

In-situ Soil Thermal and Hydraulic Data From Subgrade Sensor Network Under Granular Roadway in Hamilton County

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Granular-surfaced roads play significant roles that contribute towards accessibility and the economy within the State of Iowa. However, severe damage routinely occurs under such roadways due to the presence of water and effects of seasonal freeze-thaw cycles. As part of a detailed study on the monitoring and prediction of frost depth for granular roads, a weather station and a monitoring system with a total of 80 temperature, moisture, and matric potential sensors were installed under a granular-surfaced roadway in Hamilton County. The sensors extend to a depth of 7 ft in five boreholes which are located under the centerline, shoulders, and quarter points of the roadway. In this presentation, freeze-thaw characteristics are identified for the project site using the monitoring data collected in the winter and spring of 2018-2019. The soil thermal and hydraulic properties are predicted using the in-situ data and compared to laboratory tests, and their variation across the roadway cross-section is also examined. The recorded weather station data is compared with the closest road weather information system (RWIS) data and the observed freeze-thaw characteristics of the subgrade to better understand the response that occurred under the roadway.

Keywords: granular roads; freeze-thaw cycles; soil thermo-hydraulic properties