Public Abstract
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Due to rising healthcare costs, it is increasingly important to design health care buildings to be efficient and effective. One aspect of a healthcare facility's design is the size and layout of the building and departments. In this paper we review hospital design and the various layout methods that can be applied to hospitals. We formulate a mixed-integer linear programming model to determine the optimal size (i.e. width and length of each floor and number of floors) and department layout of a hospital. The model has multiple objectives; we consider department size requirements to determine a cost-efficient facility size and then place departments to minimize inter-departmental flows. Finally, we use the model to design a multi-floor hospital with seven departments and test the computation time for a variety of scenarios.

The Energy Policy Act of 2005 specifies that all traffic signals manufactured after January 1, 2006 must realize the energy efficiency achieved by LED technology [10]. These new LED traffic signals use less energy and last longer than their predecessors, but they deteriorate gradually and require customized maintenance schedules to optimize their useful life and maximize public safety. In the second half of this paper we review the advantages of LED traffic signals and the current literature on their maintenance. We present three models and algorithms to compute optimal maintenance schedules. The first model is designed to model routine maintenance and includes routing costs. The second model is an approximation of the first model that can be solved for scenarios which include very large quantities of traffic signals. The final model allows for two actions, inspection and replacement, and introduces stochastic deterioration. We test the computation time of each algorithm and assess the resulting schedules.