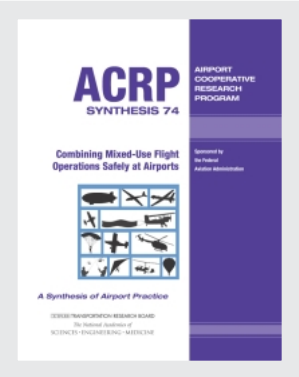

Combining Mixed-Use Flight Operations Safely at Airports

DETAILS

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AIRPORT COOPERATIVE RESEARCH PROGRAM

ACRP SYNTHESIS 74

Combining Mixed-Use Flight Operations Safely at Airports

A Synthesis of Airport Practice

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AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

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Appreciation is extended to all the individuals who participated in the survey or shared discussions about their operations or activities. Their participation and involvement are important and necessary for the benefit of others in the industry. I am indebted to the time and effort they took to participate. Contributions from the various individuals from regional and national associations are also appreciated. Contributing as well were the following State Aviation Organizations: Alaska, California, Colorado, Minnesota, Montana, New Hampshire, North Dakota, Oregon, Pennsylvania, and Virginia.

The individuals at the case example airports are especially recognized: Edward Mattern at Keene, New Hampshire; Bobbi Thompson at Minden, Nevada; Timothy Head at Boulder, Colorado; Eugene Conrad III and Sandra Walsh at Lakeland, Florida; Kevin Smith and Christopher Rozansky at Venice, Florida; Gerald Serres and Donald Ingraham at Faribault, Minnesota; David Ryan at Arlington, Washington; and Richard Lesniak at St. Petersburg, Florida. Other major contributors were Keith Holt at New River Valley Airport, Virginia; Adam Elchin at Ridgely Airpark, Maryland; and Tom and Jessica Warren at North Tampa AeroPark, Florida.

I am very thankful for the strong support of the ACRP project panel members and for Kathleen S. O'Lenic for her report assistance.

FOREWORD

Airport administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to the airport industry. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire airport community, the Airport Cooperative Research Program authorized the Transportation Research Board to undertake a continuing project. This project, ACRP Project 11-03, "Synthesis of Information Related to Airport Practices," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an ACRP report series, *Synthesis of Airport Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

By Gail R. Staba
Senior Program Officer
Transportation Research Board

The basic premise behind an airport being open to the public is that the airport will make reasonable accommodations for all types of aeronautical activities. Safety, of course, is paramount. Mixed-use aeronautical activity requires the public-use airport to accommodate all comers in compliance with FAA sponsor assurances. The different categories of aircraft can include gliders, helicopters, ultralight vehicles, balloons, airships, blimps, skydiving, aerial applications for agriculture and firefighting, banner towing, aerobatic practice, and similar flight operations. Unmanned aircraft systems and radio-controlled model aircraft activity that take place on an airport can become part of the mix of an airport's operation. Not included in this report are seaplane operations; a separate report is referenced. In accommodating mixed-use operations, an airport is challenged in two ways—with operational accommodation in the local airspace and runway environment, and with ground operational and logistical accommodation on the airfield.

This report is intended to serve as an informative document for those airport operators and policymakers who seek information about how other airports have safely accommodated mixed-use flight activity on their airport. Information used in this study was acquired through a review of the literature and interviews with airport operators and industry experts. Case examples are presented to illustrate the experiences of airport operators in accommodating users safely and efficiently. The information in this report helps an airport operator to understand better the operational characteristics and needs of the various mixed aeronautical uses, especially for airports without air traffic control tower operation (i.e., uncontrolled airports).

Stephen M. Quilty, SMQ Airport Services, Lutz, Florida, collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on page iv. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

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Note: Photographs, figures, and tables in this report may have been converted from color to grayscale for printing. The electronic version of the report (posted on the web at www.trb.org) retains the color versions.

ACRONYMS

AC	Advisory Circular
ADO	Airport district office
AFD	Airport/facility directory
AGL	Above ground level
AIM	Aeronautical Information Manual
AIP	Airport Improvement Program
ALP	Airport layout plan
AMA	Academy of Model Aeronautics
APA	Aerobatic practice area
ATCT	Air traffic control towers
ATO	Air Traffic Organization
BSR	Basic Safety Requirements
CBO	Community-based organization
CFR	Code of Federal Regulations
CGL	Compliance Guidance Letter
COA	Certificate of Authorization
CTAF	Common traffic advisory frequencies
DD	Director's Determination
FAD	Final Agency Decision
FBO	Fixed-base operator
FSDO	Flight Standard District Office
FSS	Flight service station
GA	General aviation
HAA	Helicopter air ambulance
HAI	Helicopter Association International
HLZ	Helicopter landing zone
IAC	International Aerobatic Club
JZ	Jump zone
LOA	Letter of Agreement
LRD	Legal Research Digest
LSA	Light sport aircraft
LTA	Lighter-than-air
LZ	Landing zone
NAAA	National Agricultural Aviation Association
NATA	National Air Transportation Association
NOTAM	Notice to Airmen
NPIAS	National Plan of Integrated Airport System
NPRM	Notice of Proposed Rulemaking
PDZ	Parachute drop zone
PJA	Parachute jumping area
RC	Radio-controlled
RDO	Regional district office
ROFA	Runway obstacle free area
SMS	Safety management system
SOP	Standard operating procedures
SSA	Soaring Society of America
s-UAS	Small Unmanned Aerial Systems
UAS	Unmanned aircraft systems
USC	United States Code
USFS	United States Forest Service
USPA	United States Parachuting Association
VFR	Visual flight rules
VTOL	Vertical takeoff and landing
WSC	Weight-shift control

COMBINING MIXED-USE FLIGHT OPERATIONS SAFELY AT AIRPORTS

SUMMARY

The objective of this study is to document literature, experiences, and practices in safely accommodating mixed-use aeronautical activity at airports. Mixed-use aeronautical activity refers to the different categories of aircraft a public-use airport is intended to accommodate in compliance with FAA sponsor assurances. These categories include gliders, helicopters, ultralight vehicles, balloons, airships, blimps, skydiving, aerial applications for agriculture and firefighting, banner towing, aerobatic practice, and similar flight operations. Also discussed are unmanned aircraft systems and radio-controlled model aircraft activity that take place on an airport and can become part of the mix of an airport's operation. Not discussed are seaplane operations; a separate report is referenced.

This report is intended to serve as an informative document for those airport operators and policymakers who seek information about how other airports have safely accommodated mixed-use flight activity on their airport. The basic premise behind an airport being open to the public is that the airport will make reasonable accommodations for all types of aeronautical activities. Safety, of course, is paramount. Case examples are presented to illustrate the experiences of airport operators in accommodating users safely and efficiently. The information in this report helps an airport operator to understand better the operational characteristics and needs of the various mixed aeronautical uses, especially for airports without air traffic control tower operation (i.e., uncontrolled airports). In accommodating mixed-use operations, an airport is challenged in two ways—with operational accommodation in the local airspace and runway environment, and with ground operational and logistical accommodation on the airfield.

This report provides insight into both aspects for the various mixed-use aeronautical operations discussed. It centers on the normal integration of various aeronautical activities into an airport's daily operations, rather than the conduct of a special event. The report is divided into chapters that contain specific information about a particular aeronautical activity. However, general background information is contained in the first four chapters, laying a foundation for understanding any one particular aeronautical chapter. Readers are encouraged to read the background information in chapters one through four before reading a chapter of particular aeronautical interest. Thirty-six airports and six state aviation offices either self-selected to participate in the study or responded to interview requests, resulting in 100% participation.

The different types of aeronautical activities can have operating characteristics that place unique demands on airport users and operators. An airport operator's unfamiliarity with the operating characteristics of a proposed aeronautical activity can result in less than optimum actions by the airport to accommodate that activity. The results can have legal, economic, social, and operational consequences. This synthesis seeks to inform airport operators, officials, and users about the different operating characteristics and airport needs of various aeronautical activities. The need for operational integration is recognized because the various aeronautical activities have the same standing in the eyes of the FAA. A basic premise the FAA and courts have asserted about aeronautical activities is: If a pilot is conducting the activity in accordance with FAA regulations, then the operator and the operation are presumed to be operating in a safe manner.

An aeronautical user is entitled to the same rights, privileges, and protections as any other type of aeronautical user. The FAA has stated in a number of circumstances that arguments to preclude a particular aeronautical activity could easily be ascribed to any other aeronautical activity. A preclusion would be viewed as granting exclusive rights to the other aeronautical activities. Aeronautical users have equal rights to access the airspace under federal law. Too often, airport operators do not fully understand the sponsor assurance requirements to which they agree when they accept federal assistance. In particular, in exchange for the assistance and as part of their public use purpose, airport sponsors agree to make the airport available to all aeronautical users on reasonable terms and without unjust discrimination. The consequences of failing to allow an aeronautical activity on an airport have resulted in the FAA suspending the award of Airport Improvement Program funds to airports that have not properly explored alternatives for accommodating the activity. The airport operator can limit certain aeronautical activity, but only with the approval of the FAA. This report describes FAA policy decisions and directives resulting from informal and formal complaints that various aeronautical users have lodged against airports resulting from access restrictions.

Differences of opinion can exist between aeronautical users and airport management as to whether certain practices are safe, as evidenced by numerous contentions disclosed in the literature review. For this reason, airports with effective mixed-use flight operations typically publish minimum standards, operations rules, and standard operating procedures (SOPs) to enhance safety and as a means to mitigate contentions. Additionally, requesting or conducting informed safety assessments or analyses can further mitigate disagreements.

This study found that many airports do not have minimum standards or rules and regulations in place that address the possibility of a future aeronautical user request. SOPs, rules and regulations, and minimum standards are all means to enhance safety at an airport. Implicit in the development of standards is the open communication and participation of stakeholders in the development process. As the study found, the development of SOPs and rules and regulations have little value if they are not well communicated and consistently upheld.

Another finding from the study is that the FAA expects airport operators to be proactive in their efforts to accommodate various aeronautical users. Two airports were found to have conducted independent safety risk assessments to help them explore ways to safely accommodate various users, or to justify their reason for precluding a particular operation. The FAA administrative determinations provide ample history and delineation of what arguments can and cannot be used when responding to an aeronautical user's request for access to the airport (see chapter two).

Information for this report was derived largely from a review of literature; the administration of a generalized survey to selected airports; and interviews with various airport operators, state aviation organizations, and regional or national associations. Resource references are provided for those seeking more in-depth information.

CHAPTER ONE

INTRODUCTION

Airports are physical facilities that accommodate a number of different aeronautical activities. Gliders, helicopters, ultralight vehicles, balloons, blimps, parachutes, aerial applications for agriculture and firefighting, banner towing, aerobatic practice, and other similar flight operations are examples of aeronautical activities that occur on airports. Some airports allow remotely controlled model aircraft, which is not considered to be an aeronautical activity by the FAA. The advancement and utilization of unmanned aerial systems (UASs) are placing new demands on airports and surrounding airspace.

The various types of aeronautical activities can create competing demands for airspace and airport real estate. Some airport operators address the competing demands well, whereas other operators seek to limit or deny particular activities. If an airport has received federal or state financial assistance through the Airport Improvement Program (AIP), acquisition of surplus government property, or acquisition of land from the government, the airport has a basic obligation to reasonably accommodate and make the airport available to all aeronautical activities.

OBJECTIVES

The basic objective of this study is to document literature, experiences, and practices in safely accommodating mixed-use aeronautical activity at airports. The report serves as an informative document for those airport operators and policymakers seeking information about accommodating mixed-use flight activity. It includes information on the activities' various aeronautical needs, requirements, and operating parameters on an airport, especially for uncontrolled airports. Many airports are unsure of issues and associated risks of mixed-use aeronautical operations, and this report attempts to document how airports can safely coordinate and accommodate mixed-use aeronautical activity.

In accommodating mixed-use operations, an airport is challenged in two ways: (1) operational accommodation in the airspace and runway environment, and (2) ground operation and logistical accommodation on the airfield. This report provides insight into both types of accommodations for the mixed-use aeronautical activities discussed.

Combining various flight operations safely within the airport environs and the airspace can be challenging, particularly without an on-site air traffic control operation. Instances have occurred across the country in which the integration of different types of aeronautical activity have resulted in the local community perceiving that an unsafe situation exists at their airport.

To address the potential for conflict over the use of an airfield by different aeronautical users, some airports enact rules and operating procedures to coordinate these activities safely and efficiently. However, many more airports throughout the country have not drafted guidelines or operating procedures to address these issues. While this lack of guidance may be attributed to expected cooperation between pilots and airport operators in accordance with existing regulations, many airports are unsure of issues and associated risks of each mixed-use operation. This report seeks to provide information about the different activities and information for use in assessing the issues and risks.

This report also provides information helpful to airport policymakers, managers, and others having responsibility for safely overseeing and coordinating mixed aeronautical flight operations. As a result, the information can assist airport operators in drafting effective oversight rules and procedures.

WHAT IS CONSIDERED AERONAUTICAL ACTIVITY?

The United States Code (USC) defines an aircraft as "any contrivance invented, used, or designed to navigate, or fly in, the air" (49 USC 40102 2012). The Code of Federal Regulations (CFR) defines an aircraft as a device that is used or intended to be used for flight in the air (14 CFR 101). Within the regulations, four categories of aircraft are identified: airplanes, gliders, rotorcraft, and lighter-than-air (LTA) aircraft. When operated, each category of aircraft becomes an aeronautical activity. FAA Advisory Circular (AC) 150/5190-6 defines aeronautical activity as "any activity that involves, makes possible, or is required for the operation of aircraft, or that contributes to or is required for the safety of such operations" (FAA 2007e).

Within the definition of aeronautical activity, the phrase "required for the safety of such operations" refers to aspects of aircraft maintenance, fueling, pilot training, aircraft storage, and aircraft and parts sale and service. According to the AC, an aeronautical activity can be any of those identified in Textbox 1.

This list is not all-inclusive, as the FAA may determine other uses to be aeronautical in nature. For example, UAS operational rules are still evolving, and the specific determination of which UAS operations qualify as an aeronautical activity have not been established. Not included in the definition of aeronautical activity are model aircraft and model rocket operation. However, for this report a review of remote-controlled model aircraft activity on or near an airport is included for the benefit of an airport operator. For this synthesis, the following activities and operations are discussed:

- Aerial agriculture spraying
- Aerial firefighting
- Aerobatics
- Airship/blimp
- Balloons
- Banner towing/aerial advertising
- Glider/soaring
- Parachute/skydive
- Rotorcraft (helicopter and gyroplanes)
- UAS and remote-controlled model aircraft
- Ultralight (power parachute, hang glider and weight-shift vehicles)
- Vertical takeoff or landing (VTOL)/tiltrotor.

LIMITATIONS OF THIS SYNTHESIS STUDY

Each aeronautical operation considered in this report has different needs and considerations. As a result, the operational procedures developed by an airport or an aeronautical operator are generally tailored to address the specific needs and operation of that airport. To capture data about the operating procedures,

TEXTBOX 1
FAA List of Aeronautical Activities
(*Source*: Advisory Circular 150/5190-6)

- Pilot training
- Aerial photography
- Aerial application (crop spraying)
- Aerial advertising and surveying
- Parachute activities
- Ultralight activities
- Sport pilot activities
- Military flight operation
- Aircraft rental and sightseeing
- Aircraft sales and service
- Aircraft storage
- Sale of aviation petroleum products
- Repair and maintenance of aircraft
- Sale of aircraft parts
- Air taxi and charter operations
- Scheduled or nonscheduled air carrier service

policies, leases, plans, commercial operating permits, existing checklists, and other useful documents, a small sample of airports were considered nationally. Invariably, there are examples that were not captured in the study. A more in-depth study of each activity would provide greater detail and examples. Military airports were not included in the study. Application of material in this report is conditioned upon local legal and FAA review for compliance with local, state, or federal obligations.

STUDY METHODOLOGY

In seeking to identify useful practices associated with each aeronautical activity, the administration of a standard survey questionnaire for statistical analysis was not appropriate. Instead, a modified case-by-case method was used to identify airports that not only had a particular aeronautical activity, but which also had practices useful and pertinent to the goals of the study. Information was largely compiled from a review of literature, the administration of a generalized survey to selected airports, and a number of interviews with airport operators, state aviation organizations, and regional or national associations.

The three-pronged approach taken to identify airport operators having operations pertinent to this synthesis was:

1. A literature search was made to identify potential sample airports.
2. A review was undertaken of FAA Form 5010 Airport Master Records and the Airport/Facility Directory (AFD) for the entire United States and its territories.
3. Inquiries were made of the following:
   - Aviation trade associations representing each special activity
   - State aviation organizations
   - Committee members of American Association of Airport Executives
   - Panel members.

The project panel requested that at least 30 airports be included in the study, along with state aviation offices and pertinent aviation association representation. Based on the remarks and number or types of operations listed in the AFD, airports were selected from various regions of the United States and its territories for targeted consideration in the study. Once airports were identified, inquiries were made to airport managers through an 18-item questionnaire, to provide information on whether they had practices applicable to the study (Appendix A). The purpose of the questionnaire was to solicit general information about aeronautical activity and to find airports that would be suitable for the study. The questionnaire was not intended, nor suitable, for statistical analysis because the sample size is too small and not all survey questions were applicable to all aeronautical activities.

Thirty-six airports and six state aviation offices either self-selected to participate in the study or responded to interview requests, resulting in 100% participation. A list of participants in the study is provided in Appendix B, along with special acknowledgments on page v. Appendix B also identifies the different aeronautical activities that airports in the survey and interviews acknowledged as occurring on their airports.

As a result of the survey review and interviews, several airports became case examples, as their operations captured practices or challenges deemed beneficial to other airport managers. Case examples are presented in chapter fifteen.

LITERATURE REVIEW

A literature review was undertaken consisting of a web search of topics related to the synthesis. Databases included Online Computer Library Center's WorldCat, the National Technical Information Service, TRB's Transportation Research Integrated Database, FAA documents, and various trade organization websites. General research applicable to the study's purpose follows in this chapter, and chapters on particular aeronautical activities include more specific references.

AIRPORT/FACILITY DIRECTORY

A review of airports listed in the AFD was performed. The AFD is an FAA publication that lists the airport master record data (Form 5010) on file with the FAA for all public-use airports, seaplane bases, heliports, military facilities, and selected private-use airports important to the U.S. transportation system. The *Remarks* section of the AFD was reviewed. The *Remarks* section includes data that call attention to a particular aeronautical activity, such as parachute operations, an aerobatic box, ultralight activity, aerial agriculture operations, and others. The information contained in the section may not reflect current practice at an airport; several airport managers contacted during the course of the study indicated the information was inaccurate. Examples of remarks from the AFD for a particular aeronautical activity are contained in the various chapters.

The AFD also lists operational data on the number of based aircraft, including helicopter, gliders, and ultralights at each airport. A separate section of the AFD lists *Parachute Jumping Areas* and *Seaplane Landing Areas.* A total of 1,020 airports had one or more listings. A breakout of the listings is presented in Tables 1 and 2.

Table 1 summarizes the findings of the literature review of airports having mixed aeronautical use remarks, as derived from FAA Form 5010 Master Records and the AFD. Broken into the different classifications, 702 airports with remarks are part of the National Plan of Integrated Airport System (NPIAS), whereas 318 are not included. Of the total 1,020 NPIAS airports, 613 are federally obligated. That is, they have an obligation to make reasonable accommodations of all aeronautical activity requests under the sponsor assurances. The other 407 airports do not have that obligation. Many of the remarks in the AFD prohibiting or restricting mixed aeronautical use are associated with the nonobligated airports. The major types of airports having a remark related to a mixed-use activity are general aviation (GA) (906), those without an air traffic control tower (942), and those publicly owned (787).

Table 2 identifies the total number of remarks associated with each of the aeronautical activities found in the AFD. Ultralight (370), skydiving (241), helicopter (162), glider (159), and aerial applicators (125) were the predominate activities. Of note, a surprising number of airports allow RC model aircraft activity (72), as that is not considered an aeronautical activity for sponsor assurance purposes.

TABLE 1
SUMMARY OF AIRPORTS HAVING REMARKS
LISTED ON FAA FORM 5010 AND THE AFD

	NUMBER	PERCENT
AIRPORT CATEGORY		
NPIAS	702	68.8
Non-NPIAS	318	31.2
Grant Obligated	613	60.1
Non-obligated	407	39.9
CLASSIFICATION		
Primary	47	4.6
Reliever	59	5.8
Commercial Service	8	0.8
General Aviation	906	88.8
ATCT		
Full-time	6	0.6
Part-time	72	7.1
None	942	92.4
OWNERSHIP		
Public	787	77.2
Private	233	22.8

Source: Compiled from FAA Form 5010 and AFD data.

TABLE 2
NUMBER OF REMARKS IN THE AFD

Aerial Applicator	125
Aerial Firefighting	15
Aerobatic	58
Airship/Blimp	3
Banner Towing	32
Glider/Sailplane	159
Gyrocopter	4
Hang Gliding	21
Helicopter	162
Parachuting/Skydive	241
Radio Model Aircraft	72
Seaplane	29
Ultralight	370
Unmanned Aerial Vehicle	8

Source: Compiled from FAA Form 5010 and AFD data.

Table 3 provides a breakout of the number of airports having different aeronautical use remarks identified in FAA Form 5010 and the AFD, as associated with each state or territory.

The data presented in Tables 1, 2, and 3 have limitations. Not all airports with listings have current activity. The FAA is working on its processes for updating and keeping current the AFD. Also, some states were more diligent than others in listing airports with certain activities. For instance, all airports having ultralight aircraft based on the airport in the state of Minnesota had a remark of ultralight activity on and in the vicinity of the airport, even though all but one ultralight may have been based at the airport.

RELATED ACRP REPORTS

Several synthesis reports related to aeronautical activities have been previously published, including *ACRP Synthesis 41: Conducting Aeronautical Special Events at Airports* and *ACRP Synthesis 57: Airport Response to Special Events* (Prather 2013; Kramer and Moore 2014). The distinguishing aspects between this synthesis and the earlier two are in the planning for the events and in the logistics needed to conduct them. The earlier reports document the need for long lead times in planning and

TABLE 3
NUMBER OF AERONAUTICAL REMARKS FOR AIRPORTS IN THE UNITED STATES

Alabama	8	Idaho	16	Michigan	48	New York	32	South Dakota	14
Alaska	27	Illinois	30	Minnesota	46	North Carolina	27	Tennessee	10
Arizona	23	Indiana	19	Mississippi	11	North Dakota	7	Texas	76
Arkansas	20	Iowa	44	Missouri	52	Ohio	26	Utah	7
California	69	Kansas	23	Montana	20	Oklahoma	31	Vermont	6
Colorado	16	Kentucky	7	Nebraska	10	Oregon	21	Virginia	20
Connecticut	4	Louisiana	18	Nevada	16	Pennsylvania	40	Washington	24
Delaware	3	Maine	7	New Hampshire	4	Puerto Rico	2	West Virginia	9
Florida	30	Maryland	12	New Jersey	15	Rhode Island	3	Wisconsin	30
Georgia	6	Massachusetts	10	New Mexico	32	South Carolina	9	Wyoming	5
Hawaii	9								

preparing for an event. For example, *ACRP Synthesis 41* provides an overview of planning and conducting an air show event and factors to be considered in staging one. An event is described as an annual or one-time aeronautical activity, such as an air show, airport open house, aircraft static display, or fly-in. *ACRP Synthesis 41* does not contain information on the operating characteristics or needs of the aerobatic or other aircraft making up the event.

ACRP Synthesis 57 describes how airport operators respond to special non-aeronautical events that can affect an airport's aeronautical activity and operation, such as the impact of the Super Bowl, the Olympics, Formula One races, political conventions, classic car shows, and so on. That report contains information an airport operator can use to stage a large regional event, and includes items such as checklists, staffing issues, safety and operational concerns, communication protocols, and event management guidance. Information presented in the syntheses can be used by airport management to develop airport procedures, rules, and regulations.

A third synthesis report, *ACRP Synthesis 32: Managing Aerial Firefighting Activities on Airports*, provides detailed information on accommodating the special aeronautical activity of aerial firefighting application (Phillips 2012). This current report seeks not to duplicate the firefighting report, but to provide a synopsis of the activity and add new material discovered in this study.

A fourth synthesis report, *ACRP Synthesis 61: Practices in Preserving and Developing Public-Use Seaplane Bases*, provides information on the integration of float, sea, and amphibious planes into the airport environment (Quilty 2015). There are few seaplane bases in the United States that are collocated or near land airports with operating air traffic control towers (ATCTs). At both controlled and uncontrolled airports, seaplanes function the same as other fixed-wing, rotorcraft, or ultralight aircraft. Reference is made to *ACRP Synthesis 61* for those who seek to accommodate seaplane operation.

An ACRP report is a primer on UAS. *ACRP Report 144: Unmanned Aircraft Systems (UAS) at Airports: A Primer* provides an overview of how the UAS rules have evolved and their potential impact on airports (Neubauer et al. 2015a). Not covered in the report are RC model aircraft operations. The distinctions between UAS and RC model aircraft are discussed in chapter fourteen.

REPORT ORGANIZATION

This report is organized to provide a logical progression of basic information related to the various aeronautical activities, followed by separate chapters for each of the activities covered. A final section on case examples and appendices support the previous chapters.

Chapter one lays out the study methodology, indicating a case approach to finding and interviewing airports. An explanation of aeronautical activity provides a foundation for understanding the activities explored in the report. Limitations to the study methodology are explained.

Chapter two provides a basic foundation and understanding of how sponsor assurances apply to an airport sponsor's requirement to accommodate various aeronautical activities. FAA agency decisions and guidance documents are reviewed. Information related to the complaint process and the role of airport management and the FAA in resolving complaints of aeronautical activity restriction is provided. A brief overview of how the development of minimum standards and operating rules and regulations can affect aeronautical access is also provided.

Chapter three briefly addresses safety and risk management in the context of past legal determinations, current safety management system (SMS) efforts, and risk analysis resources. Insurance coverage associated with aeronautical activities is discussed generally.

Chapter four seeks to consolidate information related to the various design criteria associated with different aeronautical activities. Additional design criteria are further detailed in separate chapters on an aeronautical activity. General information on airspace and traffic pattern practices is provided, with some specific examples cited.

Chapters five through fourteen each cover a specific aeronautical activity in the following order: Aerobatic Operations, Balloons, Airships, Aerial Applications: Agricultural and Firefighting, Aerial Advertising, Glider Operations, Rotorcraft Operations, Parachute Operations, Ultralights, and Unmanned Aircraft Systems. Each chapter describes the basic operating practices for the aeronautical activity. An overview of the local airspace and on-airport operating needs and requirements for each is presented. Where applicable, items of interest and pertinence to airport operators are included, such as safe operational practices, hazard and risk issues, regulatory issues, and related sources of information.

Chapter fifteen presents nine case examples that illustrate how airport operators managed a particular aeronautical activity on their airport.

Chapter sixteen presents conclusions drawn from the study and suggests areas for future research.

CHAPTER TWO

ACCOMMODATING AERONAUTICAL ACTIVITY

A basic premise the FAA and courts have asserted about aeronautical activities is: If a pilot is conducting an aeronautical activity in accordance with FAA regulations, then the operator and the operation are presumed to be operating in a safe manner (*Citizens for Quiet Skies v. Mile-Hi Skydiving Center, Inc.* 2015). An airport operator may not otherwise deny access, with one exception. The exception permits an airport sponsor to exercise control of the airport to preclude safe and efficient use of navigable airspace that would be detrimental to the civil aviation needs of the public. Safety concerns that an airport operator has about a particular operation would need to be brought to the attention of the FAA. These are discussed in chapter three.

A number of publications and reports, such as *ACRP Legal Research Digests* (LRD), document past assessments and decisions made about the safety of operations at an airport. In particular, *Legal Research Digest 23: A Guide for Compliance with Grant Agreement Obligations to Provide Reasonable Access to an AIP-Funded Public Use General Aviation Airport* and *Legal Research Digest 11: Survey of Minimum Standards: Commercial Aeronautical Activities at Airports* (Kirsch 2015; Reimer and Meyers 2011), are of importance.

LRD 23 describes the sponsor assurances and how they limit an airport sponsor from unreasonably denying an aeronautical activity at GA airports. This current synthesis report supplements the material found in *LRD 23* by further expounding upon several of the outcomes mentioned in the digest. Appendix C provides a sample informational summary on several aeronautical activities presented in the digest. *LRD 11* contains source material for adopting and enforcing minimum standards, reports survey results showing current practices, provides an index of case law, and includes a compendium of comparative minimum standards. Whereas *LRD 11* focuses more on minimum standards applicable to fixed-base operators (FBOs), this synthesis report adds material addressing mixed aeronautical use activity and their corresponding operating rules and regulations.

SPONSOR ASSURANCE REQUIREMENTS

When airports receive federal grant funds or a transfer of federal property for airport purposes, the airport owner or sponsor agrees to certain obligations and conditions. These obligations are incurred through contract (called sponsor or grant assurances) or by restrictive covenants contained in a property deed transfer. There are currently 39 sponsor assurances an airport operator or sponsor agrees to comply with when accepting federal funds, though fewer assurances may be incurred when accepting a noise compatibility or planning grant. The assurances that primarily are referred to when discussing accommodating aeronautical uses on airports is Sponsor Assurance 22, *Economic Nondiscrimination*, and Sponsor Assurance 23, *Exclusive Rights* (FAA 2014d). Other assurances mentioned in this report include Sponsor Assurance 24, *Fee and Rental Structure*; Sponsor Assurance 27, *Use by Government Aircraft*; and Sponsor Assurance 29, *Airport Layout Plan* (FAA 2014d).

LRD 23 provides a concise and practical overview of the obligations an airport has as a result of accepting federal assistance (Kirsch 2015). Applicable to this synthesis report is Sponsor Assurance 22, *Economic Nondiscrimination* (FAA 2014d). The assurance states the requirement to accommodate aeronautical activity at a federally obligated airport:

a. It will make the airport available as an airport for public use on reasonable terms and without unjust discrimination to all types, kinds and classes of aeronautical activities, including commercial aeronautical activities offering services to the public at the airport.

and

> h. The sponsor may establish such reasonable, and not unjustly discriminatory, conditions to be met by all users of the airport as may be necessary for the safe and efficient operation of the airport.

Sponsor Assurance 22(i) provides a limited exception for an airport operator to disallow a particular aeronautical activity:

> i. The airport sponsor may prohibit or limit any given type, kind, or class of aeronautical use of the airport if such action is reasonable and necessary for the safe operation of the airport or necessary to serve the civil aviation needs of the public.

A denial, prohibition, restriction, or limitation can be based on safety or on a conflict between classes or types of operations. The limitation or prohibition by type, kind, or class refers to a whole class or type of operation, not an individual operator, for example, all agricultural operations or all banner tow operators, not just one particular company that provides either service. If a class or type of operation can cause a problem, all operators of that type or class would be subject to the same restriction. The literature review identified several airport operators that have found themselves the subject of a tenant, user, or individual complaint because they did not apply a restriction to all like or similarly situated aeronautical activities.

ACRP Legal Research Digest 11 found that the most-discussed topic during interviews with both airport and aircraft operators were related to Assurances 22, 24, and 27 (Reimer and Meyers 2011). The report explores the issues and economic matters related to self-fueling capabilities allowed under Assurance 22, *Economic Nondiscrimination.* It was noted that past controversies over fueling operations had largely been resolved at those airports that established rules and regulations on self-serve/self-fueling. At airports that had not addressed the issue, tension continued between aeronautical users, FBOs, and the airport operators.

Communication and coordination are mentioned in the literature and interviews as key ingredients in preventing or addressing complaints about aeronautical operations. Several airport managers commented on how important it was to build relationships with the operator, users, and neighbors. Learning about skydiving operations and educating others can help reduce conflict, managers found. The FAA Aeronautical Information Services Division publishes on its website a Frequently Asked Question Forum (https://www.faa.gov/air_traffic/flight_info/aeronav/faq/) to help explain operating and procedural aspects of accommodating the many different aeronautical activities (FAA 2015d).

COMPLIANCE GUIDANCE

An FAA Order is an internal administrative document that provides guidance to FAA employees in carrying out their duties and responsibilities. Orders are not regulatory and are not considered controlling on airport sponsors' conduct. Nonetheless, orders help an airport sponsor understand how the FAA will carry out its regulatory responsibilities.

FAA Order 5190.6B, *Airport Compliance Manual*, is a primary source of information regarding the responsibilities and legal requirements an airport operator or sponsor has when receiving federal funding assistance or property conveyances (FAA 2009b). The *Airport Compliance Manual* discusses the obligations set forth in the standard airport sponsor assurances, addresses the application of assurances in the operation of public use airports, and facilitates interpretation of assurances by FAA personnel. The manual further provides guidance on allowable restrictions based on safety and efficiency procedures and organization, and describes the standards of compliance to be used when investigating allegations of sponsor assurance violations.

For example, Paragraph 14.7 of the manual provides insight into FAA's policy regarding acceptable methods and measures for accommodating aeronautical activity when the safety and efficiency of a mixed-use activity is questioned (FAA 2009b, p. 14-6):

> A complete prohibition on all aeronautical operations of one type, such as ultralights, gliders, parachute jumping, balloon and airship operations, acrobatic flying, or banner towing should be approved only if the FAA concludes

that such operations cannot be mixed with other traffic without an unacceptable impact on safety or the efficiency and utility of the airport. When it is determined that there are less restrictive ways or alternative methods of accommodating the activity while maintaining safety and efficiency, these alternative measures can be incorporated in the sponsor's rules or minimum standards for the activity in question at that airport.

Safety and efficiency in the national airspace system are the two areas of evaluation the FAA will assess in a complaint about denial of airport use. The FAA's investigation of complaints based on those two factors is made to determine whether or not the restricted or denied activity can be safely accommodated on less restrictive terms than those proposed by an airport operator, without adversely affecting the airport's efficiency and utility. If the FAA determines the accommodation can be made, the airport must revise or eliminate the restriction in order to remain in compliance with its sponsor assurances and federal surplus property obligations, according to Docket No. 16-07-06 (FAA 2008c).

If an airport operator believes an aeronautical activity is inconsistent with the safety and efficiency of airport operations, then justification is required to the FAA (FAA Order 5190.6B 2009b). Courts have affirmed the preemption of FAA's rules governing aircraft operations over state and local laws. Any aeronautical restriction is subject to concurrence by the FAA. An example cited in the FAA *Airport Compliance Manual* (Order 5190.6B) is an airport sponsor believing that skydiving unacceptably interferes with an airport's busy fixed-wing aircraft use (FAA 2009b). If the airport presents adequate justification and documentation to support the unacceptable interference, and the FAA agrees, the airport may deny permission for a parachute drop zone (PDZ) at the airport. However, the sponsor could not deny some skydiving operators while allowing others to operate. Nor could the airport operator deny public access to skydivers to board an aircraft for purposes of landing at a remote drop zone. Another example provided is precluding two-seat ultralight training aircraft from operating on the airport when single-seat operation is allowed. That would be a contestable limitation, especially since a two-seat operation generally falls into a category of aeronautical activity known as a light sport aircraft (LSA) operation. An aircraft falling in the LSA category is not by definition an ultralight operation (FAA 2009b).

Chapter 14 of the *Airport Compliance Manual* provides sample letters, rationales, and determinations addressing attempts by airports to restrict certain aeronautical operations or to seek support for a restriction (FAA 2009b). The manual provides additional insight into what constitutes reasonable accommodation, what qualifies for appropriate safety or efficiency restrictions, and the process airport operators are to follow for obtaining FAA review and assessment of airport actions. To further assist airport operators in understanding FAA policy, a Compliance Guidance Letter (CGL) was issued internally within FAA on April 25, 2016. The intent of the CGL is to provide personnel in the FAA's Office of Airports with guidance on providing an agency determination on the conduct of various types of aeronautical activity at a federally obligated airport (http://www.faa.gov/airports/airport_compliance/media/cgl-2016-interim-procedures-parachute-operations.pdf). Airport operators seeking to restrict certain aeronautical activities are encouraged to review the appendices in the *Airport Compliance Manual* (FAA 2009b) and the April 2016 or any subsequent CGL. Textboxes 2, 3, and 4 of this synthesis report provide examples of sponsor assurances—approved, not approved, or not requiring justification. Operators are also encouraged to review *LRD 23* (Kirsch 2015).

TEXTBOX 2
Examples of Sponsor Assurance 22 Restrictions Approved by the FAA
(FAA Order 5190.6B 9/30/2009)

1. Limiting skydiving, soaring, and banner towing operations to certain times of the day and week to avoid the times of highest operation by fixed-wing aircraft.
2. Banning skydiving, soaring, ultralights, or banner towing when the volume of fixed-wing traffic at the airport would not allow those activities without significant delays in fixed-wing operations.
3. Limiting skydiving, soaring, and ultralight operations to certain areas of the airfield and certain traffic patterns to avoid conflict with fixed-wing patterns.
4. Restricting agricultural operations due to conflict with other types of operations or lack of facilities to handle pesticides safely that are used in this specialized operation.

TEXTBOX 3
Examples of Sponsor Assurance 22 Restrictions That Generally Do Not Require Justification
(FAA Order 5190.6B 9/30/2009)

1. Designated runways, taxiways, and other paved areas that may be restricted to aircraft of a specified maximum gross weight or wheel loading.
2. Designated areas for maintenance, fueling, and aircraft painting.
3. Use of airport facilities by the general public may be restricted by vehicular, security, or crowd control rules.

TEXTBOX 4
Examples of Sponsor Assurance 22 Restrictions Not Approved by the FAA
(FAA Order 5190.6B 9/30/2009)

1. A ban on certain categories of aircraft, based on safety, where the banned categories of operators were defined solely by aircraft design group, which is an airport planning and design criterion based on approach speed for each aircraft type.
2. A total ban on skydiving, when skydiving could be accommodated safely at certain times of the week with no significant effect on fixed-wing traffic.

MINIMUM STANDARDS AND OPERATING RULES

Airports are encouraged (but not required) by the FAA to establish minimum standards as a means to provide a fair and equitable accommodation of commercial aeronautical activity (49 USC 47107). Sponsor Assurance 22(h) allows an airport operator to develop minimum standards and rules and regulations affecting the airport's operation. Minimum standards refer to the qualifications or criteria that may be established by an airport owner as the minimum requirements to be met by businesses engaged in on-airport aeronautical activities for the right to conduct those activities (FAA Order 5190.6B).

The FAA's objectives in recommending the development of minimum standards is to promote safety in all airport activities, protect airport users from unlicensed and unauthorized products and services, maintain and enhance the availability of adequate services for all airport users, promote the orderly development of airport land, and ensure efficiency of operations (FAA 2006). Airport minimum standards can and do vary from airport to airport, simply because airports can have different types, numbers, and levels of based aircraft, aircraft operation, commercial aeronautical services, and available land and improvements.

An exception is provided to an airport operator to allow for denial of access to an airport of an individual or individual service provider if the person has not complied with the airport's minimum standards or operating rules for safe use of airport property (FAA Order 5190.6B). Implied in the prohibition is that the FAA has previously reviewed and concurred with the minimum standards.

A compendium of information useful to airport operators intending to adopt minimum standards or rules governing commercial operations and aeronautical activities can be found in *Legal Research Digest 11* (Reimer and Meyers 2011). A commercial operation is one conducted by a licensed operator who engages in the carriage of persons or property by aircraft for compensation or hire (14 CFR 1 2015).

AC 150/5190-7 on minimum standards for commercial aeronautical activities is of additional use to airports, as it explains what constitutes aeronautical activities, provides FAA's policy on minimum standards, and gives guidance on developing effective standards (FAA 2006). The AC does not address an airport's oversight of non-aeronautical entities; those are usually addressed as part of an airport's contracts, leases, rules and regulations, or local laws.

Other sources of guidance on minimum standards include the *Airport Sponsors Guide to Minimum Standards & Airport Rules and Regulations* (National Air Transportation Association 2009), and the *Minimum Standards for Commercial Aeronautical Activities* (Aircraft Owners and Pilots Association 2012). Several state aviation offices have developed model minimum standards and guidance for their state airports as well. Appendices D, E, and F provide examples of airport rules and regulations or minimum standards for three airports that cover various aeronautical activities. A search of the web will generate others, such as those currently under review and consideration at the Taunton Municipal Airport in Massachusetts.

REVIEW OF MINIMUM STANDARDS

Some federally obligated airport operators have sought to preclude or restrict certain types of aeronautical activities using minimum standards, rules and regulations, ordinance, or other methods. Two avenues exist for tenants, users, or affected individuals to challenge or lodge a complaint concerning an aeronautical activity; either 14 CFR Part 13 or 14 CFR Part 16 processes can be used. Any rule or standard proposed by a federally obligated airport organization is to be reasonable and not unjustly discriminatory. Application by an airport of an unreasonable requirement or standard in an unjustly discriminatory manner has been construed in the past as a constructive grant of an exclusive right (FAA 2009b).

A question often asked by parties to a complaint is, "Who determines if an airport requirement is unreasonable or unjustly discriminatory?" The FAA is the final arbiter on any matter addressing the safety or efficiency of aircraft operation (FAA 2009a). This is because federal law preempts the authority of a local government when it comes to matters of safety of flight in aeronautical activity (49 USC 40103 2012). Civil courts usually will not entertain review of a tenant or user complaint because of the established federal preemption.

