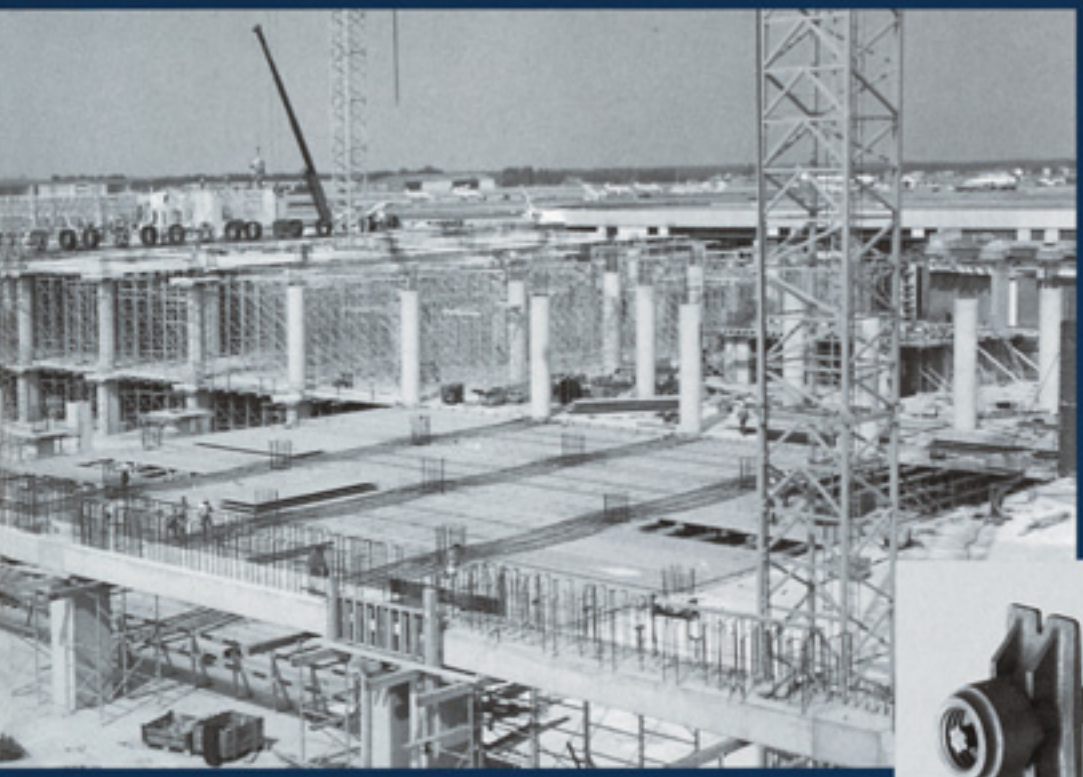
BBR

Prestressing System for Single Strands



BBR **CONA**

CONA-Single® System

The CONA-Single system for strands (0.5" and 0.6" dia.) is used where small post-tensioning units are required, such as in flat slabs of buildings and transverse prestressing of bridge decks.
For unbonded tendons the strand is coated with a special protective grease and encased in a plastic conduit for preventing corrosion as well as reducing friction.
In the case of bonded tendons, a corrugated metal or plastic conduit is used, which is grouted after completion of the stressing operations.
The CONA-Single system is protected by patents in most countries.

Tendons CONA-Single

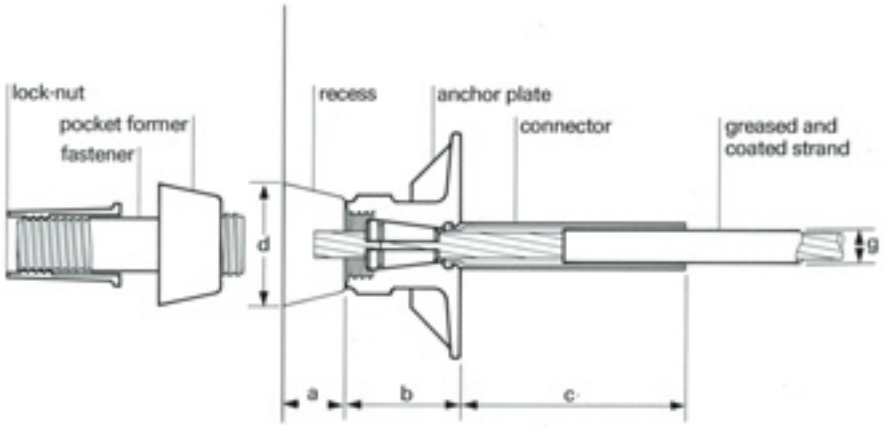
	area mm²	Ultimate tensile force kN	Stressing force at 0.8 u.t.s. kN
Strand dia. 0.5"	100	186	148.8
Strand dia. 0.6"	150	279	223.2

