OFFICE MEMORANDUM

MICHIGAN

DEPARTMENT OF STATE HIGHWAYS

February 20, 1976

To: L. T. Oehler
Engineer of Research

From: A. J. Permoda

Subject: Feasibility Study to Convert Regular-Dry Traffic Paint Applicator to Fast-Dry Use. Research Project 74 TI-255, Research Report No. R-989.

The intent of this study was to determine the feasibility of adding a simple heater to the Laboratory's regular-dry traffic paint applicator to convert it to application of fast-dry paints in the Department's annual performance tests.

Since all of the traffic paint purchased by the Department for roadway striping was of the fast-dry type starting in 1975, as was the bulk of it during several prior years, the annual performance tests have been conducted exclusively on fast-dry paints starting in 1971. The applicator for our earliest fast-dry paint tests was the standard truck-mounted roadway striping equipment, though for the subject tests the applicator was a Grayco, portable, airless, hot-spray equipment which Traffic and Safety personnel fortuitously picked up from a Right-of-Way acquisition (Research Report R-798).

That equipment has performed reasonably well, but has several disadvantages.

1) The airless spray gun differs from the air-type (Binks #21) used on roadway striping equipment, and

2) It does not accurately meter the paint and beads, as did the Laboratory's regular-dry test applicator.

To correct these deficiencies, and to improve application of the test paints to enable reinstitution of the Quality Preference Factor in the rating-bid price evaluation of these paints, we requested and obtained approval to conduct the subject exploratory study.

Our choice for the experimental heater was a 52-in. length of 5/8-in. ID flexible copper tubing fashioned to fit between the paint cylinder and the spray gun of the applicator. The tubing was wrapped with a 96-in. length (1-in. wide) of flexible heating tape, designed for 110 v.a.c. current and delivering 768 watts. A layer of aluminum backed wrap-around insulation minimized heat loss from the heater. A dial thermometer screwed into a

T-coupling in the tubing provided temperature sensing. The attached heater unit is shown in Figure 1.

The length and diameter of the heater tubing was chosen because it contained roughly enough paint for one test transverse stripe (15 mils x 4-in. x 23-ft). In operation, the heater was filled with paint from the cylinder and then the heating element was turned on. Within three minutes, the dial thermometer indicated 165 F, making the paint ready for application.

Our test applications with the unit did not yield consistently acceptable results. We have analyzed the inconsistencies as stemming from the following factors:

1) The dial thermometer did not give the true temperature of the paint, since it was also affected by the heated heater wall.

2) The paint in the heater must have varied in temperature from hot at the heater wall to cooler at the core. This produced undesirable variability of atomization of paint from the spray gun. We suspected this might happen, but knew that smaller diameter heater tubing would require greater pressure to effect paint flow, and the Laboratory applicator was not designed for high pressure development.

3) Paint, confined in the heater while undergoing heating, developed a vapor pressure from the thinners which varied with the formulation. This vapor pressure was superimposed on the cylinder pressure thereby affecting flow from the spray gun which prevented accurate metering of paint from the unit. This possibility was not foreseen when designing the experimental heater.

4) The bead dispenser on the Laboratory applicator does accurately meter the bead complement by the drop-on method for regular-dry paints. This, however, develops inadequate impact force to yield desirable bead embedment for the fast-dry paints. We suspected this, but expended almost no effort towards a suitable modification, realizing it would be redundant unless the heater was operational.

Conclusions

The tested, simple, addition type heater to the Laboratory traffic paint applicator did not meet project objectives in providing good applicability and accurately metering out fast-dry paints for road evaluation in the annual performance tests. Therefore, we recommend that this approach to the problem be dropped.

We now suspect that a circulating combination heater unit would be required to provide desirable fast-dry paint applicability and temperature sensing, but such a unit loses accurate metering of the paint. A fast-dry applica-

tor of this type is procurable as a parking-lot striper, but it is expensive and bulky and appears to provide no significant advantages over the applicator currently being used by the Department in applying fast-dry paint samples in the annual performance tests.

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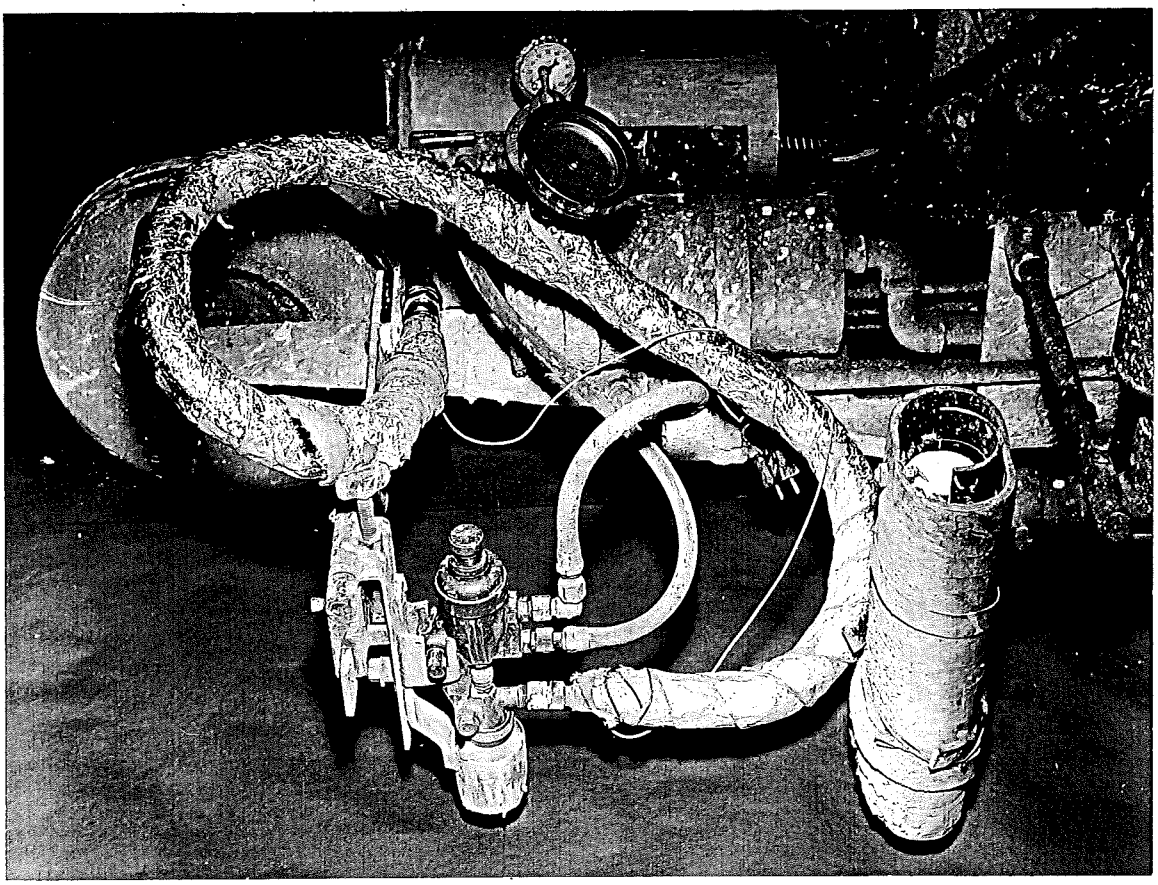

Figure 1. Test electric heater, installed between paint cylinder and spray-gun, replaces hose connector on Laboratory regular-dry traffic paint applicator.