

# FDNY Supports USMC Aviation in Brooklyn

By Battalion Chief Joseph Duggan, Jr.

**O**n Saturday, May 26, 2018, the United States Marine Corps staged a demonstration day in Prospect Park, Brooklyn. As part of the USMC event, four rotary-winged aircraft landed in the park for a static display open to the public. In support of this display, FDNY resources were assigned for aircraft landing and takeoff operations. While there are several tactical bulletins that discuss aircraft emergencies in FDNY's procedural guides, there is no dedicated standard operating procedure (SOP) at helicopter landing zone (LZ) operations for FDNY units.

Although preparing for helicopter landings is not an everyday evolution for New York's Bravest, these landings occur throughout the five boroughs and every unit should have a general understanding of this operation. An overview of Department operations in Prospect Park will examine some critical points that Firefighters and Fire Officers need to consider when assigned to similar events. Following an outline of the Prospect Park operations, a review of helicopter construction and air operations provides additional information that FDNY responders need for rotary-wing aviation incidents.

## Marine Day--Prospect Park, Brooklyn

For aircraft landings scheduled to begin at 1100 hours, FDNY units arrived at the LZ in the vicinity of the Prospect Park baseball fields at 1015 hours to coordinate/rehearse for USMC aviation arrival. Assigned to support the Marines were Engine 242 (with Engine 228's Purple-K apparatus), Engine 247 (with Foam Carrier), SOC Support Ladder 131 and Battalion Chief Joseph Duggan, Jr., Battalion 48. Additionally, the Bureau of EMS assigned Conditions Officer C-77 and Basic Life Support Unit 77A2 to stand by while the military aircraft landed and then departed the LZ. The NYPD assigned two Emergency Service Units to provide support.

While Chief Duggan coordinated with the Marine officer liaison, assigned units positioned apparatus and performed equipment maintenance checks to ensure everything was ready for service if needed. Following the inter-service coordination meeting, Chief Duggan conducted a pre-incident briefing for all Officers. His instruction for assigned resources concentrated on situational awareness (SA) and LZ safety procedures during landings/takeoffs, as well as air-crash fire suppression and rescue tactics. Headquarters assigned Battalion Chief Steven San Filippo, FDNY Foam Manager, as a subject matter expert for advice to units on LZ support in the event foam operations were needed.

## Proactive Posture--Correct Situational Awareness (SA) Approach

All FDNY leaders need to develop a proper Situational Awareness (SA) attitude in subordinates supporting the operation. When a standby position is taken for aviation landings and takeoffs, it is important to assume the correct mind-set. Officers and Firefighters should approach the operation expecting the unexpected; anticipate an aircraft accident *will* occur. Firefighters must be fully dressed in personal protective equipment (PPE); SCBAs must be worn; and apparatus need to be positioned and adjacent to a positive water source. Members who park their vehicles and watch the aircraft approach are not ready for action. Units need to be prepared for operation should an incident escalate, requiring FDNY response. Both Officers and Firefighters should develop a proactive attitude, which is essential should that need arise. Avoid complacency.

## LZ Tactics/Procedures

Prior to aircraft landing, sufficient time must be allotted for inter-service command coordination, an operational safety briefing, pre-arrival procedures and equipment checks. At a minimum, all assigned resources need to arrive on-scene one hour before aircraft arrival. Units must be assigned to the LZ incident at least two hours before the expected arrival. This allows time for units to perform rou-



*USMC aircraft arrive in Prospect Park.*



*Engine 247 wetting down the LZ.*

tine administrative duties, stop for additional staffing or resources and travel to the LZ site. Companies cannot respond to emergencies or fires that will reduce the ability to arrive at their expected time. For Marine Day operations, Chief Duggan arranged with the Brooklyn Communications Office for FDNY resources to arrive in the park at 1015 hours.

## Command Coordination

Chief Duggan arrived in the vicinity of the Prospect Park ballfields at 1000 hours. He met with USMC liaisons and military air controllers. During this meeting, important information was exchanged and communications were established. During the operation, FDNY and USMC leadership maintained a close relationship that facilitated adjustments necessary for both services.