Safety and efficiency in the national airspace system are the two areas of evaluation the FAA will assess in a complaint. The FAA investigates to determine whether the restricted activity can be safely accommodated on less restrictive terms than those proposed by an airport operator without adversely affecting the airport's efficiency and utility. According to Docket No. 16-07-06, if the FAA determines the accommodation can be made, the airport must revise or eliminate the restriction to remain in compliance with its sponsor assurances and federal surplus property obligations (FAA 2008c).

An airport operator can ask the FAA to review a proposed aeronautical activity to assess whether safety and efficiency may be compromised. The airport's request for a review is normally submitted to the Airport District Office (ADO) or Regional District Office (RDO), as those offices are the point of contact for the airport operator. The ADO and RDO will then advise airports on the appropriateness of proposed standards and help ensure that the standards do not protect or convey an exclusive right. The ADOs do not approve operating rules, regulations, minimum standards, or leases. The FAA will state if it has an objection, or if the documents appear to be in compliance. At airports that are not federally obligated, State Aviation Offices often assist in the review of standards, leases, or rules.

The FAA states clearly in AC 150/5190-7 that if an airport requests approval of an aeronautical restriction, the request must be made and obtained in advance of implementing any aeronautical restriction (FAA 2006). To support a determination, a safety analysis usually is performed. An FAA safety determination takes precedence over any airport operator's views on safety, as well as any local ordinances or local actions addressing safety.

FAA ROLE AND RESPONSIBILITY IN PART 13 AND PART 16 COMPLAINT RESOLUTION

If an airport is federally obligated, the FAA is required to consider and respond to any complaint made relative to violation of sponsor assurances or denial of airport access. The ADO or RDO have responsibility for investigating whether a particular airport access denial or restriction is a violation of the airport sponsor's grant assurances. Airport operators can find guidance on Parts 13 and 16 complaints on the FAA website (http://www.faa.gov/airports/airport_compliance), specifically in the *Airport Sponsor & Airport User Rights and Responsibilities* section (FAA n.d.).

The *Airport Compliance Manual* (FAA 2009b) describes the standards of compliance used when investigating allegations of sponsor assurance violations. A Compliance Guidance Letter (FAA 2014a) further clarifies the process of how compliance matters are brought to the attention of ADO personnel for investigation and resolution.

A Part 13 complaint is a process for informal resolution of a complaint. The ADO or RDO coordinates with the Flight Standards District Office (FSDO) to investigate and assess the complaint. The outcome may simply be a letter providing a resolution. A Part 13 complaint can be made orally or in writing, although a written complaint is preferred. There is no formal deadline for the FAA to respond to a Part 13 complaint.

In contrast, a Part 16 complaint imposes a formal and strict process for filing, adjudication, and appeal. The FAA's Office of Airport Compliance and Field Operations conducts Part 16 investigations. A Part 16 complaint results in an FAA Director's Determination (DD) or a Final Agency Decision (FAD). Each may be subject to appeal to the Associate Administrator for Airports, with further possibility for judicial review.

Upon receipt of a Part 13 or Part 16 complaint, the ADO, RDO, or headquarters Airport Compliance Division coordinates the review with the air traffic office and aviation safety office (Flight Standards) for their review and consideration, under Order 5190.6B Sec. 8.8(a) (FAA 2009b). Flight Standards will assist the ADO on safety issues, and the Air Traffic Organization (ATO) will assist on efficiency and utility issues.

FAA ATO is consulted because the aeronautical activity being denied could have an impact on the efficient use of airspace and the utility of the airport. ATO has authority to deny certain aeronautical operations, given its responsibilities for maintaining a safe and efficient air traffic system. At a controlled airport, ATC can enter into an agreement with the airport for conducting safe operations on the field (FAA n.d.).

For someone other than an airport operator (i.e., tenant, user, private individual) wanting to make a complaint about either a pilot or an aircraft operation, the point of contact can be the FAA's FSDO, which has expertise and responsibility for promoting overall aviation safety and for ensuring compliance with the operations and maintenance safety standards for aircraft operations and pilot issues (Textbox 5).

Guidance for FSDO personnel in overseeing various aeronautical activities, including banner towing, aerobatic, skydiving, balloon, and ultralight operations, can be found in chapter three of the *Flight Standards Information Management System* (*FSIMS*), Order 8900.1 (FAA 2015b).

FAA AGENCY DECISIONS AND DETERMINATIONS

Potential outcomes of a Part 13 or Part 16 complaint include an FAA letter, determination, or agency decision in which the FAA provides an analysis and review of the circumstance surrounding the complaint and its investigation of the complaint. For a formal Part 16 complaint, an FAD is made whether

TEXTBOX 5
Matters That an FSDO Might Consider

- Low-flying aircraft
- Air carrier certification and operations
- Aircraft operational issues
- Aircraft certification and modification issues
- Airmen certification (licensing) for pilots, mechanics, repairmen, dispatchers, and parachute riggers
- Accident reporting
- Aircraft maintenance
- Aircraft permits
- Enforcement of Airmen & Aircraft Regulations

an airport is in compliance with its obligations. If an airport sponsor is found to have violated an assurance, the FAD will describe what actions are required to become compliant.

An airport manager interested in an extensive analysis of the debate between an airport's arguments for a denial of access and the FAA's argument for upholding sponsor assurances can be found in Docket No. 16-11-06, FAA's FAD on skydiving activities at South County Airport in San Martin, California, (FAA 2013c). An additional example of an unlawful exclusive right was an attempt to ban ultralight aircraft at a Sacramento County, California, airport. In Docket No. 16-00-11, the FAA deemed the banning resulted in the granting of an exclusive right because, in essence, a special privilege was being granted to other aeronautical users in the use of public airport facilities not available to ultralights (FAA 2001). A similar charge of violating sponsor assurances relating to helicopter operations was made against the Town of East Hampton, New York. In Docket No. 16-15-02, the FAA deemed the town to be in violation because it granted an exclusive right by allowing some helicopters operators, but not all, to operate past a curfew time (FAA 2015g).

An FAA DD—Docket 16-09-13—addressed the closure of a glider runway at an airport (FAA 2011c). The runway closure resulted in the cessation of a glider business. The arguments were that the airport had violated Sponsor Assurance 22, *Economic Nondiscrimination*; Assurance 29, *Airport Layout Plan*; and Assurance 35, *Relocation and Real Property Acquisition.* The airport's decision to terminate glider operations was based on four general arguments: (1) no federal funds had been expended on the runway closed; (2) the glider operations constituted a safety hazard, did not meet design standards, and presented an unreasonable level of risk; (3) economic viability and self-sufficiency of the airport were needed; and (4) the sponsor's long-term plans for the airport included using the closed runway for other purposes. The FAA determination provides an analysis of a number of FAA laws, court cases, and positions relative to compliance with sponsor assurances, including:

- Once an airport becomes federally obligated, the sponsor assurances attach to the entire airport, not just specific pieces of infrastructure paid for with grant funds.
- An airport sponsor's safety argument for closing a runway on the basis of not meeting FAA airport design standards is not appropriate, as FAA airport design standards are mandatory only when constructing new runways and are not intended to limit or regulate the operations of aircraft.
- Airport sponsors are not permitted to unilaterally restrict aircraft operations for safety reasons without advance concurrence by the FAA's Offices of Airports, Flight Standards, and Air Traffic.
- It is unreasonable for an airport operator to refuse to develop a federally obligated airport in response to aeronautical demand, as the airport was conveyed for this very purpose and federal grant funds have been expended for the purpose of enhancing the aeronautical utility of the airport.
- An airport cannot close a runway shown on an approved airport layout plan (ALP) without first gaining concurrence from the FAA.
- The airport was not permitted by the state to allow use of the turf area between two runways for glider operations.
- Determining whether a particular aircraft can safely land on or take off from a particular airport runway is to be made on a case-by-case basis by the pilot, not the airport sponsor.
- The FAA interprets the willingness of a prospective provider to lease space and invest in facilities as sufficient evidence of a public need for those services.

Corrective action sought in the determination, and which can be viewed as being proactive steps for other airports, were the following:

1. Provide glider operators access to the airport.
2. Negotiate in good faith with those desiring to provide glider-related commercial aeronautical services.
3. Utilize the expertise of FAA staff to develop appropriate operating procedures applicable to all airport users.
4. Adopt and enforce appropriate operating procedures applicable to all airport users.
5. Develop a process to improve communication between the airport and aeronautical tenants at the airport.
6. Complete the draft airport Master Plan and any necessary ALP updates.

TEXTBOX 6
Examples of Accommodation Measures in Lieu of a Total Ban
(FAA Order 5190.6B 9/30/2009)

1. Establishing designated operations areas on the airport. An airport can designate certain runways or other aviation use areas at the airport for a particular class or classes of aircraft as a means of enhancing airport capacity or ensuring safety.
2. Alternative traffic patterns and touchdown areas. Examples of this would be a glider operating area next to a runway or a helicopter practice area next to a runway as long as there is proper separation to maintain safety.
3. Special NOTAM (Notice to Airmen) requirements.
4. Special handheld radio requirements.
5. Special procedures and required training.
6. Seasonal authorization or special permission.
7. Waivers issued by Flight Standards under 14 CFR section 103.5 or other applicable regulations and policies.
8. Special use permit, pilot registration, and fees.
9. Limits on the total number of operations in the restricted class. (It might be easier to accommodate just a few operations.)
10. Letters of agreement with Air Traffic Control (ATC), if applicable.
11. Restricted times of operations and prior notification.
12. Weather limitations.
13. Nighttime limitations.

In a Part 16 complaint about skydiving, the FAA asserted in Docket No. 16-07-06 that an unreasonable delay in efforts to accommodate the activity amounted to a denial of airport access (FAA 2008c). A similar decision regarding denial of access to a skydiving request (Docket No. 16-11-06) resulted in the FAA suspending the award of AIP funds to both of a county's airports, although only one was the subject of a complaint (FAA 2013c). Textbox 6 provides examples of reasonable accommodation rulings by the FAA.

At private-use airports, denial of access is a proprietary right of the airport operator, although legal consequences may still exist for such denial. In either case, it is suggested that other viable and nondiscriminatory solutions be offered to preclude possible complaint or contest. At public use airports that are not federally obligated, state aviation offices can often be the contact point for coordination.

CHAPTER THREE

SAFETY AND RISK MANAGEMENT

At federally obligated airports, an action by an airport operator to deny an on-airport aeronautical activity is subject to FAA review and concurrence. It is well established through administrative and court records that the FAA is the final arbiter of questions related to what constitutes a compromise of safety at an airport, and whether or not the efficiency of airspace is affected. The FAA's final determination of an aeronautical compatibility concern is related to its effect on the safety of operation and the efficient use of airspace, as described in Order 5190.6B, *Airport Compliance Manual* (FAA 2009b). The manual also describes an airport owner's obligations to make reasonable accommodations of aeronautical activities.

Airports that are federally obligated, especially GA airports, can have difficulty balancing the obligations of the assurances to accommodate any aeronautical activity with their ability to manage the perceived risks and liability concerns expressed within the community. *Legal Research Digest 23* summarizes the situation eloquently (Kirsch 2015, p. 22):

> FAA safety determinations can be a source of frustration. In many of the cases cited herein, FAA found that an access restriction was unreasonable or unjustly discriminatory because the aeronautical activity could be conducted safely or is not 'inherently unsafe.' GA airport operators and local governments, in contrast, typically are not focused on whether it is possible to conduct an aeronautical activity safely. Instead, GA airport operators are concerned about whether the risk of an incident or accident causing injury, death, or property damage is sufficiently high to warrant limiting the activity. In many respects, this represents one of the most significant sources of conflict between FAA (on the federal level) and GA airport operators (on the local level), because FAA and GA airport operators view the problem so differently.

Adding to the challenge are the views of aeronautical operators who argue that their particular activity is allowed to operate on an airport and that they generally find the risks of their respective sport to be relatively low. A finding from the current study is that individual aeronautical groups can be passionate about their sport or recreational activity. Their passion translates into efforts to confirm their right to pursue their activity on an airport and in the airspace. A newspaper report from the *Herald-News* of Morris, Illinois, described an aerobatic box dispute: "'It's our privilege and right to use the airspace in a legal manner,' he said. 'If they were denying everybody I would understand, but they're just denying aerobatic pilots and we must fight that'" (Chapman 2011). The passion also can translate into a challenge for an airport operator, as the operator's efforts to accommodate other aeronautical activities can be difficult or easy, depending upon whether communication and cooperation between the parties are productive. Missing in the debate are adequate data that would substantiate either party's assertions.

A 1990 journal article demonstrates the polarizing views of risk-taking and risk-aversion: "The contradictions in American society between the public agenda to reduce the risk of injury and death and the private agenda to increase such risks deserves the attention of sociologists" (Lyng 1990, p. 852). Lyng studied skydivers and their risk-taking culture, but included other perceived high-risk sports as hang gliding, rock climbing, scuba diving, car and motorcycle racing, and occupations such as firefighting and police work. Discussion of the different perspectives and motivations of those involved in the disagreement of aeronautical risk can result in better understanding and possible resolution of operational risk.

RISK ANALYSIS RESOURCES

Efforts have been made within the aviation industry to enhance safety through the implementation of both pilot and airport risk management analyses. Tools such as the FAA's *Flight Risk Assessment Tool* (2007c) and *Risk Management Handbook* (2009a), and the United States Helicopter Safety

Team's *Flight/Ground Risk Assessment Tool* (2014) do not specifically include the risks associated with mixed aeronautical use.

More information on risk analysis in aviation can be found in *ACRP Synthesis 37* (Landry 2012), *ACRP Report 131* (Neubauer et al. 2015b), and *ACRP Report 51* (Hall et al. 2011). *ACRP Report 51* provides a risk-based methodology useful in assessing the risks associated with nonstandard separations at existing constrained airports where the standards cannot be practicably met. The report provides insight into applying statistical risk analysis for aircraft operations conducted close to a runway or taxiway, similar to what may be used in conducting a safety assessment for glider, ultralight, or banner towing activity close to a runway. An example of a safety risk assessment for skydiving operations is presented in chapter fifteen of this report, on the Venice Municipal Airport in Florida.

For airport operators, information on risk management is contained in publications related to implementation of an SMS. While not a regulatory requirement as yet, a Notice of Proposed Rulemaking (NPRM) exists proposing the implementation of SMS at airports (75 FR 62008 2010).

Order 8900.1, *Flight Standards Information System*, provides guidance for FAA personnel in the surveillance and inspection of various aeronautical activities and operations, including sport parachuting activity (FAA 2015b).

INSURANCE

Prohibiting an aeronautical activity because of perceived greater liability is not a valid argument for seeking to exclude an aeronautical user from a federally obligated airport, under Docket No. 16-11-06 (FAA 2013c). In that docket on skydiving activity, the FAA views the argument of one aeronautical activity having a greater risk or liability than another aeronautical activity as an argument that could be made for promoting any one aeronautical activity over another.

A discussion of the reasonableness of insurance requirements for a skydiving (or any aeronautical) activity can be found in a May 4, 2011, FAD, Docket 16-09-09 (FAA 2011b). In that complaint resolution, a city sought in a lease agreement to establish insurance requirements that were unattainable and nonexistent and therefore in violation of Sponsor Assurance 22. However, the determination also addressed a tenant lease provision requiring the skydiving operator to pay the cost of increased insurance coverage to the city. The FAA wrote that it was not a violation of Sponsor Assurance 22 because it is not unjustly discriminatory to treat dissimilar aeronautical activities dissimilarly. The city's previous insurance policy did not include skydiving activity. Obtaining additional coverage resulted in an increased cost to the airport because the skydiving company could not obtain adequate insurance required of other aeronautical operations on the airport. It was not similarly situated as to the insurance requirements of other aeronautical operators. The added cost was passed on to the skydiving operator.

In a Part 16 skydiving complaint filed in Hawaii, the FAA in Docket No. 16-07-06 affirmed that the state of Hawaii (operator of the airport) could exercise its proprietary right to require general liability insurance on aeronautical tenants of the airport, as well as the proprietary right to be named as an additionally insured on such insurance policies (FAA 2008c). However, the FAA director cautioned that minimum insurance requirements must not be unjustly discriminatory and the amounts of coverage should be reasonably consistent with other similarly situated airport tenants. The FAA director also affirmed that the State of Hawaii could exercise its proprietary right to require a skydiving operator to include the state in any or all liability waivers signed by skydiving participants.

Skydiving operators conducting operations under the auspices of the United States Parachuting Association (USPA) carry third-party liability insurance through membership with USPA. It is common practice to have the airport named as the insured on the skydiving operator's insurance policy. The same holds true for aerobatic, model aircraft operators, and soaring associations. The Academy of Model Aeronautics (AMA), International Aerobatic Club (IAC), North American Powered Parachute Federation, and the Soaring Society of America (SSA) all provide group insurance for their members

and third-party additional insured provisions. Insurance for balloon, agriculture, banner towing, gyrocopters, and other aeronautical operators is available on the commercial insurance market. Recently, the potential legal issues surrounding the operation of unmanned aircraft systems have prompted several companies to offer insurance services (Bauer and Hawkins 2016). Two airports did not have a requirement to be named insured on a tenant policy unless a special event was taking place at which more people than usual attend, increasing risk exposure.

Discussions with airport operators identified a variety of insurance requirements and limits, with no generally conclusive set amount for a particular activity. *ACRP Synthesis 30* reports on this and provides a synopsis of insurance practices at various airports (Rakich et al. 2011). That synthesis identifies the variables that affect insurance purchasing for airport operators and the range of risk management practices that exist among U.S. airports.

This current study points toward aerial applicators as having the largest personal liability exposure, given the chemicals they manage and the possible public exposure resulting from errors made in application. The airport's exposure to the same liability is not as great, although the environmental consequences of an on-airport spill or contamination can be significant. An airport's normal comprehensive and environmental liability limits appear to apply in most cases, as noted in several of the airport interviews. Owing to the few samples obtained in the interview for each aeronautical activity, the extent to which special aeronautical activities affect insurance rates was inconclusive. It was found in the literature that insurance policies did generally preclude special events, such as air shows, fly-ins, demonstration flights, and the like. Additional coverage was needed for most special events. Airport general liability insurance carriers may also specifically preclude the act of skydiving or other aeronautical activity in a policy. *ACRP LRD 11* provides a sample analysis of airport insurance requirements (Reimer and Meyers 2011). The authors collected insurance requirements from surveyed airports across the nation for various aeronautical activities. The insurance requirements published in the digest demonstrate the different needs of airports as a result of local ownership, municipal codes, or state statutes.

CHAPTER FOUR

AIRFIELD AND AIRSPACE CONSIDERATION

In accommodating mixed-use operations, an airport is challenged in two ways: (1) operational accommodation in the airspace and runway environment, and (2) logistical accommodation on the airfield. This chapter provides insight into both aspects for the aeronautical activities covered in this report. More specific adaptations may be covered in each chapter under an individual aeronautical activity.

AIRFIELD DESIGN

An ALP is a prerequisite for eligibility to receive federal funding. Under Sponsor Assurance 29, an airport operator agrees to keep up to date at all times an ALP that shows the location of all existing and proposed aviation and nonaviation facilities and structures. For nonobligated airports, state standards can apply, which often mirror federal design standards. During this synthesis investigation, airport operators were asked if their ALP showed a unique mixed-use aeronautical operating area, or if their master plan evaluated provisions for a particular mixed-use aeronautical activity. Nine of the 36 airports indicated their ALP showed an operating area or an evaluation was made in the master plan.

Advisory Circular 150/5300-13A provides guidance on the development of airports, including turf runways for ultralights (FAA 2012b). Separate ACs exist for the design of heliports and helipads and seaplane bases: AC 150/5390-2C (FAA 2012f) and AC 150/5395-1A (FAA 2013d). Detailed information on the design of airfield and airspace associated with a particular aeronautical activity is presented in each respective chapter of this report, as appropriate. Design category A-1 is used for most ultralight and glider runways, although the wingspan of gliders can increase the category code. Guidelines for the design of a PDZ are found in the USPA's Basic Safety Requirements (BSR) and in AC 105-2E on sport parachuting (USPA 2013; FAA 2013b).

RUNWAY DESIGNATION

The FAA allows an airport operator to attach a "U" suffix to a runway designation to signify it is for ultralights. A runway does not have to have designation markings. Only one airport was observed in all the AFDs to have a runway designated with a "U" for ultralight. Several airports had remarks that a runway was to be used for ultralights, but they did not have the "U" designation. A runway designation can also be modified with the suffix "G" for glider runway or "W" for water landing area. Suffixes for helipads (H) and balloon (B) areas are also allowed on the Airport Master Record Form 5010.

A review of ALPs for airports having ultralight and glider operations found that a few had dedicated turf runways or areas that were not listed on the ALP. Those airports allowed takeoff and landings, with the pilot assuming the risk of operation. A search did not find any direct federal regulatory prohibition against using turf alongside an existing paved runway for an aeronautical activity, such as for ultralight, glider, or taildragger operations. However, permitting requirements from state aviation organizations or local ordinances, or rules or regulations may prevent such operations. A pilot is ultimately responsible for the safe operation of the aircraft. Seeking permission of airport management to operate on other than an approved surface is consistent with safe practice and decision-making. Turf runways that are within the runway obstacle free area (ROFA) of another runway can have safety implications. Normal safety practices do not allow other aircraft to operate while an aircraft

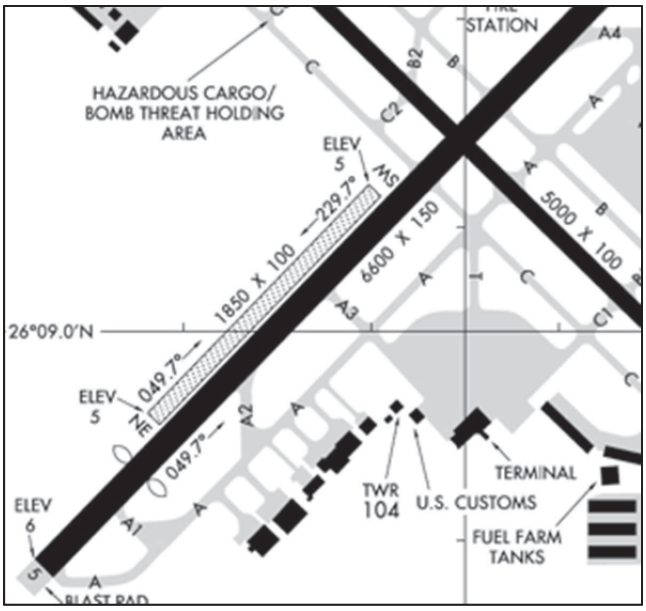

FIGURE 1 FAA airport diagram of a turf runway adjacent to a paved runway (*Source*: FAA Airport/Facility Directory 2015.).

is on the runway, or in the runway safety area or ROFA. Figure 1 is a depiction of the turf runway adjacent to a runway at the Naples Municipal Airport in Florida.

Some of the basic design factors or considerations found in the literature and through interviews that can affect or enhance safe aircraft operation of a particular aeronautical activity are:

- Placing wind indicators and traffic pattern indicators on an airport;
- Separating operating areas according to design criteria;
- Grading, compaction, preparation and maintenance of areas adjacent to a runway; and
- Maintaining runway safety areas, object free areas, and object free zone criteria.

Because winds can have a more pronounced effect on ultralights, blimps, balloons, and gliders, providing visual indicators in the area of touchdown is a valuable safety measure. Normal design facilities would include a segmented circle, a wind direction indicator, landing direction indicators, and traffic pattern indicators. If a separate runway is established for a glider, PDZ, or ultralight operation, having a supplemental wind indicator in the area of landing is of value to the pilot or operator.

AIRPORT TRAFFIC PATTERNS

Regulatory and standard procedures exist for the safe interaction of various aeronautical activities in and around an airport. The procedures are described in 14 CFR Part 91 and the *Aeronautical Information Manual* (AIM) (CFR 2015; FAA 2014c). Additional safety information for airport managers appears in *AC 90-42F, Traffic Advisory Practices at Airports Without Operating Control Towers*; *AC 90-48C, Pilots' Role in Collision Avoidance*; and *AC 90-66A, Recommended Standard Traffic Patterns and Practices for Aeronautical Operations at Airports Without Operating Control Towers* (FAA 1990a, 1983b,1993). These publications contain operating practices, procedures, frequencies, and phraseology for use when approaching or departing airports without an operating control tower, and for those that have part-time ATCTs.

The regulatory requirements of Part 91 simply call for pilots of airplanes approaching to land to make all turns to the left, unless light signals or visual markings indicate that turns should be made to the right [14 CFR 91.126(b)(1)] (2015). The former is called a standard left-hand traffic pattern,

whereas the latter is called a non-standard right-hand traffic pattern. Any changes to a traffic pattern require notification to the FAA under 14 CFR 157 (2015).

At controlled airports (those having an ATCT in operation), additional standard and local procedures are established and controlled by the ATCT controller. The absence of an operating ATCT creates a need for increased vigilance on the part of the pilot. An uncontrolled airport is one in which aircraft movement is not regulated, either by the FAA or by an FAA-approved air traffic contractor. If an ATCT is not staffed, or is not in operation, then an uncontrolled airport environment exists.

At an uncontrolled airport, the observance of a standard traffic pattern and the use of common traffic advisory frequencies (CTAF) procedures are found to improve the safety and efficiency of aeronautical operations. Conflicts can arise at airports when pilots do not follow the recommended practices. The literature review revealed a number of incidents that resulted from pilots not following recommended practices. A review of current practices at uncontrolled airports that use CTAF will be published in a forthcoming ACRP Synthesis report (Prather in press). The report provides an overview of FAA- and industry-established rules, regulations, requirements, and advisories that address non-towered airport operations, procedures, and communications, and case examples of local protocols and practices for providing advisories at uncontrolled airports.

The responsibility for developing local procedures for operating gliders, parachutists, lighter-than-air (LTA) aircraft, helicopters, and ultralight vehicles lies with airport owners and operators. AC 90-66A provides information on normal traffic patterns (FAA 1993). At uncontrolled airports, traffic patterns are established by the airport owner or operator, using AC 90-66A as a guide. *Procedures for Handling Airspace Matters*, Order JO 7400.2K, serves as the source within FAA for handling technical matters pertaining to establishing or revising traffic patterns (FAA 2014f).

Variations in the traffic pattern altitude near an airport can and do exist for a number of reasons. Primary factors affecting the pattern altitude are related to terrain and building avoidance, reduced noise exposure, or possible interference with other aircraft. Gliders, helicopters and ultralights often have traffic patterns that are at lower altitudes than that of fixed-wing aircraft. The different altitudes recognize the different speeds or operating characteristics of each. Jet aircraft cannot slow down to the speed of a piston or ultralight aircraft. Ultralights and gliders cannot match the speed of regular aircraft. By separating the patterns, safety is enhanced. No matter the operation at different altitudes, each pilot can enhance safety and prevent collision avoidance by being alert and scanning for other aircraft.

Part 91 operating rules specify minimum safe altitudes for aircraft to fly. Normally, minimum downwind pattern altitudes are 1,000 ft above ground level (AGL) or the airport elevation. Because of their speed, large and turbine-powered airplanes typically have traffic patterns of 1,500 ft AGL. Traffic pattern altitudes for military turbojet aircraft sometimes extend up to 2,500 ft AGL. Information on a specific airport traffic pattern altitude is provided in the AFD, the official publication used by pilots for current airport information.

AC 90-66A on ultralight vehicles suggests their pattern altitude should be 500 ft below and tight (or inside) the standard pattern established for the airport (FAA 1993). Although the patterns may be separate, they eventually join on the final approach and takeoff paths. For this reason, some airports in the study allow ultralights or gliders to land on the turf adjacent to the runway (see chapter fifteen). Figure 1 provides such an example. Figure 2 illustrates generally accepted traffic pattern procedures for ultralights, weight-shift control (WSC), and slow LSA.

Part 91.119 allows for helicopters, powered parachutes, or WSC aircraft to operate at less than 500 ft over uncongested areas, provided this does not create a hazard to persons or property on the surface. Whether a hazard is created can be a matter of personal disagreement. The FAA will respond to a complaint and make an assessment on a case-by-case basis.

Standard helicopter practice is to avoid the flow of fixed-wing aircraft. Helicopter traffic normally follows a right-hand pattern. This pattern also allows for greater pilot visibility, as a helicopter pilot is seated in the right seat, whereas a fixed wing pilot is seated in the left seat of a two-seat aircraft.

FIGURE 2 Separate traffic patterns for different speed aircraft (*Source*: FAA 2008b.).

Regulations restrict certain aeronautical activity over densely populated or congested areas. In part, the restriction is intended to protect persons and property on the ground. Aeronautical activities most affected are aerial applicators, aerobatics, skydiving, and certain balloon and ultralight activity. The literature review revealed cases of disagreement as to whether or not an operation was being conducted over a congested area. The term "congested area" has not been defined by either the FAA or the NTSB. Instead, it is determined on a case-by-case basis and a number of factors are evaluated (R.B. MacPherson, personal communication to L. Simmons, March 8, 2010).

Pertinent to this synthesis are basic requirements for right-of-way rules and minimum safe altitudes under Part 91 operating rules. As stated in Section 91.113, right-of-way rules apply to the following:

- Any aircraft in distress has the right-of-way over all other aircraft;
- A balloon has the right-of-way over any other category of aircraft;
- A glider has the right-of-way over an airship, powered parachute, WSC aircraft, airplane, or rotorcraft;
- An airship has the right-of-way over an airplane or rotorcraft;
- An aircraft towing or refueling other aircraft has the right-of-way over all other engine-driven aircraft;
- Aircraft on final approach to land or while landing have the right-of-way over other aircraft in flight or operating on the surface;
- Aircraft at a lower altitude have the right-of-way over an aircraft at a higher altitude; and
- Aircraft being overtaken have the right-of-way.

A pilot can prevent collisions in the traffic pattern and on the ground by being alert and scanning for other aircraft. Under Part 91, it is the pilot's responsibility to use vigilance in operating the aircraft so as to see-and-avoid other aircraft, regardless of whether the aircraft is operated under instrument or visual flight rules [14 CFR 91.113(b)]. Seaplane pilots operating on water are to give right-of-way to other vessels and follow United States Coast Guard regulations. Aerobatic practice areas (APA) or "boxes" located above an airport may require temporary adjustments to regular aircraft traffic patterns, as the FAA recommends aircraft avoid flying underneath an active APA.

The FAA publishes aeronautical maps that depict symbols to alert pilots of a particular activity on or near an airport. The depictions are for glider operation, hang glider activity, parachute jumping area (PJA), ultralight activity, and unmanned aircraft activity. Figure 3 shows symbols appearing on FAA visual flight rules (VFR) aeronautical sectional maps. The FAA is currently considering additional symbols, such as symbols for the location of an aerobatic training area and space launch activity (FAA 2015a). The FAA Aeronautical Information Services Division website has a Frequently Asked

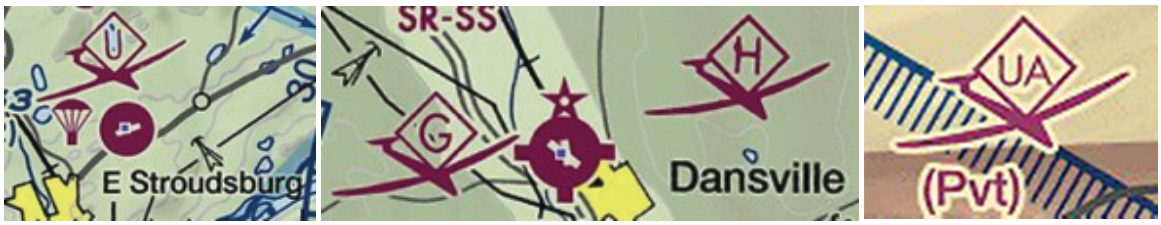

FIGURE 3 Depictions of aeronautical activity on VFR sectional charts (*Source*: FAA 2015a.).

Question Forum (https://www.faa.gov/air_traffic/flight_info/aeronav/faq/) to address the different aeronautical activities. Current questions include:

- How can I get a symbol for a specific area put on a chart?
- How can I update my airport diagram information?
- How can I make a change to the Airport/Facility Directory?

For on-airport operations, an AC 91-73B on Part 91 and Part 135 single-pilot procedures during taxi operations provides useful information and sample operating procedures for pilots (FAA 2012d). The information contained in the AC can be adapted by airports for incorporation into rules and regulations associated with a specific aeronautical activity. The AC provides practical guidance and SOPs with the goal of increasing safety and efficiency of aircraft movement on the airport surface. AC 120-74B, on Parts 91, 121, 125, and 135 flightcrew procedures during taxi operations, provides similar information for multi-crew operations on airports (FAA 2012e). For taxi operations at airports with a functioning control tower, the FAA provides further guidance in *Taxi Clearances: Know the Rules, Understand Your Clearance* (FAA 2007b).

Appendix G provides examples of remarks from the AFD for several airports. The remarks reflect different traffic patterns associated with a particular aeronautical activity. It is apparent that there is no standard for the phrasing to be used. Airport operators can view the remarks and choose a phrase that best conveys the safety message for their airport.

CERTIFICATE OF WAIVER OR AUTHORIZATION

Federal aviation regulations (14 CFR 91.303) require pilots conducting or performing certain aeronautical activities—such as aerobatic practice areas (APA), skydiving, and banner towing—to obtain FAA authorization or waiver (2015). The authorization or waiver is primarily contingent upon being able to safely conduct the activity in a particular location. A waiver provides temporary relief from certain FAA rules related to operation of an aircraft, such as minimum safe altitude limits, aircraft speed limitations, and operation within ATC-controlled areas. If the activity does not require a waiver of regulations, then a Certificate of Authorization (COA) can be issued.

AC 91-45C informs a pilot or airport operator how to obtain an authorization or waiver of federal regulations for a certain activity (FAA 1990b). FAA Form 7711-2 is the application form for requesting an authorization or waiver. Upon submittal of a request, Flight Standard District Office (FSDO) personnel will evaluate and often conduct a site assessment before approving a request. FAA Form 7711-1, Certificate of Waiver or Authorization, is the approval form from the FAA.

The issuance of a waiver for an aeronautical activity is the responsibility of the FSDO manager for the geographic area in which the activity is located. Each waiver is evaluated on a case-by-case basis. An evaluation of the application is made to assess the safety and efficiency effects on the airspace and air traffic system. The FSDO will coordinate any aerobatic application with an air traffic division and issue a waiver or COA based on safety assessment.

CHAPTER FIVE

AEROBATIC OPERATIONS

Aerobatics is an aeronautical activity that enjoys the same rights to the national airspace system as other aeronautical activities. Interviews and the literature search indicate there is resistance among airport operators and communities to allow an aerobatic box to be established over an airport. The arguments made by those who have sought to prevent aerobatic activity are that it is unsafe, can deter other traffic, and is noisy. At the same time, the aviation industry and populace expect aerobatic pilots to entertain and compete safely.

Airshows are one of the most popular spectator events in the nation (*Family Business Experts* n.d.). The skill and precision an aerobatic pilot or team displays can be captivating, especially because they perform so close to the ground. Competition pilots compete worldwide on par with other major sports. Other pilots seek training opportunities and skill capabilities for general competency development or in the event of an inflight emergency. Aerobatic practice is a key component to safe operations, just as are other types of aircraft training. Data found in the study show a low number of aerobatic accidents; noise confined to the aerobatic box area for the short practice routines; and no substantiation that other aeronautical traffic is deterred from operating at an airport as a result of aerobatic activity.

AEROBATIC PRACTICE AREA

The skills and capabilities displayed at airshows, competitions, and recovery from aircraft upset cannot be accomplished without training and practice. Whereas a pilot can practice aerobatics without a waiver or authorization almost anywhere in the United States above 1,500 ft AGL, the training is not the same as that needed for performing at air shows or competitions that require lower altitudes. An established APA at an airport allows a pilot to train below 1,500 ft AGL and gain the skills and experience necessary to perform well. There were 173 APAs in the United States in 2011 (Aeronautical Charting Forum April 27–28, 2011).

An APA is defined as a place where a pilot may practice aerobatic maneuvers below an altitude of 1,500 ft AGL. Commonly called an "aerobatic box," the designated volume of airspace can vary in size and directions given the speed and type of aircraft practicing. An aerobatic contest box for competition or air show flying is normally standardized to that shown in Figure 4, per Order 8900.1 2015, Volume 3, Chapter 5, Section 1-4, 3-119 (FAA 2015b). An additional diagram is provided in chapter fifteen for the case example of the Keene Municipal Airport in New Hampshire, which shows how an airport safely integrates the aerobatic box into its overall operation. Appendix H shows the APA license agreement the airport uses.

Increasing a pilot's awareness, especially that of transient pilots, that an aerobatic box exists at an airport is a key safety issue. Issuance of a notice to airman (NOTAM) is generally a conditional requirement of a COA whenever the aerobatic box is active. Pilots obtaining flight briefing services from flight service station (FSS) are generally informed of an active APA if a proper NOTAM has not been issued. However, the description may make it difficult for pilots to visualize where the activity is occurring. Publishing a diagram or description of the APA and placing it on the airport's website, or otherwise posting or distributing it, can help raise pilot awareness and safety. The AFD provides a list of APAs in a separate Special Notice section. To enhance standardization and awareness, the

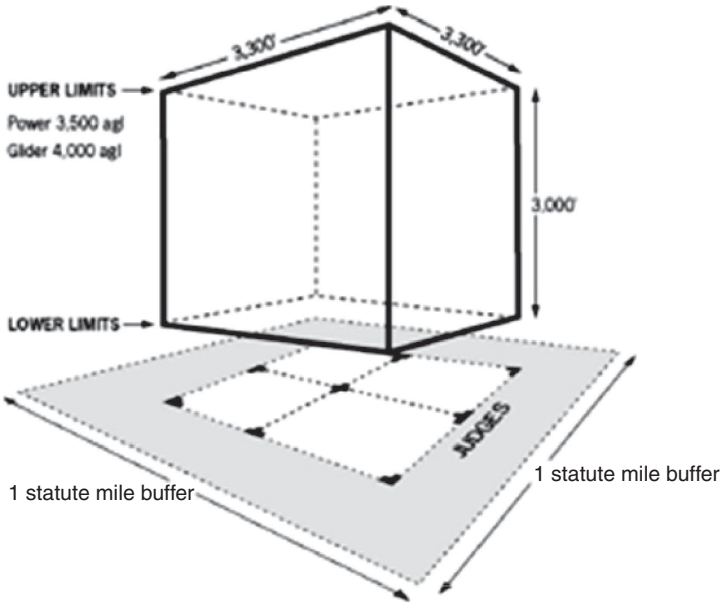

FIGURE 4 Illustration of a typical aerobatic box (*Source*: FAA 2015b.).

FAA is currently working to place an aerobatic symbol on navigational charts, similar to hang gliding, glider, parachute, and ultralight activity symbols.

APAs located above an airport may require temporary adjustments to regular aircraft traffic patterns because the FAA recommends aircraft avoid flying underneath an active APA. The FAA is currently investigating the feasibility of placing an aerobatic training area symbol on aeronautical sectional charts to inform pilots of the activity, similar to glider and ultralight symbols.

CERTIFICATE OF WAIVER OR AUTHORIZATION

Certificates of Waivers are necessary from the FAA to establish an APA. In AC 91-45C, the FAA considers an APA to be an "aviation event," therefore requiring a waiver be issued from existing regulations to be safely performed (FAA 1990b). The AC provides information to a pilot or airport operator on how to obtain an authorization or waiver of federal regulations for certain activity and to establish an APA or air show "box." An APA issued in an airport operator's name rather than a pilot's name better allows the airport operator to control and manage the activity.

An individual or airport operator requesting the establishment of an aerobatic box submits Form 7711-2 to the FAA FSDO. An aerobatic box can be issued for a short or long-term period. "Short" is for a one-time event such as an air show or competition. "Long-term" is for greater than 30 days up to 24 months, at which point permission must be renewed. At the end of October 2014, there were 165 long-term APAs in the United States.

Textbox 7 provides a list of common conditions the FAA will include when issuing a waiver. One condition, that of seeking permission from a property owner, is more for notification purposes because local jurisdictions do not have authority over activity in the airspace. The FSDO will generally seek input from the airport or landowner, but can allow an operation despite local objection. An airport operator cannot unduly withhold permission if the sponsor is federally obligated. At airports with operating control towers, ATCT concurrence is necessary for APA establishment. Overall safety is generally enhanced with an operational ATCT, because the airspace can be controlled to mitigate potential conflict with other aircraft. An example of an aerobatic box waiver for a busy controlled reliever airport is provided in Appendix I.

TEXTBOX 7
Conditions Typically Issued by the FAA for an APA Waiver
(*Source*: Literature search)

- Minimum flight visibility requirements
- Minimum elevation for maneuvers
- Requirement for notification to ATC 30 min prior and upon completion
- Activation and deactivation of NOTAMs to the FSS
- Maintenance of a who, when, and what record
- The time of day or period of activity allowed
- Identification of any flight safety requirements, such as clearing turns
- Permission of the airport manager and the property owner over which acrobatic flights are being conducted
- Requirement for any safety briefing
- Conditions for ceasing to practice if an unsafe activity occurs

Part 91 pilot operating rules describe the restrictions for pilots conducting aerobatic flight (14 CFR 91.303). Aerobatic flight may not be conducted

- Over any congested area of a city, town, or settlement;
- Over an open air assembly of persons;
- Within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport;
- Within 4 nm of the center line of any federal airway;
- Below an altitude of 1,500 ft above the surface; or
- When flight visibility is less than 3 statute miles.

