

INTELLIGENT ROAD DESIGN

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Biography of Dr. Manoj K. Jha

Dr. Manoj K. Jha is Assistant Professor of Civil Engineering at the Morgan State University, USA. He has taught over eight courses in transportation engineering at the Morgan State University and the University of Maryland, College Park. He performs research in transportation system optimization, highway design and maintenance, artificial intelligence, and geographic information systems. He is a member of several professional organizations

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Biography of Dr. Jyh-Cherng Jong

Dr. Jyh-Cherng Jong is Senior Research Scientist of Civil, Hydraulic, and Informatics Research Center at Sinotech Engineering Consultants, Inc. He received B.B.A. in Transportation Engineering and Management, and M.S. in the Institute of Traffic and Transportation from National Chiao Tung University, Taiwan. He was granted the fellowship of International Road Federation in 1995 and earned his Ph.D. in Civil Engineering

from the University of Maryland, College Park in 1998. Due to his outstanding academic achievements, Dr. Jong was selected as a member of the Phi Tau Phi Scholastic Honor Society and the Honor Society of Phi Kappa Phi. His primary research interests are in the applications of optimization theory, simulation modeling, artificial intelligence, and Information Technology to highway design and railway operation. Dr. Jong is currently the team leader of transportation research group at Sinotech Engineering Consultants, Inc. He has directed several research projects funded by Institute of Transportation and Railway Reconstruction Bureau in Ministry of Transportation and Communications, Taiwan. Dr. Jong is a member of China Road Federation, Chinese Institute of Transportation, Chinese Institute of Engineers, and Rail Engineering Society of Taiwan, where he is also a member of the academic subcommittee.



Biography of Dr. Paul Schonfeld

Dr. Paul Schonfeld is a Professor in the Department of Civil and Environmental Engineering at the University of Maryland, College Park, where he has worked since 1978. With his students he has developed methods for analyzing and optimizing various transportation systems, including highways, public transit systems, inland waterways and air transportation systems. He has advised over thirty Ph.D. students, including the coauthors of this book. He has B.S and M.S. degrees from M.I.T. and a Ph.D. from the University of California at Berkeley.



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Dr. Eungcheol Kim is Assistant Professor in the Department of Civil and Environmental System Engineering in the College of Engineering at the University of Incheon, in South Korea, where he teaches courses on highway engineering, traffic engineering, highway planning & alignment design, transportation survey and design, calculus and transportation & logistics. He received a B.A. in Dept. of Urban Planning from the Hanyang University in South Korea and a M.A. in Dept. of Environment Planning, Transportation Major from the Seoul National University in South Korea and Ph.D. in Transportation Engineering, Dept. of Civil and Environmental Engineering from the University of Maryland at College Park. His research interests include highway alignment and design optimization, highway engineering, optimization of transportation systems, capacity analysis and public transit systems operations.

He was the Winner of the Student Paper Competition at the ITE Student Chapter in University of Maryland at College Park in 2000. He has also received two awards for outstanding research from the Mayor of Seoul Metropolitan City in 1996 and from the Chairman of Korean Council of Economic and Social Research Institutes in 2005. He served as an editorial member of the Journal of Korean Society of Transportation from 2002 to 2003. He also serves as a member of Urban Planning Board in such city governments as Incheon, Bucheon and Young-In in South Korea.

Foreword

This book addresses the intelligent concepts of road design not found in other textbooks. Road design is an ancient endeavor, however, the advent of motorized vehicles in the early 1900s required paved roads. Road planners and designers in the 1950s foresaw a tremendous growth in coming decades and therefore developed road planning and design concepts to accommodate vehicles of different dimensions to improve driver and passenger safety, comfort and convenience. In the last two decades most urban roads have experienced tremendous growth in traffic leading to frequent congestion and delays.

Due to shrinking right-of-way and limited highway budgets in recent years roadway planners and designers have been constantly exploring innovative methods of road design. Moreover, in recent years highway agencies have often found it difficult to secure adequate funds for road construction due to conflicting public opinions and political views. Therefore, having an intelligent road design model that can quickly optimize horizontal and vertical alignments will allow rapid evaluations of many competing alignment alternatives which should result in faster political and public approval. This book extensively discusses how such a road alignment optimization model can be developed and applied in real case studies.

The book is based on over eight years of research by the authors in intelligent road design and alignment optimization. It should be considered an advanced textbook in road design and will be appropriate for road planners, designers, senior undergraduate students and graduate students. The authors have extensively published the research results from their intelligent road design and alignment optimization work in leading transportation journals. The readers are strongly encouraged to consult those publications and also keep an eye on the forthcoming publications of the authors to stay up-to-date with the future developments in intelligent road design. The authors wish to acknowledge Dr. David Lovell and Min-Wook Kang for some of the material that they contributed to the book.

For easy reading the book has been conveniently divided into three parts. In Part A we develop theoretical foundations and techniques for intelligent road design. In Part B we develop models and algorithms for optimizing road

alignments. In part C we discuss intersection design along with bridges and tunnels. It is hoped that the book will lay the foundations for intelligent road design and will be widely used by researchers and practitioners throughout the world.

The authors
2006

Dedicated to my maternal grandparents, Taranand Jha and Yogmaya Devi, my
parents Devendra Jha and Kusum Devi, and my wife Amarjit Kaur.

M.K. Jha

Dedicated to my parents, Marcel and Elise, and to my wife Claudia.

P. Schonfeld

Dedicated to my parents, Kuo-Shang and Pao-Chen, my wife Wen-Yuh, and my
two sons, Hou-Ting and Hou-Zhe.

J. -C. Jong

Dedicated to my parents, Taekyung Kim and Okhee Kang, my wife Jongheui
Jung, my daughter Chaelin, and my son Seongchan.

E. Kim

