Master's Thesis

Design optimization of ground freezing: A case study for the Wehrhahn Line in Düsseldorf

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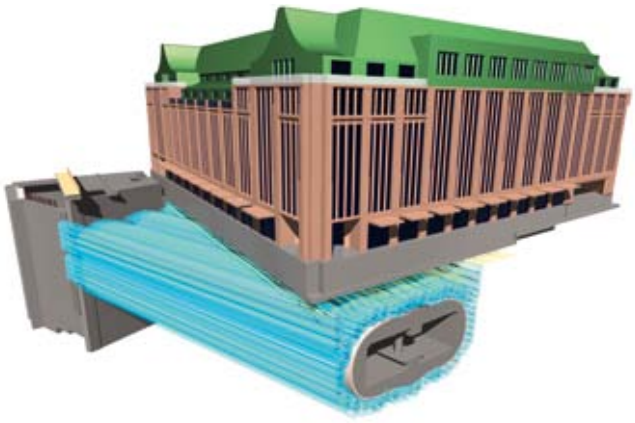

Background: When contructing the Wehrbahn Line in Düsseldorf at the intersecting Heinrich-Heine-Allee Metro Station, the undertunneling of the Galleria Kaufhof on the Königsallee becomes the most challenging phase of the whole project. Artificial ground freezing (AGF) was applied during tunneling for excavation support and groundwater control. Moreover, more economic and cost effective solutions can be obtained by incorporating design optimization with the numerical analysis, such as the Ant Colony Optimization method.

Task: Within this master thesis the following tasks are to be completed:
-- Study the existing THM coupled freezing soil model.
-- Study the existing Optimization Algorithm.
-- Optimize the ground freezing process by presenting a cost effective arrangement of freeze pipes
-- Comparative study of the simulation results for the original and optimized pipe placements.

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