



# RC CONSTRUCTION SYSTEMS

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# LECTURE CONTENT

## EXAMPLES OF CAST IN PLACE RC SLABS

- Solid Slab
- Flat Slab
- Hollow Block
- Waffle Slab

## OTHER RC CONSTRUCTION SYSTEMS

- RC Frames
- RC Shell Structure

## PRE-CAST CONCRETE CONSTRUCTION

- Concept and Process
- Advantages and Disadvantages
- Pre-cast Components

# RC SLABS



**Solid Slab**  
One way, Two way



**Flat Slab**  
Flat Plate, Flat Slab



**Hollow Block**

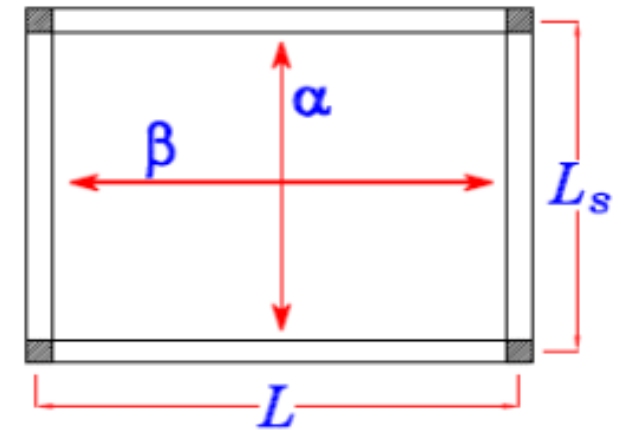
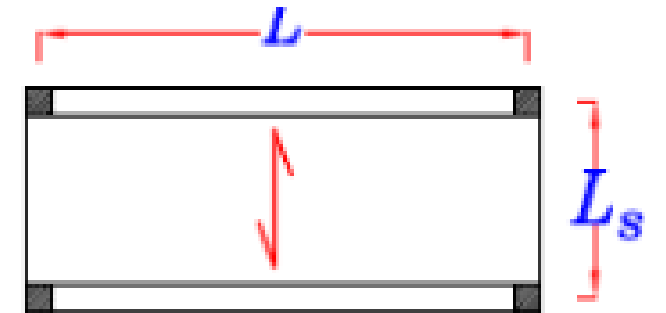
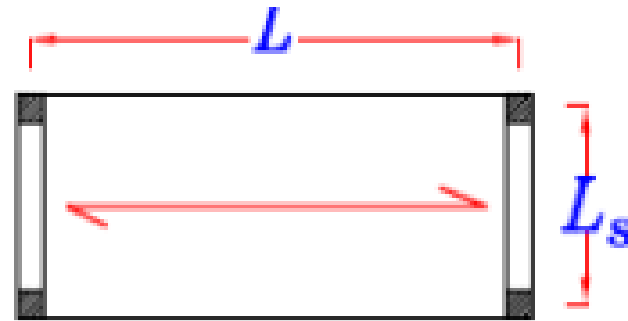


