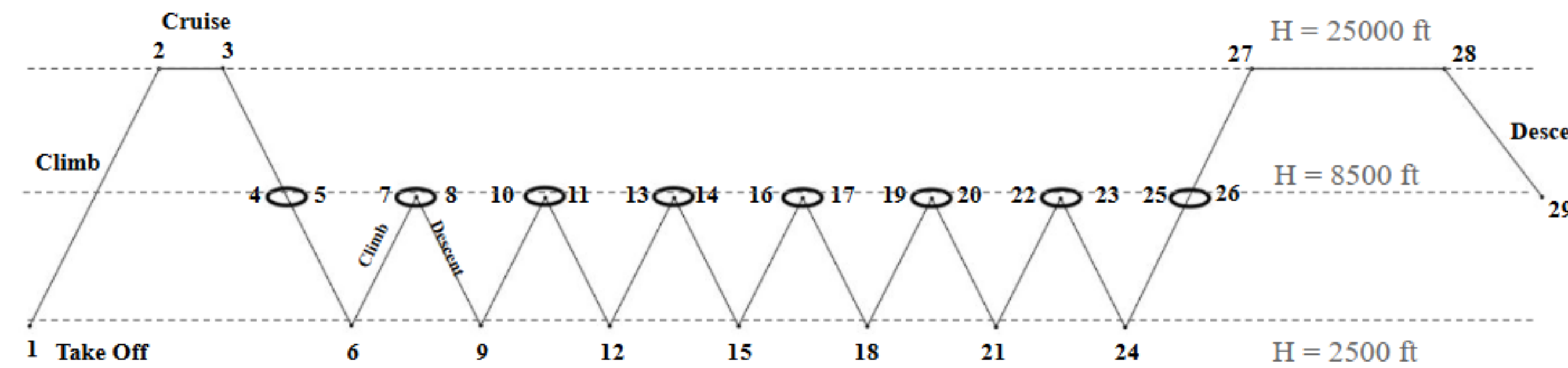


Problem Definition

Modern aerial firefighting aircraft are limited in their ability to suppress wildfires due to the need to land and resupply water. As climate change increasing the frequency and intensity of wildfires, there is a growing need for more advanced and adaptable firefighting solutions.

The Amphibious Firefighting Aircraft is designed to refill directly from nearby lakes or reservoirs, significantly reducing turnaround time and improving efficiency. Its amphibious capabilities enables it to operate from runways, grass airfields, or open water, providing flexibility across a wide range of scenarios. With a high payload capacity, quick servicing, and extended endurance, this aircraft enhances the effectiveness of aerial firefighting efforts.

Performance and Metrics



Mixed Fire-Retardant Payload Breakdown	
Parameter	Value
Number of Drops w/ Retardant	5
Total Mixed Retardant Volume	3,529.16 gal
Dry Powder Concentrate Weight per Drop	3,352.70 lb
Dry Powder Concentrate Weight Total	13,410.80 lb
Water Weight	20,116.20 lb
Water Volume	2,412.04 gal

- Scoopers** under the wings pick up the water in under 20 seconds
- Phos-Chek** is stored separately and mixed into the water tank after its refill for the most effective firefighting potential
- Payload** allows for five drops of mixed retardant and an additional three drops of pure water if necessary for eight total
- Total Mission Duration:** 4 hours 34 minutes
- Operational Range:** 1068 Miles
- Operational ceiling** of 30,000 ft to allow the aircraft to traverse mountainous terrain

Design Calculations & Analysis

Weight Breakdown	
Parameter	Value
W_{TO}	114,437 lb
W_F	11,615 lb
W_E	68,310 lb
W_p	34,511 lb
Growth Factor	3.319
Risk Level	Medium

Flaps		
Parameter	Take Off Value	Landing Value
Type	Slotted Fowler	
Deflection	15°	40°
Wing ΔC_{Lmax}	0.38	0.65
ΔC_{D0}	0.02	0.095

