

## Advanced Structural Concrete – Exercise 4

(101-0127-00L)

---

**Topic: Slabs****Skew supported slab**

Hand out: 8. December 2022, HIL E 7

### 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, 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  $g_{lk} = 3$  kN/m<sup>2</sup>, and a live load of  $q_k = 15$  kN/m<sup>2</sup> (characteristic values, acting on the entire surface of the slab). The loads are to be combined according to SIA 261 [2].

## 2 Tasks

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

## 3 Literature

- Swiss society of engineers and architects (SIA), standards: SIA 260 Basis of Structural Design, 2003
- Swiss society of engineers and architects (SIA), standards: SIA 261 Actions on Structures, 2003
- Swiss society of engineers and architects (SIA), standards: SIA 262 Concrete Structures, 2003
- FEM Software, CEDRUS-7, Cubus AG, Zürich

## Appendix A - Figures

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

