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Advanced Structural Concrete – Exercise 3

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Topic: Slabs **Skew supported slab**

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1 Dimensioning bases of the exercise

1.1 Introduction

In this exercise a slab will be dimensioned and discussed at the ultimate limit state type 2 according to the structural design standards SIA 260 to 262 [1 – 3]. This exercise examines a skew supported bridge slab.

1.2 Geometry

The dimensions can be taken from Figure A1.

1.3 Material

For the construction of the bridge a concrete C30/37 and construction steel B500B are used.

1.4 Exposure classes

The skew plate is exposed to weather conditions as well as de-icing salts and is situated in an environment with changing humidity. The concrete cover is c_{nom} = 55 mm.

1.5 Loads

The slab is subjected to its dead weight, the self-weight of non-structural elements of g_{1k} = 3 kN/m^2 and a live load of q_k = 15 kN/m^2 (characteristic values, acting on the entire surface of the slab). The loads are to be combined according to SIA 261[2].

2 Tasks

a) Choose a reasonable slab thickness.
b) Determine the minimum reinforcement of the slab and its bending and shear resistance.
c) Dimension the slab using the strip method.
d) Dimension the slab using an elastic FEM-calculation (e.g. with CEDRUS-7, [4]).
e) Draw a reinforcement layout to a scale of 1:50 of the necessary bending / shear reinforcement.
f) Determine an upper limit value of the ultimate load using the yield line method.
g) Discuss the different methods from c), d) and f).

3 Literature

[1] Swiss society of engineers and architects (SIA), standards: SIA 260 Basis of Structural Design, 2003

[2] Swiss society of engineers and architects (SIA), standards: SIA 261 Actions on Structures, 2003

[3] Swiss society of engineers and architects (SIA), standards: SIA 262 Concrete Structures, 2003

[4] FEM Software, CEDRUS-7, Cubus AG, Zürich

Appendix A - Figures

A1 Floor plan and side view of the skew supported slab, dimensions in [m].