**Waffle Slab**

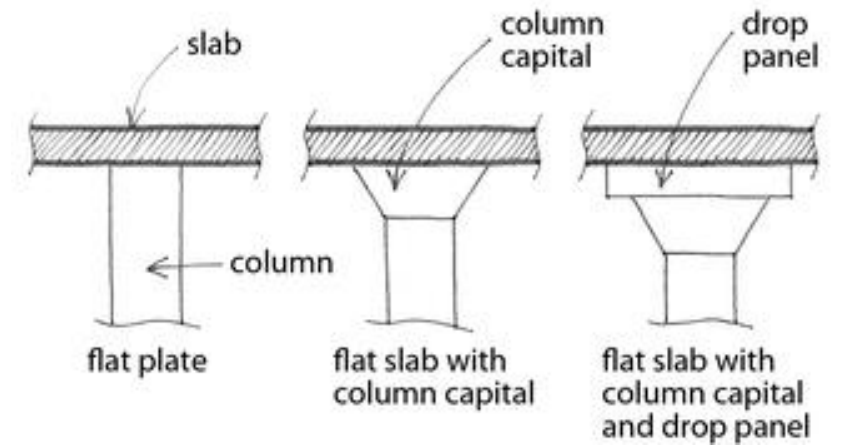
# RC SLABS COMPARISON

Slab Type		Loads Transferring	Slab Thickness	Maximum Efficiency	Span
Solid Slab	One-way Solid slab	One way only	Floors: Span/ 30 Roofs: Span/ 36 (10 cm min.)		1.8-5.5 m
	Two-way Solid slab	Two ways	Slab perimeter/ 180 (10 cm min.)	Square/ nearly square bays	4.5-12 m
Flat Slab	Two-way flat plate	Two ways	Span/ 33	Regular column grid with some flexibility in placement	3.6-7 m
	Two-way flat slab	Two ways	Span/ 36		6-12 m
Hollow Block	Two-way Hollow Block	Two ways	Span/ 24		5-12 m
Waffle Slab	Two-way waffle slab	Two ways	Span/ 24		7-16 m

# SOLID SLAB

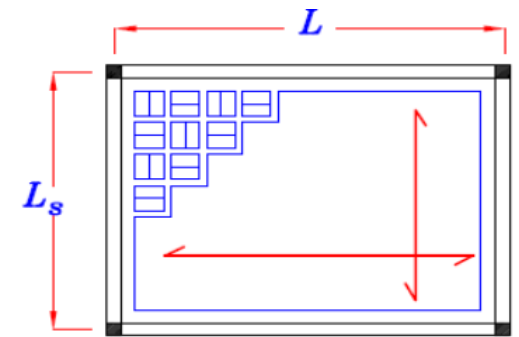
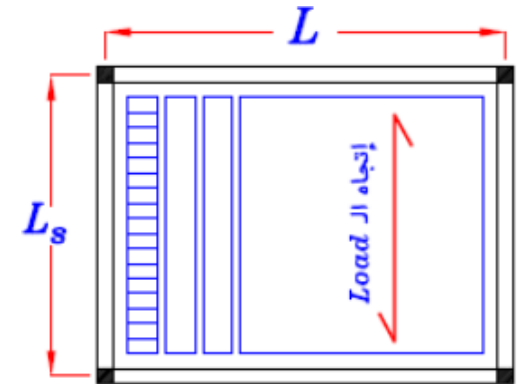


# FLAT SLAB

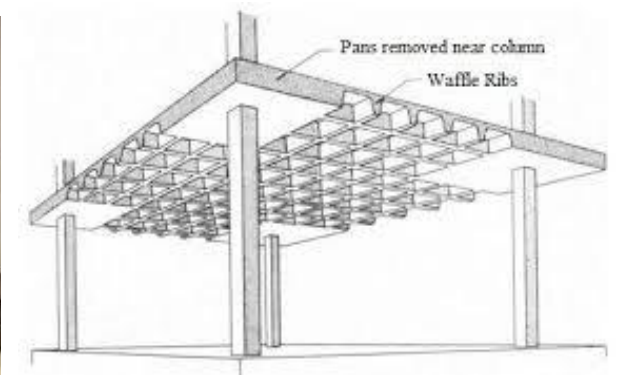
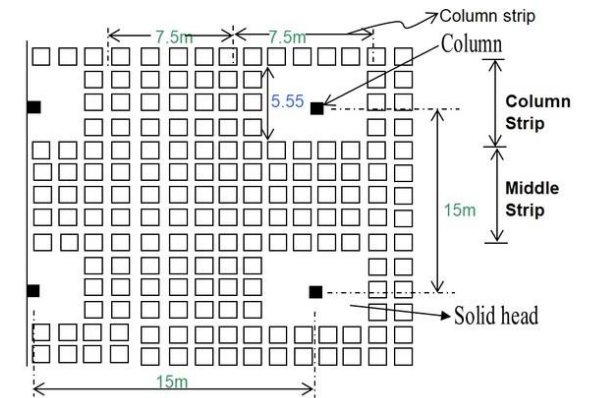




