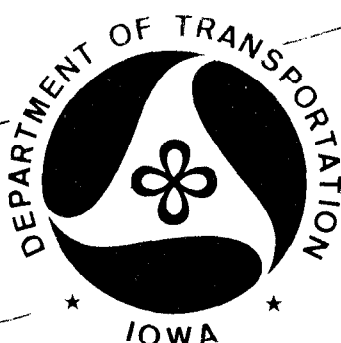


AN EVALUATION OF AN

EPOXY PAVEMENT MARKING SYSTEM



HIGHWAY DIVISION
OFFICE OF MATERIALS
OFFICE OF MAINTENANCE

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IOWA HIGHWAY RESEARCH BOARD
FINAL REPORT HR-180

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PROJECT HR-180

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AN EVALUATION OF AN EPOXY PAVEMENT MARKING SYSTEM

Purpose and Objectives

The purpose of this research project is to determine if (1) epoxy lane markings will last an entire winter season without replacement, (2) epoxy lane marking is an economical alternative to standard paint on high-traffic multi-lane roadways where lane changing is frequent, and (3) there are worthwhile benefits derived from thorough cleaning of the pavement surface before painting.

Conclusions

The success of epoxy lane marking depends on the success of the equipment with which it is mixed and applied. The epoxy lane marking material, if properly mixed and placed on a clean surface, has the durability required to withstand a high traffic volume and frequent lane changes for at least one year.

All old paint, oil and road film must be removed from the pavement surface so that the epoxy will adhere to the surface.

Recommendation

The original test application was not completed because of equipment failure. It is recommended that further research be conducted using updated equipment for surface cleaning and epoxy paint application.

Introduction

It has been evident over the past years that it is difficult to maintain pavement markings on moderately to heavily traveled highways, especially on urban sections where there is a high frequency of lane changes.

Experience has shown that even though lane markings are replaced as many as three times a year on the MacVicar Freeway (I-235) in Des Moines, there are sections where the lane markings are worn off before the end of the winter season. The frequent application of lane markings on this highly traveled multi-lane freeway has proven to be expensive. The lane markings cannot be replaced during the winter, therefore, the loss of lane markings creates potential traffic hazards.

In view of the above observations and as a result of a presentation made before the Offices of Traffic Engineering, Research, Materials, and Maintenance of the Highway Division, Department of Transportation by representatives of the H. B. Fuller Company, it was decided that a trial application of a two component epoxy paint manufactured by the H. B. Fuller Company would be made.

Field Trial Location

The intended test site was the MacVicar Freeway (I-235) in Des Moines (Figure 1). The site was to include the westbound lanes from the Easton Blvd. exit to the Second Avenue exit and one

eastbound lane line from Second Avenue to East Fourteenth Street. A total of 13,300 ft. of epoxy paint was to be applied.

The 1976 ADT count for the test site ranged from 48,000 to 58,400 vehicles per day (both directions).

Surface Preparation

The intended epoxy paint application was for both cleaned and uncleaned areas.

Two sandblasting units removed the worn paint line and road film. The sandblasting was done by Puckett Sandblasting Service of Des Moines. To avoid the heavy daytime traffic, all operations were carried out at night. Surface cleaning began the night of May 4 and was completed the night of May 6, 1976 on the westbound lanes. Traffic control was by Iowa DOT maintenance personnel.

Equipment and Application

The epoxy paint was applied by equipment mounted on a standard truck body (Figure 2). Again the operation was carried out at night and DOT maintenance personnel provided traffic control.

The two epoxy components were pumped to a gun and were mixed just prior to spraying on the surface. Glass beads were flooded over the fresh epoxy paint for reflectivity.

Epoxy paint was applied on the westbound lanes May 7, 1976

between midnight and 6:30 a.m. at which time equipment malfunction was encountered.

One lane line from the Easton Blvd. entrance ramp to the Second Avenue exit ramp and another from the same entrance ramp to the University Avenue exit ramp were painted without incident.

During the painting of the lane line from the University Avenue entrance ramp to the Des Moines River bridge near Second Avenue, the material solidified in the gun and a hose, consequently only one component was delivered to the pavement. The portion of the line from the East Fifteenth Street overpass to the river bridge immediately turned black. The black material did not harden immediately and was tracked over the pavement surface by traffic.

