Design of a Vertiport Design Tool

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Abstract: Advances in technology are enabling the deployment of an Urban Air Mobility (UAM) transportation system for congested metropolitan areas. A key element of UAM are vertiports, the infrastructure that electric vertical takeoff and landing vehicles (eVTOLs) use to land and take-off. A Vertiport Design Tool (VDT) was developed for use by architecture firms designing vertiports to evaluate operational trade-offs between vertiport surface area and vehicle throughput. A stochastic Monte Carlo simulation was developed to calculate vehicle throughput for different vertiport design alternatives, safety risk, and noise constraints. Results show that for every 420 m2 increase in vertiport surface area, the throughput increases by one vehicle per hour while the smallest allowable vehicle interarrival rate decreases by 5 minutes. Complex designs with staging areas decrease throughput but improve safety risk.

Keywords: Urban Air Mobility, Stochastic Simulation, eVTOL, Vertiport Operations