

# Parking Lysbüchel – Basel

## Resource assessment of structural elements

### Factsheet LYS02 – Supporting Beam Stahlton

Version 1.1 – July 2022

Authors: Julie Devènes, Maléna Bastien-Masse, Corentin Fivet

The parking Lysbüchel is a building located at Elsässerstrasse in Basel, erected in 1970. It consists of four floors including a parking, storage spaces and mezzanines with offices. Floors 1 to 3, which are the largest area of the building, were designed as parking. Immobilien Basel-Stadt is planning its deconstruction.

The building is composed of prefabricated prestressed concrete elements. The ribbed slabs are placed on transversal beams which are supported by columns. A thickness of 8 cm of cast-in-place concrete is placed on the top surface of the prefabricated slabs, creating a continuous slab system. The slabs and transversal beams were manufactured by Stahlton AG.

**Existing reports** used for the elaboration of the factsheet:

- A. CSD Ingénierie AG, Volta Nord - Rückbau Baufeld 4 – Konzept Kreislaufwirtschaft, Basel, 03.06.2022
- B. Zweidler, Simon & Häfeli, Beat. Versuchsbericht: vorgespannte Rippenplatten – ReUse Parkhaus Lysbüchel, Basel. Fachhochschule Nordwestschweiz, Muttenz, 05.05.2022.

**Factsheet list** for this building:

Factsheet LYS01 – Ribbed plate Stahlton

Factsheet LYS02 – Supporting Beam Stahlton

Factsheet LYS03 – Column

**Disclaimer:** This document is a preliminary resource assessment and should be used as such. The results presented are based on visual inspections and on limited material testing. Material properties and detailed condition of each element should be further assessed prior to any reuse of the elements described herein. The authors deny all liabilities with respect to the use of the information given in this document.

