exposure to contaminants.

5. Should the slab ultimately require replacement, the added beams will be beneficial to the new slab.

6. The cost of this project was high, 61% over the Engineer's estimate. This was probably due to the experimental nature of the project and the critical shortage of steel at the time of bidding and future costs should be lower.

It recommended that this method of repair be considered when no suitable means of detouring traffic is available and removing and replacing a slab would cause severe traffic congestion and inconvenience to the travelling public.

A copy of the full report of findings may be obtained by addressing your requests as follows:

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P. O. Box 5051
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SUMMARY REPORT 219-1(S)

EVALUATION OF BRIDGE SLAB STRENGTHENING SYSTEM

SUMMARY REPORT
of
Research Report 219-1(F)
Study 1-5-75-219

Cooperative Research Study of the State Department of Highways and Public Transportation and the U.S. Department of Transportation, Federal Highway Administration

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State Department of
Highways and Public Transportation
Austin, Texas

RESEARCH SUMMARY REPORT 219-1(5)

EVALUATION OF BRIDGE SLAB STRENGTHENING SYSTEM

by

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Many older highway structures which were designed for 12 kip (5443.1 kg) wheel loads are now experiencing extensive deck distress and deterioration due to increased traffic loads. On heavily travelled facilities where adequate detours are not available, current repair methods require a disruption of traffic which results in high user costs. A method has been developed to strengthen these deteriorating slabs from underneath, thus eliminating the disruption of traffic. This report describes the design, construction, and field evaluation of this method.

The two structures selected for the installation of this pilot strengthening project are near downtown Houston, Texas. They consist of 33 WF rolled steel beams with a 6 1/2 inch (16.5 cm) lightweight concrete slab. The beams are continuous for two to three spans with span lengths averaging approximately 70 feet (21.34 m). One section in each of these structures, approximately 215 feet (66 m) in length, was strengthened by adding a supplemental grid beam system of 14 W 22 beams to the existing beam and diaphragm system.

The effectiveness of this strengthening system was evaluated by means of field measurements of deflection and strain under static wheel loading before and after slab strengthening. Based on this evaluation, the following conclusions are made:

1. The added grid beam system reduced slab deflection by an average of 62% when loaded at midspan of a floorbeam and an average of 56% when loaded at midspan of a stringer. Calculated design values were 63% and 46% respectively.
2. Stresses in the bottom flange of the added floorbeams were calculated from measured strains and ranged from 5160 psi (35.6 MPa) to 7890 psi (54.4 MPa) with an average value of 6558 psi (45.2 MPa). This compares with a stress of 12,400 psi (85.5 MPa) calculated using the test load and design load distribution coefficients.
3. The strengthening system can be erected under live load conditions without a great deal of difficulty.
4. This strengthening system has not healed the existing slab cracking. Some type of surface sealing will be required to prevent further surface decomposition by