Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois/62764

June 8, 1993

Corrosion of Traffic Signal Mast Arms

COUNTY ENGINEERS/SUPERINTENDENT OF HIGHWAYS
MUNICIPAL ENGINEERS/DIRECTORS OF PUBLIC WORKS
CONSULTING ENGINEERS

#93-13

In December 1992, a traffic signal mast arm assembly owned by a northwestern Illinois city fell after being hit by a truck. An investigation following the accident revealed extensive corrosion and section loss had occurred in the vertical pole near its base. The column was a tapered octagonal painted steel type manufactured by Millerbernd and had been in service for approximately 20 years.

As a result of this failure, the department is conducting an evaluation of similar poles in the same city to determine the extent of the corrosion problem. To date, 31 mast arm assemblies have been inspected with seven showing perforation in the base area and four having a section loss of 25 percent or greater without perforations present. The perforations and significant section loss observed are occurring in the bottom 2 inches of the pole just above the weld to the base plate. The problem appears to be aggravated by the grout bed under the base which internally collects debris and moisture and prevents effective ventilation of the pole. Local agencies with steel pole plates on grout beds should develop a program to vent poles by removing the majority of the grout and installing a perimeter stainless steel mesh to exclude rodents.

We recommend that local agencies identify all painted steel mast arm poles that are over 10 years old and perform inspections to determine the extent of corrosion loss and presence of any defects (cracks, impact damage, etc.) that would affect adequacy or longevity. These inspections should consist of the following three steps:

1. Visual - Check for perforations or severe corrosion on the column in the splash zone area, vehicle damage cracks in welds, concrete/grout deterioration, anchor bolt/nut condition, and pole interior condition if handholes allow access.

2. Sounding - Use a hammer to sound unperforated poles in the splash zone area, especially near the weld connections. A welder's chipping hammer with round edges or a small ball peen hammer should be used. This will help prevent causing any nicks or dents on the pole which would develop stress risers.

3. Ultrasonic - Use a hand-held ultrasonic thickness gauge to determine variations in the poles' thickness. The equipment being used by the department is a DM-2 made by Krautkramer-Branson.

Any significant corrosion loss or structural defects should be corrected immediately. If you have questions about these procedures or about specific field situations, please contact Rich Mochel, Local Bridge Engineer, at (217)782-5928.

Very truly yours,

Bill Sunley

William T. Sunley, P.E.
Engineer of Local
Roads and Streets

cc-
District Engineers