March 19, 2019

LOS ANGELES FIRE DEPARTMENT

RALPH M. TERRAZAS
FIRE CHIEF

March 5, 2019

BOARD OF FIRE COMMISSIONERS
FILE NO. 19-030

TO: Board of Fire Commissioners

FROM: Ralph M. Terrazas, Fire Chief

SUBJECT: UNMANNED AERIAL SYSTEMS (UAS) PROGRAM REPORT

FINAL ACTION:			
	_____ Approved	_____ Approved w/Corrections	_____ Withdrawn
	_____ Denied	_____ Received & Filed	_____ Other

SUMMARY

Since approval by the Board of Fire Commissioners, the Los Angeles Fire Department (LAFD) UAS program has focused on building a foundation that will support a valuable and sustainable program. A program that could successfully support the fire department's mission required an ongoing effort focused on internal and external growth. A three-year strategic plan was created as a roadmap for that growth which would culminate in a sustainable well-managed unmanned aerial systems program. The plan represents best practices in the industry countrywide both in the private and public safety sectors.

RECOMMENDATION

That the Board:
Receive and file.

FISCAL IMPACT

There is no fiscal impact associated with this report.

DISCUSSION

The goal of the three-year strategic plan was to create a sustainable, well-managed UAS program. This has been thoroughly researched and vetted over the last year. This plan also represents "best practices" in the industry countrywide, both in the private sector and in public safety.

The Plan included four internal focus categories:

1. To develop a cadre of pilots and visual observers through recurrent training

2. Develop an operations support system that includes the data transmission flight crew communications, a dispatch protocol and cad integration; transport and support vehicles

3. Expansion of the unmanned vehicle fleet capable of supporting all incident types identified in the LAFD UAS policy for deployment and use
4. To develop an administrative support system that includes flight and crew resource management applications to comply with oversight requirements and safety operations, crew training management applications, recurrent training and a sustainability plan that includes funding source for procuring hardware software tools and equipment and training

The external growth of our program has been represented in partnerships with organizations that are shaping the future of unmanned flight in the national airspace. The LAFD has partnered with NASA Ames research laboratories (San Jose) on their unmanned traffic management (UTM) and UAS integration project, specifically phase 4. The LAFD has also partnered with the FAA and played a role in the FAA 2018 reauthorization act and will be a primary partner in the development part 35,9 which will define how public safety uses and implements UAS.

The Department of Homeland Security's Science and Technology Division has included the LAFD in their first responders research group (FRRG) as well as their first responders robotic operations systems tests (FROST) group.

We have participated in several national conferences as recognized subject matter experts on UAS integration into public safety. Locally, our pioneering efforts have been displayed for the Mayor, and as a result the LAFD is the lead agency for the Mayor's office of Economic Development's Urban Air Mobility initiative. Additionally, our lobbying efforts led to the LA Area Fire Chiefs Association adoption of the LAFD UAS program development model for the creation of a regional UAS program for our regional partners who seek to create a successful program.

Program Development Timeline

December 2017 - Received our blanket Certificate of Authorization/Waiver (COA)
December 2017 – First official LAFD UAS missions at the Skirball Fire
April 2018 - Received our full Jurisdictional Certificate of Authorization/Waiver (COA)
April 2018 - LAFD showcased UAS Technology at the National Fire Department Instructors conference (FDIC) in Indianapolis, for the first time in its history
June 2018 - Developed Agreements with LAX, Burbank and Van Nuys Towers based on the allowances of our COA
February 2019 - Pilots Training and Ground School

The Pilots Training and Ground School course was designed to teach and practice flight skills, concepts, and legal aspects that members will be required to perform as a LAFD UAS team member and pilot. The six-day training course is divided into six 8-hour days, which can be delivered in 2-day blocks based on student skill level. Each day reviews the FAA's Unmanned Aircraft Systems Airman Certification Standards along with 127 specific knowledge concepts which participants are required to demonstrate proficiency during an Aeronautical Knowledge and Practical Test.

The first class, consisting of 17 Department members who possessed the prerequisite qualifications of 20 hours of documented flight time and a Part 107 license, was delivered over 2 days, with a 3rd day for formalized testing based on the LAFD UAS policy, COA, and Operations Manual and the NFPA 2400 recommended, National Institute for Safety and Technology (NIST) manipulative test.