Tendon forces are based on a guaranteed u.t.s. 1860 N/mm²

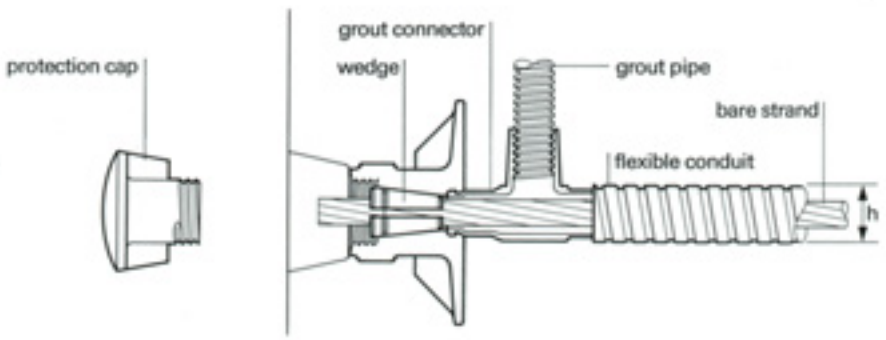
Stressing Anchorages CONA-Single

The unique plastic fastener allows an easy and quick assembly of the anchorage to the formwork. The fastener is combined with a pocket former which provides an adequate concrete cover and forms a recess for the stressing jack.
Special care is given to provide a high degree of corrosion protection. The connector which is fixed to the anchor plate with a special locking system guarantees a close-fit with the strand's conduit. A tight protection cap fitting into the recess is screwed to the anchor plate. It can be filled with corrosion inhibiting compound which protects the strand and the anchorage. Alternatively the recess can also be filled with mortar.
In case of bonded tendons a grout connector is used. Cement grout is injected through the inlet of the connector after stressing which provides the bond and required corrosion protection to the strand.

