

Design Objectives

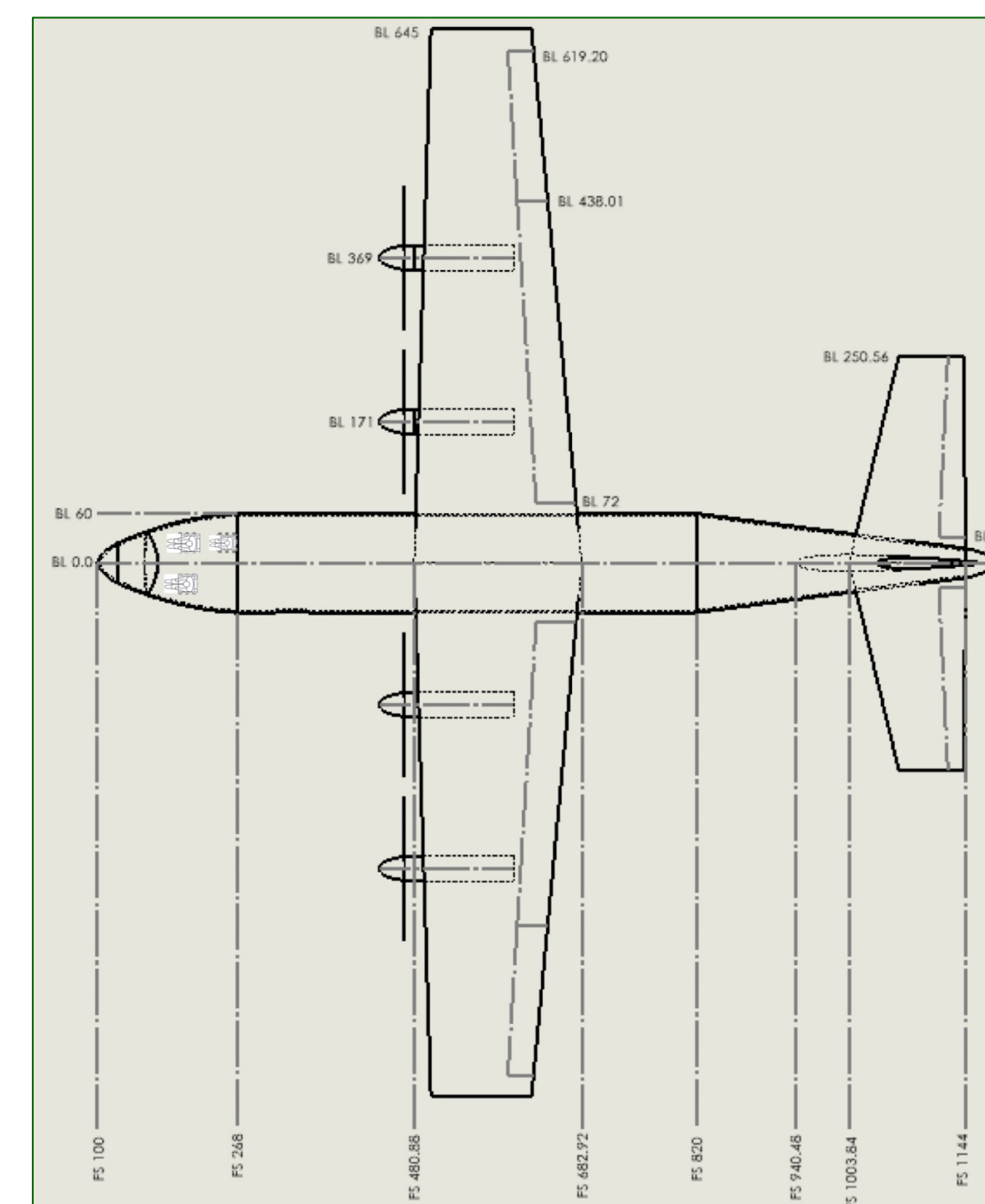
Objective: to develop an innovative, cost effective, and energy efficient solution to the increasing demand of fighting wildfires.

The aircraft utilizes Phos-Chek WD881 contained in a Modular Airborne Firefighting System (MAFFS 1) pressurized tank. Retardant is a more effective method of firefighting because it creates a barrier between fuel and fire, allows firefighters to see areas of application, and reduces the amount of water required.

The aircraft is also capable of transporting two *S300 Heavy Lift Firefighting Drones*. The drones each carry four 25kg bombs, which consist of a water-gel extinguishing agent or powder retardant. This additional capability allows for the aircraft to complete a wider range of missions and be more efficient in firefighting.

The aircraft category was selected to be Military Transport. Historical data for analysis was selected based on values for the Lockheed C-130. This aircraft was designed assuming the conditions of STD HOT.

