BRIDGE DECK EXPANSION ASSEMBLY ON JEFFERSON STREET IN OTTUMWA

Final Report for Iowa DOT Project HR-505C

Federal Highway Administration Project No. IA-82-01

November 1990

Highway Division
Iowa Department of Transportation

Final Report
for
Iowa Department of Transportation
Project HR-505C

Federal Highway Administration
Project IA-82-01

Bridge Deck Expansion Assembly on Jefferson Street in Ottumwa

by
Vernon J. Marks
Research Engineer
515-239-1447
Office of Materials
Highway Division
Iowa Department of Transportation
Ames, Iowa 50010

November 1990

TABLE OF CONTENTS

DISCLAIMER

INTRODUCTION

In general, Iowa bridges have demonstrated outstanding longevity and quite often have become functionally obsolete before they deteriorate to a condition requiring rehabilitation. Past designs of longer bridges have included expansion joints to accommodate the thermal lengthening and shortening of the bridge deck. Fifteen years ago most of these expansion joints were open finger joints allowing surface water to pass through them. The winter deicing salts produced chloride brine which when allowed to pass through the open expansion joints caused rapid failure of the protective paint and resulted in substantial corrosion of the structural steel.

In an effort to prevent the deicing salt brine from causing corrosion of the structural steel, designs were changed to require sealed expansion joints. For shorter bridges this was a simple impervious membrane fastened to both sides of the expansion joint. For longer bridges, an elaborate, very expensive sealed expansion assembly is necessary to accommodate the larger movements.

OBJECTIVE

The objective of this research was to evaluate two experimental D. S. Brown, Type SL450 and one D. S. Brown, Type SL750 expansion assemblies to identify possible construction problems and to determine the long term performances.

LOCATION

The three experimental joints were constructed on Wapello County project M-5401(1). This bridge deck is the Jefferson Street viaduct over the railroad tracks and the Des Moines River from Main Street to Cook Avenue in the City of Ottumwa.

CONSTRUCTION

The bridge was opened to traffic in August 1983. The two Type SL450 assemblies were installed at piers 3A and 9. The SL750 assembly was installed near the middle of the bridge deck at pier 4. There were no problems during construction. The quality of construction appeared to be excellent.

EVALUATION

The experimental joints were visually reviewed annually to determine if they would:

1. Prevent leakage.
2. Reject debris and dirt.
3. Maintain grade and alignment.
4. Provide a relatively quiet installation under traffic wheel impacts.
5. Resist damage from snowplows and snow removal activities.

JOINT PERFORMANCE

The joints were first evaluated in November 1983 and then annually through 1990. There has been only one time (in 1987) during a rain when there appeared to be leakage at the east

end of the middle seal. Other than that, there has been no dampness indicating leakage. By 1990, there was minor rusting of the structural steel near each of the joint assemblies with little or no evidence of rusting 15 feet away from the expansion assembly. This would indicate that there may be a very small, slow seepage type leakage that has allowed some deicing chlorides to come through the joint.

Some debris is usually in the joints, but all three joints are effective in rejecting debris and dirt.

It appears that during construction these joints were installed about 1/2 inch beneath the deck concrete surface. This results in substantial noise from traffic wheel impacts. There has been no change in grade or alignment since construction.

There is some snowplow damage of the joint assemblies.

CONCLUSIONS

This research on bridge deck expansion assemblies supports the following conclusions:

1. There were no construction problems during installation of the joints.
2. In general, the joint assemblies have performed well with no breakage or structural failure of the joint assembly.
3. There is minor rusting in the area of the joints indicating that there may be slow leakage at all three joints.