

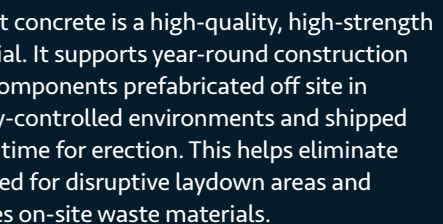
## CHECKLIST

# HOLLOW CORE FLOOR & ROOF DESIGN CONSIDERATIONS

Use the items in this checklist to review important considerations when designing hollow core floor and roof systems in your next project.

## PRECAST CONCRETE HOLLOW CORE PLANK ADVANTAGES

- ❑ With proper preparation, various floor coverings can be easily installed on the top surface of hollow core plank
- ❑ The underside of plank can serve as finished ceilings or prepared with minimal effort using paint or acoustical spray
- ❑ Hollow core plank used as floor-ceiling assemblies have excellent sound attenuation characteristics
- ❑ Voids in hollow core plank can be used for electrical or mechanical runs and in passive solar applications that distributes heated air through cores
- ❑ Prestressed strands used in hollow core plank maximize span lengths while still achieving load capacities
- ❑ The grouting of plank keyways achieve basic diaphragm characteristics and can transfer lateral loads
- ❑ Hollow core plank has excellent fire resistance depending on plank thickness and strand coverage



Precast concrete is a high-quality, high-strength material. It supports year-round construction with components prefabricated off site in quality-controlled environments and shipped just in time for erection. This helps eliminate the need for disruptive laydown areas and reduces on-site waste materials.

## FRAMING CONCEPTS

### Span Length

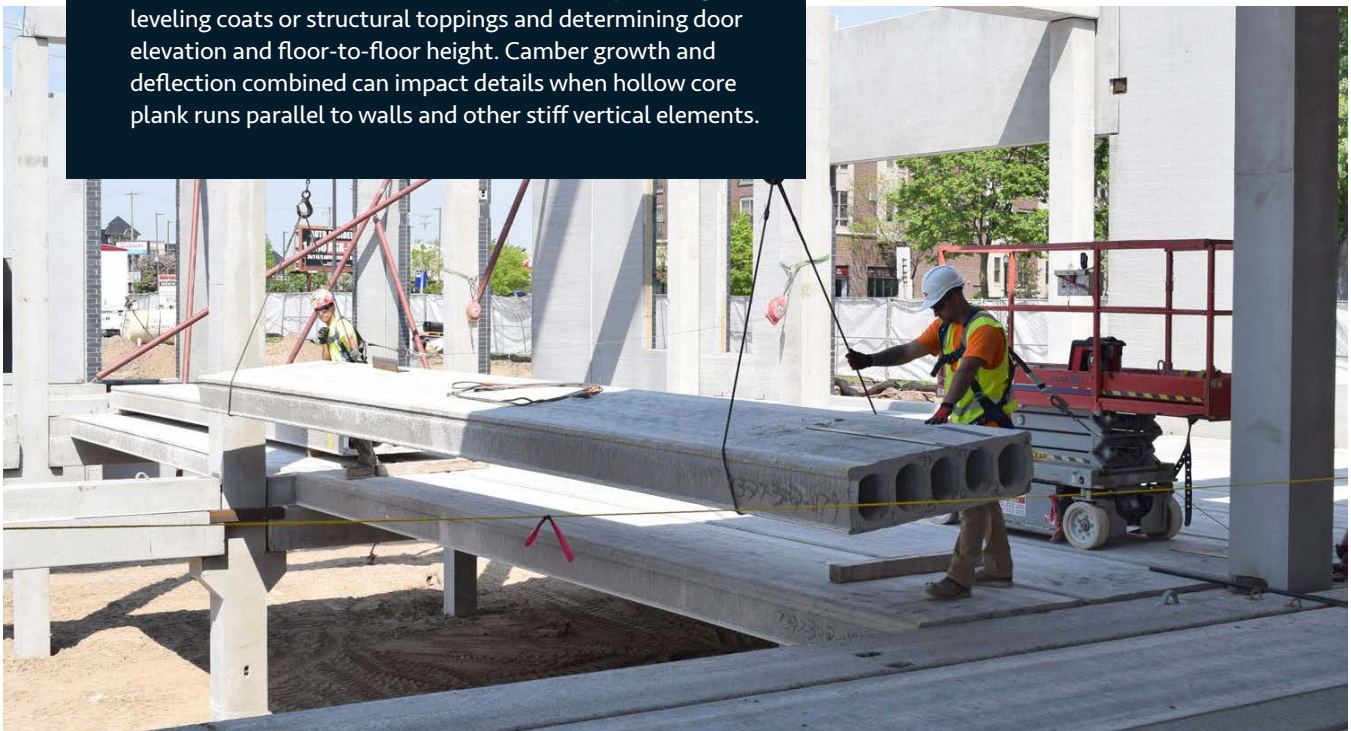
- ❑ For a given loading and fire endurance rating, span length and plank thickness can be optimized using manufacturer load tables
- ❑ A span-to-depth ratio of 45 is common when fire endurance, openings, or sustained live loads do not control a design
- ❑ Partitions and openings result in greater load capacity requirements
- ❑ Fire resistance ratings requirements will affect the load capacity of the plank

