ASCE STANDARD

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58–10

Structural Design of Interlocking Concrete Pavement for Municipal Streets and Roadways

This document uses both the International System of Units (SI) and customary units

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INTERLOCKING CONCRETE PAVEMENT INSTITUTE

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The following standards have been issued:

ANSI/ASCE 1-82 N-725 Guideline for Design and Analysis of Nuclear Safety Related Earth Structures

ASCE/EWRI 2-06 Measurement of Oxygen Transfer in Clean Water

ANSI/ASCE 3-91 Standard for the Structural Design of Composite Slabs and ANSI/ASCE 9-91 Standard Practice for the Construction and Inspection of Composite Slabs

ASCE 4-98 Seismic Analysis of Safety-Related Nuclear Structures

Building Code Requirements for Masonry Structures (ACI 530-02/ASCE 5-02/TMS 402-02) and Specifications for Masonry Structures (ACI 530.1-02/ASCE 6-02/TMS 602-02)

ASCE/SEI 7-10 Minimum Design Loads for Buildings and Other Structures

SEI/ASCE 8-02 Standard Specification for the Design of Cold-Formed Stainless Steel Structural Members

ANSI/ASCE 9-91 listed with ASCE 3-91

ASCE 10-97 Design of Latticed Steel Transmission Structures

SEI/ASCE 11-99 Guideline for Structural Condition Assessment of Existing Buildings

ASCE/EWRI 12-05 Guideline for the Design of Urban Subsurface Drainage

ASCE/EWRI 13-05 Standard Guidelines for Installation of Urban Subsurface Drainage

ASCE/EWRI 14-05 Standard Guidelines for Operation and Maintenance of Urban Subsurface Drainage

ASCE 15-98 Standard Practice for Direct Design of Buried Precast Concrete Pipe Using Standard Installations (SIDD)

ASCE 16-95 Standard for Load Resistance Factor Design (LRFD) of Engineered Wood Construction

ASCE 17-96 Air-Supported Structures

ASCE 18-96 Standard Guidelines for In-Process Oxygen Transfer Testing

ASCE 19-96 Structural Applications of Steel Cables for Buildings

ASCE 20-96 Standard Guidelines for the Design and Installation of Pile Foundations

ANSI/ASCE/T&DI 21-05 Automated People Mover Standards—Part 1

ANSI/ASCE/T&DI 21.2-08 Automated People Mover Standards—Part 2

ANSI/ASCE/T&DI 21.3-08 Automated People Mover Standards—Part 3

ANSI/ASCE/T&DI 21.4-08 Automated People Mover Standards—Part 4

SEI/ASCE 23-97 Specification for Structural Steel Beams with Web Openings

ASCE/SEI 24-05 Flood Resistant Design and Construction

ASCE/SEI 25-06 Earthquake-Actuated Automatic Gas Shutoff Devices

ASCE 26-97 Standard Practice for Design of Buried Precast Concrete Box Sections

ASCE 27-00 Standard Practice for Direct Design of Precast Concrete Pipe for Jacking in Trenchless Construction

ASCE 28-00 Standard Practice for Direct Design of Precast Concrete Box Sections for Jacking in Trenchless Construction

ASCE/SEI/SFPE 29-05 Standard Calculation Methods for Structural Fire Protection

SEI/ASCE 30-00 Guideline for Condition Assessment of the Building Envelope

SEI/ASCE 31-03 Seismic Evaluation of Existing Buildings

SEI/ASCE 32-01 Design and Construction of Frost-Protected Shallow Foundations

EWRI/ASCE 33-01 Comprehensive Transboundary International Water Quality Management Agreement

EWRI/ASCE 34-01 Standard Guidelines for Artificial Recharge of Ground Water
EWRI/ASCE 35-01 Guidelines for Quality Assurance of Installed Fine-Pore Aeration Equipment
CI/ASCE 36-01 Standard Construction Guidelines for Microtunneling
SEI/ASCE 37-02 Design Loads on Structures during Construction
CI/ASCE 38-02 Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data
EWRI/ASCE 39-03 Standard Practice for the Design and Operation of Hail Suppression Projects
ASCE/EWRI 40-03 Regulated Riparian Model Water Code
ASCE/SEI 41-06 Seismic Rehabilitation of Existing Buildings
ASCE/EWRI 42-04 Standard Practice for the Design and Operation of Precipitation Enhancement Projects
ASCE/SEI 43-05 Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities
ASCE/EWRI 44-05 Standard Practice for the Design and Operation of Supercooled Fog Dispersal Projects
ASCE/EWRI 45-05 Standard Guidelines for the Design of Urban Stormwater Systems
ASCE/EWRI 46-05 Standard Guidelines for the Installation of Urban Stormwater Systems
ASCE/EWRI 47-05 Standard Guidelines for the Operation and Maintenance of Urban Stormwater Systems
ASCE/SEI 48-05 Design of Steel Transmission Pole Structures
ASCE/EWRI 50-08 Standard Guideline for Fitting Saturated Hydraulic Conductivity Using Probability Density Functions
ASCE/EWRI 51-08 Standard Guideline for Calculating the Effective Saturated Hydraulic Conductivity
ASCE/SEI 52-10 Design of Fiberglass-Reinforced Plastic (FRP) Stacks
ASCE/G-I 53-10 Compaction Grouting Consensus Guide
ASCE/EWRI 54-10 Standard Guideline for the Geostatistical Estimation and Block-Averaging of Homogeneous and Isotropic Saturated Hydraulic Conductivity
ASCE/SEI 55-10 Tensile Membrane Structures
ASCE/T&DI/ICPI 58-10 Structural Design of Interlocking Concrete Pavement for Municipal Streets and Roadways

