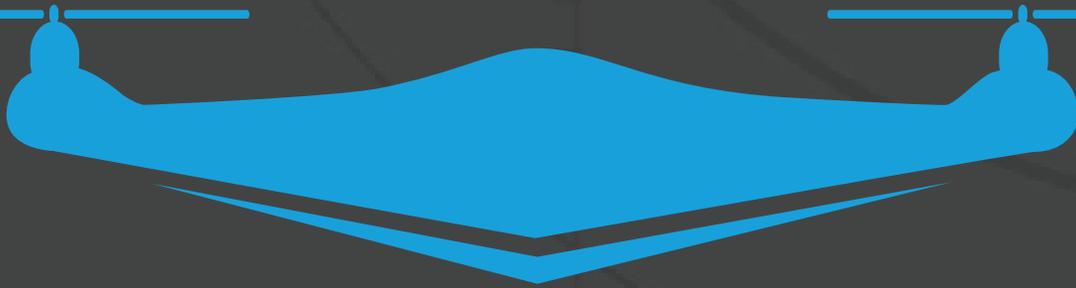


DARTDRONES



**IMPLEMENTING A UAV UNIT
FOR YOUR FIRE DEPARTMENT**

Whether your team is tasked with battling wildfires, search and rescue missions, or dousing a burning building, every piece of data available can mean the difference between life and death. This is why many fire departments throughout the United States have started utilizing Unmanned Aerial Vehicles (UAVs) and the advanced technology and data they provide in emergency situations. While there has been an increase in budget approvals for UAV programs as the use cases for drone technology become more prevalent, launching a UAV program creates several new and unfamiliar challenges and considerations. The information presented in this guide details the necessary steps to create and execute a successful UAV program for any fire department.



►►► DARTdrones: The Nation's Leader in Drone Training

DARTdrones is the nation's leader in drone training, consultation, and expert support for public safety UAV units. Our mission is to provide the highest quality training on Unmanned Aerial Systems to ensure the safe and efficient integration of drones into fire departments.

Unmanned Aircraft are revolutionizing the way firefighters approach missions, saving time and lives in the process. DARTdrones has trained over 70 public safety departments with help from our friendly, knowledgeable, and industry-expert flight instructors. All of our public safety instructors have a manned aviation background with 1500+ combined hours of UAV instruction and experience in rapid response, fire investigation, search and rescue, HazMat operations, hot spot detection, fire scene assessment and safety, landfill and sub surface fire detection, crowd control, surveillance, aerial command, and criminal pursuit.

►►► About the Author

Before becoming an expert drone pilot, Roger Hall spent 25 years as a firefighter and member of both hazmat and dive rescue teams. He is a licensed sport pilot and Certified Level 1 Thermographer who enjoys flying weight shift control aircraft. Roger's eight years of manned aviation experience led to his interest in drones. Now he uses UAVs to film live events and instructs public safety departments on how to operate and implement drones into their organizations. Roger has over 680 hours of UAS instruction with DARTdrones.



Table of Contents

- Establishing a Program Foundation.....4**
- Regulations: Choose between Part 107 or a COA.....6**
- Local and State Legislation.....10**
- Budgeting the Program.....10**
- Selecting the Correct Aircraft.....11**
- Payloads.....14**
- Software.....15**
- Insurance.....15**
- Comprehensive UAS Training.....16**
- Determining Your Costs.....17**
- Developing an Internal Policy.....18**
- Gaining Support.....19**
- Next Steps.....19**

Establishing a Foundation: The First Step to a Successful Drone Program

The first step to developing a drone program, before purchasing any equipment or choosing a pilot, is laying the groundwork. A successful drone program, like any structure, is only as strong as the foundation it's built on. Your first objective should be determining the realistic possibilities of how your fire department and community will benefit from a firmly established UAV program.

