

Proposed Table of Limiting Spans for Lateral Stability – NCDOT

NCDOT - PCI Joint Technical Committee – for July 30, 2020 Meeting

As stated in Article 5.5.4.3 of the *AASHTO LRFD Bridge Design Specifications*, 9th ed. (2020), the “stability of precast members during handline, transportation, and erection shall be investigated.” To address this new requirement, the following approach is proposed for the *NCDOT Structure Design Manual*.

For girder lengths not exceeding those shown in the following table, lateral stability during shipping and handling is taken to be acceptable and the Engineer is not required to provide calculations to demonstrate this. These limiting spans assume that girders are lifted at the distance from the end of the girder shown in the table, which has been rounded to the whole foot that is greater than or equal to 1.5 x the girder depth.

For girder lengths exceeding those shown in the following table, the Engineer is required to provide calculations to demonstrate that the lateral stability of the girder during shipping and handling can be expected to be adequate. The lifting location used in the evaluation of the girder shall be shown in the calculations and on the contract plans.

Prestressed Concrete Girder Type	Limiting Span for Lateral Stability (ft)	Lifting Loop Location from End of Girder (ft)	For info only: 1.5 x h (ft)
AASHTO Type II	60	5	4.5
AASHTO Type III	75	6	5.625
AASHTO Type IV	110	7	6.75
54" Modified Bulb-Tee	115	7	6.75
63" Modified Bulb-Tee	125	8	7.875
72" and 74" Modified Bulb-Tee	140	9	9 and 9.25

Lifting loop locations shown in the above table for AASHTO Type III and IV girders exceed the requirements of Subarticle 1078-14 of the *NCDOT Standard Specifications for Roads and Structures* (January 2018), which require girders 54 in. or less in height to be picked within 5 ft from the points of bearing and supported during storage within 3 ft of the points of bearing. For deeper girders, the lifting and storage locations are not specified; instead, the proposed method of lifting and storing of girders must be submitted for approval.

Article 6.3.1 of the *NCDOT Structure Design Manual* (June 2020) refers to **Figure 11-3** for “approximate span length limits” for prestressed concrete girders. Span lengths for stream crossings for prestressed concrete girders from **Figure 11-3** are shown in the following table. Note that the 54" Modified Bulb-Tee girder is not included in **Figure 11-3**. Except for the AASHTO Type III girder, all span lengths listed for prestressed concrete girders in **Figure 11-3** are less than those in the proposed table above.

Prestressed Concrete Girder Type	Span Length
AASHTO Type II	≤ 55'
AASHTO Type III	≤ 75'
AASHTO Type IV	< 100'
63" Modified Bulb-Tee	< 115'
72" and 74" Modified Bulb-Tee	< 125'

FOR INFORMATION ONLY: The above table is based on a similar table in the GDOT *Bridge and Structures Design Manual*, Rev. 2.7, dated August 10, 2018, which is reproduced here along with an accompanying note:

3.4.2.8 Beam Lengths

The maximum beam lengths for the PSC beams are:

- 50 feet for AASHTO Type I Mod. beams
- 65 feet for AASHTO Type II beams
- 85 feet for AASHTO Type III beams
- 125 feet for 54" Bulb Tee beams
- 135 feet for 63" Bulb Tee beams
- 150 feet for 72" and 74" Bulb Tee beams

AASHTO Type II beams are preferred for span lengths between 40 to 50 feet.

If the above maximum beam lengths are exceeded under an alternate bidding process, the engineer of record is responsible for performing a beam stability analysis.

The maximum beam length limits that appear in the table above were computed using the assumption that the beam is lifted at 1.5 x the beam height from the end of the beam.