

**AN ABSTRACT OF A THESIS**

**ASSESSMENT OF SIX SHEAR DESIGN METHODS FOR PRECAST  
PRESTRESSED CONCRETE BRIDGE BEAMS**

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Precast prestressed concrete bridge beams must be adequately designed to resist shear forces in order to be considered safe. The Tennessee Department of Transportation (TDOT) is currently monitoring approximately 71 bridges with precast prestressed concrete beams that contain one or more types of cracks. These include shear, flexural, longitudinal, and torsional cracks. Shear strength and shear cracks of precast prestressed concrete bridge beams are investigated in this thesis.

The objectives of this research are: (1) to assess the strengths and weaknesses of a new precast prestressed concrete bridge beam shear design method, the Wasserman Suggested Proposal; and (2) to assess, to a lesser degree, the strengths and weaknesses of five other precast prestressed concrete beam shear design methods. It is important to investigate whether the shear design is the problem that caused the beam cracking. Also, this research is necessary to assess the strengths and weaknesses of the six different shear design methods, especially the Wasserman Suggested Proposal.

In this study, an extensive literature review was conducted first for the research that has been done in this area. Three TDOT bridges containing shear cracks were selected, and the shear strengths of one or more sections in these three bridges were determined using six shear strength procedures. Then the calculated shear strengths were examined using a computer program named Response 2000. To further examine the newly proposed method, test data from other researchers was used to verify the Wasserman Suggested Proposal. Finally, the conclusions and recommendations were drawn from the study.

Based on this research, the Wasserman Suggested Proposal method offers the best balance of conservatism and economics among the six methods investigated. Therefore, the Wasserman Suggested Proposal appears to be an excellent shear design method.