FIRST RESPONDER UAS 5.0
Stage 4 Solutions Accelerator
Live Event Safety Plan

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Overview

The Live Event Safety Plan creates a common language and standardizes requirements and protocols for use during the First Responder UAS 5.0 Stage 4 Solutions Accelerator Live Event. This overarching plan describes how to address safety during specific procedures, tasks, and events throughout the live event.

All staff and contestants shall comply with the words and spirit of this safety plan. All judgments and decisions shall be made with safe operations in mind.

Safety Plan Objectives

The ultimate objective of this plan is to instill a safety culture and to create a safe environment for those involved with the live event. The safety plan aims to:

- Safely execute flight operations in a timely and cautious manner.
- Identify, evaluate, and eliminate hazards or reduce any associated risks to a level acceptable to the Safety Officer.
- Prioritize the reduction of dangers throughout flight evaluations.
- Creating an overarching safe event for spectators attending or participating in the live event.

Live Event Schedule

The following schedule (Table 1) defines the key events and planned tasks associated with the live event. The products developed to support the live event will be iteratively refined over time. The final delivery will take place on or about 60 days before the start of the Live Event.

Date	Task / Event
10-12 Sep 2024	Daily Safety Briefing – Main Building PSTA – Room 222
10-11 Sept 2024	Contestant Pitch Deck Sessions – Main Building PSTA – Room 214
11-12 Sept 2024	Drone Safety Tests – High Bay Building 1st Floor
11-12 Sept 2024	Simulated Indoor Mission Evaluations – High Bay
12 Sept 2024	Tour of NIST Facility
12 Sept 2024	Social and Final Comments Ceremony – NIST Facility

Table 1- Live Event Schedule

Roles and Responsibilities

Each member of the staff team has specific roles and responsibilities, as highlighted below:

NIST Mission Commander – Directs and oversees the live event, including ground and flight events. Responsible for establishing, maintaining, and enforcing the live event policies.

Safety Officer – Responsible for implementing and verifying the safety protocols and managing risks before and during the live event.

NIST Test Administrator – Conducts and oversees event criteria testing. Records all required criteria scoring on the scorecard.

NIST Admin - Oversees the live event, takes notes as needed to inform feedback better, and participates in competition remediation as needed.

Event Staff – Responsible for the overall logistics of the competition. Duties may include:

- Registration
- Badging
- Providing event instructions
- Managing access control
- Operations area logistics
- Food/Water
- Set up and tear down

Risk Management

Before any participant can fly, the Safety Officer will assess flight risk using a Flight Risk Analysis Tool (FRAT), see Appendix A. A FRAT aims to identify potential hazards, their effect on mission outcomes, and mitigations that might help to lessen those potential hazards. The FRAT will be provided to the Safety Officer as a paper form for record-keeping and reference.

Communication Equipment

Event staff will be equipped with radios to communicate with the Mission Commander, Safety Officer, and Test Administrators. The Mission Commander and/or the Safety Officer will have access to a P.A. system to loudly communicate instructions and directions in the event of an emergency to all people attending the live event.

Access Control

Access control protocols streamline access into certain event areas according to need, role, or responsibility.

- Access Control Points (ACP) will govern proper access to the spectator area, restricted areas, and the operations area. Event staff will manage ACPs by monitoring access badges.
- Access control badges will be provided at a designated welcome and check-in area (outside controlled areas).
- Government-issued identification, such as a state-issued driver's license or student identification card, must be presented to receive a badge.
- Badges will be of sufficient size and color to enable easy identification and determination of appropriate access.
- Color will be used to denote access levels as described in Table 2.

Access Title	Badge Color	Issued to	Access Areas
Event Staff	Purple	MC	All Access
Event Staff	Blue	Event staff, NIST, & CCC	All Access
Test Administrator	Blue	TAs	All Access
First Responder	Green	First Responder Spectators	Staging, Testing Area, and Other Areas With Escort
Contestant/Team Spectators	Green	Contestants and Team Spectators	Staging, Testing Area, and Other Areas With Escort
VIP/News/Media	Yellow	VIP / News / Media Teams	MC PSTA Main Lobby; Areas With Escort
Spectator	Yellow	Attendees Viewing the Live Event	MC PSTA Main Lobby; Areas With Escort

Table 2 - Notional table defining badges and levels of access

Live Event Viewing Center

An event viewing center will be established and staffed each day of the event. The viewing center will:

- Be located in a manner that enables the best view to see most aspects of the live event.
- Be always staffed by Mission Commander or designee.
- Have access to call emergency services.
- Be equipped with medical supplies.
- Roped or cordoned to be a safe distance from any drone operations.

