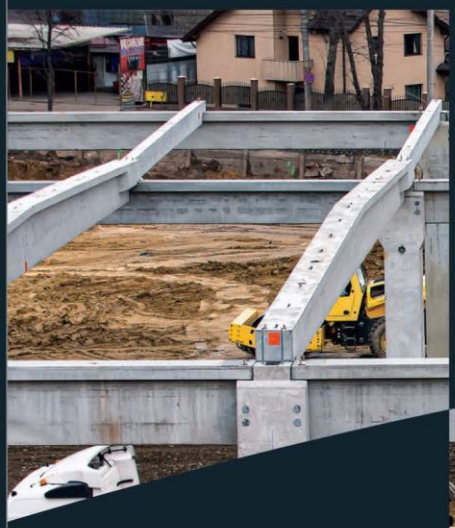
# INDUSTRIAL HALLS AND PRECAST CONCRETE STRUCTURES



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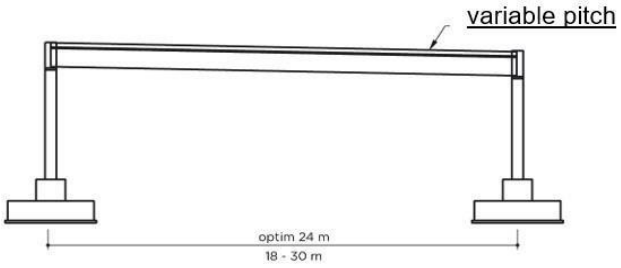
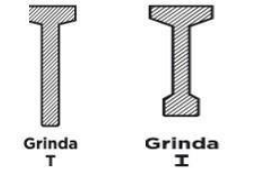
# CONTENTS

# I.1. Single-span industrial hall with a mono-pitch roof

The structure with a mono-pitch roof features a modern design, offers straightforward execution, and ensures efficient rainwater drainage.

ADN Prefabricate implemented this solution using parallel frames with 6-meter bays. For the construction of the frames, pre-stressed T-section beams can be used, or I-section beams.




T-Beam OR I-Beam

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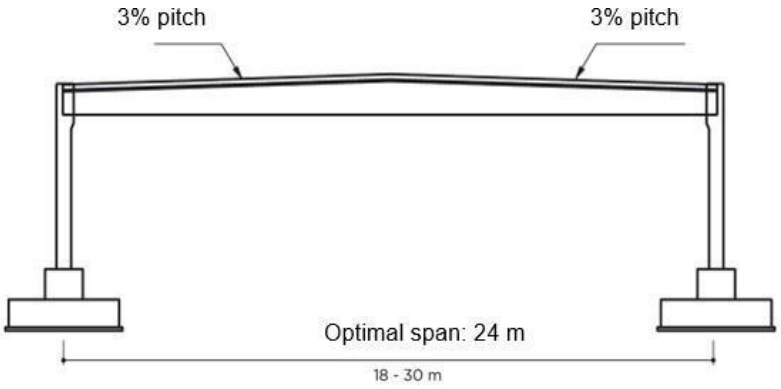
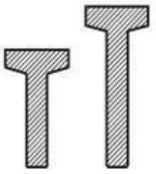
Details at p.15

Lidl Store – Tabacului Street, IAȘI

# I.2. Single-span industrial hall with a dual-pitch roof

This type of precast structure is ideal for industrial halls or commercial centers. The structure is efficiently designed using parallel frames (as shown in the image below), with 6-meter bays, braced around the perimeter at the top with metal elements. The economically optimal span is 24 meters.



T-beam (double-pitched beam)

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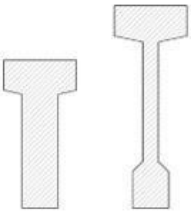


Double-pitched beam

Details at p.16

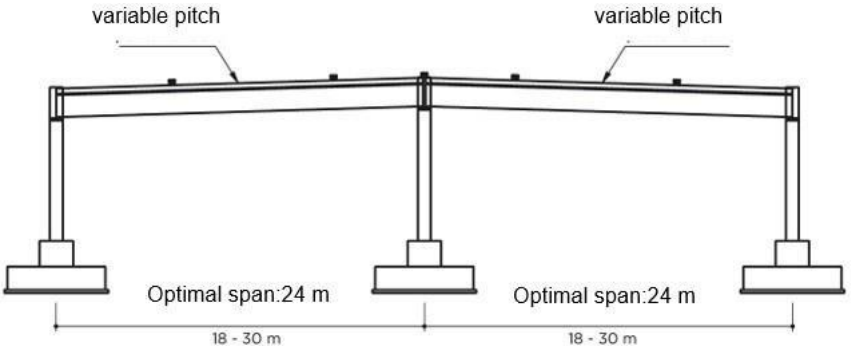
Alira Grand Vins Industrial Hall - CONSTANȚA

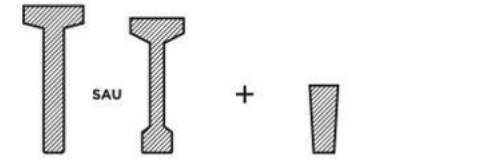
# I.3. Double-span industrial hall with a dual-pitch roof

Depending on the loads and architectural considerations, this solution can be implemented using frames (as shown in the image below) with spans of:

• 6 meters, when the structure is braced along the perimeter at the top with metal elements;

• 12 meters, when the upper part of the structure is provided not only with metal bracings, but also with pre-stressed concrete purlins (as shown in the image below).

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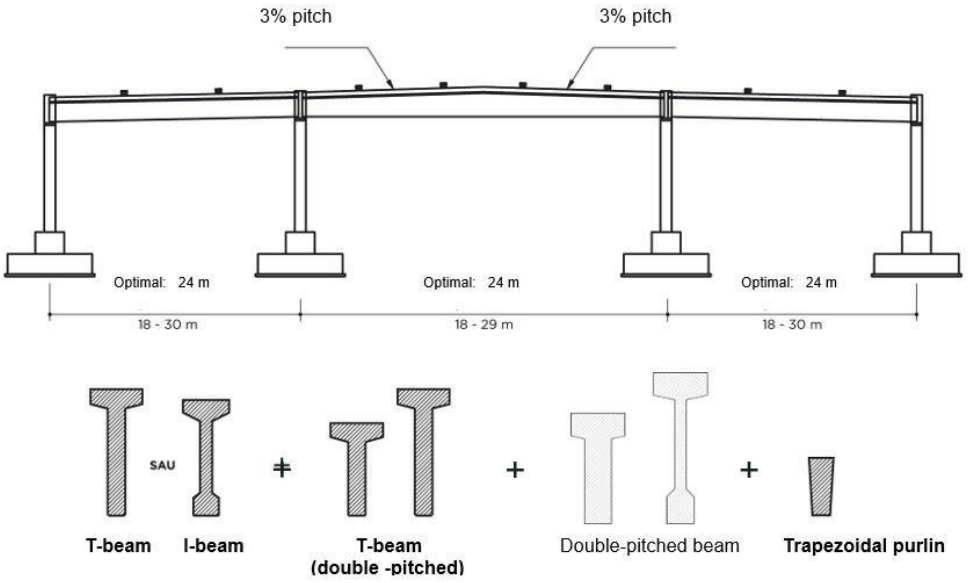
Barrier Industrial Hall - BACĂU

# I.4. Industrial hall with three or more spans and a dual-pitch roof

This solution is based on the one described in section I.3, incorporating an additional intermediate frame in the central area, obtained by adding a third roof beam to the structural system.

