Post-tensioning tendons in segmental bridge construction are often only anchored within the deviator and pier segments. The effectiveness of the post-tensioning (PT) system is therefore dependent on proper functioning of the anchorages. On August 28, 2000 a routine inspection of the Mid-Bay Bridge (Okaloosa County, Florida) revealed corrosion in numerous PT tendons. Moreover, one of the 19-strand tendons was completely slacked, with later inspection revealing a corrosion-induced failure at the pier anchor location. Anchorage failure caused all PT force to transfer to the steel duct located within the pier segment that in turn slipped and caused the tendon to go completely slack. After the application of PT force, the anchorage assembly and steel pipes that house the tendon are filled with grout. These short grouted regions could, in the event of anchorage failure, provide a secondary anchorage mechanism preventing the scenario mentioned above from occurring. This paper presents the results of a full-scale experimental investigation on anchorage tendon pull-out and a finite element model to support the experimental results and interpretation. The study focuses on the length required to develop the in-service PT force within the pier segment grouted steel tube assembly. Seven, twelve, and nineteen 0.6” diameter strand tendons with various development lengths were considered. Recommendations for pier section pipe detailing and design will be discussed.

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The public is welcome to attend.