

Design of a Rapid, Reliable Urban Mobility System

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Abstract: The Washington D.C. region is ranked 5th in the U.S. by GDP per capita and 3rd worst for traffic congestion. A confluence of technological advances enables Urban Air Mobility (UAM) transportation systems to bypass road congestion and transport passengers in electric Vertical Takeoff and Landing vehicles. Analysis of travel demand profiles have identified the initial phase of a Rapid, Reliable Urban Mobility System (RRUMS) for the D.C. Region servicing private jet owners and first-class passengers from local airports to and from central business districts, assuming relaxed aerial vehicle and FAA restrictions. A stochastic simulation with random variables for vehicle speed, boarding times, vertiport operation times, and passenger inter-arrival times identified the need for 30 vehicles creating an average vehicle inter-arrival time of 13 minutes and passenger waiting time averaging 5 minutes. A Return on Investment of 16.6% can be achieved in 8 years on an investment of \$166M.

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