Briefings

Before entering the live event, all staff, participants, press, and VIPs must receive the appropriate briefing(s) listed below. The Mission Commander and Safety Officer will provide a briefing at the beginning of each day. Event staff and participants must attend this briefing. Additional briefings to spectators, media, and VIPs that do not attend the daily morning safety briefing will be provided a safety sheet to read by event staff.

NOTE: Each day, a colored sticker applied to attendee badges will identify that they have attended the day's briefings.

Staff and Challenge Teams will receive the following:

- Event overview
- Schedule
- Operations briefing
- Safety briefing

News/Media/VIPs will receive:

- Operations briefing
- Safety briefing

Spectators will receive a safety briefing.

Use Area & Hazards

Multiple locations will be in use during the 3D Mapping UAS evaluations. These areas are depicted in the Facility Maps below. The potential hazards/risks and protection method(s) are also noted below. Refer to the Access Control section for information regarding enforcement and controls for area access.

NOTE: Any area that is used for flight operations is thoroughly marked with signage. Most flight areas are contained within designated rooms or spaces, but if held in an open area they will also be marked with caution tape, traffic cones, and floor tape. These areas are referred to as "flight boxes," contained within each of the designated flight areas. UAS that are in flight are not permitted outside of the flight boxes and people are not permitted in these areas while flights are in process. See the following area descriptions and Operations sections for further information about flight boxes.

Building A: Montgomery County PSTA Main Admin Building

- Room #222 – Safety Briefing and Main Meeting Room
- Room #208 – Meeting Place for NIST/Admin
- Room #214 – Pitch Deck Room/Team Meeting Room
- No UAS flights or Battery Charging in this building

Building E: High Bay Building

- Contestant Staging Area (North Store Front Area 1st Floor)
  - Safety Checks (West Partitioned Area)
  - Charging Stations – under event staff observation
  - Access control methods and event staff will enforce access to this area
  - UAS propellers will be removed, with no risk of projectile if requested
- 3D Mapping Test Lanes (North East High Bay 1, 2, and 3rd Floors)
  - Access control methods; event staff will enforce access to this area
  - Risk of projectile and impact from UAS while in use
  - No entry or person(s) present while UAS is in operation
  - Teams will enter this space directly from West side
  - 1st Floor Store Front staging area will be available for teams to set up their GCS, and for postprocessing.
  - Evaluation and coordination will occur in West Partitioned Area
  - When finished, teams will exit West Side
- Access control via the NW High Bay Entrance; event staff will enforce access to this area
  - Event staff will enforce access to this area and alternative entrances
  - Teams will operate in marked test lane areas
  - Risk of projectile and impact from UAS while in use
  - No entry or person(s) present while UAS is in operation

Building Public Monitoring Area Policy

The monitoring area within the High Bay 1st floor SW Corner is designed for monitoring the live scenario.

- The monitoring area has a dedicated entry door
- This area is partitioned from contestant operations and primary entry areas.
- Cleared personnel may enter the flight operations area from the monitoring area if required.

Control Station Operations Area Policy

Discipline to safety is critical while live flight operations are being conducted. The policies below are designed to protect the aircrews and UAS participating in the event.

- The Operations Areas are designated in RED on the event maps.
- All personnel with operations area access must receive an operations briefing before entering the access-controlled area.
- The operations area will have an access control point; every individual entering will be checked and must display an appropriate badge and daily briefing sticker.
- All staff and challenge participants must keep the operations area clear of clutter.
- While flying, no one may talk with the pilot other than the participant's crew, the Test Administrator, the Safety Officer, or the Mission Commander.

