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# Standard Guidelines for the Design, Installation, and Operation and Maintenance of Urban Stormwater Systems

THREE COMPLETE STANDARDS

Standard Guidelines for the Design of Urban Stormwater Systems

ANSI/ASCE/EWRI 45-16

Standard Guidelines for the Installation of Urban Stormwater Systems

ANSI/ASCE/EWRI 46-16

Standard Guidelines for the Operation and Maintenance of Urban Stormwater Systems

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AMERICAN SOCIETY OF CIVIL ENGINEERS



ENVIRONMENTAL &  
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PUBLISHED BY THE AMERICAN SOCIETY OF CIVIL ENGINEERS

## Library of Congress Cataloging-in-Publication Data

Names: American Society of Civil Engineers, editor.  
Title: ASCE standard, ANSI/ASCE/EWRI, 45-16, 46-16, 47-16 : standard guidelines for the design of urban stormwater systems.  
Other titles: Standard guidelines for the design of urban stormwater systems  
Description: Reston, Virginia : American Society of Civil Engineers, [2017] | Includes bibliographical references and index.  
Identifiers: LCCN 2016058532 | ISBN 9780784413319 (soft cover : alk. paper) | ISBN 9780784480199 (PDF)  
Subjects: LCSH: Storm sewers—Standards—United States.  
Classification: LCC TD665 .A79 2017 | DDC 628/.212021873—dc23 LC record available at <https://lccn.loc.gov/2016058532>

Published by American Society of Civil Engineers  
1801 Alexander Bell Drive  
Reston, Virginia, 20191-4382  
[www.asce.org/bookstore](http://www.asce.org/bookstore) | [ascelibrary.org](http://ascelibrary.org)

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*Errata:* Errata, if any, can be found at <https://doi.org/10.1061/9780784413319>.

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ISBN 978-0-7844-1331-9 (soft cover)  
ISBN 978-0-7844-8019-9 (PDF)  
Manufactured in the United States of America.

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ANSI/ASCE/EWRI

# 45-16

## Standard Guidelines for the Design of Urban Stormwater Systems

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## PREFACE

The *Standard Guidelines for the Design of Urban Stormwater Systems* is a companion to the *Standard Guidelines for the Installation of Urban Stormwater Systems* and *Standard Guidelines for the Operation and Maintenance of Urban Stormwater Systems*. These standard guidelines were developed by the Urban Drainage Standards Committee, which is responsible to the Environmental and Water Resources Institute of the American Society of Civil Engineers.

The provisions of this document are written in permissive language and, as such, offer to the user a series of options or

instructions but do not prescribe a specific course of action. Significant judgment is left to the user of this document.

These standard guidelines may involve hazardous materials, operations, and equipment. These standard guidelines do not purport to address the safety problems associated with its application. It is the responsibility of whoever uses these standard guidelines to establish appropriate safety and health practices and to determine the applicability of regulatory and nonregulatory limitations.

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## ACKNOWLEDGMENTS

The American Society of Civil Engineers acknowledges the work of the Urban Drainage Standards Committee of the Environmental and Water Resources Institute of ASCE.

This group comprises individuals from many backgrounds, including consulting engineering, research, construction industry, education, and government. The individuals who serve on the Urban Drainage Standards Committee are

William Curtis Archdeacon, P.E., R.L.S., *Past Chair*  
Kathlie S. Jeng-Bulloch, Ph.D., P.E., D.WRE, CFM, M.ASCE, *Chair*  
William P. Bulloch Jr., P.E., M.ASCE  
Christopher B. Burke, Ph.D., P.E., D.WRE, F.ASCE  
James C.-I. Chang, Ph.D., P.E.  
Richard Field, P.E., D.WRE, BCEE, M.ASCE  
Robert S. Giurato  
Jeffrey S. Glenn, P.E., D.WRE, CFM, F.ASCE

S. David Graber, P.E., F.ASCE, *Vice Chair and Corresponding Editor*

Jay M. Herskowitz, P.E., M.ASCE  
Conrad G. Keyes Jr., Ph.D., P.E., L.S., D.WRE, Dist.M.ASCE  
James H. Lenhart Jr., P.E., D.WRE, M.ASCE  
Lawrence M. Magura, P.E., M.ASCE, Secretary  
Garvin J. Pederson, P.E., M.ASCE  
Anthony N. Tafuri, P.E., D.WRE, M.ASCE  
Kenneth E. Waite, P.E., M.ASCE  
Keh-Han Wang, Ph.D., M.ASCE  
William J. Weaver, P.E., M.ASCE  
Donald E. Woodward, P.E., F.ASCE

The Corresponding Editor recognizes the following Committee members who were particularly helpful in updating the standard guidelines: Jeffrey S. Glenn, Conrad G. Keyes Jr., James H. Lenhart Jr., Kenneth E. Waite, William J. Weaver, and Donald E. Woodward.

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## CHAPTER 1

### SCOPE

The intent of these standard guidelines is to present design guidance for urban stormwater systems. It updates ASCE/EWRI 45-05 *Standard Guidelines for the Design of Urban Stormwater Systems* with material developed within the past eight years. The collection, management, and conveyance of urban surface waters are within the purview of these standard guidelines for applications such as airports, roads, and other transportation systems; and industrial, commercial, residential, and recreation areas. This document is intended for guidance during the design phase.

These standard guidelines do not address applications, such as agricultural drainage, landfills, and injection systems. Combined Sewer Overflows (CSOs) also are not addressed, because they are environmentally unacceptable as a new standard of practice in the United States.

Both SI units and customary units are used throughout the guidelines for the narrative, figures, and tables. The formulas are written in dual units or written separately to show the use of either SI units or customary units.

#### 1.1 APPLICABLE STANDARDS

The standards listed as follows are available from the offices of the cited organization: American Association of State Highway Officials (AASHTO) in Washington DC; American Society of Civil Engineers (ASCE) in Reston, VA; American National Standards Institute/American Water Works Association documents from AWWA in Denver; and ASTM International (ASTM) in West Conshohocken, PA. The standards are mentioned in these guidelines at the sections in which they are applicable.

The ASTM standard and comparable AASHTO standard for a product are commonly identical; however, there may be some differences, especially when AASHTO standards lag behind ASTM standard revisions. If there is a separate metric edition of a standard, its designation includes the letter M (e.g., C507M).

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