▶▶▶ Determine your Department's Needs

While this first stage may take time, detailed information will significantly reduce complications when purchasing equipment, gaining public support, pitching the program to superiors/local government, and other aspects that will arise in later steps. To determine the specific needs of your department, consider the following:

Mission Specific Operations

Determining the mission-specific operations of your department is critical in building a successful drone program. Start by listing the different types of missions your department frequently encounters. Describe how your department usually responds to these situations and identify any problems you typically face. How can the drone be used to resolve these problems or reduce response times? Many fire departments use drones for fire investigation, search and rescue, HazMat operations, locating hot spots, fire scene assessment and safety, and landfill and sub surface fire detection. Prioritizing which tasks are most important will help simplify the implementation process.

Size of Your Department

Many aspects of your drone program will be influenced by the size of your department. Very large departments can cover a vast geographic area, serve a wide population, and employ hundreds of firefighters. Small rural departments can cover only a specific location and employ far less firefighters. Large departments may deploy their drone more often, require advanced equipment, and be subjected to different regulations than smaller departments. However, all fire departments, regardless of size, deal with many similar calls for service in which the use of a drone would be very beneficial.

Budget, Pilots, and More

We will discuss developing a budget, understanding regulations and legislations, choosing and training pilots, selecting equipment, and creating a policy in later sections. However, it is necessary to start thinking about these factors and how they will fit into your new program. This will help you see the big picture while fine tuning your foundation before moving on to the next step. If you are in a smaller department but your list of mission-specific operations is extensive, there is a greater chance of needing more equipment and pilots to perform these operations. More pilots and more equipment means increased costs. If you're working with a limited budget, you may need to spend additional time determining the specific UAV needs for your department.



Utilize Past Records

Use the department's National Fire Incident Reporting System (NFIRS) codes as a helpful resource. This information can provide useful data regarding the most common types of incidents to which your department responds. This will help you identify the cases in which your drone will be used and estimate how often your UAV unit will be deployed. It can save valuable time in the early planning stages and help strengthen the foundation of your program.

Communicate with Other Divisions

Add value to your program by learning how other teams and divisions in the community could benefit from a UAV in their operations. For example, an Unmanned Aerial System (UAS) could benefit the HazMat team with extended flight time capabilities and a zoom lens camera for evaluating a scene as well as inspecting potential hazards. A micro UAV could be used by the Fire Marshal's office for mapping a fire scene. A drone equipped with a FLIR thermal camera could prove invaluable considering the cost savings and increased scene safety it could provide. The chance of gaining approval for the drone program will increase by generating additional constructive use cases during this stage.

Look for Individuals with Experience

The pilot selection process can be greatly accelerated by uncovering that a member of your department has preexisting knowledge of airspace, weather considerations, and Federal Aviation Administration (FAA) regulations. This person will be a valuable resource while building your program.

Work with Your Network

If you find experience within your own department is limited or nonexistent, speak with other agencies that operate a UAV unit. These agencies may be able to help you with any problems you come across or provide answers to difficult questions and roadblocks. Even if you have an abundance of experience in your department, networking with other agencies is a worthwhile exercise.



Regulations: Choose Between Part 107 or a COA

Part 107

The FAA launched a new set of regulations known as 14 CFR Part 107 in June of 2016. The Federal Aviation Regulations (FARs) are the FAA's first official rules regarding the commercial use of small Unmanned Aircraft Systems (sUAS). Along with defining the operational limitations of sUAS, Part 107 also lists requirements for the issuance of a Remote Pilot Certificate with an sUAS rating for commercial drone pilots.

