University of Salahaddin
Department of Architecture
2n d Stage
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Building Construction

Precast Concrete and Composite Floors
Lecture 6

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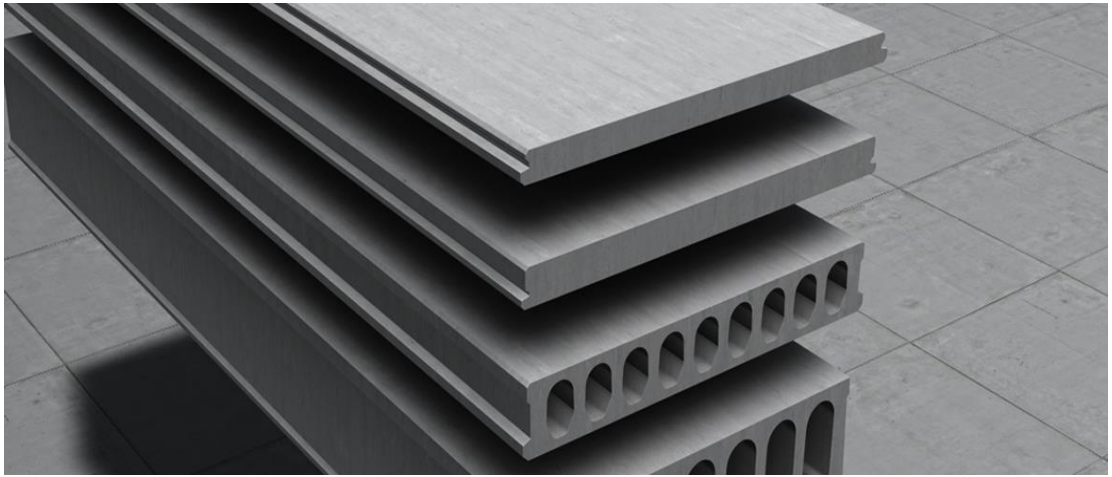
From Previous Lecture:

- Floor slab system
- The role of Architecture Design of the floor
- The role of Structural Design of the floor
- Type of roof systems
- Cast in place concrete slab

The Contents of This Class Lecture

Precast reinforced concrete slab:

- Types of Precast Systems
- Advantages and Disadvantages
- Elements
- Design Concepts
- Connections



Introduction

The concept of precast (also known as “prefabricated”) construction includes those buildings, where the majority of structural components are standardized and produced in plants in a location away from the building, and then transported to the site for assembly. These components are manufactured by industrial methods based on mass production in order to build a large number of buildings in a short time at low cost.

Advantages

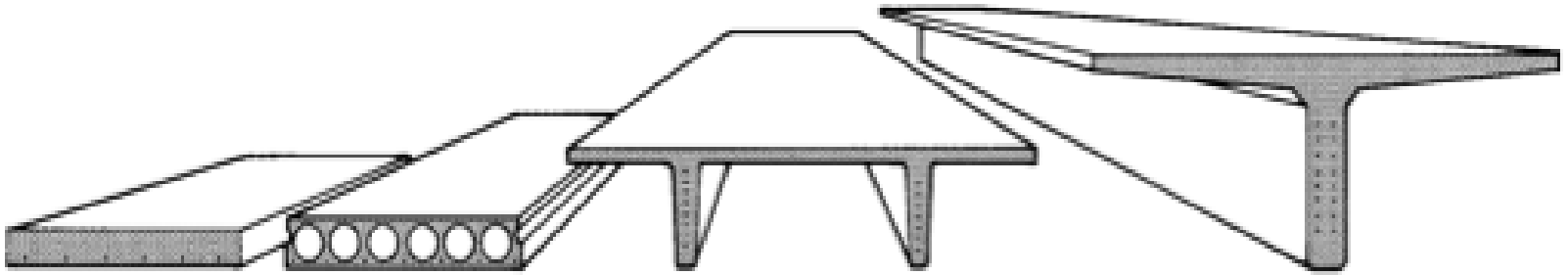
1. Speed in erection.
2. Economical forms.
3. Allow use of higher technologies.
4. Economical to construct curved, inclined surfaces and complicated shapes.
5. High quality
6. Durability
7. Aesthetics
8. Water tightness Comes Standard
9. Sustainable design

Disadvantages

1. Require higher technologies in design, manufacturing, transport and erection.
2. Problem of joints.
3. Monotony of repetition
4. Require higher amount of steel.