The roof (in this case) can be built using two edge beams with T or inverted T section and a central beam with a T or inverted T section, forming a double-pitched roof (as illustrated in the image below).

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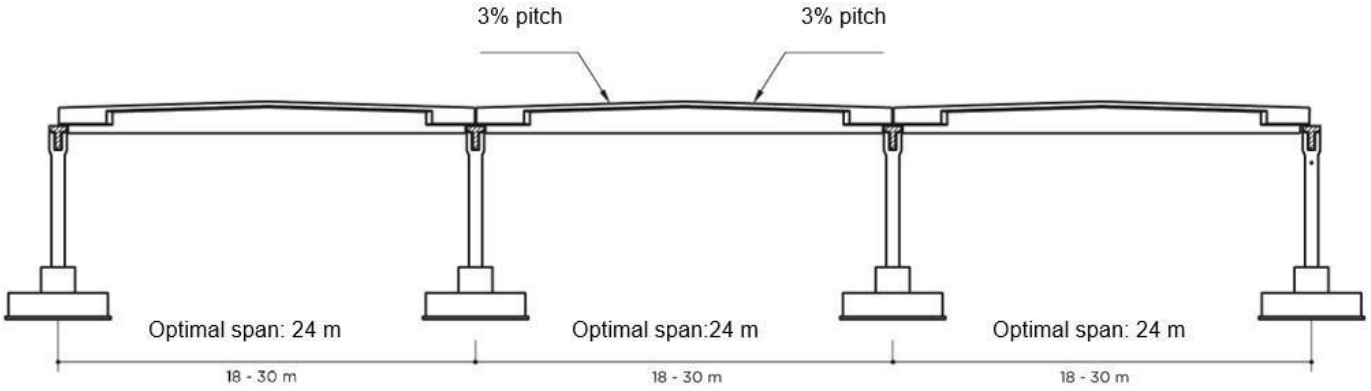
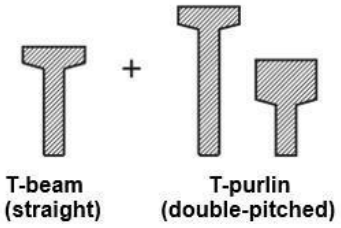
Barrier Industrial Hall - BACĂU

# I. INDUSTRIAL HALLS (GROUND LEVEL STRUCTURES)

## I.5. Industrial hall with three or more spans and double-pitched beams

This solution uses primary beams with a T-shaped cross-section, up to 12 meters in length, and secondary beams (purlins) with a T-shaped, double-pitched cross-section, up to 30 meters in length, featuring a bulb at the support area, as described on page 18, section B.



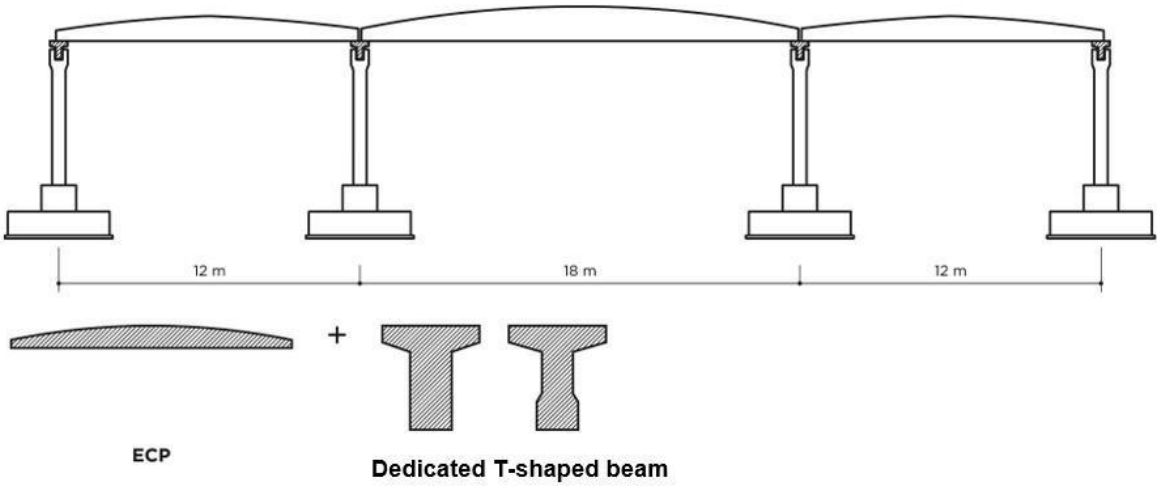

**T-beam (straight)** **T-purlin (double-pitched)**

Details at p. 17 Details at p. 18

Dedeman Store – IAȘI

# I.6. Precast structure covered with PCP (ECP) elements (pre-stressed curved concrete panels)

For this solution, two types of pre-stressed curved concrete roof elements PCP (ECP) can be used, with lengths of 12 or 18 meters and a width of 1.5 meters. An alternative configuration using a combination of ECP (pre-stressed curved concrete) elements is also possible, as illustrated in the image below. This is a low-complexity solution, resulting in a structure with a concrete roof. The structure consists of foundations, columns, T-section roof beams with lengths of 6 or 12 meters, and ECP elements bearing on these beams (as shown in the following image). For the 12-meter span, a dedicated T-section beam is used, as described on page 22.




