ASCE Manuals and Reports on Engineering Practice No. 92

Manhole Inspection and Rehabilitation

THIRD EDITION

Sponsored by the Manhole Inspection and Rehabilitation Task Committee

Edited by Joanne Carroll

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Manhole Inspection and Rehabilitation

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FOREWORD

It is with sincere gratitude and great honor that I acknowledge the many years of commitment and hard work offered freely from industry professionals to produce this, the third edition of *Manhole Inspection and Rehabilitation*, ASCE Manuals and Reports on Engineering Practice No. 92 (MOP 92).

To appreciate the many enhancements made to this edition, it is important to understand the history of MOP 92 and to acknowledge the power derived when organizations such as ASCE (and now UESI) and NASSCO join forces to provide technical resources that benefit the entire underground infrastructure industry.

The idea for MOP 92 began in 1991 during an ASCE Pipeline Infrastructure (PINS) meeting during the Water Environment Federation Conference (WEFTEC) in Washington, DC. Chaired by Jay Schrock, MOP 92 was first published in 1997 in partnership with the ASCE Committee on Manhole Rehabilitation of the Pipeline Division of ASCE and NASSCO's Manhole Rehabilitation Committee.

The second edition of MOP 92, published in 2009, included expanded content on safety, manhole inspection, manhole rehabilitation methods, cost-effectiveness analysis, rehabilitation method selection, and construction inspection and quality control.

On the following pages in this, the third edition, the reader will find a new chapter on design, authored by Ed Kampbell, P.E. The reader will also find expanded information on the importance of manhole condition assessment standardization through NASSCO's Manhole Assessment Certification Program (MACP) and proper inspection through NASSCO's Inspector Training Certification Program (ITCP) for Manhole Rehabilitation. Recognizing the critical impact manholes make on the entire collection system, the third edition of MOP 92, also includes an expanded section on various rehabilitation methods and technologies and a summary chapter,

authored by Mr. Bill Shook, on the importance of proper manhole inspection and rehabilitation.

Many dedicated professionals with a passion for manhole rehabilitation technology have been involved with MOP 92 since the very beginning and we appreciate the hard work and contributions made by all. I am especially grateful to Joanne Carroll for her careful editing of this third edition, to Karol Giokas, P.E., for the development of the glossary, and to NASSCO's Technical Advisory Council, especially Lynn Osborn, P.E., Chris Garrett, P.E., and Jerry Weimer, for their many contributions. Finally, I would like to extend special thanks to Blue Ribbon Review Panel members Chris Macey, P.Eng., Rod Thornhill, P.E., and Mark Wade, P.E. for their meticulous review and thoughtful edits to ensure that MOP 92 serves as a trusted industry resource for many years to come.

Because of the collective hard work of NASSCO's Manhole Rehabilitation Committee and these individuals, it is my sincere belief that MOP 92 will continue to be a valued resource to assist agencies in the proper identification of inventory and asset management, the assessment and condition of manhole structures, and decision-making regarding rehabilitation materials and methods, and will provide key quality control measures when specifying the use of rehabilitation materials and technologies.

NASSCO values its partnership with ASCE/UESI and looks forward to continued efforts to set standards for the assessment, maintenance, and rehabilitation of underground infrastructure.

Sheila Joy

NASSCO Executive Director

CHAPTER 1
INTRODUCTION

A manhole, alternatively referred to as a maintenance hole, access point, utility hole, inspection chamber, or access chamber, is an access point whose functions include facilitating inspections and maintenance, sewage ventilation, and the joining or changing of direction of the connected pipeline system (NASSCO 2013). The ASCE Infrastructure Report Card (ASCE 2021) gave the United States a wastewater infrastructure system grade of D+, indicative of the state of deterioration, accentuating the urgent need for rehabilitation or replacement. Evaluating and estimating the life of more than 25 million manholes providing access to more than 800,000 miles of public sewers is of considerable importance in the financial planning of agencies. The development of materials and technology over the last 30 years has greatly reduced the need to replace manholes; however, estimating the age when a manhole becomes more cost-effective to replace than to rehabilitate is a function that must be considered on a local basis. The primary objective of this manual is the provision of an inspection and condition grading protocol that serves as the basis for logical selection and application of rehabilitation solutions described in this manual to further the service life of these critical structures.

Through an effective manhole inspection program, agencies can accurately identify inventory and evaluate the condition of these structures. Over time, as comprehensive inspection and assessment information is tracked, it can also aid in determining the optimal and practical times for rehabilitation or even replacement. Gathering of data utilizing standardized techniques and coding enables identification of appropriate methods to remove infiltration and inflow (I&I), reduce corrosion, improve structural integrity, address public safety–related issues, and implement general system maintenance and proactive measures to mitigate future problems.