Air operations are heavily influenced by weather conditions. The projected LZ approach was changed 180 degrees to allow for wind shifts. Consequently, ground support had to adjust to this last-minute change. Chief Duggan also confirmed the landing information, including the expected arrival. All of the incident details were relayed to the Officers present so that all members could be informed.

## LZ Preparation

When aircraft land on unimproved LZs, there is a possible danger due to the dust and debris present on the ground. To mitigate this hazard, USMC air controllers requested that the LZ be "wet" down before the aircraft arrived. Engines 242 and 247 were assigned the task to ensure the presence of positive water sources and then proceeded to apply water to three baseball infields on the LZ. Simultaneously, both engines checked hydrants in the immediate area, positioned the Foam Carrier and Purple-K apparatus and then, using their primary apparatus, the fields were wet down, followed by refilling their tanks prior to aircraft approach; much to do in the time allocated. At the same time, Ladder 131 positioned their second piece and ensured the Hurst tool was prepared for operation.

Chief Duggan ensured that the EMS units were positioned and

prepared for aircraft arrival and briefed NYPD resources on all preparations for landing. USMC air controllers notified Chief Duggan that aircraft were inbound at 1050 hours and would be arriving at approximately 1100 hours. At this point, FDNY engines had just completed wetting the LZ and were refilling their booster tanks. Chief Duggan requested five minutes to complete this task and position apparatus for aircraft arrival. USMC air controllers made this adjustment and informed the incoming pilots. This coordination ensured that all ground support was prepared for landings to commence.

### Crash Priorities of Work

Chief Duggan held a briefing for all assigned Officers and EMS and NYPD resources before aircraft arrival to coordinate response in the event of an aircraft accident. All personnel were advised to stand fast until Chief Duggan gave the command to approach the aircraft in case of an accident. The Chief would make the determination regarding scene safety before emergency operations would begin. He wanted to ensure that all aircraft rotors had stopped before committing personnel. The following sequence of operations would commence on Chief Duggan's order (from a position upwind if possible):

1. Establish a foam line and Purple-K hand-line. Apply foam/Purple-K and extinguish any incipient fires starting in the vicinity of air crew. In the event there was no fire, provide precautionary lines for operating personnel.
2. Stabilize the aircraft and extricate air crew from wreckage (may be simultaneous with foam operations once lines are established).
3. Provide emergency medical attention for injured personnel; triage, treat and transport.
4. Extinguish remaining aircraft and other incipient fires.

Specific assignments were tasked accordingly in case of an aircraft accident:

- Engine 247's foam apparatus would move to the vicinity of the crash site, supplied by Engine 242 with booster water. Engine 247's main apparatus would key a serviceable hydrant and then proceed to the crash, establishing a positive water supply line. A foam hand-line would be stretched and prepared for operation.
- Engine 242 would approach the crash site with both their apparatus and the Purple-K unit, supply the Foam Carrier with booster water and also stretch the Purple-K line.
- Ladder 131 would approach the crash with their second piece, extricate any trapped air crew members and conduct a primary search of the wreckage.
- EMS assets would approach the crash, maintain a safe standby position and prepare for patient transfer.

The same operational procedures were assigned prior to USMC takeoff.

An apparently obvious question arises concerning FDNY assignment for the duration of the USMC event. As stated previously, air operations are dependent on prevailing weather conditions. Ground support resources need to remain available for the entire period that aircraft are on the ground. If weather conditions change unexpectedly, aircraft may need to lift off prior to the pre-planned departure time. For this reason, all FDNY assets remained assigned to the event until the safe departure of all involved aircraft.

At 1715 hours, all four USMC aircraft departed Prospect Park after a well-attended static display. All FDNY units were released and returned to service. Marine Corps commanders were grateful for the support provided by New York City and stated that the exhibition could not have taken place safely without the cooperation of the FDNY.

The conduct of LZ operations such as Marine Day depended upon all members' situational awareness regarding support for air operations. Proper SA for events such as this is based on familiarization and understanding of the aviation assets involved.