# HOLLOW BLOCK



# WAFFLE SLAB





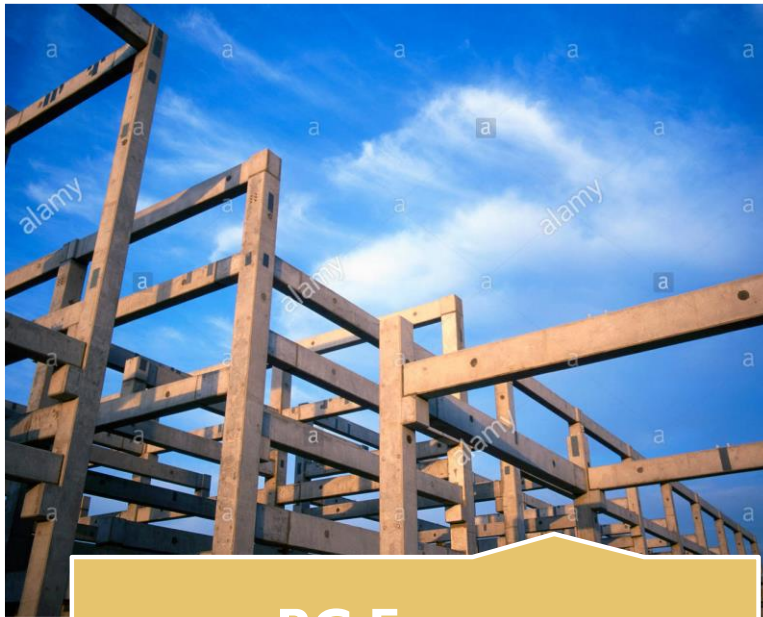
## 10 MINS. EXERCISE

On A4 paper, draw a sketch (Looking-up and Section) to a hall with 24 m Length and 8 m width

- Choose the Suitable Structural System
- Design the main elements of that system



