

Geotechnical, Geological and Earthquake Engineering

Volume 49

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Soil-Steel Bridges

Design, Maintenance and Durability

 Springer

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ISSN 1573-6059 ISSN 1872-4671 (electronic)
Geotechnical, Geological and Earthquake Engineering
ISBN 978-3-030-34787-1 ISBN 978-3-030-34788-8 (eBook)
<https://doi.org/10.1007/978-3-030-34788-8>

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Preface

The soil-steel bridges and culverts constitute more and more often an element of transportation infrastructure in various parts of the world. For this reason, the presented book fits in the actual trends in bridge engineering and additionally fulfils the gap in the world literature concerning to such type of bridge structures.

The book is intended mainly for people interested in soil-steel bridges and culverts, in particular for designers, scientists, practitioners, students, contractors and managers of transportation infrastructure.

The primary objective of this book is to provide designers with a set of analysis and design specifications for soil-steel bridges and culverts so also called the flexible structures. Brief but informative, this guide to the analysis and design of soil-steel bridges is based on a quick lookup approach to code applications, design and analysis methods/calculations as well as applications and solved examples. Additionally, the corrosion problem and durability of soil-steel bridges will be also analysed.

The book presents information on current methods and standards for the design of soil-steel bridges. The book starts with a clear and rigorous exposition of the various codes, which govern design, including the American Association of State Highway and Transportation Officials and Canadian Highway Bridge Design Code. The Swedish design method as the most modern calculation method will be presented in detail. Problems and design and implementation errors that may occur during the design and construction phase of these bridges were also characterized. Methods of numerical modelling of soil-steel bridges and exemplary results of calculations using the finite element method are presented. This is especially important for large-span soil-steel bridges. An important problem of corrosion in soil-steel bridges and methods of protecting these objects against corrosive and abrasion damages has been described. Then, the results of experimental tests on several soil-steel bridges under service and standard loads were presented. At the end, the problem of durability of soil-steel bridges was characterized.

Soil-Steel Bridges: Design, Maintenance and Durability brings together the analytical tools and methods based on lessons learned which were accumulated

over 19 years of experience as a structural and bridge engineer, academic teacher and project and design manager for transportation and industrial clients. The information presented in the book is the result of research and analysis on soil-steel bridges and culverts. The work contains data from own experimental and numerical analyses, as well as obtained from the analysis of the world literature in this field.

Issues covered in the book are interdisciplinary on the borderline of several scientific disciplines, i.e. civil engineering, in particular bridge engineering and soil mechanics, as well as material engineering, including materials corrosion.

As in any scientific book, some shortcomings and remarks may appear at work; therefore, the author asks for comments (d.beben@po.edu.pl), which in the future will allow to improve the content of the book in subsequent editions.

The author would like to thank the reviewers of the book in a special way: Professor Giovanni Bosco from L'Aquila University and Professor Halil Sezen from Ohio State University and anonymous reviewers for their valuable comments that contributed to the final form of the book.

At the end, the author would like to thank Professor Zbigniew Zembaty for his inspiration to write the book and for all the help in this area.

Opole, Poland
July 2019

Damian Beben

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