Unbonded Tendon

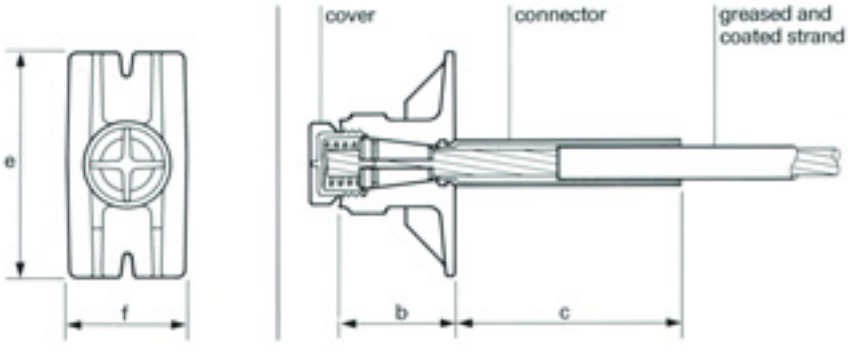


Bonded Tendon



Fixed Anchorages CONA-Single

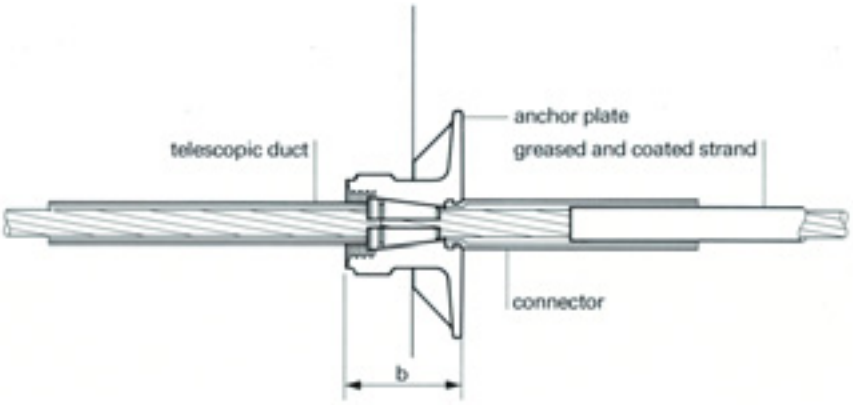
The fixed anchorage is similar to the stressing anchorage. However, the anchoring wedges are preseated. A spring and plastic protection cover ensure that the wedges remain securely seated in the anchor plate. The concrete and the cover, which can be filled with a corrosion inhibiting compound, provide an efficient corrosion protection of the complete anchorage.



Intermediate Anchorages CONA-Single

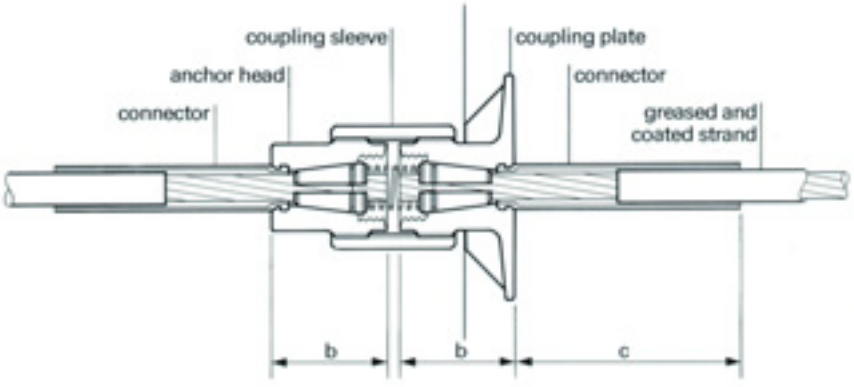
If a structure is concreted and posttensioned in sections, stressing anchorages can be installed at intermediate points of the tendon. At the construction joint the tendon is prestressed and the remaining length of the tendon is kept coiled, ready to be installed in the adjacent section.

Intermediate Anchorage with Continuous Strand



If such coils at construction joints are not practicable it is possible to connect two tendons by means of a coupling anchorage.
Technical reasons and safety requirements may also demand such coupling anchorages.

Intermediate Anchorage with Coupling



	a	b	c	d dia.	e	f	g O.D.	h I.D.
Strand dia. 0.5"	30	56	150	58	110	58	15	20
Strand dia. 0.6"	30	78	150	70	136	70	19	25