The H. B. Fuller Company representative said that several days would be required to remove the material from the gun and to rebuild the equipment, therefore, no more epoxy paint was applied. The remaining areas intended to be painted with epoxy paint were painted by the Iowa DOT with standard traffic paint.

Evaluation

There appeared to be some irregularities in the width of the epoxy paint lines. Also, observation revealed that some of the lines painted before the University Avenue--Des Moines River

bridge line may not have had proper proportions of the two components indicating that the equipment may have been malfunctioning prior to actual failure.

One year after application, the major portion of the Easton Blvd--Second Avenue line and random portions of other lane lines were judged to be in "good" condition. After two years, the same lines were in "fair" condition. All of the stripes so rated were placed on a cleaned area. It was difficult to maintain perfect alignment on a curve. As a result, some stripes were placed on an uncleaned area. Also, a stripe would occasionally begin prior to, or run past, the cleaned area. Any stripe, or portion thereof, that was placed on the uncleaned surface could be lifted with a knife blade.

Discussion of Results

The first objective, to determine if epoxy lane markings will last an entire winter season was met. Based on the amount of epoxy lane markings deemed acceptable, epoxy paint will last an entire winter and possibly two winters on MacVicar Freeway.

The second objective, to determine if epoxy paint is an economical alternative to standard traffic paint on high traffic multi-lane roadways where lane changing is frequent could not be decided as the planned lane marking could not be completed because of equipment failure.

The third objective, to determine if there are worthwhile benefits to be derived from cleaning the pavement was met. Although the planned application on an uncleaned area was not done, it could be determined from those stripes on a curve where the epoxy paint missed the cleaned area and where the end of the stripe overran the cleaned area that the pavement must be cleaned before applying epoxy paint. If the pavement is not cleaned, the accumulated road film will prevent adherence.

Sandblasting is a slow and expensive process for cleaning the pavement surface. Since the epoxy paint was applied on I-235, a waterblast cleaning method has been developed. The cleaning equipment is mounted on the same truck as the painting equipment and operates immediately ahead of the paint gun. A specially designed truck has been constructed and became available for use during the 1978 season.

The H. B. Fuller Company had agreed to return and replace 8100 lineal feet of dashed white lines (2025 lineal feet of paint) without additional cost. This replacement was originally scheduled for 1977, but equipment problems prevented application. Replacement was rescheduled for 1978, but again was not provided due to time restrictions of Century Fence Company (presently making application of H. B. Fuller traffic paint) in completing other contractual agreements. At this time, replacement has not been scheduled.

Acknowledgments

Edward Thornton, Maintenance Area Supervisor at West Des Moines, and crew worked nights measuring and marking the exact locations for cleaning and painting. They also furnished traffic control, protecting the people working on the roadway. Their cooperation and assistance to the project were very much appreciated.