Details at p.22

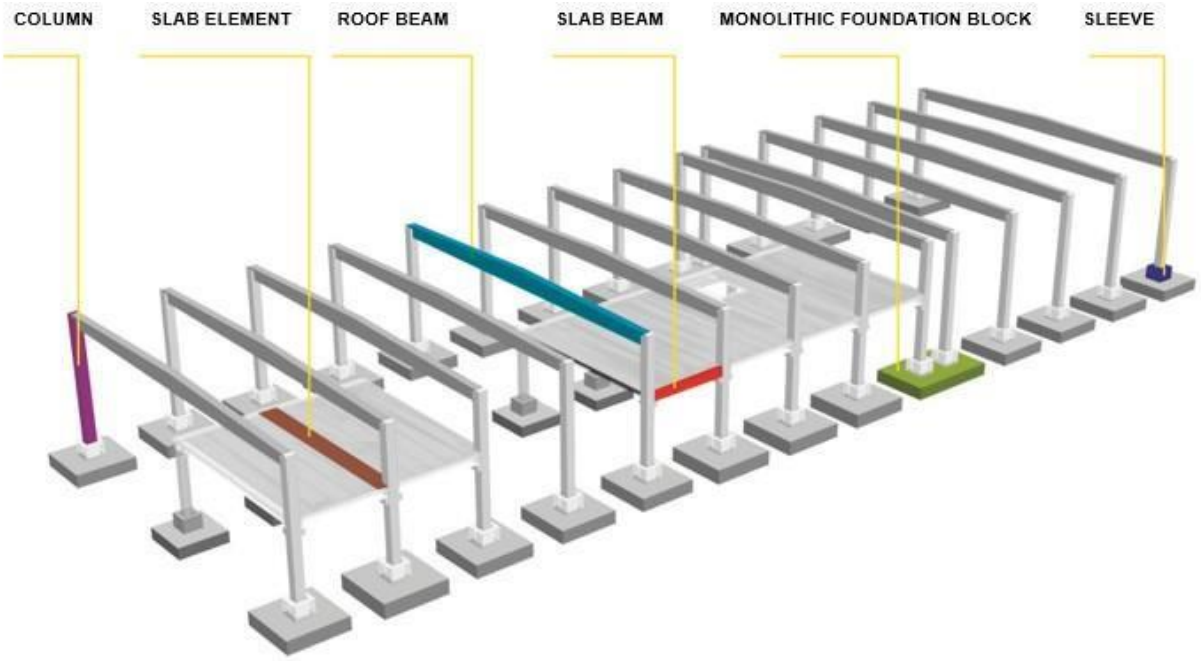
Details at p.22

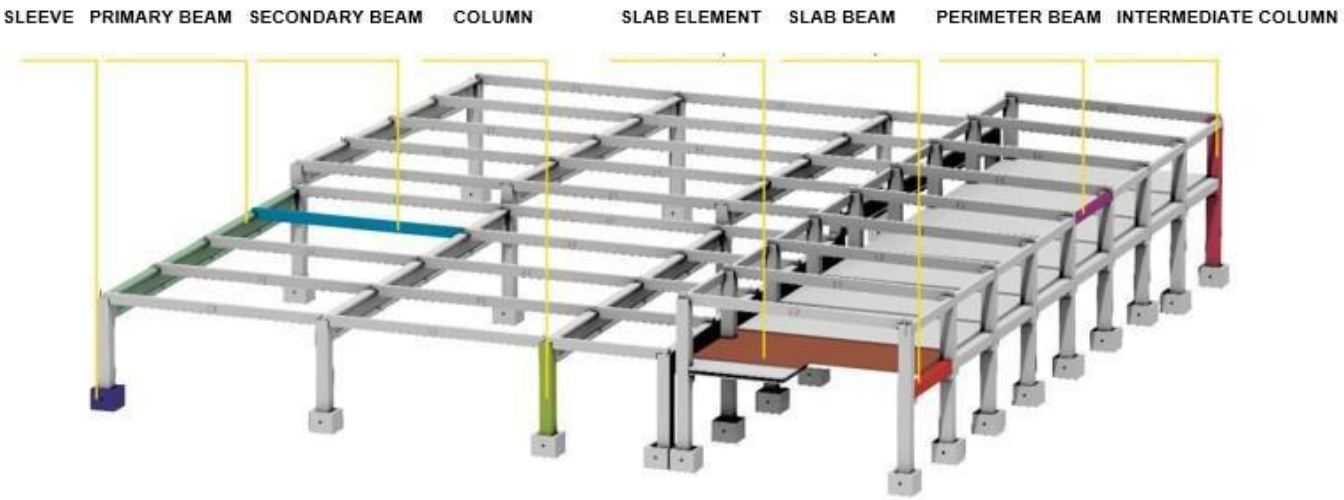
Winery Production Unit Cotnari – IAȘI

# II. MULTILEVELED PRECAST STRUCTURES

# GENERAL OVERVIEW

These structures are developed based on architectural requirements that combine areas with different functions—such as manufacturing, storage, offices, and technical spaces. They are customized solutions, adapted to the specific needs of each client. Depending on the structure's configuration, a wide range of structural elements may be used, including foundations, columns, floor beams, slab elements, roof beams, roof purlins, plinth panels, walls, and ground beams.



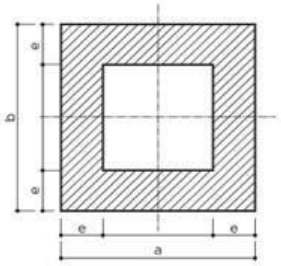



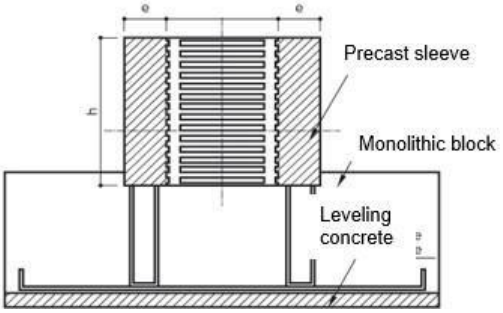
# III. STRUCTURAL ELEMENTS

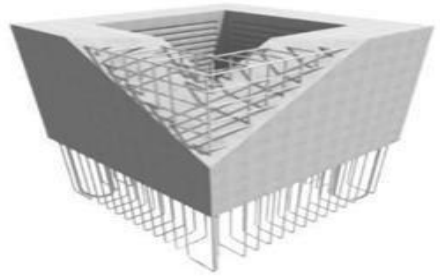
## III.1. Sleeve Type Foundations

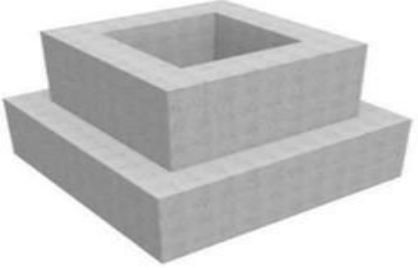
It serves as the connecting element between the column and the monolithic foundation block. The sleeves are installed by rotating them 180° in the vertical plane and placing the reinforcement directly onto the leveling concrete. Afterward, the sleeves are aligned along the axes, the foundation block is formworked, reinforcement is installed, and concrete is poured to embed the precast sleeve into the foundation block, resulting in foundations prepared for column installation. This is a fast method that significantly reduces labor time on site. In the case of seismic joints or for future expansions, double sleeves may be used, or multiple sleeves can be placed on the same leveling layer and embedded in a shared foundation block.

