

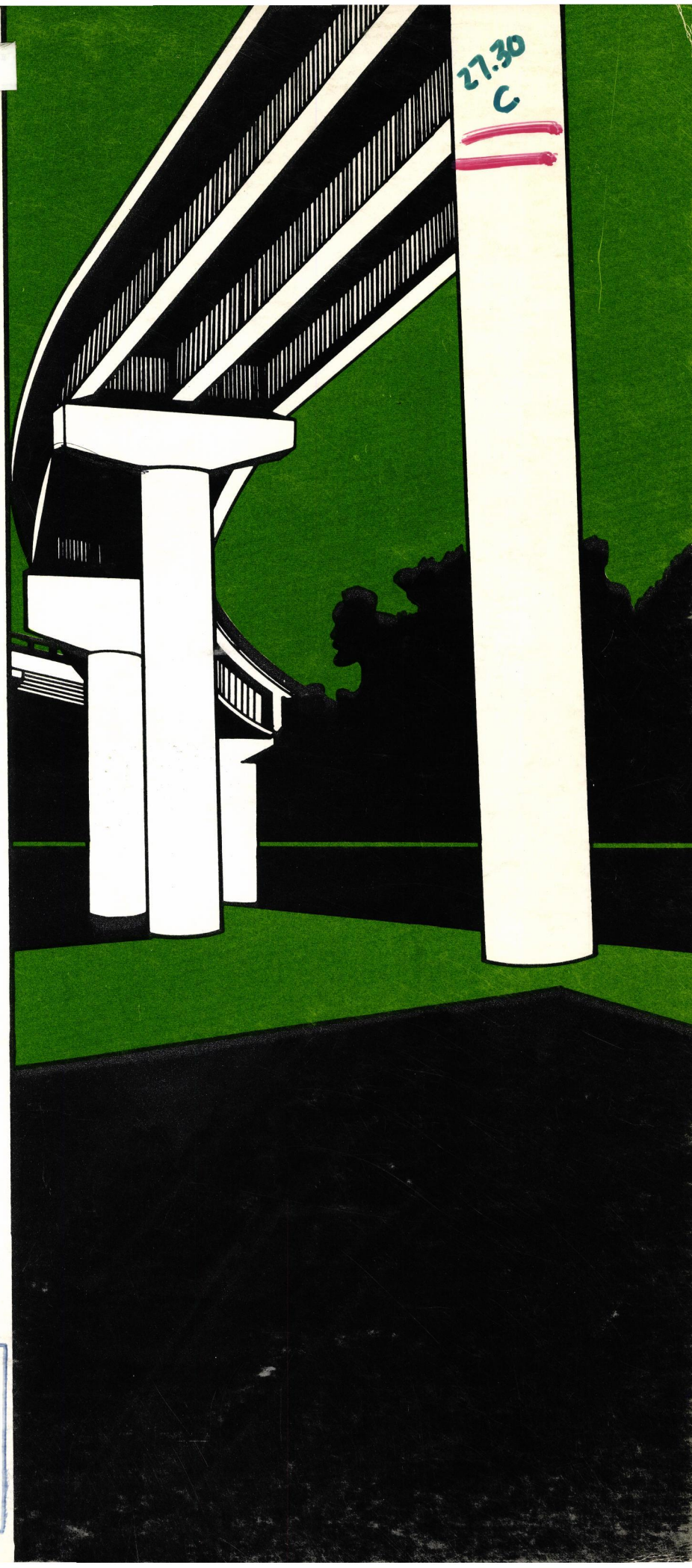
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Causes Of Bridge Pier Staining

Sam I. Thornton
Charles Springer
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16. Abstract Four types of bridge stains exist in Arkansas: Rust stains – those stains directly traceable to rust; Red Stains – broad stains which are not directly traceable to rust; Gray stains – similar to red stains except for color; and graffiti. Except for graffiti, bridge stains are the result of weathering and runoff from the bridge deck. The stains contain the elements normally found in soil, rust, and tires. Bridge stains in Arkansas cause no significant structural damage, i.e., they do not accompany a deterioration of aggregate. Red and gray stains, which comprise over three-fourths of all stain on most bridges, can be effectively removed by sandblasting, washing with soap, water and a brush, or application of certain acids then rinsing. Stains on new structures can be greatly reduced by eliminating or sealing expansion joints above bridge piers.			
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CAUSES OF BRIDGE PIER STAINING

by
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Charles Springer

FINAL REPORT
HIGHWAY RESEARCH PROJECT 33

conducted for
The Arkansas State Highway Department
in cooperation with
The U.S. Department of Transportation
Federal Highway Administration

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Arkansas State Highway Department or the Federal Highway Administration.

FEBRUARY, 1974

ABSTRACT

Four types of bridge stains exist in Arkansas: Rust stains – those stains directly traceable to rust; Red stains – broad stains which are not directly traceable to rust; Gray stains – similar to red stains except for color; and graffiti.

Except for graffiti, bridge stains are the result of weathering and runoff from the bridge deck. The stains contain the elements normally found in soil, rust, and tires. Bridge stains in Arkansas cause no significant structural damage, i.e., they do not accompany a deterioration of aggregate.

Red and gray stains, which comprise over three-fourths of all stain on most bridges, can be effectively removed by sandblasting, washing with soap, water and a brush, or application of certain acids then rinsing.

Stains on new structures can be greatly reduced by eliminating or sealing expansion joints above bridge piers.

GAINS, FINDINGS, AND CONCLUSIONS

This study shows that most bridge stains are a result of weathering and storm runoff from the bridge deck. Stains, other than graffiti, are composed of the elements which make up road grime, i.e., soil, rubber and rust. Due to their superficial nature, stains cause no significant structural damage to the bridge piers.

Stains on new structures can be greatly reduced by eliminating or sealing the expansion joints above bridge piers. By eliminating runoff, stains (except for graffiti) will be stopped at their sources.

Ninety to ninety-five percent of bridge stains can be removed. Rust stains, however, can only be removed by a time consuming and costly chemical procedure. Graffiti, and sometimes rust stains, can be removed by sandblasting. Sandblasting has the disadvantage of removing part of the concrete matrix. Red and gray stains, which comprise over three-fourths of the stains on most bridges, can be removed by washing with soap, water and a brush, sandblasting, or application of certain acids then rinsing.

IMPLEMENTATION STATEMENT

Bridge pier stains can be effectively prevented by eliminating runoff from the bridge deck to the concrete below. Use of continuous span bridges, placing expansion joints away from the bridge piers, or sealing the joint with the new compressible joint sealers, angle trough drains, or neoprene belt type troughs. New bridge structures should incorporate methods to eliminate runoff over the concrete substructure.

Stains from existing structures can, for the most part, be removed by cleaning. Cleaning will not prevent the stains from recurring, however, unless a method is found to eliminate discharge through the existing expansion joints. For this reason, and because the costs and effectiveness of a regular cleaning program are not known, a pilot bridge cleaning program should be initiated. Information from the pilot study can be used to determine the frequency of a routine cleaning program.

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