Standard Practice for

Developing Performance Engineered Concrete Pavement Mixtures

AASHTO Designation: PP 84-20[1]

Technical Subcommittee: 3c, Hardened Concrete

Release: Group 1 (April)

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INTRODUCTION

Specifications for concrete pavement mixtures have traditionally been prescriptive, with State Highway Agencies (SHA) specifying means and methods for both constituent materials and specific requirements for proportioning. This places the majority of the performance risk on the SHA and limits innovation. Recent trends of blending cementitious materials, reducing paste content, using modern additives and admixtures, and other innovations in the industry provide the opportunity to move towards specifying the performance characteristics of concrete mixtures and allowing industry to design mixtures that meet specific performance requirements. New methods to evaluate concrete performance have been developed, and others are being formulated, that can result in improved performance and economics. Further, shifting the responsibility for performance to the contractor provides an opportunity for innovation.

1. SCOPE

1.1. This practice covers elements of a concrete pavement mixture that considers, and includes, alternative performance characteristics for acceptance.

1.2. In Section 6 of this practice, SHA traditions of using prescriptive methods are respected while also offering options to use one or more performance measures instead.

1.3. This practice is intended to provide SHAs flexibility in their approach to the use of alternative performance measures and includes a range of choices that can be selected to best fit the needs of the agency.

1.4. Life cycle cost of concrete pavements will be considerably reduced, as a result of extended service life, by reducing material and construction variability. This is achieved by a robust quality control (QC) program.

1.5. Performance values included are for an average concrete pavement life in the range of 30 yr. Due to normal materials and testing variability and available local contractor expertise, some risk exists in predicting actual service life. As service life prediction models and test methods mature, that risk is expected to be reduced.

1.6. Substantial research has shown that a key to reduce the life cycle cost of concrete is by reducing construction variability.

1.7. The values stated in SI units are to be regarded as the standard. The values given in parentheses are provided for information only.

1.8. When performance-based measures are selected, the importance of quality control increases; compliance with the acceptance criteria are predicated on a well-designed and executed QC program that includes process, production, and construction control.

1.9. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. REFERENCED STANDARDS

2.1. *AASHTO Standards*:

- M 6, Fine Aggregate for Hydraulic Cement Concrete
- M 80, Coarse Aggregate for Hydraulic Cement Concrete
- M 85, Portland Cement
- M 154M/M 154, Air-Entraining Admixtures for Concrete
- M 194M/M 194, Chemical Admixtures for Concrete
- M 224, Use of Protective Sealers for Portland Cement Concrete
- M 240M/M 240, Blended Hydraulic Cement
- M 295, Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- M 302, Slag Cement for Use in Concrete and Mortars
- M 307, Silica Fume Used in Cementitious Mixtures
- M 321, High-Reactivity Pozzolans for Use in Hydraulic-Cement Concrete, Mortar, and Grout
- R 39, Making and Curing Concrete Test Specimens in the Laboratory
- R 60, Sampling Freshly Mixed Concrete
- R 76, Reducing Samples of Aggregate to Testing Size
- R 80, Determining the Reactivity of Concrete Aggregates and Selecting Appropriate Measures for Preventing Deleterious Expansion in New Concrete Construction
- R 90, Sampling of Aggregates
- T 22M/T 22, Compressive Strength of Cylindrical Concrete Specimens
- T 23, Making and Curing Concrete Test Specimens in the Field
- T 97, Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
- T 121, Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- T 152, Air Content of Freshly Mixed Concrete by the Pressure Method
- T 160, Length Change of Hardened Hydraulic Cement Mortar and Concrete
- T 161, Resistance of Concrete to Rapid Freezing and Thawing
- T 196, Air Content of Freshly Mixed Concrete by the Volumetric Method
- T 277, Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
- T 318, Water Content of Freshly Mixed Concrete using Microwave
- T 334, Estimating the Cracking Tendency of Concrete
- T 336, Coefficient of Thermal Expansion of Hydraulic Cement Concrete
- T 358, Surface Resistivity Indication of Concrete's Ability to Resist Chloride Ion Penetration
- T 363, Evaluating Stress Development and Cracking Potential due to Restrained Volume Change Using a Dual Ring Test