| LENGTH<br>a (m) | WIDTH<br>b (m) | HEIGHT<br>h (cm) | Wall<br>e (m) |
|---|---|---|---|
| 0.80-2.00 | 0.80-2.00 | 1.10-1.50 | 0.25-0.45 |





# III. STRUCTURAL ELEMENTS

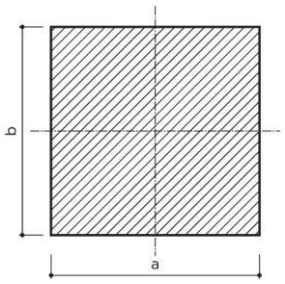
## III.2. Columns

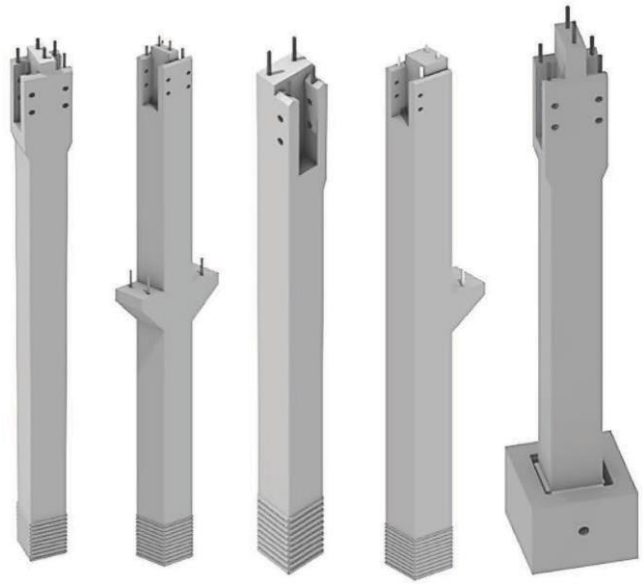
Precast columns may have a rectangular cross-section. Along their height, they can be manufactured with either constant or variable cross-sections, depending on the building height regime. The column-to-beam joint is made using corbels and fork-type bearing devices.

| LENGTH<br>a (m) | WIDTH<br>b (m) | HEIGHT<br>h (m) |
|---|---|---|
| 0.3-1.00 | 0.3-1.00 | 2.5-20 |

* Larger-section columns are available on request

** The cross-section can be optimally adjusted in 5 cm steps



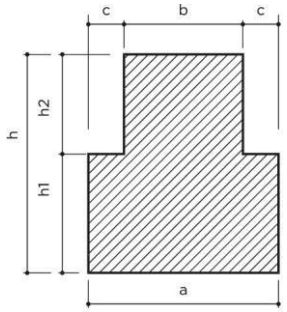



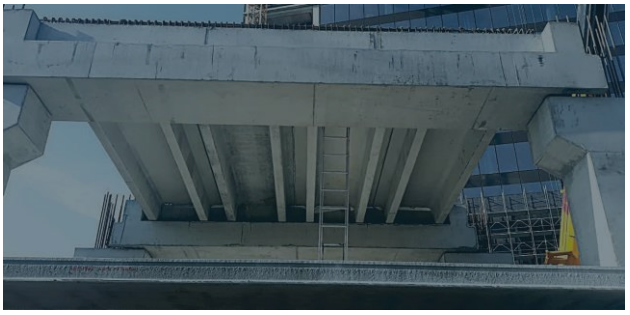
# III. STRUCTURAL ELEMENTS

## III.3. Slab beams with inverted T-shaped and L-shaped cross-sections

A. Inverted T-section beams are precast elements made of reinforced or pre-stressed concrete, manufactured with a constant cross-section and a maximum length of 25 meters. These beams can be equipped with projecting reinforcement bars or loops for bonding with floor slabs and topping concrete, ensuring a rigid diaphragm effect.

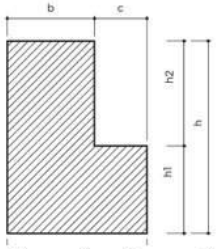
| FLANGE WIDTH* a (m) | WEB THICKNESS* b (m) | BEARING LENGTH c (m) | FLANGE THICKNESS h1 (m) | WEB HEIGHT h2 (m) | BEAM HEIGHT h (m) | MAXIMUM BEAM LENGTH (m) |
|---|---|---|---|---|---|---|
| 0.40-1.00 | 0.10-0.70 | 0.15 | ≥ 0.15 | ≥ 0.15 | 0.30-1.20 | 25.00 |
| 0.70-1.00 | 0.10-0.40 | 0.30 | ≥ 0.15 | ≥ 0.15 | 0.30-1.20 | 25.00 |



B. L-section beams are precast elements made of pre-stressed or reinforced concrete, manufactured with a constant cross-section and a maximum length of 25 meters. Beams with simple reinforcement may be equipped with projecting reinforcement bars or loops for pre-stressed concrete beams, to enable connection with the slab elements and the topping concrete layer.

| FLANGE WIDTH* a (m) | WEB THICKNESS ^ b (m) | BEARING LENGTH c (m) | FLANGE THICKNESS h1 (m) | WEB HEIGHT h2 (m) | BEAM HEIGHT h (m) | MAXIMUM BEAM LENGTH (m) |
|---|---|---|---|---|---|---|
| 0.25-1.00 | 0.10-0.85 | 0.15 | ≥ 0.15 | ≥ 0.15 | 0.30-1.20 | 25.00 |
| 0.40-1.00 | 0.10-0.70 | 0.30 | ≥ 0.15 | ≥ 0.15 | 0.30-1.20 | 25.00 |




* For singly reinforced beams, dimensions a and b may be increased by up to 0.1 meter

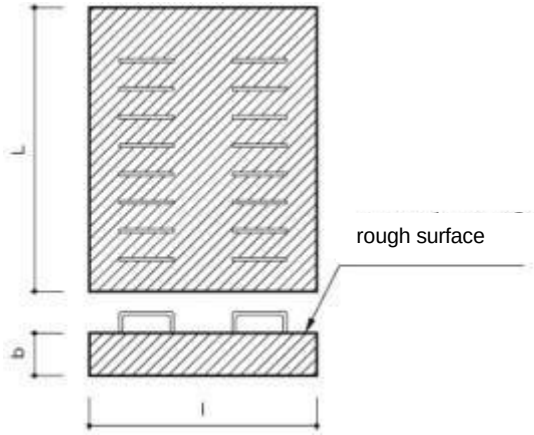
# III. STRUCTURAL ELEMENTS

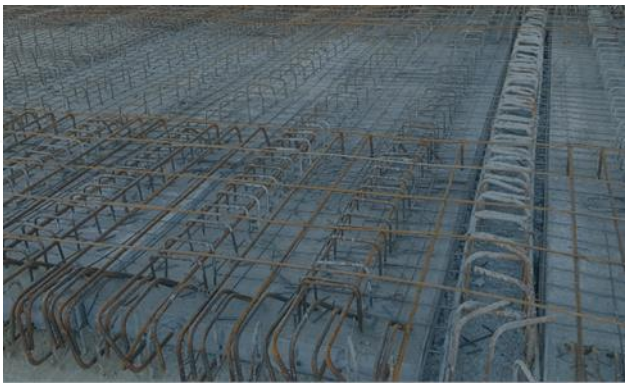
## III.4. Slab elements: pre-slab decks and TT type elements

A. Pre-slab decks can be manufactured as either singly reinforced or pre-stressed, depending on the spans and loads required by the design. After installation, the surface is reinforced and completed with concrete topping.