# OTHER RC CONSTRUCTION SYSTEMS



**RC Frames**  
Handling **COMPRESSION** loads

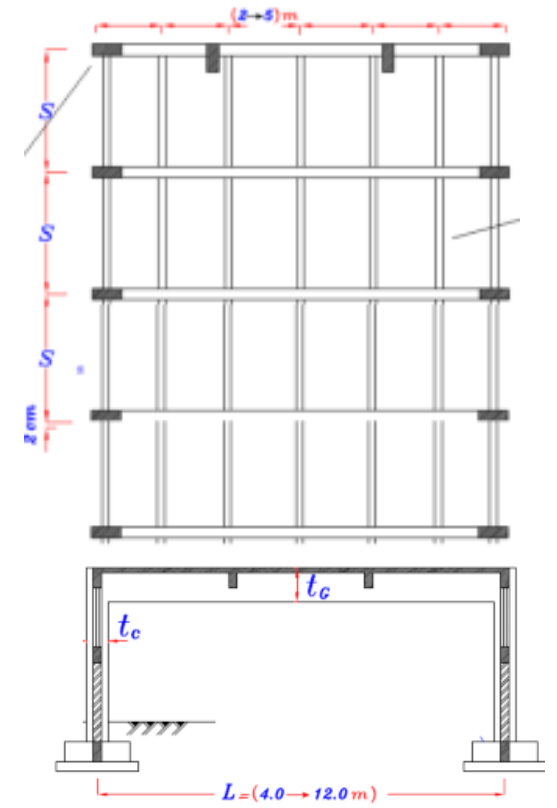


**RC Shell Structure**  
Handling **TENSILE** and **SHEAR** stresses

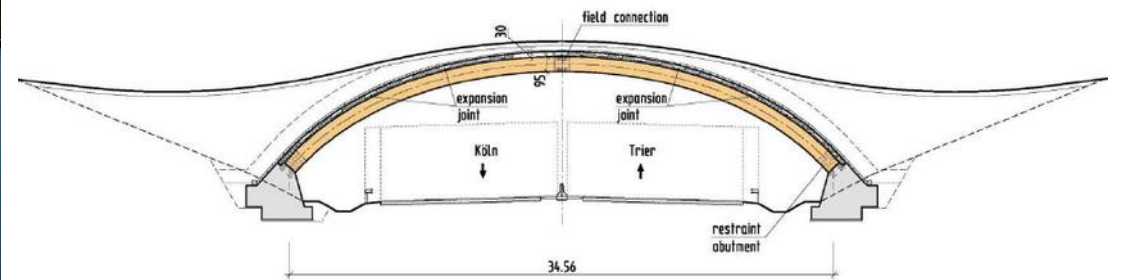
# RC FRAMES



AE | I22 BUILDING CONSTRUCTION IB

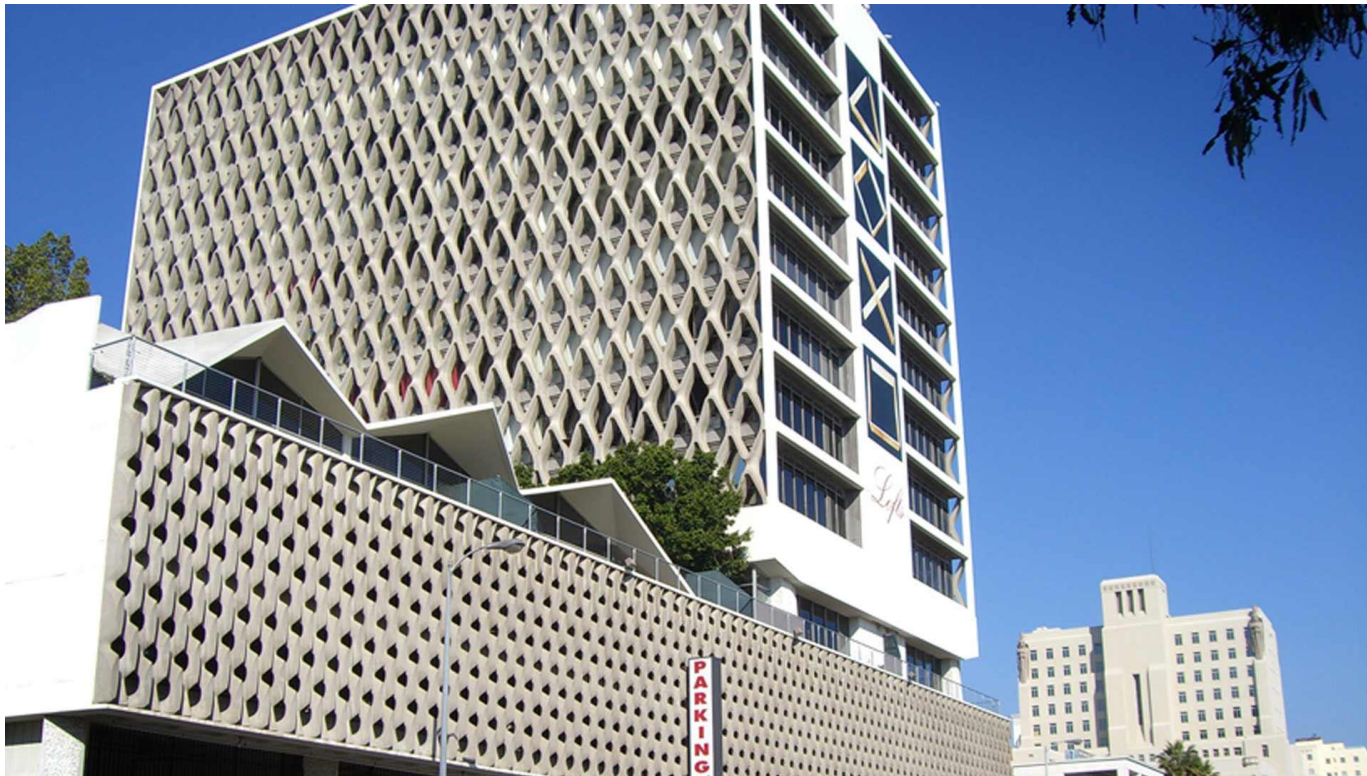


# RC SHELL STRUCTURE





# PRE-CAST CONCRETE CONSTRUCTION





# CONCEPT AND PROCESS

Concrete units are cast and steam-cured in a plant off-site, transported to the construction site, and set in place as rigid component with cranes.