These regulations are also intended to be the first step towards integrating UAVs into the National Airspace System (NAS). While the full set of regulations can be found in the Federal Aviation Regulations Aeronautical Information Manual (FAR AIM), these are some of the aspects you ought to be aware of:

- Categorized as "Civil Aircraft Operations" (not public safety)
- Liability/responsibility falls on individual pilots
- Allows for daytime flight ONLY without a special waiver
- Must get permission to fly in B, C, D, and E airspace for each flight - a significant issue for most major metro areas
- Allows for operation under 400' AGL (Above Ground Level)
- Allows for operation within visual line of sight for the operator

Some fire departments operating a UAV unit under Part 107 have found that many of the regulations restrict them from efficiently completing a mission; however, Part 107 has many sections that allow for waivers if the operator can provide a safety plan to minimize risk. Currently, operators have requested Part 107 waivers and authorizations for the following:

- Flying at night
- Flying over people
- Flying beyond the visual line of sight
- Flying multiple UAVs at the same time
- Flying at altitudes over 400' Above Ground Level (AGL)
- Flying in regions of controlled airspace

The primary benefit of having pilots receive their Part 107 Certificate is a guaranteed proof of training in FAA regulations. By passing the Airman Knowledge Test, your pilots will know the rules regarding safe operation within the National Airspace System.

The Certificate of Waiver or Authorization for Public Aircraft Operations (COA) offers fire departments a degree of flexibility that cannot be found with just a Part 107 Certificate. This certificate is designed to benefit qualifying governmental and nonprofit organizations, including:

- Local Municipalities
- Fire Departments
- Police Departments
- Public Schools

While many organizations opt for the COA because of its flexibility, the process for obtaining this certificate is lengthier and more difficult than obtaining a Part 107 Certificate. However, if your department would require multiple waivers listed in the previous section, a COA may prove to be the better route. After the FAA and the applicable Air Traffic Control facilities authorize a COA, the government entity can benefit from the following:

- Permission to routinely fly within applicable regions of controlled airspace
- Permission to fly under any special provisions named in the COA
- Permission to fly at night
- Permission to fly over people during a life safety incident, given that all necessary safety measures have been implemented

A COA allows your department to create its own training curriculum as long as it complies with NAS regulations. So, while operators are not *required* to become Part 107 certified, the FAA still strongly recommends UAV operators receive their Remote Pilot Certificate in addition to the COA. Agency liability will be reduced since training will not be as intensely scrutinized if an incident occurs.





▶▶▶ Recommendations Based on Department

To determine whether Part 107 or a COA is best for your department, there are a number of factors to consider including the size of your agency, local airspace, the nature of your jurisdiction, and your department's most frequent missions.

Personnel - Determine the number of people in the department who will be trained. A high number of trained personnel would operate better under a COA with self-examining authority. FAA officials still recommend that all pilots, at a minimum, receive a Remote Pilot Certificate to establish proof of training even if a COA is in place with self-examining authority.

Jurisdiction - Smaller agencies with limited or no controlled airspace can operate solely under Part 107 with a Night Waiver. Larger jurisdictions may need to operate within more controlled airspace and require a number of waivers, making the COA a simpler option.

Local airspace - It is easier to secure a Part 107 airspace authorization for lower classes of airspace (C and D). The COA will not offer as much benefit if the agency is able to acquire the Part 107 airspace authorizations. An agency operating within large class B airspace or multiple airspaces in more urban environments would be better suited to a COA.

Mission requirements - A COA is a better option when the agency is going to use the UAS for a variety of mission types. The agency may be operating in locations where airspace authorization can be difficult or even impossible to obtain during the incident. If UAS use is limited to search and rescue and fire-ground operations, and there is limited or no controlled airspace in the area, Part 107 is the recommended option.

It is important to remember that both Part 107 and a COA have advantages and disadvantages. Consider the unique needs of your department — they may be different from the consultation that other departments provide you. Whether your department chooses to follow a COA as written and approved or to operate under Part 107 regulations and apply for any needed waivers, know how each will affect your program's overall goal. That information, once determined, will dictate the route best suited for you.