The use of pre-slab decks significantly reduces construction costs by eliminating the need for formwork and associated labor, thereby considerably shortening the slab construction time.

| LENGTH<br>L (m) | WIDTH<br>lmax (m) | THICKNESS<br>b (m) |
|---|---|---|
| 1.00 – 8.00 | 1.20 | 0.07-0.15 |

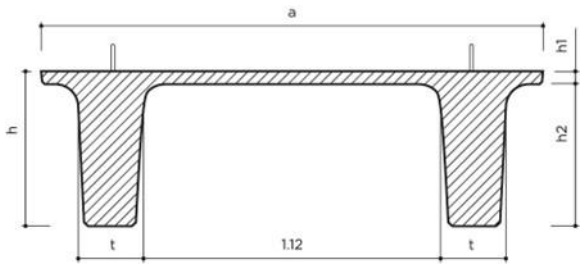


B. TT-type slab elements are pre-stressed concrete units with one or two ribs, used for slab execution. They have a relatively low weight, allow for very large clear spans (up to 20 meters), and can span large areas in a short installation time. After installation, the surface is reinforced and a concrete layer is cast on top.

| RIB WIDTH<br>t (m) | TOP FLANGE WIDTH<br>a (m) | TOP FLANGE HEIGHT<br>h1 (m) | ELEMENT HEIGHT<br>h (m) | MAXIMUM BEAM LENGTH<br>(m) |
|---|---|---|---|---|
| 0.15 | 2.00-2.50 | 0.05 | 0.30-1.00 | 20.00 |
| 0.20 | 2.00-2.50 | 0.05 | 0.30-1.00 | 20.00 |

* The dimensions are given for an element with two ribs;

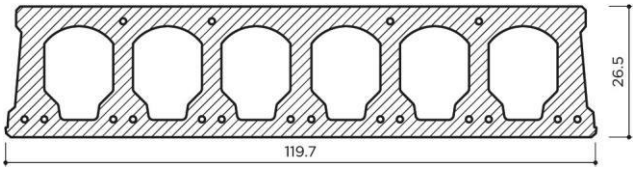



# III.5. Slab elements: hollow strip-type precast slabs (FGP)

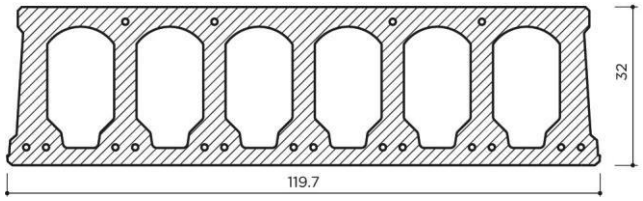
C. The hollow strip-type precast slabs (FGP) are pre-stressed elements manufactured using vibro-compacted high-strength concrete and reinforced exclusively with pre-stressing strands. With a standard width of 120 cm and three available height options, the slab lengths are adjusted according to project requirements.

| TYPES OF STRIPS a (m) | HEIGHT h (cm) | WIDTH l (cm) | MAXIMUM NUMBER OF STRANDS* |
|---|---|---|---|
| FGP 265 | 26.5 | 120 | 18 |
| FGP 320 | 32.0 | 120 | 18 |
| FGP 400 | 40.0 | 120 | 18 |

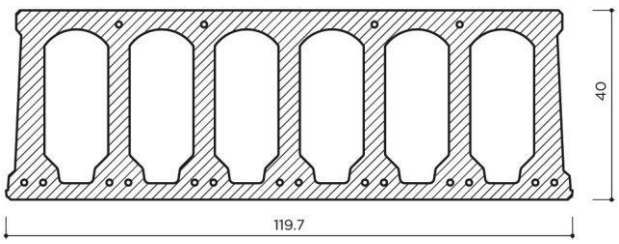
### III.5.C.1. FGP 265




### III.5.C.2. FGP 320



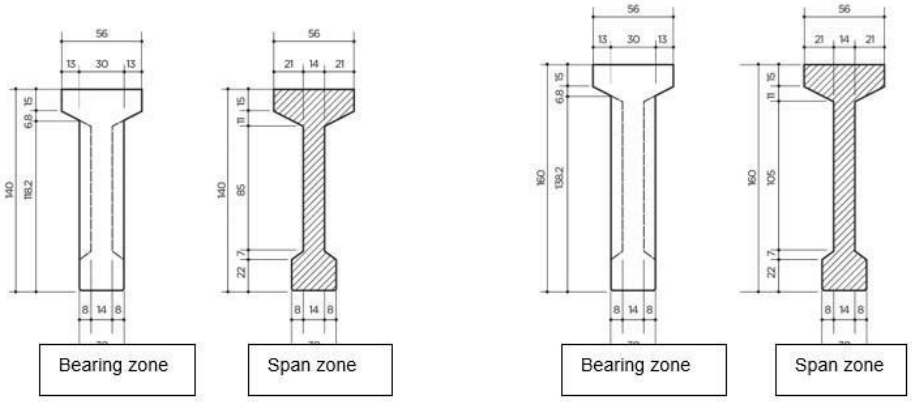

### III.5.C.3. FGP 400

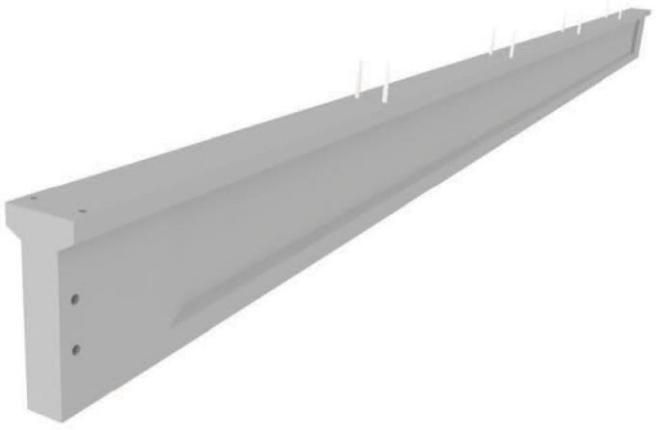



# III. STRUCTURAL ELEMENTS

## III.6. A. Roof beams with I-shaped cross-section

I- section beams are precast pre-stressed concrete elements that can be manufactured with a constant cross-section and a maximum length of 30 meters.

