

# Plan, Build, and Manage Transportation Infrastructure in China



**ASCE**

**Proceedings of** the Seventh  
International Conference of Chinese  
Transportation Professionals (ICCTP)

**Edited by** Rongfang (Rachel) LIU,  
DongYuan YANG, and Jian John LU



This is a preview. [Click here to purchase the full publication.](#)

# PLAN, BUILD, AND MANAGE TRANSPORTATION INFRASTRUCTURE IN CHINA

---

PROCEEDINGS OF THE SEVENTH INTERNATIONAL CONFERENCE  
OF CHINESE TRANSPORTATION PROFESSIONALS (ICCTP)

---

May 21–22, 2007  
Tongji University  
Shanghai, China

SPONSORED BY

North America Chinese Overseas Transportation Associates (NACOTA)

The Transportation & Development Institute (T&DI)  
of the American Society of Civil Engineers

The Shanghai Highway Association

Tongji University

EDITED BY

Rongfang (Rachel) LIU, Ph.D., P.E.

DongYuan YANG

Jian John LU, Ph.D., P.E.



Published by the American Society of Civil Engineers

Library of Congress Cataloging-in-Publication Data.

International Conference of Chinese Transportation Professionals (7th : 2007 : Shanghai, China)

Plan, build, and manage transportation infrastructure in China : proceedings of the seventh International Conference of Chinese Transportation Professionals (ICCTP) : May 21 and 22, 2007, Tongji University, Shanghai, China / sponsored by North America Chinese Overseas Transportation Associates (NACOTA), the Transportation & Development Institute (T & DI) of the American Society of Civil Engineers, the Shanghai Highway Association, Tongji University; edited by Rongfang (Rachel) Liu, DongYuan Yang, Jian (John) Lu.  
p. cm.

Includes bibliographical references and index.

ISBN-13: 978-0-7844-0952-7

ISBN-10: 0-7844-0952-8

I. Transportation engineering--China--Congresses. I. Liu, Rongfang (Rachel) II. Yang, DongYuan. III. Lu, Jian, 1957- IV. North America Chinese Overseas Transportation Associates. V. Transportation & Development Institute (American Society of Civil Engineers) VI. Tong ji da xue (China). Shanghai Highway Association. VII. Title.

TA1005. I5225 2007

388.0951--dc22

2007049676

American Society of Civil Engineers

1801 Alexander Bell Drive

Reston, Virginia, 20191-4400

[www.pubs.asce.org](http://www.pubs.asce.org)

Any statements expressed in these materials are those of the individual authors and do not necessarily represent the views of ASCE, which takes no responsibility for any statement made herein. No reference made in this publication to any specific method, product, process, or service constitutes or implies an endorsement, recommendation, or warranty thereof by ASCE. The materials are for general information only and do not represent a standard of ASCE, nor are they intended as a reference in purchase specifications, contracts, regulations, statutes, or any other legal document. ASCE makes no representation or warranty of any kind, whether express or implied, concerning the accuracy, completeness, suitability, or utility of any information, apparatus, product, or process discussed in this publication, and assumes no liability therefore. This information should not be used without first securing competent advice with respect to its suitability for any general or specific application. Anyone utilizing this information assumes all liability arising from such use, including but not limited to infringement of any patent or patents.

ASCE and American Society of Civil Engineers—Registered in U.S. Patent and Trademark Office.

*Photocopies and reprints.*

You can obtain instant permission to photocopy ASCE publications by using ASCE's online permission service (<http://pubs.asce.org/permissions/requests/>). Requests for 100 copies or more should be submitted to the Reprints Department, Publications Division, ASCE, (address above); email: [permissions@asce.org](mailto:permissions@asce.org). A reprint order form can be found at <http://pubs.asce.org/support/reprints/>.

Copyright © 2008 by the American Society of Civil Engineers.

All Rights Reserved.

ISBN 0-7844-0952-8

978-0-7844-0952-7

Manufactured in the United States of America.

# Preface

The exponential growth in travel demand and related transportation investment in China during the past two decades may stun most ordinary minds especially when compared with the developed countries of the Western World and compared to its own stalled development since the early days. The combination of economic growth, improved standard of living, and urbanization has led to motorization in China, and the process is accelerating. Massive infrastructure building is the current response to the ever-growing travel demand. Governments at all levels and the private sector are all trying to improve the transportation infrastructure, particularly in road and highway construction.

The theme of the Seventh International Conference of Chinese Transportation Professionals (ICCTP) focuses on critical issues associated with planning, building, and managing transportation infrastructure in China. The 7<sup>th</sup> ICCTP, held in Shanghai, China in May 2007, continues the summer annual conference tradition started seven years ago by North America Chinese Overseas Transportation Associates (NACOTA), a federally registered non-profit organization in the United States. The 7<sup>th</sup> ICCTP was jointly organized by Tongji University, NACOTA, and the Shanghai Highway Association. The Transportation and Development Institute (T&DI) of the American Society of Civil Engineers (ASCE) was one of the co-sponsors of the conference.