Part 107 v COA Examples



- 1 Agency:** Small agency with less than 50 line personnel
Jurisdiction: Rural/suburban; no controlled airspace in local areas
Mission requirements: General UAS use for SAR, hazardous materials mitigation, fire-ground size-up and support, assessment of training activities, confined space inspections, disaster response, scene mapping, pre-fire planning, post fire investigation
Recommendation: Part 107; add-on waiver for night operations and operating limitations for sUAS
- 2 Agency:** Small agency with less than 100 line personnel
Jurisdiction: Suburban/urban; Class C or Class B in part of jurisdiction
Mission requirements: General UAS use for SAR, hazardous materials mitigation, fire-ground size-up and support, assessment of training activities, confined space inspections, disaster response, scene mapping, pre-fire planning, post fire investigation
Recommendation: Begin with Part 107 with enabled airspace authorizations and waivers for night operations and operating with reduced visibility. Depending on the success of authorizations, apply for blanket COA, then jurisdictional. Part 107 will allow your agency to begin limited operations and training while progressing towards full operations under a COA
- 3 Agency:** Large agency with more than 100 emergency response personnel
Jurisdiction: County-wide jurisdiction; multiple airports with various classes of airspace
Mission requirements: General UAS use for SAR, hazardous materials mitigation, fire-ground size-up and support, assessment of training activities, confined space inspections, disaster response, dive rescue/recovery, swift water ops, scene mapping, pre-fire planning, post fire investigation
Recommendation: Begin with part 107 for training but simultaneously begin application for a COA. Multiple airports with different airspaces will be more easily navigated with an established COA

Local and State Legislation: Assure the Legality of your Program

In developing your drone program, the next step is determining your program requirements under the FAA's jurisdiction within the National Airspace System. Local and state governments are limited in their ability to enact laws governing airspace use, aircraft maintenance requirements, and training requirements. However, certain laws regarding state and local firefighters including land use, trespassing, privacy, zoning, and emergency service operations are still governed at the state and local levels.

Fire departments using UAVs must adhere and conform to all enacted local or state legislation. Most often this involves topics of surveillance and privacy. Your state Attorney's Office should be contacted for specific questions about your department's area of operation. Consultation on the best operation options for your department will be provided. The development and enactment of new legislation can change as rapidly as drone technology, so it is paramount to be aware of current laws and regulations, as well as those under development. These laws can drastically affect the operation of a UAS by emergency service agencies.

Budgeting the Program: Understand and Plan Expenses

It is extremely important to construct your budget to include all financial factors required for the UAV unit to function efficiently. The budget should include the selected aircraft, pilot training, insurance, estimated maintenance costs, and all required or additional accessories. Purchasing a \$3,000 drone but neglecting to include the cost of extra batteries will decrease the effectiveness of your department's drone program. Plan a reasonable expenditure cushion so your budget covers unexpected purchases or replacement items. Do not create a short-sighted budget in hopes of improving the chance of approval.

If someone in your department has grant writing experience, it is worthwhile to inform him or her about the program. Many agencies have partially or fully funded their UAV program using a government grant. The time spent researching and writing a grant could be extremely valuable. As more agencies develop UAV programs, obtaining grants is becoming increasingly competitive.

Check out the Firehouse Subs Foundation, FEMA Firefighters Grant Program, and Combating Terrorism Technical Support Office for grant opportunities.

Item	Estimate
Equipment	\$5,000
Matrice 200	\$900
Matrice 210	\$1,000
Matrice 210 RTK	\$1,100
Inspire 1v2	\$1,200
Phantom 4 Pro	\$1,300
Mavic Pro	\$1,400
Payloads	\$1,500
Zenmuse X4S	\$1,600
Zenmuse X5S	\$1,700
Zenmuse Z30	\$1,800
FLIR Zenmuse XT	\$1,900
Batteries	\$2,000
Matrice Batteries	\$2,100
Inspire, Phantom, Mavic Batteries	\$2,200
Hard Case	\$2,300
Matrice Case	\$2,400
Inspire, Phantom, Mavic Case	\$2,500
Display Screen	\$2,600
Tablet	\$2,700
Software	\$2,800
Fleet Management (annual)	\$2,900
Mapping (annual)	\$3,000
Aircraft	\$3,100

SELECTING THE CORRECT AIRCRAFT: Choose the Best Tool for the Job

The drone selection process will be simplified by the planning you have completed up to this point. Different drones have been created by multiple manufacturers for various purposes. In-depth knowledge regarding drone usage will help limit the amount of options. This section will outline the features of several DJI platforms. DJI is currently the global leader of commercial drone manufacturing and is the preferred platform for many companies and organizations.