PRECAST CONCRETE STRUCTURAL ELEMENTS

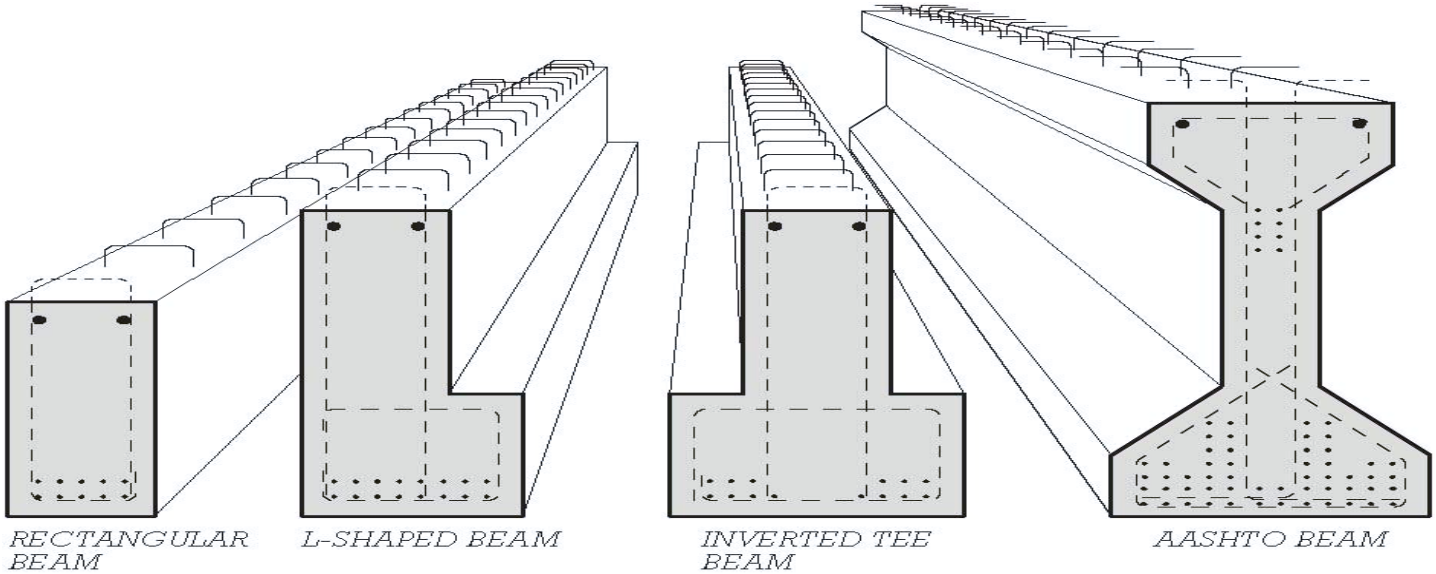
1- Precast Slabs



SOLID FLAT SLAB	HOLLOW CORE SLAB	DOUBLE TEE	SINGLE TEE
Widths vary	2', 4', 8' wide (610, 1220, 2440 mm) (1'4", 3'4" some manufacturers)	8', 10' wide (2440, 3050 mm)	8', 10' wide (2440, 3050 mm)