Established in January 1996, NACOTA strives to promote transportation development in China by providing technologies and expertise through its members; strengthen the links between transportation professionals and students in North America and their counterparts in China; promote networking among Chinese overseas transportation professionals and students; and disseminate information on transportation developments and major events in China. NACOTA has more than 500 members and friends in North America and other parts of the world. Starting in 2001, NACOTA has collaborated with a number of universities in hosting its annual summer conference in various Chinese cities including Shanghai (2001 and 2007), Nanjing (2002), Beijing (2003), Wuhan (2004), Xian (2005), and Dalian (2006). The 7<sup>th</sup> ICCTP was in conjunction with the 100 year anniversary of Tongji University on May 21 and 22, 2007.

More than three hundred people attended the conference and heard more than 100 presentations among the three main tracks:

- Transportation Planning and Policy
- Traffic Operation and Safety
- Infrastructure/Pavement

In order to preserve the spirit of the conference and promote dialogs among various researchers, scholars, and practitioners around the world, we have selected about two thirds of the best papers to be included in these proceedings.

I would like to thank Mr. Dongyuan Yang, Vice President of Tongji University, who co-chaired the conference with me. Professor Yang has led the collaboration effort with

NACOTA and provided his full support for the 7<sup>th</sup> ICCTP despite his full throttle involvement with the 100 year Anniversary Celebration.

My sincere appreciation goes to a number of administrative and technical leaders in the College of Transportation, Tongji University. Professors Zhongyin Guo, Lijun Sun, Shouen Fang, and Xiaohong Chen, among others, came to Washington DC two years in a row, first to invite the NACOTA delegation to their new Tongji Campus for this conference in conjunction with the 100 year anniversary celebration, and second to pursue me and other key NACOTA members to publish these proceedings. In the end, I would like to say it has been all worth it.

My deepest gratitude goes to my dear friend and mentor, Eva Lerner-Lam. Our breakfast of Chinese crepes with Starbucks coffee in Beijing has “conspired” to produce a number of fruitful projects, including a series of conferences, a transportation glossary, and several potential publications. As the first elected President of T&DI (2005-2006), Eva has trail blazed a series of China initiatives. Her successors, Louis Cohn, Kam Movassaghi, and the T&DI staff Director, Jon Esslinger, are equally enthusiastic and persistent in these efforts. Without their whole-hearted support, these proceedings would not be possible.

I am also indebted to Dr. Jian (John) Lu, the Chair for the Technical Review Committee and its members: Ning Wu, Linbin Wang, Zhongren Peng, Junyi Zhang and Chiapei Chou. Dr. Lu is not only the pillar of the 7<sup>th</sup> ICCTP but also instrumental in organizing all the past NACOTA China conferences.

Last, I would like to acknowledge the dedication and thorough work of Xiaolei Zou, Tongji University. Mr. Zou has painstakingly gone through all the papers, forms, and other administrative tasks, which made my job as the chief editor so much easier and enjoyable.

Finally, it is a great team effort to put the conference and these proceedings together. It would not be possible without the participation and contribution of all conference attendees, particularly our NACOTA delegates. It would be all worthwhile since I am sure much useful information contributing to the areas of transportation infrastructure planning, building and managing will be found here. I hope to see you in Chengdu at the 8<sup>th</sup> ICCTP conference in August 2008, one week before the 2008 Beijing Olympic Games.

Rongfang (Rachel) Liu, Ph.D., AICP, P.E.

President,  
North America Chinese Overseas  
Transportation Association (NACOTA)  
<http://www.nacota.org>

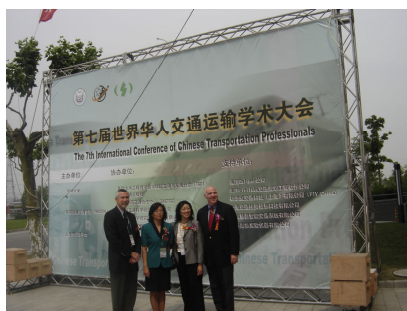
# 海内外共创育人新天地

百年  
风雨  
同舟  
共济

**The surrounding antithetical couplet was composed by Dr. Rongfang (Rachel) Liu, President of NACOTA, to celebrate the 100 Anniversary of Tongji University and the opening of the 7<sup>th</sup> International Conference of Chinese Transportation Professionals in Shanghai, May 2007. A brief translation is: the wise and experienced Tongji University, celebrating her 100 year birthday, and NACOTA, a 10 year old youth and energetic organization, will work together in China and internationally to educate the future generations of transportation professionals.**

