

ABSTRACT

Post-tensioned concrete is a popular structural system in modern bridge design, allowing for longer bridge spans and the construction of curved, spliced, and segmental girders. When designed and constructed properly, post-tensioned concrete can offer improved durability over reinforced concrete as it is more resistant to cracking. However, corrosion of prestressing strands can compromise the integrity of post-tensioned construction. Grouting has been the primary method of providing corrosion protection to the prestressing strands. However, grouting of tendons presents numerous limitations and results in multiple problems in practice. As a result, there has been increased interest in the use of unbonded tendons. Corrosion protection can still be achieved in unbonded tendons through the use of flexible fillers such as grease and microcrystalline wax. Limited research has been conducted on unbonded tendons, and no known research exists regarding the behavior of unbonded tendons subject to torsion. The objective of this research was to investigate the torsional behavior and strength of unbonded post-tensioned bridge girders. The scope of work included testing six specimens to investigate the difference in behavior between bonded and unbonded tendons as well as the influence of internal versus external ducts. The influence of transverse reinforcement was also considered.