Unmanned Aerial Systems Operations Around Vertical Communications Infrastructure

Introduction

This document represents the National Association of Tower Erectors’ (NATE) efforts to create guidelines for operating small Unmanned Aerial Systems (UAS) around vertical communications infrastructure. UAS hold significant promise with their ability to enhance worker safety, reduce fatigue and increase productivity. However, like any new technology, operational considerations must be addressed to escort UAS into the current value stream seamlessly and safely. In doing so, the benefits will be recognized by all constituents at multiple locations along the current operational path.

Objective and Scope

The intended focus of this document is on small UAS operations around wireless infrastructure, cellular towers, broadcast towers and electrical distribution towers.

Primary consideration has been placed upon the safety of tower technicians, ground personnel, the general public and flight operations of UAS in the national airspace system as they relate to vertical real estate. The operational suggestions in this document are in support of all United States Federal Aviation Administration (FAA) Regulations, which take precedence over any suggested operational procedures outlined below.

Federal Aviation Administration

The use of UAS in the National Airspace System (NAS) is quickly changing as the technology improves and the regulatory environment clears. However, the FAA has also identified that flight operations of UAS pose a safety risk to manned aircraft if operated irresponsibly and thus the agency is regulating the airspace accordingly.

FAA regulations will, no doubt, continue to change. Therefore, it is incumbent upon each UAS operator to comply with all regulatory requirements established by the FAA as the industry continues to mature.

Airspace

Current FAA regulations for manned aircraft (FAR 91.119) require minimum safe distances from obstructions. The minimum manned-flight safe separation distances are greater than 500 feet in uncongested areas or greater than 2,000 feet horizontally and 1,000 feet above the highest obstacle in congested areas (i.e., areas of higher population density). This no-fly zone for manned aircraft essentially creates safe
operating space for UAS operations to de-conflict manned and unmanned flights. However, commercial UAS operators must acquire authorization to fly in proximity to communication towers through the 333 Exemption process before they can operate legally.

Fortunately, the unintended benefit for UAS operators keeps manned aircraft separated from most UAS operations around towers making flight around structures one of the safest UAS flight operations happening today.

**Commercial Operations**

The FAA requires UAS operators, flying UAS for compensation or hire, or for internal purposes, to acquire appropriate authorization within the National Airspace System. Application forms and the current process can be found on the FAA’s website ([http://www.faa.gov/uas/](http://www.faa.gov/uas/)). The typical exemptions necessary for flying around towers in the NAS are Section 333 Exemptions and Certificates of Authorization.

### 333 Exemptions and Certificate of Authorization (COA) Operations

All commercial UAS flight operations can only be authorized by the FAA. Current approval methodology is conducted through an exemption process mandated by Congress and managed by the FAA.

NATE wholly supports the efforts of the FAA and encourages all UAS operators’ intent on operating commercially around structures to become FAA approved through the current FAA Section 333 exemption process before conducting any commercial operations in/around vertical structures.

**Aircraft Registration (N Numbers)**

All aircraft performing commercial operations must have FAA N Number per existing FAA regulations.

**Flight Operations**

- **FAA Requirements** - To date, there are no practical test standards for small UAS operations. Platform reliability, advancements in technology and simplicity of operation continue to improve user capabilities and overall safety. NATE believes operators should be provided some guided training around towers to ensure safety and reduce the probability of an incident with the UAS and the communication structure being inspected.

- **Training**
  - **Judgment** - This is an important part of flight operations and usually is not taught. The need for the operator to demonstrate common sense is an important characteristic to ensure safe flight operations. This characteristic should be considered before the operation of UAS is attempted or
employees are selected to operate UAS for the company.

- **Initial Operation Experience & Flight Supervision** - Flight training using a defined syllabus of aircraft operations, standard operating procedures, emergency procedures, UAS systems, National Airspace System and pertinent Federal Aviation Regulations should be part of the initial operating experience and knowledge for each UAS operator operating UAS around structures. Fifteen hours of combined ground training and operational training by a qualified instructor is recommended for each operator before operating independently.

- **Standard Inspection Flight** - Clearly identified objectives about the route of flight, expected time necessary to complete the mission, identification of intended observations to be made and how the data are to be collected. Standardizing the route provides the most consistent data collection and provides the highest quality data/photos for the end user.

- **Expected Outcomes** - Clearly identified objectives about what information/data is being used and who is the intended recipient of what is being collected. Effort should be made to help operators improve the context of the images or inspection data before they begin the flight.

- **Aircraft Manual and Operators Handbook** - Operators should be familiar with the contents of the aircraft manual and operator handbook to familiarize them with systems, standard procedures and emergency procedures.