Considerations

Flight time: A few minutes can determine the success or failure of an operation. When a drone is regularly grounded to change or charge the battery, valuable surveillance or search time can be lost. Since duration of a public safety incident is impossible to predict, a drone with a battery that provides superior flight time is preferred.

Wind/Weather capability: Incidents requiring aid from firefighters are never planned. It is inevitable that you will encounter inclement weather during a response. Larger UAS platforms offer increased capabilities to maintain a steady hover in windy conditions. However, there are only a few water resistant or weatherproof options available, such as the DJI Matrice with ingress protection.

Sensor system: The aircraft must be capable of operating at night and your payloads must be able to perform accordingly. A drone equipped with a thermal or FLIR camera system can be a valuable asset for your department.

Storage and deployment of UAS: Consider the size of the storage case for the UAV as well as where the system will be stored when not in use. The carrying case needs to be securely mounted in a temperature-controlled area; an air conditioned vehicle that responds to most, if not all, major incidents is an ideal solution on where to store the UAS.

Ability to use multiple sensors: A UA's ability to carry multiple sensors or have additional sensors included in the fuselage will provide great value over time. For firefighters, being able to add a thermal camera to the device, in addition to an optical camera, allows for greater functionality. An RFID reader may also prove to be a useful sensor. When attached to the UA, the RFID reader allows operators to determine the exact location of all personnel at the incident - an ideal accountability system. The UA could also be flown over the area prior to clearing the scene to check for hot spots and scan any buildings and the surrounding area for possible tagged tools or equipment left behind.

DJI Matrice 200 Series

- Price: \$5,000 - \$15,000
- Weight: 10+ lbs
- Speed: 50 mph
- Flight time: ~27-38 minutes

The Matrice 200, Matrice 210, and Matrice 210 RTK are currently the three models in the Matrice 200 series. While each platform has its own capabilities, payloads are purchased separately from the aircraft itself. The Matrice 200 models can use both a visual imaging payload and a thermal imaging payload (Zenmuse XT system) simultaneously. They can also be equipped with a visual imaging system with zoom capabilities for detailed inspections, or an ultra-high-resolution camera that is well suited for orthomosaic photo capture. These platforms are water resistant and approved by the manufacturer for flights in light to moderate precipitation, as long as all regulatory weather minimums are met.



DJI Inspire 1 v2.0

- Price: \$1899.99
- Weight: 7 lbs
- Speed: 45-55 mph
- Flight time: 18 minutes

The Inspire offers several advantages over DJI's smaller platforms. This aircraft can operate in steady winds up to 30 mph. Additionally, the Inspire's larger build allows for heavier payloads and a broader range of camera equipment. The standard camera can be upgraded to the Z3 that features a 7x digital zoom, the Z30 with 30x zoom, or a FLIR thermal system. The Inspire 1 can incorporate thermal imaging for more effective nighttime operations, and the latest version of the Inspire platform (Inspire 2) is capable of extended flight times up to 30 minutes – compared to the average 18 minute flight time of the original.