PRECAST CONCRETE STRUCTURAL ELEMENTS

2- Precast Beam & Girders



PRECAST CONCRETE STRUCTURAL ELEMENTS

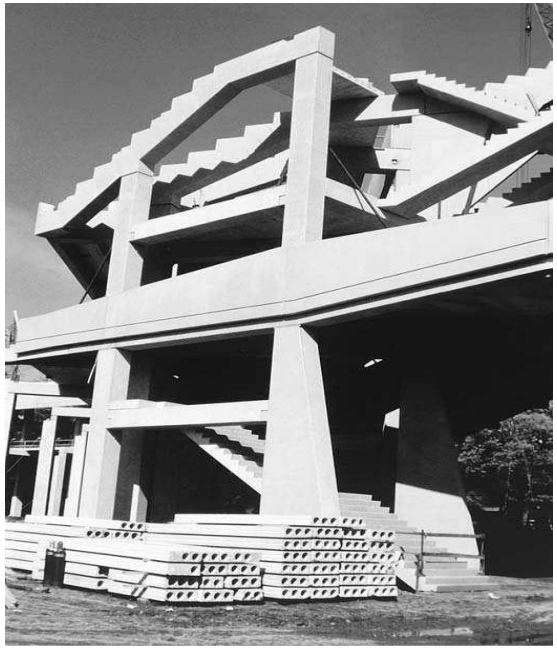
3- Precast Columns

PRECAST CONCRETE STRUCTURAL ELEMENTS

4- Precast Walls

PRECAST CONCRETE STRUCTURAL ELEMENTS

5- Other Elements

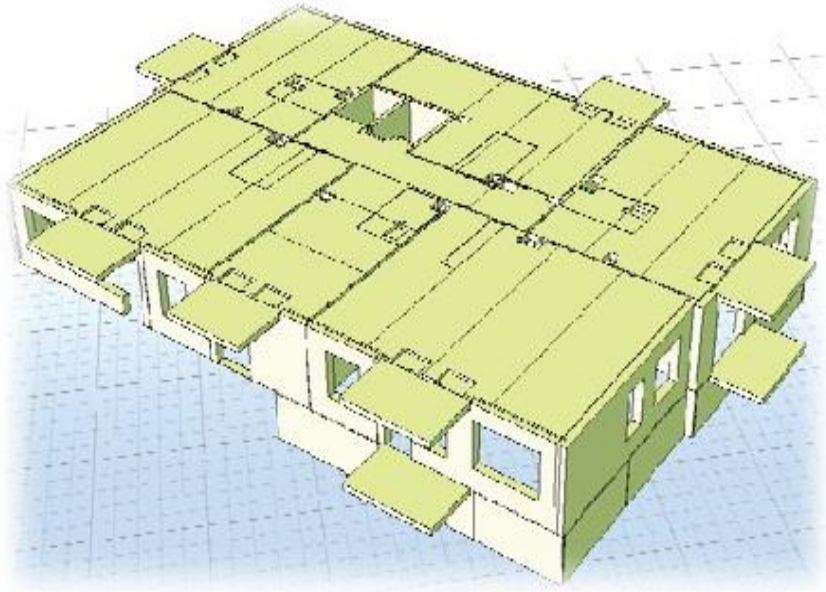


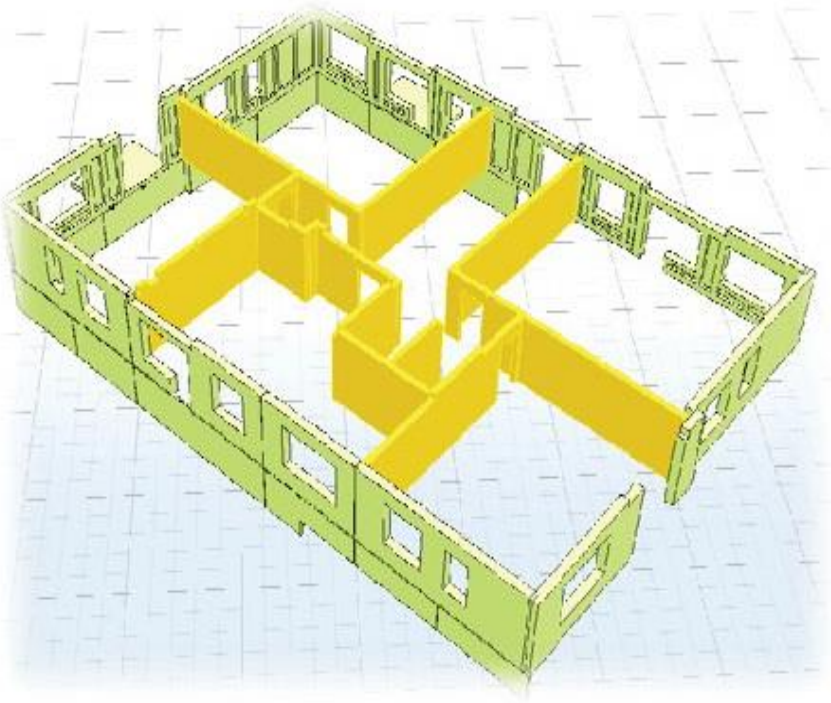
DESIGN CONCEPTS FOR PRECAST CONCRETE BUILDINGS

The design concept of the precast buildings is based on the build ability, economy and standardization of precast components.

The first thing we start with when we build a project with prefab technology is the stability of the structure. We need to decide which elements in the building should stabilize the structure, it is very important to choose the right number of elements in the current directions and ensure that the links between these elements and the slab are done in such a way so that the loads can be transferred to the foundation.

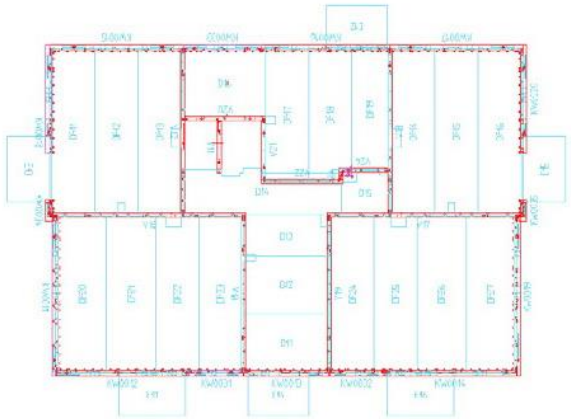
DESIGN CONCEPTS FOR PRECAST CONCRETE BUILDINGS



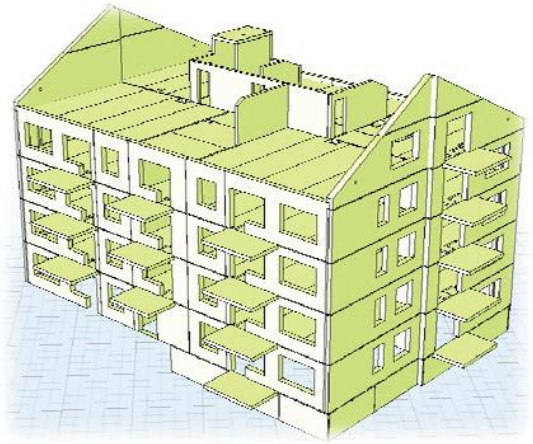


DESIGN CONCEPTS FOR PRECAST CONCRETE BUILDINGS

The slab elements have to be interconnected with each other by using reinforcement in the joints between them.
We have to choose suitable sizes for the elements which are possible for production, transport and assembly.



Location of the elements on plan drawing



3-D model

DESIGN CONCEPTS FOR PRECAST CONCRETE BUILDINGS

In design of precast members and connections, all loading and restraint conditions from casting to end use of the structure should be considered.

