

ABSTRACT

If designed and constructed properly, post-tensioned construction can provide improved durability and offers the ability to construct longer span bridges and curved girders. Furthermore, this method of construction has become economically competitive with traditional, pretensioned concrete and steel plate girder bridges. A critical issue, however, has been corrosion of the steel strand. While grouting has been the primary corrosion protection method for the strand, experience has shown that grouting presents its own problems and limitations that compromised the durability and service-life of bridges. As a result, unbonded post-tensioning has gained interest as it eliminates issues with grouting and allows for inspection as well as future strand replacement. The behavior and strength of structures constructed with unbonded post-tensioning, however, is not well understood, especially shear strength. Therefore, the objective of this research investigation is to evaluate the structural performance of prestressed girders containing unbonded tendons with a primary focus on shear strength. The scope of this phase of the research was to develop the means and methods to construct and test girder specimens with multiple design criteria and allow evaluation of multiple test variables. The research developed the materials and procedures to enable the large scale testing program to be developed. Finally, the procedures developed were verified through the construction of the initial set of test specimens and testing of the first shear specimen.