Abstract

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Optimal Construction Facilities Location Selection for Linear Infrastructure Projects

Planning an efficient site layout for construction projects is an important task to ensure safety and productivity of construction operations. Existing models focus only on optimizing site layout of confined construction sites. As opposed to previous work, this paper optimizes site layout for linear infrastructure projects in crowded and congested inner cities roads (i.e., road maintenance, pipeline installations, etc.). These projects are characterized by frequent changes of construction site location as the work progresses. Therefore, Selecting Construction Facilities Locations (CFL) is a major problem prior to organizing these facilities. The presented work introduces an optimization tool via Uniform-Cost Search (UCS) that optimizes CFL Selection in inner-cities crowded and congested roads considering the progress of work throughout the segments of the project. The developed model Selects the optimal CFL through minimizing the (1) resources transportation cost, (2) land renting cost, and (3) facilities relocation cost. The proposed model is coded in Java using NetBeans IDE 8.1 platform. A hypothetical case study with a solution space of 243 solutions was conducted to test the model's limits and demonstrate its beneficial usage. The model succeeded in finding the optimal CFL for each segment of the road in under 1100 milliseconds seconds using an 8GB Ram, 2.00GHz machine. The proposed model can be integrated into the planning and site layout decision making processes for linear infrastructure projects to reduce the overall site layout cost and maintain adequate site conditions while reducing the interruptions in road utilization.