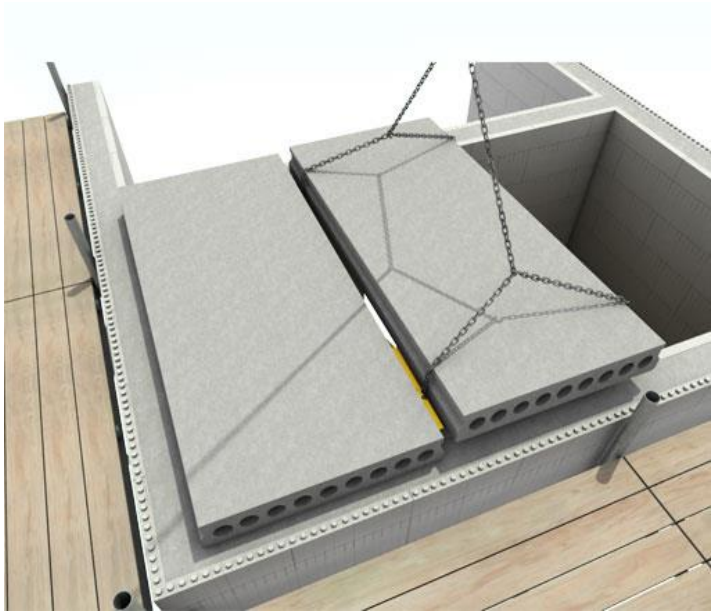
The stresses developed in precast elements during the period from casting to final connection may be more critical than the service load stresses.

Special attention should be given to the methods of stripping, storing, transporting, and erecting precast elements.

Types of Precast Concrete Slabs

1- Hollow Precast Concrete Floor Unit:

D=S/40



Types of Precast Concrete Slabs

2- Precast Pre-stressed Reinforced Concrete Double TEE Slab:

D=S/30

Maximum span = 24:00 meters

Types of Precast Concrete Slabs

Types of Precast Concrete Slabs

3- Hollow Precast Concrete Floor Beam.
4- Precast Concrete Ribbed Floor Unit.
5- Precast Concrete Floor Beam.

Types of Slabs of Side Supports

1- Cast-in place reinforced concrete slab with masonry filler.

2- Cast-in place reinforced concrete slab with masonry filler and Beam.

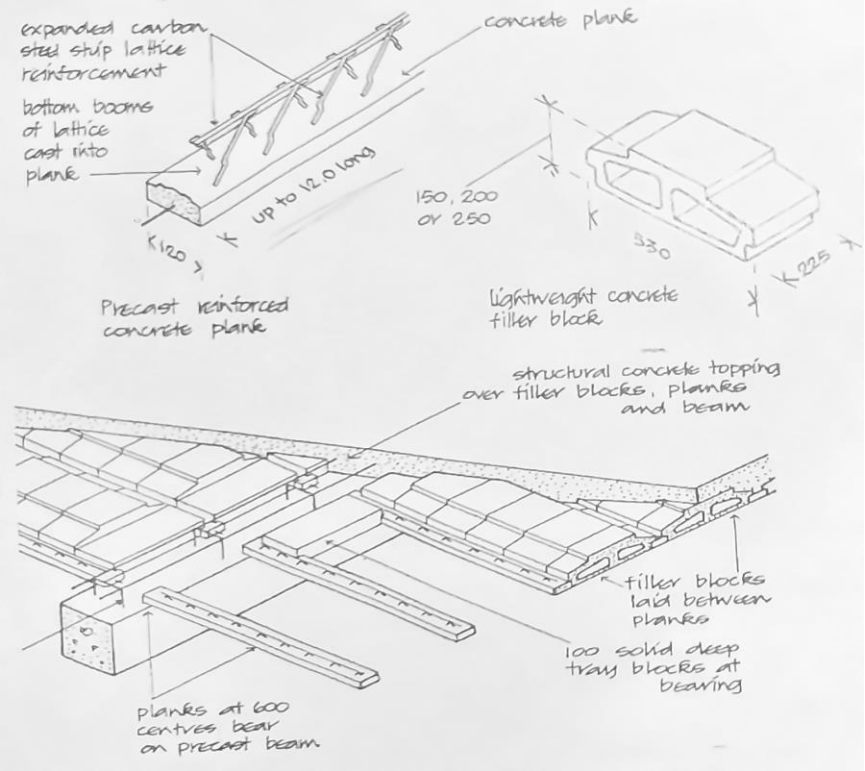
3- Corrugated metal sheet with Cast-in-place reinforced concrete slab.

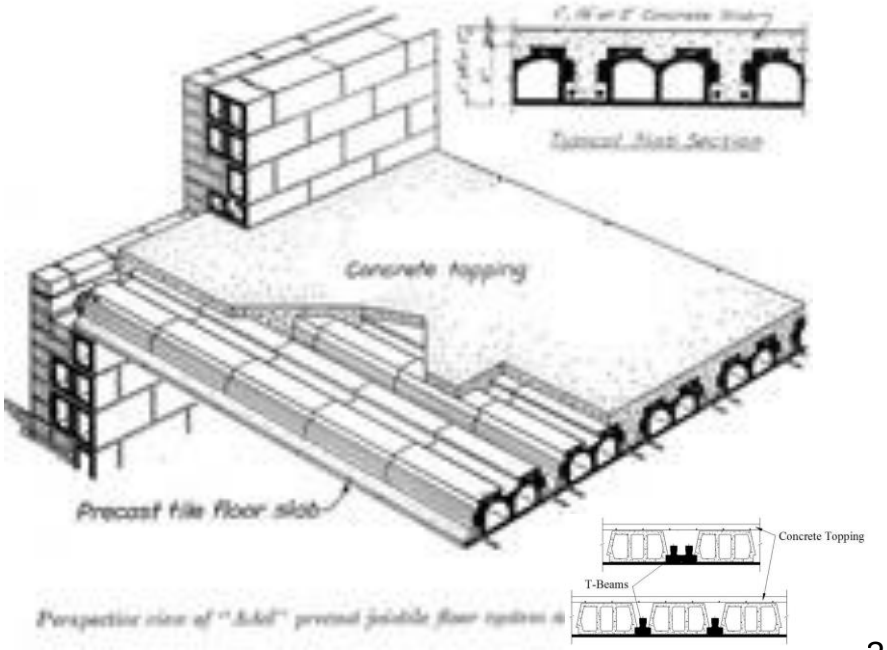
4- Corrugated metal sheet Decking.