Flight Operations

Indoor Airspace Management

- Areas utilized for flight activities occur immediately within and adjacent to Operations Areas. Most flight activities have designated, enclosed spaces, but some are within open, shared indoor areas. These flight box areas are marked with caution tape, floor tape, and cones. Flight boxes are contained within physically separated access restricted and/or blocked-off areas.
- Access controls are in place to prevent unauthorized personnel from entering the flight areas. Participants and spectators are not authorized to enter the flight areas and other restricted access areas unless escorted.
- Flight operations areas for specific events are defined and clearly marked.
- Unless otherwise specified, only one UAS team may operate within a flight operations area at a time.
- A landing/takeoff zone is designated and clearly marked within each flight operations area. This is the area from which all UAS must take off and land (unless an emergency landing is required).
- No personnel may enter the flight operations areas when a UAS is in flight.

The following locations contain flight operations areas, see the Event Maps for visual approximations:

- High Bay
- Technical Flight Evaluations: NE 1st, 2nd and 3rd Floor High Bay

NOTE: If unforeseen encroachment into a flight operation area occurs, the Test Administrator must immediately halt flights until the matter can be resolved. The Test Administrator shall determine the most appropriate method to terminate the flight and immediately inform the Mission Commander and Safety Officer of the issue and status.

Aircraft Inspections

Each pilot is responsible for the safe maintenance and inspection of the UAS that they will fly. However, to reduce risk, before the flight, each aircraft must pass the safety inspection and Flight Risk Analysis.

Flights

During live flights, the items below must be followed:

- Flight crews will follow all directions from the Mission Commander, Safety Officer, or Test Administrator without delay or question.
- A Test Administrator will be present during all participant flights.
- The Test Administrator will survey the local area and flight area to ensure it is safe for flight operations.
- At no time shall any UAS operate outside of a flight operations area.

Any malfunctioning UAS shall land immediately in a safe area.

NOTE: If the Mission Commander, Safety Officer, or Test Administrator identifies an unsafe condition, the flight must be immediately stopped until the matter can be resolved. The Test Administrator shall determine the most appropriate method to terminate the flight and immediately inform the Mission Commander and Safety Officer of the issue and status.

Recharging Stations

Power outlets will be available in the staging area during the live event for charging batteries. A fire extinguisher is co-located at the recharging area. Batteries undergoing charging will be monitored by event staff at all times.

Incident Response Plan

Incident Response

The most critical component of an incident is to prepare in advance and clearly communicate how such events are handled. The Safety Officer will cover these procedures within the Safety Briefing.

If any incident occurs, the Safety Officer will direct and coordinate the overall incident response and notify appropriate emergency response agencies as required.

UAS Crash and Recovery

In the event of a UAS crash, the process below shall be followed:

- The Test Administrator will tell the pilot to initiate the 'kill switch.'
- The Test Administrator will notify the Mission Commander and Safety Officer of a crash or unplanned landing.
- If someone is injured or there is an immediate threat (e.g., fire), the Test Administrator will provide that information to the Mission Commander and Safety Officer and provide aid.
- The Test Administrator will attend to a patient if first aid is needed until incident response personnel arrive.
- The Safety Officer will evaluate the crash site and determine if further action is required before recovery.
- If cleared, the Safety Officer will direct event staff to recover the UAS.

NOTE: If the Mission Commander, Safety Officer, or any Test Administrator observes a UAS not responding appropriately to commands and deems it a threat to safety, will immediately direct the UAS team to initiate the 'kill switch.'

Fire

In the event of a fire, all personnel will be directed to exit the building via the nearest exit. The safety officer will assess the situation and take appropriate action.

- The safety officer will sound a portable air horn to signal fire in the High Bay Building.
- Everyone will be instructed to meet at the main parking lot in front of the building, away from the path of smoke.
- It is very important not to leave the area until all personnel are accounted for.
- Fire extinguisher locations (e.g., specific High Bay locations) will be called out in the Safety Briefing.
- In the High Bay Facility, buckets of sand will also be available to smother small, localized fires, and locations will be called out in the Safety Briefing.

NOTE: If anyone observes indications of fire following a crash, notify the Mission Commander or Safety officer immediately. The Safety Officer will direct all teams to land their aircraft immediately and lead an evacuation to the predetermined safe location outside. The local fire department will be contacted. No one will be allowed reentry until the appropriate authorities give the all-clear.

Medical Services

The Safety Officer will contact the appropriate local emergency services if these services are needed. The Safety Officer may direct other Event Staff to use on-site medical kits to tend to a patient until medical services arrive.