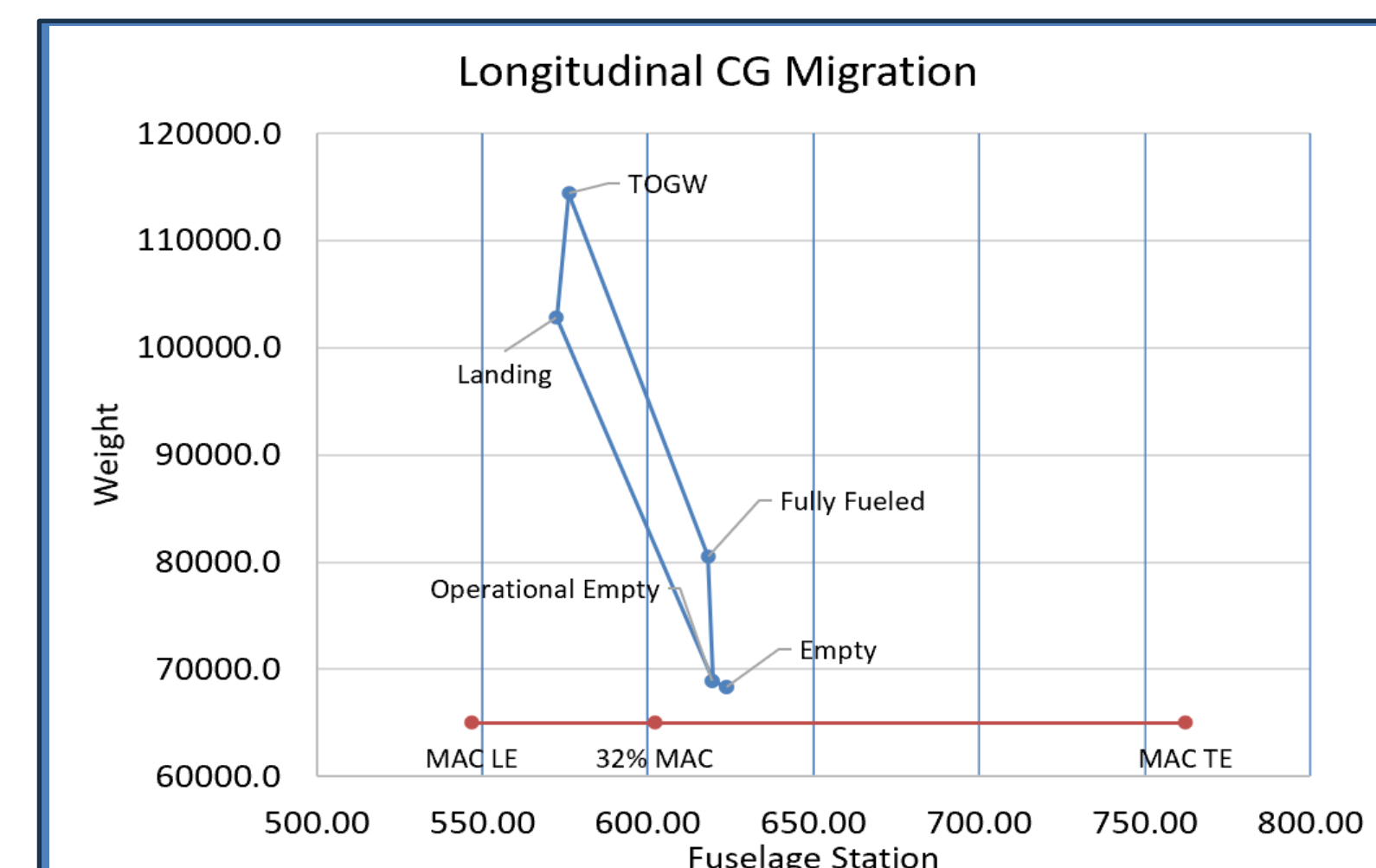
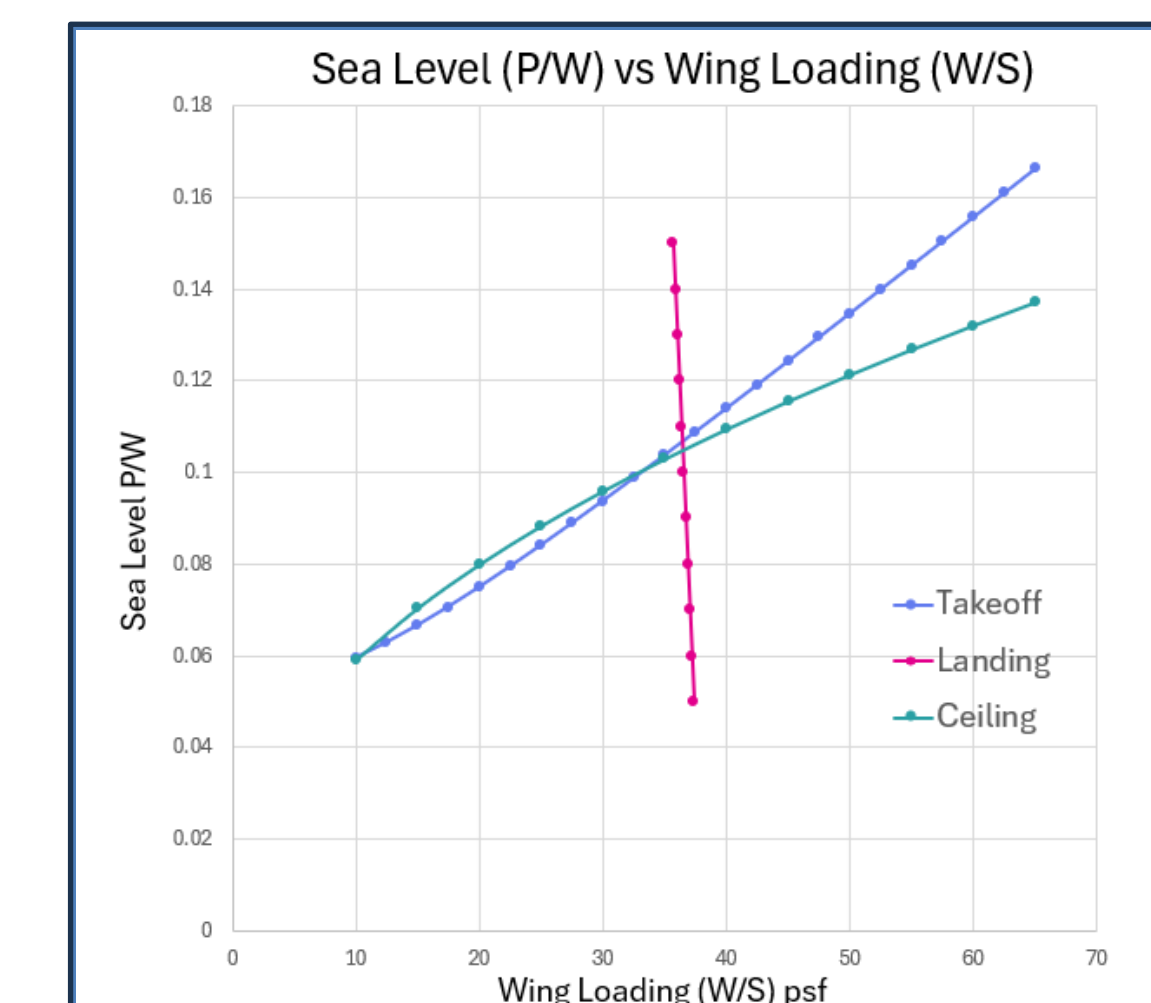
Engines	
Parameter	Value
Engine Selection	GE T64-S4D-1
Number of Engines	4
Engine Performance	3,780 shp
Power Required	13,160 hp

Empennage		
Parameter	Vertical Stabilizer Value	Horizontal Stabilizer Value
Area	324.9 ft ²	490.4 ft ²
Aspect Ratio	1.2	3.5
Taper Ratio	0.8	7.5
Quarter Chord Sweep	16°	12°
Airfoil	NACA 0010	NACA 0010

Wing	
Parameter	Value
Wing Area	3,051.66 ft ²
Wingspan	174.69 ft
Aspect Ratio	10
Mean Aerodynamic Chord	17.96 ft
Fuel Tank Capacity	1,734 gal
Leading Edge Sweep	1.66°
Taper Ratio	0.55
Airfoil	NACA 23013
Hinge Chord Line	75%

Landing Gear		
Parameter	Main Gear Value	Nose Gear Value
Center of Gravity Height	9.08 ft	
Gear Location	FS 62.05 ft	FS 21.48 ft
Track	13.65 ft	-----
Static Load (per strut)	53,981.23 lb	6,474.87 lb
Tires	44 x 16 Type VII*	25 x 6.75 Type VII

*For main gear tires, there are two tires per strut (ESWL = 40,587 lb)



Final Design