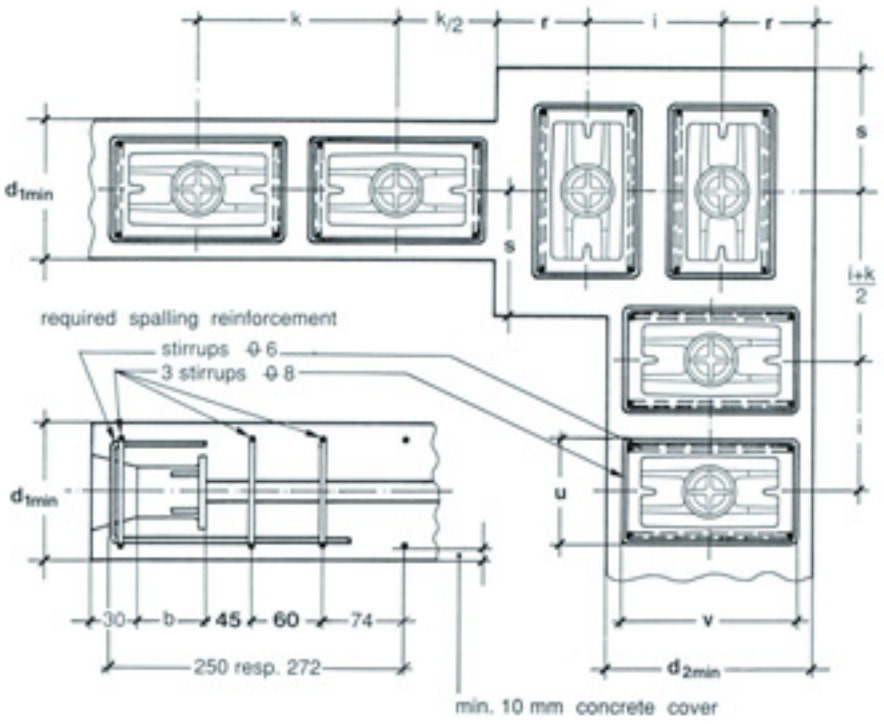
Dimensions in millimetres

Location of the Anchor Castings in the Structure

The min. required distance from the anchor castings to concrete edges and between adjacent anchor castings depends in general on:

- the post-tensioning force to be transmitted
- the concrete strength
- the anchor casting dimensions
- the reinforcing steel behind the anchor casting
- structural requirements.

The following distances and spalling reinforcement behind the anchor casting must be observed.



CONA-Single 0.5"

Concrete quality fc	b	Edge distance r	s	Distance i	k	Required slab depth d_1 min	d_2 min	Stirrup dimensions u	v
23	56	60	85	100	150	120	170	100	150
28	56	55	80	90	140	110	160	90	140
33	56	50	75	80	130	100	150	80	130
38	56	50	75	80	130	100	150	80	130
43	56	50	75	80	130	100	150	80	130

Dimensions in millimetres

CONA-Single 0.6"

Concrete quality fc	b	Edge distance r	s	Distance i	k	Required slab depth d_1 min	d_2 min	Stirrup dimensions u	v
23	78	70	100	120	180	140	200	120	180
28	78	65	95	110	170	130	190	110	170
33	78	60	90	100	160	120	180	100	160
38	78	60	90	100	160	120	180	100	160
43	78	60	90	100	160	120	180	100	160

Dimensions in millimetres

- fc = nominal cylinder strength (N/mm²)
- Stressing is possible when the concrete has reached 80% of its nominal strength.
- The distance i or k can be reduced provided the distance in the other direction is increased accordingly.
- The spalling reinforcement behind the anchor casting shall be made from deformed bars with a min. yield of 420 N/mm². It can be combined with the statically required reinforcing steel.
- For particular cases, deviations from the indicated values are permissible. Details are available from the tendon supplier or BBR Systems Ltd, Switzerland.

Initial Prestressing Losses

Losses due to friction

Friction losses in a distance x from the stressable anchor: $V_x = V_o \cdot e^{-(\mu\alpha + kx)}$

The following friction coefficient μ and k shall be assumed for the design:

- for greased strand with PE-extruded sheathing:	$\mu = 0.05$	$k = 0.0010$
- for strand in corrugated metal ducts:	$\mu = 0.15 - 0.20$	$k = 0.0015 - 0.0020$

In the case of corrugated metal ducts, it is recommended to check the influence of the friction, using the lower and upper limit ot the coefficients μ and k.

Losses due to wedge draw-in

The wedge draw-in is not a constant value. It depends principally on

- the diameter of the strand
- the wedge seating force exercised by the jack
- the prestressing force at transfer.

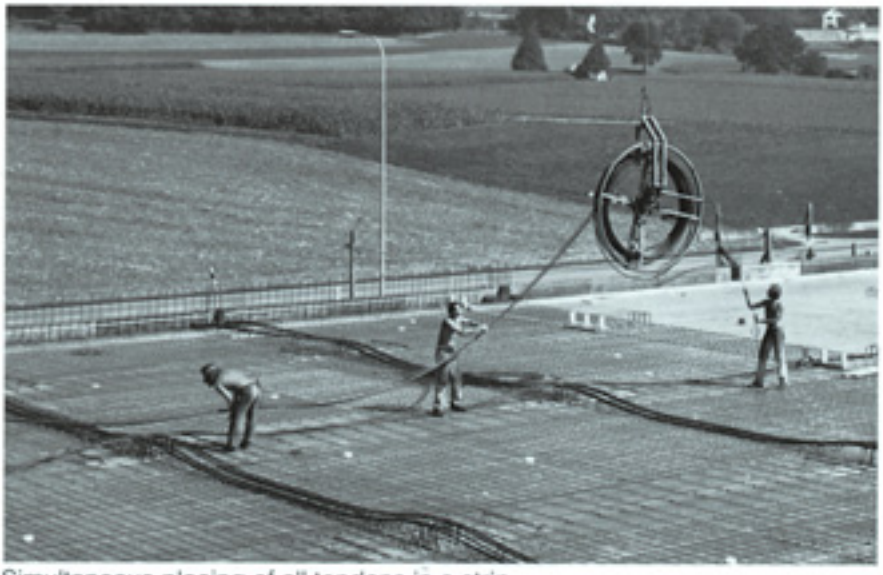
The wedge draw-in of fixed ends must be considered in the determination of the tendon extension, the one at the stressing end in the statical computation.