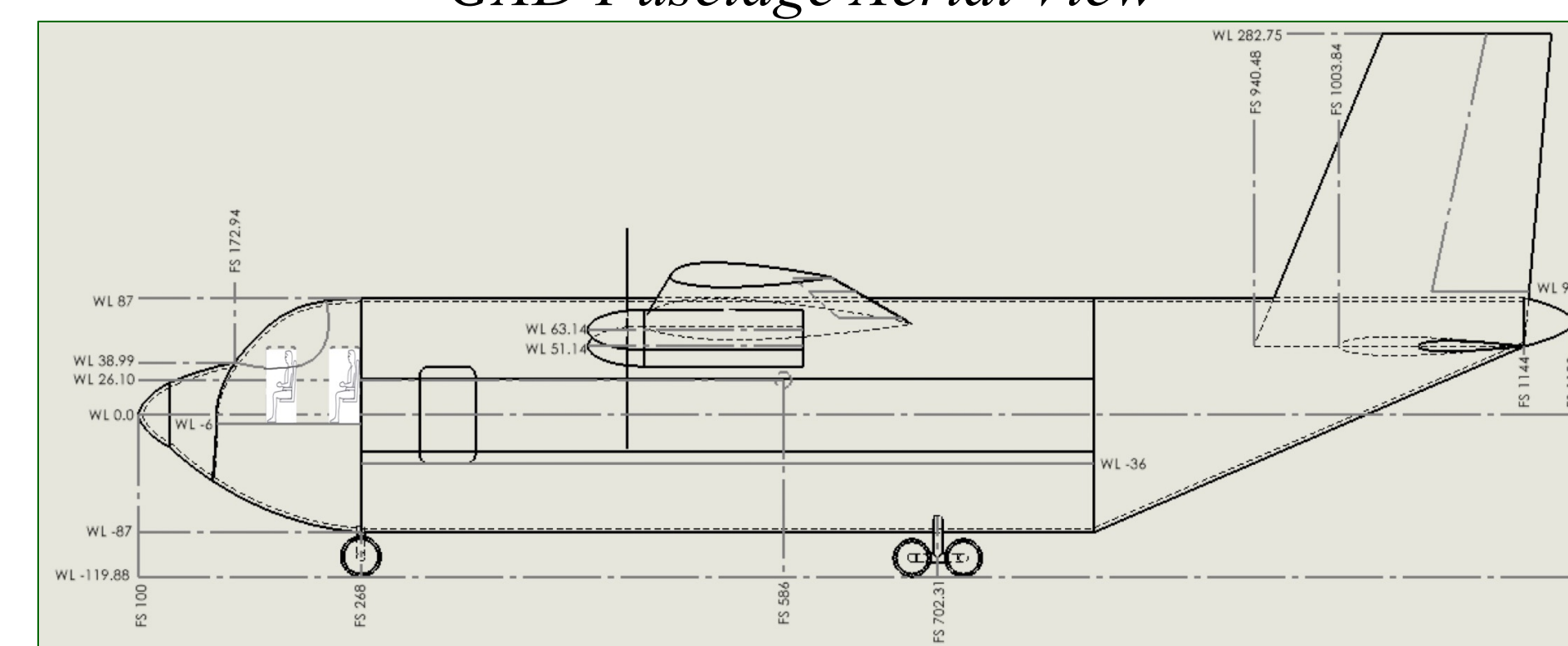
Final Design



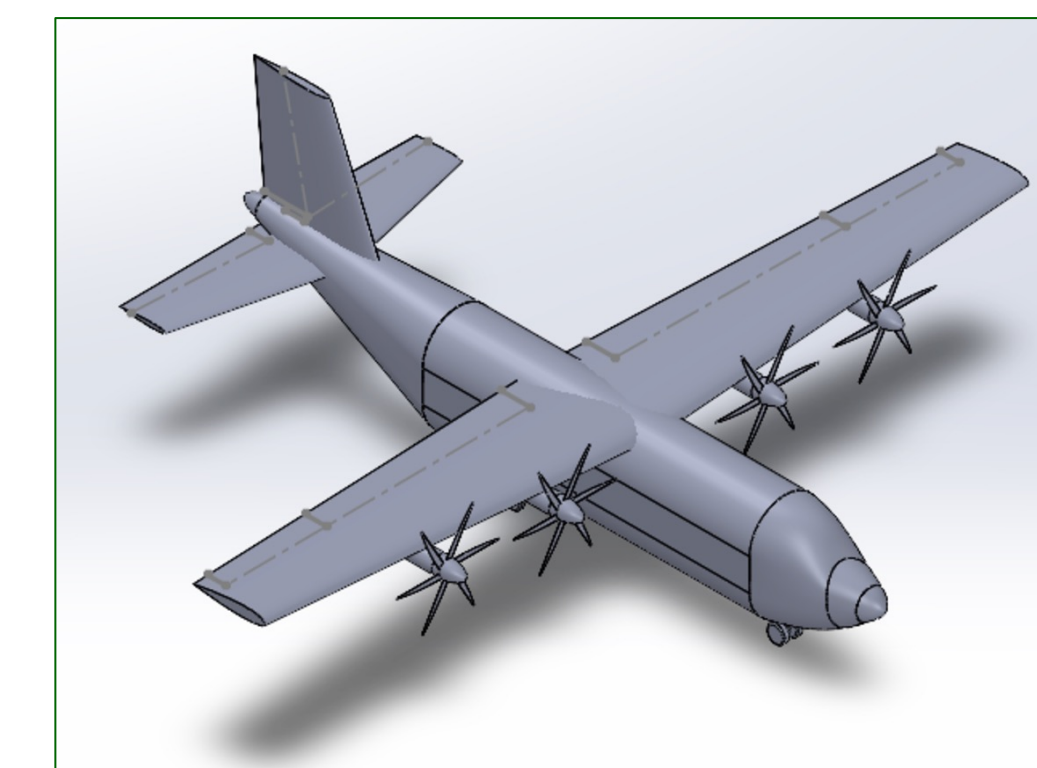
GAD Full Aerial View



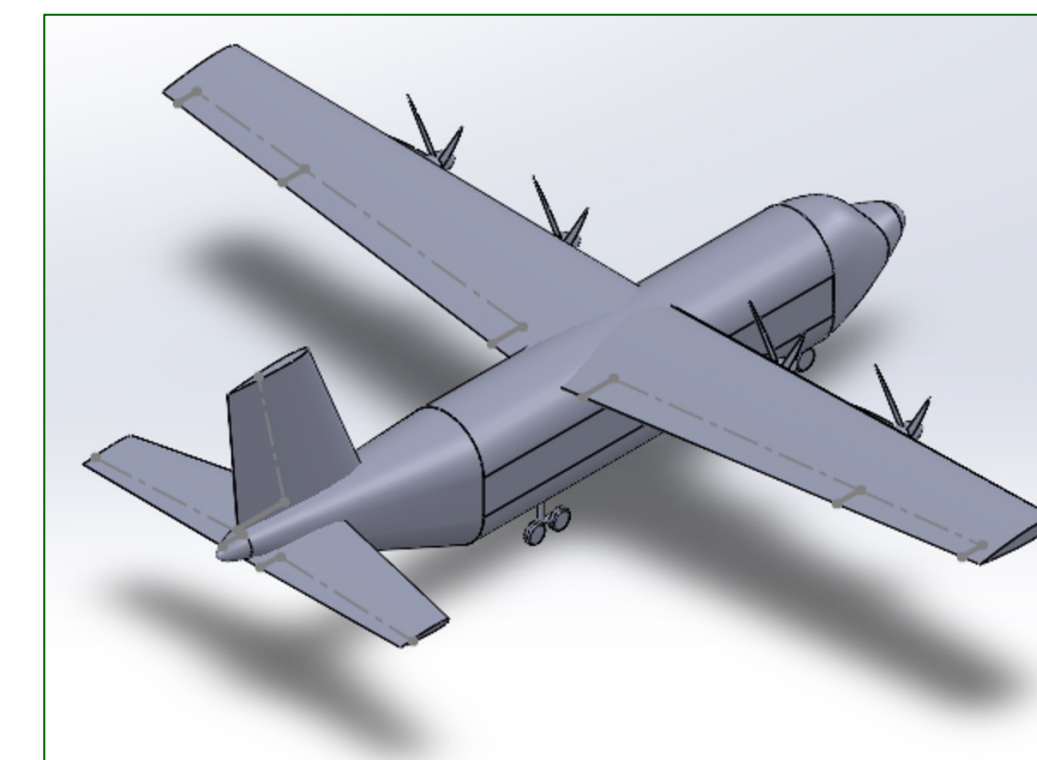
GAD Fuselage Aerial View



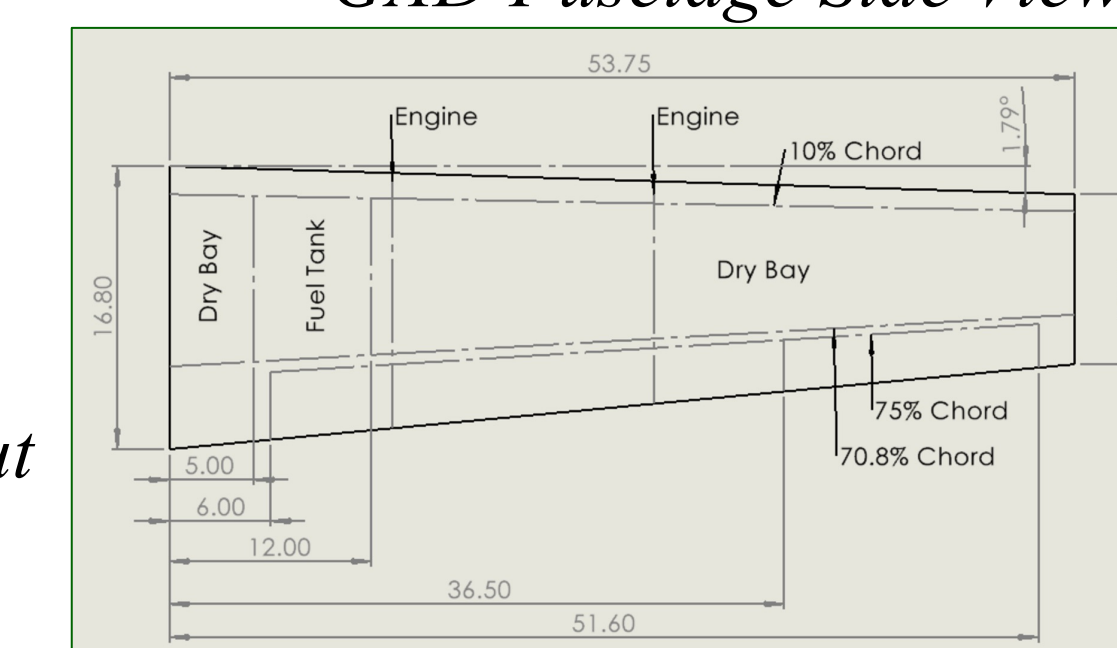
GAD Fuselage Side View



