

ABSTRACT

De Schepper, Allen M. M.S.C.E., Purdue University, December 2011. An Investigation of Wind-Induced Loading Cycles on High-Mast Lighting Towers . Major Professor: Robert J. Connor.

This master's thesis documents and presents the results of research into cyclical, wind-induced loads on high-mast light towers (HMLTs). Field and laboratory tests were performed to investigate the effects of wind gusts (i.e., buffeting), vortex shedding, and their associated dynamic oscillations. A long-term field monitoring study gathered wind and strain gage data from eleven different HMLTs over the course of two years. Fourteen additional HMLTs were pluck tested to gather dynamic data. Results obtained from the field tests lead to the development of rational design criteria to be used for the fatigue design of HMLTs. The concept of a combined wind effect, which accounts for the effects of a variety of wind-induced loads, is presented for fatigue design.