Support Strip Method of Prestressing Flat Slabs

A special feature of this method is that all prestressing tendons are concentrated in support strips to run over the columns in both directions. In addition reinforcing bars must be provided according to the principles of partial prestressing.

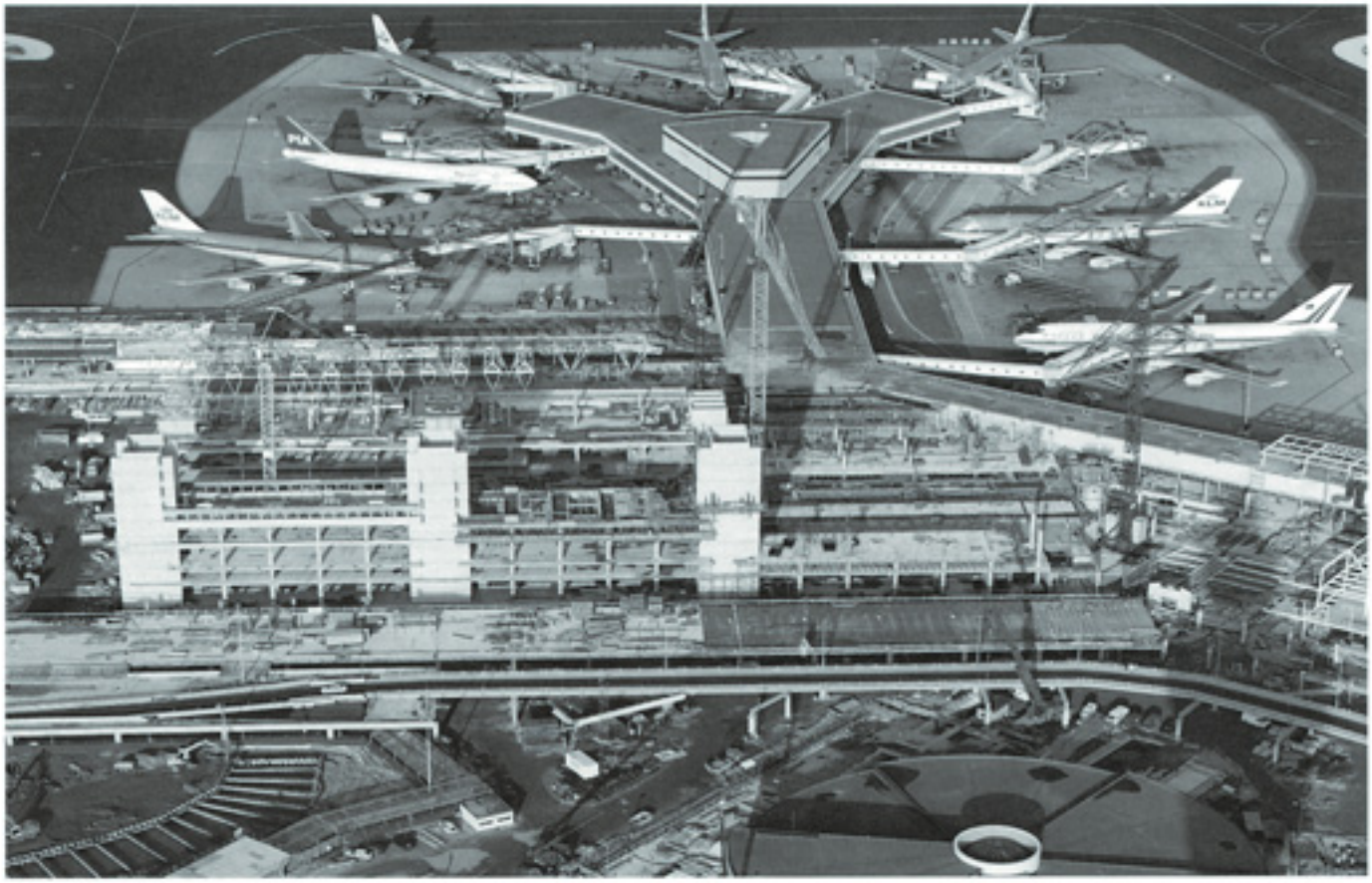
The particular advantages of the support strip method are:

