

# BUILDING TECHNOLOGY IV

## CONCRETE SLAB AND HOLLOW CORE

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# PRECAST SOLID SLAB

Structural deck components similar to hollow-core slabs.

## **Uses**

The solid slab technique is a good choice when there are very heavy loads or lots of cross piping etc. in the floor, or when extra fire resistance is required. Usually used for shorter spans.



**Typical widths:**  
2 to 4 feet

**Typical spans:**  
8 to 30 feet

**Typical thicknesses:**  
4 to 12 inches

# PRECAST SOLID CORE SLAB

## Advantages

- Heavy weight capacity
- Extremely high fire resistance
- Rapid speed of erection
- Good choice for cross piping



# PRECAST SOLID CORE SLAB

## Disadvantages

- Heavy compared to hollow slab
- Only effective for shorter spans
- Can limit certain design flexibility with wiring
- Superior acoustic insulation and thermal properties
- More Expensive than hollow core
- Waste of raw material unless high fire rating is a must



# HOLLOW CORE SLAB

## Uses

Floor and roof deck components for various structures. Multifamily housing, hotel and condominiums, office buildings, schools, and prisons are where they are most commonly used.



**Typical widths:**  
4 to 12 feet

**Typical spans:**  
20 to 50 feet

**Typical thicknesses:**  
4 to 12 inches

# PRECAST HOLLOW CORE SLAB

## Advantages

- Heavy weight capacity
- Exceptional fire resistance
- Lower self-weight
- Superior acoustic insulation and thermal properties
- Cost-effective construction solution
- Offers better designing flexibility to builders
- Rapid speed of erection
- Moderate use of raw material
- Highly effective for circulating fresh and warm air
- Requires few construction site workers
- Offers preformed site services etc.
- Quick erection time



# PRECAST HOLLOW CORE SLAB

## Disadvantages

- precast elements can be hard to transport/mobilize on site
- less flexibility for modification in field
- often require a 2" topping slab
- Considerable lead time needed when ordering the hollow core planks
- Deep girders needed to provide sound structural strength, can cause arch problems





# MANUFACTURE OF HOLLOW CORE SLABS

## 1. Extruded Process



-An extrusion device squeezes a stiff dry concrete mix through a moving bed to produce void shape directly.  
-Vertical openings and weld plates cannot be easily cast in.

## 2. Wet- Cast Process



-A bottom layer of concrete is poured on the casting bed.  
-A second layer of concrete with collapsible tubes or light weight aggregate to form voids is deposited.  
-The tubes or aggregates are removed after the concrete has cured.

## 3. Slim form Process





# CONSTRUCTION: TIME AND COST

## Time

- Hollow core should be installed by skill Technicians
- Must have experience operating lifting devices and cranes.
- 3-4 workers can install about 500-600 sq. m per day
- Fast erection time 5000-8000 sq. ft per day
- Important to consider is site access, and crane access



## Cost

- Cost is usually more affordable than other types of systems.
- Need to pay for equipment.
- Material is what cost the most.
- Labor is also a high cost due to the need of experienced workers.
- For residential work it is approximately \$20 per sq. ft.

Table 3: Precast Planks Cost Estimate

Precast Concrete Hollow Core Planks Estimate										
Item	Units	Quantity	Unit Mat'l	Mat'l Cost	Unit Labor	Labor Cost	Unit Equip.	Quantity	Equip. Cost	Total Item Cost
8" Hollow Planks	planks	70	\$1,500.00	\$105,000	\$200.00	\$14,000	\$974/Day	10 days	\$9,740	\$128,740
2" Concrete Topping w/ 6" x 6" W1.4 x W1.4 W.W.F	sf	7252	\$5.00	\$36,260	\$0.00	\$0	\$0.00	-	\$0	\$36,260
<b>Total Precast Concrete Planks Estimate:</b>										<b>\$165,000</b>

# FLEXIBILITY OF THE SYSTEM DIVERSITY OF FORMS AVAILABLE

## Commercial Applications:

- High-rise office buildings
- Factories
- Warehouses
- Hotels
- Hospitals/nursing homes
- Churches
- Parking facilities
- Prisons & justice facilities
- Retail outlets
- Schools/universities
- Athletic complexes
- Bridge deck units



Hostel Building at Trichy



## Residential Applications:

- Single or multiple family homes
- Garages with basement, storage, or living space underneath
- Noise wall panels
- Housing complexes/condominiums