The term "congested area" has not been defined by FAA or NTSB. Instead, it is determined on a case-by-case basis in which a number of different factors are evaluated (R.B. MacPherson, personal communication, Mar. 8, 2010). Operations over congested areas are restricted because of the potential to cause harm to people or property below.

Pilots engaging in aerobatic activity have different levels of skills. For a pilot to perform at an airshow, he or she will obtain a Statement of Aerobatic Competency from the FSDO (FAA Form 8710-7). The statement is not required if a pilot is competing in a non–airshow-related aerobatic contest, or if a pilot is practicing in a previously authorized APA.

SAFETY CONSIDERATIONS

The literature search points to concerns about safety and noise as the two main obstacles to establishing an APA at an airport. Safety concerns include collision with other aircraft and collision with the ground. Because an APA involves the allocation of airspace, local airport objections may not affect the issuance of a waiver from the FAA. Aerobatic pilots and airports can take measures to minimize risks and improve acceptance of aerobatics through educational and notification efforts, and thoughtful discussion and review of procedures. Informing pilots by disseminating information through NOTAMs, AFD remarks and web page listings, posting flyers at pilot areas and other local airports, and having regular safety or user meetings are means to enhance safety. SOPs for aerobatic activity are affected by the waiver conditions authorized by FAA and from IAC guidance material. Individual airport minimum standards or rules and regulations can be developed from the waiver and the guidance material.

Aerobatic boxes are generally established close to an airport, with 90% of those being associated with an uncontrolled GA airport. One reason for being located over an airport is to add a measure of safety for a pilot in the event of an aircraft mechanical or system failure. The pilot can readily land. Another reason is the airport layout can provide easy recognizable boundaries that help describe the aerobatic limits of the box.

NOTICES TO AIRMEN

Examples of NOTAMs issued for aerobatic activity are (FAA Order JO 7930.2P CHG 2):

- AEROBATIC ACFT WITHIN AN AREA DEFINED AS 6NM RADIUS OF FOD068025 (5NM S CAV) SFC-4500FT AVOIDANCE ADVISED 1312291200-1312292200
- AEROBATIC AREA WITHIN AN AREA DEFINED AS 3NM RADIUS OF SGF 3000FT–8500FT AVOIDANCE ADVISED 1312301400–1312301800
- AIRSPACE AIRSHOW ACFT WITHIN AN AREA DEFINED AS 5NM RADIUS OF MIV SFC-10000FT AVOIDANCE ADVISED

Appendix G contains a list of permanent NOTAMs listed in the AFD. The remarks reflect different traffic patterns associated with each aeronautical activity. It is apparent from the listing that there is no standard for the phrasing to be used. Airport operators can view the remarks and choose a phrase that best conveys the safety message for their airport.

ACCIDENTS AND INCIDENTS

Aerobatics are one of the more risky ventures in aviation because the activity takes place close to the ground. The main cause of most aerobatic accidents was identified as not maintaining proper altitude (de Voogt and Van Doorn 2009). For this reason, practicing aerobatic maneuvers is important for improving safety. For the same reason, airports operators can be reluctant to allow the establishment of an aerobatic box over their airport.

The International Council of Air Shows website includes a wide variety and large number of documents related to emergency response, including sample emergency response plans, PowerPoint presentations from past council conventions, and emergency response-related articles from the back issues of *Air Shows Magazine.* The IAC is a source of safety information as well. Figure 5 provides a recent analysis of aerobatic accidents for the period 2008 to 2013.

NOISE AND ENVIRONMENTAL REVIEW

As part of the consideration for issuing a waiver for a long-term aerobatic box, the FAA is obligated to assess the box's environmental impact, primarily from a noise standpoint (FAA 2015e). The engine-propeller combination on most aerobatic aircraft, coupled with frequent pitch and revolution changes, can generate noise that is irritating to some. To address the issue, the FAA had a study conducted in 2006 that sought to better identify and model the type and effect of noise from aerobatic activity

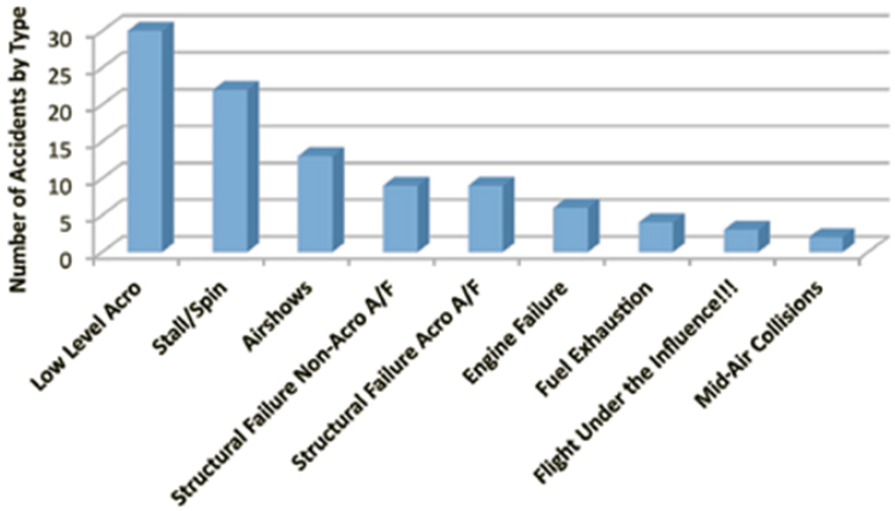

FIGURE 5 Number of aerobatic accidents by type, 2008–2013 (*Source*: Johnson 2014.).

(Boeker et al. 2012). It was concluded that none of the piston engine aerobatic routines flown in the study would have exceeded 65 dBA DNL at distances 0.25 mi or more from the center of the practice box. The study recommended that heavily utilized practice boxes be located 0.5 mi or more from noise-sensitive receivers.

Environmental reviews can delay a waiver or authorization for a special aeronautical activity. Environmental assessments are not considered for temporary aerobatic practice areas to be used 10 consecutive days or fewer. While it is the responsibility of FAA to evaluate the impact, an airport can improve the review process by submitting a voluntary environmental information document (FAA 2011a).

CHAPTER SIX

BALLOONS

A balloon is defined by the FAA as a lighter-than-air (LTA) aircraft that is not engine driven, and that sustains flight through the use of either gas buoyancy or an airborne heater (14 CFR 1 Part 1.1). LTA can be powered or unpowered. Unpowered balloons are still an aeronautical activity. As an aircraft, a balloon is issued an airworthiness certificate, is registered as an aircraft, and is assigned a registration "N" number. A licensed pilot operating a balloon would have an LTA rating with a class specification of balloon, provided he or she is not a student pilot. Balloon pilots are also known as aeronauts.

Two types of balloons exist: hot air or gas-filled. The type used most commonly at U.S. airports for transporting people is the hot-air type, in which air is heated by a burner system. The rising hot air is captured in the balloon envelope. The difference in air density inside the balloon versus outside the envelope causes the balloon to ascend or descend. Balloons can carry water ballast. Releasing water ballast allows the balloon to arrest its descent or to rise.

Gas-filled balloons are generally used for high-altitude, extended flights, or long-distance travel. They are commonly used for transporting weather and communication devices. They ascend or descend as a consequence of the gas being lighter than the surrounding air and being able to support the weight of the gondola or equipment. Gas balloon designs are generally classified as netted or quick fill. Helium or hydrogen is commonly used as the lifting gas. Anhydrous ammonia and methane are two less common options. Helium is an inert gas and is relatively expensive owing to a limited supply. Hydrogen is more readily available, but when combined in proper ratio with air, it is a flammable mixture.

Unless otherwise noted, the discussion below primarily applies to hot air balloon operation. The FAA describes the regulatory class as that of balloons with airborne heaters.

AIRSPACE ACCOMMODATION

Aeronauts have the same duty as pilots of other aircraft to be alert to the potential for midair collision and near midair collisions. Sections of Part 91 regulate flight over populated or congested areas and establish the concept of "see and avoid" as a provision of VFR flight. Because of the lack of maneuverability of balloons, the regulations also provide them with the right-of-way over other aircraft, except for those experiencing an emergency. When operating in the vicinity of an airport, an aeronaut will generally maneuver the balloon below the traffic pattern of other aircraft. Its speed and direction are dictated by the wind.

Because balloons are certificated without an electrical system, the aeronaut is not required to carry a radio or a transponder. However, certain airspace rules require two-way communication with ATC. The availability and use of an aviation radio is therefore considered an effective practice for balloon operators. Depending on the expected airspace, a pilot will often carry at least one handheld radio to communicate with the ground crew and an aviation radio to communicate with ATC or other pilots in the air. Cell phones often act as a backup emergency communication source, although they are not supposed to be used when airborne, according to FCC rules (47 CFR 22.925).

Procedures for the use of radios at both controlled and uncontrolled airports are summarized in the *Balloon Flying Handbook* (FAA 2008a) and the AIM. The procedures focus on making appropriate announcements on Unicom or CTAF.

Balloon operations are primarily conducted in Class G or E airspace. Class G airspace is typical of small, uncontrolled airports that do not have an instrument approach, and class E is typical of small, uncontrolled airports that do have an instrument approach. Class G airspace does not require a radio or transponder. Ceiling and visibility requirements in Class G require a balloon pilot to remain clear of clouds and have at least 1-mi visibility. Glass E airspace has higher visibility requirements.

Balloon access to airspace controlled by ATC requires two-way radio communication, greater minimum ceiling and/or visibility restrictions, and possibly transponder equipment. Because a balloon is not certificated with an electrical system, a balloon can operate beneath the veil of Class C or B airspace without a transponder or radio. To enter into any Class B airspace, either prior arrangement with ATC is necessary, or the balloon requires a transponder. Balloons do not show up well on ATC radar because they reflect a poor radar signal.

Aeronauts use maps that portray terrain elevation highlights, forested and swamp areas, congested or densely populated areas, power transmission lines, cell or other towers, windmills, and similar features. A local satellite view of the earth is an important navigation tool for an aeronaut. Marked with color-coded areas that identify various balloon restricted areas, the map can help the aeronaut operate in safe areas and avoid community complaints.

AIRFIELD ACCOMMODATION

An airport is not required for a balloon to either take off or land. The advantages of using an airport are the general availability of clear space and the expected accommodation of an aeronautical activity. However, interviews and the literature search indicate airport management's primary concerns with balloon operation were related to airfield access for support crew, slow launch or retrieval operation affecting other aircraft operations, and the possibilities of experiencing a reportable runway incursion. Airport management's use of operating procedures for ground access can help mitigate incursion possibilities. Management can also assist balloon operators by reviewing the locale area and pointing out local hazards, sensitive community areas to avoid, and procedures to be used on the airport. Educating local emergency response personnel and the community to the operational aspects of ballooning can be beneficial.

Balloons are used for recreational, sport competition, and commercial purposes. Typical recreational and competition balloons range 65 to 80 ft in height with a girth of 50 to 60 ft. Special shapes or designs can increase the height and width substantially. The same amount of ground area is needed for layout and inflation, plus added area for support vehicles and personnel. Figure 6 shows an example of the area needed for balloon inflation and deflation. The recommended amount of ground area is generally 100 ft by 100 ft for one regular-sized balloon; more area is needed for specialty balloons or for stronger wind conditions. A common rule related to the distance of a balloon launch

FIGURE 6 Space required for balloon and support vehicles (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

from an object in the line of flight is to add 100 ft of distance from the object for each 1 mph of wind speed. Objects or obstructions could be trees, fences, poles, aircraft, or livestock.

The amount of time to prepare and inflate a balloon for flight and the subsequent deflation and packing can range from 20 to 45 min for each, depending on the number of support crew and their level of skill. The number of crew can range from two to six ground handlers or more. Landing and lifting off from an area away from the runway will allow for regular aircraft activity to continue, provided the flight path is away from the runway. The duration of a balloon flight is conditioned upon the amount of fuel available, winds, weight carried, and the skill of the pilot. Flight duration of 1 to 1½ h is typical.

Because both gas and hot air balloons are subject to wind conditions, aeronauts more often conduct flights when wind conditions are calm, normally found during the 2 h around dawn or dusk. Winds exceeding 8 knots (9.2 mph) make liftoffs and landings more difficult. "Weigh-off" describes the point at which an inflated balloon reaches neutral buoyancy with the surrounding air. With the addition of more heat or gas the balloon will ascend unless held down by a tether or ground crew. When ready for lift-off, the crew releases its hold on the balloon (weigh-off), and it will rise into the air.

A hot air balloon intending to lift off from an airport or elsewhere has a number of different requirements for accommodation:

- Gate and field access
- Cleared ground area for transport or chase vehicle, trailer, and/or dolly
- Cleared ground area for basket and balloon layout, normally a 100- by 100-ft area, though larger for specialty balloons
- Ground area free of anything that could tear the fabric
- Generally, four to six individuals or more to set up and inflate the balloon
- Common rule is to inflate 100 ft from any object for each 1 mph of wind speed.
- Launch site to have no obstacle in the direction of balloon track following liftoff
- Gas-powered inflation fan and other equipment
- If a tether operation, additional vehicles or other suitable heavy ground objects needed.

Standard support equipment for ballooning includes a transport or chase vehicle. The most common vehicles are a van with the balloon carried inside, a pickup truck with the balloon carried in the bed, or a van or pickup truck with a small trailer (flatbed or covered) (Figure 7).

Unless properly trained and controlled, support personnel and vehicles operating in, adjacent, and close to a runway can be cause for an incursion report. Airport management's use of operating procedures or rules and regulations can help mitigate incursion possibilities.

Most refueling of portable fuel tanks used for balloons is performed at off-airport private or commercial propane refilling sites. The balloon operator normally transports the refill tanks in a

FIGURE 7 Balloon basket and transport vehicles (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

FIGURE 8 Propane storage tank located at an airport (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

personal vehicle. One airport operator in this study allowed local balloon operators to place a tank at the airport (Figure 8). Local building and fire codes apply in most cases. Other airports address refueling in their minimum standards or operating procedures. Local propane dealers can provide safety information, including material safety data sheets. The Balloon Federation of America's *Balloon Event Guidelines* contains suggestions for propane refueling rules and policies at competition events (Balloon Federation of America 2011).

NOTICES TO AIRMEN

Activities that will affect or prohibit the use of airspace require the issuance of a NOTAM. Examples of NOTAMs issued for balloon activity are (FAA 2015i):

- AIRSPACE HOT AIR BALLOON WITHIN AREA DEFINED AS 2NM RADIUS OF 13M SFC-1500FT 1312291600–1312291800EST
- HOT AIR BALLOONS 8NM RADIUS OF ABQ SFC-8000FT 1310141400–1310141830EST

Appendix G contains a list of permanent NOTAMs listed in the AFD and applicable to balloon operations. There is no standard phrasing. Airport operators can view the remarks and choose a phrase that best conveys the safety message for their airport.

SAFETY CONSIDERATIONS

Most balloon flight operations are conducted away from an airport or at airports without an operating control tower. There may be circumstances that require the use of airport property, either for launch or for landing and recovery of the balloon. These activities can be safely conducted at an airport, if the balloon pilot remains aware of the movement and location of other aircraft and ground vehicles. No airports reviewed for this study had operating procedures and practices established for balloons. Instead, several had a common clause that any aeronautical activity not listed would be evaluated on a case-by-case basis.

Appendix J provides a list of hazards and risks associated with balloon activity compiled from the literature and interviews. The list can also be used to inform fire, police, and other emergency response personnel not familiar with balloon operations, or for inclusion in an emergency response plan.

ACCIDENTS AND INCIDENTS

Accident and incident data for balloons are not fully represented in the literature, because many accidents or incidents are not reported. The accident data that exist do not break out the data as to those occurring on airports or near airports. A 2013 study reviewed NTSB accident data and found

the vast majority of ballooning accidents and injuries occur on landing (Ballard et al. 2013) Most of the accidents reviewed were associated with pilot error, strong wind conditions encountered during landing, and striking power lines, structures, or trees.

A fire is considered the most dangerous situation for an aeronaut. An Australian report evaluated hot air balloon accidents in Australia, the United Kingdom, and the United States from June 1985 to June 2009 (http://www.brisbanehotairballooning.com.au/hot-air-balloon-accidents/). Another study reported that a range of causal factors affect ballooning outcomes (Filtness et al. 2014). Aeronaut errors were cited as the leading cause of incidents, with weather, inexperience, and poor or inappropriate decisions rated as having greatest perceived risks. On the ground, the use of the inflation fan was a source of accidents and injuries. None of the news or other reports reviewed cited a collision between a balloon and an aircraft.

RELATED INFORMATION

Most paid passenger-carrying flights in unscheduled small aircraft are regulated by 14 CFR Part 135. Balloon sightseeing flights are exempt from those rules. Instead, balloon operations are conducted under Part 91, *General Operating Rules* [14 CFR 119, 119.1(e)(5)].

Whereas aerial advertising is more commonly associated with a fixed-wing banner tow operation, other types of aerial advertising include balloons and blimps. FAA has stated that a balloon or blimp that carries a banner can also be considered a commercial aeronautical activity. In a 1992 request for legal interpretation, FAA provided an interpretation of a number of different scenarios addressing balloon operations as a commercial operation (Terasaki 1992).

If conducting a special event such as an airshow or balloon festival, an airport manager can refer to *ACRP Synthesis 41* and *ACRP Synthesis 57* for more detailed information (Prather 2013; Kramer and Moore 2014). Information about completing an Application for Waiver, which is required for special events, is available from Flight Standards Information Management System (FSIMS) (FAA 2015b; Advisory Circular AC 91-45C (FAA 1990b); and FAA Compliance and Enforcement Program Order 2150.3B (FAA 2007a). Occasionally, a balloon operator will sponsor a walk-in balloon event. The public is able to gain entry into a balloon that has been laid out on the ground and is partially inflated. An airport manager may be surprised to learn that entry into an enclosed space such as a partially inflated balloon may be governed by state or local regulations related to carnival activity.

CHAPTER SEVEN

AIRSHIPS

An airship is an engine-driven LTA aircraft that can be steered. Airships can be rigid or non-rigid, with blimps the common example of a non-rigid airship. A rigid airship has an internal structural framework that forms its shape and that contains compartments or bags of LTA gas, whereas a non-rigid blimp's form is maintained by the LTA gas envelope. If a rigid airship deflates, its shape remains the same. If a blimp deflates, it loses its shape.

Blimps are the main form of airships seen in the United States. They are used primarily for commercial promotion and advertising, and as platforms for televising sporting and specialty events. One main airship operator is currently converting its blimp fleet to rigid airships.

AIRSPACE ACCOMMODATION

Owing to limited maneuverability, airships do not normally fly a standard traffic pattern. A blimp has the right-of-way over an airplane or rotorcraft. It does not have the right-of way over an aircraft in distress, a balloon, or a glider. An airship's size makes it easy to see and avoid.

Airships are susceptible to weather conditions, especially wind, ice, and snow. As the airship slows to approach a mooring, wind can create an unsafe condition resulting from an airship's inherent lack of low-speed controllability. An airship requires a clear approach into any wind direction, for safety purposes. A flat surface, unobstructed approaches, and the ability to dock and move 360 degrees with prevailing winds are other needs for successful mooring. Ice and snow are concerns because they add weight to the blimp that can significantly reduce its lifting capabilities.

AIRPORT ACCOMMODATION

Airships tend to be infrequent visitors to airports, because their commercial use, appearance schedules, route of flight, and operational needs require preplanning by airship operators. The specific routes and the airports used for stopovers are normally vetted beforehand. Because of their mooring needs, an airship operator will visit an airport manager a week or more in advance of movement to survey the airport as a potential landing site. Some airports have received an unexpected visit when weather conditions make the stop a prudent choice. When conducting a site assessment, a blimp operator primarily considers the local topography, soil conditions, weather conditions, and the mooring method to be used. Figure 9 illustrates a typical mooring position away from the taxiway and runway with a large open area for approach, departure and mooring, and staging area for blimp crewmembers.

There are four mooring methods: bow mooring, belly mooring, complete vehicle (total) restraint, and hangars. Bow mooring is the typical method of restraint when the airship is away from its home base. Figure 10 illustrates a bow mooring and the various cable stakes secured into the ground. At its home base, a hangar is the norm for housing an airship, although initial capture uses a bow or belly mooring process. Bow mooring allows the aircraft to swivel with the wind, but it requires a 360-degree movement area on the ground.

An airship typically has a ground/support crew of 13 to 17 people. They travel with vehicles that contain support equipment and supplies, such as ground power units. If the airport is selected as a

FIGURE 9 Blimp positioned and moored away from aircraft movement areas (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

landing facility, the crew requires access to the airport. It can take several hours to complete a set-up or tear down. A newly designed truck vehicle for a rigid airship has an integral mast that can support and move the airship as needed. It can operate on pavement, if the ground will not support the truck. Most accidents and incidents related to airships are associated with ground crew mishaps.

NOTICES TO AIRMEN

Typical NOTAMs issued for a blimp or airship moored at an airport contain information on where it is located on the airport; its distance from a runway, taxiway, or approach/departure path; its height; whether it is lighted or illuminated for night or instrument meteorological conditions; the presence of persons and or vehicles in the vicinity; line of sight issues; and operational status of any affected navigational aids.

FIGURE 10 Blimp moored at the bow (*Credit*: S. Walsh, Lakeland Linder Regional Airport, Florida. Used with permission.).

RELATED INFORMATION

Weather, aircraft size, maneuvering area, crew access, and public attraction are concerns of airport operators accommodating airships.

Persistent bad weather can result in an airship staying moored at an airport for a long period of time. The size and height of an airship can penetrate safety surfaces surround an airport and its runways. If a surface is penetrated, a NOTAM is issued. Consideration needs to be given to a moored airship interfering with navigational or weather aids. If moored overnight, FAA requires that the airship be lighted in some way. Portable generators usually accompany the crew, and power flood lamps. The airport managers surveyed indicated the blimp operator normally stations at least one crew-member with the blimp at all times, including an overnight watch.

One airport manager described how he accommodated a blimp by placing it on a crosswind runway, requiring closure of the runway. Bad weather arrived, preventing the airship from departing. The bad weather also brought winds requiring the use of the crosswind runway for aircraft, however, the blimp prevented the runway's use. A lesson learned.

Another airport manager related how an airship crew was quite nervous about a local community test of its tornado sirens. The crew rushed to the airport thinking they would need to deflate the blimp—an expensive proposition. Blimps use helium for their LTA capabilities. Helium does not present a significant safety hazard, as it is an inert gas. The problem with helium is its availability. Once deflated at a remote site, the scarcity of helium to re-inflate the blimp can cause a lengthy delay.

As certificated aircraft, the current blimp fleet use certificated piston engines and avgas fuel. Emergency response personnel need to be familiar with emergency egress hatches and the operation of the fuel system and gas bag releases. With the exception of one airport, which charged a nominal five-dollar overnight fee for all aircraft, airport managers interviewed for this report did not charge a blimp for other services.

A concern expressed by one airport operator was the amount of foot and drive-through traffic a blimp generates from people sightseeing. Normal parking lot and perimeter roads can become clogged with traffic and present security concerns.

CHAPTER EIGHT

AERIAL APPLICATION: AGRICULTURAL AND FIREFIGHTING

Aerial application applies to both aerial agricultural operation and aerial firefighting operations. Aerial agriculture is the preferred term for what many previously knew as crop dusting or crop spraying. The term is more acceptable because the use of aircraft to disperse chemicals has extended beyond just dusting or spraying to include aerial firefighting and the application of other materials or chemicals by aircraft.

An agricultural aircraft operation is the operation of an aircraft for the purpose of dispensing any economic poison; dispensing any other substance intended for plant nourishment, soil treatment, propagation of plant life, or pest control; or engaging in dispensing activities directly affecting agriculture, horticulture, or forest preservation, but not including the dispensing of live insects (14 CFR 137).

Aircraft used for those purposes are regulated by 14 CFR Part 137, unless they are public aircraft. If an aircraft is used in aerial application and is engaged by a federal, state, or local government agency for a public purpose, then the organization conducting aerial application operations are not required to comply with Part 137 (49 USC 40125). This is the case for more aerial firefighting operations than agricultural applications, although states contract with a private operator to fulfill a public mission, such as mosquito control. In AC 00-1.1, an FAA determination was rendered that private contractor aircraft used by a federal agency are considered public aircraft when engaged by a governmental organization (FAA 2014g). Part 137 exempts a certificate holder from several Part 91 operating rules, such as altitude restrictions and traffic pattern operation, without need for a waiver.

AERIAL APPLICATION: AGRICULTURE

Airspace Accommodation

Agricultural aircraft are certified in FAA's restricted certification category. This means the aircraft has design or operating characteristics different from normal certificated aircraft. For aerial application, aircraft are modified to accommodate nonstandard equipment and loads, and they operate at altitudes in ways that are unique to their purpose. Operations over congested areas are restricted because of the potential to cause harm to people or property below.

A key aspect of safe operations at an airport is the use of standard traffic patterns and radio communication procedures. One of the consistent concerns expressed by airport managers in the survey was that aerial applicators often ignored standard traffic patterns and radio communications. There are two explanations for this. One is that many aircraft used in the business do not have radios, as they frequently operate in rural areas and do not interact with ATC. Radios become an unnecessary expense or maintenance item. Pilots generally carry a nonaviation radio for communicating with ground support or their base.

The other reason for not complying with standard accepted procedures is that aerial applicators are not required to do so. Part 137.45 provides an exception, as shown in Textbox 8. The last criterion in Textbox 8—that of giving way to other aircraft—can be problematic, as an agricultural aircraft may not have an aviation radio and can therefore be unaware of other aircraft in the pattern. Also, similar to the skydiving business, time is money for agricultural operators. Given the length of the day, area to be sprayed, and proximity of the loading area to the spray area, every minute counts in terms of expense and daylight. The human factors of time and peer pressure can result in a pilot focusing on a quick turnaround and being complacent toward other aircraft. An airport agreement describing the

TEXTBOX 8
Federal Regulation on the Observance of Airport Traffic Patterns
(*Source*: 14 CFR 137.45)

Notwithstanding part 91 of this chapter, the pilot in command of an aircraft may deviate from an airport traffic pattern when authorized by the control tower concerned. At an airport without a functioning control tower, the pilot in command may deviate from the traffic pattern if—

(a) Prior coordination is made with the airport management concerned;
(b) Deviations are limited to the agricultural aircraft operation;
(c) Except in an emergency, landing and takeoffs are not made on ramps, taxiways, or other areas of the airport not intended for such use; and
(d) The aircraft at all times remains clear of, and gives way to, aircraft conforming to the traffic pattern for the airport.

procedure to be used may help address the issue. Contributing to the issue can be the location of the loading pad operation. Its location often dictates the arrival and departure patterns of the agricultural aircraft, sometimes contrary to normal traffic patterns.

Airfield Accommodation

Because agricultural operators use small aircraft, they are inclined to operate from uncontrolled GA airports. A review of the AFD found that many agricultural applicators operate from private airstrips rather than from public airports. Rarely do agricultural applicators operate from Part 139 certificated airports.

The availability of minimum standards, operating procedures, or lease agreements was found to vary among the few airports reviewed for this report. The character of the airport, and whether an airport manager was employed on-site, appeared to be key determinants of whether standards existed or not. Some states had strong aviation offices that promoted having minimum standards, operating procedures, or lease agreements in place to enhance safety and communication among mixed-use aeronautical users.

At rural airports, the lack of either an on-site airport manager or a set of operating rules and regulations can make coordination of agricultural operations a problem. As described in chapters two and fifteen, the promulgation of minimum standards, operating rules and regulations, and lease provisions are an important component for safely combining mixed-use aeronautical activities. Enforcement of the same is another critical component. A sample agricultural operator agreement is provided in Appendix K.

One concern raised in an interview was of a conflict created by the transitory nature of aerial applicators, often from out-of-state operators. In moving from one airport to another for a short period of time, proper notification to the airport often is not provided beforehand, especially at rural airports where an there is no on-site manager.

The need for and use of airport water and the availability of fuel were other concerns. Modern turboprop agricultural aircraft require jet fuel, a fuel not readily available at small rural airports. Fuel may be transported onto the airport and can conflict with minimum standards in effect, or with an airport's FBO fuel provider. Aerial applicators do have a right to self-fuel, but the airport can require certain standards to be met for fuel dispensing. Access to water to dilute chemicals or to wash the aircraft after use is a consideration.

The type of loading pad to be used for aerial applicators is likely determined by a state's agricultural statutes. Agriculture applicators prefer to stage loading processes and equipment as close to a runway as possible, to reduce turnaround times and minimize operating expenses. This can cause a safety concern at airports, as the proximity to a runway or taxiway can result in lower separation and safety

FIGURE 11 Staging of agricultural equipment near a runway end (*Source*: Imagery © 2015 DigitalGlobe, State of Arkansas, USDA Farm Service Agency; map data © 2015 Google. Fair use.).

margins for other aeronautical users. Figure 11 illustrates a loading operation with vehicles and equipment inside the runway safety area and close to the approach end of a runway.

The location of a loading pad also needs to address the possibility of a spill causing ground or water contamination. One airport manager cited the need to be firm and have a lease agreement that spells out allowable staging locations based on safety and the resolution of potential environmental issues. If multiple applicators are using an airport, having one loading area may not be wise, as cross-contamination and other liability issues would make it challenging to determine the responsible party. Figure 12 depicts a staging area that can accommodate two operators. Adequate ground area is necessary to accommodate the maneuvering, loading, cleaning, and fueling of agricultural aircraft.

Notices to Airmen

Because Part 137 aerial applicators are waived from complying with standard traffic pattern operation, airports responding to the survey and interview indicated they issue NOTAMs, provide announcements over AWOS, or respond to Unicom or CTAF calls. Appendix G provides samples of remarks listed for aerial applicators in the AFD.

FIGURE 12 Staging of agricultural equipment near a runway end for two operators (*Source*: Imagery © 2015 DigitalGlobe, State of Oregon. Fair use.).

Environmental Considerations

Aerial applicators are subject to environmental laws governing the use and disbursement of chemicals. A publicly operated airport manager's concern for federal environmental regulation increases if an agricultural applicator stores, mixes, or cleans chemicals on airport premises. This is simply because of the amount and type of chemicals used, and the requirement for spill prevention and containment measures to be taken. Lease agreements should address environmental requirements for bulk storage and dispensing.

In allowing the aerial applicators onto the airport, an airport operator can be subject to federal and state laws addressing spillage, storage, and disposal. If contamination occurs, no matter who is responsible, expansion or use efforts of the contaminated land will be hindered and clean-up can be costly. State EPA requirements identify minimum requirements for storage and spill prevention measures. Several of the airports in the survey indicated they were required to have storm water pollution prevention plans and National Pollution Discharge and Elimination System permits. Most states have agriculture statutes related to on-site containment of pesticides, fertilizers, and soil conditioners. Information on steps to take in the event of pesticide spill can be found on the Internet.

Aerial applicators are required to be trained and certified for any chemicals or products being used. The Federal Insecticide, Fungicide, and Rodenticide Act include regulations applicable to the certification of persons who apply pesticides and to pesticide handling. There can also be local, tribal, and state regulations associated with the licensing, use, storage, handling, and disposal of chemicals. The state or U.S. Environmental Protection Agency has responsibility for enforcement. Federal environmental Worker Protection Standards for personnel protection apply to individuals involved in mixing and using pesticides, as can Occupational Safety and Health Administration regulations at the state or local levels.

The most effective preventive measures can be taken when an airport manager knows what chemical and processes are used at the airport. Communication and cooperation with the aerial applicator is a necessity. Because of the toxic nature of some chemicals used, informing and coordinating information with emergency response and firefighting personnel are important. While the agricultural operator is required to have material safety sheet data available, it is important that the airport also have them available. A handbook on agricultural aircraft operations on municipal airports suggests that airport managers obtain a number of records from an agricultural operator in the event of a spill. Appendix L is a sample form used by Iowa's airports to record and list data of importance for emergency or other purposes. Appendix M provides an outline for an incident response plan and sample reporting form in the event of a spillage.

Security Considerations

Security concerns for bioterrorism exist with the ability of agricultural aircraft to spread toxic chemicals. For this reason, DHS oversees measures that affect aerial applicators and can directly affect airports as well. All aerial application operations are required to have some measure of site security in place to minimize crime, prevent unauthorized access, and protect company assets.

Aerial applicators are trained to be vigilant as part of their security efforts, as airport employees, tenants, and users should be. Breaches of security or suspicious activity around aerial applicators should be reported as outlined in the airport security plan, if one is in place. The review indicated that many of the airports used by aerial applicators do not have a security plan. Otherwise, security notices are normally given to the local police, Federal Bureau of Investigation field office, and DHS.

The trade organization for aerial applicators, the National Aviation Agriculture Association (NAAA), provides a number of safety- and security-related education best practices for its members. Airport managers may consider the elements shown in Textbox 9 in their security and operations plans, or for incorporation into leases.

TEXTBOX 9
Security Elements in Airport Plans or for Leases
(*Sources*: NAAA and FAA)

- Have basic fencing, lighting, and locks.
- Use intrusion detection systems and cameras.
- Establish inventory management policies.
- Park the aircraft and equipment in a secure place when not in use.
- Park disabled trucks or other equipment in front and back of aircraft.
- Install hidden electrical system shut-off switches.
- Remove batteries from aircraft, vehicles, or equipment.
- Use devices that lock propellers or rotors.
- Disable engines in unused aircraft.
- Establish methods to know the location and status of all equipment used.

Related Information

A number of resources exist for those seeking more detailed information on aerial agricultural application. In particular, the Minnesota Airport Technical Assistance Program, or AirTAP, published *Agricultural Aircraft Operations on Municipal Airports: A Guidebook for Municipal Airport Managers* (AirTAP 2009). The guide provides information on related laws and recordkeeping suggestions, mixing and loading area requirements, storage requirements, incident and emergency response plans, and a specialized insurance program established for pesticide applicators under Minnesota statute. A sample incident report form is provided in Appendix M. Other states have similar statutes, outreach, and programs that provide assistance for airport and agricultural operators.

The NTSB conducted a special study on agricultural operations that found most accidents occurred away from an airport and involved a variety of accident causes, factors, or other safety concerns (NTSB 2014). One accident during the 10 years investigated was noted to have involved a runway worker injured during a repositioning flight. Additional sources of information on aerial applicators are identified in Textbox 10.

AERIAL APPLICATION: FIREFIGHTING

ACRP Synthesis 32: Managing Aerial Firefighting Activities on Airports explored the impact of aerial firefighting operations on both controlled and uncontrolled airports (Phillips 2012). The synthesis provides a useful guide and reference source for airport operators with aerial firefighting operations at their airports. It provides comprehensive economic, administrative, and operational information on the various aspects of an aerial firefighting base on an airport, and gives a reasonable idea of what to expect, which agencies are involved, what issues an airport operator might face, where to get help,

TEXTBOX 10
Sources of Information on Aerial Applicators

- *Aerial Applicator's Manual: A National Pesticide Applicator Certifications Study Guide* (O'Connor-Marer n.d.)
- *Aerial Application Manual* (U.S. Department of Agriculture 2006)
- National Agricultural Aviation Association (NAAA)
- National Agricultural Aviation Research & Education Foundation
- Various state and local agricultural aviation associations

and how to deal with most of the challenges presented by aerial firefighting base operations. Topics covered in the report include:

- Airport and operator roles
- Fire management in general
- Money and contractual matters for airport operators
- Safety and operational matters
- Lessons learned
- Appendices containing references and contact information resources
- A checklist of items commonly considered in agreements between an airport and an aerial firefighting support agency/user
- How airports with commercial service and subject to Transportation Security Regulation 1542 *Airport Security* address the issue of access control
- Information from the *Interagency Helicopter Operations Guide* (2013) by the National Wildfire Coordinating Group, which governs the safe use of aerial firefighting helicopter operations on an airport.

Airfield Accommodation

It is more common for aerial firefighting aircraft than agricultural application aircraft to use a public airport, because firefighting craft often require longer runways than private airports can provide. Firefighting aircraft also routinely operate in airspace controlled by ATC. When operating from rural airports during a fire, normal procedure is: If more than six aircraft will be used in the operation, a contractor ATCT will be set up at previously uncontrolled airports. A NOTAM would be issued alerting other aeronautical users of the ATC operation.

An aerial firefighting operation on an airport can be of two types: (1) the firefighting unit is stationed on the airport, or (2) a seasonal or temporary base is established to address a nearby wildfire. In the former, a lease agreement normally exists. Generally, the agreements are between the airport and a federal agency, such as the United States Forest Service (USFS) or the Bureau of Land Management in Alaska, although a lease could also be made with a state entity, local agency, or regional entity with firefighting responsibilities. Figures 13 and 14 provide examples of aerial firefighting operational areas on airports.

In establishing a base, airport operators were asked to provide or accommodate a number of different resources and support functions. *ACRP Synthesis 32* elaborates on each, including:

- Hazards of helicopter operation
- Security and access control issues

FIGURE 13 Firefighting operational area at McCall Municipal Airport, Idaho (*Source*: Imagery © 2015 DigitalGlobe, USDA Farm Service Agency; map data © 2015 Google. Fair use.).

FIGURE 14 White Sulphur Springs Airport, Montana, with remote agricultural and firefighting pad location (*Source*: © 2016 Microsoft Corporation © 2016 HERE. Fair use.).

- Safe fueling operations
- Foreign object debris potential
- Staging and parking of aircraft
- Reduced visibilities from smoke
- Spillage of retardant or chemicals
- Temporary flight restriction (TFR) that can impede other aeronautical activity.

Notices to Airmen

No airport operators interviewed in the report identified any problems or issues with NOTAM procedures. Appendix G provides examples of AFD remarks related to aerial firefighting.

Sponsor Assurances

Sponsor Assurance 27 covers governmental aircraft use, often for aerial firefighting applicators. A firefighting aircraft under contract to the USFS and acting in that capacity is considered to be operating as a public aircraft and performing a governmental function (49 USC 40125). A public aircraft is different from a civil aircraft primarily in its intended use [49 USC 40102, (a)(41)]. The distinction between the two can have implications on the ability of an airport to recover fees for use of an airport, issues arising from legal and environmental liability exposure, and accommodating aircraft that exceed an airport's pavement design capabilities. *ACRP Synthesis 32*

discusses the pressures to accommodate aerial firefighting activity and how safety margins can be affected.

Related Information

Both positive and negative impacts were reported in the *ACRP Synthesis 32* study. Positive impacts were economic and more of benefit to the community than to the airport. Negative operational impacts of aerial firefighting operations on airports were listed as:

- Noise complaints during extended operations
- Dust generated by vehicle and helicopter operations
- Aircrew issues with security access measures
- Increased workload on airport staff and field maintenance personnel
- Fire season corresponding with construction season
- Conflicts with other aeronautical users, especially student training
- Potential damage to surfaces from overweight operations
- Generation of foreign object debris from rotor and prop blast.

Pertinent to the current synthesis study were the following observations from *ACRP Synthesis 32*:

- Airports reported damage to airport facilities. While the USFS took responsibility for the costs associated with the repairs, the repair was generally left to the airport to resolve. Common damage was to runway or taxiway lights, sod disruption, propeller or rotor blast, and pavement overstress.
- If an ATCT is not in operation, the firefighting operator often established a temporary ATCT on the field. Triggers for establishing a temporary mobile tower were having approximately six or more aircraft operating from the airport simultaneously or having visibilities reduced by smoke. The primary issue for airport operators related to portable ATCTs is the identification of a suitable site.

CHAPTER NINE

AERIAL ADVERTISING

Aerial advertising is the name given to operations such as banner towing, airborne signs, skywriting, and public address systems [14 CFR 21.25(b)(6) and (7)]. While aerial advertising is more commonly associated with a fixed-wing banner tow operation, other types of aerial advertising include balloons, blimps, and helicopters. For this report, banner towing is the activity primarily discussed because it involves access to an airfield and operation to and from an airport.

A banner is an advertising medium supported by a temporary framework attached externally to an aircraft and towed behind the aircraft (FAA 2003). Banner towing is primarily a commercial activity, undertaken for compensation or hire. FAA has opined that a balloon or blimp that carries a banner can also be considered a commercial aeronautical activity. In a 1992 request for legal interpretation, the FAA provided an interpretation of several scenarios addressing balloon operations as a commercial operation (Terasaki 1992). Information contained in this chapter also applies to airships used for similar purposes and described in chapter seven.

Banner tow operations are conducted primarily in areas where it is economically advantageous to do so. Nevertheless, the majority of U.S. airports have no experience with banner tow operations. In this study, few of the airports interviewed had incorporated minimum standards on banner towing because there was no expected demand for it.