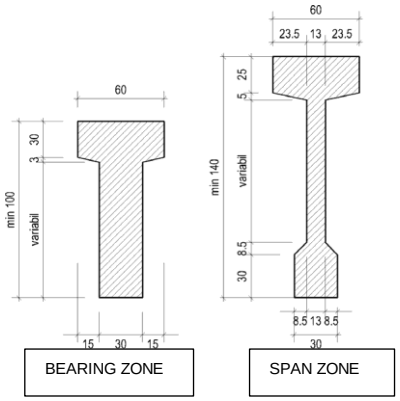


## III. STRUCTURAL ELEMENTS

# III.6.B Roof beams with double-pitched I-shaped cross-section

The double-pitched I-shaped cross-section beams are precast pre-stressed concrete elements that can be manufactured with a 3% pitch and a maximum length of 30 meters.



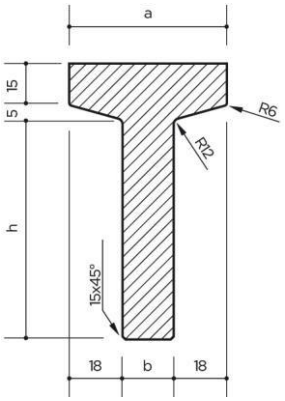

# III. STRUCTURAL ELEMENTS

## III.6.C. Roof beams with T-shaped cross-section

T-section beams – Variant A – are precast elements made of pre-stressed or reinforced concrete, manufactured with a constant cross-section. This solution is both structurally efficient and cost-effective in terms of concrete consumption.

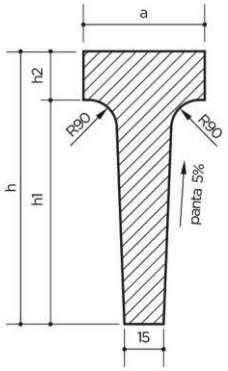
| TOP FLANGE WIDTH a (cm) | WEB THICKNESS b (cm) | TOP FLANGE THICKNESS (cm) | WEB HEIGHT* h (cm) | BEAM HEIGHT (cm) | MAXIMUM BEAM LENGTH (m) |
|---|---|---|---|---|---|
| 50 | 14 | 20 | 40-115 | 60-135 | 30.00 |
| 54 | 18 | 20 | 40-115 | 60-135 | 30.00 |

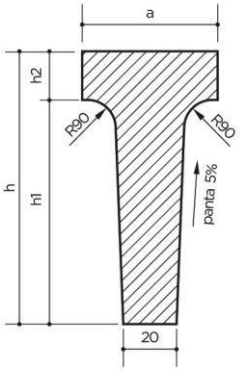
* Modular adjustment available in 5 cm intervals




T-section beams, Variant B, are an alternative version of the T-beam and may have the cross-section shown in the figure below.

| TOP FLANGE WIDTH a (cm) | TOP FLANGE THICKNESS h2 (cm) | WEB HEIGHT h1 (cm) | MAXIMUM HEIGHT h (cm) | MAXIMUM BEAM LENGTH (m) |
|---|---|---|---|---|
| 50-54 | ≤ 30 | 25 - 95 | 125 | 20.00 |



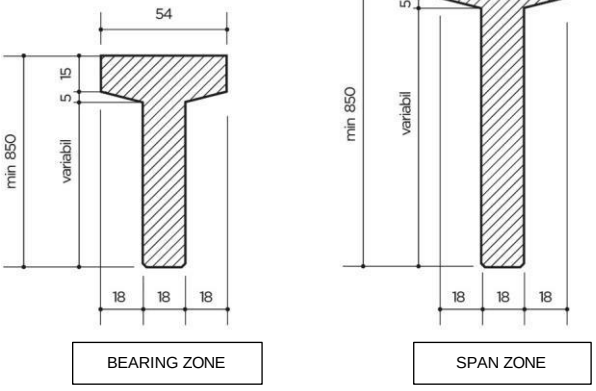




# III. STRUCTURAL ELEMENTS

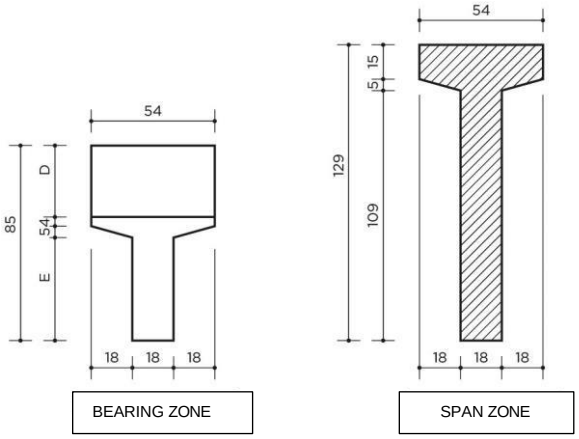
## III.6.D. Roof beams with double-pitched T-shaped cross-section

Double-pitched T-section beams are precast pre-stressed concrete elements that can be produced with two end-section variants, as described below. The maximum length is 30 meters, and the pitch is 3%.

A. SIMPLE T-section beams



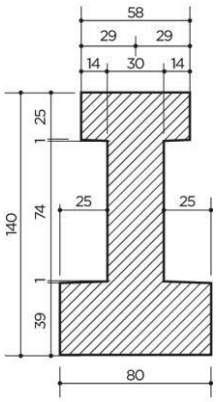

B. T-section beams with BULB-SHAPED BOTTOM FLANGE

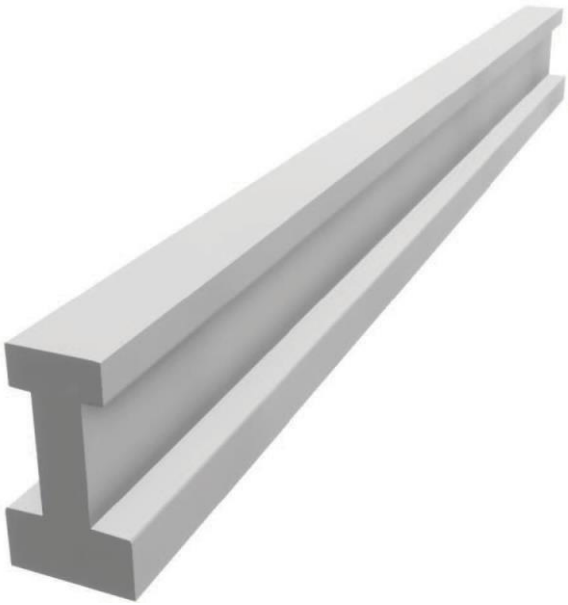



# III. STRUCTURAL ELEMENTS

## III.6.E. Roof beams with inverted T-shaped cross-section

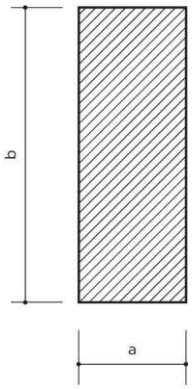
The inverted T-section roof beam is made of reinforced concrete and provides a solution for creating column-free spaces. This is achieved by allowing one or two roof beams from the structure to bear directly on it, thereby eliminating the need for intermediate columns. The maximum casting length is 15 m, and the beam can be equipped with two or four steel brackets that support the perpendicular roof beams resting on the inverted T beam.