- optimum resistance to punching at the column head
- small and uniformly distributed bending moments in the slab
- practically deflection free
- greater flexibility in positioning openings through the slab
- weaving of tendons is avoided
- simultaneous placing of all tendons in a strip on common support chairs is possible.



Simultaneous placing of all tendons in a strip

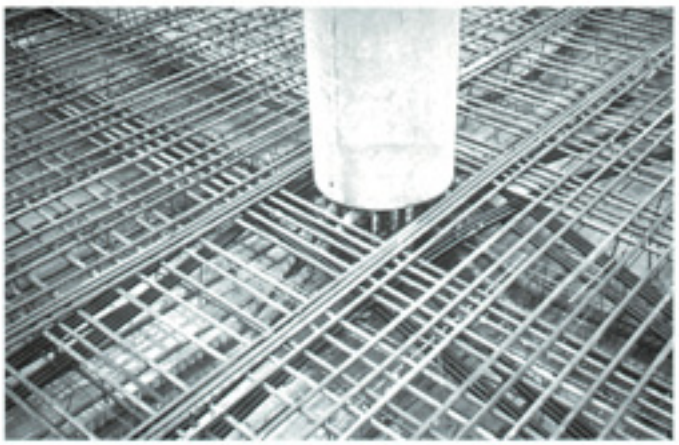
Details are subject to changes. Due to differences in building codes and available strands, it is recommended to contact the local BBR representative for detailed information.

