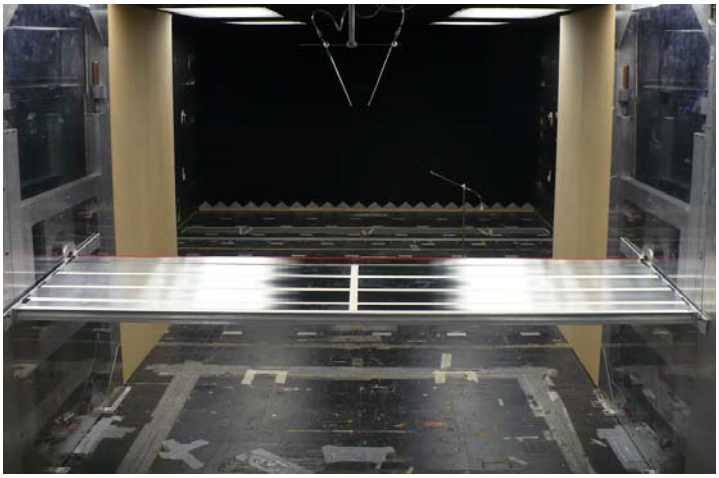
Bridge Girders While Under Construction - Florida

Wind Engineering Study

Test Set-up for Wide Flange Plate Girders (Phase 2)



Test Set-up with Stay-in-Place Formwork (Phase 3)

Owner: Florida Department of Transportation	*Client: University of Florida*	*Year Tested: 2011, 2012 and 2013*
Section Model Scales: 1:25 for the Wide Flange Plate Girders, the Narrow Flange Plate Girders, and the Box Girders *1:28 for the 78-inch "Florida" I-Beams, and the 45-inch "Florida" I-Beams*		

The Project

The project was a critical component of a larger project with the Florida Department of Transportation (FDOT). The proper bracing of bridge girders for extreme wind during the construction process was the primary focus of this study. The critical component, as part of the FDOT Project, was an accurate quantification of wind loads on the girders during construction. It was performed in the Boundary Layer Wind Tunnel in three phases. This includes the windward girder, as well as an estimation of the effects of shielding on the interior girders, including the influence of spacing and cross-slope on shielding. Five different girder types have been selected for study as well as two girder spacing and two cross slopes in Phase 1.

The second phase was an extension of Phase 1. Three different girder types, identical to those studied in Phase 1, have been selected for this investigation in an arrangement as a group of ten girders with two different cross slopes.

The third phase study addresses the condition where stay-in-place formwork bridges the gap between girders. Four different girder types have been selected for this investigation in groups of two girders to ten girders, with different spacing and cross slopes.

The Wind Tunnel Studies

Section models were constructed at two geometric scales relative to the prototypes: 1:25 scale for the wide flange plate girders, the narrow flange plate girders and the box girders, as well as 1:28 scale for the 78-inch and 45-inch "Florida" I-beams.

The objectives of the Phases 1, 2 and 3 investigations were to determine:

1. Static force coefficients for five types of bridge girders (Phase 1);
2. Effects of shielding on leeward girders by windward girder for various girder groupings (up to 5 girders) and arrangements (Phase 1);
3. Static force coefficients for each girder within the configuration of ten for three types of bridge girders (Phase 2);
4. Effects of shielding on leeward girders by windward girder within the groupings of 10 girders (Phase 2);
5. Static force coefficients for each girder under the condition where stay-in-place formwork bridges the gap between girders. Four of the studied types of bridge girders in Phases 1 and 2 were tested with stay-in-place formwork (Phase 3).

The Boundary Layer Wind Tunnel Laboratory

Western

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