# FLEXIBILITY OF THE SYSTEM DIVERSITY OF THE AVAILABLE FORMS

Shapes of planks



Shape of Buildings





# PRECAST SOLID SLAB SPANS

Under typical residential loading conditions  
**Panel Width Ranges From 8'-12'**

Typical Solid  
Plank Depth Available

(1/40 span = depth)

Maximum  
Span



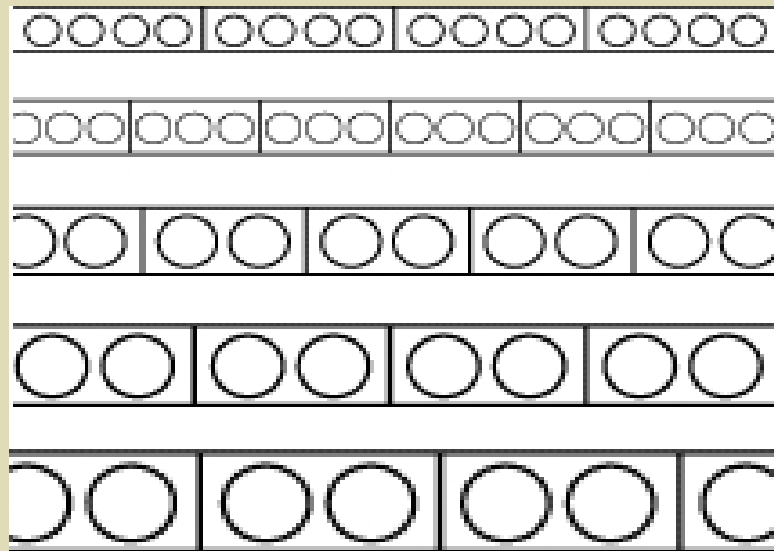
3"	←————→	10'
4"	←————→	12'- 4"
5"	←————→	16'- 8"
6"	←————→	20'
7"	←————→	23'- 4"
8"	←————→	26'- 8"
10"	←————→	33'- 4"

# PRECAST HOLLOW SLAB SPANS

Under typical residential loading conditions

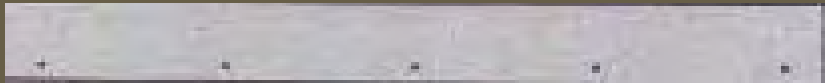
**For A Typical 4' Wide Panel (Range from 2'-4')**

**Typical Hollow  
Plank Depth Available**



**Maximum  
Span**

6"	←————→	20'
8"	←————→	30'
10"	←————→	35'
12"	←————→	40'
16"	←————→	50'