Operations Manual

The manual was written to address unmanned aircraft operations, but more importantly, to support the development of an aviator's mindset when operating these aircraft in the national airspace. Development of UAS policy and procedures are meant to incorporate LAFD Air Operations, knowledge of FAA regulations, to include Operational Risk Management (ORM), Crew Resource Management (CRM), and Aviation Training Operations Procedures Standardization (ATOPS).

Missions

The UAS is an operational tool to be used by authorized Department personnel in response to "all hazard" scenarios, which include: active structure fires; post-extinguishment phases of a structure fire; brush (wild land) fires and natural disaster damage assessment; hazardous material identifications; and confined area search operations, such as "river rescue" and "hiker" incidents.

The Department's UAS intended use is to provide greater situational awareness to incident commanders thereby enhancing firefighter safety in response to and mitigation of emergent situations and incident types. The UAS was also intended for training exercises, such as operational pre-planning training (drills) and related video production.

In compliance with our policy and Certificate of Authorization the stated program mission, the LAFD UAS program has flown:

- 175 incident related missions 35 flight hours
- 45 Mapping/Pre Incident analysis missions – 22 flight hours
- 4 Training support missions (recording and documenting training events)
- 10 Others – Supporting PIO, the Drill Tower

Our current method of records management is not sustainable or efficient. To support expansion of the program and to remain compliant to FAA requirements and department policy, securing a flight and records management application is a priority.

Data Retention

With the assistance of available technology, specifically, image transmission equipment, all incident related missions have been flown providing "real time" intelligence, thereby eliminating the need to record data for future consumption or analysis. We have, however, purposely recorded during UAS flight team training, Department training exercises, mapping exercises and while collaborating with other city departments.

Incident Related Missions - Of the 175 incident related missions, none have involved an injury or death or other unusual occurrence that made recording or archiving video or photographic data. However, during the Griffith Park wildland fire in June 2018, several thermal images and videos were provided to the Incident Commander to assist in determining resource allocation. The data is currently archived and available for review.

Mapping/Pre-Incident Analysis – Working with the Bureau of Engineering, in part to test mapping software (Drone Deploy and Pix4D) and to assess terrain, live and dead fuel amounts, we conducted planned flights in five Hillside and Canyon areas in Battalions 5 and 9 capture choke points, vehicle access and pre-positioning for emergency apparatus. This data was rendered as map layers in several applications including ESRI and LAFD Ready.

Training Support Missions – In June and July 2018, LAFD UAS supported Tactical EMS Unit "Active Shooter" exercises. These evolutions were recorded for the following purposes:
1. To provide proof of concept for the value of UAS integration into incidents of acts of violence
2. To test mapping software (Drone Deploy and Pix4D).
Other – LAFD UAS completed several non-incident related flights for aerial photography for the PIO, Fire Chiefs office and Drill Tower 81

Fleet

The original fleet of 6 vehicles, all manufactured by Dji, and purchased by generous donations from the Fire Foundation, consisted of:

(4) Phantom 4 Pro series quadcopters
(2) Matrice 100 developer series quadcopters

We have expanded the fleet by adding an additional 3 vehicles, all manufactured by Dji:

(1) Phantom 4 Pro series quadcopter (In Service Training purchase)
(1) Matrice 210 RTK Developer series quadcopter (Dji QEP loan)
(1) Matrice 600 Pro hexacopter (Fire Foundation donation)

Future expansion of the UAS program will be based on the administration's vision for the program and a continued effort to provide proof of concepts. The program is planning the next iteration to equip specialized resources: HazMat, USAR, Marine Division, Swift Water and FEMA California TaskForce 1.

CONCLUSION

The successful growth of the program to this point, has been a collaborative effort by the membership under the leadership, constant support and trust of this administration. Today, the LAFD UAS program's development and implementation processes stand as a national exemplar and the program's leaders have inked their names among the Nation's subject matter experts.

Board report prepared by Richard Fields IV, Battalion Chief, LAFD UAS Program Coordinator.