十  
龄  
学  
童  
齐  
心  
协  
力





During and After Conference Tour



# Contents

## *Transportation Planning and Policy*

<b>Brief Introduction of the Shenzhen Urban Transport Simulation System .....</b>	<b>1</b>
Dongyuan Yang, Xiaohong Chen, Qun Lin, Hangfei Lin, and Zhichao Guan	
<b>Estimating Congestion Index at the Link Level with TransCAD GIS .....</b>	<b>7</b>
M. Zhang and T. Lomax	
<b>Planning Bicycle Corridor for Shanghai Central City .....</b>	<b>18</b>
Xiaohong Chen, Wen Xiong, and Zhaoyi Huang	
<b>Transportation Planning: Travel Demand Modeling Forecast Model Conversion from TransCAD to Cube Voyager .....</b>	<b>30</b>
Ka-Fai Wong	
<b>Design and Development of Planning a Decision-Oriented Transport Information Platform .....</b>	<b>43</b>
Hangfei Lin, Chao Yang, and Xiaohong Chen	
<b>An Origin-Based Algorithm for a Combined Distribution, Hierarchical Mode Choice, and Assignment Network Model.....</b>	<b>52</b>
Meng Xu, Hillel Bar-Gera, and Ziyong Gao	
<b>Computing Job Accessibility with Integrated GIS and DBMS.....</b>	<b>58</b>
Jiawen Yang	
<b>Study on the Relationship between Highway Passenger Transfer Terminals Planning and Urban Spatial Development .....</b>	<b>67</b>
Xiucheng Guo, Jun Fan, Shuangyan Chen, Haibo Zi, and Hainan Huang	
<b>Research on the Equivalent Capacity of Urban Streets and Its Validation .....</b>	<b>76</b>
Minhua Shao, Lijun Sun, and Xiaoning Zhang	
<b>A New Braess's Paradox with Queue Spillovers Considering Dynamic User Equilibrium.....</b>	<b>90</b>
Xiaoning Zhang and H. M. Zhang	
<b>Resident Trip Characteristics Comparison in Small Cities between a Developed Zone and a General Developed Zone .....</b>	<b>100</b>
Jian-zhi Gao, Yao Zhao, He-ling Ma, and Zhi-yun Zou	
<b>The Strategies of Multimodal Transport Transfer System for World Exposition 2010 Shanghai Based on Trip Chain Analysis .....</b>	<b>111</b>
Wusheng Liu, Ya Wen, Kefei Yan, and Chaowei Yu	
<b>Harmonious Urban Development and Strategic Transportation Planning in China.....</b>	<b>121</b>
Kuo-Ann Chiao, Xi Zou, and Fei Yang	
<b>Towards a Hub-and-Spoke Network: A Study on the Chinese Mainland Hub Airport Planning .....</b>	<b>134</b>
Bo Zou, Huapu Lu, and Qiang Liu	



<b>Traffic Distribution Forecast of Urban External Traffic Hub Based on Uncertainty .....</b>	<b>147</b>
Shunying Zhu, Juxiang Guan, Wuxiong Peng, and Yuan Xu	
<b>A Land Use Transport Modeling Framework and Its Design and Development for the Province of Alberta .....</b>	<b>159</b>
Ming Zhong, John Douglas Hunt, and John Edward Abraham	
<b>Evaluation of Yangshan International Hub Port Competitiveness for Container Transshipment Business .....</b>	<b>170</b>
Rong Zhang and Tao Chen	
<b>Selective Evaluation of Traffic-Tools Based on Fuzzy Analytic Hierarchy Process .....</b>	<b>184</b>
Jianyou Zhao, Mourong Gao, and Meng Du	
<b>Predicting the Peaking of Holiday Traffic (Victoria Day Example) .....</b>	<b>192</b>
Zhaobin Liu and Satish Sharma	
<b>Research and Application of Cross-Nested Logit Model in Traffic Mode-Split .....</b>	<b>203</b>
Gu Wang, Xiucheng Guo, and Jie Yang	
<b>Study on Effect of Taxi Quantity to Taxi Split Rate .....</b>	<b>213</b>
Chaofan Chang, Baohua Mao, and Tuansheng Chen	
<b>Intermodal Coordination: A Vital Element for the Success of Shanghai Maglev Services .....</b>	<b>222</b>
Rongfang (Rachel) Liu, Yi Deng, and Gao Li	
<b>Research on Basic Concept and Key Technologies of Experimental Traffic System .....</b>	<b>235</b>
Zhizhou Wu and Mei Tong	
<b>Research on Appropriate Road Grade Proportion of Urban Road Network .....</b>	<b>243</b>
Haiyuan Li and Wei Deng	
<b>Bus Transit Service Optimization—State-of-the-Art, State-of-the-Practice, and Challenges .....</b>	<b>254</b>
Fang Zhao	
<b>Price Negotiation Model in E-Commerce .....</b>	<b>268</b>
Jinkai Wang	
<i>Traffic Operations and Safety</i>	
<b>Modeling of Cargo Vehicles Choice in Variable Pricing of Freeways .....</b>	<b>276</b>
Qiaojun Xiang, Yingwei Ren, Jian Lu, and Shourong Wu	
<b>Logical Definition and Application of Expressway Network Guide Sign System .....</b>	<b>288</b>
Yuren Chen, Yueru Wang, and Shaojun Chen	
<b>Research on Pedestrian-Vehicle Collision Model and Simulation Calculation .....</b>	<b>294</b>
Shouen Fang and Junhua Wang	
<b>Safety Evaluation Approach of Highway Intersection .....</b>	<b>301</b>
Li Yuan, Jian Lu, Guoqiang Zhang, and Qiaojun Xiang	
<b>Multi-Objective Transit Route Network Design Using Tabu Search .....</b>	<b>308</b>
Deming Lei and Xinping Yan	
<b>Dynamic Model for Evaluation of Advanced Traveler Information System .....</b>	<b>317</b>
Chao Yang and James Luk	