Type LYS02

Category: Beam elements

## Supporting Beam Stahlton

Location

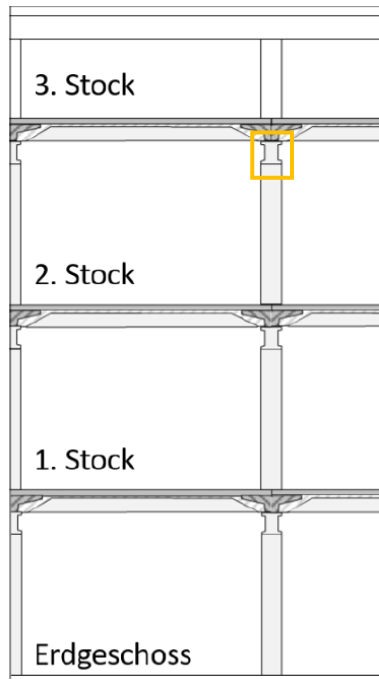


Figure from CSD Ingenieure, reference A

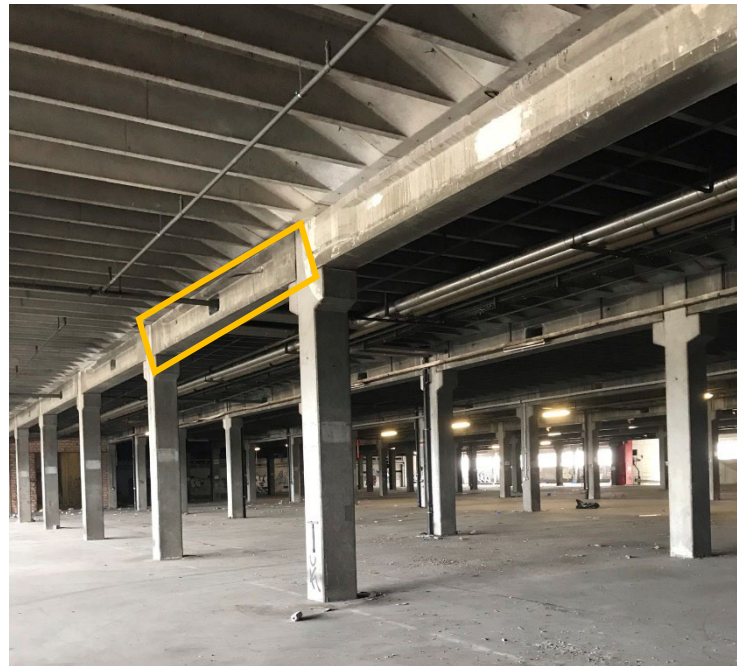


Photo from Zirkular AG

### Supporting Beam Stahlton



Photos from Zirkular AG

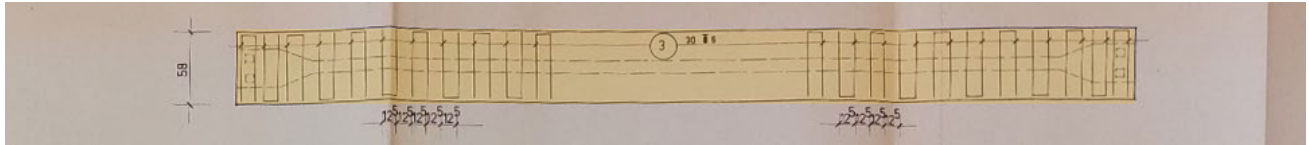
## Type LYS02

Category: Beam elements

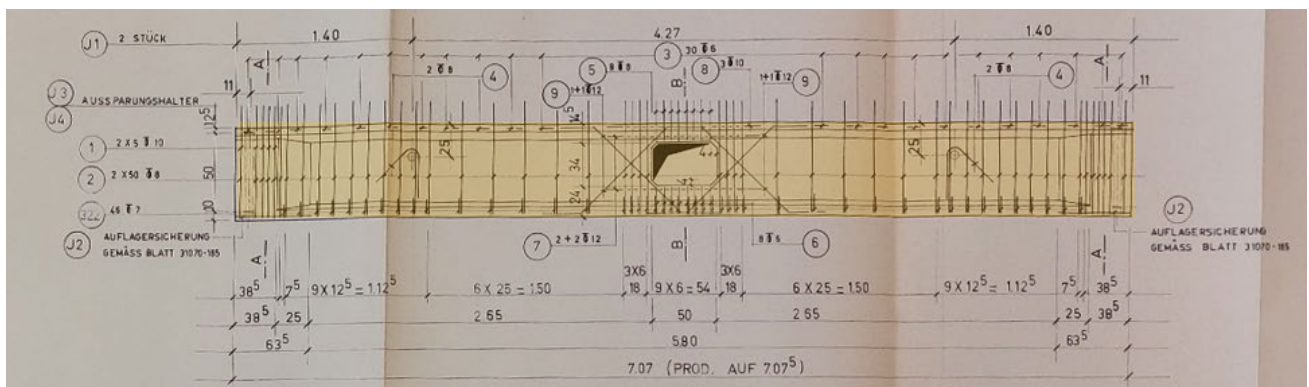
## Supporting Beam Stahlton

## Subtype n°1

These dimensions and reinforcement layout is valid for at least 22 units, located on the roof slab. It should be verified for all other elements.



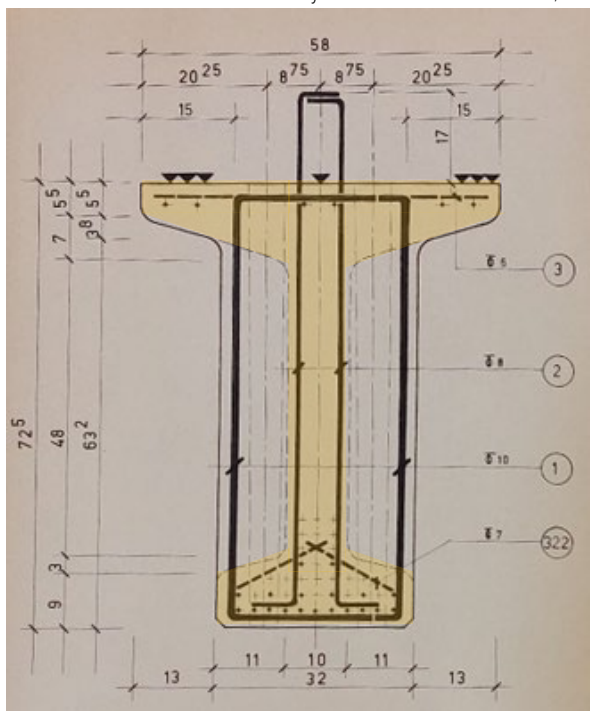
## Grundriss



Ansicht

## Subtype n°1, cross-section dimensions

These dimensions and reinforcement layout is valid for at least 22 units, located on the roof slab. It should be verified for all other elements.



