

SPUN-CONCRETE LIGHT POLES,
I 96 AND I 296 KENT COUNTY

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MICHIGAN DEPARTMENT OF STATE HIGHWAYS

SPUN-CONCRETE LIGHT POLES,
I 96 AND I 296 KENT COUNTY

F. Copple

Research Laboratory Section
Testing and Research Division
Research Project 70 TI-7
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Department of State Highways
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SPUN-CONCRETE LIGHT POLES,
I 96 AND I 296 KENT COUNTY

In response to a letter from P. J. Marek, Engineer of Maintenance, an inspection was made on March 4, 1970, of spun-concrete light poles in the Grand Rapids area. This report is to add further information to the verbal report made to P. Milliman and L. T. Oehler after the inspection.

Several spun-concrete light poles were found to be in a seriously deteriorated condition, apparently as a result of exposure to ice-control chemicals (Fig. 1). Two of the poles are known to have fallen during the past few weeks. Figure 2 shows a fallen pole located near the I 96 and US 131 intersection.

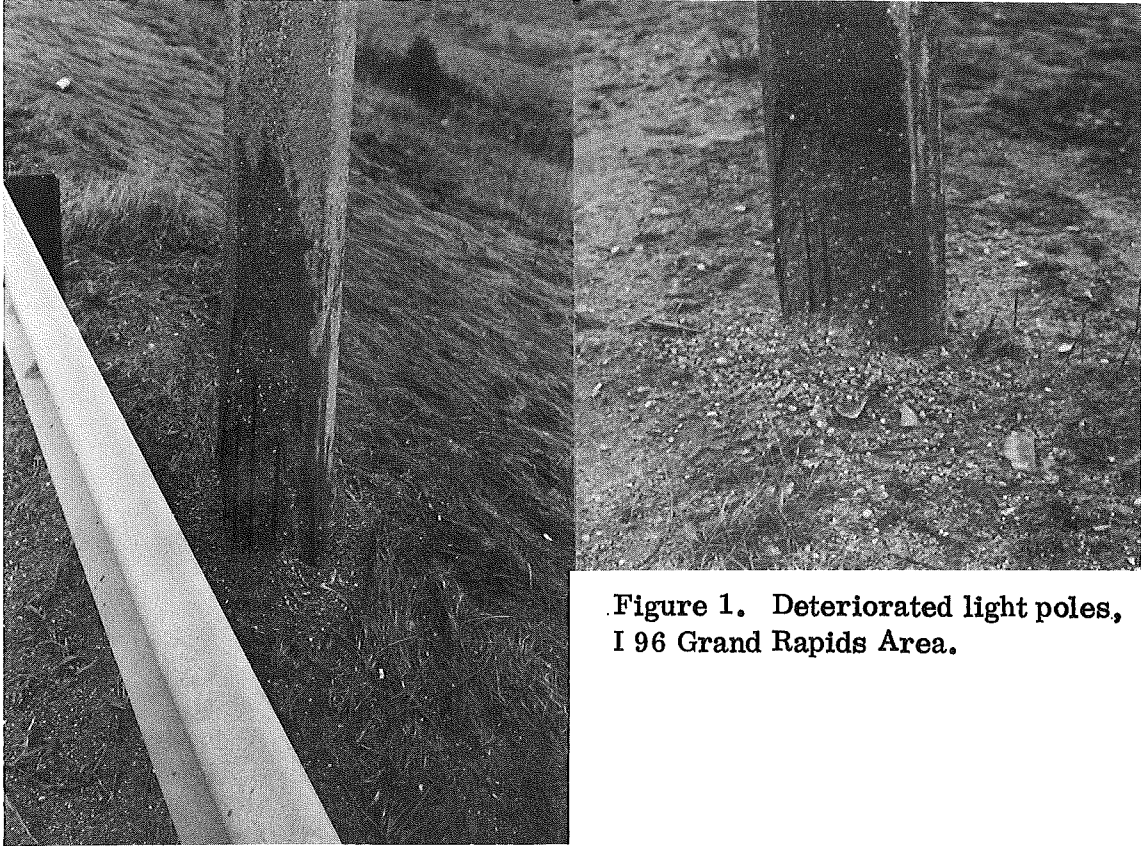
Laboratory examination of concrete samples from the pole showed several particles of deleterious aggregate which contributed to accelerated deterioration. The surface of the poles had been polished or etched; a process which removes the protective "skin" from the concrete and makes it more susceptible to deterioration by environmental action (Fig. 3). Also, there appeared to be no air entrainment in the concrete to resist freeze-thaw action. To make the situation even worse, the mortar appeared to be of poor quality (probably high water-cement ratio) as evidenced by the large number of aggregate particles that pulled out of the mass when it was being sawed and polished for observation under the microscope.

