4.2 CONCRETE GIRDER BRIDGES WITH SKEWED SUPPORTS

4.2.1 GENERAL

This policy addresses the analysis of Concrete Box Girder and Beam-Slab bridges with skewed supports.

4.2.2 POLICY

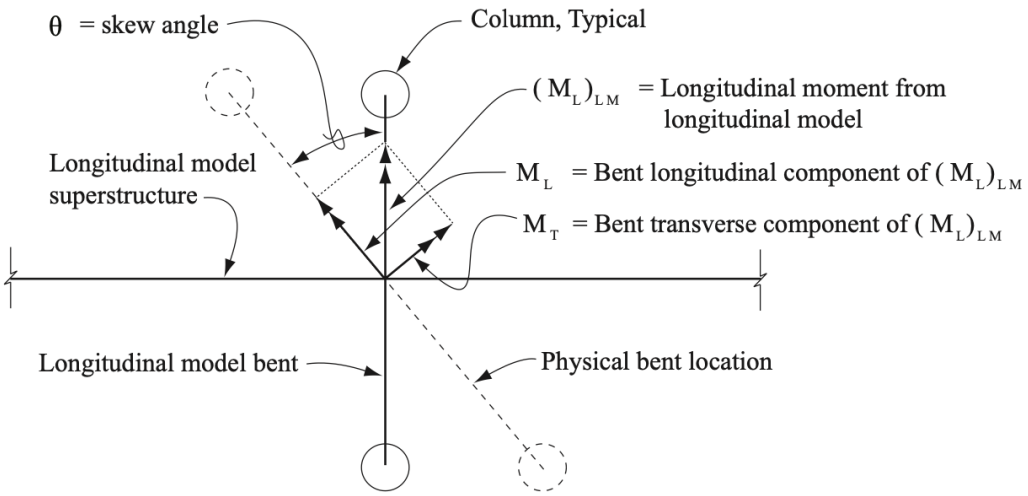
For a bridge on a straight alignment with support skews exceeding 60 degrees and for a curved concrete bridge with support skews exceeding 45 degrees, the designer shall use refined methods, such as a grillage or shell model, to capture live load distribution.

When determining the effect of skewed supports on a bridge with a curved alignment, the effects of both curvature and skew shall be included.

4.2.3 MODELING REQUIREMENTS

In a 3D spine beam model used for superstructure longitudinal design, the supports shall be modeled with no skew. Girder shear results shall be modified by shear correction factors obtained through approximate or refined methods.

In 2D bent models used for substructure design, the physical skew shall be explicitly considered. Support loads taken from the longitudinal superstructure model shall be transformed into components in the bent-column coordinate system.



M_L and M_T are transformed components of response from the longitudinal analysis and are to be added to the response from the bent analysis.

$$M_L = (M_L)_{LM} \times \cos\theta$$

$$M_T = (M_L)_{LM} \times \sin\theta$$

Other longitudinal force effects shall be transformed similarly.

Figure 4.2.3.1 Plan View of Longitudinal Model at a Bent

4.2.4 REFERENCES

1. AASHTO. (2017). *AASHTO LRFD Bridge Design Specifications*, 8th Edition, American Association of State Highway and Transportation Officials, Washington DC.
2. Caltrans. (2019). *California Amendments to AASHTO LRFD Bridge Design Specifications*, 8th Edition, California Department of Transportation, Sacramento, CA.
3. Davis, Ray and Wallace, Mark. (1976). *Skew Parameter Studies*, Volumes 1 & 2.