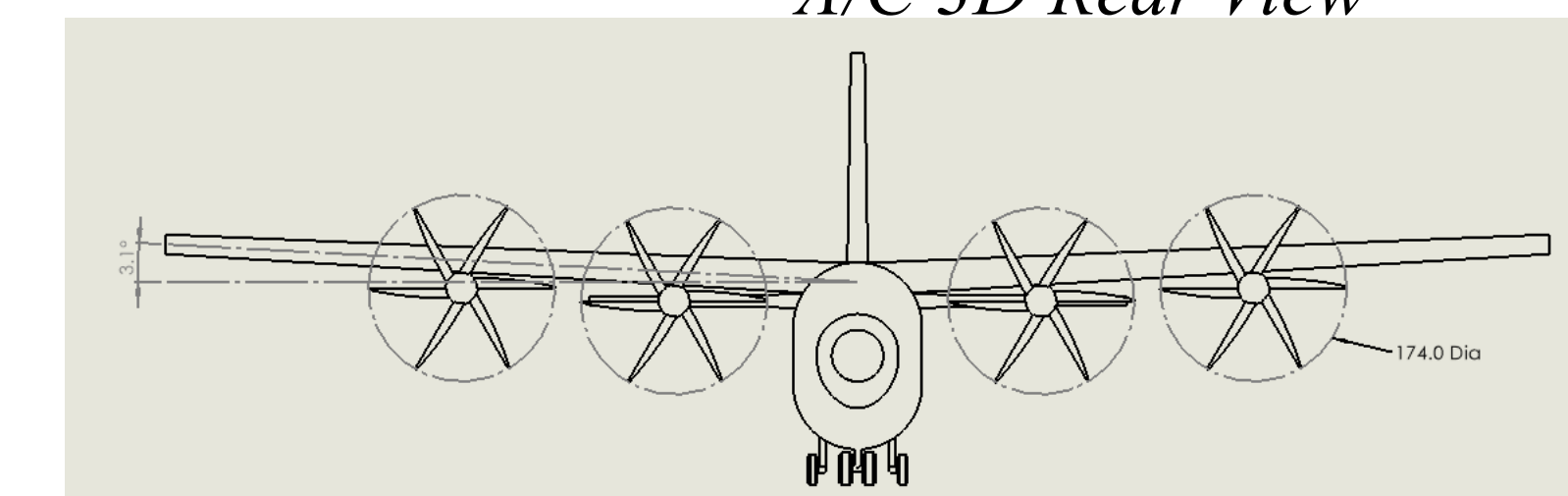
A/C 3D Front View



A/C 3D Rear View



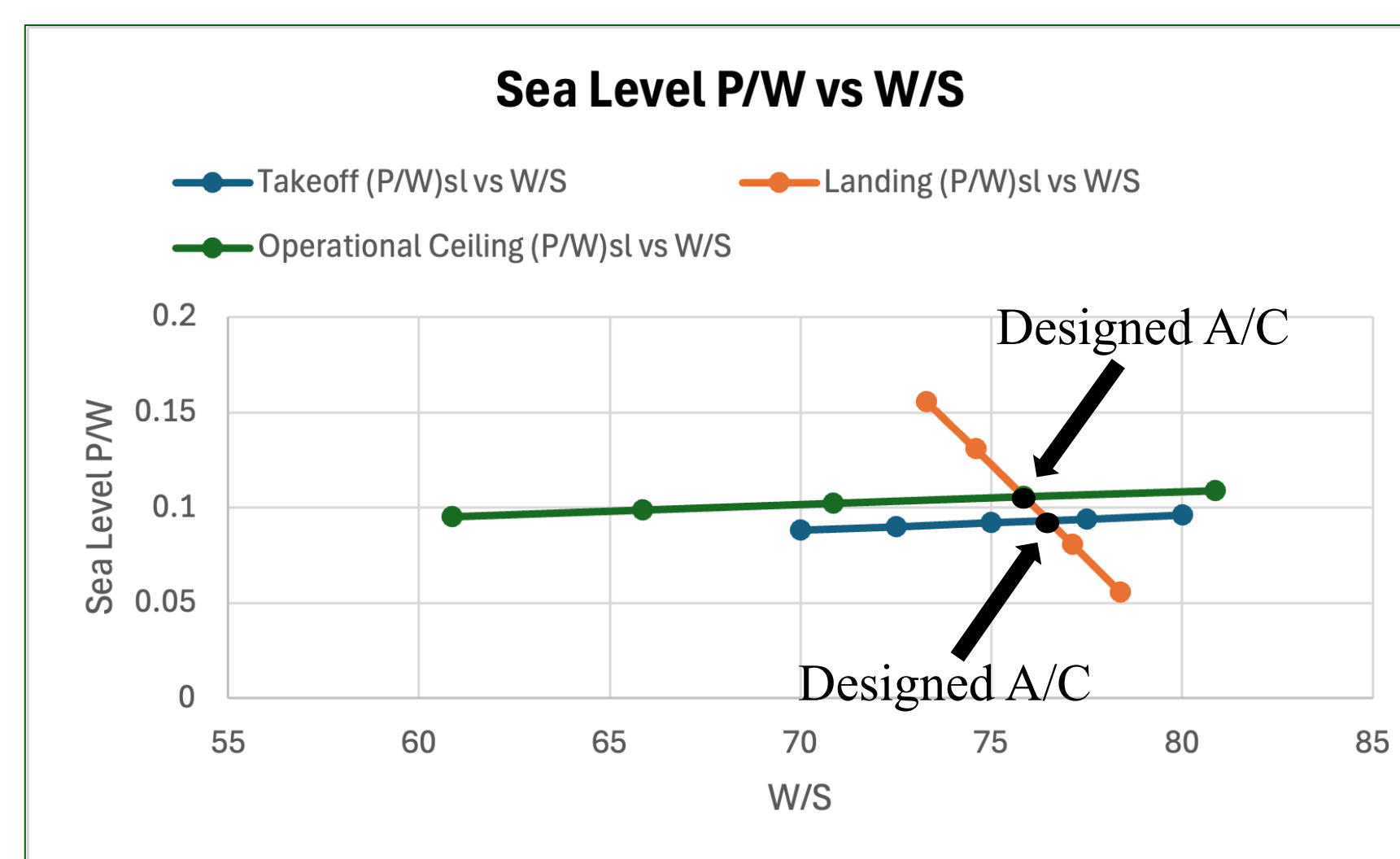
GAD Wing Layout



GAD Fuselage Front View

Design Calculations & Analysis

Parameter	Description	Value
b	Wingspan	107.5 ft
S	Wing Area	1,444.4 ft ²
AR	Aspect ratio	8.0
P/W	Power to Weight Ratio	0.1057 HP/lb
W_{TO}	Total Takeoff Gross Weight	106,162 lb
W_{empty}	Empty Weight	58,041 lb
$W_{payload}$	Payload Weight	35,921 lb
W_{fuel}	Fuel Weight	12,200 lb
GF	Growth Factor (Risk: Moderate)	2.955