<b>Feasibilities and Challenges of Probe Technologies for Real-Time Traffic Data Collection .....</b>	<b>328</b>
Kai Liu, Toshiyuki Yamamoto, and Taka Morikawa	
<b>Driving Fatigue Identification Method Based on Physiological Signals .....</b>	<b>341</b>
Zhe Mao, Xin-ping Yan, and Chao-zhong Wu	
<b>Evaluation Model for the Urban Public Transit Network Connectivity Based on Graph Theory.....</b>	<b>352</b>
Xiaoguang Yang, Chao Zhang, and Zhuang Bin	
<b>UCF Driving Simulator's Research and Application in Traffic Safety and Operation.....</b>	<b>360</b>
X. Yan, E. Radwan, M. Abdel-Aty, X. Wang, R. Harb, and C. Santos	
<b>Further Research and Application of Train Interconnecting Network System.....</b>	<b>371</b>
Xi Li, Xiaoning Zhu, and Guoqiang Cai	
<b>Safety Research during Entrance and Exit of Highway Tunnel Based on Drivers' Eye Movement Experiment.....</b>	<b>381</b>
Xiaodong Pan, Zhigang Du, and Zhen Yang	
<b>Safety Analyses at Signalized Intersections: Research Strategies, Modeling Techniques, and Significant Factors.....</b>	<b>389</b>
Xuesong Wang, Mohamed Abdel-Aty, and Xiaohong Chen	
<b>Research on Train Operating Scheme of Intercity Rail Transit .....</b>	<b>401</b>
Xingfang Xu and Jingsong Xiang	
<b>Survey and Analysis of Driver's Response to Dynamic Traffic Information.....</b>	<b>408</b>
Guiyan Jiang, Zuduo Zheng, Zhu Bai, Leilei Dai, and Jiaqi Zhao	
<b>Development of an Application Programming Interface (API) in Simulation to Evaluate Real-Time Signal Control .....</b>	<b>419</b>
Fang Clara Fang	
<b>Non-Motor Vehicle Trip Characteristics and Its Application for Disabusing Related Policies in Shanghai .....</b>	<b>433</b>
Wen Xiong and Xiaohong Chen	
<b>The Application of Combinational Evaluation in Traffic Transfer System Based on Multi-Objective Programming .....</b>	<b>445</b>
Bin Shuai, XiCheng Zhang, and JiangHong Wang	
<b>Performance Measurement on Arterial Roads in Real Time.....</b>	<b>451</b>
James Y. K. Luk	
<b>The Application of Visual Information into Freeway Operating Speed Prediction Modeling.....</b>	<b>465</b>
Zhiqing Yang, Xiaoli Du, and Zhongyin Guo	
<b>Optimizing Passenger Train Services: A Model and a Genetic Algorithm Solution .....</b>	<b>476</b>
Jing Teng, Baoming Han, and Winggun Wong	
<b>Two Proposals for Solution to Transport Problems in Wuhan .....</b>	<b>492</b>
Qi Cheng, Akio Kondo, Akiko Kondo, and Hideaki Shimada	
<b>Optimal Coordination of Artery System Based on Modified Cell Transmission Model and Particle Swarm Algorithm .....</b>	<b>500</b>
Zhengwu Wang, Dayong Luo, and Zhongxiang Huang	