. Additional

there are recommendations regarding sign-postings for restriction of load and weight, for speed limit, for driving lane restriction and the passage height restriction are regulated.

Liability of inspection staff

Staff is not liable for damage but the official employed body. A precondition is, that the staff executed the tasks not according the official duties. Inspections by third parties requires special agreements and insurance.

Administration regulations

Some important issues are which official accomplishes which inspection at which building, centralize or decentralize organization of the inspection teams, authority, responsibility, paying. Also work time regulations and supply of building data and documents are an important aspect.

2. Technical aspects

Civil construction

All technical measures are regulated in the German standards. The DIN technical reports concerning construction, construction procedures and construction materials, additional technical contract conditions and guidelines are basics of the technical process.

Safety of Traffic

Different reasons of damages, i.e. defective drainage systems caused flooding danger, tripping edges and corrosion often causes accidents. Therefore permanent controls are necessary to guarantee safe traffic.

Execution of Inspections

The engineer of bridge inspection is leader of an inspection team. He is responsible for completeness and exactness of the results. Assistants are co-operating during the inspection, by maintaining and driving the inspection vehicle. Examination vehicles with equipment and instruments had to be provided and highway attends had to be provided the safety of the traffic area, aiding during the inspection and supply the different special vehicles for reaching the complete bridge for hand-near examination. Additional examinations and evaluations of non-destructive testing methods for concrete bridges are developed to get more information of the inner structure.

Inspection Reports

According to the guideline for the collection, evaluation and documentation of examinations of bridges, the results must be documented in a uniform, good quality inspection report. For a objective rating, there is a catalogue is created with about 1400 examples of damages. All conditions are documented in a database for bridges and buildings. Codings and building data, results of main and simple inspections, maintenance and repairs are collected for each building, including the position data in a geo-information system.

Evaluation and Measures

The routine data acquisition causes operational measures according to the boundary conditions of the building. A prognosis of the needed support and the maintenance planning is possible. The software system is partitioned in different blocks and parts.

1. Part: Measure Variants - catalogue of measures, intervention timing, optimization of strategies and a catalogue of costs.
2. Part: Measure Evaluation - economic effects, evaluation on object levels
3. Part: Scenario formation - financial requirement preservation
4. Part: Preservation Planning -Optimization on network level and evaluating a preservation program on network level.