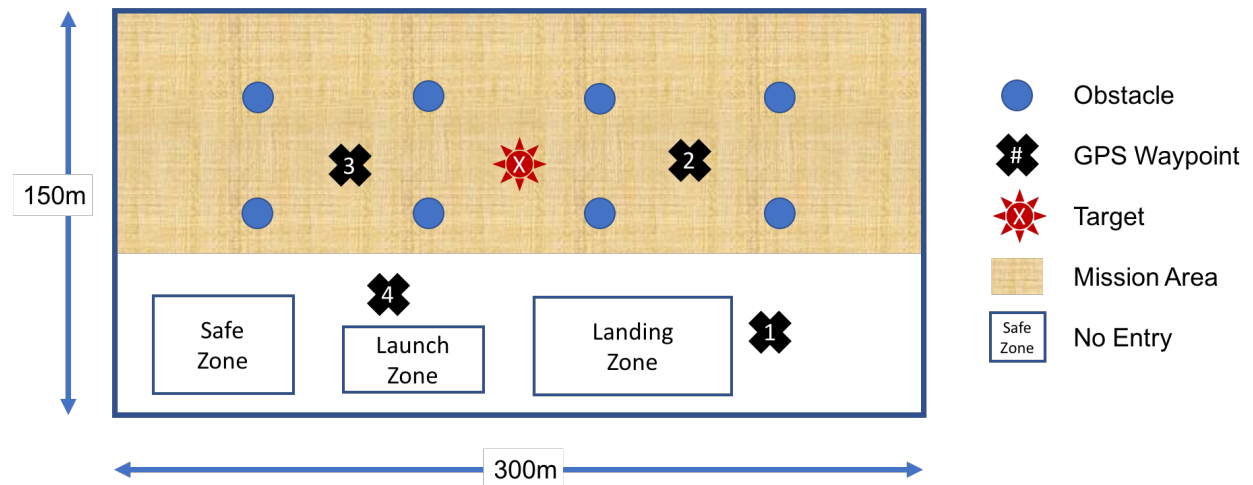


# Autonomous Plane Long Line Loiter (APL3) Project Mission Phase 0 Requirements

## I. The Mission Arena



## II. Safety Rules

- Fully-charged ABC fire extinguisher on hand.
- Li-ion battery fire isolation equipment on hand.
- Aircraft remains in Mission Arena at all times.
- Aircraft remains below 100m altitude at all times.
- All personnel in Safe Zone or outside Mission Arena at all times while aircraft is energized.
- Aircraft in line-of-sight of Team leader at all times while airborne.
- Wind speed less than 2m/s during mission.
- Maintain radio contact for ability to take radio control at any time.
- Aircraft proceeds to land autonomously in center of Mission Arena upon loss of radio contact.
- Aircraft has turn-away feature when approaching edges of Mission Arena.

## III. Team Givens:

- Waypoints
- Obstacle positions
- Launch zone starting position
- Landing zone
- Target visual characteristics

- IV. Team setup
  - a. Team is given humanitarian package containing accelerometer.
  - b. Humanitarian package, including accelerometer is total
  - c. Target is placed in arena.
  - d. Team places aircraft in launch zone starting position.
  - e. Team reports to safe zone.
  - f. Team activates aircraft remotely.
  
- V. Mission Execution
  - a. Aircraft starts up, performs calibrations, etc.
  - b. Aircraft commences logging GPS position and altitude freq = 1/sec.
  - c. Aircraft takes off autonomously and remains above 20m and below 100m altitude in Mission Area.
  - d. Aircraft reports 'successful takeoff' via telemetry (Course, Speed, Altitude, Heading).
  - e. Aircraft passes Waypoint #1 and reports passing via telemetry (C,S,A,H)
  - f. Aircraft passes Waypoint #2 and reports passing via telemetry
  - g. Aircraft heads toward Waypoint #3 and detects Target visually
  - h. Aircraft reports 'successful target detection.'
  - i. Aircraft lowers and releases package via long line loiter technique.
  - j. Package experiences  $|\alpha| < 2g$
  - k. Aircraft retrieves cord and reports 'delivery complete.'
  - l. Aircraft proceeds to Waypoint #3 and reports passing via telemetry.
  - m. Aircraft proceeds to Waypoint #4 without passing through airspace of Safe Zone and reports passing via telemetry.
  - n. Aircraft proceeds to Landing Zone and reports 'entering landing routine.'
  - o. Aircraft lands autonomously.
  - p. Aircraft reports 'mission complete' and shuts down.
  - q. Aircraft reports 'safe to approach' by personnel.
  
- VI. Post-Mission Complete
  - a. Team proceeds to Landing Zone to retrieve aircraft.
  - b. Team produces mission telemetry reports and position and altitude data.
  - c. Data evaluation.
    - i. Aircraft passed within 5m of Waypoints
    - ii. Aircraft 20m < altitude < 100m in Mission area
    - iii. Visual target detection
    - iv. Delivery complete
    - v. Package experiences  $|\alpha| < 2g$
    - vi. Aircraft remained in Mission Arena
  
- VII. Unknowns for development
  - a. Telemetry Data format for evaluation