DJI Phantom 4 Pro

- Price: \$1499.99
- Weight: 3 lbs
- Speed: 45 mph
- Flight time: 30 minutes



The Phantom 4 Pro is currently the most advanced model of DJI's "flagship" platform. Smaller than the Inspire, the Phantom is an easily transportable and deployable aircraft that provides unsurpassed still imagery capturing capabilities within its size class. With professional level performance, it is compact, discrete, and versatile. The quad-directional sensors and synthetic vision obstacle detection makes it ideal for training inexperienced operators and conducting sUAS flight operations in confined environments or areas without consistent GPS connections. It has an integrated visual camera capable of capturing 4K video and 20mp photographs mounted on a 3-axis stabilized gimbal.

DJI Mavic Pro

- Price: \$999.99
- Weight: 1.6 lbs
- Speed: 40-45 mph
- Flight time: 28 minutes



The small and compact DJI Mavic Pro is capable of performing many of the same operations as larger models. It folds neatly and is easily transported in a small camera bag or carrying case along with its pocket-sized remote and spare batteries. The Mavic Pro's camera captures 4K video and an aftermarket FLIR camera provides thermal capability as well. Propeller cages are also available, allowing increased functionality for operations such as inspecting confined spaces.

	Mavic Pro	Phantom 4 Pro	Inspire 1	Matrice 210
Price	\$999	\$1499	\$1899	\$5k - \$25k
Weight	1.6 lbs.	3 lbs.	7 lbs.	10+ lbs.
Speed	40-45 mph	45 mph	45-55 mph	50 mph
Flight time	28 min	30 min	18 min	27 min

Payloads

A number of DJI payloads are designed to enhance the Matrice 200 series as well as other platforms. Once you know how you intend to use your drone, decide which payloads will help you accomplish your missions.

Zenmuse X4S

The Zenmuse X4S digital camera has a 3-axis stabilizing gimbal system capable of capturing 20mp still photographs in multiple aspect ratios while using a mechanical shutter. These are ideal qualities for orthomosaic imagery capture. Extensive camera settings allow for complete customization based on environmental conditions for mission-specific operations. The X4S is ideal for any flight involving imaging data capture for aerial mapping/modeling using photogrammetry.

Zenmuse X5S and Zenmuse Z30

The Zenmuse X5S is a micro 4/3 D-SLR camera system and 3-axis stabilizing gimbal. When equipped with the appropriate lens, the X5S can be used to see close-up views of areas or persons of interest while maintaining a safe distance away from the subject, making it an ideal tool for many types of real-time or targeted focus operations. If a more powerful zoom capability is required, the Zenmuse Z30 has a 30x optical zoom. A significant price separates these two cameras, so most begin with the X5S and expand to the Z30 if determined necessary.

Zenmuse XT

The Zenmuse XT is a thermal/IR imaging camera system and 3-axis stabilizing gimbal. Its high-resolution and high frame-rate unit with radiometric capabilities allow the operator to view temperature variations within a few degrees across small scale areas of a particular item/area of interest. The Zenmuse XT is the only thermal imaging camera specifically designed for integration with DJI aircraft like the Matrice.



Zenmuse X4S



Zenmuse XT



Zenmuse X5S



Zenmuse Z30

Software

Fleet Management - There are a number of fleet management softwares available for companies and organizations. While small teams may be able to utilize a free software version, larger fleets can opt for paid versions with more features. Fleet management software allows you to review flight records and set job specifications, plan multiple flight areas, assign pilots and equipment, see pilot flight hours and areas of expertise, upload pre/post flight and emergency checklists, and receive updates on missions while pilots are able to log their flights in real-time. [DJI](#) and [Skyward](#) both offer excellent fleet management software options.

Mapping and Modeling - Mapping and modeling software can be used for a number of mission types. While this software helps to capture the necessary images to recreate a scene, maps processed online (in the cloud) cannot be used in court. If there is a potential legal issue, maps must be manually compiled. Both [Pix4D](#) and [DroneDeploy](#) are good software options for gathering the necessary imagery for creating maps while AutoCAD can help you develop maps offline.

Insurance

Hourly - Divisions that only deploy a UAV a few times a month may opt for on-demand insurance like [Verify](#). Policies cover up to \$10,000,000 of drone liability insurance with prices starting at \$10 an hour.

