Surin Srapsiri 2014: Behavior of Anchorage Zone in Flanged Section PC Girder with Multiple Prestressing Forces. Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering. Thesis Advisor: Assistant Professor Songwut Hengprathanee, Ph.D. 153 pages.

This research investigates the behavior of anchorage zone in post-tensioned prestressed concrete girder with flanged section under the application of multiple prestressing forces with concentric and eccentric load configurations using finite element method. The focus of this research is to find the magnitude and the location of bursting force in the web and the flange of the girder. Parameters which are used in this research consist of the height of section (h_w), thickness of web (t_w), thickness of flange (t_f), width of flange (b_f), size of anchorage plate (a), distance between prestressing forces (2s), and eccentricity (e). The results from finite element analyses are compared to those from the AASHTO Standard Specifications (2007), the equations proposed by Hengprathanee (2004), and the application of Strut-and-Tie Model approach.

The results from this research show that the width of flange significantly affects the magnitude and the location of bursting force. For concentric load configuration, the behavior of bursting stress in anchorage zone depends on the distance between prestressing forces (2s). A distance which is used to specify the behavior of bursting stress can be presented as $2s' = 0.425h_w + 0.75a + 0.30h_w[(b_{f2}/b_{f1})-1]$. If $2s < 2s'$, bursting stress with highest value occurs in only one region. If $2s > 2s'$, bursting stress with highest value occur in more than one region near the applied forces.

The comparison of the finite element analysis results and other design methods presents that in the case of $2s < 2s'$, the equations proposed by Hengprathanee give the closest values to finite element results and in the case of $2s > 2s'$, the application of STM gives the closest values to finite element results. For eccentric load configuration, bursting stress within the web will contain a larger magnitude if the area under the anchor has a wider region.

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