

IART-050
Review and Development of Design Criteria for Signal Structure Base Plates

Robert Connor
Research Engineer, ATLSS Center, Lehigh University, Bethlehem, PA

Industry Participants
Edwards and Kelcey, Inc., City of Philadelphia Dept. of Streets

Abstract

This project involves the review, development and laboratory testing of base plates used in cantilevered mast-arm sign and signal structures. Current design practice is based on geometry of the base plate and locations of the anchor rods. The thickness of these plates is commonly determined base on engineering judgment and “rules of thumb”. However, base plates are typically assumed to be fully rigid when design anchor rods and the members to which they are attached.

Research on the behavior of mast arm structures currently in underway conducted at Lehigh University has revealed that significant prying and bending of anchor rods can occur due to base plate flexibility. In addition, bending or warping of base plates alters the stress field in the connected member, especially at the connection to the base plate. This results in stress range cycles which are larger than predicted assumed a rigid base plate. The problem is more apparent in four bolt anchor rod details, which are by far the most common in service today. The research is sponsored by the City of Philadelphia.