Annual Liability Coverage - Divisions that intend to deploy their unit at least once a week are better suited for annual liability coverage. Liability coverage only covers damage done by the drone. It does not cover the drone itself.

Annual Hull Coverage - Hull coverage insures the drone itself. This can have a higher cost associated with it depending on the value and size of the aircraft.

Global Aerospace - [Global Aerospace](#) is the currently leading provider of aviation and UAS insurance. Call today for a quote at (937) 490-8500.



Comprehensive UAS Training

Your unit will need multiple officers trained as pilots, payload operators, and visual observers. After you have decided whether your unit will operate under a COA or Part 107, you may have more guidance on your training requirements. A COA allows an agency to “self-certify” its drone operators, meaning the actual agency will be liable for training its pilots and any operations of the aircraft. The agency can choose to either internally develop a training program that addresses all issues related to sUAS operation, aeronautical knowledge, maintenance, inspection, emergency procedures, maintenance, etc. or they can have all operators earn a Part 107 Remote Pilot Certificate. This method allows the FAA and the agency to ensure all operators have a full understanding of current regulations.

Beyond an understanding of current regulations and basic flight operation, you will also need to consider advanced mission-specific training for your organization such as FLIR Operation or Aerial Disaster Response tactics.

DARTdrones Public Safety Training Program

DARTdrones offers a number of customizable training options for Fire Departments. The following options will be fully available in 2018:

- Basic Flight Training
- M210 Flight Training
- Part 107 Test Prep
- COA and Waiver Consultation
- Search and Rescue Training
- Night Operations Training
- Thermal Training
- Accident Investigation Training
- Aerial Disaster Response Training
- Public Safety SOP
- LiPo Battery Safety
- Weather Assessment
- Equipment Care
- Site Assessment
- Emergency Procedures
- Visual Observers
- Radio Communications
- And more

DARTdrones Public Safety Instructors



Roger Hall

Florida

Retired Firefighter; HazMat Operations Team; Dive Rescue Team; Licensed Thermographer



Chris Grazioso

Massachusetts

FEMA Urban Search and Rescue; Emergency Management Systems; Damage Assessment



Michael Uleski

Florida

Patrol Division Sergeant; Law Enforcement Officer; Firefighter; Emergency Medical Technician



Paul Matheson

Utah

Helicopter Air Ambulance Operations; Search and Rescue; Salt Lake City Air Medical Company

Please note that this list is not comprehensive and costs will vary. If you would like a free consultation, please give us a call at 800.264.3907

Item	Estimated Cost	Your Quantity	Total
Equipment			
Matrice 210 RTK	\$15,000		
Matrice 210	\$9,000		
Matrice 200	\$5,000		
Inspire 1v2	\$2,000		
Phantom 4 Pro	\$1,500		
Mavic Pro	\$1,000		
Payloads			
Zenmuse X4S	\$600		
Zenmuse X5S	\$2,000		
Zenmuse Z30	\$9,000		
FLIR Zenmuse XT	\$6,000 - \$14,000		
Batteries			
Spare Batteries (each)	\$100 - \$400		
Hard Case			
Matrice Case	\$700		
Inspire, Phantom, Mavic Case	\$100 - \$400		
Display Screen			
Tablet	\$400 - \$800		
Software			
Fleet Management (annual)	\$1,000 - \$3,000		
Mapping (annual)	\$3,000 - \$5,000		
Insurance (per aircraft)			
On-Demand (hourly)	\$10+		
Liability Coverage (annual)	\$600 - \$800		
Liability/Hull Damage (annual)	\$1,000 - \$2,000		
Certification			
Part 107 Test Fee (per person)	\$150		
COA Professional Writing	\$2,000 - \$6,000		
Waivers Professional Writing	\$500 - \$3,000		
Training (per person)			
Part 107 Prep Online	\$250		
Part 107 Prep In Person	\$670		
Basic Flight Training	\$580		
Basic sUAS Competency Training	\$300		
Search and Rescue Training/Thermal	\$900		
Accident Investigation Training	\$900		
Disaster Response Training	\$500		