5- Jack arching.

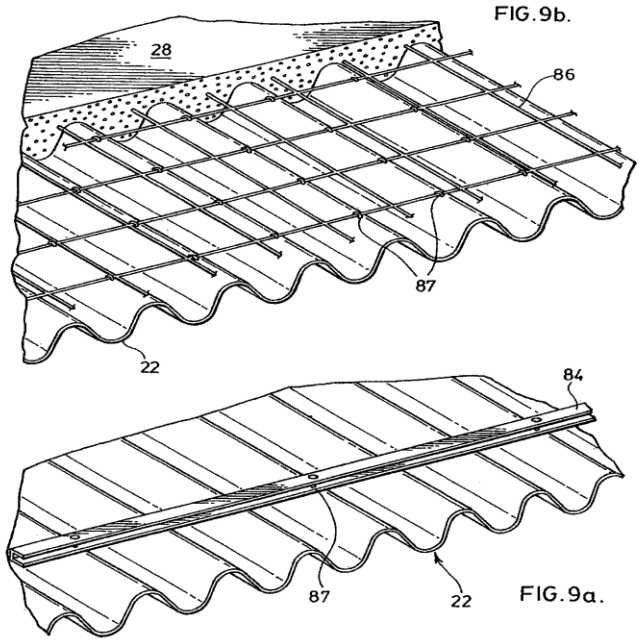
All types are supported on two opposite sides (walls or beams).