Personal protective equipment (PPE), such as gloves, safety glasses, and hearing protection, will be provided upon request.

Severe Weather

The Safety Officer will monitor the local weather for adverse conditions (i.e., severe storms, tornados, etc.). Upon notification of impending severe weather, the Safety Officer may elect to postpone the event or notify all present for the live event to move to safe areas until the weather passes.

If not possible to reach these areas during a tornado, the Safety Officer may direct everyone to alternative areas.

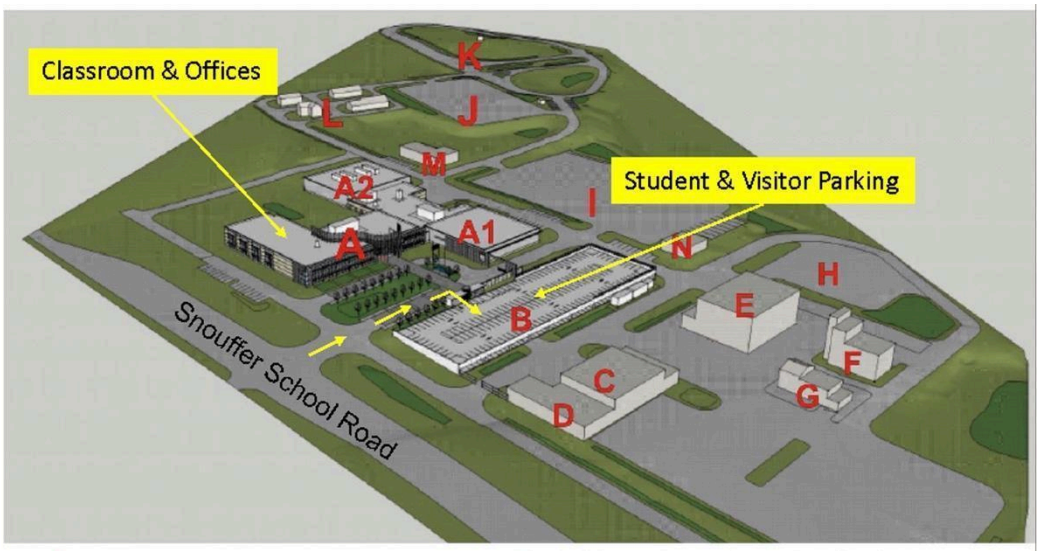
Appendix A: Flight Risk Assessment Tool (FRAT)

Instructions: The safety officer will use the FRAT below to fill out a holistic risk assessment for the day. This includes all participants and staff. If mitigation is in question, the higher risk value must be used.

NIST 3D Mapping Challenge FRAT						
	Date Modified: 03/21/2023			Pre-Mitigation #	Mitigation Strategy	Post Mitigation Sign-Off
Environmental	Current Weather	Clear	1			
		Low-Med Risk Storms	2			
		High Risk Storms	3			
	Forecast Weather	Clear	1			
		Low-Med Risk Storms	2			
		High Risk Storms	3			
	Temperature Inside	50°F-80°F	1			
		(20°F-49°F)(81°F-100°F)	2			
		(< 20°F)(>100°F)	3			
	Emergency Egress	Checked and free of obstructions	1			
		Not checked or obstructed	50			
Equipment	Passed Tech Inspection	Complete by all Teams	1			
		Partially Complete	2			
		Not Complete	3			
	Daily Safety Briefing	Complete	1			
		Not Complete	50			
	First Aid	Available and stocked	1			
		Not available or not stocked	50			
	Fresh Water	Available and stocked	1			
		Not available or not stocked	2			
	Access Control	In place and inspected	1			
		Not inspected	50			
	Fire Extinguishers	Available and in green arc	1			
		Not available or not in green arc	50			
Staff	Safety Officer Hours of Sleep	> 8	1			
		7-5	2			
		< 4	3			
	Safety Officer Distractions (Stress)	None-Mild	1			
		Mild-Moderate	2			
		Extreme	3			
	Mission Commander Hours of Sleep	> 8	1			
		7-5	2			
		< 4	3			
	Mission Commander Distractions (Stress)	None-Mild	1			
		Mild-Moderate	2			
		Extreme	3			
	Staffing	All positions staffed	1			
		- 1 position staffed	2			
		- 2 positions staffed	3			
		- 3 or more positions staffed	5			
		Pre-Mitigation Total			**Post Mitigation Total**	