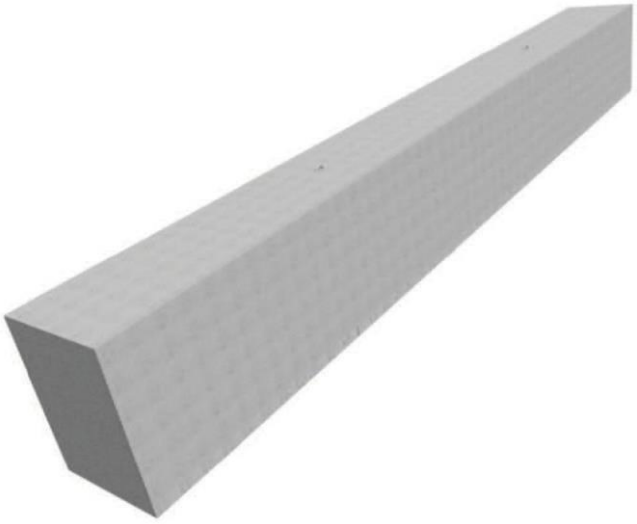



# III.6.F. Roof beams with rectangular cross-section

Beams with rectangular cross-sections are precast pre-stressed or reinforced concrete elements, featuring a constant section and a maximum length of 25 m.




| BASE a (cm) | HEIGHT b (cm) | MAXIMUM BEAM LENGTH (m) |
|---|---|---|
| 30-100 | 30-120 | 25 |

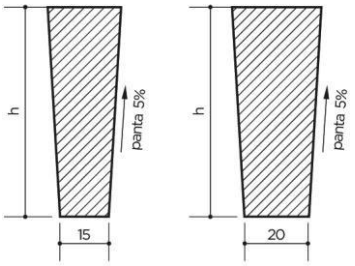


# III. STRUCTURAL ELEMENTS

## III.7. Purlins with trapezoidal and T-sections

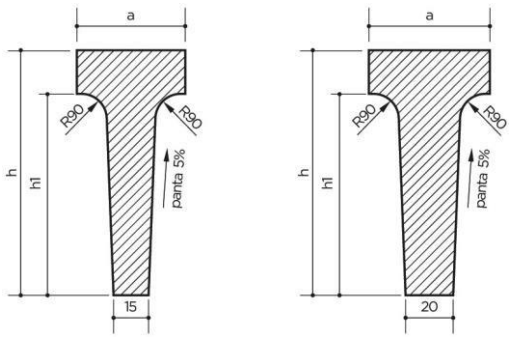
A. Purlins with trapezoidal section. They are precast items made of pre-stressed or reinforced concrete, manufactured in lengths of up to 19 m.

| SMALL BASE a (cm) | PITCH | MAXIMUM HEIGHT h (cm) | MAXIMUM LENGTH (m) |
|---|---|---|---|
| 15 | 5% | 90 | 19 |
| 20 | 5% | 90 | 19 |




B. T-section purlins. These are precast elements made of pre-stressed or reinforced concrete, with a maximum length of 20 m.

| TOP FLANGE WIDTH a (cm) | MAXIMUM HEIGHT h (cm) | WEB HEIGHT h1 (cm) | MAXIMUM LENGTH (m) |
|---|---|---|---|
| 50-54 | 125 | 25-95 | 20 |

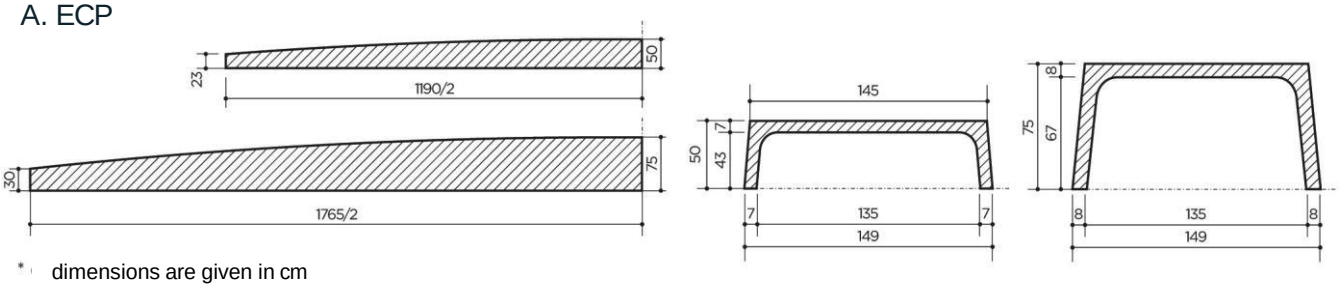



# III. STRUCTURAL ELEMENTS

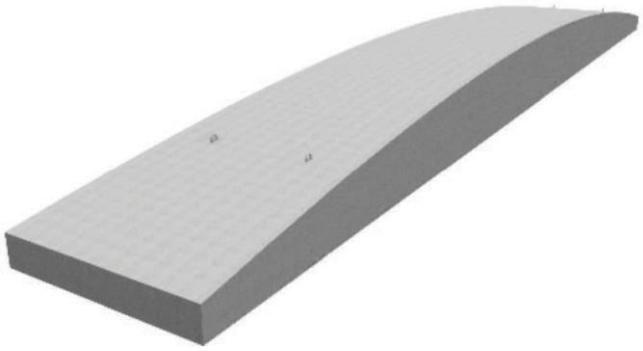
## III.8. ECP-type roof elements with dedicated T-shaped beam

The pre-stressed curved concrete panels (ECP) are precast components used as roof covers for industrial structures. They are available in two lengths: 12 m and 18 m, with a width of 1.5 m, and are installed on the primary beams. They can be produced with cut-outs for skylights and do not include thermal or waterproof insulation.