AIRSPACE ACCOMMODATION

Any aircraft that tows anything into the air, other than a glider or unpowered ultralight vehicle, requires a waiver of regulations from the FAA (14 CFR 91, Part 91.113). Typical waiver requirements that affect airports are the following (FAA 2003):

- The certificate holder is to obtain the airport manager's approval to conduct banner tow operations at each airport of intended operation.
- Notify appropriate airport officials in advance when banner tow operations will be in close proximity to each nontowered airport.
- If the airport involved has an FAA control tower, the holder is to inform the FAA control tower of the time of the banner tow operation.
- Banner pickup or banner drop should be in a pre-designated area not closer than 500 ft to taxiways, runways, persons, buildings, parked automobiles, and other aircraft whenever possible. If the tow plane lands with the banner attached, due care should be exercised to avoid obstacles and endangering other aircraft in the air or persons, property, or aircraft on the surface.
- Banner tow operations at airports will be conducted in accordance with ATC clearance or the local standard traffic pattern procedures established by airport management.

AIRFIELD ACCOMMODATION

Consideration for allowing banner tow operations on an airport primarily center on whether adequate space exists to conduct the activity safely. A banner can extend more than 250 ft in length. An aircraft climb performance dictates the necessary clear area for a successful banner lift. Based on the literature search and interviews, the preferred banner operating area for airports is adjacent to a runway or taxiway that allows for a clear, obstacle-free approach and departure path for pickup and drop-off.

Basic airport design standards suggest that the pickup and drop area be located a minimum of 250 ft from the centerline of an active runway, though it can be less at smaller design category GA airports. The distance allows for positioning the catch poles and staging personnel, vehicles, or equipment outside the runway safety areas, object-free areas, and object-free zones of an airport. Staging can be accomplished with from one to four individuals.

NOTICES TO AIRMEN

A NOTAM is generally a condition for obtaining a waiver. Sample NOTAMs are provided in Appendix G.

SAFETY CONSIDERATIONS

One of the risks with banner towing is the possibility of an emergency drop of the banner should the aircraft experience difficulty or should the banner malfunction. Identifying one or more secondary drop areas close to the pickup area is a best practice. For this reason, caution is suggested to minimize flying over taxiways. Another risk is the trailing aircraft hook catching on something other than the banner, such as a light fixture or sign. Access to the banner tow pickup and drop-off area can also be a safety consideration. Chapter fifteen contains an example of the Albert Whitted Airport in Florida having the banner area located where a primary runway and taxiway must be crossed for access.

RELATED INFORMATION

In a review of NTSB and FAA data, a news reporter found 191 banner-related accidents between April 1995 and July 2015 (Schroeder 2015). Not known is how many banner tow operations were conducted over that 20-plus-year period. Neither did the report identify the causes of the accidents or where they occurred (on the airport or away from the airport).

A number of communities have sought to limit aerial advertising, primarily through enactment of ordinances that restrict aerial advertising over a particular area (276 F.3d 1109 2002; Weisberger 2008; Moore 2013; Riley 2013; Morales 2014). These efforts can conflict with established FAA preemption determinations that the federal government controls airspace. However, the issue is not fully clear, as evidenced by different rulings in court cases. The issue of free speech accommodation has also arisen in these cases (Namowitz 2013).

Noise can be an issue for airports and the community, as the nature of banner tow operations requires high horsepower output to overcome the drag of the banner. Aircraft propellers are kept in high rpm and low pitch, which results in higher noise levels. Away from the airport, banner tow operators seek to maximize advertising effectiveness by flying at the lowest altitude allowed and continuously in a high viewing area.

The FAA produces a number of documents that provide guidance to both aerial advertisers and airports.

- FAA/FS-I-8700-1 (FAA 2003) Information for Banner Tow Operations
- AC 00-61 (FAA 2000b) Event Planning Guide
- AC 91-45C (FAA 1990b) Waivers: Aviation Events

The *Information for Banner Tow Operations* is an informative guide on banner tow operations (FAA 2003). It provides safety recommendations, lists procedures, and discusses the waiver requirements needed when conducting operations.

CHAPTER TEN

GLIDER OPERATIONS

The terms “sailplane” and “glider” are often used interchangeably in the aviation industry, but there is a distinction for those who fly them. Most individuals start out using gliders for training but then advance to sailplanes for soaring activities. Gliders are heavier-than-air aircraft that are supported in flight by the dynamic reaction of the air against its lifting surfaces and whose free flight does not depend principally on an engine (14 CFR 1). A sailplane is different from a glider primarily in its glide ratio and ability to soar. Whether a pilot flies a glider or sailplane, a glider rating is the certificate issued to a pilot. Therefore, glider is the common term used to describe both operations.

Gliders are typically towed to an area within gliding range of a landing area. Upon release from the tow aircraft, the aircraft glides back to the departure runway with limited ability to climb to new altitudes. In contrast, a sailplane is designed to stay aloft for much longer periods of time as a result of its higher aspect ratio wings and reduced weight.

Some gliders are self-propelled and do not require a tow or ground launch. Self-launching sailplanes, powered sailplanes, motorized sailplanes or motorgliders have become increasingly common types of vehicle for use in aviation sport flying. Powered gliders or sailplanes are certified and registered in the category of gliders, rather than in the airplane category. Gliders are considered to be less hazardous than powered aircraft because, with the exception of powered gliders, they do not have engines or propellers, nor do they carry flammable liquids.

AIRSPACE ACCOMMODATION

Similar to skydiving, glider operations tend to congregate activity at one airport to take advantage of operational efficiencies and economies of scale. Both activities require support personnel to manage ground operations. The nature of glider activity depends on surrounding terrain and weather conditions that are conducive to gliding and soaring. This limits the number of airports where the activities could thrive.

The flight characteristics of gliders allow for both shallow and steep rates of descent. Similar to ultralights, their speed is slower than that of powered aircraft. For these reasons, the FAA suggests glider traffic patterns be identified inside of a regular powered aircraft traffic pattern or on opposite side of the runway (Figure 15). Pattern altitude can vary at airports from 600 to 1,000 ft, depending on local conditions and operations.

To operate in ATC-controlled airspace, radio communication is a requirement. The SSA has reserved use of 123.3 and 123.5 for gliderports and inter-glider communication. Without engine-powered electrical systems, battery-operated or handheld radios are the norm for gliders. Their transmission range may be limited. A glider, including the tow aircraft during towing operations, has the right-of-way over powered aircraft. Coordination is necessary between a tow plane operator and the towed glider as to who will make radio announcements. The Boulder Municipal Airport in Colorado has established an operating policy that is intended to facilitate safe and consistent operations at airport. It is also intended as a means to mitigate noise complaints. The information is provided in Appendix N.

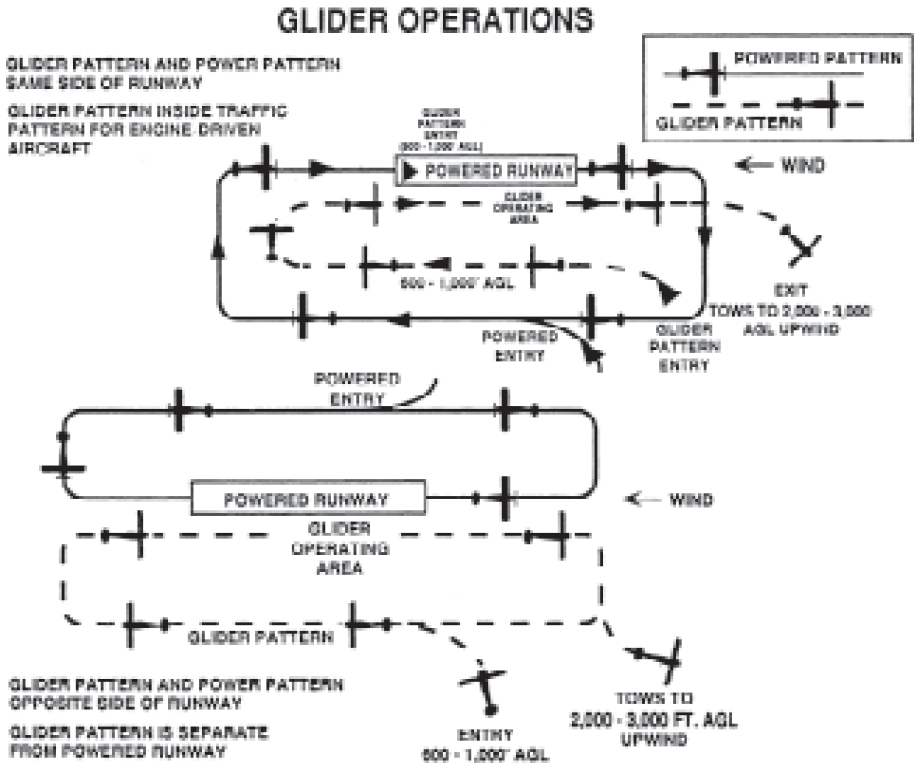

FIGURE 15 Recommended traffic patterns for gliders (*Source*: FAA 1993.).

AIRFIELD ACCOMMODATION

Depending on the volume of activity, the land available, and the type of glider used, gliders can use either the runway or a turf/dirt area. A dedicated glider runway can have the descriptor "G" assigned to it in the AFD. However, creating a separate glider operating area involves maintaining a graded surface.

A concern expressed by airport operators is the length of time it can take to position a glider and tow aircraft on a runway, or to retrieve one upon landing. The length of runway occupancy time can interfere with other aircraft operations, especially at busy airports. For this reason, airport operators often try to create a "glider operating area" that separates glider operations from other aeronautical activities, if space allows.

One method to increase airport functionality is to have a separate runway for glider use. At federally obligated airports, FAA does not allow operations to occur simultaneously from two parallel runways unless FAA design separation standards are met. Minimum design separation between runways that allow for simultaneous VFR operations is 700 ft (Advisory Circular 150/5300-13A) (FAA 2012b). If the runways are less than 700 ft apart, aircraft use must be sequential. This can be a safety issue for pilots unfamiliar with the requirement, as was stated by one airport manager in an interview.

A second method is having a staging or holding area near the approach end to a runway for quick access, similar to a run-up area for powered aircraft. A third method is to allow operations off to the side of a runway. A fourth method is to operate from a taxiway area. In all methods, personnel and equipment normally accompany and assist with the movement of the glider and will be present on the runway for a period of time. Figure 16 shows a glider being positioned on a runway end with accompanying ground crew support.

This study found airports that allow gliders to operate adjacent to a runway. Such operations are at the pilot's own risk if the area is not properly designated as an operating area. The airport operator assumes additional risk when allowing the operation. Operators also undertake greater responsibility to

FIGURE 16 Glider and tow aircraft staged and ready for takeoff (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

maintain the turf area and mitigate hazards such as holes, depressions, objects, and vegetation growth. Weather conditions can affect turf or gravel areas and can impact operations, as ruts or washouts can occur from rain. The operating procedure for one airport reads:

> It is alright to drive on the hard surfaced runway when retrieving a plane, but do not drive on and off the side of the runway when the ground is wet or during the summer months when the runway is hot since it causes the edges of the runway to be broken down.

Another airport manager who was interviewed incorporates into the lease agreement that the responsibility for maintaining the glider operating area is that of the glider operator.

A few uncontrolled airports with a low number of total operations allow taxiway takeoff and landings. In those cases, both the airport operator and the pilot assume more risk for the operation, especially if nearby obstructions exist or if it causes a hazard to persons or property in the vicinity of the taxiway. There is a rationale for allowing glider operations to occur from a taxiway; it can reduce the potential of conflict with other aircraft using the runway. Owing to the long and low wingspan of gliders, contact with edge lighting is a hazard. A safety risk analysis for either taking off or landing from a surface other than a runway can mitigate the risks.

Some states have permitting or licensing requirements that prevent aeronautical operations from other than an identified runway. Local airport rules and regulations were found to have clauses restricting operation from non-designated areas without permission of the airport manager. Figure 17 shows a glider landing in an undesignated grass area adjacent to a paved runway.

FIGURE 17 Glider landing in an undesignated grass area adjacent to a paved runway (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

NOTICES TO AIRMEN

Sample NOTAMs for glider operation are provided in Appendix G.

SAFETY CONSIDERATIONS

Separating gliders from other users can enhance operational safety on and near an airport. The SSA and its affiliate, the Soaring Safety Foundation, provide education and training outreach for members. Airport managers can utilize the information in developing their own policies, rules, or regulations. One service provided to members by the Soaring Safety Foundation is a soaring site survey. The survey is a review of the soaring site's operations, organizational culture, airspace, regulations, and safety procedures. A site survey can have value to an airport in improving safety and communication. Appendix O provides a sample glider operating agreement developed by the SSA.

Preventing Launch Accidents, an article in *Eglider*, provides a list of what could go wrong on a glider launch (Knauff n.d.). The information is useful for understanding the numerous possibilities of what can occur during a glider launch and for performing a safety risk analysis.

RELATED INFORMATION

FAA publishes a handbook on glider operation, the *Glider Flying Handbook* (2013a). A number of soaring organizations and chapters provide information related to their operations. For example, the Utah Soaring Association operates from four different airports. As part of the association's safety initiative, it has developed familiarization training tools and SOPs for its members. The SOPs are good examples of the type of information an airport manager may want to incorporate. The SOPs can be found at http://www.utahsoaring.org. Appendix D provides the glider operation rules and regulations for the Arlington Municipal Airport in the state of Washington.

Chapter two described a 2011 FAA DD that addressed an airport operator's closure of a glider runway at an airport and the resultant elimination of a glider business (Docket 16-09-13). The determination provides insight into the arguments that airports typically make in seeking to preclude glider activity. Chapter fifteen provides several case examples of glider practices at different airports. One airport example allows winch launches. There are currently no regulations governing winch launches. Ordinary due care is expected in any operation.

CHAPTER ELEVEN

ROTORCRAFT OPERATIONS

A rotorcraft is a heavier-than-air aircraft that depends principally on the lift generated by one or more rotors for its support in flight (14 CFR 1). Within the category of rotorcraft are the classes of helicopters and gyroplanes. While both use rotors to generate and sustain lift, their operational characteristics are different, as are their operation on an airport.

A helicopter is an aircraft that is lifted and propelled by one or more horizontal rotors, each rotor consisting of two or more rotor blades (FAA 2012a). Helicopters are able to operate on most airports without unduly interfering with regular airplane traffic. This study, found that no issues were cited by any of the interviewed airports, other than concerns for rotor downwash and noise generation.

A gyroplane is an aircraft that achieves lift by a free spinning rotor (FAA 2000a). A separate propulsion engine propels the craft forward, and the rotors react to the force of air, resulting in rotation and lift. In contrast, a helicopter's engine powers its rotors in liftoff, landing, and cruise. Gyroplanes operate similarly to fixed-wing aircraft. However, their slow speeds and steep approach angles can result in integration problems with regular airplanes.

The terms autogyro, gyrocopter, and gyroplane refer to the same type of aircraft. Autogiro was the original name given by the inventor, Juan de la Cierva. Development of the autogyro in the United States was accomplished by Igor Bensen. He trademarked the name "Gyrocopter" on his particular design. FAA uses the term gyroplane as the official FAA designation for the aircraft.

Vertical takeoff and landing (VTOL) aircraft are hybrids of the fixed-wing and rotorcraft categories and apply to both helicopters and tilt-wing or tilt-rotor aircraft. Each can take off, land, and hover similar to a helicopter and fly similarly to a turboprop airplane during cruise operation. Figure 18 shows a VTOL and a helicopter on an airport.

HELICOPTERS

An airport that experiences or seeks to encourage helicopter activity will often establish a heliport, helipad, or other designated helicopter landing zone (HLZ) area, such as on a movement area or ramp. The term heliport describes an area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters and includes its buildings and facilities, if any. Heliport is the official name for a formalized landing area. A helipad is a small, designated area, usually with a prepared surface, used for the takeoff, landing, or parking of helicopters. It can be located on a heliport, airport, hospital, or private area, and it can be an improved or unimproved facility. Figure 19 shows two helipads located along a taxiway and opposite the terminal ramp. The lighting and markings for heliports and HLZs are described in AC 150/5390-2C (FAA 2012f).

Airspace Accommodation

Airport managers are encouraged to develop operating procedures and distribute them widely. The AIM describes how helicopter design characteristics and user needs often require operations from movement and nonmovement areas at an airport having an ATCT (FAA 2015a). Pilot familiarization with local procedures is important. The development of an airport familiarization map or chart that contains normal procedures and graphic information for helicopter pilots is a valuable tool. The

FIGURE 18 Helicopter and VTOL on an airport (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

same can apply to uncontrolled airports. An airport manager does have a challenge in disseminating information about the airport's preferred flight and/or taxi routes because the FAA does not depict defined surfaces for air or hover taxiing of helicopters or final approach and takeoff paths on airport diagrams. Compliance and enforcement of violators must be spelled out in approved rules and regulations. When developing local procedures, communication is a key component of success. Consulting with local helicopter users will go a long way toward achieving compliance.

At busy GA, commercial service, or helicopter training airports, separate facilities and approach/departure procedures may exist. If the airport has an ATCT presence, procedures are worked out with the control tower personnel, airport management, and the FBO, if utilized. If at an uncontrolled airport, airport management develops acceptable procedures in conjunction with the helicopter operator.

FIGURE 19 Helipad locations and markings at the Athens, Georgia, airport (*Source*: © 2016 Microsoft Corporation © 2016 HERE. Fair use.).

Helicopters can legally operate in visual conditions if they remain clear of clouds with at least ½-mi visibility during the day and 1-mi visibility at night. The low visibility allowances mean helicopters must stay clear of instrument approach and departure paths of regular aircraft if operating VFR.

Helicopters' advantages are their ability to lift off and land in a small area and to hover in space. If a helicopter experiences an engine failure, the rotors will continue to rotate and generate enough lift to allow it to glide to a safe landing, if done properly. The loss of power results in an autorotation. The procedure is practiced routinely at airports that conduct helicopter training, according to AC 61-140 (FAA 2013e). However, two airports had AFD remarks indicating that autorotation practice is not allowed on their airports. This was the result of perceived safety concerns about possible interference with other aircraft, reduction of liability exposure, and possible damage to the turf or runway. Any aircraft operation is to be conducted without creating a hazard to persons or property on the surface.

As noted in chapter four of this report, helicopters are generally expected to avoid the flow of fixed-wing aircraft in the traffic pattern. Large, noisy, or fast helicopters may integrate into the fixed-wing aircraft pattern if the pilot determines it is operationally safer to do so. Unless terrain, obstacles, noise restrictions, or other operational restrictions apply, a helicopter is expected to use a right-hand traffic pattern. This is partly because a helicopter pilot's seated location on the right side of the aircraft, in contrast to a fixed-wing aircraft, where the pilot sits on the left side. A helicopter makes turns to the right to allow for greater outside visibility in the turn.

Traffic pattern altitude for helicopters is generally 500 ft AGL. However, for large or fast helicopters, standard 1,000-ft patterns may be used. Whereas a pilot is not expected to have extensive knowledge of all traffic patterns at all airports, a number of airports with helicopter traffic list the traffic pattern and altitude in the AFD (Appendix G).

There are often variations in helicopter operations at airports that have an ATCT. The controllers are responsible for safe separation of aircraft, and they will specify traffic pattern procedures. If the landing zone (LZ) is in a movement area of a Part 139 airport, the controller clears a pilot to the designated spot. If the LZ is in a non-movement area, the controller issues a "proceed to" instruction. The latter instruction infers the pilot is to progress at his or her risk and discretion. At uncontrolled airports, SOPs from the AIM are to be followed. Problems arise at airports that have not communicated expectations to helicopter operators about the procedures to be used at their airport.

Once making their approach to a runway or other designated landing zone, a helicopter can utilize three different types of taxiing: surface taxi, hover taxi, or air taxi. Surface taxi involves taxiing on pavement with the use of wheels. A hover taxi involves progressing along a taxiway within 25 ft AGL. An air taxi would occur below 100 ft AGL. General practice is to not taxi faster than a brisk walk. Ground taxi turns of wheeled helicopters are significantly larger than a hover turn.

The greatest physical and mechanical demands are placed on a helicopter as it transitions to a takeoff or to a landing. Helicopter pilots often consider a flight path that will allow for a safe landing in the event of an engine failure or other emergency. In developing local procedures, an airport manager would take into consideration the need for an emergency plan. Other considerations are not conflicting with arrival and departure of other aircraft, effects of typical wind conditions, not posing a hazard to people or facilities on the ground, reducing noise exposure, providing adequate clearance from obstacles, and accommodating expected operational needs of access, fueling, and maintenance. The Helicopter Association International (HAI) produces a *Fly Neighborly Guide* that consists of best practices for "flying neighborly" (HAI n.d.).

Airfield Accommodation

Helicopters are classified for design purposes as small (maximum takeoff weight of 7,000 lbs or less); medium (maximum takeoff weight of 7,001 to 12,500 lbs); and large (maximum takeoff weight of more than 12,500 lbs). Typical HLZs are 60 ft^2, 75 ft^2, and 120 ft^2, respectively. Beyond identifying

an HLZ, an airport operator needs to consider a helicopter's movement on the ground, which includes taxiing, parking, servicing, and storage.

Design of heliports and helipads for federally obligated airports is described in AC 150/5390-2C (FAA 2012f). Developers of an HLZ at a non-obligated airport are encouraged to use the same AC. Individual states may have their own applicable design requirements. Local zoning codes or regulations may apply also. Hospital and rooftop HLZs have special design considerations. The HLZ for a VTOL tilt-wing or tiltrotor requires design consideration beyond those recommended in the AC and requires coordination with the FAA.

A major design consideration for a helicopter landing area is its load-bearing capability. Turf is the most common in the United States. Concrete helipads are good for supporting all types of helicopter operations. Asphalt helipads are not conducive to supporting helicopters with skids, as the concentrated weight can result in the skids sinking into the asphalt if it has not been compacted properly. For this reason, dollies, wheel attachments, support pads, or beams are used to distribute the weight. Figure 20 shows a helicopter towed onto a taxiway with a portable dolly. Upon takeoff or for landing, a person other than the pilot needs to retrieve the dolly, otherwise it becomes an obstruction to other aircraft.

Notices to Airmen

The NOTAM system can be used to convey operating requirements or restrictions, such as an exclusive use area for helicopters or gyrocopters. Appendix G contains sample remarks in the AFD for helicopter operations.

Safety Considerations

Safety is enhanced for helicopter pilots when they have adequate obstruction-free airspace for approach and departure, adequate clear space for expected ground maneuvers, clear visual lighting and marking, and current information about wind speed and direction. An HLZ can minimize risk to persons and property by reducing ground proximity or overflight of taxiways, buildings, fuel facilities, and the like, and by having an area that safely accommodates the servicing, maintenance, and loading/unloading of passengers or cargo, including passengers with disabilities.

For many of the design reasons cited, airport operators often locate helipads away from the taxiway, ramp, or apron areas. A safety issue can arise owing to the locations necessitating people and vehicles to cross an active taxiway or ramp area. Figures 19 and 21 show examples of airports with helipad locations requiring traversing a ramp and taxiway.

If the ability to fuel helicopters at remote pads is lacking, landing helicopters near a fuel pump can be a design issue (Figure 22). The same fueling location consideration applies to other aeronautical uses, such as aerial spraying, skydiving, and banner tow operations.

FIGURE 20 Portable dolly used to position skid-equipped helicopter (*Source*: E. Conrad, Lakeland Linder Regional Airport, Florida. Used with permission.).

FIGURE 21 Airport layout for accommodating high-use helicopter operations (*Source*: Imagery © 2015 DigitalGlobe, USDA Farm Service Agency; map data © 2015 Google.).

Because aircraft operate most effectively when taking off or landing into the wind, two or more approach/departure paths are recommended, as a way to provide greater safety and operational flexibility during varying wind conditions. The placement of one or more windsocks in the vicinity of the landing zone can enhance a pilot's situational awareness. Lighted windsocks for night operation are important. A windsock can be located to minimize turbulence from buildings and obstacles and to show true wind direction and speed.

A primary safety consideration in rotorcraft operation is the strong rotor wash created. Rotor wash can pick up and throw small gravel at significant speeds. It also creates restricted visibility or obscuration for the pilot and ground crew by blowing snow, sand, or soil (Figure 23). For that reason, helicopter landing areas need to be free of dust, loose dirt, snow, or other forms of loose debris and objects. Turf landing areas are most effective when vegetation is no higher than 12 in.

Because it is often difficult for a pilot to see unmarked wires, antennas, poles, cell towers, and similar objects, even in the best daylight weather, airport management is encouraged to mark or light difficult-to-see objects in and around the landing zone area and along normally traveled approach/departure paths. Guidance on marking and lighting objects can be found in AC 70/7460-1K on obstruction marking and lighting and AC 150/5390-2C on Heliport Design (FAA 2007d, 2012f). Ball markers can be an effective means for marking obstacles such as power lines and guy wires, especially if the markers are internally lighted, have a luminous surface, or are covered with reflective tape.

FIGURE 22 Helicopter positioned close to fuel pump for fueling purposes (*Source*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

FIGURE 23 Rotor downwash is a major safety issue (*Source*: FAA 2012a.).

AIM, AC 91-32B, AC 91-42D, and the *Helicopter Flying Handbook* provide information on safety in and around helicopters (FAA 2014c, 1997, 1983c, 2012a). The following list of safety issues is derived from the literature search and interviews:

- Park helicopters in a way to avoid passenger ingress or egress around the tail rotor area.
- Create a safety barrier using hedges to prevent inadvertent entry and to minimize the effect of rotorwash.
- Display a cautionary sign similar to that illustrated in Figure 24.

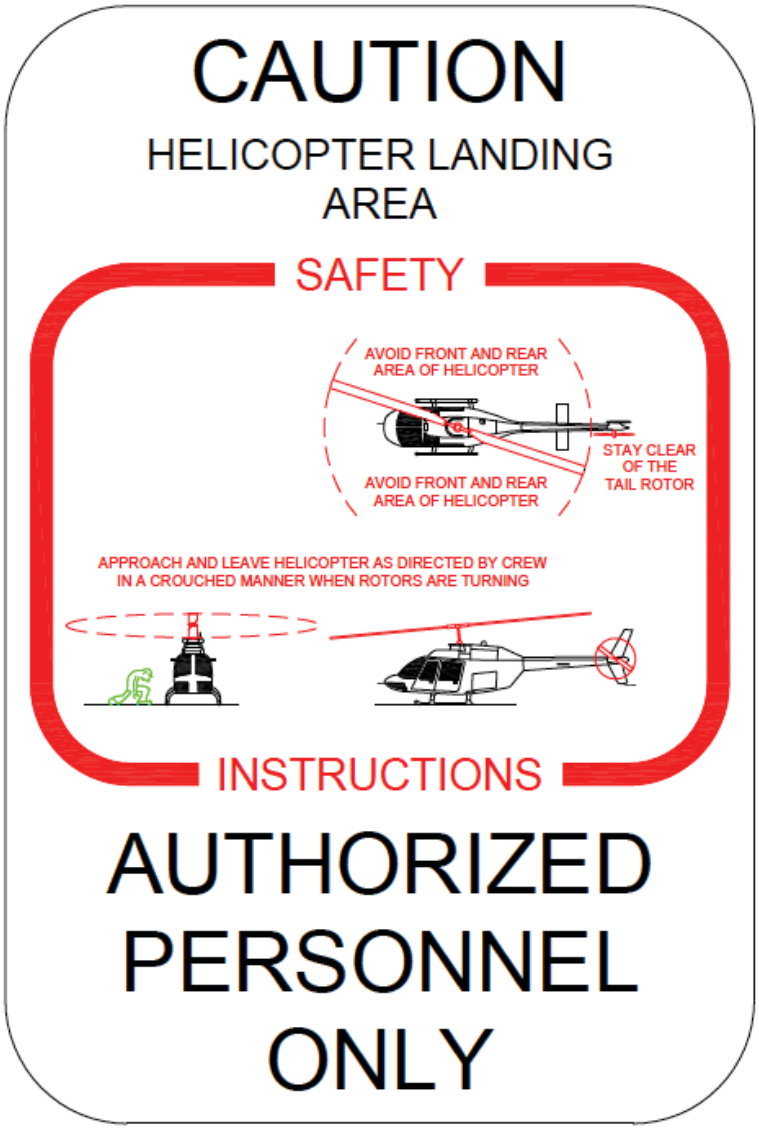

FIGURE 24 Helicopter caution sign (*Source*: FAA 2012f.).

- Provide access means for rescue and firefighting services.
- Provide means for snow removal operations and equipment.
- Install wind indicators or an Automated Weather Observing System.
- Consider passenger and cargo access to the loading/unload area
- Establish a reporting system for unsatisfactory or dangerous conditions.
- Develop and disseminate a local hazard map showing power lines, towers, and tall structures in the vicinity of designated LZs.
- Develop and disseminate a map showing final approach and takeoff areas and preferred approach/departure and taxi routes.
- Identify preferred taxi routes.
- Incorporate best practices from the *Fly Neighborly Guide* (HAI n.d.)
- Staff UNICOM or CTAF and provide advisories.

Helicopter Air Ambulance

Several of the airports interviewed for this report had 24-h helicopter air ambulance (HAA) operations stationed at the airport [the term Emergency Medical Service/Helicopter (EMS/H or HEMS) is considered obsolete]. Common practices for HAA were to have a dedicated helipad and consistent approach/departure profiles. Consideration of access control to the airport by HAA personnel and transport vehicles was not investigated in this report.

HAAs can require different services. One airport staged the HAA near the fuel pumps because no fuel trucks were available. A 24-h operation required on-site living quarters for responders. The landing area had backup power generators available for startup. Access to the ramp for ambulance or support vehicles was through a gate that the HAA controlled. The construction of a dedicated hangar was in progress. Specific information on HAA operations can be found in AC 135-14B, *Helicopter Air Ambulance Operations*; AC 00-64, *Air Medical Resource Management*; and *Air Ambulance Helicopter Operational Analysis* (FAA 2015h, 2005; Newman 1991).

Recently enacted regulations (79 FR 9931) require air ambulance helicopters and commercial helicopters to operate under Part 135 and comply with more stringent instrument flight rules, especially if an airport does not have weather reporting capabilities (CFR 2014).

AC 00-59, *Integrating Helicopter and Tiltrotor Assets into Disaster Relief Planning*, identifies issues to be addressed for safe incorporation and use of helicopters and tiltrotor aircraft; provides general guidance on how they may be addressed; and lists contacts and references that may be helpful during the planning and execution of disaster relief plans (FAA 1998).

Helicopter Tour Operators

None of the airports participating in the study had helicopter tour operators based on their airport. Tour operators can have unique commercial operating needs, including building and restroom facilities, access for those with disabilities, and parking. The development of commercial minimum standards can address the requirements.

Related Information

Individuals interested in learning more about some of the basic data used for development of AC 150/5390-2C, *Heliport Design* (FAA 2012f), can find a good source of information in the FAA report *Safe Heliports Through Design and Planning, A Summary of FAA Research and Development* (Smith 1994). While the report is somewhat dated, it provides a comprehensive compilation of data on helipads, heliports, helistops, vertiports, and unimproved sites. Smith also analyzed helicopter accidents and incidents, and hazards associated with rotorwash, obstacles in approach/departure paths, parking and maneuvering, airfield markings, and several other design concerns. Another study, *Heliport/Vertiport Implementation Process-Case Studies*, provides information, case studies, and strategies for airport operators on the processes involved in the proposal and development of a heliport (Peisen et al. 1996).

Noise generated by helicopter operation has been a source of conflict and concern for certain airport operators and communities. In Docket No. 16-15-02, a recent court case highlights the obstacles to resolving the issue (FAA 2015g). Three ACRP projects are currently under way to address the issue of helicopter noise on airports. They are *ACRP Report 02-44: Helicopter Noise Modeling Guidance* (available: http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3439); *ACRP Report 02-48: Assessing Community Annoyance of Helicopter Noise* (available: http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3694); and *ACRP Synthesis 11-03/Topic S02-13: Helicopter Noise Information for Airports and Communities* (available: http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3897).

A key source of information on helicopter safety and risk assessment is the International Helicopter Safety Team (http://www.ihst.org/Default.aspx?tabid=1507&language=en-US). The team is made up of government and industry leaders intent on addressing the factors that affect international civil helicopter accident rates. A number of safety management system toolkits, risk and liability assessment tools, checklists, and safety videos are available on their website. The HAI also produces several documents addressing safe helicopter operating procedures (http://www.rotor.com/Safety.aspx).

HAA operators often are required to provide a training program for hospitals, first-responders, and law enforcement personnel. Topics that airport operators may consider for a similar employee training or for their emergency planning documents are:

- Familiarity of the helicopter landing area, to include size, surface, terrain conditions and hazard/obstacle identification;
- Operation of the heliport;
- Effects of rotor-wash;
- Radio communications and standard hand signals;
- Night landing lighting, ground/vehicle lighting issues, and night vision goggle operations;
- Personal safety in and around the helicopter during day and night;
- Loading/unloading with the helicopter shut down;
- Loading/unloading with the helicopter running;
- Emergency shutdown procedures;
- Emergency procedures in the event of fuel leaks, helicopter fires, fire suppression;
- Helicopter evacuation procedures;
- Emergency response plan; and
- Operation of the fire protection system.

The National Fire Protection Association publishes a *Standard for Heliports* (2011), which addresses emergency response and minimum fire suppression requirements for heliports. The recommended standards for the minimum rating of available fire extinguishers are identified in Table 4.

GYROPLANES

As an aeronautical activity, gyroplanes function the same as airplanes, requiring a ground area or runway for takeoff and landing. One-seat gyroplanes normally operate as an ultralight under Part 103. If the gyroplane exceeds the weight limitations of Part 103, which most two-seat gyroplanes do, then

TABLE 4
NATIONAL FIRE PROTECTION ASSOCIATION MINIMUM FIRE EXTINGUISHER REQUIREMENTS FOR HELICOPTER CATEGORIES

Heliport Category	Helicopter Overall Length*	Minimum Rating
H-1	Less than 50 ft (15.2 m)	4-A : 80-B
H-2	50 ft (15.2 m) up to but not including 80 ft (24.4 m)	10-A : 120-B
H-3	80 ft (24.4 m) up to but not including 120 ft (36.6 m)	30-A : 240-B

*Helicopter length includes the tail boom and rotors.

Source: *Standard for Heliports*, National Fire Protection Association 418 (2011).

FIGURE 25 Two-seat light sport gyroplane (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

they fall into the LSA category (see chapter twelve). Figure 25 shows a two-seat gyroplane. Heavier gyroplanes fall into a normal aircraft certification category. LSAs and normal certificated gyroplanes are required to be registered aircraft, use FAA certificated engines, and have a registration "N" number. Whether the aircraft falls into the ultralight, LSA, or experimental category determines whether a pilot is required to have an FAA license to operate it.

A gyroplane taxis in a manner similar to an airplane, with its rotor stopped or turning slowly. If a gyroplane rotor is turning rapidly, the gyroscopic action makes it difficult to make a turn onto a runway, taxiway, or ramp. Normal operation for takeoff is to slowly taxi onto a runway and commence pre-rotation of the rotor. This takes time and can cause issues with other aircraft in the pattern or on the ground expecting a quick takeoff of the gyroplane. A gyroplane needs to build up rotor speed before commencing takeoff, and that results in a delay. The opposite occurs upon landing. A gyroplane can land in a short distance, but it needs time to slow or stop the rotors before taxiing, otherwise gyroscopic forces may tip the vehicle over.

The takeoff roll is short, generally in the range of 300–1,000 ft. Liftoff speeds can be as low as 30 mph. Landing speed can be a little as 20 mph. with a resultant ground roll of 10–50 ft. Most gyroplane flying is done between 500 and 1,000 ft above the ground, and at speeds in the 50–70 mph area. In the air, a gyroplane cannot stall, as can a normal fixed-wing aircraft. Loss of engine power results in aerodynamic forces working on the rotor to allow the gyroplane to descend in a controlled manner.

On approach to landing, a gyroplane's approach angle will approximate 30 degrees. The approach is steep in contrast to a helicopter's 10-degree approach angle and a fixed-wing aircraft's approach angle of 3 degrees. For the previously discussed reasons, a gyroplane will often fly a tighter and lower pattern than airplanes. Establishment of a separate traffic pattern will most effectively accommodate gyroplanes' operational needs of slow flight and steep approaches. As it is a rotorcraft, a right-hand traffic pattern similar to helicopters is often used by gyroplanes. Because of their small profile, gyroplanes are somewhat difficult to see in the air and in a pattern. For this reason, gyroplanes are often equipped with strobe lights.

Gyroplane noise is primarily generated by the engine-propeller combination and, in contrast to helicopters, not by the rotors. Because gyroplanes normally operate at low altitudes, their noise footprint can sound louder than other aircraft at higher altitudes.

If a gyroplane is classified in the LSA category, it can only be used for recreational or sport purposes and not for commercial purposes, other than for training. This study did not find many airports with gyroplanes because few exist in the United States. This is because gyroplanes were previously only in the kit-built experimental category. With the implementation of the LSA category, gyroplanes are slowly being produced and sold as complete units.

CHAPTER TWELVE

PARACHUTE OPERATIONS

A parachute is a device used or intended to be used to retard the fall of a body or object through the air (14 CFR 1). Sport parachuting is more commonly referred to as skydiving. A "skydive" is defined as the descent of a person to the surface from an aircraft in flight when he or she uses or intends to use a parachute during all or part of that descent (USPA 2013).

Skydiving operations were found to be the aeronautical activity of most concern to airport operators because they were often considered to be incompatible with other aeronautical activity. The perception is that skydiving is unsafe and does not mix well with traditional fixed-wing activity, or that adequate space did not exist on the airport to accommodate a PDZ. The main safety concerns expressed in the literature search are that skydivers landing on an airport descend through an aircraft traffic pattern, they are not readily visible to other aircraft, they do not always land where they should, and jumpers may have to walk across active runways and taxiways to return to the staging area upon landing.

Whether for training, recreational, or competitive purposes, skydiving is recognized by the FAA as an aeronautical activity, even though parachutists are not certificated airmen (FAA 2007b). Airports that receive FAA funding agree to accommodate all aeronautical activity unless the FAA determines that compatibility issues prohibit parachuting or other operations at a particular airport. The FAA considers most skydiving to be a commercial operation under 14 CFR Part 91, as it is offered to the public for compensation or hire. Chapter fifteen contains case examples of airports that have skydiving operations.

FAA determinations as a result of Part 13 or Part 16 complaints indicate that airports need to make a good faith effort to address safety concerns. Two airports in the study were found to have conducted independent safety risk assessments as part of their evaluation for accommodating or limiting skydive activity. Other airports were found to be lacking in policies, standards, or rules in place to justify their denial of skydiving activity.

CERTIFICATE OF WAIVER OR AUTHORIZATION

The airspace and landing area where parachute operations are to occur determine whether the skydiving operation will need a Form 7711-1, *Certificate of Waiver or Authorization* (COA) from the FAA. Table 5 is from an appendix in AC 105-2E (FAA 2013b). The AC provides guidance on whether a waiver or COA is necessary for a skydiving activity. A COA is necessary for parachute operations over or into a congested area of a city, town, or settlement, or an open-air assembly of persons, and for a jump associated with a special aviation event, such as an airshow or festival.

AIRSPACE ACCOMMODATION

AC 150/5300-13A, *Airport Design*, provides guidance on the development of airports (FAA 2012b). However, the AC does not specify design standards for parachute landing areas (PLAs) or PDZs. The FAA Airport Planning Division uses the term and acronym PLA in their design references to describe the ground area where skydivers land. PDZ describes and includes the airspace and landing area on an airport. However, the December 2015, update of the FAA pilot/controller glossary was revised to include the definitions for drop zone and jump zone (http://www.faa.gov/air_traffic/publications/

TABLE 5
GUIDANCE FOR ISSUANCE OF WAIVER FOR PARACHUTING OPERATIONS

Location of Jump	Kind of Authorization Required	When to Apply or Notify	Where to Apply or Notify	Title 14 CFR Section Reference
Over or onto any airport	Prior approval	Prior to jump	Airport management	§ 105.23
In or into Class E or G airspace	Air Traffic Control (ATC) notification	Between 24 hours and 1 hour prior to jump	ATC facility having jurisdiction	§ 105.25
In or into Class A, B, C, or D airspace	ATC authorization (see Note 1)	Prior to jump	ATC facility having jurisdiction	§ 105.25
Over or within a restricted or prohibited area	Prior authorization	Prior to jump	Controlling agency, as noted on sectional chart	§ 105.25
Over or into a congested area or open air assembly of persons	FAA Form 7711-1, Certificate of Authorization	10 working days prior to jump	Flight Standards District Office (FSDO) having jurisdiction over the area where jump is to be made	§ 105.21
Note 1: Verbal authorization normally issued.				

Source: FAA Advisory Circular 105-2E 2013b.

media/PCG.pdf). Used primarily by air traffic control in the standardization of phraseology, a drop zone is defined as any predetermined area upon which parachutists or objects land after making an intentional parachute jump or drop (14 CFR Part 105). A jump zone (JZ) is the airspace directly associated with a drop zone. Vertical and horizontal limits for a JZ are locally defined by the FAA. Figure 26 is a representation of a typical JZ.

The parachuting industry simply uses the term drop zone (DZ) in describing an operating area. The terms jump zone and landing zone are used as well. LZ tends to be used when there is more than one landing area used at an airport, such as for use by different skydiver skill categories.

The *Skydiver's Information Manual* is a general guidance document used in the development and identification of DZs (USPA 2013). Federal regulation 14 CFR Part 105, AC 105-2E, and the USPA Basic Safety Requirements (BSR) are the primary guidance documents to be used in the design and development of DZs. Part 105 covers who is authorized to conduct parachute operations, where parachute operations may or may not occur, the aircraft operating parameters for communication and conducting operations, the training of personnel engaged in conducting parachute operations, and the packing and use of parachutes and related equipment.