# CONCEPT AND PROCESS



**1. Mass  
Production**



**2. Transportation**



**3. Placed with  
Cranes**



**4. Connecting  
units**

# ADVANTAGES AND DISADVANTAGES





# PRE-CAST COMPONENTS



Slabs



Beams

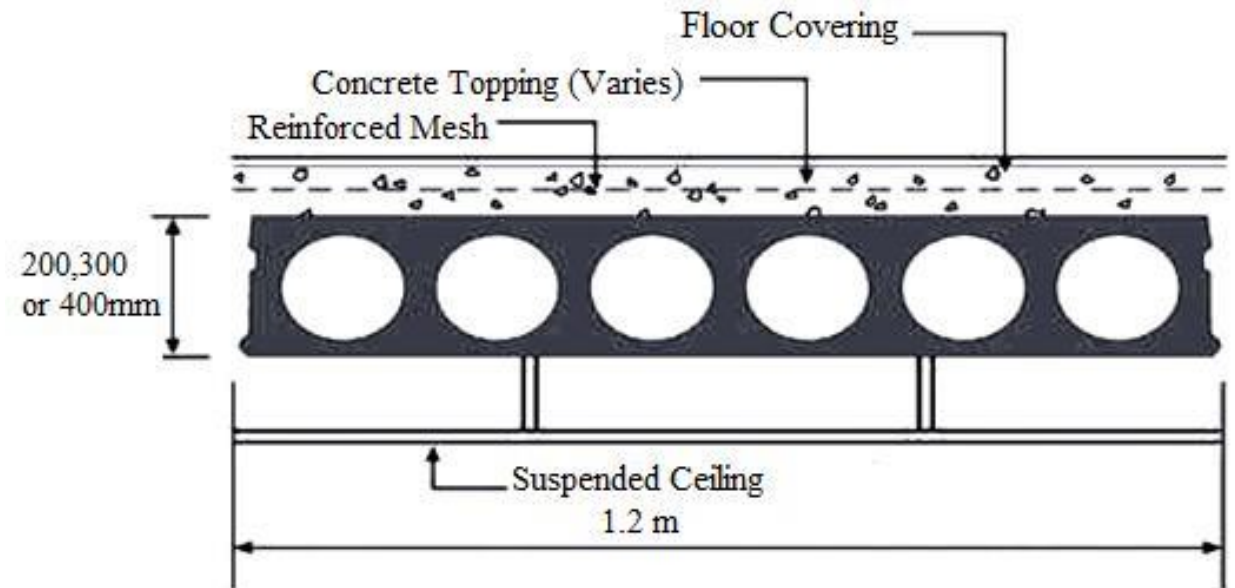
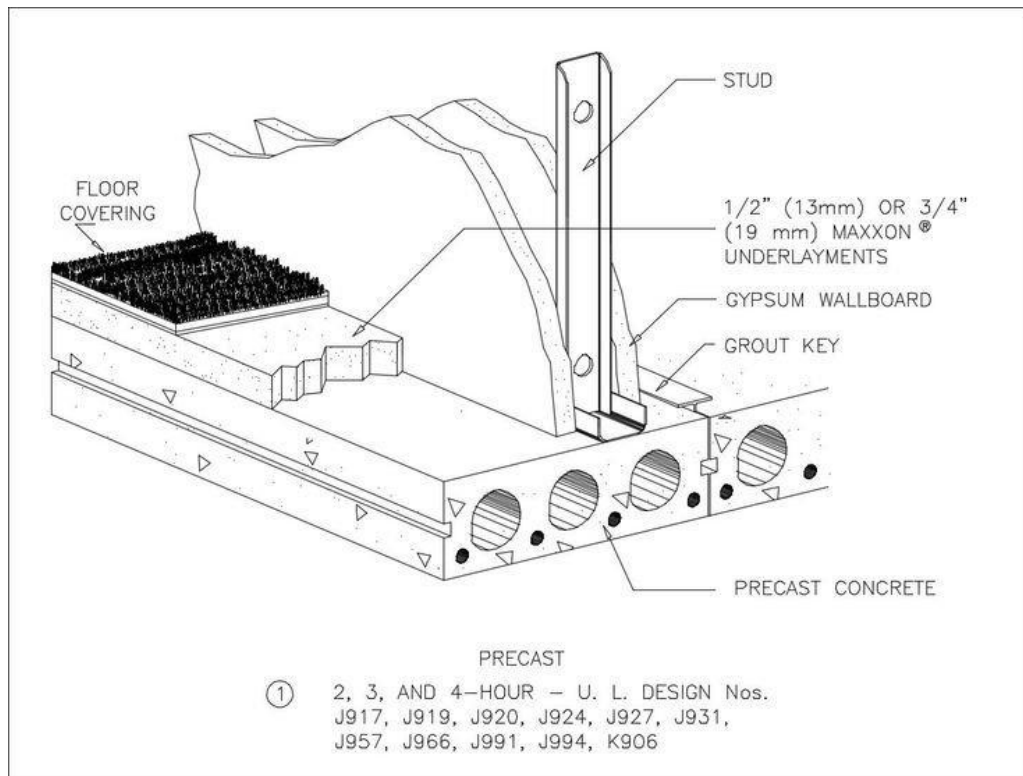


