

# **Efficient Design of Spanning Trusses**

## ***Charts and Tools***

## Other Titles of Interest

***Constructability Concepts and Practice***, edited by John A. Gambatese, James B. Pocock, and Phillip S. Dunston (ASCE/CI 2007). This report examines constructability, the integration of construction knowledge and experience in the planning, design, procurement, construction, operation, maintenance, and decommissioning phases of a project consistent with overall project objectives. (ISBN 978-0-7844-7184-5)

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# Efficient Design of Spanning Trusses

## *Charts and Tools*

Sponsored by the Efficient Design of Spanning Trusses  
Task Committee of the Optimal  
Structural Design Committee of the  
Structural Engineering Institute of the  
American Society of Civil Engineers

Efficient Design of Spanning Trusses Task Committee

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# Dedication

This report represents several years of research and hard work of many.  
But like everything, the idea had its beginning.  
It started around the year 2013 with a seed—a simple conversation.  
Fueled by a series of *what if* questions.  
The person responsible for the seed to grow is William F. Baker.  
I would like to dedicate this report to him.  
Thank you, Bill.

Arek Mazurek



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# Preface

Members of the Optimal Structural Design (OSD) Committee of the Structural Engineering Institute (SEI) of the American Society of Civil Engineers (ASCE) are individuals from academia and engineering practice who are knowledgeable on topics of multidisciplinary optimization. The goal of the committee is to promote efficient structural design, efficient not only in financial terms but also when including other parameters such as time, weight, carbon footprint, and others. A task committee for *Efficient Design of Spanning Trusses* has been formed to focus on the publishing of this work. This publication is specifically meant to help in selecting the most efficient designs for single span structural steel trusses. However, it broadly discusses optimization procedures that could be applied to other structures. Assumptions needed to allow for the encapsulation of multiple truss designs into the series of unitless charts are also discussed.

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## About Charts and Tools

Design charts are included to assist engineers in making an informative initial selection of a truss. These charts can also be utilized to estimate a weight of a truss without the need of a design. Ranges of parameters considered to generate the charts have been selected to consider most of the practical structural trusses. In the event a truss falls beyond the range of the charts, the reader is encouraged to utilize the attached tools.

The attached tools are spreadsheets in MS Excel, and these have been used to generate all single topology truss charts that are attached to this report. Generating trusses that differ from these attached may require the reader to edit the spreadsheets and/or macros. The tools are provided in an open form to enable further research on the subject of the efficient design of trusses.



# Acknowledgments

A special recognition goes to Jerome Tobolski for his exceptional dedication and contribution in the development of this book. His passion for engineering, attention to details, and hard work stood out and was important component in our quest for perfection.

Arek Mazurek