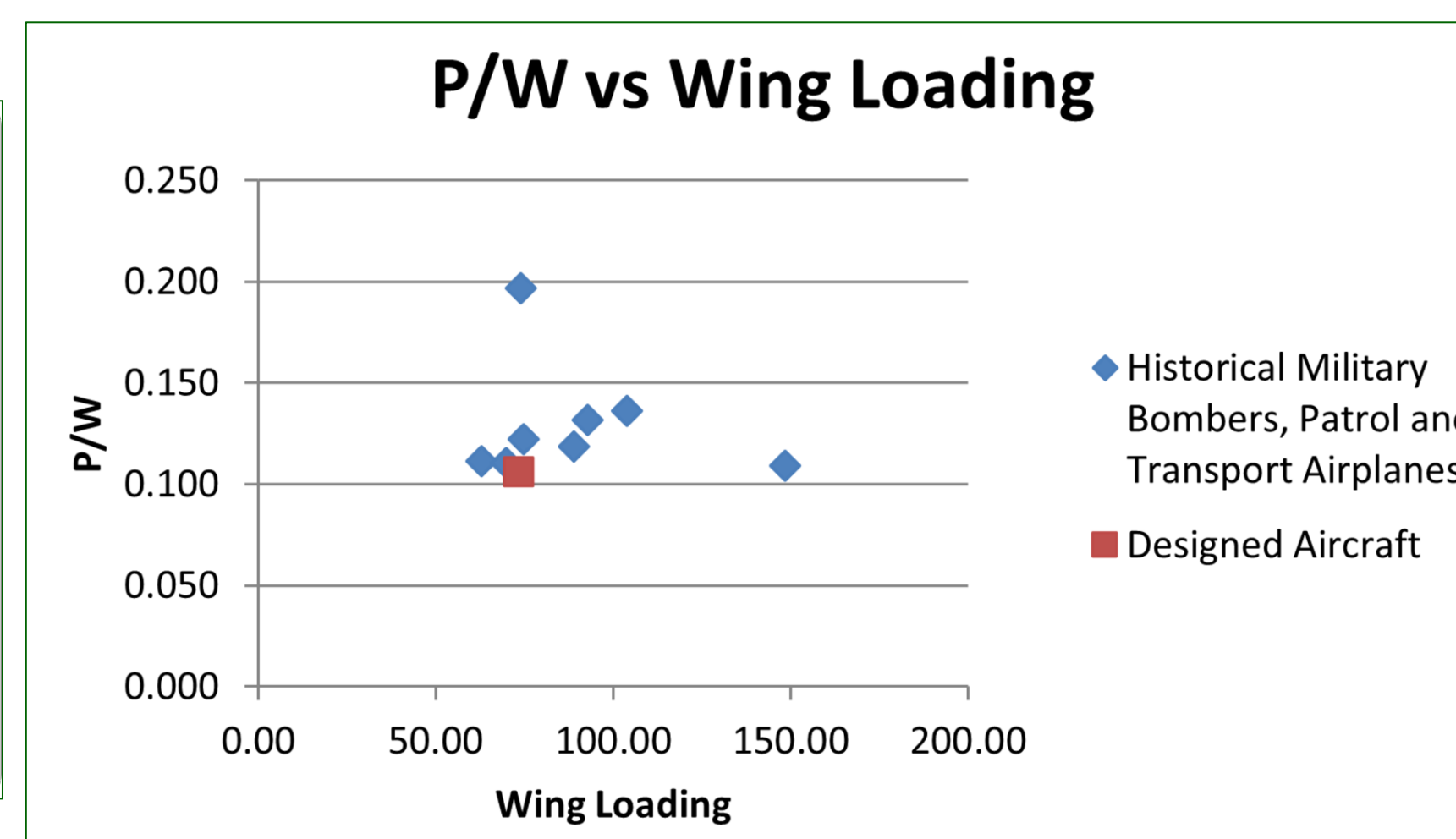