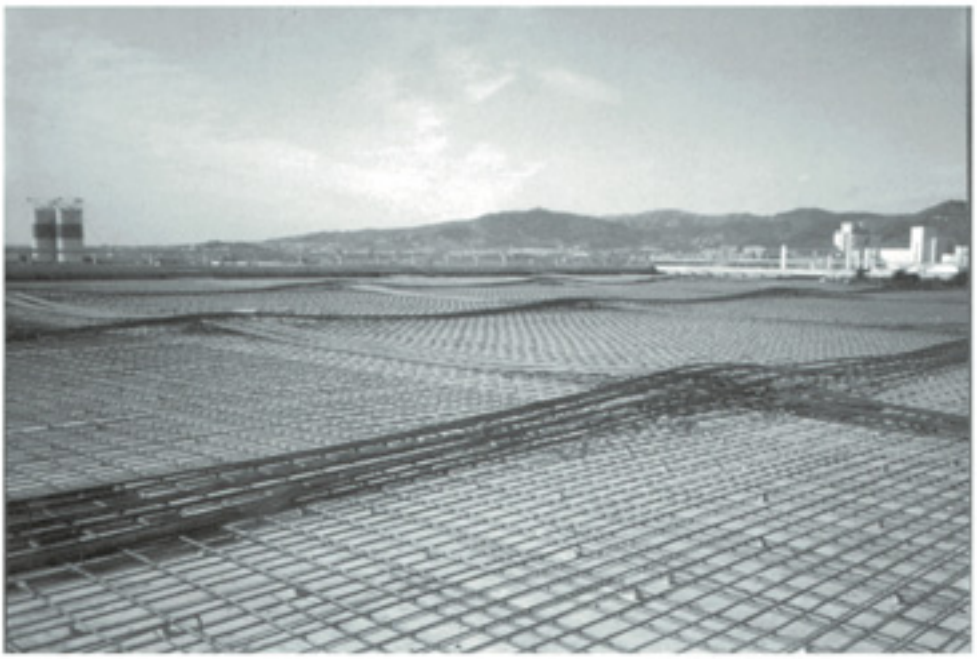


Terminal Buiding Schiphol in Amsterdam, Netherlands

Ratchada Pavilion in Bangkok, Thailand

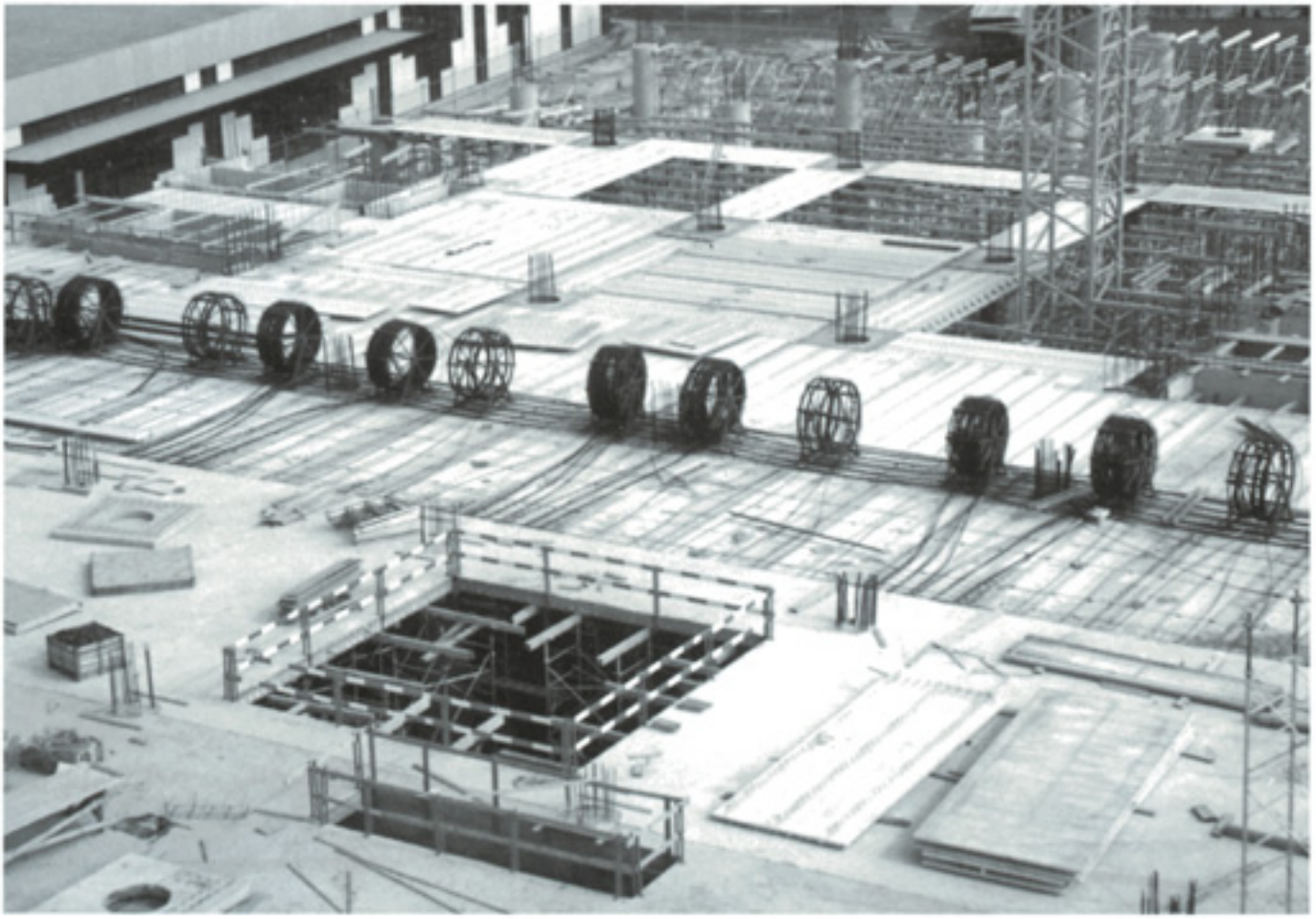
Business Center "Grindel" in Bassersdorf, Switzerland





Near Barcelona, Spain,
Water Reservoir San Juan

International Airport in
Brussels, Belgium



Cover: Airport Terminal Zaventem in Brussels, Belgium

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