# Congress on Technical Advancement 2017

## **Cold Regions Engineering**

Proceedings of the 17th International Conference on Cold Regions Engineering Presented at the First Congress on Technical Advancement

Duluth, Minnesota, USA 10 – 13 September 2017

**Editor:** 

Jon E. Zufelt

ISBN: 978-1-5108-4979-2

#### Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2017) by American Society of Civil Engineers All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact American Society of Civil Engineers at the address below.

American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 USA

Phone: (800) 548-2723 Fax: (703) 295-6333

www.asce.org

#### Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA

Phone: 845-758-0400 Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com

### **Contents**

Effect of the Presence of Pre-Service Construction Cracks in
Concrete Decks on the Thermal Profile of Composite Steel-Concrete
Bridges in Cold Regions
Omar Y. El Masri and Caesar Abi Shdid
Opportunities for Increased Utilization of Geothermal Resources in the
United States1
Gretchen E. Schimelpfenig
Effect of Diamond Grinding on Pervious Concrete2
B. I. Izevbekhai
Effects of Aggregate Thermal Contraction Properties on Asphalt Mixture's
Thermal Properties and Low Temperature Performance3
Moses Akentuna and Sang-Soo Kim
Bagged Reinforced Concrete Shaft in Saline Soils in Cold Regions5
Yu Zhang, Jianhong Fang, Zhaohui (Joey) Yang, and Jiankun Liu
The Use of Electrical Resistivity Methods for Ground Ice Characterization
for Engineering59
Kevin Bjella, Misha Kanevskiy, and Kenneth Hinkel
Internal Observation of Soil in Frost Heave Process Using the X-Ray
CT Scan
Baiyang Song, Dai Nakamura, Takayuki Kawaguchi, Shunzo Kawajiri,
Satoshi Yamashita, and Dahu Rui
Haughton-Mars Project at 20: Challenges and Designs for
Future Exploration79
Sarah J. Seitz and Brian J. Glass
Evaluation of a Simulated Roadway Weather Information System's
Pavement Temperature Data in Illinois9
Wouter Brink, Carmine Dwyer, Gregg Larson, and William Vavrik
Methods and Quality of Embankments Constructed in Winter
Atsuko Sato, Toshihiro Hayashi, Teruyuki Susuki, and Shinichiro Kawabata
Numerical Modeling of Electrically Conductive Pavement Systems11
S. M. Sajed Sadati, Kristen Cetin, and Halil Ceylan

Frost Resistance of High Early-Age Strength Concretes for Rapid Repair123 Matthew Maler, Meysam Najimi, and Nader Ghafoori
Frost Resistance of Self-Consolidating Concrete Containing Natural
Pozzolan
Meysam Najimi, Monammad Reza Sharbar, and Nader Gharbori
Estimating Liquefaction Potential of Thawing Permafrost Soils, an
Evaluation of Frozen and Recently Thawed Soils141
John D. Thornley, Nick Moran, Andrew Daggett, and Thomas G. Krzewinski
Thermosyphon Design for a Changing Arctic151
Edward Yarmak and Jason T. Zottola
Stress Analysis of the Phoenix Compacted Snow Runway to Support
Wheeled Aircraft161
Ariana Sopher and Sally Shoop
Thermal Evaluation of Common Locations of Heat Loss in Sandwich
Wall Panels
Taylor Sorensen, Sattar Dorafshan, and Marc Maguire
Wear of Steel and Heavy Duty Coating Caused by Friction of Sea Ice185 S. Kioka, N. Maruta, and T. Takeuchi
On the Thickness of Sacrificial Steel Wall for Protection of Sea Ice
Action
T. Takeuchi, S. Kioka, and H. Miyazaki
Comparing Ground Snow Load Prediction Methods in Utah207
Brennan Bean, Marc Maguire, and Yan Sun