As indicated in a February 23 letter from R. J. Hogeboom, District Maintenance Engineer, to J. F. Oravec, Maintenance Operations Engineer, approximately 50 concrete light poles on I 96 and I 296 in the greater Grand Rapids area are deteriorated to some degree. Our brief inspection revealed several poles where over half a wall thickness had been consumed in the lower portion of the pole facing the highway. This is a very dangerous situation for the following reasons: 1) the light bracket causes compressive stress in the pole on the street-side where the concrete is deteriorated and least able to resist compression, 2) the pole is pre-stressed which adds compressive stress to the concrete, and 3) the light bracket creates a moment in the pole which causes it to fall into the highway should a failure occur. As the photographs show, some poles are deteriorated to the point where failure is imminent.

A different type of hazard was noted on several poles where missing cover plates permitted easy access into the wiring hand hole where the danger of electrical shock exists (Fig. 4).

It is recommended that an inspection of all concrete lightpoles be made immediately and any that are badly deteriorated be taken down immediately or, at the very least, their light brackets removed immediately to reduce the compressive stress in the pole. Further, an annual or biannual inspection of all concrete poles should be made to detect those which deteriorate in the future.

A final recommendation is that concrete light poles not be permitted on future projects unless improved specifications are developed.



**Figure 1. Deteriorated light poles,
I 96 Grand Rapids Area.**

**Figure 2. Fallen light pole I 96 near
Intersection with US 131. Note dent
in top of guardrail where pole fell
onto pavement.**





Figure 3. Typical ground polished or etched finish on light pole.

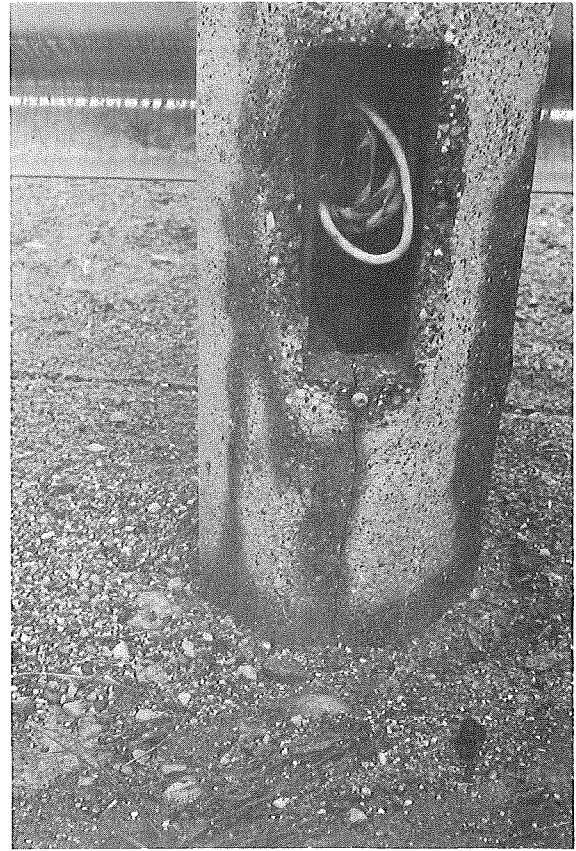


Figure 4. Wiring hand hole with missing cover plate. Note vertical cracks in pole typical of those where side facing street has deteriorated.