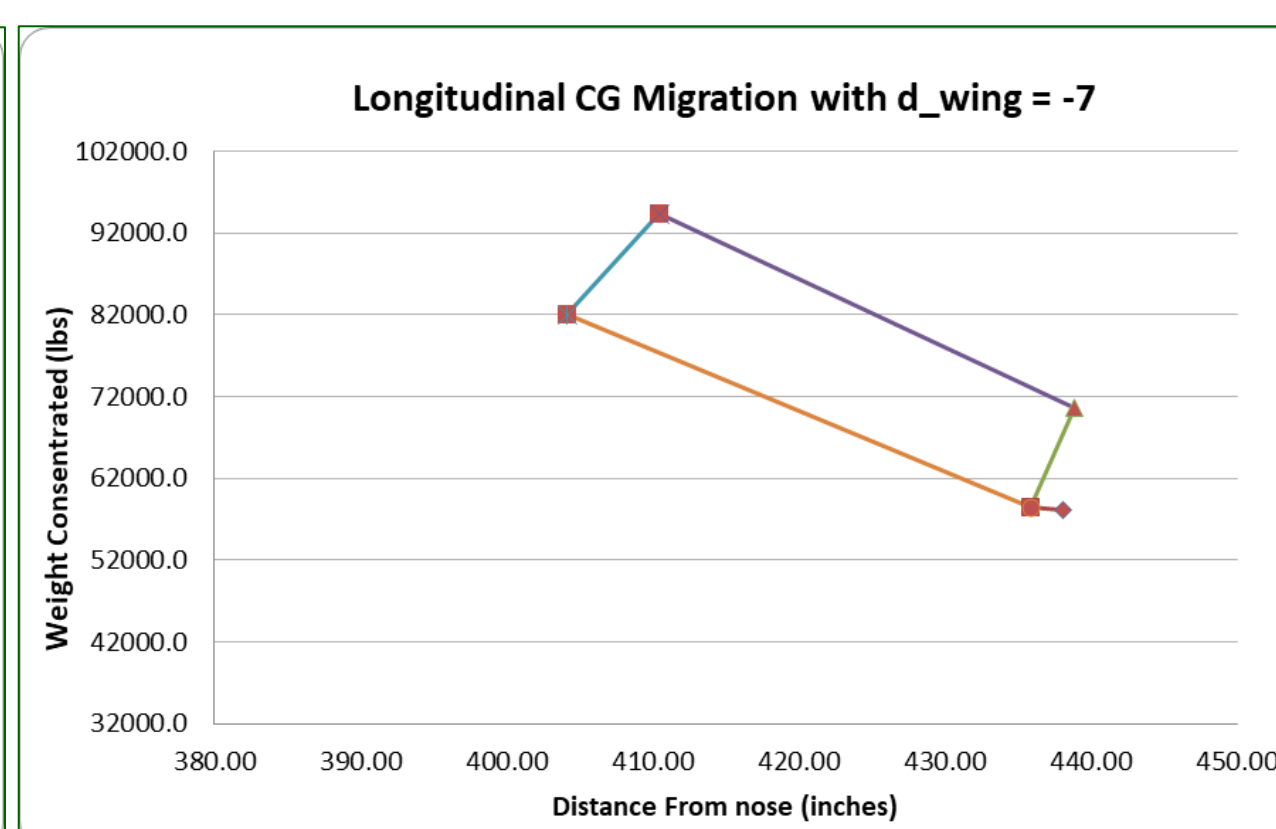
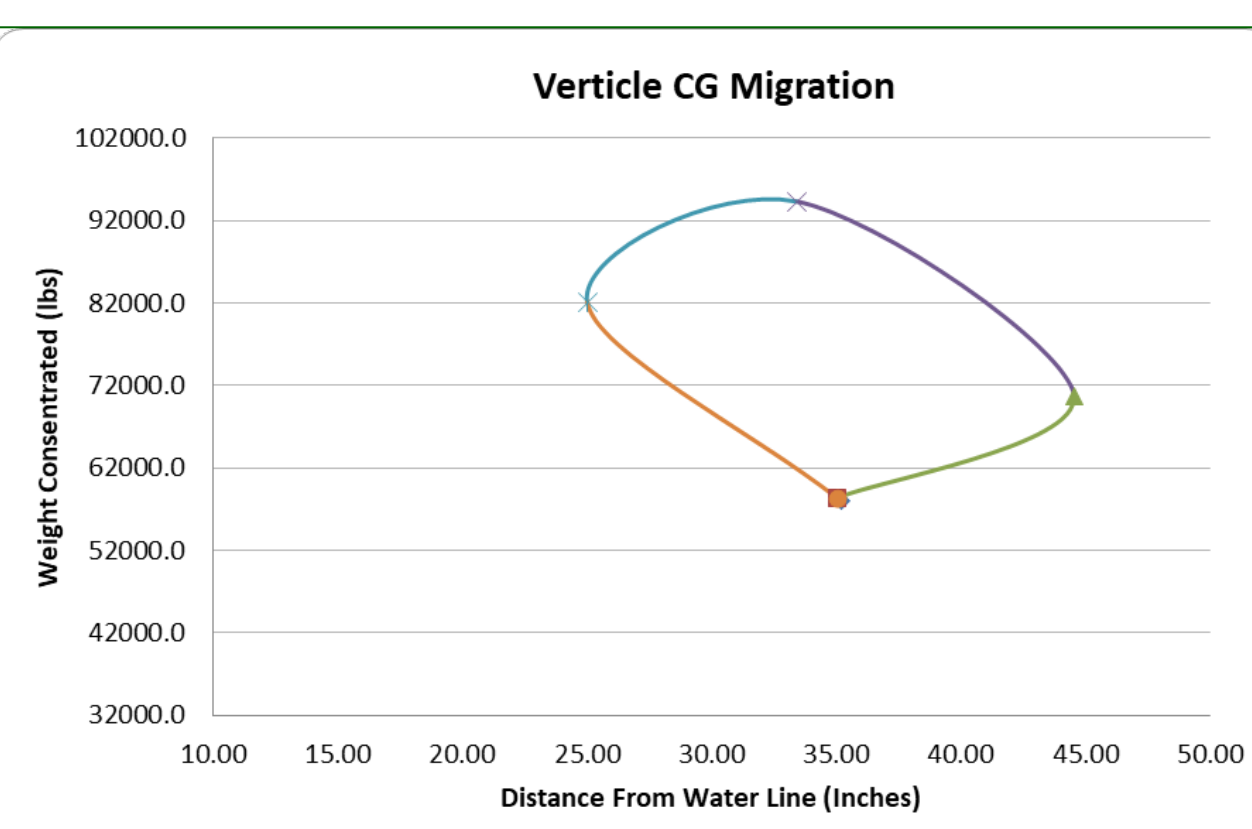
