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Aerial Survey Flights and Operational Considerations

[Greet the audience and thank them for coming.]

This presentation was created by a group of MAPPS members to familiarize you with the MAPPS organization, the aerial survey profession, and specifics related to aerial survey flights. It is designed to enhance our working relationship and address airspace access issues.

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Purpose of the Meeting

As we go through this presentation, we will cover the following points:

- Flight restrictions that affect aerial survey flights

- Highly restricted areas, such as Flight Restricted Zones, Temporary Flight Restrictions, Class "B" and others

- The basics about what we do

- Security issues as they pertain to aerial survey flight patterns

- And finally, to present long-term solutions

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MAPPS

First, allow me to familiarize you with the MAPPS organization.

The Management Association for Private Photogrammetric Surveyors (MAPPS) is comprised of firms in the surveying, spatial data and geographic information systems fields. MAPPS member firms are engaged in surveying, photogrammetry, satellite and airborne remote sensing, aerial photography, hydrographic, aerial and satellite image processing, GPS and GIS data collection and conversion services.

There are over 150 member firms nationwide, not all of which have flying capability. Some limit their services to mapping.

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MAPPS

MAPPS member firms provide aerial photography and photogrammetry services. Aerial survey flights, conducted by experienced and highly skilled flight crews, utilize small aircraft, modified to hold highly sophisticated survey cameras and sensing equipment, which acquire imagery, data, and spatial information.

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MAPPS

There are a number of misconceptions about aerial survey flights. So let's go through a list of what they are not.

- Not: Scenic photo flights

- Not: Flights for brochures or real estate

- Not: Press or media flights

- Not: Routine pipeline or power line monitoring patrols

- Not: Traffic reporting

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Aerial Photography Members

Nationwide, there are approximately 150 aircraft utilized for aerial survey flights by MAPPS member firms.

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Operations

Flights operate under FAR Part "91". Most projects require ideal VFR weather conditions and aircraft are generally less than 12,000 pounds gross weight.

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Aircraft Used

Aircraft used are high-performance piston single-engine planes, light piston twin-engine planes, and on a more limited basis, small turbo props. Some helicopters are utilized for limited, low-altitude mapping applications

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Aerial Photo Mission Crews

Aerial photo missions limit crews to essential personnel and do not carry passengers. Essential crew includes a commercial pilot, a camera or systems operator, and occasionally, a GPS technician. Most flight crews regularly pair the same company-owned aircraft with the same crew members.

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Camera Equipment

Camera equipment is calibrated by the US Geological Survey. These precision cameras use film rolls 9 ½ inches wide and up to 500 feet long. Cameras are bolted to the floor of specially modified aircraft, weigh approximately 300 pounds, and cost anywhere from \$250,000 to \$600,000. Aircraft modifications are made in compliance with FAA regulations (Form 337)

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Additional Equipment

Additional equipment aboard aircraft can include:

- Precise navigation systems interfaced with the camera
- Inertial Measurement Units, or IMUs
- Survey grade GPS units,
- Laptop computers
- LIDAR laser equipment & other digital sensors

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It All Starts With The Flying

It all starts with the flight. Aerial surveying for mapping and spatial data capture is the critical first step in any major project.

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Applications

Here are some typical aerial survey applications. You will note airports are at the top of the list. Aerial survey flights are not only used for airport planning, but also to determine tree heights for minimum clearance requirements.

[Go through the list and elaborate as you see fit]

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Clients

Aerial survey flights are conducted for a variety of government agencies and private companies of all sizes.

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Typical Clients – Federal Government

Here is a list of typical federal clients.

[Go through the list and elaborate as you see fit]

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Typical Clients – State and Local Government

State and local government clients make up another category.

[Go through the list and elaborate as you see fit]

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Typical Clients – Industrial and Private

In addition, industrial and private clients account for a substantial amount of business.

[Go through the list and elaborate as you see fit]

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Typical Aerial Photography Project

Let's take a look at what goes into planning a survey flight. First, the area of coverage is determined, and ground control is established. Flight lines are drawn to ensure adequate coverage, with consideration given to required forward overlap and sidelap.