Querschnitt A-A.

## Type LYS02

Category: Beam elements

## Supporting Beam Stahlton

## Description

Construction year	1970
Material	Precast reinforced concrete
Actual location	All beams supporting the ribbed slabs of the parking
Initial function	Structural I-beam element
Accessibility	Moderate - Ribbed slabs should first be removed
Anchor points	Two openings in the web of the beam
Exposition	Indoor, not directly exposed to rain
Color	Grey
Finishing	Exposed concrete
Overlays	Type                      Fixation                      Thickness
	-                                      -                                      -
Connexion type	Ribbed slab connected to the beams with cast-in-place concrete and rebars.
Deconstruction tool	None

## Condition and durability

Condition assessment	n.a., to be investigated
Carbonatation depth [mm]	n.a., to be investigated
Toxic substance	n.a., to be investigated

## Mechanical characteristics

Concrete density ( $\rho_c$ )	n.a
Concrete compressive strength ( $f_{ck}$ )	Assumed 67.4 N/mm <sup>2</sup> *
Concrete young modulus ( $E_{cm}$ )	Assumed 42 to 50 kN/mm <sup>2</sup> *
Prestressed tensile strength ( $f_{pk}$ )	Assumed 1487 N/mm <sup>2</sup> *
Reinforcement tensile strength ( $f_{sk}$ )	Assumed 615 N/mm <sup>2</sup> *
Reinforcement young modulus ( $E_s$ )	Assumed 201 kN/mm <sup>2</sup> *

Element	Geometry			Inventory					Environmental impacts					
Subtype	Dimensions (L x L x h) [mm]	Reinforcement [mm]	Cross-section characteristic resistance [kNm]	Quantity [u]	Weight [kg/u]	Total area [m <sup>2</sup> ]	Total volume [m <sup>3</sup> ]	Significance	Initial production	Conventional demolition	Dismantling by sawing	Initial production	Conventional demolition	Dismantling by sawing
									[kgCO <sub>2</sub> -eq/u]			[kWh oil-eq/u]		
1	7070 x 580 x 725	n.a.	n.a.	330**	2635	-	n.a.	n.a.	503	31.6	-	1157	132	-

## Additional information

Additional note	<ul style="list-style-type: none"> <li>&gt; * Material properties were extracted directly from reference A by CSD Ingenieure AG and reference B by Fachhochschule Nordwestschweiz (FHNW). Tests were done for the concrete of the ribbed plates (Factsheet LYS01). It is supposed that the same properties can be considered for the beams, as both elements were fabricated by Stahlton.</li> <li>&gt; ** A total of 330 units are assumed to have similar dimensions. This should be verified and validated with existing drawings, if available, or by onsite measurements.</li> <li>&gt; The beams should be easy to dismantle once the ribbed slab elements are sawn and remove. However, the connections between the beams and the column should be verified to correctly plan the deconstruction of the beams.</li> </ul>
-----------------	--

Type LYS02

Category: Beam elements

## Supporting Beam Stahlton

Additional note	<ul style="list-style-type: none"> <li>&gt; The elements were not inspected by the authors of this factsheet which was created using only the available drawings. A complete inspection and investigation should be carried out to validate the suitability of these elements for reuse, in particular regarding their condition. This should be carried out prior to the detail design phase of the project reusing the elements.</li> <li>&gt; Since the details on the reinforcement contained in the section are not available, the environmental impact is calculated by neglecting the weight of the reinforcement and therefore only considering the weight of the precast concrete. The results may be underestimated.</li> <li>&gt; The embodied global warming potential (in kgCO<sub>2</sub>eq) and the grey energy (in kWh oil-eq) for fabrication and demolition of the elements is calculated using their weight and the equivalent factors available in the Life Cycle Assessment KBOB database. The considered factors are the following: Precast concrete element, normal concrete, from factory - KBOB ID-Number 01.043.</li> </ul>
Attention point	<ul style="list-style-type: none"> <li>&gt; The depth of carbonation of the concrete is unknown, but it can be assumed to be similar what was measured for the ribbed plates (Factsheet LYS01), i.e. around 20 mm. There is thus a risk of corrosion of the stirrups and they elements should be inspected to check for any corrosion stains.</li> <li>&gt; To prevent development of corrosion, the elements should be protected against water and humidity.</li> </ul>