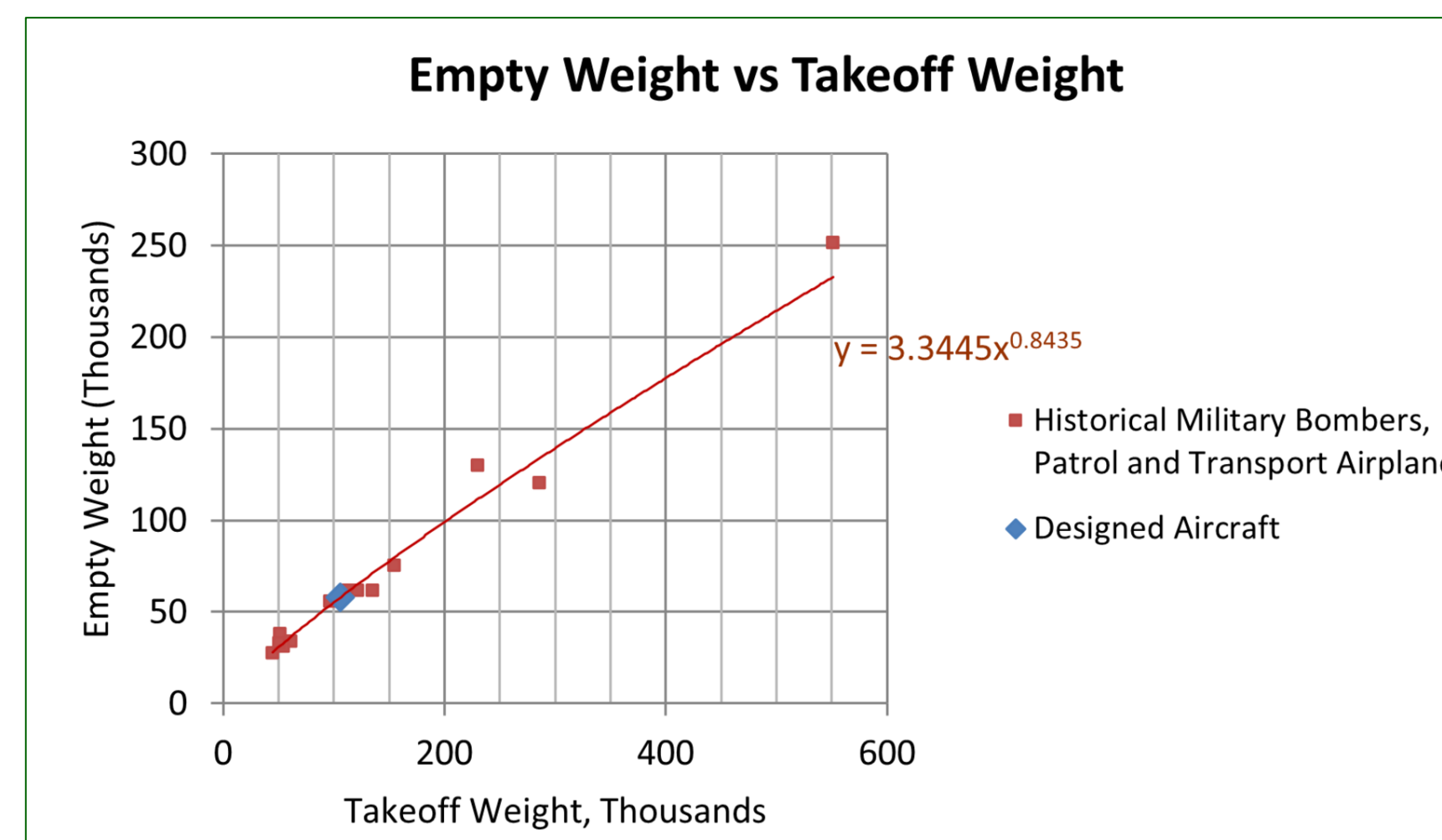


