IN-LB	Inch-Pound Units
SI	International System of Units

Concrete Overlays for Pavement Rehabilitation—Report

Reported by ACI Committee 325

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This report provides information on the use of both bonded and unbonded concrete overlay solutions for the rehabilitation of concrete and asphalt pavements. Information is provided on the characteristics of each overlay type along with important design and construction considerations. Critical considerations are provided for the selection of the appropriate overlay type to meet the needs and condition of the project.

Keywords: bonded; concrete overlay; construction; design; performance; rehabilitation; unbonded.

CONTENTS

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CHAPTER 1—INTRODUCTION AND SCOPE

1.1—Introduction

Hydraulic cement concrete overlays are used as a rehabilitation technique for existing concrete and asphalt pavements. Concrete overlays offer the potential for extended service life, increased structural capacity, reduced maintenance requirements, and lower life-cycle costs when compared with other overlay alternatives.

Concrete overlays have been used to rehabilitate existing concrete pavements since at least 1913 and to rehabilitate existing asphalt pavements since at least 1918 (Hutchinson 1982). Beginning around the mid-1960s, many highway agencies began to search for an alternative means of rehabilitating existing pavements, and the use of concrete overlays increased significantly (McGhee 1994). Since the 1990s, there has been an even greater use of concrete overlays, spurred by improvements in concrete paving technology. For example, the use of zero-clearance pavers, accelerated paving concepts, and high-early-strength concrete mixtures greatly increased the ability of concrete overlays to serve as a viable rehabilitation alternative. The use of concrete overlays has also emerged as a beneficial rehabilitation solution for distressed asphalt pavements. Numerous studies on concrete overlays of existing asphalt pavement have demonstrated the feasibility and effectiveness of the technique, including thinner overlays that are bonded to the existing asphalt pavement. This technique has evolved from a radical rehabilitation concept to a mainstream rehabilitation alternative.

To ensure that concrete overlays provide durable, long-lasting rehabilitation solutions, good design and construction practices should be followed. These include designing an overlay that is appropriate for the situation, conducting appropriate pre-overlay repairs, properly preparing the existing pavement, and using good construction practices such as proper jointing and curing. With proper planning, work zones can be managed to accommodate these activities without sacrificing project safety, traffic flow, or cost-effectiveness.

Much of the information in this report has been extracted from Fick et al. (2021), which, for readability, is not specifically referenced further.

1.2—Scope

The goal of this document is to fill the knowledge gap and address relevant issues so that engineers and owners can confidently include concrete overlays in their toolbox of pavement rehabilitation solutions and make more informed decisions regarding their design and construction. This report discusses the selection, design, construction, and performance of concrete overlays. It is intended to provide the current state of the technology of concrete overlays of existing concrete, asphalt, and composite pavements.

CHAPTER 2—DEFINITIONS

Please refer to the latest version of ACI Concrete Terminology for a comprehensive list of definitions. Definitions provided herein complement that resource.

break and seat—technique involving fracturing an existing jointed reinforced concrete pavement using high impact energy; more impact energy is needed to rupture the steel or break its bond with the concrete to ensure independent movement, and seating with a heavy roller.

COA–B—concrete overlay on asphalt–bonded.

COA–U—concrete overlay on asphalt–unbonded.

COC–B—concrete overlay on concrete–bonded.

COC–U—concrete overlay on concrete–unbonded.

crack and seat—technique involving fracturing an existing jointed plain concrete pavement into pieces 1 to 4 ft (0.3 to 1.2 m) on a side by inducing full-depth cracks using a modified pile driver, guillotine hammer, whip hammer, or other equipment, and seating with a heavy roller.

curling—concrete distortion, usually in a slab, resulting from differential temperatures.

drainage, subsurface—inclusion of specific drainage elements in a pavement structure intended to remove excess surface infiltration water from a pavement.

equivalent single-axle loads (ESALs)—summation of equivalent 18 kip (80 kN) single-axle load applications used to combine mixed traffic to estimate the design traffic during the analysis period.