FOREWORD

Interlocking concrete pavers can provide a durable and effective pavement system, but, as with any pavement, proper design, construction, and maintenance procedures are required. This standard guideline has been prepared by the ASCE/T&DI Structural Design of Interlocking Concrete Pavement Standards Committee. It establishes guidelines for developing appropriate pavement structures for various traffic and subgrade conditions. The overall goal of this standard guideline is to assist the industry and public by establishing structural design standards for interlocking concrete pavements.

It is recognized that the trend in North America is towards the development and implementation of mechanistic-empirical design protocols. While efforts are underway by the interlocking concrete pavement industry to move towards adopting a mechanistic-empirical design procedure, the required data to implement such a procedure is not yet available and therefore this standard guideline was developed based on the 1993 AASHTO *Guide for Design of Pavement Structures* (AASHTO 1993).

The development of this standard guideline is a result of a partnership between the Transportation and Development Institute of ASCE and the Interlocking Concrete Pavement Institute. The organizations jointly encouraged expert volunteers to become a part of the standards committee that developed the standard guideline and supported the efforts of that committee. This committee comprises individuals from many backgrounds, including consulting engineering, research, design and manufacturing, education, government, and private practice.

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CONTENTS

Foreword v

Interlocking Concrete Pavers Standards Committee vii

1 General 1
- 1.1 Scope 1
- 1.2 Referenced Standards 1
- 1.3 Deviations from this Standard Guideline 1
- 1.4 Engineer Required 1

2 Preparation for Pavement Design 3

3 Design Elements 5
- 3.1 General 5
- 3.2 Design Principles 5
- 3.3 Design Life 5
- 3.4 Design Reliability 5
- 3.5 Design Traffic 6
- 3.6 Subgrade Soil Strength Assessment 7
- 3.7 Select Base Materials and Thicknesses 8
- 3.8 Determine Subbase Thickness 8
- 3.9 Design Pavement Structure Drainage 8
- 3.10 Geotextile 9
- 3.11 Bedding and Joint Sand Requirements 10
- 3.12 Concrete Pavers 11
- 3.13 Edge Restraints 13
- 3.14 Construction Details and Specifications 13

4 Design Tables and Worked Examples 15
- 4.1 Design Tables 15
- 4.2 Example Case Studies 27

5 Other Design Considerations 29

Glossary of Terms 31

References 35

Index 37

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1
GENERAL

1.1 SCOPE

The provisions of this Standard Guideline establish the procedures for the structural design of interlocking concrete pavements. This Standard applies to paved areas subject to applicable permitted axle loads and trafficked up to 10 million 80-kN (18,000-lb)-equivalent single axle loads (ESALs). A minimum 80-mm (3⅛–in.) thick paver is used in the standard guideline as this is the minimum thickness recommended for municipal roadways. This Standard Guideline applies to roadways with a design speed of up to 70 kph (45 mph). Many of the design considerations herein require a working knowledge of soil mechanics, traffic loading, and pavement materials. Such knowledge is necessary for the application of this Standard Guideline.

This Standard Guideline applies only to the design of new pavement structures surfaced with interlocking concrete pavers. The Standard Guideline includes structural design guidelines for untreated, asphalt-treated, and cement-treated bases. Asphalt concrete (hot mix asphalt) bases are considered on a limited basis for high traffic, low subgrade strength conditions as a means to reduce the overall thickness of the pavement.

The Standard Guideline does not include provisions for inclusion of interlocking concrete pavers on a portland cement concrete (PCC) base. This Standard Guideline does not address aspects such as project-specific details, specifications, construction, and maintenance practices that are critical to the successful performance of the pavement. Other references should be consulted for the design of these pavement systems.

1.2 REFERENCED STANDARDS

In addition to provincial, state, and local pavement design procedures and guidelines having jurisdiction, the provisions of this Standard Guideline's References should be considered where they apply and where noted.

1.3 DEVIATIONS FROM THIS STANDARD GUIDELINE

Use of proprietary, new, and/or improved interlocking concrete pavement, materials, evaluation techniques, and installation methods are not prohibited, as long as the design and installation of the pavement are shown to comply with or exceed these Standard Guidelines.

1.4 ENGINEER REQUIRED

Work covered by this Standard Guideline should be carried out under the guidance of a Professional Engineer with a background in the design of pavement systems. The Professional Engineer is hereinafter referred to as the Engineer.