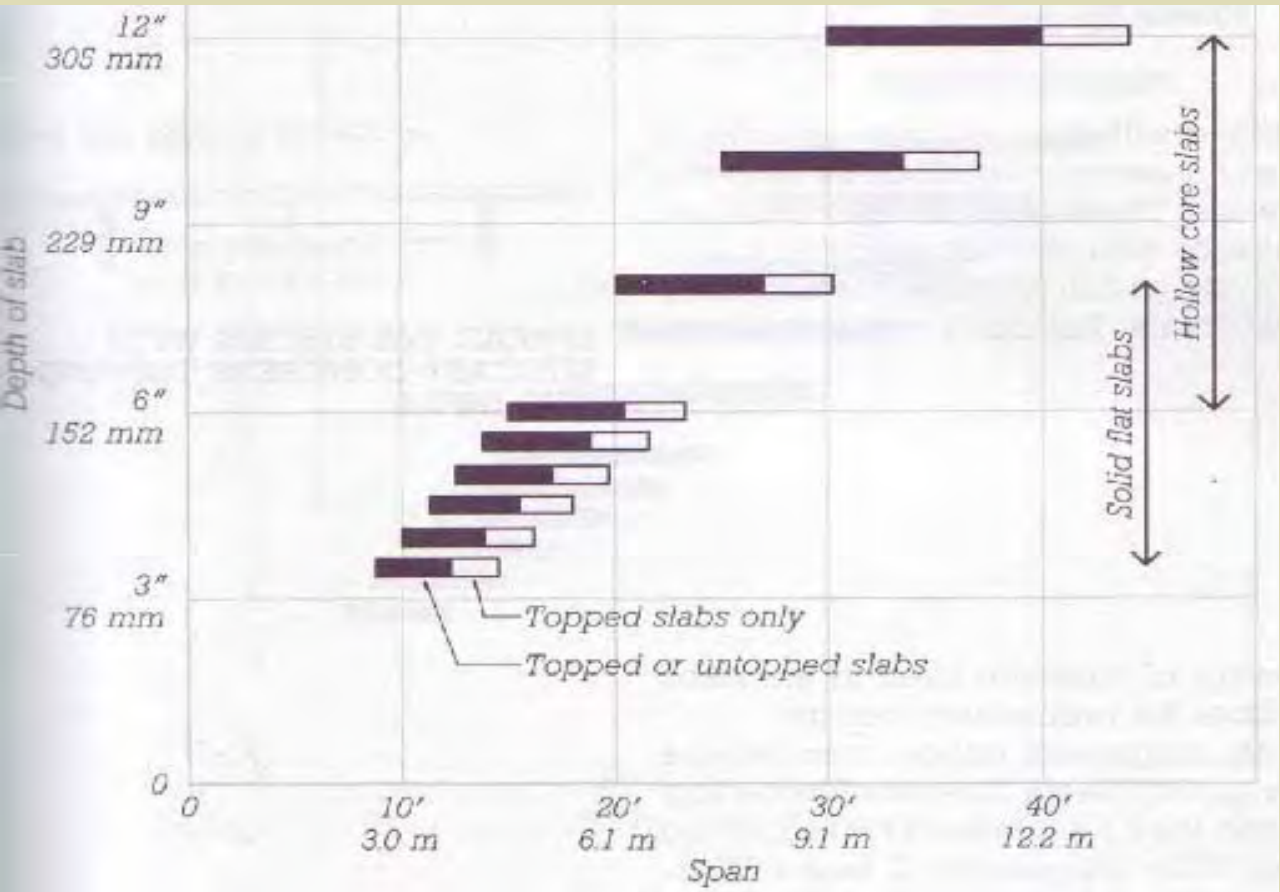


Solid

VERSUS

Hollow Core

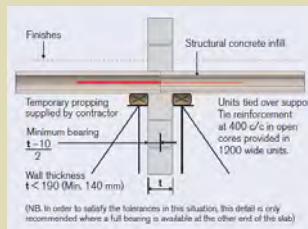
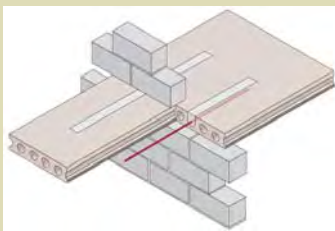
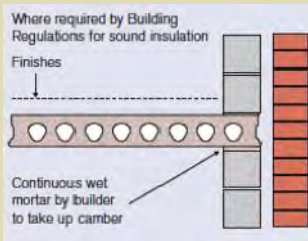
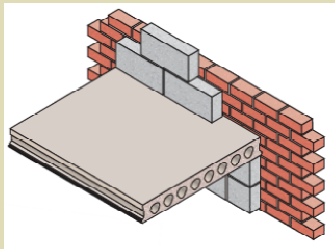
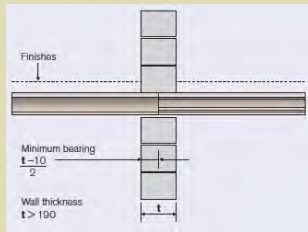
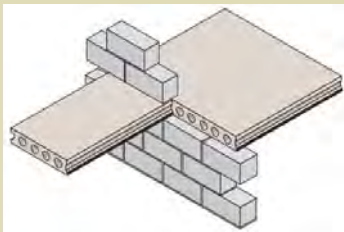
### Depth to Span Comparison



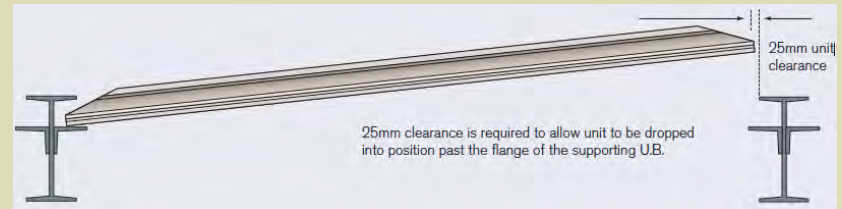
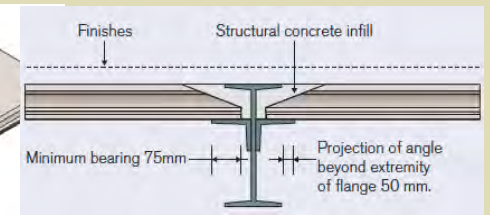
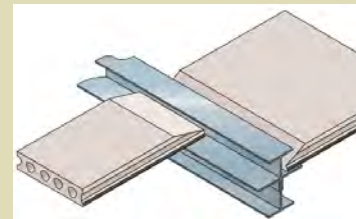
Solid Slabs are usually used for short spans as opposed to Hollow Core Slabs which can range up to 50' in span.

