

## **5.12.4 DIAPHRAGMS**

Intermediate concrete diaphragms shall be placed as follows:

<u>Span Length</u>	<u>Diaphragm Location</u>
< 40'	None
40' – 79'	Midspan
80' – 119'	1/3 points
> 120'	1/4 points

When the skew is  $>20^\circ$ , intermediate diaphragms should be staggered and placed perpendicular to the centerline of girder.

### **Shallow Girders with cast-in-place deck**

AASHTO, Bulb Tee, and WF girders less than 66" in depth shall have permanent concrete diaphragms or end beams at the ends of each span. Intermediate diaphragms shall be spaced as noted above.

### **Deep Girders with cast-in-place deck**

AASHTO, Bulb Tee, and WF girders  $\geq 66"$  in depth shall have temporary diaphragms installed between the exterior and first interior girder. These diaphragms shall be placed midway between all permanent intermediate diaphragms as well as the end beams and the girders restrained at the ends before pouring the permanent intermediate diaphragms and end beams.

Temporary diaphragms shall be removed after the deck overhang brackets have been removed. Intermediate diaphragms shall be spaced as noted above.

### **DeckTee Girders connected with weld ties**

DeckTee girders with non-structural overlay and connected with weld ties shall have permanent concrete diaphragms or end beams at the ends of each span. Intermediate diaphragms shall be spaced as noted above.

DeckTee girders with a minimum 5" cast-in-place concrete deck slab and connected with weld ties shall have permanent concrete diaphragms or end beams at the ends of each span. No intermediate concrete diaphragms are required for spans less than 120'. Intermediate diaphragms for spans greater than 120' shall be spaced at 1/4 points.

### **DeckTee girders connected with a cast-in-place closure pour**

DeckTee girders connected with a cast-in-place closure pour shall have permanent concrete diaphragms or end beams at the ends of each span. No intermediate concrete diaphragms are required for spans less than 120'. Intermediate diaphragms for spans greater than 120' shall be spaced at 1/4 points.

### **Expansion Ends**

To facilitate jacking for future repairs at simply-supported ends of precast, prestressed girder bridges, the end diaphragms shall be designed for a minimum clearance of 10 inches above the level of the beam seats on piers and abutments. No extra reinforcement is required beyond that provided for normal dead, live and impact loads.

### **Continuous Ends**

The end of girders in bridges designed without expansion joints shall be cast into full-depth end diaphragms.

### **Revisions:**

July 2010	Added note for skewed intermediate diaphragm orientation.
Mar 2015	Added requirements for DeckTee girders.
Oct 2017	Renumbered article from 5.13.2.2 to 5.12.4 to conform to the 8th Edition of the AASHTO LRFD Bridge Design Specifications.
Oct 2023	Clarified that the girder ends need to be restrained with temporary diaphragms.