Pre-Mitigation Totals			
< 20	Good to fly		
21 - 24	Requires Self Mitigation		
> 25 < 30	Requires Mitigation and Mission Commander Signature	Signature:	
> 30	Requires Mitigation + Executive Director Signature	Signature:	

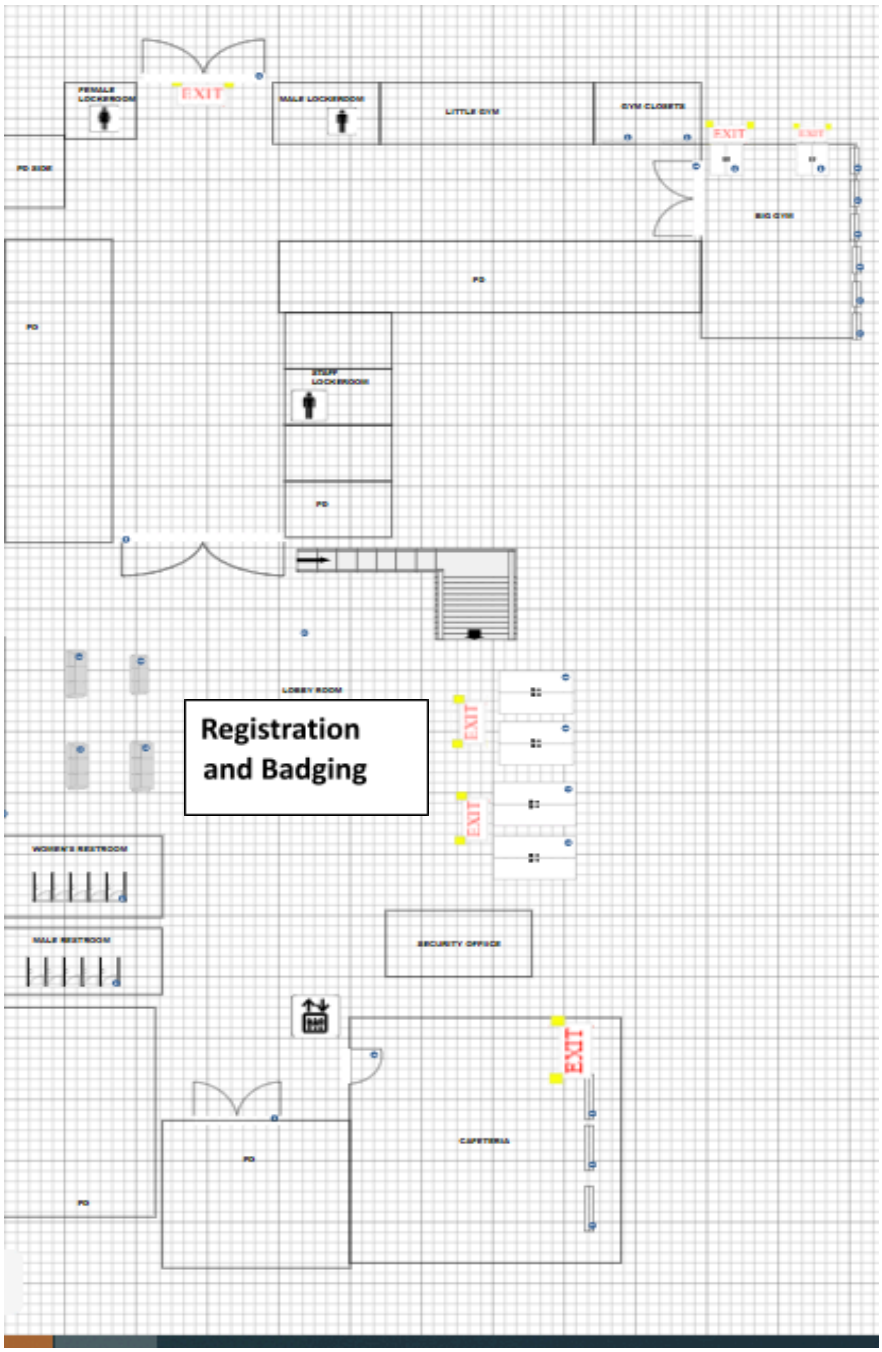
Appendix B Facility Maps



★A - Academic Building
A1 - Gymnasium/Fitness Center
A2 - Indoor Range
★B - 2 Story Parking Garage
C - Apparatus Bays (6)
D - Command Lab
E - High Bay