# CONNECTION DETAILS

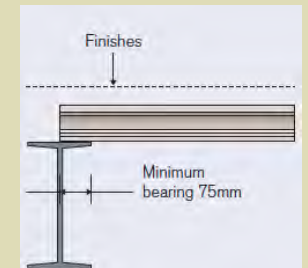
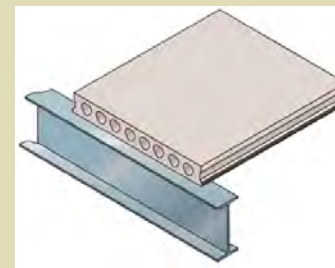
## Bearing details Masonry



## Shelf Angles



## Top of Steel





# FINISHES

## Ceramic Tile

- Not recommended to apply directly on the plank



## Vinyl Floors

- Most vinyl floors are fully adhered to the substrate.
- They require not be applied directly to the un-topped planks.
- However in large areas can be tested to insure compatibility of the glue.



## Wooden Floors

- They are typically set as floating or sleeper systems.



- Can be applied directly to the un-topped system.
- It is not recommended to anchor the system directly to the plank.

# CASE STUDY

## Generalities

- Location: 838 Broadway, NY
- Project Type: Multi-Family Housing Bldng.
- Size: 128,000 Sq. FT
- Precast: 8"—8' Spancrete Hollowcore.
- Architect: Urban Architectural Initiatives



SILVERLEAF HALL  
Bronx, NY

## Generalities

- Location: 9530 Marketplace Road, Fort Myer, Florida.
- Project Type: Office Bldng.
- Size: Three Story, 65,000 Sq.
- Precast: 12" Spancrete Hollowcore, Precast beams, columns, stairs and landings



RENAISSANCE CENTER-  
Fort Myers, FL

# ECHO

## “FLEURHOF” & Madulamoho Housing Association (MHA) Involvement in South Africa’s “Cry For Homes”



The answer?

High density housing communities.

Most efficient solution for building these structures?

Hollow Core Concrete Slab Technology

The “ECHO” Group is South Africa’s largest manufacturer of hollow-core concrete flooring slabs. They have been a main factor in the creation or construction of the “Gaunteng” Suburbs, the “Jabulani CBD” development in Soweto and the “Fleurhof Extension 2 Township” which is Northwest of Johannesburg

# Madulamoho Housing Association (MHA)

## Fleurhof



**Platinum Impumelelo Award**  
**Halala Joburg Award**  
**Govan Mbeki Award**

## Scottsdene in Kraaifontein, Cape Town





# Fleurhof Johannesburg



**The “Fleurhof”  
Johannesburg,  
South Africa**

**Residential development  
group Calgro M3 Holdings  
and Inkanyele Projects**



# NEW YORK STATE OFFICE OF GOVERNMENT SERVICE PARKING STRUCTURE



## Generalities

- Located in Albany, NY.
- Designed by Desman Associates
- A Parking structure.
- 8 levels, and 1,380 parking spaces.



## Reasons for Hollow Core use:

- “the state had a limited budget”
- Needs lots of space for a parking lot.
- Hollow core is cheap and easy to built.
- It thrives in long spans with minimal support.

# CITATION WORK

- Precast Solid Concrete and Hollow Core
- [http://www.nordimpiantisystem.com/\\_english/4\\_1\\_3\\_elementiaps.html](http://www.nordimpiantisystem.com/_english/4_1_3_elementiaps.html)
- [http://www.heidelbergcement.com/NR/rdonlyres/DECAC297-B027-4E60-A7C0-7BCF29AEDC19/0/Flooring\\_Hollowcore.pdf](http://www.heidelbergcement.com/NR/rdonlyres/DECAC297-B027-4E60-A7C0-7BCF29AEDC19/0/Flooring_Hollowcore.pdf) ( VERY GENERAL )
- concrete precast institute ( p c i )
- <http://www.archiexpo.com/cat/partitions-ceilings-raised-floors/raised-access-floors-accessories-AB-1139.html>