MASTER'S DISSERTATION AT STRUCTURAL MECHANICS

DEPARTMENT OF CONSTRUCTION SCIENCES | FACULTY OF ENGINEERING LTH | LUND UNIVERSITY

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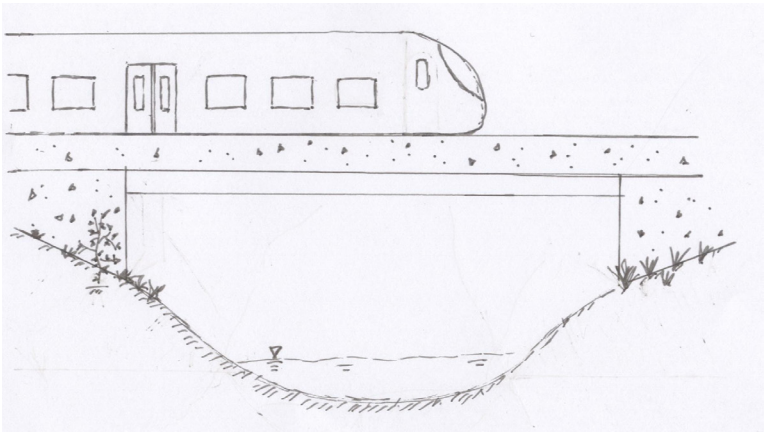
PARAMETER STUDY FOR DYNAMIC DESIGN OF HIGH-SPEED RAILWAY BRIDGES



BACKGROUND

The Swedish Transport Administration is planning to build railway for high-speed trains, connecting the country's three biggest cities: Stockholm, Gothenburg and Malmö. The aim of the expansion is to reduce the strain on the current rail system and to shorten the travel time; thus, obtaining a more attractive means of transport. The intended velocity of the high-speed train is 320 km/h, which is much greater than today's limit of 200 km/h. This increase in velocity will result in larger acceleration forces and higher stresses on the bridges along the intended railway lines.

AIM

The purpose of this master's thesis is to investigate how the high-speed trains affect different types of bridges regarding dynamics. The main focus will be on bridges along the East Link, between Järna and Linköping, which constitutes the first construction phase of the expansion. Results from this dissertation could be used as a decision basis to, at an early stage of a project, determine which type of bridge to use in order to avoid complications considering the higher dynamic loads.

METHOD

Two analysis will be performed. In the first analysis, referred to as Analysis 1, the impact of different parameters on the bridge's sensitivity to dynamic loading will be evaluated. The parameters that will be varied includes span length, number of spans and cross-section height. Several types of bridges will be covered in Analysis 1; however, the study is limited to concrete bridges since it is the most common type of railway bridge in Sweden. The second analysis, Analysis 2, will include the interaction between soil and structure and will be performed on one of the bridges from Analysis 1. Ground models with fixed boundary conditions, which are most broadly used today, will be compared with more realistic, elastic ground models. The dynamic analysis will be executed primarily using the computer software Brigade+.

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