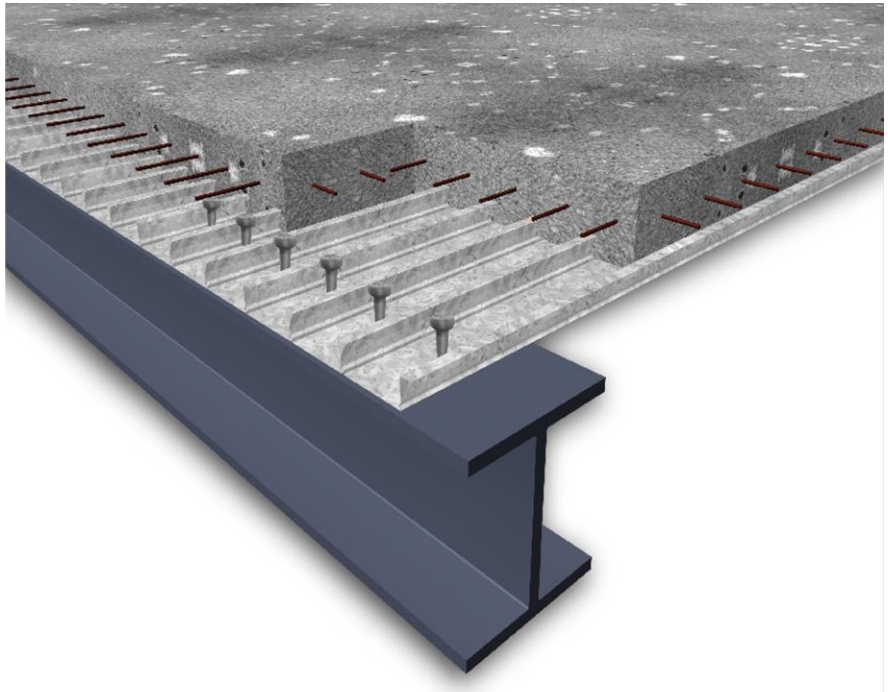
Types of Slabs of Side Supports



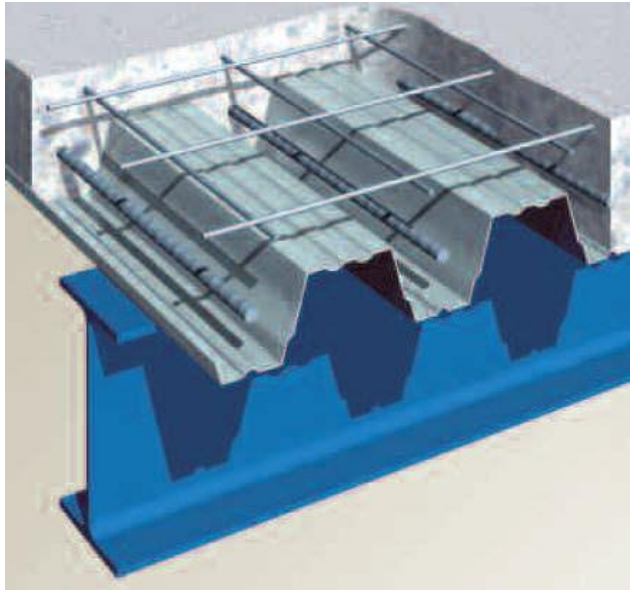


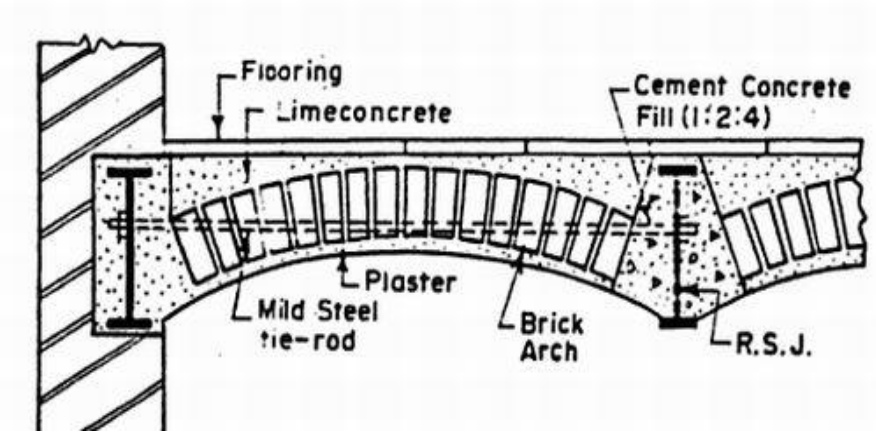
Types of Slabs of Side Supports





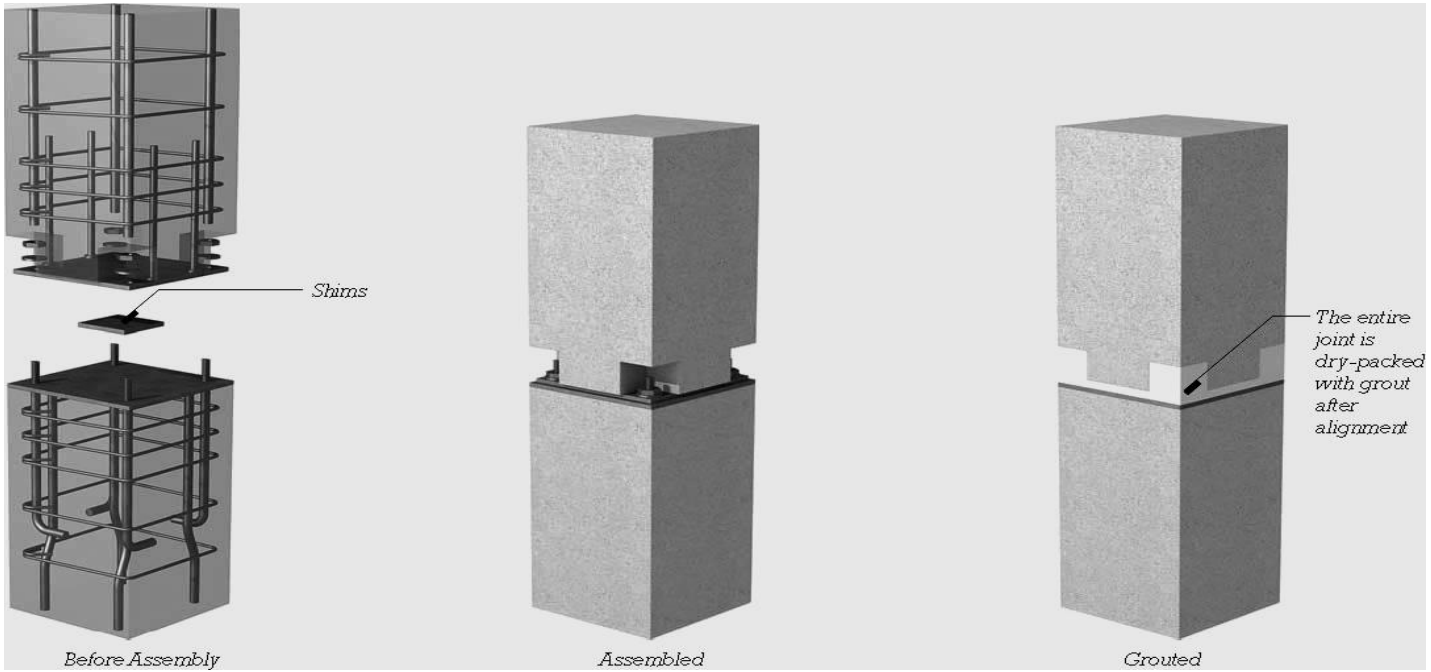