Part 105 prescribes rules governing parachute operations conducted in the United States (14 CFR 105). Part 105.23 requires approval from airport management prior to skydiving onto any airport. Federally obligated airports are required to accommodate parachute operations to the extent possible unless determined otherwise by FAA (see chapter two). Section 105.23(c) allows a parachutist to drift over an airport with an open parachute without airport management approval, as long as the parachutist remains at least 2,000 ft above that airport's traffic pattern and the skydiver is not landing at the airport. The exemption applies when the DZ is located other than on the airport being overflown. Specifically, Section 105.21 states (14 CFR 105):

> No person may conduct a parachute operation, and no pilot in command of an aircraft may allow a parachute operation to be conducted from that aircraft, over or onto any airport unless—
>
> (a) For airports with an operating control tower:
> (1) Prior approval has been obtained from the management of the airport to conduct parachute operations over or on that airport.
> (2) Approval has been obtained from the control tower to conduct parachute operations over or onto that airport.

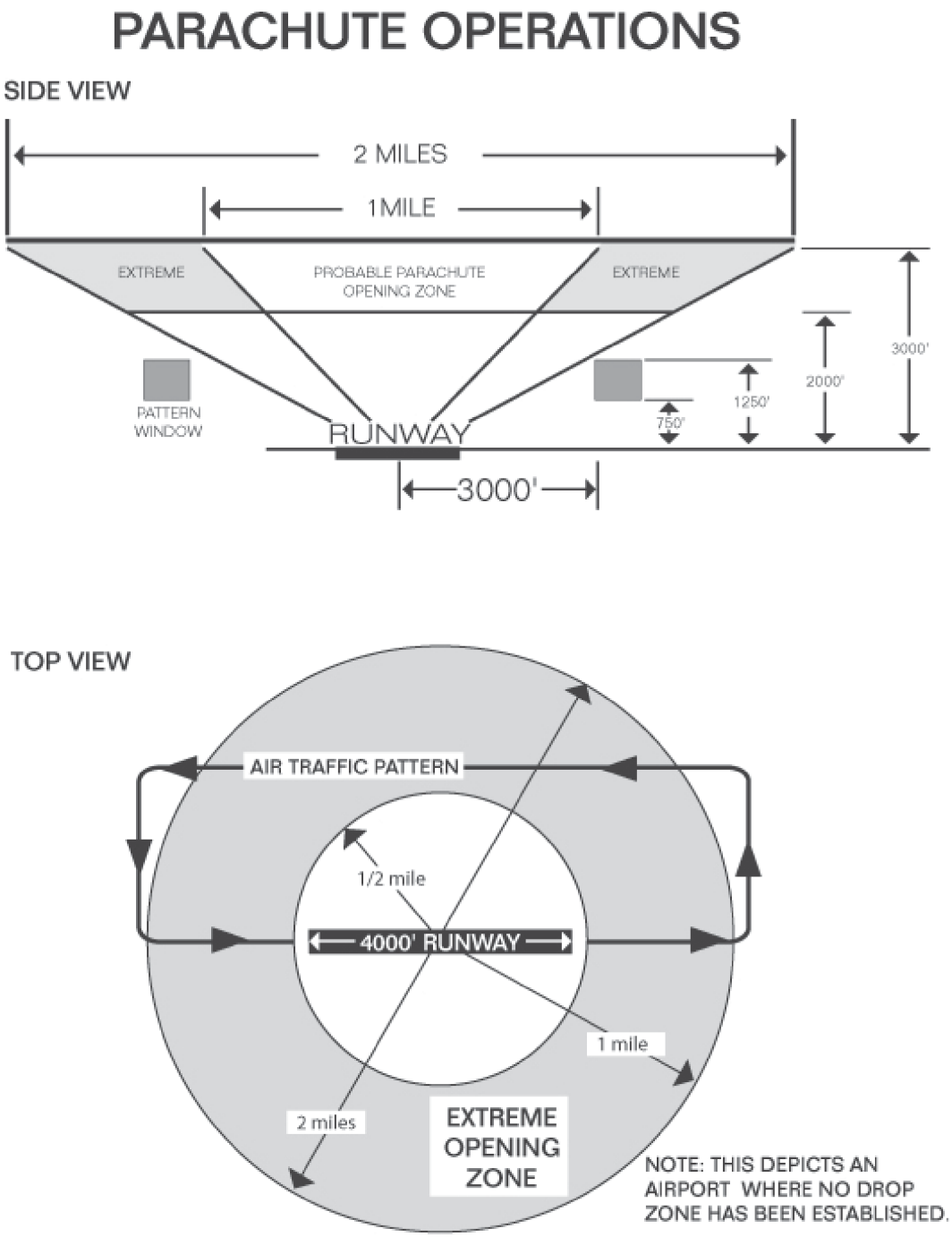

FIGURE 26 Depiction of a parachute jump zone (*Source*: FAA 1993.).

(3) Two-way radio communications are maintained between the pilot of the aircraft involved in the parachute operation and the control tower of the airport over or onto which the parachute operation is being conducted.

(b) For airports without an operating control tower, prior approval has been obtained from the management of the airport to conduct parachute operations over or on that airport.

(c) A parachutist may drift over that airport with a fully deployed and properly functioning parachute if the parachutist is at least 2,000 ft above that airport's traffic pattern, and avoids creating a hazard to air traffic or to persons and property on the ground.

The USPA's BSRs are considered best practices for skydiving operators and participants, as they are established by evaluating incidents and identifying their root causes. The full 247-page document is available at http://www.uspa.org/Portals/0/Downloads/Man_SIM_2014.pdf. The FAA does not

FIGURE 27 Skydivers landing on an airport parachute landing area (*Credit*: C. West, Skydive Spaceland, Rosharon, Texas. Used with permission.).

officially sanction the BSR safety standards, but does recognize them as acceptable measures to be used on an airport. As a result, sport parachuting is largely a self-governed sport, with the USPA providing guidance through the BSRs. The BSRs serve as the foundation for safe operations. Most sport parachute operators belong to the USPA, and skydiving activity is largely conducted under USPA auspices. The FAA FSDO issues waivers and provides safety surveillance of sport parachuting as a commercial operation. Figure 27 shows skydivers collectively landing on an airport PDZ.

The DZ requirements described in the USPA's *Skydiver's Information Manual 2014–2015* (2013) include the following information on the size and location criteria for PLAs on airports:

1. Areas used for skydiving should be unobstructed, with the following minimum radial distances to the nearest hazard: 1.1. Solo students and A-license holders—100 meters (320 ft) 1.2. B- and C-license holders—50 meters (160 ft) 1.3. D-license holders—Unlimited.
2. Hazards include telephone and power lines, towers, buildings, open bodies of water, highways, automobiles, and clusters of trees covering more than 3,000 square meters.
3. Staffed ground-to-air communications (e.g., radios, panels, smoke, and lights) are to be present on the drop zone during skydiving operations.

AC 105-2E provides suggestions for improving sport parachuting safety and on-airport parachuting operations, and assists parties associated with sport parachuting in complying with 14 CFR Part 105 (FAA 2013b). The following excerpt from the AC applies to DZs at airports:

> Parachute Landing Areas. The FAA recommends that areas used as parachute landing areas remain unobstructed, with sufficient minimum radial distances to the nearest hazard. The guidelines in the USPA's BSRs can be used in determining if the landing area is adequate.
>
> Parachute Landings on Airports. Airports may designate suitable parachute landing areas. While skydivers attempt to land in such areas, at times there may be inadvertent landings in other grass or hard-surfaced areas. This could include landings on runways, taxiways, and other hard-surfaced areas. Areas such as runways, taxiways, clearways, and Obstacle Free Zones (OFZ) are not prohibited areas but should not be designated as a primary landing area and should be vacated as soon as practical. Flying a parachute over runways at low altitudes should be avoided where possible. The FAA recommends that airport management work with parachute operators to develop standard operating procedures (SOP) for activities conducted by parachutists. Airports that receive or have received Federal funding or grant assurances may have additional requirements or restrictions to parachute landing areas.

Skydivers generally deploy a parachute in the range of 3,000 to 5,000 ft AGL. Minimum opening altitude is normally 2,000 ft AGL. Skydivers follow a traffic pattern similar to aircraft except that their rate of descent requires the pattern to be very close to the landing area. There may be different landing zones established that correlate to the skill and certification category of the parachutist. Appendix P presents a graphic used for training skydivers and informing other airport users of the parachute landing area at Skydive Spaceland in Texas.

The application of the see-and-avoid principle generally makes it easy to see a skydiver when under an open parachute (*aka* under canopy). A skydiver also has a better opportunity to see, hear, and avoid aircraft when under canopy. Prior to opening one's chute, a skydiver experiences greater

difficulty and risk for a collision, as the skydiver is traveling at a higher speed, is a smaller visual target for aircraft pilots, and has limited maneuverability.

Section 4 of Order JO 7210.3Y provides information on factors that an ATC facility may consider for a *Letter of Agreement* (LOA) with skydiving operators (FAA 2014e). Similar factors may be considered for an operating agreement between airport management and the skydiving operator:

1. A description and the location of the jump zone(s) and the conditions of use;
2. Activity schedules;
3. The maximum jump altitudes, common jump altitudes, and common parachute opening altitudes (all altitudes to be expressed in feet above mean seal level);
4. The communication frequencies to be used by the jump aircraft;
5. Jump aircraft call signs;
6. Jump aircraft climb and descent areas;
7. Notification procedures;
8. Assigned transponder code when appropriate;
9. Any other items pertinent to the needs of the ATC system, the airport, and the users.

AIRFIELD ACCOMMODATION

The FAA does not formally approve or disapprove DZ siting or dimensional standards at airports, unless depicted on an approved airport layout plan. Under Sponsor Assurance Number 29, the airport operator agrees to keep an ALP up to date at all times, showing the location of all existing and proposed aviation and non-aviation facilities and structures.

Skydiving companies or operators can have different facility needs. Minimum standards established by an airport operator are intended to address the different needs. As with any commercial operation, an area that allows for meeting customers and provides restrooms, classrooms, and parking is common. Skydivers also need an area for the laying out, packing, and rigging of parachutes in a protective environment, along with having storage or parking for equipment or aircraft.

A small commercial operator with one aircraft will have less space or operating requirements than a larger skydiving outfit. The social nature and culture of a larger skydiving activity with frequent events can result in greater airport operational needs and use for extended periods of time. It is not uncommon for skydivers to camp out or reside for a weekend or full week. Figure 28 shows a facility layout with an array of recreational vehicles and campsites staged at the Chicagoland Skydiving Center in Rochelle, Illinois. It is not uncommon for a large skydiving operator to provide Internet access, retail sales, food and beverage outlet, laundry and shower facilities, water swoop pond, bonfire pit, volleyball or other recreational areas, and spectator viewing access and parking. For high activity events, provisions for emergency personnel or first responder support are often arranged.

FIGURE 28 Facility needs for a high activity commercial skydiving operation (*Credit*: Matthew Veno, FlyingChipmunk.com. Used with permission.).

During this study's review of current practices, the literature search and interviews found skydiving operators and airport operators expressing a need for more education about skydiving operations and its compatibility with traditional aeronautical uses. Some airports hold monthly meetings to facilitate a forum where all airport users can discuss safety issues and promote awareness. Textbox 11 provides a compilation of current practices, as found in the literature search and from interviews.

TEXTBOX 11
Practices for Enhancing the Safety of Skydiving

- Pilots of jump aircraft follow traffic pattern procedures found in AC 90-66A and the AIM.
- Pilots of jump aircraft follow communication procedures found in Part 91, Part 105, AC 90-42, and the AIM.
- Pilots of jump aircraft are required to inform ATC or FSS prior to operation.
- A NOTAM is issued and is activated for each skydiving operation.
- Pilots inform ATC of impending jump 5 min in advance.
- Pilots make an announcement on CTAF 1 min prior to jump.
- Pilots make an announcement on CTAF continually during skydiver descent.
- ATC alerts the jump pilot of known aircraft in the vicinity of the jump.
- Pilots monitor local frequencies for other aircraft operation.
- PDZs are established away from the protected surfaces of the runways and taxiways.
- Parachutists land only in the designated DZ.
- DZ are clearly marked on an airport diagram, posted, and used in training.
- An aerial photograph of the landing area is provided to parachutists to reference.
- Have overshoot/undershoot areas border at least three sides of a DZ.
- Information on DZs, activity levels, and operating procedures are disseminated to other airports.
- Parachute jump aircraft operations are published in the AFD.
- A parachute symbol is placed on air navigation sectional charts.
- Flotation gear is worn by the parachutist if the jump area is within 1 mi of an open body of water.
- Emergency procedures are posted in the PDZ area.
- Cars, vans, four-wheelers, golf carts, or similar vehicles are used to retrieve jumpers, either from the PDZ, outside the PDZ, or from off-airport landings.
- Monthly safety meetings are held for all airport users to discuss safety issues and promote awareness.
- LOAs or operating agreements describe the PDZ, define preferred runway use, and detail any specific procedures for the parachute jumping activities (i.e., runway crossing procedures for skydivers).
- Have procedures and an operating agreement that address situations of a parachutist needing to cross a runway or taxiway (e.g., the parachutist is to remain at his or her location and wait for an airport escort; signs or designated crossing points established).
- The LZ is made visible from the air by the use of markings (panels, smoke, lights, traffic-style cones, mowed grass height or lower than the grass outside the LZ, landscaping, streamers, flags, or lines in white or orange chalk, paint, or engineering tape).
- Locate the PDZ where good visibility is present for other aircraft on takeoff and landing.
- Limit or restrict the use of round main or reserve canopies, as they are less maneuverable than ram air chutes.
- Use radios for ground-to-air communications of skydivers and aircraft.
- Require parachutists to use an Automatic Activation Device for every jump.
- LZs established on airports are usually a grass or dirt area. An accuracy landing point within the LZ will normally have sand, pea gravel, or a lower cut grass than the surrounding area. Some LZs will have water ponds constructed for skimming.
- Install a supplemental windsock near the LZ.
- Have at least two LZs in case the parachutist cannot land at his or her first LZ choice.
- Have different LZs designated for different skydiver experience levels.
- At land-constrained or high-activity airports, require each jumper to have a minimum experience level before jumping onto the airport (e.g., have at least an A license from the USPA).
- Have the airport named as insured on skydiver insurance policy.
- Have each waiver signed by a skydiver also include airport release from liability.

NOTICES TO AIRMEN

When skydiving activities are conducted, the FAA requires a NOTAM to be in effect. The NOTAM describes the location, altitudes, and time or duration of jumping operations. The NOTAM can be of long (12 months), short, or one-time duration. Who is authorized to open and to close skydiving NOTAMs can be the person to whom the COA or waiver was issued, the airport manager, the ATC controlling agency, or the FSS. As required in 105.13, the skydive operator needs to inform ATC of a pending jump by radio communication 5 min before a skydiver exit. Some airports or ATC facilities require additional radio communication calls as part of their lease or operating agreement with a skydiving operator.

AIRPORT/FACILITY DIRECTORY

The AFD is an FAA publication that lists the airport master record data (Form 5010) on file with the FAA for all open-to-the-public airports, seaplane bases, heliports, and military facilities and selected private use airports important to the U.S. transportation system.

The AFD has a section titled *Parachute Jumping Areas.* For a parachute jumping area (PJA) to qualify for inclusion in the AFD and to be depicted on the air navigation sectional chart, the jump area has to meet the following criteria: (1) be in operation for at least 1 year, and (2) conduct and log 1,000 or more jumps each year. FAA Regional Offices can nominate a PJA for charting if they do not meet the criteria. If a PJA has been established for a long period of time or meets volume thresholds, the information is published in the AFD and a parachute symbol is placed on aeronautical charts. Figure 29 provides an example of a parachute and glider symbol on a VFR sectional map, representing skydiving and glider activity at an airport. It also indicates that a right-hand traffic pattern exists for Runways 19 and 23. Appendix G provides a sample of AFD remarks on skydiving activity.

The *Airport Remarks* section of the AFD airport listing can state whether an airport has parachute or other types of aeronautical activity. Some listings may describe where the LZ is located on the airport, but this study found that very few appear to have the LZ location indicated on an airport diagram. Air navigation sectional charts can provide a graphic parachute symbol to alert pilots to the presence of parachuting activity in the area (Figure 30). Through the literature review and interviews, it was discovered that a number of skydiving sites were no longer active and some active ones were not shown. In a telephone discussion on July 29, 2015, Randy Ottinger of the USPA indicated the organization was working with the FAA Aeronautical Information Management Office to update the listings. Figure 30 shows an LZ with a circular target area between the runway and the tie-down areas of an airport. Also shown are helicopter landing pads near a fueling facility.

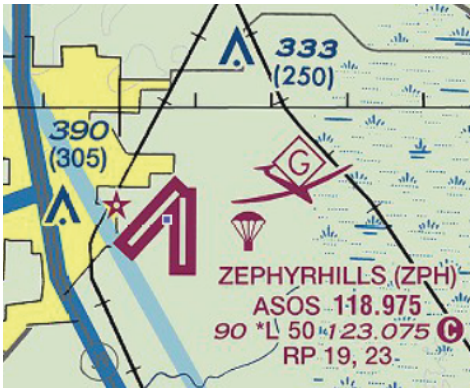

FIGURE 29 Parachute symbol on a VFR sectional map representing skydiving and glider activity (*Source*: FAA 2015a.).

FIGURE 30 Parachute landing area and helicopter pads at the Snohomish, Washington, airport (*Source*: Imagery © 2015 DigitalGlobe, U.S. Geological Survey; map data © 2015 Google.).

SAFETY CONSIDERATIONS

The literature search showed that when locating a DZ on an airport, a safety analysis can assess the presence of the following hazards:

- Tall towers and buildings;
- Trees above height (35 ft) of the canopy extension;
- Large forested or swamp areas;
- Clusters of trees covering more than 3,000 m^2 (9,840 ft);
- Close-in obstacles such as goalposts, lamp standards, fences, rocks, ditches;
- Well-traveled roadways;
- Telephone, power, and other transmission lines;
- Bodies of water greater than 4 ft deep;
- Paved surfaces (ramps/aprons, runways, taxiways);
- Aircraft tie-down areas;
- Equipment necessary for aircraft operations or navigation (NAVAIDs, airfield lighting, signage);
- Skydivers walking across runways or taxiways; and
- Fire hazard, spillage, and spinning aircraft propellers when engaged in rapid (hot) refueling.

When the FAA conducts a site assessment for skydiving activity and safety, their report to the airport often identifies the following common requirements as conditions for safe operation:

- Weather conditions must be VFR and present no hazard for the jumpers or present visibility conditions which would preclude pilots from maintaining visual contact with jump participants.
- A NOTAM must be established to advise all users of the airport of the parachute jump activities.
- Radio contact between the jump aircraft and the appropriate air traffic facility must be established and maintained throughout the jump activity.
- The jump aircraft pilot will communicate with the appropriate air traffic facility and visually scan the area to ensure aircraft are not entering or maneuvering within the traffic pattern prior to authorizing jumpers to depart the aircraft.
- Radio transmissions will be conducted by the jump aircraft on the airport advisory frequency to alert anyone in the area that jump activities are in progress.
- Jumpers will be briefed to maintain directional control at all times and remain clear of the runway and stay within the designated drop zone area.
- Airport management will ensure the AFD and the associated sectional charts are updated to reflect a designated PDZ has been established at the airport.
- Airport management will ensure any advisory information is updated to advise all who utilize the airport that a DZ has been established and its location on the airport.
- Airport management will advise all aircraft operators based at the airport of the establishment and location of a DZ at the airport.

ACCIDENTS AND INCIDENTS

The USPA posts accident statistics on its website. The USPA estimates there were 3.2 million skydives in the United States in 2014. During that year, 24 fatal skydiving accidents were recorded, resulting in a rate of 0.0075 fatalities per 1,000 jumps. Also recorded were 729 skydiving injuries for a rate of 2.3 injuries per 10,000 skydives. A skydiver collision with an aircraft was very rare, though one did occur in 2007.

As part of a site assessment for a DZ, the Venice Municipal Airport in Florida queried the FAA Aviation Safety Reporting System about relevant incidents from 1998 to 2015 (C. Rozansky, personal communication, September 14, 2015). Using the keywords "skydiving" and "parachute," they located 423 records over the 17-year period. More than 56% of the submitted reports described a perceived conflict between a jumper and aircraft in the vicinity of an airport. Approximately 27% of the reports described a perceived conflict between skydiving aircraft and other aircraft operating in the vicinity of an airport. For actual risk comparison, the number of reports could be compared with the total number of operations made for the same time period. It is unknown how many skydiving jumps or aircraft flights were made during the 17-year period. An example of a safety assessment for skydiving operations from the Venice Municipal Airport is presented in chapter fifteen. Appendix E contains sample rules and regulations.

RELATED INFORMATION

Because of disagreements in the past as to whether a skydiving operation was safe or efficient, some airport operators have sought to prevent or discourage the activity on their airport. The disagreements and the actions taken to restrict skydiving activity have resulted in Part 13 and Part 16 complaints to the FAA. As a result, the FAA often seeks to address the conflicts by conducting a study and by providing standards guidance.

In 2010, the FAA Airport Safety Technology Research and Development Section undertook a study to identify then-current practices for PLA designations at airports; to evaluate whether parachute experience and maneuverability of equipment was a factor in determining the size and location for PLAs; to provide recommendations for the minimum distances required from hazards of PLAs on airports; and to provide recommendations for the minimum size of PLAs on airports (Vitagliano et al. 2012). AC 105-2E has since been updated to incorporate the findings from the study (FAA 2013b). The findings and recommendations were:

- Few airports had the DZ location indicated on an airport diagram.
- A correlation was found between a skydiver's experience and the size of the DZ. More experienced skydivers do not require as large a DZ as less experienced skydivers do.
- The type of parachute used is a factor in determining the size of the DZ.
- The development of an LOA outlining DZ procedures is suggested between airport management and the skydiving operators.
- Revisions are suggested to the AFD and sectional charts, such as graphic depiction of zones on maps and better descriptions of level of activity.
- Provide standard markings on the ground to identify the perimeter of LZs. Examples of markings could be mowing, landscaping, streamers, flags, traffic-style cones, or lines in white or orange chalk, paint, or engineering tape.
- Better education and training of the existence of DZs was suggested.

Skydiving operators generally operate under a business model that generates revenue and customer satisfaction by delivering skydivers to an assigned altitude in the shortest amount of time and with the least amount of expense. Similar to aerial agricultural applicators, time becomes money. The operation of an aircraft, to include fuel and pilot services, generally constitutes the largest expenses in a skydiving business.

Practices that skydiving operators may use in an attempt to minimize expenses and enhance customer satisfaction are:

- Use different types of aircraft to satisfy demand and expected altitude performance needs.
- Locate loading areas that result in shortening the taxi route for takeoff or landing.
- Locate PDZs that result in shortening the distance to the assembly or loading area.
- Use aircraft takeoffs, landings, climbs, and descents that minimize the fuel burn and/or time aloft, by using takeoffs and landings in the same direction.
- Allow rapid or hot refueling (refuel with engines running) of turbine aircraft operations.

Issues and concerns can arise within the local community about the safety of skydiving operations, or result in airport operational conflicts with other users. Comments made to a proposed *Change 19* NPRM for AC 150/5300-13, *Airport Design* (FAA 2012c), reflected a number of airport managers' concerns toward skydiving activities. Those concerns generally focused on operational liability, insurance, feasibility, and security issues. The following list identifies concerns raised by airport management about skydiving activity, as culled from the literature:

- Access to the AOA;
- Skydivers crossing active aircraft movement areas;
- Vehicle parking and gate access using codes, keys, etc.;
- Ability to comply with regulations for access to the flight line or aircraft loading areas;
- Use of building or toilet facilities;
- How to handle spectators/observers;
- Perceived increased liability insurance costs;
- Scaring away other aeronautical users;
- Weather;
- Noise generation;
- Who issues and cancels NOTAMs;
- Inability to control skydiving operations adequately;
- No control tower; and
- Aircraft landing and taking off contrary to established traffic pattern operations.

This list presents concerns a community often raises about the same operations.

- Increased noise;
- Improper behavior (swearing, nudity, partying);
- Off-airport landings and diminished safety (crash into house, school, playground);
- Concerns about public safety;
- Possible loss of life;
- Limited availability of emergency response personnel;
- Potential of disturbing or damaging environmental, cultural, and historic areas;
- Potential drift off course by a skydiver;
- Trespassing onto private property; and
- Lowering property values.

As a result of the concerns noted in these two lists, several Part 13 and Part 16 complaints have been filed and resolved over allowing skydiving activity at an airport. Results and determinations from three such cases are:

1. Longmont, CO (Citizens for Quiet Skies 2015)
   - A local government or airport operator cannot prohibit an aircraft that is otherwise in compliance with FAA regulations from flying in order to decrease noise levels, as local government and airport operators, pursuant to federal regulations, have no authority to impose such restrictions on aircraft operations.
   - The parachute operator owes a duty to the community at large to not operate in a careless or reckless manner.
   - Limiting the number of skydiving flights per day at a low activity airport was previously deemed an unreasonable restriction by the FAA. However, based on their activity and arguments, a limitation of 50,000 operations per year was allowed at Longmont Municipal Airport, Colorado.

2. State of Hawaii (Docket No. 16-12-04b 2014)
   - Skydiving operations can be safely conducted with proper coordination and communication.
   - A multi-year delay in instituting rules and regulations prevented the skydiving operator from obtaining equal access to a federally obligated airport in violation of Sponsor Assurance 22.
   - Federally obligated airport sponsors may not abdicate their responsibility to maintain current compliance with federal obligations while waiting for proposed or future federal statutes, regulations, or guidance.
   - Federally obligated airports may not arbitrarily prohibit commercial skydiving operations because they are a certificated airport, or are seeking to achieve Part 139 certification at a later date.
   - The presence of skydiving operations on a federally obligated airport would not necessarily jeopardize the airport's application for Part 139 certification.
   - Aeronautical access to a federally obligated airport may not be conditioned on the aeronautical user's voluntary membership (or lack thereof) in an advocacy group such as the USPA.
   - Good faith effort was not made in seeking to accommodate or resolve the issue.
3. Santa Clara County, California (Docket 16-11-06 2013c)
   - County's liability concerns did not justify banning skydiving operations.
   - Safety studies demonstrated skydiving operations may safely coexist with VFR/IFR traffic in the airspace above the airport.
   - General liability concerns may not be used to prohibit a legitimate aeronautical activity on the airport, especially where specific safety measures have been identified which would allow the activity to take place with an acceptable level of safety on the airport.

Other lessons can be found from similar complaints filed with the FAA. Information can be found at http://part16.airports.faa.gov.

PARASAILS

Parasail operations are similar to skydiving operations only in that they use similar equipment and canopies to create lift and support an individual. Because parasails are tethered to and towed by a vehicle or boat on the ground, they are subject to FAA regulations applicable to kites under 14 CFR Part 101. FAA currently regulates kites only to the extent that they are objects that can penetrate the airspace controlled by FAA.

CHAPTER THIRTEEN

ULTRALIGHTS

An ultralight vehicle is a special type of vehicle allowed to operate in the air by FAA under its own regulatory statute, Part 103, which was promulgated in 1982 (14 CFR 103). FAA chose to not regulate ultralights in the same way it regulates certificated aircraft. For this reason, ultralights are not considered an aircraft under the FAA regulatory provisions and therefore are not issued any form of an FAA airworthiness certificate. Instead, they are referred to as vehicles. Certain operating restrictions are placed on the ultralight vehicle and its pilot under 14 CFR Part 103. Despite not being considered an aircraft, ultralight operation is an aeronautical activity and therefore is permitted at airports that have federal obligations, or that are subject to sponsor assurances.

An ultralight vehicle can be unpowered (balloon, glider, hang glider, weight-shift trike, or paraglider) or powered (airships, powered parachutes, helicopters, gyrocopters or rotorcraft, airplane, or anything with means of horizontal propulsion), provided they meet the following requirements:

- Has single occupancy.
- Used for sport or recreational purposes only.
- Has no airworthiness certificate.
- If unpowered (i.e., balloons, gliders, WSCs and hang gliders), it weighs less than 155 lbs.
- If powered, an ultralight has
  - an empty weight less than 254 lbs
  - a fuel capacity no greater than 5 gallons
  - full power airspeed no greater than 55 knots (64 mph)
  - power-off stall speed less than 24 knots (28 mph).

The term “ultralight” is used in the United States for vehicles that are single seat and do not require a pilot certificate. A term commonly used in Europe is “microlight.” Microlight is a classification within the Fédération Aéronautique Internationale, which establishes regulations for air sporting events worldwide. The fédération classification includes aircraft that are heavier than U.S. ultralights, can have two seats, or can require a pilot certificate. In the United States, a vehicle with any of those conditions would fall under the LSA classification, unless an exemption is granted by the FAA. The FAA has issued exemptions of the single seat rule to qualifying organizations involved in training. Exempted ultralights can be used only for instructional purposes.

Ultralights are not required to meet the same performance and manufacturing standards required of certificated aircraft, which are issued airworthiness certificates. Because ultralights are not certificated as aircraft, the vehicles do not need to meet any maintenance requirement. A certificated aircraft can only be flown by a licensed pilot, whereas an ultralight pilot is not required to be licensed. Nor are pilots of ultralight vehicles required to meet any aeronautical knowledge, age, or experience requirements prior to operating the vehicle. This understanding is important for security and law enforcement officials asking an ultralight pilot to show a pilot license or an airworthiness certificate for the vehicle. The pilot is not required to have either.

SELF-REGULATION

Despite not being considered an aircraft, ultralight operation is an aeronautical activity by definition. Therefore, it is permitted at airports that have federal obligations, or at those subject to sponsor assurances. Ultralights can be restricted or prohibited at airports if the FAA agrees with an airport or ATC safety assessment. Chapter two provides a discussion on safety assessments. Appendix F provides one airport’s rules and regulations.

Part 103 does prohibit the operation of an ultralight over congested areas. However, the term "congested area" has not been defined by the FAA or the NTSB. Instead, it is determined on a case-by-case basis in which a number of different factors are evaluated (R.B. MacPherson, personal communication to L. Simmons, March 8, 2010).

The operators of ultralight vehicles are responsible for assessing the risks involved and assuring their personal safety. Part 103 assumes that an individual who elects to fly an ultralight vehicle has assessed the dangers involved and assumes personal responsibility for his or her safety. Part 103 rules are intended to assure the safety of those not involved in the sport, such as persons and property on the ground and other users of the airspace.

Safety of aircraft operations on the airport is always a prime consideration for any airport operator. Therefore, the airport owner or manager has a responsibility for determining the compatibility of operating the various classes of aircraft on the airport. If an ultralight pilot seeks to operate from an airport, the airport owner has the authority to manage safety through appropriate measures and can grant or deny permission to operate. If the airport is obligated to meet grant or planning assurances, then "reasonable accommodations" becomes the operative term. Unless the airport sponsor can demonstrate a negative impact to overall safety and airspace efficiency at the airport, the reasonable accommodation provision of the sponsor assurances would warrant any aeronautical activity to be allowed. It is expected that off-airport operations would require the permission of the landowner. In that regard, local zoning or state regulations may apply.

FAA has the legal authority to inspect any ultralight, whether it is operated as an aircraft under Part 91 or as an ultralight vehicle under Part 103. A fatal accident involving an ultralight falls under the purview of the NTSB and can be investigated by the board. The NTSB can also choose to delegate investigations of accidents or incidents to the FAA.

LIGHT SPORT AIRCRAFT

If a pilot seeks to carry a second person or conduct commercial training in an ultralight, he or she cannot do so under the ultralight rules. They must upgrade to the LSA category, or obtain an exemption to Part 103 from FAA. The LSA category of aircraft was created in 2004 to help meet an aviation need for a simple, low-cost option to full aircraft and pilot certification. The LSA category bridges the gap between the limitations of an ultralight and the full certification of larger aircraft. The FAA's intent behind establishing the LSA category was to provide for safety with a minimum amount of regulation. The LSA category does place limitations on weight, power, pilot certification, and maintenance, but allows a more affordable option for people to enter into and enjoy the realm of flight. Operators of LSA aircraft are to have a sport, recreational, private, or other license. LSAs are to be used for sport, recreation, flight training, and aircraft rental only.

No LSA or aircraft having an airworthiness certificate can operate under Part 103. LSA are registered as aircraft with the FAA and receive an FAA registration N-number. The LSA category of aircraft can include airplanes (land or sea), gyroplanes, rotorcraft, airships, balloons, weight-shift control vehicles (land or sea), gliders, and powered parachutes.

AIRSPACE ACCOMMODATION

Separation is a key component to integrating ultralight activity safely into the airport environment. To the extent possible, separating ultralights from other aeronautical activity can enhance overall safety of airport operations. FAA's interest and responsibility toward ultralights is to ensure the safety of other airspace users and persons and property on the ground. At uncontrolled airports, it is the ultralight operator's responsibility for "see-and-avoid" and right-of-way procedures. Airport operators can enhance the safety of operations by establishing policies, standards, and rules and regulations, and by separating to the extent possible ultralight activities from other aeronautical activities. A culture of safety awareness can arise from enforcement of the same policies and rules.

Although ultralight vehicle operators are not required to demonstrate any aeronautical knowledge or experience, failure to recognize and avoid certain airspace can be hazardous. It can also place the operator in violation of FAA regulations. Part 103 states that no person may operate an ultralight vehicle within an airport traffic area, control zone, terminal control area, or positive control area unless that person has prior authorization from the air traffic control facility having jurisdiction over the airspace (14 CFR 103, 103.17). Guidance on operating in controlled airspace can be found in AC 103-6, *Ultralight Vehicle Operations—Airports, Air Traffic Control, and Weather* (FAA 1983a). Operations outside of ATC airspace or at uncontrolled airports do not require a pilot to have a radio. Aircraft without radios or those they fail to operate are routinely referred to as NORDO (NO RaDio Operation).

The design and weight limitations of an ultralight do not lend the vehicles to having radios routinely installed, although ultralight pilots can and often do carry handheld radios to communicate with ATC, other traffic, or with each other. At uncontrolled airports, there is no requirement for a pilot to have a radio, though good practice suggests doing so. For operations at uncontrolled airports, AC 90-42F provides guidance (Advisory Circular 90-42F 1990a).

In this study, few ultralights were noted to have been based or to operate from tower-controlled airports. Permission to operate in ATC airspace requires any pilot to obtain and coordinate authorization beforehand. Generally, this is accomplished through a radio while in the air, but authorization can also be accomplished through telephone, personal visit, or similar communication. According to AC 103-6, controllers can authorize ultralight operations provided they will not interfere with, and can be kept relatively clear of, normal aircraft operations. An ATC controller has discretionary authority to disallow an activity if safety and airspace efficiency is a concern. This authority refers to ATC's responsibility to operate an efficient airspace system, a condition that allows controllers to deny or restrict certain classes or kinds of aeronautical activities.

A common practice for ultralight operators without a radio is to call and communicate with an air traffic facility prior to operating within its jurisdiction. Usually, light gun signals will be arranged, or altitude and directional information will be provided. Even while in communication with an air traffic facility, ultralight pilots will only receive advisory notices, rather than receive ATC separation services. Those services are typically available to only regular aircraft. When communicating with ATC, it is common practice for an ultralight pilot to state the word "ultralight" when communicating its type identification. At uncontrolled airports, the responsibility for separation of aircraft falls under the concept of see-and-avoid and right-of-way procedures. It is solely the ultralight pilot's responsibility to avoid a conflict with aircraft and other ultralights.

Ultralight vehicles are to yield the right of way to aircraft, per Part 103. By their nature, ultralights fly at low altitudes and at slower speeds than other aircraft. For these reasons, establishing a separate takeoff and landing area or a different traffic pattern helps improve safety of operation. If operating from turf, a graded area free of holes, muddy spots, rocks, dips in the terrain, high grass, and other objects prevents problems during takeoff and landing. Appendix Q is a traffic pattern diagram from the Pikes Peak Paragliding Club and the Meadow Lake Airport Association in Colorado Springs, Colorado. Individuals operating a powered paraglider at Meadow Lake are required to read the procedures, receive a briefing from a club member, and sign a letter acknowledging both actions and agreeing to follow these procedures

Because of their weight and power constraints, all ultralights and LSA are affected by their ability to operate in strong winds. For this reason, the alignment of a runway or the presence of obstacles close to a landing or takeoff area can pose a safety risk. Generally, winds need to remain under 10 mph for many ultralights. Winds of 15 mph are generally considered unsafe.

Other concerns related to ultralights are:

- Because of possible lower operating altitudes, noise intensity can be higher from powered ultralights.
- Lower altitudes can create a perception in the general populace of ultralights not being safe.
- Both ultralights and LSA fly significantly slower than normal category airplanes.
- Ultralights can exhibit very steep takeoff and approach angles.

FIGURE 31 WSC hang glider positioned on a dolly for takeoff (*Credit*: A. Elchin, Highland Aerosports, Ridgely, Maryland. Used with permission.).

- Within a traffic pattern, turns in an ultralight turns will generally be made sooner and closer to the runway than with a normal aircraft, so as to clear the area expediently.
- Takeoff and landing distances will be considerably shorter than normal category aircraft.

HANG GLIDING

The United States Hang Gliding & Paragliding Association has developed a number of recommended procedures for their sport to help ensure safety. The guidelines call for handouts, postings, or site familiarizations that include information on launch and landing location and elevation, names of access roads, radio frequency for local emergency crew contact, site protocols, required or recommended skill ratings, safety equipment, maps including street names and addresses, and specific directions to launches and landing fields.

At an airport, hang gliders are normally towed into the air by a powered aircraft. To do so, an ultralight pilot rides a dolly that is towed by an aircraft, as shown in Figure 31. Figure 32 shows a powered ultralight vehicle towing an unpowered WSC hang glider positioned on a dolly. Safe practice suggests a released dolly be retrieved from the operating area so to not constitute a hazard to others.

Hang gliding pilots will often be equipped with a ham-type radio or a cell phone. The hang gliding and paragliding association has several licensed business band frequencies. The band 151.625 is for emergency purposes, as is 146.520, which is the national simplex frequency used by any licensed ham radio operator. The frequencies do not interfere with any radio repeater in the country.

FIGURE 32 Powered ultralight towing an unpowered WSC hang glider set on a dolly (*Credit*: A. Elchin, Highland Aerosports, Ridgely, Maryland. Used with permission.).

FIGURE 33 Powered trike paraglider (*Source*: https://en.wikipedia.org/wiki/Powered_parachute. Public domain.).

POWERED PARACHUTES AND GLIDERS

There are two types of powered parachutes (also known as parafoils or paragliders). There are Paraplane™ and foot- or dolly-launched versions of it. A Paraplane has a tricycle landing gear with a seat and engine/propeller suspended below a high-performance rectangular parachute (Figure 33). Substitute a rotor for the parachute and you have a gyroplane. The Paraplane normally takes off and lands on a designated clear or runway area.

The foot- or dolly-launched clone versions of the Paraplane also have a small engine with a propeller mounted inside a wire cage. However, the engine is strapped to the back of the pilot and is often called a paramotor. The pilot starts running to inflate the parachute, or a vehicle-pulled dolly is used. A seat or harness supports the pilot once airborne. Foot- or dolly-launched paramotors can take off wherever adequate space exists, not just at airports. They are often found soaring along foothill areas of mountains, similar to hang gliders. Using an unpowered parachute towed by a boat or vehicle is termed parasailing.

POWERED WEIGHT-SHIFT CONTROL (TRIKE)

A parawing is an aircraft that has rigid leading edges rather that the inflatable edge of a powered parachute or paraglider. A parawing trike is a powered ultralight based on a hang glider–type wing, but with a tricycle geared undercarriage incorporating the pilot seating and a pusher-type propeller and engine (Figure 34). "Trike" is the industry term for both ultralight vehicles and LSA WSC aircraft that

FIGURE 34 Powered parawing trike (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

have the body and landing gear feature. A WSC aircraft is a powered aircraft with a framed pivoting wing and a fuselage controllable in pitch and roll only by the pilot's ability to change the aircraft's center of gravity with respect to the wing (FAA 2008b). Flight control of the aircraft depends on the wing's ability to flexibly deform, rather than the use of control surfaces. WSC aircraft are single- and two-place trikes that can be either an ultralight vehicle or an LSA, depending upon its weight and the number of seats.

AIRFIELD ACCOMMODATION

The definition of an airport under 14 CFR Part 157 means any airport, heliport, helistop, vertiport, gliderport, seaplane base, ultralight flightpark, manned balloon launching facility, or other aircraft landing or takeoff area. Under federal and most state regulations, continued use of an area for ultralight operations would require the registration of the operating area or site.

There are no FAA standards for the geometric design of a runway intended to serve ultralight vehicles exclusively. Because the FAA does not identify an ultralight as an aircraft but rather a vehicle, ultralights can be operated on and off any suitable surface. The FAA does reference in AC 150/5300-13A, *Airport Design*, that turf standards can be applied to a flightpark or ultralight runway design (FAA 2012c). AC 150/5370-10G, *Standards for Specifying Construction of Airports*, provides guidance on the types and attributes of turfing (FAA 2014b).