- **Standard Operations** - Standard operations vary across different UAS manufacturers and types. It is important to understand the standard operations of the particular aircraft being operated. Some examples of standard operations include the following.
  - Pre-flight Checks
  - A Notice to Airmen (NOTAM) must be filed with FAA 24 hours in advance of each flight.
    - Aircraft
    - Airspace - Planned Route, Surrounding Area and Airspace
  - Normal Take-off
  - Normal Landing
  - Altitude and Distance Management
  - Free Flight and Waypoint Route Planning
  - Cold Weather Operations
  - Fuel/Power Reserves - Understanding Aircraft Systems and Indications
  - Performance - Each UAS has its own performance capabilities and wind limitations. It is important to understand each aircraft’s performance limitations and corresponding weather conditions prior to each flight.
- **Safety Reporting** - Commercial UAS operators should have a written notification procedure covering accident or incident reporting in accordance with FAA, National Transportation Safety Board (NTSB), Occupational Safety & Health Administration (OSHA) and client requirements. They should also have a written safety plan.

- **Emergency Procedures** - Emergency procedures vary from aircraft to aircraft, but generally include the following. It is important to thoroughly understand the emergency procedures as specified by the manufacturer.
  - Manned Aircraft Avoidance
  - Forced Landing
  - Lost Communications Landing Procedures
  - RF Interference and Awareness

- **Hardware**
  - GPS Connection Indications and Meanings
  - Altitude Indication for Operator
  - Battery Life indication for Operator
  - Maintenance (Required and Documented) - See operations manual

- **Hours of Operation**
  - Daylight Hours
  - Night Operations – (Not recommended and not currently permitted by the FAA)

- **Weather Requirements**
  - Visibility
    - Weather minimums should be defined for flight operations.
    - One mile of visibility and clear of clouds should be an absolute minimum.
  - Wind - See aircraft manual for limitations
  - Temperature - See aircraft manual for limitations

- **Noise Abatement** - Operators should consider their location, local buildings and time of day. Normal business hours should be considered when operating in residential locations.

- **Non-participating Observers** - The general public and observers have the potential to unintentionally interfere with flight operations. Non-participants should be discouraged from being around flight operations. In most cases, as part of 333-exemption approval, non-participants are not allowed to be part of flight operations and need to be kept at safe distances greater than 500’.

- **Operational Considerations**
  - **Guyed Towers** - Guy wires add an additional level of complexity
for flight operations. Standard procedures should be to transverse to another part of a structure by operating outside the wires. Passing between wires should not be performed.

- **Self-Support Structures**
- **Monopole Structures**
- **Elevated Water Towers**
- **Relationship to the Operator** - Unobstructed view between the operator and the UAS is critically important. It is also important the UAS is not directly above the operator, observers or other critical infrastructure.
- **Landowners Permission (Landlord Consent)** - Written consent from all property owners within 500’ of operation should be obtained.
- **COA Filing any structure above 400’ AGL.**
- **Airports** - Maintain appropriate distances away from airports and comply with all FAA regulations regarding airspace operations and required communication.

**Documentation**

- **Flight Operations** - Commercial operators of civil aircraft in the United States are required to have and maintain a written flight operations manual (FOM), or a standard operating procedure (SOP) covering their flight operations. They are also required to have a written aircraft maintenance manual (AMM) or standard maintenance procedure (SMP) covering their aircraft maintenance program. These are good practices that tower owners, carriers and others in the mobile communications industry are likely to require from UAS operators to perform flight services in and around their assets.

- **Regulations** - Although close, the complete set of regulations are not in place by the U.S. Federal government, and other laws and ordinances are being created. It is advised to maintain written procedures for staying current with new or changed UAS usage requirements and restrictions issued by the FAA, State, and Municipal authorities. A satisfactory procedure will ensure that any proposed flight plan will comply with FAA, state (i.e., trespass, tort, privacy), and local (i.e., noise ordinance) requirements.

- **Public Right to Privacy** - Commercial UAS operators will be expected to hold themselves to a higher standard and have a written privacy policy to assure that privacy rights of the public are not violated. A satisfactory policy will indicate how your UAS pilots will remain aware of and comply with relevant laws concerning trespass, privacy, and if applicable, associated data collection transparency requirements.
Additional Thoughts about Airspace

- **Emphasis** - The most important issue affecting the use of UAS in the national airspace system is ensuring proper separation between UAS and manned aircraft. The dangers of operating a UAS without proper knowledge of how the airspace system works could produce a catastrophic outcome if a small UAS collides with manned aircraft. The importance of operating safely cannot be over-emphasized.

- **Airspace Ownership** - There are a number of competing entities believing they own/manage the airspace around a tower. In fact, it is the FAA. However, the tower companies, carriers and tenants all lay claim to the authorization of flying small UAS around a tower. It is important to understand who should be considered before flying around a tower.