Developing an Internal Policy: What to Include in your New Policy

While developing an internal policy for your unit, consider contacting the agencies you communicated with in the earlier stages. Other units may already have tried-and-tested policies developed. Certain components found in many departments' policies can be applied to any UAV unit while others are very specific to the operating agency. Use the pieces that benefit your department and build the custom portion around this.

Consider a variety of scenarios while developing your policy, especially for those rules which restrict the operation of the drone. If the policy is written, "Flight at night is prohibited," then flight at night is prohibited with no exceptions. Trying to amend the policy at 3 a.m. during a mission is not very feasible. A balanced policy will promote a safe operating environment and allow for a successful UAV unit. A thorough policy will likely not need as many amendments and will allow your unit to operate efficiently and successfully.

Information to Include

The policy should clearly answer the specifics regarding who, how, what, when, and where.

Who? - Which positions will be in your UAV unit and who will fulfill them? Some positions to consider include:

- Supervisor
- Pilots and aircrew members
- Instructor pilots
- Visual observers
- Maintenance officers
- Safety officers

How? - Add your agency specific information here, such as:

- How will the UAV be stored?
- How will flight time and maintenance be documented?
- How will evidence be handled?
- How will training be conducted?

What? - What is the overall mission of the UAV program? Some policies will simply use a mission statement, while others may provide additional information regarding the complete objective and purpose of the unit.

When? - This section will detail when the unit can or will deploy a UAV. It should include the reasons for the deployment, the time of day, and weather restrictions. The policy may maintain a fairly open policy, allowing the on-duty supervisor and remote pilot-in-command to decide when to utilize a UAV, or it may contain more restrictive requirements.

Where? - Define the locations where the fire department UAV may operate. Consider any controlled airspace, local hazards, or critical infrastructure and how the department will respond to areas outside of its primary jurisdiction, for example, responses for Specialized Regional Teams or mutual aid requests. Understand locations of controlled airspace and that a waiver or separate authorization to operate in that geographical location may be required.

Gaining Support: The Importance of Community

Stories on drones continue to make their way into the public eye. Some of these stories are very positive, highlighting successful rescue missions or new and safer ways to battle wildfires. Meanwhile, other stories are unfortunately negative. Since most people receive their limited drone knowledge from the news, it's important to educate others about the positive capabilities and uses of your department's UAV. Gaining community support and having them on board from the start will be needed to reap the benefits of this emerging technology. Some ways to gain support include:

- Add UAS information to citizen academies
- Utilize local public access TV to educate and ease concerns
- Invite local leaders and the media to a demonstration of how the sUAS team works to protect safety
- Utilize department social media pages to display positive aerial photos and videos

If concern or resistance is anticipated from a local politician or member of the community, consider a soft introduction. Begin your drone program by using it exclusively in the most positive ways possible. For example, the UA could be used for fire inspections and investigation. Explain that this reduces the amount of time needed to gather evidence; allowing the fire marshal to collect more accurate and relevant scene information.

Next Steps

Launching a drone program takes long-term planning and time, but by following the steps in this guide, your department can build the foundation for a successful UAV program. Remember, begin by determining why your department exactly needs a UAV and whether your department will operate under a COA or Part 107. Establish your requirements under the FAA's jurisdiction, write your policy, train fire department personnel, and buy a drone. We believe that every fire department in the country is on the path of using UAV technology to benefit their community and keeping firefighters safe. If you have any questions or would like to learn more about training with DARTdrones, please call Mike McCann at 800.264.3907 Ext. 701 or visit www.dartdrones.com.

Have questions? We love to talk!
Give us a call for your free consultation today

1.800.264.3907