



# ICCREM 2020



## *Intelligent Construction and Sustainable Buildings*

Proceedings of the International Conference on  
Construction and Real Estate Management 2020

Stockholm, Sweden ■ August 24–25, 2020

*Edited by*  
Yaowu Wang, Ph.D.  
Thomas Olofsson, Ph.D.



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## *INTELLIGENT CONSTRUCTION AND SUSTAINABLE BUILDINGS*

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PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON  
CONSTRUCTION AND REAL ESTATE MANAGEMENT 2020

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August 24–25, 2020  
Stockholm, Sweden

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Modernization of Management Committee  
of the China Construction Industry Association

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## Preface

We would like to welcome you to the 2020 International Conference on Construction and Real Estate Management (ICCREM 2020), organized by Harbin Institute of Technology, Luleå University of Technology, Hong Kong Polytechnic University, Louisiana State University, University of Alberta, Guangzhou University, Marquette University and Nottingham Trent University. The Conference is a continuation of the ICCREM series which have been held annually since 2003.

The theme for this conference is “Intelligent Construction and Sustainable Buildings”. It especially highlights the importance of sustainable development of construction industry and aims to advance the progress of intelligent construction theories and technologies. The conference proceedings include 110 peer-review papers covered thirteen important subjects. And all papers went through a two-step peer review process. The proceedings of the congress are divided into four parts:

- Intelligent Construction and Construction Informatization
- Green Construction and Sustainable Buildings
- Project Management and Construction Industrialization
- Construction Industry and Knowledge Management

On behalf of the Construction Institute, the American Society of Civil Engineers and the 2020 ICCREM Organizing Committee, we welcome you to participate in the conference and wish you leave with a wonderful experience and memory at ICCREM 2020.

**Professor Yaowu Wang**

Harbin Institute of Technology  
P. R. of China

**Professor Thomas Olofsson**

Luleå University of Technology  
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# Acknowledgments

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