Payload Weight Breakdown

Component	Weight (lb)
PHOS-CHEK WD881	23,031 (2,694 gal)
Crew	200 x 3
Crew Baggage	30 x 3
MAFFS 1 Tank	10,500
Safety Equipment	1,000
S300 Heavy Lift Drones	330 x 2
Steel Cable (Drone Securement)	40

Engine: GE-CT64-820-4

Parameter	Description	Value
P	Power Provided	11,221 HP
P_{excess}	Excess Power Provided	10.46%
SHP	Shaft Horsepower	3,133 HP
SFC	Specific Fuel Consumption	0.486



Results

Additional Capabilities: This aircraft is compatible with the folded *S300 Heavy-Lift Firefighting Drone*. These drones utilize four 25kg fire-extinguishing bombs for rapid and precise fire suppression. The aircraft can transport a maximum of two drones, which then are capable of autonomously navigating to mission sites.



- Fleet Size: 30 A/C
- Crew: Captain, First Officer, Load Master (90 crew total)
- Takeoff Speed: 130 kts
- Landing Speed: 110 kts
- Stall Speed: 90 kts
- Cruise Speed: 225 kts
- Mission Time: 2h 57 min (round trip)
- Fuel: 1,857 gal of Jet A1
- Refuel Time: 9-15 min (post mission)
- Retardant: 2,694 gal of Phos-Chek WD881
- Retardant Refuel Time: 15-19 min (post mission)
- TAT: ~45 min

