

Geosynthetic Reinforcement of the Aggregate Base Course of Flexible Pavement Structures



AASHTO Designation: PP 46-01 (2007)¹

1. SCOPE

- 1.1. This recommended practice provides guidance to pavement designers interested in incorporating geosynthetics for the purpose of reinforcing the aggregate base course of flexible pavement structures. Geosynthetic reinforcement is intended to provide structural support of traffic loads over the life of the pavement.
 - 1.1.1. For the purpose of this guide, base reinforcement is the use of a geosynthetic within, or directly beneath, the granular base course.
 - 1.1.2. When referring to geosynthetics, the discussion is limited to geotextiles, geogrids, or geogrid/geotextile composites.
-

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standard:*
 - M 288, Geotextile Specification for Highway Applications
 - 2.2. *Other References:*
 - Geosynthetics Materials Association (GMA) White Paper I—"Geosynthetics in Pavement Systems Applications," May 1999. Available at bookstore@ifai.com.
 - Geosynthetic Materials Association (GMA) White Paper II—"Geosynthetic Reinforcement of the Aggregate Base Course of Flexible Pavement Structures," June 2000. Available at bookstore@ifai.com.
 - National Highway Institute (NHI) Participant Notebook—*Geosynthetic Design and Construction Guidelines*, April 1999. Available at www.nhi.fhwa.dot.gov.
-

3. INTRODUCTION

- 3.1. Because the benefits of geosynthetic reinforced pavement structures may not be derived theoretically, test sections are necessary to obtain benefit quantification. Studies have been done that demonstrate the value added by a geosynthetic in a pavement structure. These studies, necessarily limited in scope, remain the basis for design in this field.
- 3.2. This recommended practice is very empirical in nature and restricted to applications already demonstrated to be useful. The practitioner will need to consult the references and locate a tested

section similar to that which is expected in their own design. In that way, the experimentally determined benefit may be applied to the project being designed.

4. TERMINOLOGY

4.1. *Definitions:*

- 4.1.1. *base course reduction (BCR)*—percentage of the base or subbase thickness in a reinforced pavement, as compared to the base or subbase thickness in an unreinforced pavement with the same material components, such that equal life cycles for a defined failure state result between the two.
- 4.1.2. *separation*—use of a geotextile to prevent the mixing of a subgrade soil and an overlying aggregate material.
- 4.1.3. *stabilization*—use of a geotextile in wet, saturated conditions to provide the functions of separation and drainage.
- 4.1.4. *traffic benefit ratio (TBR)*—ratio of the number of load cycles of a reinforced pavement structure to reach a defined failure state to the number of loads for the same unreinforced section to reach the same defined failure state.
- 4.2. *Discussion*—Use of geotextiles for separation and stabilization applications is covered in M 288 and, therefore, is not included in this guide.

5. SUMMARY OF DESIGN METHOD

- 5.1. The purpose of this guide is to provide the practitioner with general information regarding the use of a geosynthetic for reinforcement in a pavement structure. The guide will not provide step-by-step procedures for the design of the geosynthetic in this application; instead, overall design considerations are outlined.
- 5.2. Design procedures use experimentally derived input parameters that are often geosynthetic specific. Thus, computed engineering designs and economic benefits are not easily translated to other geosynthetics. Therefore, users of this document are encouraged to affirm their designs with field verification of the reinforced pavement performance, both in engineering design and economic benefits.

6. SIGNIFICANCE AND USE

- 6.1. Geosynthetics are used in the pavement structure for structural support of traffic loads over the design life of the pavement. The geosynthetic is expected to provide one or both of these benefits: (1) improved or extended service life of the pavement, or (2) reduced thickness of the structural section.
- 6.2. Service life improvement may be in the form of extended performance periods or increased reliability (1) so that the constructed pavement will support the actual versus designed equivalent single-axle loads, or (2) to account for actual subgrade strengths lower than assumed designed subgrade strength.