

**Title** Development of Procedure for Improving the Design of Pre-stressed Concrete Poles Using Confinement

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### **Abstract**

With rapid increase in the need for spun pre-stressed concrete poles to use in the electric power transmission lines, telephone and telegraph lines, and overhead power transmission lines for railroad, the qualified spun pre-stressed concrete poles are needed. Pre-stressed spun concrete poles are mainly used for supporting electric power transmission lines, power distribution lines and for area lighting. The poles that are improved by developing the procedure used in the design process can provide the desired structural characteristics for high strength pre-stressed concrete poles. This research work presents an approach to improve the flexural behavior of spun prestressed concrete poles by developing the design procedure. The flexural behavior of the poles was evaluated in terms of the load versus deflection curves, cracking moment, ultimate moment capacities. Primary design equations to estimate these terms were developed based on the equations available in the literature, and the design guidelines for concrete poles. Prototype specimens were manufactured and tested to verify the proposed equations. Pole Designer Software was conducted to increase understanding of the behavior of these poles under loading. The specimens were modeled using the Pole Designer Software and the results were compared with the test results. The results of this study provide a basic to develop the design procedure for upgrade design of the prestressed concrete poles.

**Keywords** Spun pre-stressed concrete pole, optimized design, flexural full-scale bending testing, structural response of the poles, cracking moment, ultimate moment, crack width, deflection, confinement effect, steel stirrup.