

PURPOSE

The purpose of this report is to describe Iowa's first attempt at constructing a bonded, thin-lift, non-reinforced portland cement concrete resurfacing project.

SCOPE

The scope of this report is threefold: 1) to explain the development of the specifications, mix designs, and construction methods, (2) to describe and discuss each of the various phases of the project, and (3) to provide recommendations for changes in specifications and procedures for use on future projects of thin-lift concrete resurfacing.

ABSTRACT

In October, 1976, the Iowa Department of Transportation constructed a 1500 ft. (457 m) long project of thin lift (2 inch - 50 mm) bonded, portland cement concrete resurfacing on a concrete pavement. The project was located on U.S. 20, at the east edge of Waterloo, in Black Hawk County.

The project was conceived because of two developments: (1) the availability of a high production scarifying machine, the Roto-Mill Profiler, and (2) super water reducing admixtures to provide workability in concrete with lower than normal water-cement ratios.

The objectives of the project, with pertinent comments, are listed below.

Objective 1.

To determine the feasibility of proportioning, mixing, placing, and finishing a thin lift (approximately 2 inches - 50 mm) of bonded, dense, non-reinforced portland cement concrete using conventional slip-form plant and paving equipment in resurfacing existing concrete pavements.

Comments:

Objective was achieved. Some problems with uniform mixing, and discharging, from transit mix trucks. Material was readily placed with slip form paver. Refinements of proportioning, mixing, delivery, are still needed. Uniformity of concrete mixture will most likely alleviate the finishing problems experienced. More knowledge and experience is needed with use of super water reducing admixtures.

Objective 2.

To determine the feasibility of partial depth repair of deteriorated transverse joints in concrete pavements using a bonded, dense, non-reinforced, portland cement concrete.

Comments:

Existing partial depth repairs, with and without resurfacing, are performing excellently to date. Recommend additional research to determine (1) if partial depth repair is a viable alternate to traditional full-depth repair in different pavement conditions, and (2) the minimum requirements for concrete mixtures used for partial depth repair.

Objective 3.

To determine if an adequate bond between the existing pavement and an overlay of thin lift, dense, non-reinforced portland cement concrete can be obtained. (Surface scarified with Roto-Mill).

Comments:

Objective achieved to our satisfaction. Delamination testing indicates complete bond attained and still

existing to date. Shear testing at the interface indicates very high bond strengths, 1000 psi (6.9 megapascals) + average. Additional research recommended to determine if sufficient and lasting bond can be attained when old surface is cleaned rather than scarified. Additional equipment development needed to provide for mechanical application of grout.

Objective 4.

To determine the economics, longevity, and maintenance performance of a bonded, thin lift, non-reinforced portland cement concrete resurfacing course as a viable alternate to bituminous resurfacing of concrete pavements.

Comments:

Concrete paving industry spokesman indicate that competitive initial construction costs are quite possible. Refinements to procedures, equipment, etc., as mentioned above, as well as a larger sized project are needed to verify expectations.

Conclusions:

Iowa's first attempt to apply its bridge deck repair and overlay procedures and techniques to pavement resurfacing was successful as verified by the experience and test results of the short Demonstration Project on U.S. 20.

Additional research is required to refine the procedures, equipment, techniques, etc., in order to provide designers with a viable alternate for concrete pavement restoration and rehabilitation. Objectives of that research should be:

- (1) To determine the mixing and proportioning procedures required in using a conventional, central mix proportioning plant to produce a dense portland cement concrete mixture using standard mixes with super water reducing admixtures.
- (2) To determine the economics, longevity, and maintenance performance of a bonded, thin-lift, non-reinforced portland cement concrete resurfacing course using conventional procedures, equipment, and concrete paving mixtures both with and without super water reducing admixtures.
- (3) To determine if an adequate bond between the existing pavement and an overlay of thin lift, dense, non-reinforced portland cement concrete can be obtained with only special surface cleaning and no surface removal or grinding.