### Layout Economics

- ❑ Square-cut ends are the most efficient, but slabs can be cut at an angle if time allows
- ❑ Hollow core plank is typically manufactured to 4'-0" nominal widths and may be manufactured narrower to meet building dimensions
- ❑ Consider product and building tolerances when determining MEP openings and sizes
- ❑ Consider camber tolerances and differentials when determining span directions of hollow core planks

### A NOTE ON CAMBER

Camber is the upward deflection that results from the eccentric loading of prestress strands. Differential camber occurs when adjacent planks have different amounts of camber. Camber must be accounted for when providing leveling coats or structural toppings and determining door elevation and floor-to-floor height. Camber growth and deflection combined can impact details when hollow core plank runs parallel to walls and other stiff vertical elements.



## STRUCTURAL DESIGN RESPONSIBILITIES

Precast concrete producer engineers typically perform the final engineering for precast hollow core products. Engineers of record providing preliminary planning and design loads have several specific responsibilities in precast structural designs.

### Engineer of Record (EOR)

- Performing preliminary planning to ensure the specified floor or roof system is achievable
- Establishing design load criteria for the hollow core plank, including vertical and lateral loads
- Communicating the forces to be transmitted through structural connections
- Creating connection concepts for design of materials not contained in the hollow core plank
- Reviewing and approving the precast hollow core plank shop drawings and design calculations

### Precast Engineer

- Designing hollow core plank and connections to meet provided load criteria
  - Handling and shipping
  - Fire rating
  - Opening accommodations
- Preparing design calculations to substantiate all design cases
- Signing and sealing drawings and calculations for engineer review and approval

### EOR PROJECT TIP

Hollow core plank drawings and calculations should be reviewed for proper design loads, building dimensions, appropriate details and bearing conditions, conformance with specified fire ratings, and location of openings when hollow core plank runs parallel to walls and other stiff vertical elements.

## ARCHITECTURAL DESIGN

- Is the natural appearance of hollow core plank acceptable in as-cast condition?
  - Will an exposed ceiling be part of the design?
  - Are additional finishes or materials required?
- How will camber influence floor covering preparation and finishing?
  - How will it affect leveling coat or structural topping application?
  - How will it affect the ceiling materials below?
- What mechanical, electrical and plumbing items need to be considered?
  - What does MEP design need to look like for coordination of openings and MEP systems?
  - Are solid cores for structural performance required, which make MEP routing and electrical wiring challenging?
- What ratings and requirements need to be met?
  - What sound transmission class (STC) requirements exist?
  - What impact insulation class (IIC) rating is required?
  - What is the fire rating of the plank itself and of the floor/ceiling system

### PROJECT TIP

Provide all necessary building dimensions for the efficient development of precast shop drawings.

## TOLERANCES

Consider building tolerances, product tolerances, and erection tolerances when determining finished and exposed materials. See *PCI MNL-126* for detailed information on tolerances

## LOGISTICS

The overall construction scheduling, coordination, and erecting sequence are critically important for hollow core plank use. Evaluate your logistics options to approach projects safely.

- Explore the potential for on-site product storage locations whenever possible
- Confirm temporary on-site storage or laydown areas are flat and level for proper plank care
- Determine crane placement based on type of crane, piece weights, and reach relative to the building
- Ensure delivery trucks and cranes have proper access to job sites
- Verify delivery trucks and cranes have stable and graded road access to move under their own power to offloading and crane setup positions

Lattice boom crawlers, hydraulic cranes, and tower cranes are used in plank erection. Cranes are sized based on the weights of pieces and reaches.

## LEARN MORE

Download a free copy of the [PCI Manual for the Design of Hollow Core Slabs and Walls MNL-126](#) for more information. Then discover how other innovative industry professionals rely on the versatility, efficiency, and resiliency of precast concrete to support projects. [See how precast builds in a variety of markets and applications.](#)

## HAVE QUESTIONS?

Take advantage of everything the PCI Mid-Atlantic Chapter has to offer its members. Get in touch with the PCI Mid-Atlantic Chapter coordinators and tap into the knowledge of fellow precasters for answers to your transportation, architectural cladding, and total precast concrete project questions.

### MID-ATLANTIC CHAPTER

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