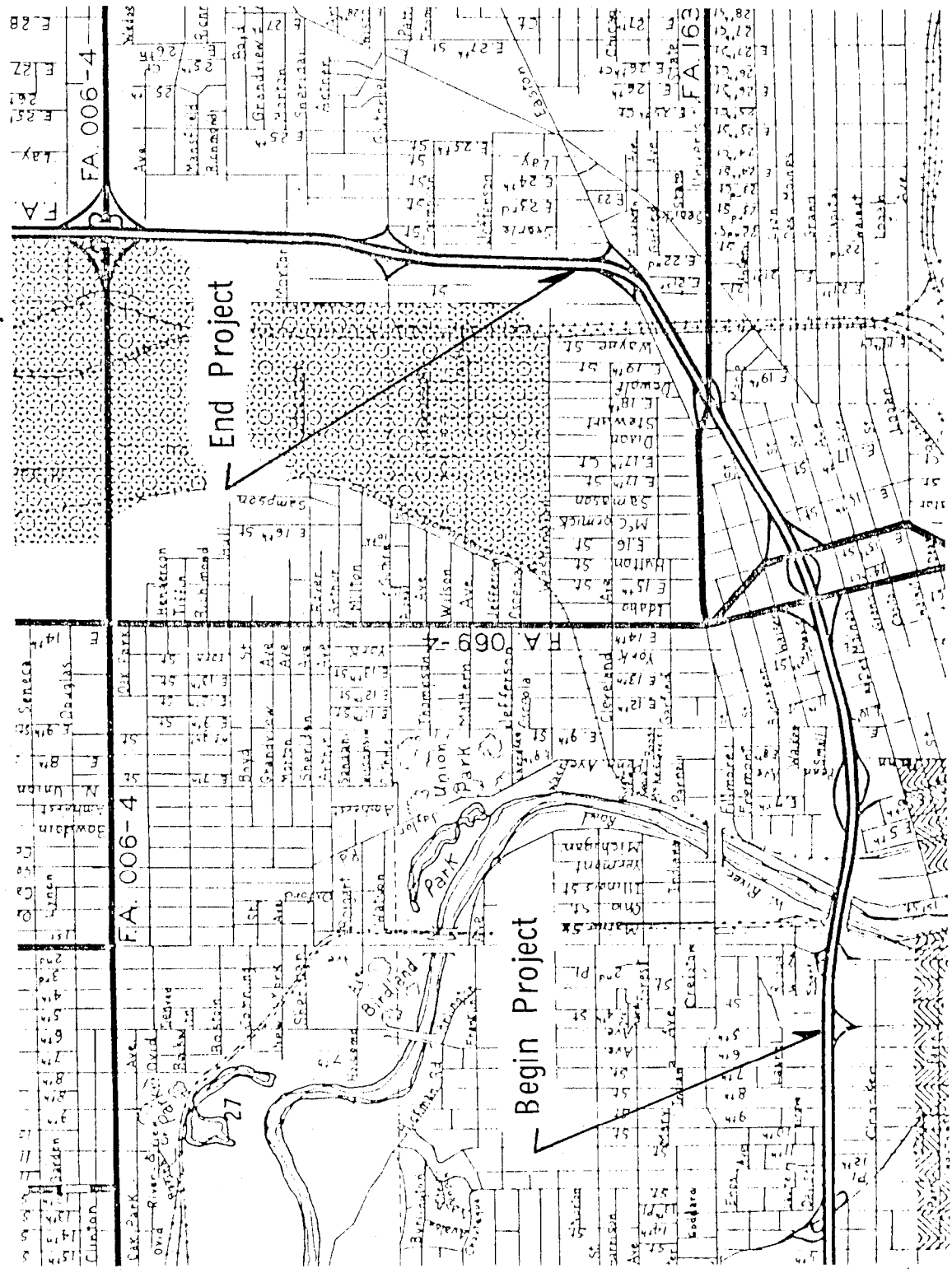


Figure 1 Project Location Map

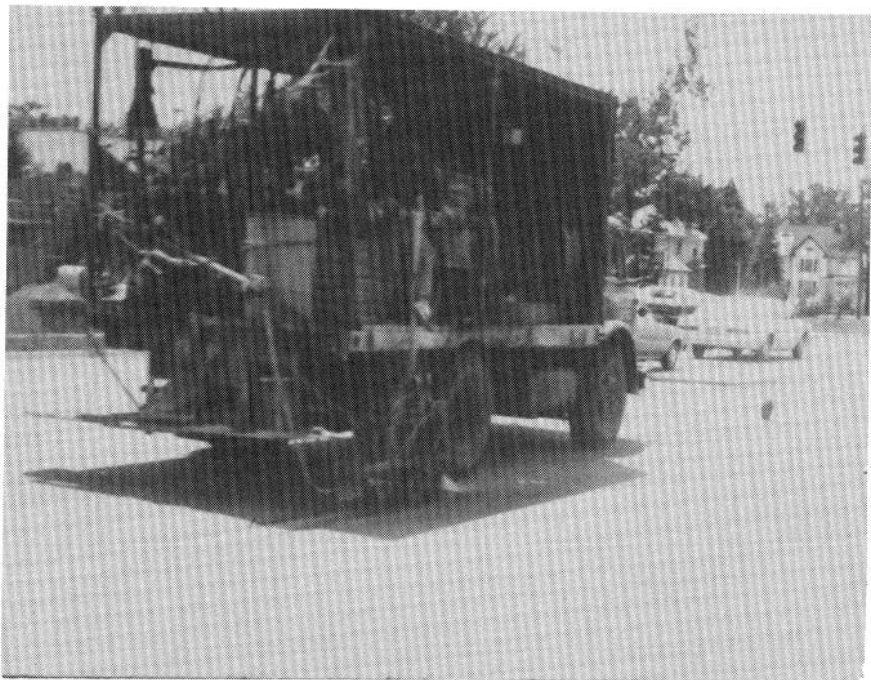


Figure 2: Truck and equipment for applying epoxy paint lines