Columns



Walls

# SLABS





# SLABS



## Solid Flat Slab

Span: 3.6 – 7.0 m  
Width: 0.12 m  
Depth: Span/ 40



## Hollow Core

Span: 3.6 – 12.0 m  
Width: 0.4 – 1.4 m  
Depth: Span/ 40



## Single Tee

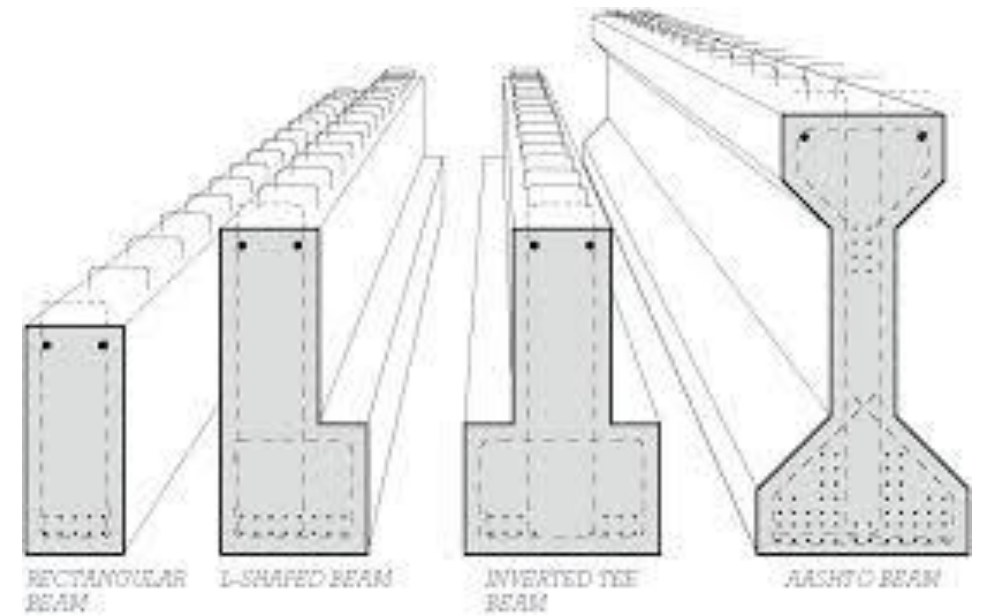
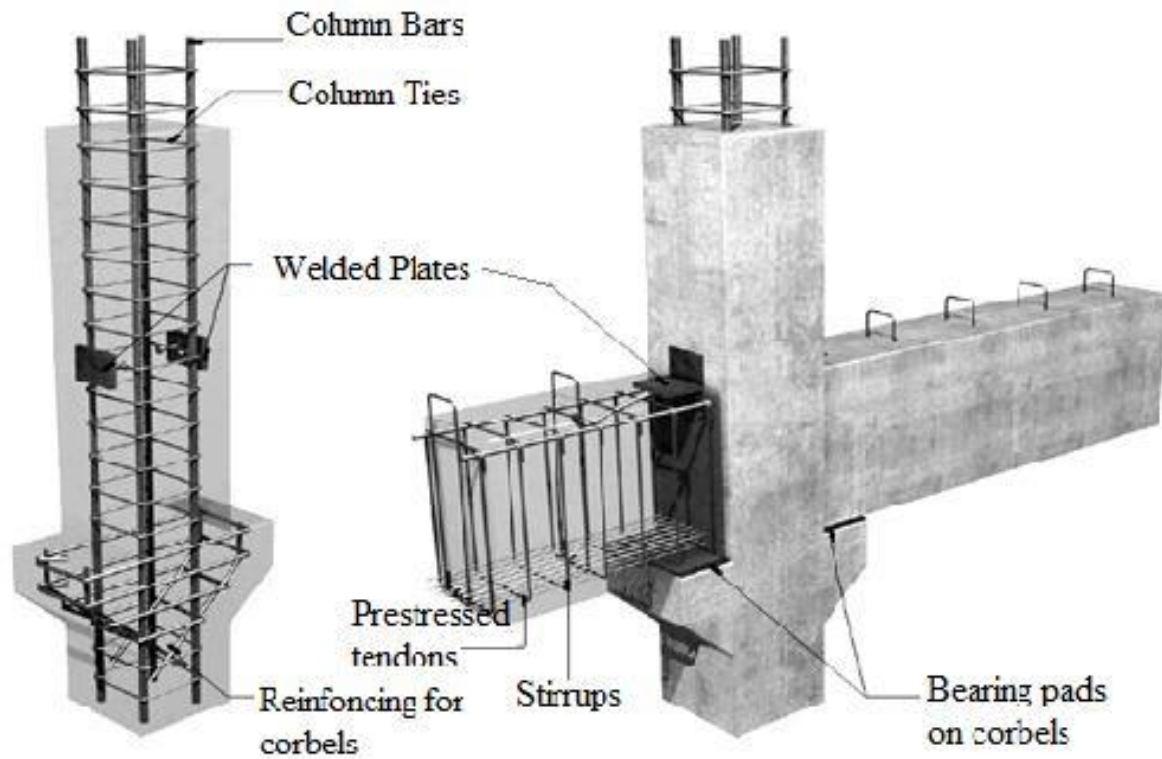
Span: 9.0 – 36.0 m  
Width: 2.4, 3.0 m  
Depth: Span/ 30