Flight altitudes are calculated based on terrain elevation and required mapping scale. The project is then digitized for compatibility with onboard camera and GPS equipment. Airspace considerations are noted, and the flight is coordinated with ATC.

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Aerial Photography Prerequisites

Here are some prerequisites for a successful aerial photo mission.

[Elaborate as you see fit]

Opportunities for success can be limited because there are so many variables to be evaluated. Add to these occasional requirements that some projects be flown under specific tide conditions, or with parking lots empty. Keeping this in mind, it is of paramount importance to have access to airspace and maximum cooperation between flight crews and ATC. A reflight can be extremely costly or, in some cases, a second opportunity may not even present itself.

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Flight Lines

Let's take a look at flight line patterns. As you can imagine, the first example would be difficult to describe over the radio to a controller; that's why prior coordination with a faxed copy of the map is crucial. In some cases, faxes sent to the ATC facility do not reach the hands of the controller handling the flight. Without this coordination, the aircraft movements could raise security concerns on the part of the controller viewing the radar screen.

In the next example, which illustrates block coverage, you will note the aircraft does not necessarily fly the next consecutive line, as the controller might expect. Because the turn radius of the aircraft is limited, the pilot may skip over a line or two in order to not lose GPS signal, or to make the most efficient use of available time. Flight crews are not able to deviate from prescribed flight altitudes due to scale requirements. Also, exposures must be taken over pre-determined photo centers. These examples illustrate why it would be beneficial for air traffic controllers to have basic knowledge of aerial survey requirements.

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Economic Impact

Where does aerial photography sit with regard to economic impact? It has a phenomenal downstream effect:

[Elaborate by going through points on the slide]

It becomes obvious that any inability or delay in completing an aerial survey mission levies huge financial implications...and, again, access to airspace and cooperation between flight crews and ATC is pivotal.

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Actual Project

The total costs associated with an actual project are tallied on this slide.

[Elaborate as you see fit]

In this case, a \$49 million total construction project hinges on the success of a \$6,000 aerial photo mission.

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Critical Flights

Critical flights are essential in response to natural disasters, emergencies and acts of terrorism. The private aerial survey firm is capable of capturing a birds-eye view immediately, providing critical information to FEMA or DHS, or related emergency personnel. Any restrictions to airspace delay that quick-response mechanism. Taking a proactive approach, pre-approved survey companies could be allowed access to sensitive airspace, even under higher security threat levels.

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Current Restrictions

Current airspace restrictions have hindered aerial survey operations in a number of areas ---These include FRZs, TFRs, and Class "B"

Some inconsistencies have been noted in the FAA's interpretation or TFR's in different areas of the country. Other restricted areas, such as power plants, industrial complexes, and outdoor events, can prevent the completion of a survey mission. In some cases, it is the power plant or industrial complex that is actually the client and the object of the mission. Again, hard turns, steep banks, and changing direction, could be erroneously perceived as a security threat.

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Considerations

In summary, we are dealing with a small number of single- and twin-engine aircraft that carry only minimum flight crews , and no passengers. The survey flights they carry out are narrowly defined, and an integral part of major projects with considerable economic impact.

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Recommendations

In conclusion, we would like to present the following recommendations:

- 1: Continued advocacy by MAPPS for maximum prior coordination of survey flights and cooperation with ATC and TSA.
- 2: Greater familiarization on the part of the FAA and TSA with aerial survey requirements and the MAPPS organization, and
- 3: Prioritization of critical survey flights and access to airspace, especially under higher security threat levels.
- 4: Establishment of a unique identifier code for our profession, allowing priority access to sensitive airspace.
- 5: Creation of a separate sub-section of FAR Part "91" for aerial survey operations.

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Maintain a Dialogue

It is important to maintain a dialogue to achieve change that is mutually beneficial. MAPPS member firms are eager to have a close working relationship with the FAA, and to conduct aerial photography flights efficiently and safely within the ATC environment.

[Take this opportunity to invite further discussion, meetings, tours of facilities, etc --- the next step to addressing issues specific to your company and areas of operation]

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Questions / Comments

[Ask for questions, comments]

[Provide contact information]