An airport owner or manager can designate certain areas of an airport as suitable for any type of ultralight or normal aircraft category operation. AC 150/5300-13 provides guidance on drainage, compaction, gradient, approach clearances, and boundary marking for operating from a turf area. For an airport paved surface, the design AC suggests using the standards associated with small aircraft having approach speeds of more than 50 knots, and less than 50 knots, respectively.

Several airports in the AFD and Form 5010 review were found to have identified and designated turf landing areas adjacent to a runway or taxiway available for ultralights and gliders (see the chapter fifteen case example on Arlington Municipal Airport in Washington). Several other airports were found to expressly disallow turf operations. The FAA allows an airport operator to attach a "U" suffix to a runway designation to signify it is for ultralights only. The runway does not need to have designation markings. Only one airport was observed in all the AFDs descriptions to have a runway designated with a U for ultralight. Several had remarks that a runway was to be used for ultralights, but they did not have the U designation. See Appendix G for a list of AFD remarks regarding ultralight operations.

Ultralights are often stored off airport and are transported by trailer from home storage (Figure 35). An airport operator can establish reasonable policies and rules for access to the airport, including training requirements. However, they cannot deny an ultralight operator access unless FAA concurrence is provided. The exceptions are private airports or those airports not federally or state-obligated under the sponsor assurances. An airport operator who believes it is unsafe to accommodate ultralights can request an FAA safety assessment of the proposed operations. See chapter three for more information on safety assessment.

Similar to skydiving operators, ultralight operators have a passion for their sport. They often congregate on weekends to participate and socialize. Support facilities such as campsites, bunk houses, meeting rooms, toilet facilities, hangar assembly buildings, and parking are the norm. An airport operator needs to give consideration to operating rules and regulations, policies, and lease agreements that spell out what is allowable and what is not.

NOTICES TO AIRMEN

A NOTAM issued for hang gliding, powered parachute, or other ultralight activity will contain information on the radius area around an airport, upper and lower airspace limits, duration of activity, and other remarks as necessary. NOTAMs are issued for NPIAS airports. Ultralight activity often

FIGURE 35 WSC aircraft transported in a trailer (*Source*: FAA 2008a.).

occurs at airports that are private or not listed. For those airports, a NOTAM would require reference from either the nearest public-use airport or the closest VHF omnidirectional range navigational aid. Appendix G provides examples of ultralight remarks contained in the AFD. Examples of NOTAMs from JO 7930.2P are:

- HANG GLIDERS WITHIN AN AREA DEFINED AS 2NM RADIUS OF BRK205018 SFC-10000FT 1312141400-1312141830EST
- GLIDERS WITHIN AN AREA DEFINED AS 2NM RADIUS OF MTU2700050 (5NM E U69) SFC-10000FT 1312141400-1312141830EST

CHAPTER FOURTEEN

UNMANNED AIRCRAFT SYSTEMS

Unmanned aircraft systems (UAS) is the preferred collective term used to describe what formerly was known by other descriptors, such as drones, unmanned aerial vehicles, remotely piloted aircraft, or remotely piloted vehicles. In *Unmanned Aircraft Systems (UAS) Frequently Asked Questions*, the FAA defines UAS as unmanned aircraft and all of the associated support equipment, control station, data links, telemetry, communications and navigation equipment, and so forth necessary to operate the unmanned aircraft (FAA 2015d). An unmanned aircraft is an aircraft operated without the possibility of direct human intervention from within or on the aircraft (14 CFR 1). Regulations affecting UAS are still very much in a state of flux, and the breadth and depth of describing UAS operation is beyond the scope of this synthesis. However, an ACRP Report has been published for those seeking to better understand the industry (Neubauer et al. 2015a). Textbox 12 provides five key sources of information available to an airport operator to remain informed about the changing UAS scenario.

The North Carolina Division of Aviation is one of the first state organizations to develop criteria for the operation of UAS within its state. State statutes require a commercial and governmental operation in North Carolina to obtain a permit (www.ncdot.gov/aviation/UAS). Obtaining a permit requires an individual to pass a knowledge test on UAS operations. Other sections of the regulation govern the use drones for special imagery, hunting and fishing, weapons attachment, interference with manned flights, and launch and recovery sites.

The FAA distinguishes UASs by categorizing their type of operation and by describing requirements for both small and regular UASs. The different types of UAS operations can be categorized as public operations (governmental), civil operations (nongovernmental), and model aircraft (hobby or recreation use only). Information on model aircraft operation is described later in this chapter.

UASs can be in a variety of shapes and sizes, from the size of corporate jets to hand-launch RC vehicles. They can serve diverse purposes, such as aerial photography and motion picture filming, livestock and animal monitoring, agricultural and geological surveying, utility patrol and infrastructure inspection, search and rescue, and hobby, police and military uses, to name a few.

A small UAS (s-UAS) is an unmanned aircraft weighing less than 55 lbs on takeoff, including everything that is on board or otherwise attached to the aircraft (14 CFR 1). A published interim final rule affecting small s-UAS requires registration and marking of s-UASs weighing less than 55 lbs and more than 0.55 lbs (250 g) on takeoff, including everything that is on board or otherwise attached to the aircraft (80 FR 78594 2015). FAA reserves the right to further regulate future micro-UASs that weigh less than 0.55 lbs.

FAA aircraft regulations as of February 2016 required any aircraft to be certified, have an airworthiness certificate, be registered with the FAA, and be operated by a licensed pilot. For UASs, public law allows the FAA to accommodate unlicensed aircraft through what is known as a Section 333 Exemption of the FAA Modernization and Reform Act of 2012, sec. 331(6); 49 USC 44703; 49 USC 44711) (FAA 2013f). Operations of UASs that are not model aircraft operations can only be done with specific authorization from the FAA. The FAA currently authorizes UAS operations that are not for hobby or recreational purposes through one of three means:

1. issuance of COA;
2. issuance of special airworthiness certificates, either in the restricted or experimental categories;

TEXTBOX 12
Four Key Sources of Information on UAS

1. FAA's UAS webpages (https://www.faa.gov/uas/)
2. Association of Unmanned Vehicle Systems International (AUVSI) (http://www.auvsi.org)
3. AC 91-57A Model Aircraft Operating Standards (Advisory Circular 91-57A 2015c)
4. National Conference of State Legislators (http://www.ncsl.org/research/transportation/current-unmanned-aircraft-state-law-landscape.aspx)
5. AAAE's source for UAS integration (http://www.uashub.org)

3. an exemption process in which it determines that such operations are in the public interest (also known as a Section 333 exemption).

A COA is an authorization issued by the FAA's air traffic organization to an operator for a specific UAS activity. The COA allows an operator to use a defined block of airspace and includes special provisions unique to the proposed operation. For example, a COA may require flying only under VFR or only during daylight. A COA is issued on a case-by-case basis.

Whether a UAS requires an airport runway to operate to and from depends on the craft's size and purpose. Figure 36 shows a UAS that would use an airport runway. The majority of anticipated s-UASs will not require a runway. Rather, they are hand launched, catapulted, or can operate from an area less than the size of a football field. As of early 2016 UASs could not comply with FAA "see and avoid" rules that apply to all aircraft, making the introduction of UASs into the nation's airspace a challenge for both the FAA and aviation community. If not properly managed, the risk for collision with other aeronautical users can increase.

An NPRM issued for the operation and certification of s-UAS operation uses the segregation of air traffic as the initial means of ensuring safety of operations (80 FR 9544 2015). If enacted, the rule would require s-UAS operators to fly their aircraft at less than 500 ft AGL and at speeds no greater than 100 mph (87 knots), remain within the line-of-sight of the operator, have visibility conditions of 3 mi or greater, be operated only during daylight hours, yield to all other aircraft, and have ATC permission if operated in Class B, C, D, or E airspace. The final rule is expected in June 2016.

A task force was established to make recommendations to the FAA on s-UAS registration processes contained in the NPRM (available at https://www.faa.gov/uas/publications/media/RTFARC FinalReport_11-21-15.pdf). The recommendations were considered by the FAA and resulted in the publication of rules for the registration and marking of s-UAS (80 FR 78594 2015). Additional s-UAS and UAS regulations are expected to continue to evolve over the next several years. The latest information on UAS operations and regulations can be found using the sources listed in Textbox 12. UASs flown indoors, such as in an aircraft hangar or enclosed stadium, do not require registration.

A question raised during this study was whether airports are required to make reasonable efforts to accommodate the aeronautical activity under Assurance 22. In a February 2016 update of *Frequently*

FIGURE 36 Unmanned aircraft system that uses a runway (*Source*: https://commons.wikimedia.org/wiki/File%3AHermes_450.jpg. Public domain.).

Asked Questions on the FAA's UAS website, the FAA provides policy guidance to airport managers about potential UAS operations on their individual airport (http://www.faa.gov/airports/special_programs/uas_airports/#qn3). In particular, if a COA has been issued to an operator, the airport sponsor is to make efforts to accommodate the activity, as UAS operation is considered a permitted user of the National Airspace System like any manned aircraft flight.

As part of the FAA's safety assessment for issuing a COA, a civil or public UAS operation is to enter into an LOA with the airport operator. The LOA would address concerns on communication, ground access, runway and taxiway safety, and other user safety concerns. The airport operator can charge reasonable fees for use of the airport by a UAS. Additional guidance exists on the FAA UAS website for questions related to impact on other aeronautical users, NOTAM requirements, possible need for ALP updates, guidance for law enforcement agencies, and applicability of state and local regulation.

ACRP Report 144 suggests that federally obligated airport sponsors treat a new UAS operator as they would any new operator or tenant. This implies that many airports may be unprepared to handle a request for accommodation (Neubauer et al. 2015a). None of the minimum standards and rules and regulations reviewed for this synthesis specifically addressed UAS operation. Some airport standards and regulations did include the statement that aeronautical activity not covered would be evaluated on a case-by-case basis.

ACRP Report 144 serves as a primer on UAS, published for those seeking better understanding of the industry (Neubauer et al. 2015a). Information culled from the report that has relevance to this synthesis includes the following:

- Research is ongoing across the country on the uses of UAS and how unmanned aircraft can be safely integrated into the NAS.
- Early successful UAS operations have occurred at both military and civilian controlled airfields.
- The near-term growth of runway-dependent UAS will likely occur at smaller airports with limited commercial air carrier service.
- Airport planners and operations personnel need to understand the system requirements prior to commencing the planning for operations.
- The operational requirements for runway-dependent UAS will vary from system to system.
- For many systems, unmanned aircraft can be treated the same as manned aircraft by airport staff.
- Large wingspan UAS may exceed airport design safety areas and require towing operations.
- The operation of larger, runway-dependent UAS at civil airports is manageable.
- UAS takeoffs and landings are concerned about wake turbulence, winds, and visibility.
- A UAS and another aircraft (UAS or manned) are not allowed in an airport's approach or departure pattern at the same time. Standoff distances are based on environmental conditions, such as weather in the area, and visibility.
- A UAS and another aircraft are not allowed on the same airport movement area simultaneously.
- The taxi route to and from the runway must be completely clear of aircraft prior to the UAS going to or from the runway and ramp area.
- Aircraft may need to sit on the runway for an extended time as navigation and communications systems are brought online.
- Equipment used to support UAS can be located near the runway.
- UASs taxi at slower rates than regular aircraft, or are towed to and from the runway.
- As of early 2016, UASs are not allowed to operate at night, primarily because ATC might not be in operation while GA and cargo aircraft continue to fly.
- Airspace separation is widened, based on environmental conditions.
- The primary mitigation of collision risks around an airport is having "eyes on" the UAS to maintain separation, such as a spotter on the ground, a chase plane in the air, positive radar control, or sterilization (separation) of the airspace.
- COAs segregate UAS operations from manned aircraft and limit the number of UAS operations.
- Careful planning of UAS lost link procedures and holding points are important operational issues to consider.

- In the event of lost communications, large UAS are preprogrammed to proceed automatically to a holding point and commence an automatic recovery procedure at a planned and predicted time.
- Training of individuals accessing UAS on the airport is necessary.
- The placement of communications antenna on an airport is an important factor to ensure no lost link during taxi and ground maneuvering.
- Operators of UAS may have extensive to little knowledge of FAA flight and ground rule procedures.
- Some UAS will require infrastructure support of land, building, utilities, and the like, similar to an FBO operation.
- Some UAS will be independent of infrastructure requirements.
- The communications infrastructure at the airport must support the needs of the UAS operator.
- Building and maintaining community support for UAS operations is a continuous process.
- The need to educate and communicate with local communities to gain acceptance of UAS will increase.
- No special UAS environmental concerns were raised by operators, as no exotic fuels are involved and payloads are primarily data collection and communication equipment.
- Potential noise impact has not been determined.
- Current FAA regulation and safety require UAS to maintain a wider separation between the unmanned and manned aircraft.

RADIO-CONTROLLED MODEL AIRCRAFT

As defined in the FAA Modernization and Reform Act of 2012, a model aircraft is an unmanned aircraft that is (1) capable of sustained flight in the atmosphere; (2) flown within visual line of sight of the person operating the aircraft; and (3) flown for hobby or recreational purposes (14 CFR 1). Model aircraft and unmanned rockets are not specifically listed as an aeronautical activity, although they do meet the definition of a UAS. Recent rule-making requires model aircraft flown outdoors to be registered with the FAA (80 FR 78594 2015).

Although RC model aircraft are not considered an aeronautical activity, the scope of this synthesis included a review of model aircraft activity because as a number of airport operators allow the activity on their airport. The review of the AFD identified 72 airports having issued a remark indicating model aircraft activity occurred on or in the vicinity of the airport (Table 2). The study identified the majority of model aircraft clubs operate on private airports.

The evolution of UAS activity and subsequent proposed rules affected long-established and accepted RC model airplane activity because model aircraft meet the definition of UAS. To help clarify the niche that modelers have in being allowed to operate in the national airspace, the FAA updated AC 91-57A (FAA 2015c) and clarified the exclusion that model aircraft enjoy from the regulations. Whether a given unmanned aircraft operation may be considered a model aircraft operation is determined with reference to section 336 of Public Law 112-95.

(1) The aircraft is flown strictly for hobby or recreational use;
(2) The aircraft operates in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization (CBO);
(3) The aircraft is limited to not more than 55 pounds, unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a CBO;
(4) The aircraft operates in a manner that does not interfere with, and gives way to, any manned aircraft; and
(5) When flown within 5 miles of an airport, the operator of the model aircraft provides the airport operator or the airport air traffic control tower (when an air traffic facility is located at the airport) with prior notice of the operation. Model aircraft operators flying from a permanent location within 5 miles of an airport should establish a mutually agreed upon operating procedure with the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport).

Individuals who fly model aircraft within the scope of these requirements do not require FAA permission to operate, although their aircraft must be registered with the FAA if it weighs more than 0.55 lbs. Any flight outside the permission parameters (including any non-hobby, non-recreational operation) requires FAA authorization. FAA provides a brochure that helps to explain what RC model

aircraft and s-UAS operators can and cannot do with their model or UAS aircraft (Appendix R). It is noted that AC 91-57A and the NPRM on s-UAS operation and certification address operations of UAS and model aircraft within a 5-mi radius of the airport. Procedures and processes concerning permission to operate within the vicinity of a controlled or uncontrolled airport are still being formulated at the time of this report.

The community-based organization that is the official national body for model aviation in the United States is the Academy of Model Aeronautics (AMA) (www.modelaircraft.org). The AMA is the organization whose purpose is to promote development of model aviation as a recognized sport and as a worthwhile recreation activity. In essence, the AMA is similar to the USPA in that both organizations seek to self-regulate members to preclude future federal regulation that may impede the enjoyment of their sport. The AMA has developed a plethora of standards and guidelines for its members. An airport manager seeking guidance about allowing model aircraft activities on his or her airport can find documents from AMA to support the efforts.

The AMA operates a charter club system. Each AMA club and/or site owner or property manager decides what can or cannot be flown at a particular flying site. The manager of the club negotiates with the airport manager any conditions for operating on an airport. Model aircraft include fixed wing, rotary wing, and multi-rotor platforms. The AMA provides insurance coverage to its chartered clubs and routinely lists airport property owners as additionally insured.

The AMA publishes a *National Model Aircraft Safety Code* that spells out the requirements for model aircraft clubs and their members when operating model aircraft (AMA 2014) (see Appendix S). The safety code was included in several lease agreements between airport operators and model aircraft clubs that were reviewed for this report. A number of additional safety codes exist on the AMA website for the different kinds of model aircraft flown, including large model aircraft (more than 55 lbs). The AMA requires each club is to adopt site-specific safety and operational rules. A sample site layout diagram is provided in Figure 37.

Model aircraft operations are limited to no more than 400 ft AGL and to line-of-sight operation. This normally provides an airspace buffer of 600 ft between the model aircraft and a normal 1,000-ft airport traffic pattern. However, caution is issued for airports that have lower traffic pattern altitudes for helicopter or ultralight activity.

The fuel capacity of a model aircraft generally provides for 8–10 min of flight. Fuels used in model aircraft are easily carried in appropriate small containers. On-site fire extinguishers are a norm. Battery-operated electric model aircraft are popular as well.

As derived from interviews and the literature search, hazards and risks associated with model aircraft can be:

- Interference with regular aircraft;
- Use of fuels such as nitromethane, gas, diesel, or jet fuel, depending on the engine;

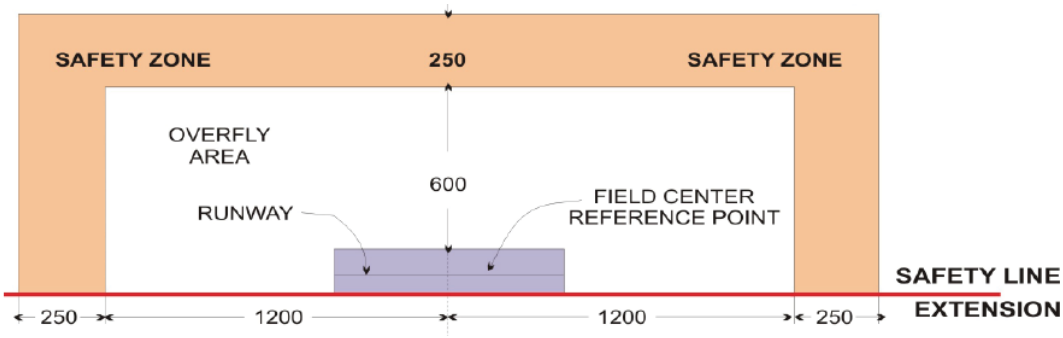

FIGURE 37 Sample layout site plan for RC model aircraft (*Source*: Academy of Model Aeronautics Publication 706. Fair use.).

FIGURE 38 Gathering of model aircraft and support equipment at an airport site (*Credit*: S. Quilty, SMQ Airport Services, Lutz, Florida. Used with permission.).

- Lithium-ion battery overheat;
- Loss of radio control link (as a result of failure, out of range, or signal interference);
- Radio frequency interference (other than 2.4 gHz);
- Operator distraction or incapacitation;
- Staging of vehicles and trailers (Figure 38); and
- Control of access onto airport.

To mitigate these hazards, a number of measures are used, including safety spotters, a buddy-box system (secondary override controller box), preprogrammed failure modes responses or fail-safe modes, operating rules, and safety lines and barricades. Established airport rules and regulations can govern access onto the airport and the placement of vehicles and equipment. Appendices T and U provide a safety briefing used by the Lakeland Linder Regional Airport for informing others of special aeronautical activity on their airport. The form can be used for other coordination and communication purposes.

One main consideration for model aircraft activity is noise generation. Airports are often requested by RC modelers to accommodate their aircraft activity primarily because of the open space available, but also because model aircraft can be loud. A target decibel (dB) goal is less than 98 dB in the flight area, but actual noise can be louder.

NOTICES TO AIRMEN

Appendix G provides a sample of AFD remarks related to UAS and model aircraft operation. Examples of NOTAMs from JO 7930.2P are:

- UNMANNED ACFT WITHIN AN AREA DEFINED AS 10NM RADIUS OF AML223010 (10NM SW IAD) SFC-5000FT 1310251000–1310251200
- UNMANNED ACFT WITHIN AN AREA DEFINED AS 10NM RADIUS OF NYL SFC-10000FT 1312122100–1312122300
- WHEN CLASS D AIRSPACE IN EFFECT UNMANNED AERIAL VEHICLES OPER SFC TO 7000 FT MSL.
- MANNED & UNMANNED ACFT NOT AUTHORIZED IN THE SAME TFC PAT. ARRIVING MANNED ACFT MAY FOLLOW UNMANNED ACFT ON FINAL.
- CIVIL TRAFFIC PATTERN NOT AVAILABLE DURING DAYTIME UNMANNED AIRCRAFT TRAFFIC PATTERN OPERATIONS.

CHAPTER FIFTEEN

CASE EXAMPLES

The following case examples explain some of the situations and experiences airport operators have at their airports for accommodating various aeronautical users. Included are procedures, practices and steps they went through to address the various challenges on their airport.

CASE EXAMPLE—KEENE DILLANT–HOPKINS AIRPORT (KEEN)

Dillant–Hopkins Airport in Keene, New Hampshire, has an aerobatic box established by the New England Aerobatic Club (Figure 39) where several aerobatic pilots from the club participate. Although individual routines last less than 15 min each, the practice continues most of the day to accommodate multiple pilots. Initially, the club's waiver called for club to issue NOTAMs. The club wanted to further issue a NOTAM restricting practice touch-and-go operations while the box was active. The city viewed the aerobatic club favorably and wanted to accommodate its activity but was uncomfortable with the club issuing NOTAMs. Discussions followed that included the local flight schools and the aerobatic club.

The aerobatic box has a floor of 1,500 ft AGL, which is 500 ft above the normal traffic pattern. The aerobatic club and airport management's concerns were the occasional aircraft flying out of the box and that student pilots frequently used the facility. Of more concern was the transient pilot who did not check NOTAMs beforehand or who did not properly use Unicom when transiting or entering the area. The airport also had a voluntary noise abatement practice that precluded modifying existing traffic patterns.

CASE EXAMPLE—MINDEN–TAHOE AIRPORT (KMEV)

The local flying school had no objection to conducting student training while the box was active and used the situation to promote student learning and awareness. As a result, the airport entered into a licensing arrangement with the club that could be revoked at any time if conditions were not met. The licensing conditions stipulated the box could be used only five times per year, on Saturdays only; that activation of the box would be after 10 a.m.; spotters with radios would monitor Unicom; and a safety briefing open to the public would be held before each practice. Student touch-and-go training would be restricted. The FAA recommended that pilots not fly under the aerobatic box when it was active. The aerobatic box was activated by the authorized club member, at which point the FSS issued a standard NOTAM. The airport would include the NOTAM on its AWOS announcement, as it is believed that transient pilots are more likely to monitor winds and weather announcements than Unicom.

Minimum Standards

The Minden–Tahoe Airport is a diverse GA airport that operates at a profit solely from aeronautical revenues. The airport welcomes all kinds of aeronautical activity to help sustain its operation and has adequate space to accommodate them. Its location on the east side of Lake Tahoe and the Carson Mountain Range lends itself as a major attraction for glider operations. Although not listed on the FAA airport master record, the airport is home to more than 100 gliders.

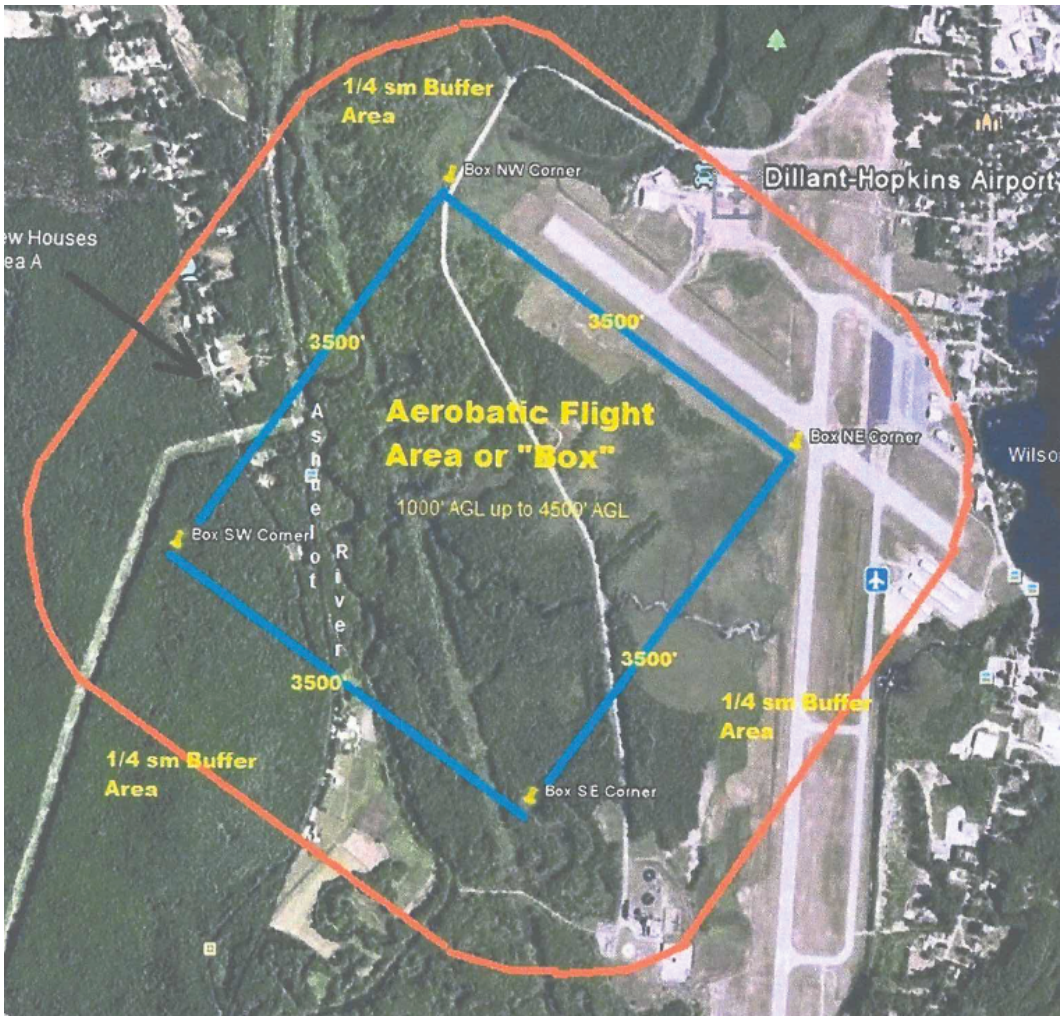

FIGURE 39 Diagram of the aerobatic box at Keene Dillant–Hopkins Municipal Airport (*Source*: E. Mattern, Keene Municipal Airport, New Hampshire. Used with permission.).

Prior to a management company taking over operations in 2010, the airport frequently experienced "wild west" conditions, as gliders, tow aircraft, based aircraft, aerial applicators, and others vied for different runways and space on the uncontrolled airport. The key to turning things around was establishing policy documents, such as minimum standards and rules and regulations (documents are available at http://mindentahoeairport.com/about-us/documents-and-forms/).

Going through the public process of developing the documents signaled the county's intention to bring order to the airport facility. As stated in MEV minimum standards, the documents' purpose is to:

- Promote safety;
- Promote the economic health of airport businesses;
- Protect airport users from unlicensed and unauthorized products and services;
- Protect the investment of providers of aeronautical services meeting minimum standards from competition not making a similar investment;
- Improve community relationships;
- Promote the orderly development of airport property; and
- Encourage high quality products, services and facilities to airport users.

Once the MEV policies passed, airport management started mandatory monthly safety meetings for its prime tenants and operators. Access to the airport and leases became the means of enforcement. At first, opposition to the procedures was evident. But as new operating procedures were implemented,

the tenants started to realize that the airport was becoming a safer place to operate. Buy-in from stakeholders became easier.

The MEV rules and regulations address practices in the area of traffic patterns, runway usage, access to movement areas, radio requirements and CTAF practices, ground handling of aircraft (including gliders), helicopter operations, hot air balloon operation, aerial applicators operation, firefighting services, skydiving operations, proper conduct of the public when on the airport, and other matters. RC model aircraft operation is prohibited. The airport is currently working on UAS regulations. The state of Nevada is striving to be a leader among states in promoting UAS operations because of its expected economic contributions (documents are available at http://mindentahoeairport.com/about-us/documents-and-forms/).

Glider and Parachute Operations

Glider tow operators and gliders use traffic patterns opposite from the fixed-wing aircraft. Helicopter patterns are established in concert with the airport manager's office review. Because glider traffic patterns progress through the drop zone for skydivers, the airport's rules and regulations specify a coordination procedure involving the use of the CTAF and persistent announcements of activity. Jump aircraft give 5-, 2-, and 1-min announcements prior to jump. Included in the announcement are approximate position of jump aircraft, location of the jump zone, and approximate time jumpers will be in the air. When jumpers are exiting, the jump plane pilot announces their exit. When all jumpers are on the ground, the skydive operator is to specifically announce "Minden–Tahoe traffic, jumpers on the ground." Jumper coordinators on the ground are to have two-way radios. The drop zone is located on airport property but outside the airfield fence. Skydivers are shuttled back through a fence and onto the airfield as part of the control process. Currently, only tandem skydiving is allowed regularly.

Gliders preparing for takeoff are staged in a designated ramp area. When ready, they are hooked up and towed onto the runway by the tow aircraft. No staging occurs on the runway. A dirt runway, parallel to the secondary runway and adjacent to the glider staging area, is used by tow airplanes and gliders for landing purposes only. One suggestion airport management has for other airports with glider activity, is to design glider turn-out areas off the runway. The turn-outs allow for the glider to roll clear of the runway for recovery, rather than settle on the runway and cause delays in runway use by others.

Aerial Firefighting Operations

During fire season, MEV can serve as a staging point for aerial firefighting operations. The airport leases an area on a former (now closed) runway to the forest service and operating company. When service is activated, the fire control management company erects a temporary ATCT to manage traffic. Controllers are contractors approved and certificated by the FAA. A NOTAM is issued identifying the ATCT is in operation. Revenue is generated through the lease arrangement and a daily aircraft use fee. The lease allows for the storage and dispensing of retardants with proper environmental precautions. The firefighting service uses both fixed-wing aircraft and helicopters.

CASE EXAMPLE—BOULDER MUNICIPAL AIRPORT (KBDU)

Situated at the base of the Rocky Mountains, the Boulder Municipal Airport (KBDU) in Colorado is a natural location for glider and sailplane activity. Home to more than 40 gliders, the uncontrolled airport is challenged to integrate aeronautical activity on its limited land area. KBDU has one paved runway and a second parallel turf runway designated for gliders. The length of the paved runway precludes major jet traffic, but piston engine business aircraft use and heavy flight training activity add to the congestion. The airport is just outside of the Denver Class B airspace and lies beneath a busy north-south corridor circumventing the airspace.

Glider Operations

A designated turf runway intended for gliders only is located inside the ROFA of the main paved runway. Because the glider runway is situated inside the primary ROFA, it currently has a modification

to standards to allow its use. Gliders parked along the turf runway are outside the ROFA. The conditions associated with the modification to standards as stated in the AFD are:

- RY 08G/26G FOR GLIDER USE ONLY, 197 FT SEPARATION CNTRLN TO CNTRLN. GLIDER OPS AS CLOSE AS 60 FT PARALLEL TO RY 8/26.
- SIMULTANEOUS APCHS TO, AND DEPS FROM, RY 8/26 AND 8G/26G ARE PROHIBITED. POWERED ACFT YIELD RIGHT OF WAY TO GLIDERS ON FINAL OR INITIATE A GO-AROUND FOR ADEQUATE SPACING.

Problems arise when transient aircraft pilots have not properly reviewed the AFD and thus do not (1) understand that they need to go around if a glider is making an approach to the turf runway, and (2) runway 26 has a non-standard right-hand traffic pattern. Complicating matters are the glider traffic pattern approaches' steep, tight turns close to the runway. To an uninitiated pilot, the glider can appear to cut off a fixed-wing aircraft on a normal traffic pattern approach if the fixed-wing pilot is unaware of glider operating procedures and that gliders will make steep close-in turns. Most of the gliders have radios; they make announcements over the CTAF.

To accommodate the glider activity, a special traffic pattern is in effect for glider tow aircraft and gliders (Figures 40 and 41). The glider traffic pattern to the south of the airport is for student training with quick return capability back to the airport. The glider pattern can pose a conflict for pilots of aircraft transiting north-south between Denver Class B and the mountains. For more experienced glider pilots, the path to the northwest will take them to the foothills of the mountains. In cooperation with airport management, the glider operators have implemented a rigorous training program before students are released to fly on their own. Pilots from outside the area have to pass the glider orientation program before operating. The orientation program is part of a classroom instruction that explains

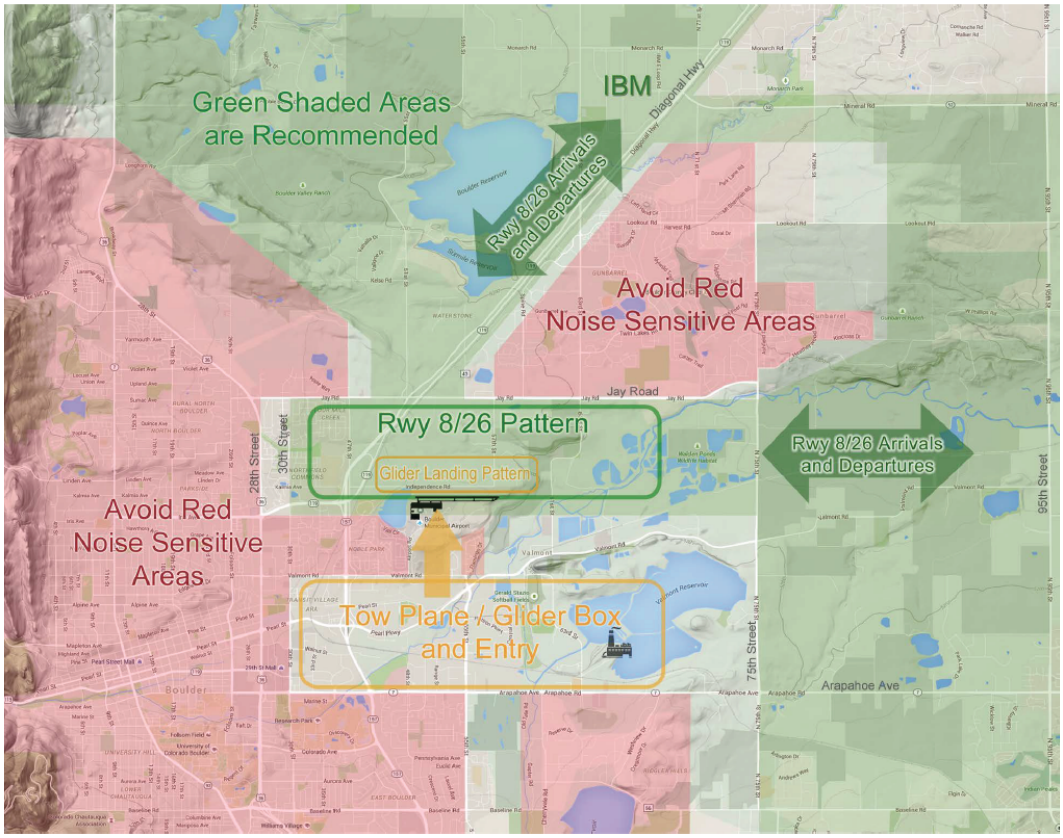

FIGURE 40 Designated traffic patterns and flight paths for Boulder Municipal Airport (*Source*: Boulder Municipal Airport, Colorado, Noise Abatement and Traffic Pattern informational brochure.).

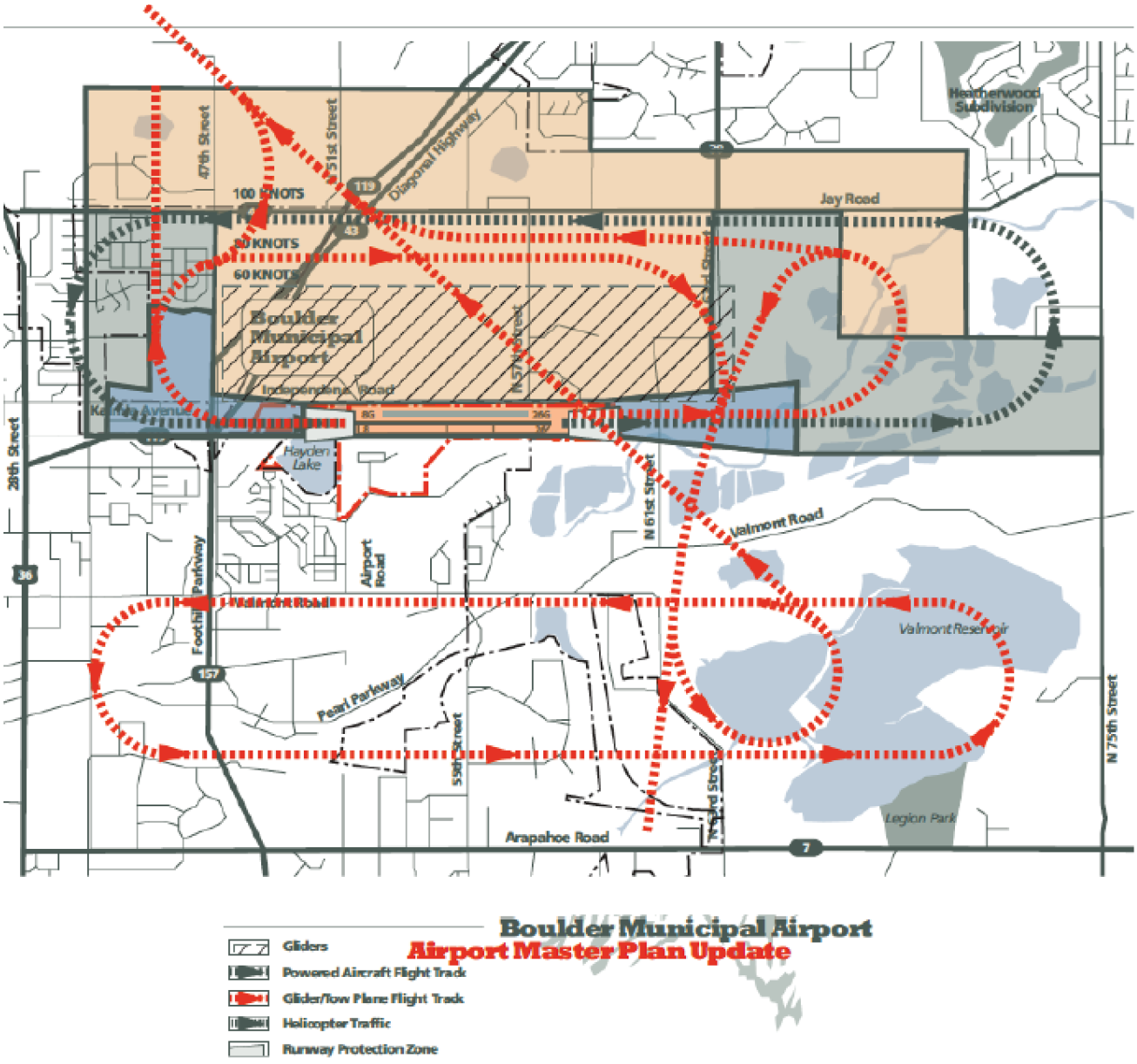

FIGURE 41 Depiction of traffic pattern for noise mitigation at Boulder Municipal Airport (*Source*: Boulder Municipal Airport, Colorado, Airport Master Plan Update 2006.).

the airport's operating rules and regulations, traffic pattern, operating areas, radio communications, and so forth. The table of contents from a recent training manual includes:

- Transition to/from hangars
- Glider launching
- Returning to the airport after glider release
- Pattern entry
- Landing pattern
- Landing on the glider runway, the area between runways or the main runway
- Aborted landing procedure
- Radio usage.

To help make pilots more aware of the operations at BDU, the airport developed a glider towplane operating policy, which is posted on its website (see Appendix N). BDU's website also

includes a section on traffic pattern noise abatement. A traffic pattern limitation is further published in the AFD:

- MIDFIELD PATTERN ENTRY FROM THE SOUTH IS ONLY AVBL FOR GLIDER USE.

Aerial Firefighting Operations

The airport is sometimes a staging facility for aerial firefighting operations. Helicopters are primarily used. The helicopters use water buckets from nearby lakes, so no storage or transfer of retardants occur on the airport. The firefighting operations do engage in hot refueling activities, but this is done only by trained personnel authorized by the aerial firefighting agency.

Parachute Operations

In the past, skydiving companies did operate from the Boulder airport, but they had an off-site drop zone. Skydiving customers would arrive at the airport, obtain their in-class training and briefings, don parachutes, board the aircraft, and depart for a PDZ located on private land about 4 nm northeast of the airport. The plane would return and land, and customers would be shuttled back to the airport in a van. The arrangement worked well until the company lost its PDZ as a result of a zoning issue. The skydiving company then sought to establish a PDZ on the airport. Upon receiving the request, airport management held discussions with the operator. Airport management posited that it would be difficult to accommodate an on-airport PDZ because of the high level of glider traffic, complexity of existing patterns, and the limited space available for a drop zone. The city eventually declined the request and, as a result, a Part 13 complaint was filed.