Types of Slabs of Side Supports





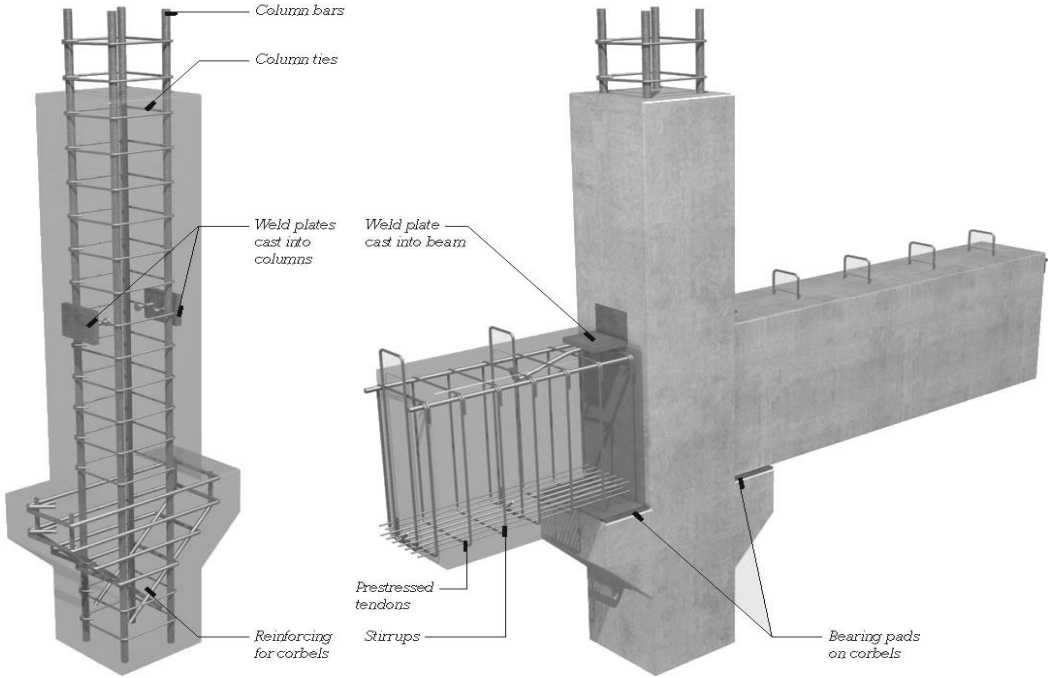
TYPICAL CONNECTION OF PRECAST CONCRETE ELEMENTS

- COLUMN TO COLUMN CONNECTION



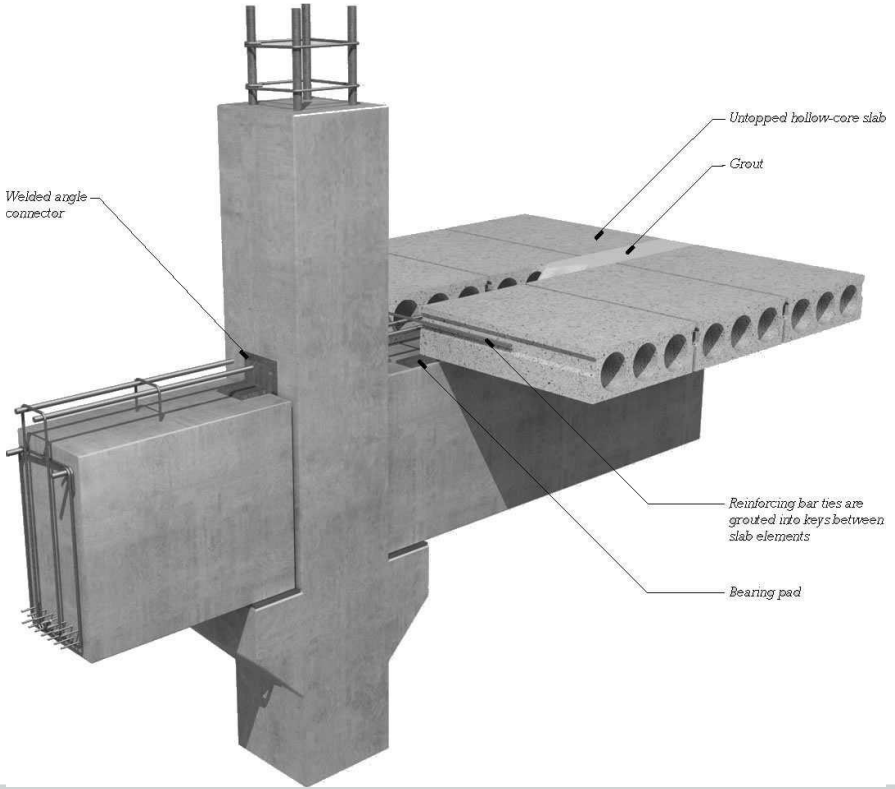
TYPICAL CONNECTION OF PRECAST CONCRETE ELEMENTS

