Nonzero moment at abutment locations

This article describes various reasons that can lead to nonzero moment at abutment location of bridge objects.

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Nonzero moment due longitudinal restraint

When bearing links are located at the bottom of the girder, and have nonzero stiffness in the longitudinal direction, this results in longitudinal force acting on a lever arm about the neutral axis of the section. This is kinematically correct behavior. Releasing the abutment bearing links in the longitudinal direction (U3) should produce zero moment at the abutments. For stability, ensure that the model has a longitudinal restraint, such as at one abutment or bent.

To avoid removing a longitudinal restraint, set the bearing elevation to the neutral axis of the superstructure section. This decouples longitudinal and bending behavior, though it may not be physically realistic.

Nonzero moment due abutment skew

Nonzero abutment moment can be caused also by abutment skew, because the total abutment moment is obtained by summing up all reactions about a line perpendicular to the layout line at the abutment location. If the loading is not symmetrical, the total moment may be nozero, because reactions closer to the more heavily loaded portion of the bridge are contributing more moment than the other reactions.

For results reported for individual girders, the moments reported on the "Bridge Object Response Display" form are obtained from section cuts that include both the girder and the tributary section of the deck. When there is a skew at the abutment, the skew also causes twisting of the deck and the interaction with the adjacent girder or the deck of the adjacent girder may cause negative section cut moment at the abutment. In other words, the reported moment is not solely caused by the vertical reaction at the support, but the contribution of all joints included in the section cut must be accounted for.

See also

- Effect of insertion point on beam reactions test problem