### Aircraft Hazards

Aviation transportation carries inherent dangers that should be understood by fire service members. Without a clear concept of these hazards, an accurate SA cannot be developed or maintained. This will lead to unacceptable risks and a lack of optimal scene safety at aircraft crashes and emergencies. Hazards the fire service must consider fall into three general categories--aircraft construction and materials, aviation fuel (specifically fuel for helicopters) and general air operational hazards.

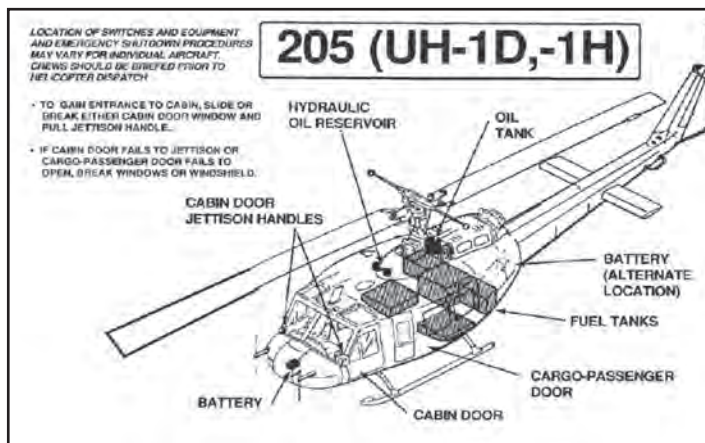


Diagram of a Huey UH-1.

**Construction--**Weight is the enemy in aircraft design. In order to save weight, designers use lightweight metals--such as magnesium, titanium and aluminum--in structural components in landing gear, the airframe and major engine components. These metals can present firefighters with the following challenges:

- Magnesium is a lightweight, silvery-white metal that melts and ignites at approximately 1,200 degrees Fahrenheit. It will burn violently and explosively *when water is applied* to burning metal and will require specialized extinguishing agents, such as MET-L-X and G-1 powder. These are trade names for similar extinguishing agents the FDNY uses on our Purple-K units.
- Titanium is a silvery-gray metal that is as strong as ordinary steel. Although lightweight, it presents significant extrication challenges. Ladder company personnel need to be ready to switch tactics from the Hurst cutters to Hurst spreaders or saws. Due to the presence of aircraft fuel, the use of acetylene cutting torches is not applicable.
- Aluminum is lightweight and will melt at 700 to 800 degrees Fahrenheit and lose structural strength.

**Fuel--**Helicopter fuel can be misunderstood. Most helicopter fuel is much more like diesel fuel than gasoline. It has a low flame spread, a relatively high flash point and a narrow flammable range. The common misconception is that helicopter fuel is highly volatile, much like a high-grade gasoline. This is true for aviation gasoline, the type you may find in small planes at your local airport (generally 100-octane gasoline). Crash-induced fuel fires can occur when fuel cells--usually located in the floor of the aircraft--are punctured. Some fuel cells have rubber bladders, which reduce the potential for fuel leaks.

**General Helicopter Hazards--**Depending on model and type, the tail rotor spins at six to 20 times the speed of the main rotor and essentially is invisible when turning. The tail rotor generally is low enough to be a danger to an individual. Obviously, it is important to keep people away from this danger. (Always approach from the front.)

- Main Rotor Danger: A helicopter pilot maneuvers the rotors to move the aircraft in the direction he wants it to go. Moving and tilting the main rotor and rotor disc forward cause the helicopter to move forward. Pilots can fly the main rotor down in the front low enough to injure anyone within the rotor disc coverage area. (You always should make eye contact with the pilot so he knows you have entered the danger area.)
- Rotor Wash: Rotor wash is a constant danger to firefighters during landing zone operations. A good generalization is that rotor wash speed is approximately 70 mph. The speed and volume will vary with the helicopter type, but the speed is such that it makes dangerous projectiles out of gravel, trash and other loose items. Generally speaking, the larger the aircraft, the more intense the rotor wash.
- Onboard Dangers: There are other onboard dangers to consider. First, there are the fuel and lubricating oils. Although not especially volatile, the oils will burn if heated. Additionally, they get very hot during the high speeds generated by the transmission and other mechanical systems and could leak during a crash and burn the air crew or rescue firefighters.