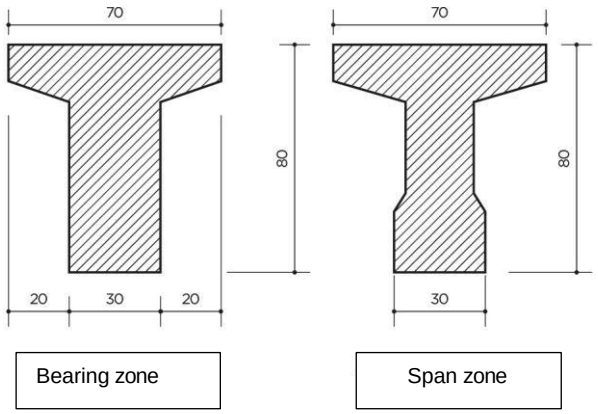
A. ECP




* dimensions are given in cm



B. T-section beams designed for ECP structures



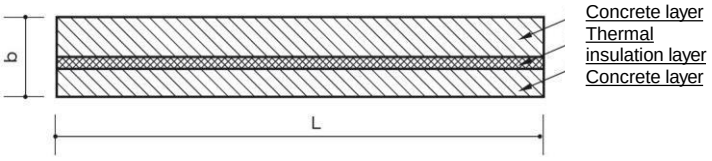

# III. STRUCTURAL ELEMENTS

## III.9. Precast panels / walls

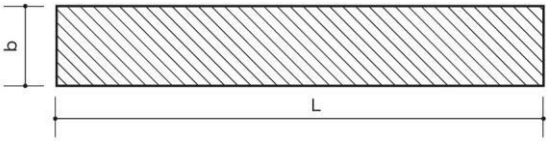
These are precast elements manufactured as either single-layer or three-layer panels. Single-layer panels are made entirely of reinforced concrete, while three-layer panels consist of two reinforced concrete layers separated by a thermal insulation core. Connection to the structure is done using welded or mechanical joints. They can be used as plinth panels or exterior wall panels, with the following dimensions:

| PANEL TYPE | MAXIMUM HEIGHT<br>Hmax (m) | MAXIMUM LENGTH<br>Lmax (m) | THICKNESS<br>b (m) |
|---|---|---|---|
| Three-layer | 3 | 12 | 0.2-0.35 |
| Single-layer | 3 | 12 | 0.1-0.30 |

Three-layer panel




Single-layer panel




# III. STRUCTURAL ELEMENTS

## III.10. Custom-made elements

This category includes precast elements designed for special purposes within major projects. These may be derived from the previously presented categories or may have entirely different configurations. ADN Prefabricate manufactured the precast bleachers for the Slatina Sport Hall (in 2015), as part of this category.

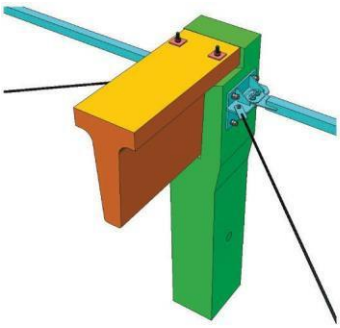
The precast staircase is a structural element that provides vertical access between different levels (floors) of the building.

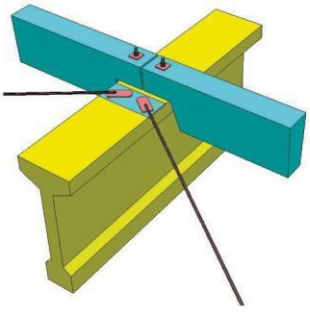
Dock ramps facilitate the loading and unloading of goods from trucks into warehouses.

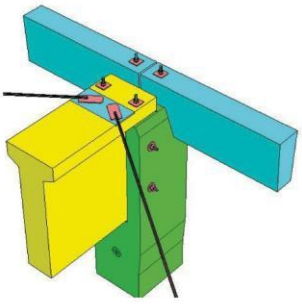
# III. STRUCTURAL ELEMENTS

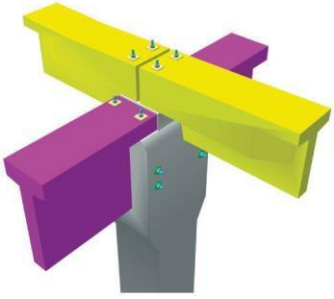
## III.11. A Pinned joints

In the pinned joint, both the beam and the column are precast. The beam is supported on the column corbel using neoprene bearing pads. The joint is formed by a dowel embedded in the column and inserted into a recess provided in the beam.







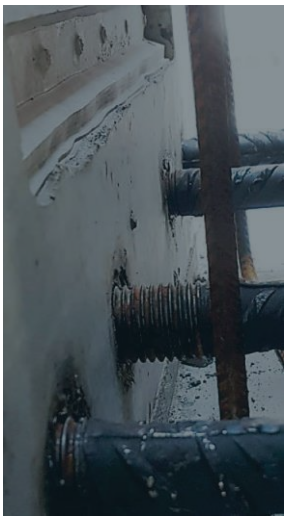


# III.11.B Rigid joints or semi-rigid joints

In rigid or semi-rigid joints, the beam is precast, while the column can be either precast or monolith. If both the beam and the column are precast, the reinforcement in the joint must be continuous. This continuity can be achieved by lapping or welding the reinforcement bars, or by using special components with threaded sleeves and bars for mechanical splicing.

If the beam is precast and the column is monolith, the precast beams will be designed to stop at the face of the column join. Reinforcement bars will be extended from the column and lapped or welded to the bars provided in the precast beams for the concrete topping.

The most commonly used joints in precast structures are pinned joints.



Reinforcement continuity detail using threaded couplers in the column–beam joint

Reinforcement continuity detail from monolithic raft to precast column, with rigid joint executed by mortar injection into reinforcement ducts

# IV. CERTIFICATIONS

## System Certifications

| CERTIFICATE | STANDARD |
|---|---|
| Quality Management System | SR EN ISO 9001:2015 SR |
| Environmental Management System | EN 14001:2015 |
| Occupational Safety and Health Management System | SR EN ISO 45001:2023 |

## Product Certificates

| CERTIFICATE | STANDARD |
|---|---|
| Precast concrete goods – elements for ribbed deck-slabs | SR EN 13224:2012 |
| Precast concrete goods – elements for walls | SR EN 14992+A1:2012 |
| Precast concrete goods – elements for foundations | SR EN 14991:2007 |
| Precast concrete goods – linear structure elements (pillars, beams and framework elements) | SR EN 13225:2013 |
| Precast concrete goods – strips with hollows | SR EN 1168+A3:2011 |
| Pre-assembled steel products: cages for piles, slurry walls, pillars beams.<br>Shaped and trimmed steel goods: frameworks, cross-ties, fasteners, anchors, curved bars | ST 009-2011<br>NE 012/2-2022 |

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