

Fatigue Cracking and Inspection of High-mast Lighting Towers

Introduction and Background

Recent failures of high-mast lighting towers in several states have raised questions as to the robustness and safety of the existing inventory of similar structures. Failure of these structures is very critical as they are typically located adjacent to Interstates or other high-speed highways. The potential exists for these fracture-critical structures to fall across multiple traffic lanes or adjacent property. Forensic studies have revealed that fatigue is the cause of most of the failures, either at the base plate-to-column weld, at the handhole detail, or of anchor rods. The loading which produces cyclic stresses is a combination of natural wind gusts and vortex shedding. The latter is a phenomenon which can produce a significant number of large stress-range cycles in a short amount of time under relatively low wind speed. Corrosion of the tube wall and the resulting section loss has also been identified as the cause for other failures and has led to the preemptive removal of heavily corroded structures. Field inspection conducted by some owners has also revealed that loose base plate leveling and/or top nuts are quite common, most likely due to a lack of comprehensive construction specifications. Believed to be the first of its kind, a long-term in-depth field experimental and analytical study on the behavior and dynamic response of these structures is currently being conducted in the state of Iowa. This paper will report on the initial results of the Iowa study and provide suggested strategies for inspection and maintenance of these fracture critical structures. Discussion on preliminary design, detailing, and construction guidelines will also be included



- Sponsor – Iowa DOT
- Student – Greg Callahan

