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Building Capacity and Personnel Flow Modeling for Operating amid COVID-19

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Abstract : The COVID-19 pandemic has spread across the United States, forcing cities to impose stay-at-home and shelter-in-place orders. Building operations had to adjust as non-essential personnel worked from home. But as buildings prepare for personnel to return, they need to plan for safe operations amid new COVID-19 guidelines. In this paper we propose a methodology for capacity and flow modeling of personnel within buildings to safely operate under COVID-19 guidelines. We model personnel flow within buildings by network flows with queuing constraints. We study maximum flow, minimum cost, and minimax objectives. We compare our network flow approach with a simulation model through a case study and present the results. Our results showcase various scenarios of how buildings could be operated under new COVID-19 guidelines and provide a framework for building operators to plan and operate buildings in this new paradigm.

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