

# HIGH MAST LIGHTING TOWER INSPECTIONS REVEAL HAZARDOUS CONDITIONS



**BACKGROUND:** On November 12, 2003, a 140-foot high mast lighting tower collapsed near Sioux City, Iowa, during a windstorm. At the time of collapse, wind speeds were reported at 37 mph with gusts up to 56 mph. The collapsed high mast lighting tower was a 12-sided, galvanized steel shell, attached to the base by a socket type connection. The socket connection fit the tower shell into a hole in the base plate. Two circumferential fillet welds connected the tower shell to the plate. One weld was on the top of the base plate, and the other between the end of the shell and the side of the hole in the plate. The fracture occurred in the shell at the upper toe of the top fillet weld. After further investigation, cracks were found at each of the 12 bend points on the top circumferential fillet weld of the tower shell. During the windstorm, the entire cross section fractured causing the high mast lighting tower to fall.

The Iowa Department of Transportation (DOT) recently removed 19 cracked high mast lighting towers from service after one high mast lighting tower fell due to a crack near the base plate weld. In order to ensure the safety of the public, the Iowa DOT contacted Collins Engineers, Inc. to perform a comprehensive inspection of 226 structures before Christmas and the winter snowstorms. Within one day, Collins submitted a customized inspection plan, written procedures for nondestructive testing (NDT), a staffing schedule, and cost-conscious options to complete this massive task in a very short time frame.

Fortunately, Collins was on retainer from an earlier sign structure inspection project, thereby allowing the Iowa DOT to process a work-order to Collins within one week. Collins utilized multiple inspection teams and completed the inspection of all 226 structures in one week. Collins' field team consisted of experienced professional engineers, certified weld inspectors, and in-house NDT Level II and Level III technicians. The depth of staffing and the Iowa DOT's element-based database enabled deployment of inspection teams in prioritized regions to document specific conditions with minimal paperwork.

There were a total of 20 galvanized high mast lighting towers of similar construction and age located in Sioux City. These high mast lighting towers were erected in 2000 or later. Twelve out of the 20 towers exhibited significant cracking in the same location as the tower that failed. As a precautionary measure, the DOT decided to take down all 20 towers.

The Collins team provided the Iowa DOT with a cost-conscious approach while ensuring effective communication. The Iowa DOT was contacted immediately after finding cracked towers and was kept informed daily of the inspection schedule and progress.

Collins' responsiveness and ability to follow the DOT's wishes resulted in a successful end to a serious issue. Over the last 10 years, Collins has successfully demonstrated the ability to submit inspection reports ahead of schedule, provide sign structure and high mast analysis, and produce multiple PS&E repair plans of the highest quality in record time.

## COLLINS ENGINEERS INC.