

Span Notes



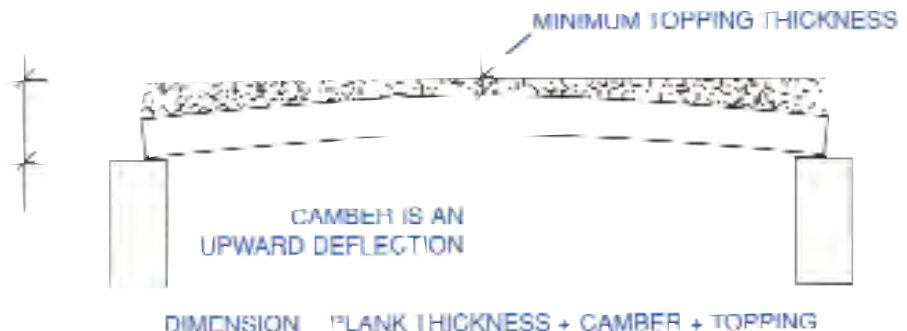
No. 10

ADVANTAGES OF PRESTRESSED CONCRETE

Reinforced concrete members must carry their own weight in addition to any applied superimposed loads. Short spans and thick depths of section are common limiting factors in conventionally reinforced members. Efforts to overcome these limitations resulted in the development of prestressing the precast concrete members. The major advantage of prestressed concrete is its ability to span longer distance with much thinner sections while carrying heavier loads. Span and load requirements determine the member thickness and the amount of prestressing force. It is important to note that camber is a result of the design and is not a design parameter.

WHAT IS CAMBER

Camber is the upward deflection created by the prestressed strand located below the center of gravity in the hollow core plank section which compresses the bottom more than the top.

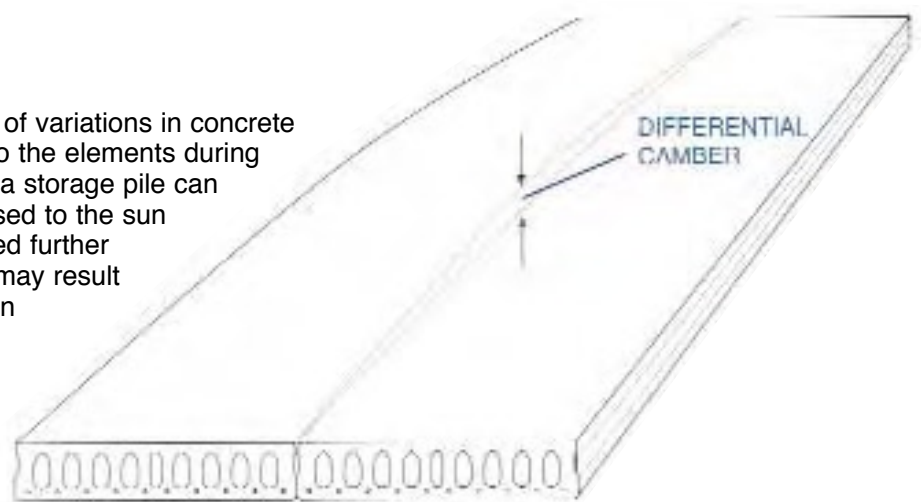


THEORETICAL CAMBER

Theoretical camber is the calculated upward deflection based on known design parameters. It is time-dependent and sensitive to actual production and service conditions.

DIFFERENTIAL CAMBER

Differential camber can be the result of variations in concrete strength gain, creep, and exposure to the elements during curing and storage. Even location in a storage pile can cause a difference. Top pieces exposed to the sun will react differently than those shaded further down the pile. Design requirements may result in the need for heavier prestressing in adjacent members.



DIFFERENTIAL CAMBER BETWEEN ADJACENT MEMBERS OF THE SAME LENGTH AND DESIGN CAN BE LEVELED PRIOR TO GROUTING. IT MAY NOT BE POSSIBLE TO LEVEL ADJACENT MEMBERS OF DIFFERENT DESIGN AND /OR LENGTH.

LONG-TERM CAMBER

Camber and deflection will change over time, but forces tend to negate themselves. For example, the sustained downward forces of applied loads offset the upward camber growth due to sustained unbalanced compression created by the prestressing strand on concrete.

From the preceding simplified discussion we can conclude the following:

- A. Theoretical Camber can be kept within acceptable tolerances throughout design and construction by following a few simple guidelines:
 1. Design for realistic superimposed loads.
 2. Select a plank size (thickness) near the mid-range of the recommended span-to-depth ratios (e.g., use a 10" thick plank with acceptable camber rather than using 8" thick plank with high camber that will also carry the load).

- B. Differential Camber between adjacent pieces can be handled in several ways:
 1. Flash patching (feathering) joints between adjacent plank.
 2. Using temporary shoring and/or bolting through joints to adjust camber prior to grouting keyways.
 3. Shimming bearing points of shorter pieces.
 4. Apply leveling coatings (Gypcrete) or use structural topping.

In summary, a prestressed member with its inherent camber:

- Allows you to offer longer clear spans.
- Allows you to offer higher superimposed load capacities.
- Allows solutions to real problems and—as you can see—dealing with it is easy.