A SYSTEMATIC APPROACH FOR LOCATING ROAD WEATHER INFORMATION SYSTEM (RWIS) STATIONS IN CANADA

Tae J. Kwona, Liping Fu, Max S. Perchanokb and Heather McClintockb

Innovative Transportation System Solution (ITSS) Lab, Department of Civil & Environmental Engineering, University of Waterloo. bOntario Ministry of Transportation.

Introduction

BACKGROUND

North American transportation agencies expend more than $3.3 billion dollars annually on various winter road maintenance (WRM) activities to keep roads safe and mobile.

RESEARCH MOTIVATION & OBJECTIVE

RWIS stations are COSTLY to install and operate, and can only be installed at a LIMITED number of locations. Therefore RWIS stations then must be placed STRATEGICALLY to provide most INFORMATIVE inputs.

The primary objective is to construct a systematic approach for determining the candidate RWIS station locations at the regional level.

“A Good” Locations?

Weather-related factors

- Intuitively, RWIS stations should be placed to areas that experience severe yet less predictable weather patterns.

Traffic-related factors

- Intuitively, RWIS stations should be placed to areas with a greater number of road users and a higher chance of accidents.

Methodology

Creating Regional Base Grid

Identifying Highway Segments

Locating Potential Locations

Weather Factors

Traffic Factors

Analysis of Alternatives

Evaluation

Alternative I: Weather Factors Combined

Percent of Matching with Ontario RWIS Network: 26%

Alternative II: Traffic Factors Combined

Percent of Matching with Ontario RWIS Network: 71%

Alternative III: Weather & Traffic Factors Combined

Percent of Matching with Ontario RWIS Network: 66%

Conclusions

- Alternative 1 is more focused on the northern region comprising of highly varying weather conditions.
- The high matching rate of the alternative 2 indicates that the current RWIS network has been set up in such way that it predominantly considers the need of covering the road network.
- The alternative 3 well balances the limitations of the first two alternatives by showing the potential candidate RWIS locations across the whole province.
- The proposed framework is easy to apply when planning a RWIS network expansion by introducing different weights to individual criteria based on their importance.

Acknowledgements

The authors wish to acknowledge Mary Anne Grespsma, Bill Harrett, and Laura Kingston at the Ontario Ministry of Transportation, and Steve Xu at the Geospatial Lab at the University of Waterloo.