A helicopter with flotation pontoons also contains one or more cylinders of compressed nitrogen for inflation. These bottles are 3,000 psi and should be treated with the same respect as a pressurized



SCBA bottle. Pressurized containers of this type and pressure present obvious hazards in crash scenarios. (Note on the picture far right the deployed pontoons.)

### Crash Scenarios

Studies of helicopter accidents have revealed general similarities. Due to the fact that the engine is the heaviest component of the aircraft and located on the top of the fuselage, helicopters often will crash and roll, either onto their side or roof. In the event of a crash, responders should expect to encounter an aircraft on its side or upside down. This may require that you use tools—such as ladders—to access and remove victims or vehicle stabilization systems to stabilize the aircraft during the rescue operation. Moreover, in a water accident, helicopters will roll immediately on landing if it is not equipped with flotation pontoons; an important factor for rescue divers to keep in mind. This is what happened when a sight-seeing helicopter crashed into the East River on March 11, 2018. In this incident, the pontoons did not successfully support the helicopter on crash landing.

On approach or takeoff, FDNY resources also should be prepared to move to a crash site not within the expected LZ. Of necessity, this will be in an urban area in NYC and we should expect crashes that may be on top of adjacent structures or on residential streets. Responding to a crash on a residential or commercial building is complicated by possible collapse, fire and victims inside the structure, in addition to the standard fire suppression and rescue tasks.

Because an aircraft incident may occur outside the anticipated LZ, it may not be optimal to pre-stretch hose-lines. This would enable FDNY units assigned to the LZ to immediately move to a crash site near the planned LZ. However, FDNY engines still must check hydrant serviceability and they may key hydrants for possible apparatus stretches with 3½-inch supply lines. This tactic can be repacked quickly should the need to move arise.

When hovering, helicopters have little ability to remain aloft if power is lost suddenly. The aircraft will plummet to the ground like a stone unless the pilot can auto-rotate. This is a maneuver that turns the aircraft against the direction the rotors are spinning. In this move, the pilot uses what energy is left in the rotors to land the helicopter. Needless to say, when this occurs, the pilot has very little ability to choose the area to come down. For this reason, all ground personnel should remain well clear of the LZ until all aircraft have touched down.

Individuals need to understand how to protect themselves in the event of a sudden incident that puts them in the vicinity of an aircraft accident. FDNY leaders must limit the number of personnel operating in the immediate vicinity of the LZ. Additionally, Fire Officers must ensure that all subordinates know that they need to drop to the ground and cover their heads and faces, preferably facing away from the copter, if a mishap occurs. Running away makes you a bigger target for flying debris.

With a basic understanding of how helicopters react in the event of a crash, Fire Officers and Firefighters can anticipate rescue challenges and obstacles they might face. Ultimately, this knowledge will greatly enhance FDNY situational awareness at helicopter incidents.



Brooklyn helicopter crash, May 4, 2004.



March 11, 2018, helicopter crash.



Battalion Chief Joseph Duggan, Jr., Battalion 48, in front of a V-22 Osprey.

### Conclusion

Although a relatively rare event, helicopter accidents can occur anywhere within the City. Similarly, planned aviation landings are possible in almost every unit's response area. This is why all Fire Officers and Firefighters require a basic operational understanding of these incidents. Battalion 48 is regularly responsible for LZs in Prospect Park and has been able to develop a general SOP for these events. A review of the sources that this article draws from (see below) will provide Chief and company Officers with the ability to develop their own SOPs for their respective Commands. ■

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### About the Author

Battalion Chief Joseph Duggan, Jr., has served the FDNY since 1991. He is the Commander of Battalion 48. Previous assignments include Engine 233 and Ladders 169 and 176 as a Firefighter; Ladder 174 as a Lieutenant; and Division 8 as a Captain. He holds a BA degree from Fordham University and an MA degree from the Naval Postgraduate School. He graduated from the FDNY West Point Counterterrorism Course and completed the 2016 FDNY Officers Management Institute (FOMI) program. Since 2011, he has been a member of the FDNY Incident Management Team (IMT), assigned to the Operations Section. This is his third article for *WNYF*.