- BEAM TO COLUMN CONNECTION



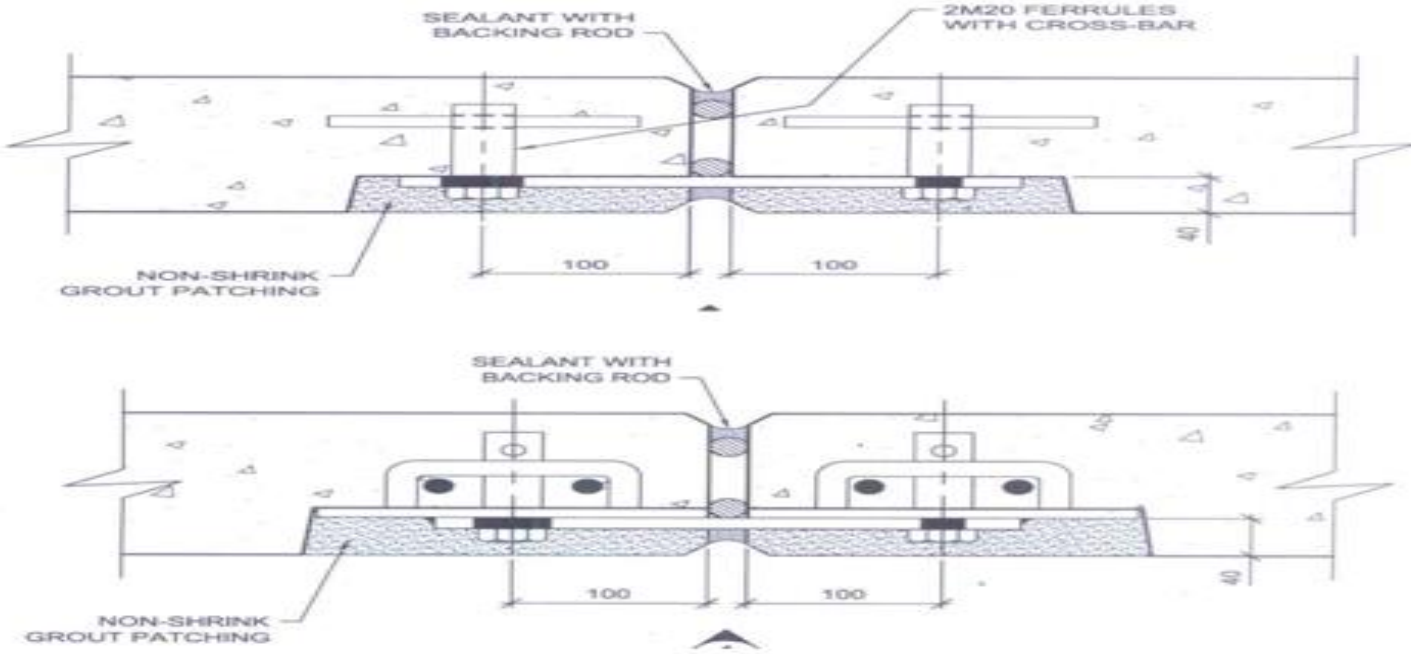
TYPICAL CONNECTION OF PRECAST CONCRETE ELEMENTS

- SLAB TO BEAM CONNECTION



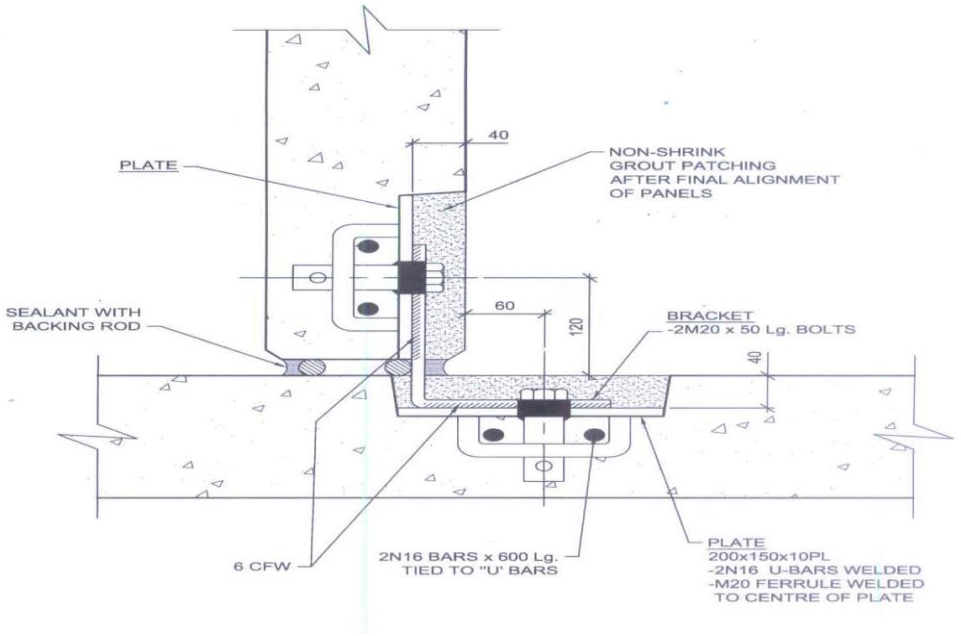
TYPICAL CONNECTION OF PRECAST CONCRETE ELEMENTS

- CONNECTION BETWEEN SLABS



TYPICAL CONNECTION OF PRECAST CONCRETE ELEMENTS

- CORNER CONNECTIONS OF WALL PANELS



Questions & Answers

The End


thank you
danke
謝謝
ngiyabonga
teşekkür ederim
спасибо
Баярлалаа
рахмат
gracias
dank je
tapadh leat
хвала
mochchakkeram
go raibh maith agat
dziękuję
bedankt
obrigado
hvala
mauruuru
sukriya
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arigato
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