F - High Rise Burn Building
G - 2 Story Single Family attached garage
H - Future Special Ops
I - Skill Pad
J - Skid Pan
K - High Speed Drivers Track
L - City Scape
M - Police K9
N - Ride-On Office

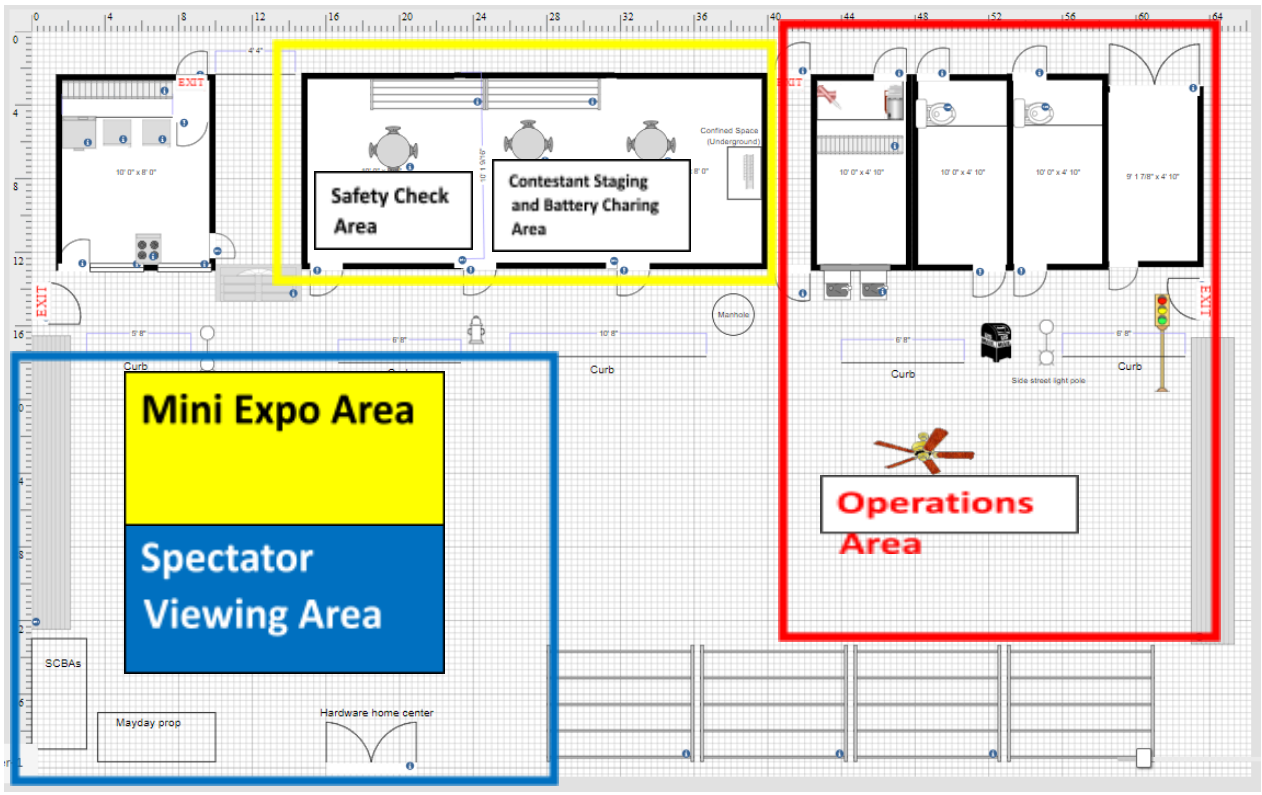
Montgomery County Fire Rescue Training Academy Campus

Montgomery County Fire Rescue Training Academy Campus



Building A: Academic Building – 1st Floor

Building A: Academic Building - 2nd Floor



Building E: High Bay Building