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Guide for Construction of Concrete Pavements

Reported by ACI Committee 325



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Guide for Construction of Concrete Pavements

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The primary focus of this guide is pavement construction. Modern slipform paving techniques and time-proven formed construction procedures are highlighted. Quality control, quality assurance, and construction inspection, as well as the environmental, economic, and societal benefits of concrete pavement, are also presented. This guide briefly reviews all aspects of concrete pavement construction for highways and, to some extent, local roads, streets, and airfields. Intended for field and office personnel, this guide provides a background on design issues that relate to construction and reviews material selection.

Note that the materials, processes, quality control measures, and inspections described in this guide should be tested, monitored, or performed as applicable only by individuals holding the appropriate ACI certifications or equivalent.

Keywords: concrete pavement; concrete pavement construction; concrete paving; fixed-form paving; paving materials; slipform paving; sustainability.

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CHAPTER 1—INTRODUCTION AND SCOPE**1.1—Introduction**

In the United States, concrete pavements have been built for over a century. The first street constructed with concrete was built in Bellefontaine, OH, in 1891; a portion of which, built in 1893, still remains in service. Concrete pavements make up an integral part of the national primary and secondary highway system, farm-to-market road system, city streets, parking lots, and airport runways. Historically, concrete pavements have exhibited a higher initial cost than asphalt pavements, but recent construction and market forces have narrowed that gap. Moreover, the longer service life and lower maintenance costs associated with concrete make it a very attractive and sustainable paving material.

1.2—Scope

This guide briefly discusses the construction of hydraulic cement concrete pavements for highways, streets, local roads, and airfields. Design issues are presented in the context of their impact on construction. Today, the slipform method of paving is preferred for roadway construction. This modern construction method is capable of producing a sustainable, high-quality, smooth pavement that can be placed quickly and economically. This guide will focus on pavement constructed using slipform methods; however, where appropriate, formed pavement construction practices are also discussed.

This guide is intended to serve as a reference for field project management, inspectors, and construction personnel by providing background information, illustrations of best practice, and information helpful in solving day-to-day

jobsite problems. Designers and specification writers will also find the guide helpful in preparing contract documents and selecting construction methods that assure quality construction under normal jobsite conditions using established and proven practices. Regardless of the type of equipment used, quality construction depends, in large measure, on the skill of crews involved in the construction process and quality of materials used.

CHAPTER 2—ACRONYMS AND DEFINITIONS**2.1—Acronyms**

- AAR: alkali-aggregate reactivity
- ABS: anti-lock braking system
- ACR: alkali-carbonate reactivity
- ADTT: average daily truck traffic
- ASR: alkali-silica reaction
- ATB: asphalt-treated base
- BPN: British Pendulum Number
- BPT: British Pendulum Tester
- CBR: California bearing ratio
- COTE: coefficient of thermal expansion
- CPX: close proximity
- CRCP: Continuously reinforced concrete pavement
- CT meter: circular texture meter
- CTB: cement-treated base
- CTE: coefficient of thermal expansion
- DF tester: dynamic friction tester
- EAC: exposed aggregate concrete
- EICM: Enhanced Integrated Climatic Model
- EOT: early-opening-to-traffic
- FN: friction number
- FWD: falling weight deflectometer
- GPR: ground-penetrating radar
- HPC: high-performance concrete
- HRWR: high-range water reducers
- HRWRA: high-range water-reducing admixture
- IFI: international friction index
- IRI: international roughness index
- JPCP: jointed plain concrete pavement
- JRCP: jointed reinforced concrete pavement
- LCA: life cycle assessment
- LCB: lean concrete base
- LOI: loss on ignition
- LTE: load transfer efficiency
- LWAS: lightweight aggregate sand
- M-E: mechanistic-empirical
- MIT: magnetic imaging tomography
- MOR: modulus of rupture
- MPD: mean profile depth
- MTD: mean texture depth
- NCHRP: National Cooperative Highway Research Program
- NDT: nondestructive testing
- NGCS: next-generation concrete surface
- OBSI: On-board sound intensity
- PCC: portland cement concrete
- PI: plasticity index
- QA: quality assurance