The complaint triggered a safety assessment by the FAA in September 2014. In discussions between airport management, the skydive operator, the USPA, the Denver FSDO, and the regional ADO, proposals for accommodating the aeronautical activity were evaluated. Personnel from FSDO conducted a safety assessment. Included in the review were two proposed drop zones, altering traffic patterns, alternating days of operation between skydiving and glider operations, alternating times of the day for each operation, limiting skydiving activity to mornings only before glider activity commenced, and establishing the presence of a landing zone safety officer to coordinate and direct skydiving operations.

The conclusion of the FAA ADO compliance officer in January 2015 was that the city of Boulder had made a good faith effort to accommodate the skydive operation (M. Miller, personal communication to J. Divan, Jan. 9, 2015). The FAA stated that “parachuting activity could not be said to be entirely incompatible with existing operations, the highest degree of safety in the public interest could not be maintained if both operations (glider and skydiving) were conducted over the same area at the same time.” In the safety assessment, the FSDO found the parachute operation posed a modest risk to existing operations and a change to those operating procedures would bring added risk. The skydiving operation chose to relocate to another airport.

CASE EXAMPLE—LAKELAND LINDER REGIONAL AIRPORT (KLAL)

Lakeland Linder Regional Airport (KLAL) is a busy GA reliever airport in central Florida that is home to the annual Sun ’n Fun Fly-in and Exposition. During Sun ’n Fun, the exposition hosts varied aeronautical activity that include balloons, ultralights, powered parachutes, light sport, aerobatic aircraft, skydiving, gyrocopter, helicopters, amphibious seaplanes, warbirds, and fixed wing aircraft of many sizes. Special operating procedures are put in place similar to those in place for the annual EAA Oshkosh event in Wisconsin. Several of the procedures from both airports have applicability to operations throughout the year.

LAL has two intersecting runways and more than 103,000 operations in 2014. Based aircraft include 152 single-engine, 24 multi-engine, and 33 jet-based aircraft. The airport has a part-time

contract air traffic control tower that operates 16 h each day. The airport has a Part 139 airport operating certificate and has received commercial air service in the past. KLAL is about to open a new U.S. Customs office. The airport operates a 24-h aircraft rescue and firefighting station. The airport is home to several large aircraft maintenance facilities, routinely stages military helicopter operations, and has an RC model aircraft operating area. The airport is popular in central Florida for students practicing instrument approaches.

A portion of the airport is leased to the Sun 'n Fun organization. The agreement allows the airport to safely manage its Part 139 responsibilities and allows for flexibility in accommodating varied aeronautical activity. The leased area places responsibility for security access and maintenance on the Sun 'n Fun organization or tenants in the area.

To accommodate and manage the varied activity throughout the year, airport management has implemented a number of procedures. A *Special Operation Brief* communicates the key aspects of an activity or event occurring on the airport (Appendix T). The *Ops Brief* lists event information, event contacts, timeline and staging of activities and events, and includes a note section for listing NOTAMs and responsibility assignments. General information about special events is further communicated by posting to the airport's website, social media, and by email to tenants.

Glider and Ultralight Operations

The LAL airport is also home to an on-airport aviation aerospace academy high school, a college aviation program, and four other flight-training businesses. To accommodate the request of the Aerospace Academy Aeroclub for student training efforts, the airport is currently in the process of building a turf runway for use by taildraggers, antiques, and gliders. During Sun 'n Fun, the turf runway will serve the LSA and ultralight group. Once completed, an operating agreement with the Aerospace Academy Aeroclub will make the club responsible for the upkeep of the turf runway and surrounding area as part of their educational endeavor.

The location of the proposed turf runway is approximately 2,800 ft from, and parallel to, the main runway. It falls beneath one of the runway protection zones for the crosswind runway. Designed as a VFR daytime turf runway only, traffic to and from the runway will be controlled by ATC. The turf runway is being funded by a local benefactor of the Aerospace Academy and will be restricted to only those authorized users with prior permission. The traffic pattern will be at a lower altitude than the left-hand traffic for the main runway.

The area designated for the turf runway is isolated from the main runway and is identified as a non-movement area under Part 139. ATC clearance will still be necessary to access the airspace. Student, pedestrian, and vehicle access is controlled through standard security badging and escort procedures.

The steps involved in developing the turf runway are as follows:

1. Initial discussions and agreement among stakeholders
2. Submission of Interim ALP to the FAA showing the proposed runway location, design category A-1
3. Receipt of FAA conditional approval of ALP
4. Submission of the FAA Form 7460-1 Notice or Proposed Construction
5. Receipt of 7460 evaluation and conditions from FAA
6. Submission of the FAA Form 7480 Notice of Landing Area Proposal to FAA and state
7. Receipt of 7480 response and conditions
8. Evaluation and Submission of Environmental Assessment (Category X exclusion)
9. Submission of the Construction Safety & Phasing Plan (CSPP) for construction
10. Submission of FAA Form 7460-2 Notice of Actual Proposed Construction
11. Issuance of Notice to Proceed for construction
12. Construction of turf runway
13. Final inspection and acceptance
14. Revision of ATC Letter of Agreement, Airport Facility Directory, and Airport Operating Manuals.

Balloon Operations

Balloon activity outside the annual fly-in is rare on the airport because the airport has Class D airspace, which requires a radio. The balloon operator and guests are either escorted onto the field by airport operations personnel or are issued security identification badges. Balloon operations during the annual fly-in are conducted in accordance with a waiver issued by the FAA for the event. NOTAM activation is initiated by the authorized holder of the waiver.

Airship Operations

The airport has served as a stopover point for blimp operations. It has adequate space to accommodate a blimp's movements and requirements. A blimp is normally positioned south of the primary runway and outside of various airport design surfaces for the runways. ATCT visibility is not impeded. The airship operator and guests are either escorted onto the field by airport operations personnel or are issued security identification badges.

Helicopter/Vertical Takeoff and Landing Operations

Helicopters, primarily used in law enforcement and the military, routinely use the airport. In cooperation with ATC, the airport has developed standard arrival and departure routes for the helicopters, depending upon which side of the field they will use. The routes help separate the helicopters from the fixed-wing aircraft as well as mitigate noise complaints in the community. Their flight path is below that of standard fixed-wing traffic. To prevent pavement damage, tenant helicopters or those arriving for maintenance often use a dolly landing platform. Transient helicopters locate at the FBO on a grass area. The FBO has responsibility for managing operations in its leased area.

The military uses the airport as a staging area for a nearby training area. Blackhawks and Chinooks are the helicopters that frequent the airport. The airport also has been the site of several Osprey V-22 VTOL operations. LAL has adequate pavement to accommodate the helicopters and VTOL away from normal GA activity. The airport worked out operating procedures with the military and the ATCT to have arrivals over the runway and wheel taxi to the staging area. The procedures limit the damage done to the grass areas from the rotor wash. Figure 42 illustrates the rotor extension onto the grass taxiway safety areas and the position of the hot exhaust gases onto the pavement. Takeoffs and landings are accomplished on the runway and follow normal air traffic procedures to and from the airport. To reduce the consequence of rotor wash creating FOD on the taxiways, especially from the VTOL, the airport has made adjustments to mowing operations and collects the mown grass.

FIGURE 42 VTOL operation on a taxiway (*Credit*: S. Walsh, Lakeland Linder Regional Airport, Florida. Used with permission.).

Aerial Advertising Banner Tow Operations

The LAL airport discourages banner tow operators, as limited space is available for setup along the runway or taxiways. Other factors that reduce interest in banner tow operations are the insurance requirements, the fee structure, ATCT presence, and the need for security escort onto the field. Banner tow operators generally find more favorable operating requirements at a number of other airports in close vicinity to LAL.

Aerobatic Operations

Two aerobatic boxes exist at the LAL airport—a jet box and a piston-engine box. The jet box is primarily utilized by jet and warbird teams that practice in preparation for upcoming airshows and performance at Sun 'n Fun. However, a civilian jet team has requested and been authorized to use the jet box during the show season. The piston aerobatic box was established to benefit local tenants and competition fliers. The waiver was issued by FSDO to the airport. The box is only available to individuals meeting airport requirements. The waiver and map used by the airport for authorizing users is provided in Appendix I. Two airport operations officers monitor the edges of the box during an aerobatic practice session. The length of time the box is active is generally only 15 min. A NOTAM is issued when a box is active, per the requirements of the waiver.

Parachute Operations

While skydiving is not a common activity on the airfield, an occasional request is made to use the airport, especially during Sun 'n Fun. Jump aircraft are normally loaded 15 mi to the northwest at well-known Skydive City in Zephyrhills, Florida. The recovery aircraft coordinates with KLAL operations personnel. An FAA authorization is obtained for the jump, and NOTAMs are issued by the responsible party identified. ATC controls local and transient aircraft during the jump.

Radio-Controlled Model Operations

KLAL has a dedicated paved area that is used by a local RC model club. The paved area is at the southern boundary of the airport but near the runway protection zone for the crosswind runway. Permission is granted to access the area through a controlled gate. An operating agreement restricts the height that RC models may obtain. The RC modeler is required to have one individual in radio communication with the control tower and KLAL operations at all times. NOTAM issuance is coordinated through KLAL operations personnel. Model aircraft operators are badged for access to the air operations area to retrieve any downed models that stray. There have been occasions when an RC model has been "lost." Appendix T provides an example of a Special Operations Brief for the RC modelers.

CASE EXAMPLE—TRUCKEE–TAHOE AIRPORT (KTRK)

The scenic and high-mountain location of the Truckee–Tahoe Airport by Lake Tahoe, California, makes the airport a desirable site for varied aeronautical operations. The mission of the Airport District Board is to provide high quality aviation facilities and services to meet local needs, and to strive for low impact on neighbors while enhancing the benefit to the community at large. Being recognized as a noise sensitive and environmentally conscientious area makes it a challenge for airport management to balance the needs of the community, the tourism industry, airport tenants, and economic self-sufficiency, and the requirements of its federal grant obligations.

TRK is a two-runway uncontrolled GA airport with more than 100 based aircraft and an estimated 25,000 annual operations. It has a high volume of seasonal glider activity and often has simultaneous operations on its two intersecting runways. As a result of high-density altitude conditions, the airport restricts ultralight operation to prior permission approval by airport management.

In spring of 2014, airport management was approached by a skydiving company seeking seasonal operations at the airport. The airport was in the midst of having new minimum standards for

commercial operators approved. Because skydiving operations were not present at the time of development, the minimum standards did not reflect the possibility of skydiving. Since then, a new policy has been approved (Truckee–Tahoe Airport District 2014). As part of the policy and overall safety management system, the airport requires the implementation of a safety risk assessment for operational changes. The safety risk assessment process minimally examines on-airport safety issues, off-airport safety issues, and airspace issues associated with the PDZ. The skydiving company submitted an SMS program for review. The airport then had a third-party consultant conduct an independent safety analysis of the proposed skydiving SMS proposal. Management further engaged an aviation attorney to review the airport's documents and its efforts in accommodating skydivers under its sponsor assurance responsibilities.

The difficulty in seeking to accommodate the skydiving activity was in how to integrate the operation without conflicting with existing glider operations or with voluntary noise abatement procedures flown by corporate and transient aircraft (Figure 43). Glider operations in the Truckee area have an established glider area depicted on FAA navigational sectional charts. The skydive company proposed an area that minimally impacted the glider activity (Figure 44).

Airport management has been diligent in addressing the concerns of its tenants. In-depth meetings were held with involved parties to discuss each party's concerns and possibilities. Open communication kept everyone informed, especially the airport board of directors. As a result of the lengthy discussions, working through the issues, the development and passage of minimum standards, the

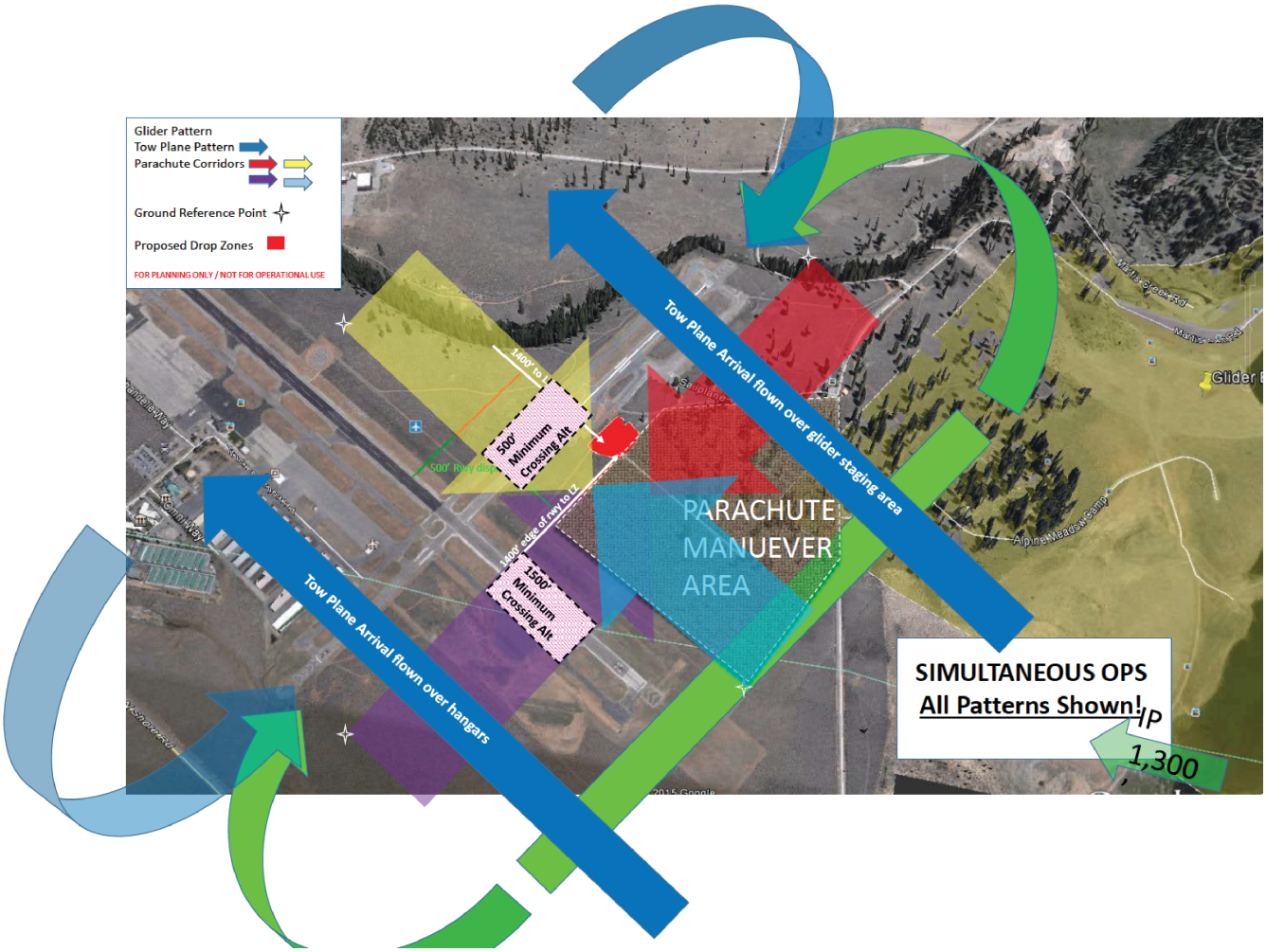

FIGURE 43 Diagram of different traffic patterns for gliders, tow aircraft, and skydivers at Truckee–Tahoe Airport, California (*Source*: Property of Convergent Performance, LLC. Used with permission.).

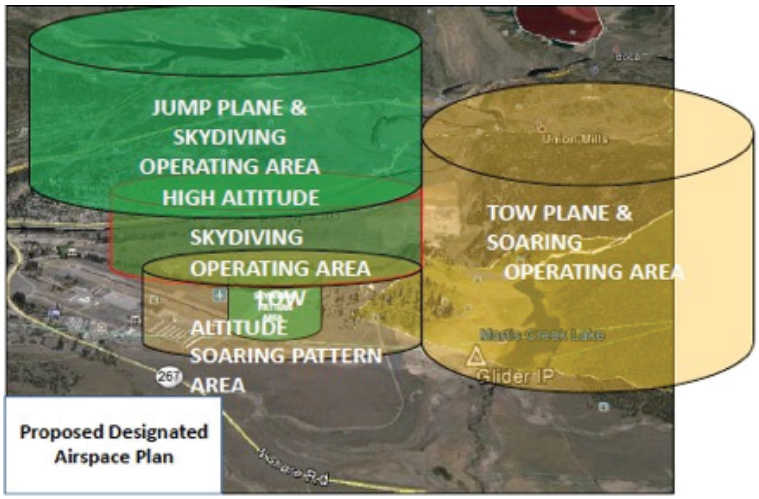

FIGURE 44 Proposed airspace plan combining skydiving and glider activity at Truckee–Tahoe Airport, California (*Source*: Property of Convergent Performance, LLC. Used with permission.).

development and analysis of safety and risk, and a goal of accommodating aeronautical activity, no informal or formal complaints have been filed with FAA. Feedback received by the airport from the Reno FSDO and the Western Regional ADO stated that the airport was proactive in its efforts to accommodate skydiving activity, and had done more so than other airports to accommodate the proposed activity, with its safety analysis.

Because the glider and skydiving operation would be operating adjacent to each other, there was concern on the part of the airport that conflicts could arise. To help mitigate the conflict, all parties entered into an LOA that addresses the need for cooperation, behavioral expectations, communication and deconfliction, safety, operations affecting community annoyance, and adherence to SOPs. A special provision in the LOA allows the Airport District to act as the primary arbiter in case of disagreement before any operator seeks FAA involvement. Airport management is also to be involved in all conversations related to shared facilities, airspace use, shared safety protocol, and shared communication (radio) protocols.

The skydiving operation is set to commence operation in spring of 2016. The lease and SOPs developed for skydiving operations include the following:

- Use of USPA guidelines
- SOPs become part of the lease and enforceable as such
- Safety is 1st.
- All aircraft to have operating radios
- Pays land rent and cost or maintenance and repair or premises
- Allows suspension of activity during peak aeronautical activity
- No alcohol or illegal substances on airport property
- All skydivers are to read and sign the skydiving SOPs.
- Notification to ATC or jump operation
- Identification of aircraft position reports and time to jumpers away
- Stray jumper recovery
- Announcement of skydivers on the ground
- Crowd control and use of golf carts.

The SOPs developed for gliders include the following:

- Safety is 1st.
- All glider pilots are to undergo familiarization training.

- All glider pilots are to read and sign the glider SOPs.
- All gliders are to have operating radios.
- Timely commencement of flight to minimize runway occupancy time
- Use of tail dolly requires attendant to remove it.
- Tail dolly used as count of sailplanes in the sky
- Aircraft tow announcements made prior to takeoff
- No dumping of water ballast below 400 ft
- Crowd control.

Information on the various documents presented in this case example can be found in the 2015 May–September Board of Directors minutes as posted at https://truckeetahoeairport.com/administration/board/meetings. The final report can be accessed at: https://truckeetahoeairport.com/board_meetings/122/view_file?file=TAB+11+-+Skydive+Lake+Tahoe.pdf.

CASE EXAMPLE—FARIBAULT MUNICIPAL AIRPORT (KFBL)

Glider Winch Operations

Faribault Municipal Airport (FBL) is a GA airport with one 4,257-ft paved runway and a 2,300-ft turf runway. Nine gliders are based on the field to complement the 53 fixed-wing aircraft. The airport also has ultralight activity, primarily powered parachutes. There were approximately 18,700 operations in 2014.

Unique to glider operations at FBL is the use of a motorized winch to launch the gliders. More common in Europe, there are but a dozen or so winch operations used in the United States. The commercial glider operator uses a Socata Rallye 235 as a tow aircraft, but it is considered more economically and environmentally effective to launch aircraft using a powered winch. There are no FAA regulations specific to winch launching.

The winch unit is a towable piece of equipment secured to a vehicle. The equipment is generally located beyond the departure end runway end safety area and object-free area, but within the runway protection zone (Figure 45). The winch rope is strung alongside the edge of the pavement and extended the entire length of the 4,257-ft runway. An ATV-type vehicle runs the rope the length of the runway. The unit is required to be equipped with a radio and a flashing beacon. No special airfield training was provided to the operators because most are pilots.

With the glider positioned at the opposite approach end of the runway from the winch, a hook-up is completed, announcements are made on CTAF, and a launch commences. Caution is exercised in laying the tow rope so to not ensnare weeds, brush, or lights beside the runway. During a launch, the rope line rises several feet above the runway surface. In the event the crosswind runway is to be used by another aircraft, the airport manager requires the glider operator to station a person with a radio at the intersection of the turf and paved runways to warn pilots of the cable obstacle. If a pilot calls on CTAF intending to use either runway, the glider operator is to take measures to accommodate

FIGURE 45 Glider winch equipment past the runway end (*Credit*: D. Ingraham, Cross Country Soaring, Faribault, Minnesota. Used with permission.).

fixed-wing traffic by retracting the rope or by towing the winch device outside the runway protection surfaces.

The launch results in the glider rising to above 2,000 ft, at which point the tow rope is released by the glider pilot. A small parachute slows the rope's fall while at the same time the winch is reeling it in. FAA does suggest that a 2-min window be allowed for no aircraft activity after a glider release from a winch rope (FAA 2011c). The time allows for safe retrieval of the tow rope. Upon return and using a right-hand pattern, the glider lands on the runway. No NOTAMs are issued, other than the standing NOTAM in the Remarks section of the AFD:

- ULTRALIGHTS & GLDRS USE TAXIWAY AND EXTENDED TAXIWAY PARALLEL TO RY 12/30. ULTRALIGHTS & GLDRS USING TAXIWAY FLY PATTERN ON 'NE' SIDE OF RY 12/30.

Because of the low operational use of the airport, problems have been minimal, although some have cropped up. One occasional problem is the tow rope falling to the far extremes of the runway sides, depending where the glider pilot releases it. Runway lights have been damaged when the launching glider veered off the edge of the runway. Tow rope breakage has occurred, as with regular aircraft-towed operations. Glider procedures and training allow the pilot to safely recover from any height. The concern of the airport manager has been more related to the length of time it takes to stage and recover the gliders. It can take up to 5 min to complete a launch or retrieval. Although it is not a high operation airport, the concern is for delay and irritation from other pilots. The other concern is for the number of persons and vehicles near the runway (Figure 46).

Overall, the airport manager believes both ultralight and glider operation are beneficial to the airport from a community relations perspective. It shows the airport is busy and the activities attract local sightseers.

Ultralight Operations

The airport is the site of powered parachute operations during the summer months. A large grass area between the hangars and the runway is made available for their operation. Powered parachute operations generally occur early in the morning or late evening, when winds are calmest in the Midwest. Any complaint generally stems from someone else being inconvenienced.

Aerial Agriculture Operations

The airport used to have agriculture operators at the airport, but the airport's drainage system is now tied into the city's wastewater treatment center. The potential for having to process a spill or cleaning would exceed the capabilities, so aerial applicators have located elsewhere.

FIGURE 46 Staging of glider and equipment near runway (*Credit*: D. Ingraham, Cross Country Soaring, Faribault, Minnesota. Used with permission.).

CASE EXAMPLE—ALBERT WHITTED AIRPORT (KSPG)

The Albert Whitted Airport is located on a peninsula that fronts on the Gulf of Mexico and helps form Tampa Bay. Because of its location close to beaches and to sports and cultural arts activities, the airport has been a site of aerial advertising since the early 1970s. In compliance with its grant assurances, the airport accommodated competing aerial advertisers on its limited acreage. But the arrangement was less than satisfactory, as competing businesses attempted to operate from the same area. In 2011, the airport sought to address its obligations under the grant assurances while resolving the operational issues by issuing a request for proposal for a single aerial advertising firm to lease space at the airport, and to manage the banner tow operating area. Under the management arrangement, the aerial advertising firm could supplement its existing on-airport operations by subcontracting with any number of off-airport banner operators or even with airport tenants if they met the minimum standards to conduct banner operations. A consolidation of aerial banner business resulted in one aerial advertising company operating at the airport. They operate from an area adjacent to the runway but outside the object-free area (Figure 47).

Access to the banner pickup and dropoff area requires personnel and vehicles to cross a taxiway and runway that is under the positive control of a contract ATCT. Radio contact is necessary, and access to the area is at the banner operator's risk. A separate LOA was entered into with the contract ATCT operator and the city that delineates the duties and responsibilities of each party. The closeness of the banner operations to the runway prevents simultaneous operations with other aircraft. With the airport surrounded by water, an emergency drop is expected to be in the bay.

The banner tow operator has obtained a waiver of 14 CFR Part 91.311. The waiver identifies which aircraft and pilots are authorized, geographic operational area, weather limitations, duration of waiver, and special conditions such as training, personnel responsibility, notices, public safety.

CASE EXAMPLE—VENICE MUNICIPAL AIRPORT (KVNC)

The Venice Municipal Airport is a busy uncontrolled GA reliever airport on the gulf coast of Florida. The airport has two intersecting runways and has a noise abatement program because of housing close to the airport. Because the area is a tourist location and serves a retirement community, transient

FIGURE 47 Banner towing operational lease areas contained in a request for proposal (*Source*: R. Lesniak, Albert Whitted Airport, Florida. Used with permission.).

jet and turboprop aircraft frequent the airport, especially during the winter months. An annual balloon event is conducted. The airport is occasionally visited by a blimp.

The airport has a wide range and mix of aircraft operations and use. Based aircraft include 178 piston single-engine, 20 multi-engine, three jet, and four helicopters. Powered parachutes and parasail operations are conducted a mile from the airport along the gulf shore. The airport has one based flight school and numerous others that frequent the airport, including one school that caters to foreign students and one that provides helicopter training. A request by a skydiving business to operate at the airport resulted in an FSDO site assessment. The city has been diligent in seeking means to determine whether the airport can safely accommodate the skydive operation. Its efforts are ongoing at the time of this report. Figure 48 shows the three PDZ locations being considered. An independent analysis using the FAA's safety risk management guidance has been undertaken. As part of the risk assessment, the following hazards and mitigations were identified.

Skydiving risk hazards:

- Skydivers transitioning through congested airspace and airway routes
- Skydiving operations crossing active runways or taxiways
- Skydiving operations occurring close to active runways
- Large and diverse volume and mix of aircraft
- Congested traffic pattern at peak hour operations
- Congested or blocked radio transmissions
- Unannounced or non-radio traffic operation
- Large and fast aircraft operations in vicinity of proposed skydiving activity
- Student pilots with varying degrees of proficiency and communication/language skills
- Transient aircraft unaware of skydiving operations
- Pedestrian activity (landed skydivers) in vicinity of aircraft movement area (potential runway incursion)
- Ground vehicles operating on aircraft movement area (potential runway incursion)
- Military helicopter operations in vicinity of skydiving activity
- Ultralight and powered parachutes operations in vicinity of skydiving activity
- FAA regulations regarding the safe conduct of skydiving activities in a congested and dynamic operating environment not well established
- Limited ability of the airport sponsor to establish, disseminate and enforce procedures for aircraft in flight.

FIGURE 48 Site analysis of parachute drop zones and aircraft traffic patterns at Venice, Florida (*Source*: C. Rozansky, Venice Municipal Airport, Florida. Used with permission.).

Skydiving risk mitigations:

- Provide alternate travel route for parachutists to avoid crossing runways/taxiways
- Post signs at crossing points with instructions for skydivers and pilots
- Provide training to skydivers regarding runway/taxiway crossing procedures
- Provide vehicle driver training for those assigned to recover skydivers
- Establish and disseminate best practices for operations in the vicinity of skydiving
- Skydiving operator to establish and disseminate operating procedures
- Provide safety briefings with based tenants and known users
- Locate the DZ site to avoid creating existing or potential hazards
- Post signs advising pilots and skydivers of possible hazard by prop wash or jet blast
- Establish and disseminate rules and regulations for ground operations
- Provide outreach to regional airports, FBOs, flight schools and instructors, flying clubs, pilot organizations, military units, air ambulance, regional helicopter, and corporate operators
- Change CTAF to a more discrete frequency
- Skydiving operator use CTAF to inform local traffic of skydiving operations in progress
- Facilitate formal communications with ATC
- FAA/Operator: Develop Letter of Agreement between ATC and skydiving operator
- ATC: Establish distinct transponder code for skydiving aircraft.
- Publish skydiving information in the Airport Master Record
- Issue NOTAM for skydiving operations
- Append AWOS message to inform about skydiving operation
- Have parachuting symbol depicted on appropriate Sectional Chart if eligible.
- Use visual indicators (flags, banners, etc.) on the airport to alert pilots of skydiving operations in progress
- Establish and disseminate best practices in the vicinity of skydiving.

CASE EXAMPLE—ARLINGTON MUNICIPAL AIRPORT (KAWO)

Ultralight and Glider Operations

Arlington Municipal Airport is an uncontrolled GA airport with a broad mix of aircraft activity. When asked what benefit the airport derives from accommodating various mixed-use aeronautical activities, the airport manager responded, “A delightful mix of flying machines!” First developed in 1934 and later improved by the Army and Navy in the 1940s, the current triangular runway layout of KAWO allows for the accommodation of a number of different aeronautical users. The mix includes business jets, turboprops, piston-engine, historic military and antiques, gliders, helicopters, gyrocopters, powered parachutes and other ultralights, tethered balloons, and aerobatic aircraft. The airport estimates it has more than 400 based aircraft, including 11 jets, 12 helicopters, 45 gliders, and 60 ultralights. Total number of operations was approximately 62,000 in 2013.

To accommodate the various users, KAWO currently has two paved runways, one designated turf runway for fixed-winged aircraft within the ROFA of the crosswind runway, one designated turf area for ultralights away from all runways, and three successive turf glider operating areas parallel to the main 5,332-ft runway but outside the ROFA. The turf runways are used at the pilot’s discretion and risk.

Traffic Patterns

To manage the various activities, the airport has developed and publishes a traffic pattern diagram (Figure 49) and a traffic pattern information brochure (Figure 50). The information is posted in the operating areas of the ultralights and gliders areas and posted on the airport’s website. The airport manager conducts quarterly user group meetings to address safety and operational concerns. The airport allows glider and ultralight personnel to access their respective areas in accordance with the airport’s rules and regulations. Airport operating rules and regulations exist to specifically govern each type of aeronautical activity and are regularly reviewed and updated (see Appendix D).

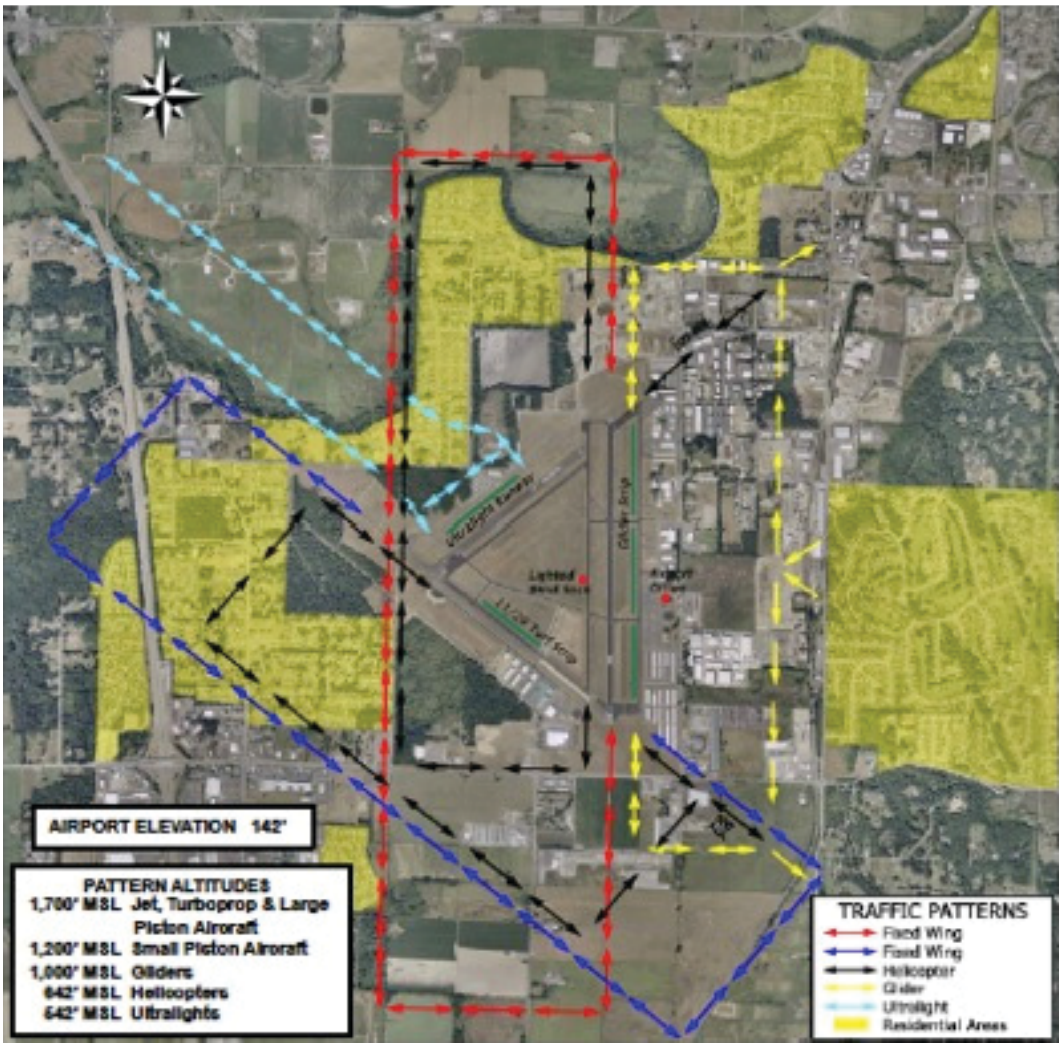

FIGURE 49 Traffic patterns for Arlington Municipal Airport, Washington (*Source*: Arlington Municipal Airport Traffic Pattern Map, http://www.arlingtonwa.gov/index.aspx?page=98).

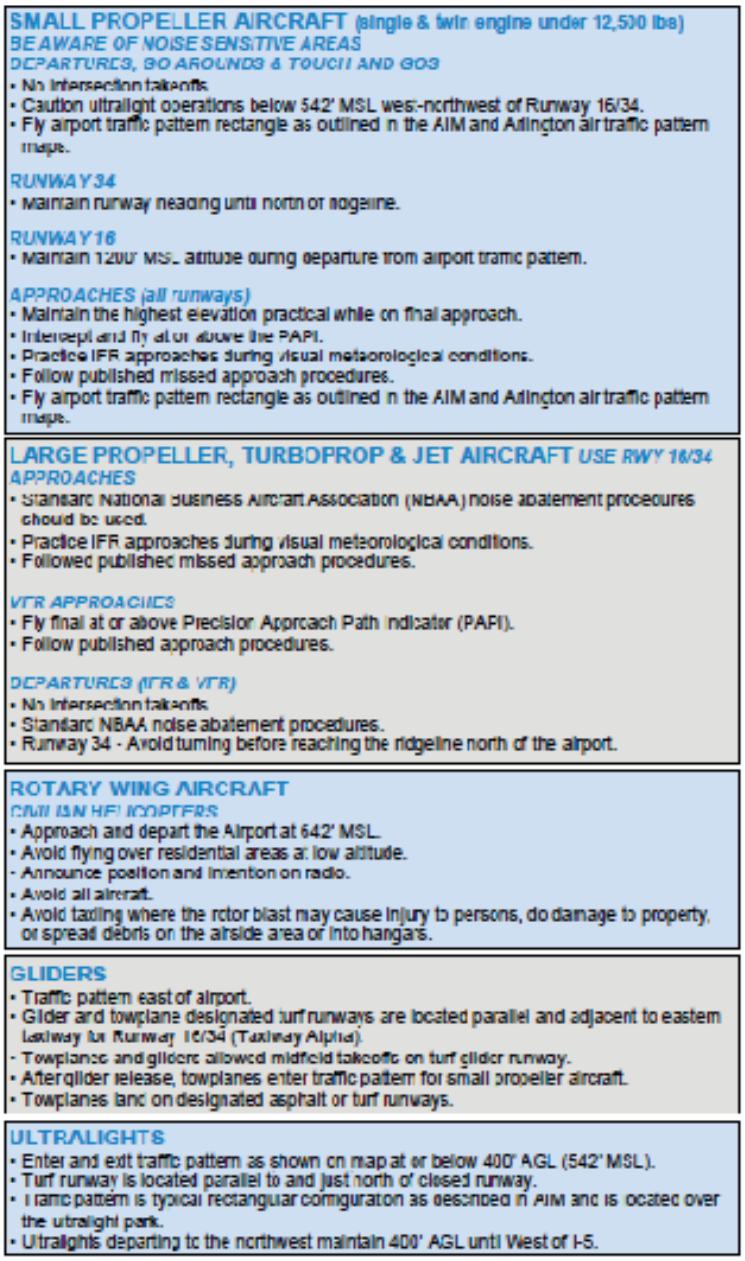

FIGURE 50 Traffic pattern information card for Arlington Municipal Airport, Washington (*Source*: Arlington Municipal Airport Brochure, http://www.arlingtonwa.gov/index.aspx?page=90.).

CHAPTER SIXTEEN

CONCLUSIONS

This study found that although a number of airport and community leaders believe there are significant issues and risks associated with combining various aeronautical activities at any one airport, anecdotal and interview information indicated a less significant problem. For the majority of airports in the United States, especially the small general aviation airports, the infrequent or low volume of operations do not result in major conflicts or challenges. Issues become a concern primarily where there are high volumes of traffic, a wide mix of activity, or frequent use of an airport by one particular type of aeronautical user. With communication and coordination, several airports in the study have been able to resolve those issues to a large extent.

Important points to learn from the study are:

- A basic premise asserted by both the FAA and courts is, if a pilot is conducting the activity in accordance with FAA regulations, then the operator and the operation are presumed to be operating in a safe manner.
- Stakeholder communication and coordination are keys to safely combining mixed-use operations.
- Prohibiting uses at an airport requires extensive documentation and approval by FAA.
- Minimum standards, operating rules, and standard operating procedures (SOPs) are effective practices that airport managers use to assure safe operations in mixed-use aeronautical environments. These practices must be policed and kept current to remain effective.

Issues involving mixed-use aeronautical activities appear to stem primarily from the difference in operating speeds, lack of user knowledge or understanding of competing operational user needs, user's failure to follow existing standard and accepted practices, lack of airport land area to accommodate a user, and conflicts with competing economic entities. Airport design criteria are tailored toward traditional aeronautical uses, such as fixed-wing and rotary-wing operations. Other mixed-use aeronautical activities, such as gliders, skydiving, balloons, and ultralight operations are expected to integrate with existing facilities. Airports have only recently started to benefit from additional planning and guidance that helps ensure safety. FAA has provided a number of handbooks and advisory circulars to address those activities, as have aeronautical user trade associations. The most evident means of accommodating different aeronautical users is through separation of their activities to the extent possible at individual airports.

A prohibition of all aeronautical activity of one type, such as ultralights, gliders, parachute jumping, balloon and airship operations, acrobatic flying, or banner towing is allowable if the FAA concludes that such operations cannot be mixed with other traffic without an unacceptable impact on safety or the efficiency and utility of the airport. If the FAA determines there are less restrictive ways or alternative methods for accommodating the activity while maintaining safety and efficiency, then an airport is expected to accommodate the activity to some extent. A review of FAA determinations and discussions with study participants indicates the need to not arbitrarily reject or delay a user request, but to make a diligent effort to find alternatives for accommodation. Upon request, the FAA will perform a safety review of any aeronautical activity at an airport. In light of recent industry efforts to enhance safety through the implementation of safety management systems, an airport's diligent effort could include an independent safety risk analysis.

The synthesis study reaffirmed the airport's responsibility to manage the affairs of the airport in a reasonable, and not unjustly discriminatory, manner. The development of minimum standards or rules

and regulations can lay a strong foundation for meeting the airport operator's obligations. SOPs, rules and regulations, and minimum standards are all means to enhance safety at an airport.

The literature review for this study discovered news articles, standards, and court cases that tend to group into two general formats for establishing minimum standards: (1) those developed by airports that seek to encourage and support various aeronautical uses and (2) those that tended to discourage them. Concern has been expressed in the literature that skydiving, ultralights, and other mixed-use aeronautical activity may result in traditional fixed-wing flight operators avoiding operation at an airport, especially jet activity. Airport operators project that there can be a subsequent decrease in fuel sales and other economic business activity. This study did not find quantifiable data related to the various claims.

As the study further discovered, the development of SOPs and rules and regulations have little value if they are not well communicated and consistently upheld. A common finding from minimum standards at airports is that they often use a boilerplate approach to the more common commercial aeronautical activities, rather than including the possibility of a different aeronautical user. It is not until a little-anticipated aeronautical operator appears at the airport manager's door and requests access to the airfield that many managers first think of the possibility or consequences.