## Double Tee

Span: 9.0 – 36.0 m  
Width: 2.4, 3.0 m  
Depth: Span/ 28

# BEAMS



# BEAMS



## Rectangular

Width: 0.3 – 0.4 m  
Depth: 0.61, 0.81,  
1.0 m



## L-Shaped

Width: 0.45/ 0.3 m  
Depth: 0.61, 0.81,  
1.0 m



## Inverted Tee

Width: 0.45/ 0.25 m  
Depth: 0.51, 1.52 m



## AASHTO Girder

Width: 0.45 m  
Depth: 0.91, 1.14,  
1.37 m

# COLUMNS



One Story



Multi Story

# WALLS



## Solid Panels

Hight: Up to 7.0m

Thickness: 0.09 – 0.25 m



## Composite Panels

Hight: Up to 7.0m

Thickness: 0.14 – 0.3 m



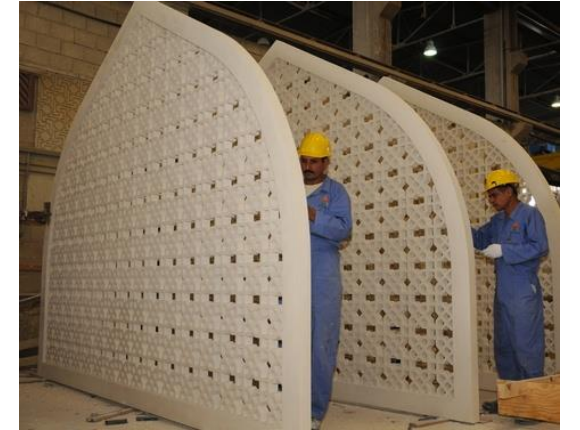
## Ribbed Panels

Hight: Up to 14.0m

Thickness: 0.3 – 0.61 m



# WALLS



# ASSIGNMENT #9

On 50x70 cm paper, Draw to scale **1:20** the Pre-Cast Components (Slabs, Beams, Columns and Walls)

Assume:

- column dimensions 30x30 cm
- Any missing dimensions.

# CONTACTS



<http://bu.edu.eg/staff/sameir.hammad>



Saturday, Sunday and Tuesday ... 9:00 am to 2:00 pm



Sameir M. Hammad