

## **Abstract**

Electric Transport 1 is a fully electric urban air motility vehicle designed for the San Francisco Bay Area by Urban Flight Operations. ET1 will carry one pilot and 2 passengers through typical San Francisco weather such as thick fog, rain, and high winds. Major design decisions were made after conducting trade studies analyzing competing aircraft as well as a review of relevant academic texts. Computational aerodynamic and fluid dynamic techniques were used to determine and optimize key design parameters of ET1. ET1 maximizes efficiency in an urban environment by using a tilting tandem wing system to reduce the overall wingspan, allowing flight in smaller spaces. ET1 has a total of eight rotors, four sets of coaxial contra-rotating props, mounted on the wings that provide both lift during takeoff and thrust during cruise. The wings tilt up into rotorcraft configuration during vertical takeoff and landing, then drop to the fixed-wing configuration during cruise in order to maximize efficiency while eliminating the space requirements associated with runways. ET1 flies at an altitude of 4,000 ft, cruising at 110 mph for ranges as far as 50 miles in windless conditions with a full payload of 650 lbs, with an additional 30 miles of reserve range. ET1, fully loaded, has a maximum take-off weight of 4,625 lbf. This range allows ET1 to reach across the most heavily populated areas of the San Francisco Bay without a need for recharging. ET1's high cruise efficiency and quick vertical takeoff, stable OEI condition and favorable cruise speed make it stand out against other short-range aircraft, which are usually optimized for either cruise or vertical take-off and landing. The approximate cost of a 50-mile trip would be around \$300 for a ride carrying a single passenger, depending on current cost of electricity and other external factors.