While much of this study focuses on the responsibility of the airport operator, the data collected also describe users' actions having an impact on airport operations. As the study progressed, it became apparent the various aeronautical users are passionate about their activity. That passion can bring solutions to the table or can create obstacles. The majority of users displayed efforts to bring solutions to the table. This is evident in the efforts of the aeronautical trade associations to provide leadership and guidance to their members. Their development of organizational structure, operating manuals and best practices, education and training resources, safety documents and reviews, and a host of social and competitive opportunities, all are indicative of efforts to provide solutions. However, the trade association handbooks tend to have little information on how to integrate with other aircraft, or information on how to work with airport management.

Simple courtesy and common sense go a long way when different aeronautical users share the same airspace and airport. Users of an airport have a responsibility to completely and thoroughly understand the operating rules of the airport and airspace, and combine that with good decision-making. Many of the accidents reviewed for this study reflect shortfalls in those responsibilities. A number of airport operators emphasized the need to better train and educate users, but the study found smaller airports are less likely to have the resources or to make efforts to do so beyond normal issuance of a Notice to Airmen. However, the review discovered a gap in information listed in the remarks section of the Airport/Facility Directory. Often the information does not reflect current practice at an airport, if information is lists at all. The various aeronautical handbooks that have been developed invariably focus on enhancing the knowledge of pilots. Pilot education could be enhanced with additional emphasis on integrating some of the practices presented in this report.

The guidance material in the literature and lessons from study participants suggest the following basic elements will help airports safely combine mixed-use aeronautical activities:

- Develop useful minimum standards and operating rules and procedures that consider the possibility of future aeronautical users and that are reasonable and not unjustly discriminatory.
- Mixed-use operations require an understanding of accepted procedures and needs of the other categories of operations. Promote public outreach to meet that goal.
- Accepted procedures and standards need to be enforced quickly, equitably, and consistently.
- The absence of an operating airport control tower creates a need for increased vigilance and situational awareness on the part of all users operating at an airport.
- Efforts that promote communication and understanding among the users can improve safety.
- Regular safety and user meetings improve communication and understanding.
- A safety review and risk analysis can help achieve a number of goals.
- Be open to the benefits that a particular aeronautical user group can bring to the airport.

Owing to the limited breadth of this study, there are airports and examples of practices that were not captured. Each of the aeronautical activities studied in this report could warrant a separate synthesis study to elaborate on airport practices. A singular study on each aeronautical activity could provide more in-depth analysis. In particular, a review of minimum standards focusing on each activity would be beneficial.

None of the airports participating in the study had helicopter tour operators. Further study on tour operators could be beneficial to the industry because they have unique commercial operating needs and practices that would be valuable to present.

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APPENDIX A

Survey Instrument

Airport Cooperative Research Program S04-13
Safely Combining Mixed-Use Flight Operations at Airports

AIRPORT IDENTIFIER: CONTACT PERSON:

EMAIL: PHONE:

Please check all those specialized activities that routinely or seasonally occur *on* or *within 1 nm* of your airport:

- ☐ Glider
- ☐ Helicopter
- ☐ Gyrocopter
- ☐ Parachute/Skydive
- ☐ Powered Parachutes
- ☐ Hang glide, micro or powerlight vehicles
- ☐ Balloon
- ☐ Blimp
- ☐ Banner towing
- ☐ Acrobatic
- ☐ Agriculture aerial applicator
- ☐ Floatplane/Seaplane
- ☐ VTOL/Tiltrotor
- ☐ UAV/RPV
- ☐ Fire fighting
- ☐ Other
- ☐ RC model aircraft

Q1. Are you satisfied with the manner that your specialized activities have been safely incorporated into your airport operating environment? YES ☐ NO ☐ SOMEWHAT ☐

Q2. What benefits does the airport or community derive from accommodating any of the listed specialized activities?
Please list/describe:

Q3. What concerns or issues might you have with any of the specialized activities, if any?
Please list/describe:

Q4. Are there particular hazards, risks, or problems that you have encountered as a result of allowing any of the specialized activities? Please list/describe:

Q5. What common complaints have you received from aeronautical users about the specialized activities?
Please list/describe:

Q6. Are there operational or managerial impacts on staffing or supervision that are related to any of the specialized activities, such as: (Please check those that apply)

- ☐ maintenance of a pavement, grass, ramp or other operational area?
- ☐ access control?
- ☐ providing escort/security?
- ☐ training or education?
- ☐ interference with navaids?
- ☐ affect on the community?
- ☐ emergency response?
- ☐ Other. Please list/describe:

Q7. Are there any specialized activities that you would NOT ALLOW on your airport? YES ☐ NO ☐
If yes, which activities?
For what reasons would you not allow them?

Q8. What airport logistics, requirements, or resources are needed for each aeronautical activity in order for them to stage, launch, recover, or manage the activity? For instance, access for support vehicles, airfield training, mowing, parking, storage, office, restroom, security, key code, utility provision water/electrical, NOTAM issuance, permits, environmental requirements, etc.
Please list/describe:

Q9. What hazards or risks do you associate with any of the specialized activities on your airport?
Please list/describe:

Q10. Does your airport require operators to carry insurance? YES ☐ NO ☐ OTHER ☐
If so, what type , amounts , or conditions?

Q11. Does your airport charge a special fee or rate structure for the use of the airfield by each specialized operator?
YES ☐ NO ☐ OTHER ☐
Please describe the fee or rate structure:

Q12. How do you inform other aeronautical users, especially transient aircraft, of specialized activity operations?
Please list/describe:

Q13. From a safety and operational standpoint, what actions, procedures or measures have you taken to improve the safe and concurrent use and operation of the specialized activities on your airport?
Please list/describe:

Q14. Does your airport have minimum standards, rules and regulations, standard operating procedures, permit applications, or checklists related to any of the specialized activities?
YES ☐ NO ☐ OTHER ☐

Q15. Does your FAA ADO Regional Office or State Bureau /Division of Aviation have regulations related to any of the specialized activities, or have helpful guidelines or recommendations?
YES ☐ NO ☐ OTHER ☐

Q16. Does your airport layout plan (ALP) show a specialized operating area for any of the activities noted, or does your master plan evaluate provisions for the specialized aeronautical activities?
YES ☐ NO ☐ OTHER ☐

Q17. Would you be willing to share one or more of your documents so others may benefit?
YES ☐ NO ☐ OTHER ☐

Q18. Are there any particular lessons you have learned that would be of benefit to other airport operators? In particular, what unexpected circumstance happened, what would you do differently, or what has really worked well for you?
Please list/describe:

Thank you very much for your responses, as they will help other airports to learn from your experiences.
Contact me should you have any questions. I will follow up if any clarification is needed.
Please return email to: SMQAirportServices@gmail.com.

Stephen M. Quilty, A.A.E. 26757 Haverhill Drive SMQAirportServices@gmail.com
SMQ Airport Services Lutz, FL 33559-8509 813-388-9132

The mission of SMQ Airport Services is to support the airport management profession with training and education, safety audits, SMS and SRA facilitation, organizational development and assessment, and special research study.

APPENDIX B

List of Participants and Types of Activities

			Glider	Helicopter	Gyrocopter	Skydive	Powered ultralight	Hang glider	Balloon	Blimp	Banner tow	Aerobatic	Ag Applicator	RC Model	VTOL	UAV/RPV	Aerial Firefighting
		TOTALS	14	25	7	8	12	7	9	7	6	8	13	3	1	3	6
STATE	**ID**	**AIRPORT**															
CA	ACV	Arcata								X							
CA	DWA	Yolo County		X		X		X	X				X				X
CA	LVK	Livermore Municipal		X	X				X	X	X						
CA	TRK	Truckee–Tahoe	X	X				X	X								X
CO	BDU	Boulder Municipal	X	X				X									X
FL	APF	Naples Municipal					X										
FL	LAL	Lakeland–Linder Regional	X	X		X	X	X	X	X		X		X	X	X	
FL	VNC	Venice Municipal	X				X		X			X					
FL	X39	North Tampa		X	X		X		X								
GA	48A	Cochran											X				
IA	AMW	Ames	X										X			X	
IA	DVN	Davenport Municipal		X					X	X	X		X				
IA	FOD	Fort Dodge Regional		X		X			X				X			X	
IL	MDH	Southern Illinois		X									X				
IL	C15	Pekin Municipal		X									X				
MA	TAN	Taunton Municipal		X		X					X						
MD	MD1	Massey Aerodrome					X	X									
ME	BXM	Brunswick Executive					X					X					
MN	AEL	Albert Lea Municipal	X	X			X										
MN	FBL	Faribault Municipal	X	X			X										
MN	GPZ	Grand Rapids/Itasca County		X			X										X
MN	STC	St Cloud Regional		X									X				
MT	WYS	W. Yellowstone	X	X		X							X				X
NH	EEN	Keene		X								X					
NH	ASH	Boire Field		X							X						
NM	5T6	Dona Ana County	X	X	X	X	X			X		X	X				
NV	MEV	Minden–Tahoe	X	X	X	X		X					X				X
OH	LHQ	Fairfield County				X	X					X					
OH	7G8	Geauga County	X	X							X			X			
PA	OQN	Brandywine		X													
TX	AMA	Amarillo International													X		
VA	PSK	New River Valley								X							
WA	AWO	Arlington Municipal	X	X	X		X	X	X			X					
WA	OLM	Olympia Regional	X	X	X							X		X			X
WI	LUM	Menomonie Municipal	X										X				
WI	SBM	Sheboygan County Memorial		X	X					X	X		X				

STATE AVIATION OFFICES

AK	Division of Statewide Aviation
CA	Division of Aeronautics
NH	Bureau of Aeronautics
MT	Montana Aeronautics Division
NC	North Carolina Division of Aviation
ND	North Dakota Aeronautics Commission
PA	Bureau of Aviation
VA	Virginia Department of Aviation

ASSOCIATIONS AND ORGANIZATIONS

Academy of Model Aeronautics	Muncie, IN
Aircraft Owners and Pilots Association	Frederick, MD
Balloon Federation of America	Indianola, IA
Experimental Aircraft Association	Oshkosh, WI
Helicopter Association International	Alexandria, VA
National Aerial Agricultural Association	Alexandria, VA
Soaring Society of America	Hobbs, NM
Ultralight Association	Lewes, DE
United States Parachute Association	Fredericksburg, VA
United States Hang Gliding & Parachuting Association	Colorado Springs, CO

APPENDIX C

Sample Informational Summary from *ACRP Legal Research Digest*

Source: *Airport Cooperative Research Program Legal Research Digest 23* (2015).

(Others descriptors available for Skydiving, Ultralights, Helicopters, and Weight-Based Vehicles)

Page 3

What is it?

Banner towing, sometimes known as aerial advertising, involves attaching a banner to an aircraft and flying the aircraft over populated areas or congregations of people, typically at low altitude.

How is it regulated by the FAA?

Operators may be required to submit FAA Form 7711-2, *Application for Certificate of Waiver or Authorization*, to the FAA Flight Standards District Office to obtain a waiver from minimum altitude and other requirements of 14 C.F.R. Part 91.

How is it regulated by airport operators?

An airport operator may determine that banner towing should be restricted or prohibited when the airport serves a high volume of commercial passenger aircraft and/or high-speed general aviation jet aircraft. *See* Director's Determination, *Florida Aerial Advertising v. St. Petersburg – Clearwater International Airport,* FAA Docket No. 16-03-01 (2003).

Banner towing is subject to complying with airport minimum standards and paying the fees established by the airport operator for conducting the activity. *See* Director's Determination, *Drake Aerial Enterprise v. City of Cleveland*, FAA Docket No. 16-09-02 (2010).

Local governments may restrict banner towing in the interest of protecting the visual landscape. *See Center for Bio-Ethical Reform v. City and County of Honolulu*, 455 F.3d 910 (9th Cir. 2006); *Skysign International, Inc. v. City and County of Honolulu,* 276 F.3d 1109 (9th Cir. 2002).

How common are local regulations and what are some examples?

The search term "banner towing" appears in the August 22 – October 17, 2013 edition of Airport/Facility Directory 47 times, and 8 airports (or 17%) have limited or restricted this activity in some way. Examples of notifications concerning limitations and/or restrictions on banner towing include the following:

- "Banner towing prohibited within 2 NM of the airport."
- "Banner towing on weekends from May–Sep."
- "Arpt CLOSED to banner towing ops."

Where can I look for additional information?

- *FAA/FS-I-8700-1, Information for Banner Tow Operations* (2003)
- Director's Determination, *United Aerial Advertising v. County of Suffolk*, FAA Docket No. 16-99-18 (May 8, 2000)
- Record of Decision, *Gary's Banners Aerial Advertising v. Capital Region Airport Auth.*, FAA Docket No. 13-96-17 (1999)

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APPENDIX D

Rules and Regulations—Arlington Municipal Airport, Washington

Source: D. Ryan. Arlington Municipal Airport, WA. Used with permission.

Title 14 AIRPORT

Chapter 14.06

Ultralight Aircraft Regulations

14.06.010 Purpose and designation of airport. This Chapter 14.06 is intended to provide for safe and orderly ground and flight operations of ultralight aircraft at the Arlington Municipal Airport. Hereafter in this chapter the word "airport" refers to the Arlington Municipal Airport.(Ord. 839 §1(part), 1983).

14.06.020 General rules. The following general rules shall govern all aeronautical activities of ultralight aircraft operators at the airport:

(1) All aeronautical activities of ultralight aircraft arriving at or departing from the airport shall be conducted in conformity with the current pertinent provisions of the Federal Aviation Administration (FAA) and all other pertinent airport rules and regulations as set forth in this chapter.
(2) The airport manager may suspend or restrict any or all ultralight operations for reasons of safety or adverse weather conditions whenever such action is deemed necessary.
(3) The airport manager or his or her duly authorized representative shall at all times have the authority to take such action as they may deem necessary for safety of operation and to safeguard the public at the airport. (Ord. §1378 (part), 2005).

14.06.030 Airport surface operations. The following rules shall govern ultralight aircraft surface operations at the airport:

(1) All ultralight flight operations shall be conducted from such takeoff and landing areas as are prescribed by the airport manager (see ultralight operation diagram, attached hereto as Exhibit 14.06-1).
(2) All ultralight ground support activities shall be conducted only in areas prescribed by the airport manager (see ultralight operation diagram, attached hereto as Exhibit 14.06-1).
(3) All ultralight fixed base operators shall have the duty at all times to carry out the policies of the Arlington airport commission in respect to admission and control of children, pets and non-flying observers to or at the ultralight operations area.
(4) Hours of activity may be specified by the airport manager and shall be consistent with the airport's multi-use policies. (Ord. §1378 (part), 2005).

14.06.040 Flight operations. The following rules shall govern all aircraft flight operations at the airport utilizing the ultralight runway:

(1) Traffic Pattern:
    (a) The ultralight traffic pattern shall have the same general rectangular configuration as described in the aeronautical information manual and the pattern entry and exit paths as shown in the (ultralight operation diagram attached hereto as Exhibit 14.06-1).
    (b) The ultralight pattern shall be five hundred forty-two feet Mean Sea Level (MSL), or four hundred feet Above Ground Level (AGL).
    (c) The ultralight pattern entry and exit path shall be flown at the same altitude as the ultralight traffic pattern altitude from a point of at least three nautical miles from the airport.
    (d) Care shall be taken by all ultralight operators so as not to cross over any active runway approach area, runway, ramp, restricted zones, or hangar area, and to stay at least eight hundred feet horizontally from any of the above areas.
    (e) The airport manager shall have the right to change, alter, or adjust the ultralight traffic pattern to insure safety and minimum impact in respect to noise and to foster good relationships with persons living near the airport.
(2) Ultralight flight operations shall be conducted only during daylight hours and during V.F.R. weather conditions as prescribed by the Federal Aviation regulations.
(3) Operation Announcements:
    (a) The proper and approved ultralight operation area diagram shall be displayed at all times in the designated ultralight operations area (see ultralight operations diagram, attached hereto as Exhibit 14.06-1).
    (b) Ultralight activity information shall be included in the Airport/Facility Directory.

(c) All ultralight operators with knowledge of an unusual concentration of ultralight activity, such as a "fly-in", competitive event, display or demonstration, shall notify the airport manager, who shall endeavor to issue a "NOTAM" with the FAA. (Ord. §1378 (part), 2005).

14.06.050 Safety. The following safety rules shall govern ultralight aircraft operations at the airport:

(1) Pilot Qualifications:
  (a) Ultralight pilots shall be familiar with local IFR procedures and with the nonstandard patterns flown by aircraft operating IFR or practice IFR.
  (b) Ultralight pilots shall be aware of the effect of wake and helicopter rotor turbulence upon ultralight aircraft and aware of the proper separation criteria to be observed.
  (c) Each ultralight pilot operating on the airport must demonstrate to the airport manager or to such individual or association as the airport manager has appointed for this purpose that pilot's knowledge of the following matters and that pilot's abilities in the following respects:
    (i) Shall operate the ultralight aircraft in a safe and orderly manner;
    (ii) Shall operate the ultralight aircraft within the allotted and designated area;
    (iii) Shall operate the aircraft consistent with flight rules, traffic patterns and ground procedures.
(2) Equipment Qualifications
  (a) Each operator of an ultralight aircraft operating on the airport shall be responsible for determining the safe operating condition of the aircraft and that the aircraft shall meet the following conditions:
    (i) All aircraft must be equipped with an approved muffler system in perfect working condition.
    (ii) All aircraft must be equipped with a properly operating and accurate altimeter. (Ord. §1378 (part), 2005).

14.06.060 Ultralight operation diagram. The ultralight operation diagram, attached hereto as Exhibit 14.06-1, is adopted and made a part of this chapter (Ord. §1378 (part), 2005).

14.06.070 Enforcement. The city and its duly authorized employees and representatives shall have the power and authority to enforce this chapter and all parts thereof, and may, in its discretion to protect the safety and welfare of the public, prohibit the use of the airport to any person, firm or corporation violating or having violated any rule, regulation or provision of this chapter, such prohibition to continue until such time as it may reasonably appear to the city that such violations will not recur. The city, or its representatives, may summarily eject or remove any such violators, together with the personal property of the violators, from the airport premises, whether or not the violation occurred upon leased premises on the airport. (Ord. §1378 (part), 2005).

Chapter 14.07

GLIDER REGULATIONS

14.07.010 Purpose and designation of airport. This Chapter 14.07 is intended to provide for safe and orderly ground and flight operations of glider aircraft at the Arlington Municipal Airport. Hereafter in this chapter the word "airport" refers to the Arlington Municipal Airport (Ord. 1377 §1 (part), 2005).

14.07.020 Definitions. As used in this chapter:

(1) "Airport" means the Arlington Municipal Airport at Arlington, Washington and includes all of the land, improvements, facilities, and developments within the boundaries of the airport.
(2) "Airport Manager" means that person appointed by the mayor to be responsible for the day-to-day administration, operations, and maintenance of all city-owned Airport property, material assets, financial assets, and employees, or that person's designee.
(3) "Commercial Glider Operation" means any glider operation conducted by a person, firm or association where money is exchanged in return for services.
(4) "Glider" means a heavier-than-air aircraft, that is supported in flight by the dynamic reaction of the air against its lifting surfaces and whose free flight does not depend principally on an engine. (FAR/AIM 1998)
(5) "Glider Club" means a nonprofit entity organized for the purpose of providing members access to aircraft for members' personal use and enjoyment.
(6) "Glider Operations Area" means the area where gliders are launched, recovered, and parked during glider operations.
(7) "Glider Trailer" means any trailer used to transport and/or store a glider.
(8) "Operation" means any glider activities conducted by commercial glider organizations, club glider organizations, or private individuals on the airport.
(9) "Runway" A defined rectangular surface on an airport prepared or suitable for the landing or takeoff of airplanes.
(10) "Staging Area" means that area where all individuals who are not directly part of the glider operations gather (pedestrians, customers not flying, families, club members not assisting in operations, etc.).

This area will be used by the commercial and club organizations to answer questions, take money, and register customers.

(11) "Taxiway" means an area of the airport developed and improved for the purpose of maneuvering aircraft on the ground between runways and aprons and between one part of the airport and another.

(12) "Taxiway Connector" means an area of pavement that separates the runway from the taxiway. Aircraft use this area to move onto and off of the runway.

(13) "Tow Plane" means any aircraft used to launch a glider (Ord. 1377 §1 (part), 2005).

14.07.030 General rules. The following general rules shall govern all aeronautical activities of glider aircraft at the airport:

(1) All aeronautical activities of glider aircraft and tow plane operators at the airport shall be conducted in conformity with the current pertinent provisions of the Federal Aviation Administration (FAA) and all other pertinent airport rules and regulations as set forth in this chapter.

(2) The airport manager or his or her duly authorized representative shall at all times have the authority to take such action as they may deem necessary for safety of operation and to safeguard the public at the airport (See regulation 14.20.100).

(3) The airport manager may suspend or restrict any or all glider operations for reasons of safety or adverse airport conditions whenever such action is deemed necessary by him or her.

(4) No person, firm, corporation or association shall conduct any commercial or glider club operations on the airport without first securing written permission to do so from the airport manager or his or her duly authorized representative.

(5) All glider organizations conducting operations on the Airport are to possess the required level of insurance as indicated in the Airport's Title 14.

(6) All gliders (and tow planes) shall use a functioning two-way VHF radio.

(7) No glider shall be left unattended unless it is properly tied down in an approved tie-down location. Glider owners are to provide their own tie-down ropes.

(8) Gliders will not be parked or left with any part extending over any taxiway.

(9) Glider trailers are to be parked either on leased property or in the designated trailer parking area (Ord. 1377 §1 (part), 2005).

14.07.040 Staging. The following general rules shall govern all glider staging operations at the airport:

(1) As part of the glider operations at Arlington Municipal Airport, there shall be a designated staging area to control pedestrian access to the airport operations area. The staging area shall be separate from the glider operations area, and shall be located East of Taxiway Alpha. In addition, the staging area shall not be located on any aircraft movement surface and shall not interfere with normal aircraft operations.

(2) The designated staging area shall be used by the commercial and club glider organizations to answer questions and register customers, and shall be the location from which customers are escorted to the glider operations area.

(3) The glider clubs shall use the staging area during any club events, and should use it as a viewing area for any individuals not directly involved in club operations.

(4) The glider organizations among themselves shall coordinate safe access to the glider operations area from the staging area. In addition, each day at the start of operations, a field manager shall be designated to coordinate the operations between all glider organizations. The field manager shall wear an identifying safety vest at all times.

(5) All individuals are to be given a safety briefing regarding the procedure and hazards associated with airport operations before being allowed access to the glider operations area.

(6) As soon as an individual has finished a glider ride, he or she is to be directed back to the staging area. The only exception is if the individual must remain in the glider operations area for training purposes. (See AMC 14.20.090(e).)

(7) The glider operations area shall be free of all objects except tow planes, gliders, and that equipment which is necessary for conducting safe operations. No vehicles may be parked or left standing in the glider operations area.

(8) Each glider organization shall be held responsible for the violation of any of these regulations by customers or members of that organization (Ord. 1377 §1 (part), 2005).

14.07.050 Launching. The following general rules shall govern all glider launching operations at the airport:

(1) Standard Soaring Society of America (S.S.A.) procedures and hand signals are to be used.

(2) At no time shall a glider be launched when there is conflicting traffic. The pilot and wing runner shall assure that departures will not conflict with aircraft that are taxiing, taking-off or landing.

(3) The tow pilot shall announce all departures on UNICOM frequency prior to take-off roll.

(4) When taking-off to the North, gliders shall be launched from the grass area adjacent to taxiway connector A2. When taking off to the South, the gliders shall be launched from the grass area adjacent to taxiway connector A3. (Refer to Figure 14-1) (Ord. 1377 §1 (part), 2005).

14.07.060 Thermaling. The following general rules shall govern all thermaling activities of gliders operating at the airport:

(1) There is to be no thermaling below 1500 ft Mean Sea Level (M.S.L.) within 1 mile of the traffic pattern (Ord. 1377 §1 (part), 2005).

14.07.070 Traffic Pattern. The following rules shall govern the glider traffic pattern at the airport:

(1) Glider traffic patterns will be east of the airport at all times.
(2) Traffic pattern altitude shall be 1000 ft M.S.L. Glider pilots will use a 45 degree entry to the downwind. (Refer to Figure 14-1)
(3) Tow planes that are landing to the North are to fly over State Road 531/172nd at an altitude of at least 200 ft Above Ground Level (AGL) to clear the rope. Tow planes landing to the South are to fly in at an angle to avoid the Instrument Landing System (ILS) antennas. (Refer to Diagram) (Ord. 1377 §1 (part), 2005).

14.07.080 Landing. The following rules shall govern glider landing procedures at the airport:

(1) Gliders shall announce traffic pattern entry on the CTAF frequency, and shall announce their position in the traffic pattern (45 and Downwind).
(2) Except in cases of emergency, gliders shall utilize only the designated glider landing areas as indicated in the Airport Master Plan.
(3) When landing to the North, gliders shall land on that portion of the glider landing area that is located South of taxiway connector A2. When landing to the South, gliders shall land on that portion of the glider landing area that is located North of taxiway connector A3. (Refer to Diagram) (Ord. 1377 §1 (part), 2005).

14.07.090 Glider traffic pattern diagram. The glider traffic pattern diagram, attached to this section as Figure 14-1, is adopted and made a part of this chapter (Ord. 1377 §1 (part), 2005).

14.07.100 Enforcement. The city and its duly authorized employees and representatives shall have the power and authority to enforce this chapter and all parts thereof, and may, at its discretion to protect the safety and welfare of the public, prohibit the use of the airport to any person, firm or corporation violating or having violated any rule, regulation or provision of this chapter, such prohibition to continue until such time as it may reasonably appear to the city that such violations will not recur. The city, or its representatives, may summarily eject or remove any such violators, together with the personal property of the violators, from the airport premises, whether or not the violation occurred upon leased premises on the airport (Ord. 1377 §1 (part), 2005).

APPENDIX E

Rules and Regulations—DeLand Municipal Airport, Florida

Source: http://www.delandairport.com/sites/delandairport/files/rules_regulations.pdf. Fair use.

Specialized Aviation Service Operation (SASO)—An aeronautical business that offers a single or limited service.

4.12 Skydiving Center—Any operator engaged in a parachuting/skydiving operation shall meet, at a minimum the following requirements:

A. The Skydiving Center shall have available for skydiving, either owned or under lease, at least one properly certificated Aircraft. The jump plane pilot must be appropriately certificated by the FAA and be appropriately rated for the Aircraft being operated.
B. The Skydiving Center shall meet or exceed the requirements of FAR Part 105 and related FAA Advisory Circulars, as the same may be amended from time to time, and any other applicable governmental regulations.
C. The Skydiving Center shall have available for its exclusive use the following land area and buildings:
   - An enclosed building with at least 5,000 square feet of lighted floor area. Such building must have at least two restrooms and otherwise comply with all applicable building codes and zoning regulations.
   - At least 6,000 square feet of ramp space plus 4,000 square feet of ramp space for each additional skydiving Aircraft above one (1).
   - A designated spectator area which is separated or cordoned off from any areas in which Aircraft will be operating.
   - A designated Aircraft staging area, landing area location and loading area shown on a site plan as required in the application process (see Section 3.1L).
   - An available parking area for customer and employee parking with a capacity as determined to be required by the City's Planning Department.
D. Prior to the commencing operations, the Skydiving Center shall enter into a Letter of Agreement with the Daytona Beach Air Traffic Control Tower and Jacksonville ARTCC for the purpose of supplementing FAR Part 105 by further defining procedures for skydiving activity at the DeLand Airport. Such Letter of Agreement shall remain in effect throughout the duration of the Skydiving Center's operations at the DeLand Airport.
E. The Skydiving Center shall obtain through a lease with the City of DeLand, or through a sublease approved by the City of DeLand, the rights to operate a facility which complies with the Minimum Standards for Skydiving Center for a period of not less than two (2) years.
F. The Skydiving Center shall operate 52 weeks per year and at a minimum 5 days per week. On each day the Skydiving Service is in operation, it must be open at least eight (8) hours.
G. The Skydiving Center shall have on duty an adequately qualified manifestor at all times while jump operations are taking place who shall communicate with all skydiving Aircraft operating at the Airport.
H. The Skydiving Center shall have each of its customers execute a hold harmless agreement, on a form to be approved by the City's risk manager, which agreement will name the City of DeLand as a party released from liability.
I. Establishment of a new Skydiving Service shall be subject to the following:
   Safety and Efficiency Plan submittal—A safety and efficiency study to determine whether the DeLand Municipal Airport can safely accommodate the proposed operation without adversely impacting the efficient operation of the Airport. In the event that the City of DeLand uses a consultant for the purpose of assisting in this analysis, the party proposing to establish the Skydiving Service shall pay for the cost of the consultant to the City of DeLand, and shall deposit the anticipated cost thereof with the City of DeLand prior to the City undertaking such study. The City of DeLand will seek input from the FAA, and request its own analysis, before making any decision on establishment of a new skydiving service operation.

4.13. Agriculture Spraying Services—Agricultural spraying operations will be conducted in accordance with procedures approved by the Airport Manager and made known to all persons conducting agricultural spraying operations. Agricultural spraying operations shall be accomplished in accordance with the standards of the US Environmental Protection Agency and the Florida Department of Environmental Protection in an area so designated by the Airport Manager. Each agricultural spraying operator shall be responsible for the cleanup of any chemical spills on the Airport property caused by the Ag operator.

Each Commercial Operator shall at all times maintain in effect the following types and minimum amounts of insurance as applicable to the business to be conducted:

Schedule of Minimum Insurance Requirements

Clubs	
Commercial general aviation liability policy with coverage for premises, operations and products.	$1,000,000 CSL
Skydiving	
Commercial general aviation liability policy with coverage for premises, operations and products.	$1,000,000 CSL
Aircraft liability with coverage for bodily injury and property damage including passengers.	$1,000,000 CSL
Agricultural Spraying	
General Liability Policy	$2,000,000 CSL

Rule 7-10. Standard Traffic Pattern and Altitude—All Aircraft will follow the traffic pattern rules as published in the FAA Airport/Facility Directory or through posted Notices to Airmen (NOTAMs). All flight activity will adhere to FAA Advisory Circular 90-66 (latest change) "Recommended Standard Traffic Patterns and Practices for Aeronautical Operations at Airports without Operating Control Towers."

The approved traffic pattern for the Airport provides for a standard left hand traffic pattern, with an altitude of 1000 feet above ground level (AGL).

Rule 7-12. Takeoffs from Areas Other Than Runways—Takeoffs or landings shall not be made on the apron, parking ramp, taxiway, or any area other than designated runways by airplanes, gyroplanes, power lift, ultralights, or light sport Aircraft except by prearranged permission from the Airport Manager or in emergencies. Helicopters may operate to and from designated helicopter landing areas.

Rule 7-14. Special Procedures—The Airport Manager may, in the interest of safety, designate special traffic procedures for certain operations, such as helicopters, air shows or aviation fly-ins, agricultural operations, gyroplanes, powered lift, gliders, balloons, airships, ultralights, and light sport Aircraft in the weight shift control or powered parachute class. Any such change from standard procedures shall be published in the FAA's Airport/Facility Directory if of a permanent nature or the Airport Manager shall issue a NOTAM if such change is of a temporary nature.

Rule 7-15. Model Aircraft, Kites, Fireworks, Balloons, etc.—No person shall fly or release a model Aircraft, rocket, kite, fireworks, balloon, etc., on the Airport except in those areas established for such purpose and approved by the Airport Manager. Model A/C operations for specific aeronautical events such as fly-ins or air shows may be approved for specific times by the Airport Manager.

Source: DeLand Municipal Airport, Florida [Online]. Available: http://www.delandairport.com/sites/delandairport/files/rules_regulations.pdf [accessed Dec. 1, 2015].

APPENDIX F

Sample Ultralight Rules and Regulations—Bremerton National Airport, Washington

Source: http://www.portofbremerton.org/sites/default/files/BNA%20Rules%20and%20Regs%2003%2014.pdf. Fair use.

ULTRALIGHT OPERATIONS

Ultralight aircraft will be operated in accordance with the provisions of FAR Part 103 and the following procedures:

1. No person may operate an Ultralight aircraft within the Airport Control Zone except between the hours of sunrise and sunset.
2. Ultralight operators are required to notify Seattle Approach Control on 127.1 MHZ or via telephone prior to commencing and upon terminating flight operations within the Class E airspace.
3. All Ultralight aircraft operating within five (5) miles of the airport shall remain at an altitude no higher than 500 feet AGL. Ultralights shall use lefthand traffic for runway 2 and right hand traffic for runway 20.
4. The operator of an Ultralight at Bremerton National is encouraged to install and use or have in his possession, a functioning VHF radio capable of monitoring and broadcasting his intentions on the airport's UNICOM frequency (123.05 MHZ) while operating near the airport or in the traffic pattern.
5. The designated area for take-offs or landings shall be the active runway 02/20.
6. No Ultralight aircraft may be operated under weather conditions less than those required for VFR flight which requires a minimum of three (3) miles visibility and a minimum ceiling of 1000 feet AGL.
7. Each person operating an Ultralight aircraft shall maintain vigilance so as to see-and-avoid aircraft and shall yield the right-of-way to all other aircraft.

APPENDIX G

Sample Airport/Facility Directory NOTAM Remarks

Source: SMQ Airport Services data compilation

GENERAL

- SPECIFIC TFC PATS ARE PUBLISHED FOR HELICOPTER AND FIXED WING TFC; COMPLIANCE IS MANDATORY. OBTAIN THIS INFO FROM ATCT OR FBO OR AMGR; OR REQ SPECIFIC TFC PAT INSTRUCTIONS ON INITIAL CTC.
- PWRD PARAGLIDERS AND MOBILE AEROSTATS OPERATE SE SIDE OF ARPT SURF-500'

AGRICULTURE

- RWY 07/25 RSTRD FOR AGRICULTURE USE ONLY.
- NO AGRI FLIGHTS EXCP BY PPR ARPT MGR
- ARPT CLSD TO PART 137 OPS EXCP PPR
- HEAVY CROP DUSTER ACTIVITY INVOF ARPT-RYS 26 AND 08 USED EXTENSIVELY BY AERIAL APPLICATOR ACFT. RECOMMEND EXTENSIVE USAGE OF CTAF FOR POSITION REPORTING
- EXTENSIVE AGRICULTURAL ACFT ACTIVITY ON & INVOF ARPT
- CROP DUSTING ACFT & AGRICULTURAL EQUIP ON & INVOF ARPT
- FREQUENT AERIAL APPLICATION TFC DUR MONTHS OF JUN, JUL, AUG
- NUMEROUS AGRICULTURAL ACFT OPPS WEST OF N/S TWY. ACFT DEPART NORTH AND LAND SOUTH.
- TURF STRIP 3300' × 75' PARALLEL TO & EAST OF RWY 15/33 USED BY CROP DUSTERS ONLY
- CROP DUSTING OPNS CONDUCTED DURING DALGT HRS.
- RWY 18 AGRI OPN LCTD 10 FT NORTH & 70 FT EAST OF RY CNTRLN THLD.
- NUMEROUS AGRICULTURE ACFT OPS FROM FEB–NOV 500 FT AGL AND BELOW.
- FREQUENT NO RADIO AGRICULTURAL ACFT ACTIVITY IN VICINITY OF ARPT

HELICOPTER

- HELICOPTER HOVERS, SKID LANDINGS AND AUTO-ROTATIONS ARE NOT PERMITTED
- HELICOPTER FLIGHT TRAINING OPRS PROHIBITED.
- ARPT CLSD TO HELICOPTERS EXC PPR
- HELICOPTERS REFRAIN FM AIR TAXI OVER PAVED PARKING RAMPS.
- FULL ON AUTO-ROTATIONS, SLIDING SKID LANDINGS OR TAKEOFFS BY SKID TYPE HELICOPTERS ON ANY PAVED SURFACE NOT AUTHORIZED.
- HELICOPTER RUNNING LNDGS NOT AUTHORIZED ON RY 18/36.
- HELICOPTER TAXIING PROHIBITED IN VICINITY OF BLDGS.
- NO HELICOPTER PARKING IN FIXED WING TIE-DOWN AREAS.
- HELICOPTER TFC APCH ARPT FM EAST ALONG TWY TO HELIPAD.
- HELICOPTER TRNG FLTS USE LEFT-TRAFFIC FOR RY 30, AND RIGHT-TRAFFIC FOR RY 12.
- HEL OPNS APCH ARPT BDRY AT MIDFIELD AT OR ABOVE 900 FT MSL.
- HELICOPTERS CROSS ACTIVE RYS AND TWYS
- HELICOPTERS ARRIVING & DEPARTING FM RYS & TAXIWAYS
- FREQUENT HELICOPTER MEDIVAC OPERATIONS—MONITOR CTAF.
- HELICOPTER TRAFFIC REQUESTED TO LAND AND TKOF FM RY ONLY.
- RWY 08 RIGHT TRAFFIC HELICOPTERS—RWY 26 RIGHT TRAFFIC HELICOPTERS
- HELICOPTERS USE CONC HELIPADS TO PARK OR REFUEL.
- HELICOPTERS APCH PARALLEL TO RY 05/23 & TRANSITION PERPENDICULAR TO RY 05/23 TO HELIPADS ON NE CORNER OF APRON.
- LOW FLYING HELICOPTERS IN TFC PAT.
- TRANSIENT HELICOPTER OPS PREFERRED NORTH (CONCRETE) GENERAL AVIATION RAMP.
- HELICOPTERS PROHIBITED AT FUELING ISLANDS
- ALL HELICOPTER TFC TO COME & GO VIA THE TWY. FLYING OVER BLDGS ADJACENT TO RAMP IS PROHIBITED.

GYROCOPTER

- GYRO OPNS INVOF ARPT LAST SAT EVERY MONTH

GLIDER

- GLIDER OPNS BY WRITTEN APVL ONLY; CONTACT AMGR. GLIDER OPNS ALLOWED ON RYS 06 & 30 ONLY. NO SOD OPNS.
- GLIDER TOWING RQRS PRIOR NOTIFICATION, CTC ARPT OFC
- NO GRASS LANDINGS OR TAKEOFFS EITHER SIDE OF RY 06/24.
- BE ALERT FOR GLIDER OPS MAY–SEP
- GLIDER OPNS LEFT & RIGHT TFC TO ALL RYS
- GLIDERS APCH FM N, USE RWY 9L/27R; PWR ACFT APCH FM S, USE RWY 9R/27L
- GLIDERS OPERATING SW OF RY 15/33.
- EXTENSIVE GLIDER ACTIVITY IN VICINITY UP TO 12,000 FT MSL
- SAILPLANE TFC PAT RYS 30 & 34 RIGHT TFC.
- GLIDER OPNS FM GRASS WEST SIDE OF RY.
- GLIDERS & TOW AIRPLANES OPERATE FM TURF AREA JUST SOUTH OF RY 07/25
- EXTSV GLIDER OPNS ALONG WEST SIDE OF RY; GLIDERS FLY OPPOSITE PTN TO POWERED ACFT.
- FREQUENT GLIDER TFC 1000—SUNSET DAILY DURING APRIL–MID NOVEMBER
- GLIDERS USE THE TURF AREA WEST OF RWY 18/36, GLIDER FREQUENCY 123.5
- EXTENSIVE SOARING ACTIVITY.—ACFT PKD ADJ TO RYS 09/27 & 18/36 DURING GLIDER OPERATIONS
- GLIDER ACTVTY ON WKENDS & OCNLY WKDAYS WITH EXTENSIVE PRE-LAUNCH & AFTER LDG GND OPNS ON SHOULDERS OF RY IN USE
- EXTSV GLIDER ACTVTY. NORMAL GLIDER OPNS UTILIZE RIGHT-HAND PATTERN FOR THE TURF AREA TO THE RIGHT OF RY 32; LEFT-HAND PATTERN FOR THE TURF AREA TO THE LEFT OF RY 14
- HEAVY GLIDER TFC.—RWY 23 GLIDERS ONLY—GLIDERS OCNLLY USE POWER PLANE RWY FOR LNDG TO THE WEST.
- HEAVY GLIDER ACTIVITY DURING DALGT HRS, ALL ALTS, ON AND INVOF AIRPORT AND WITHIN 15 NM EAST AND SOUTH OF ARPT.
- GLIDER TRAINING AREA NORTH OF RY 09/27 CENTERLINE.
- GLIDER & TOW PLANES LND/TKOF—SOMETIMES OPPOSITE TO WIND INDCTNS.—MONITOR GLIDER ACTVTS ON CTAF.

AEROBATIC

- AEROBATIC BOX LCTD WITHIN 1 NM RAD OF ARPT SFC TO 4500 FT MSL SR-SS.
- AEROBATIC AREA 1700 FT–4200 FT MSL ABOVE ARPT.
- AEROBATIC BOX OVER ARPT, FROM 500 FT AGL TO 5,000 FT AGL IMT SOUTH OF AND INCLUDING RY 9/27; 8,700 FT LONG × 6,000 FT WIDE. SEE NOTAMS FOR ACTIVE TIMES
- AEROBATIC MANEUVERS AT ARPT
- AEROBATIC PRACTICE AREA WI 1 NM SFC-5000'MSL, HRS IREG, CHECK NOTAMS.—OCNL GND LEVEL AEROBATIC PRACTICE.—USE CARE
- AEROBATIC PRACTICE SFC TO 4500 FT AGL ABOVE RY 18/36
- RWY 27 AEROBATIC BOX SOUTH OF RY 09/27—CHECK NOTAMS—RIGHT TFC RY 27 WHEN AEROBATIC BOX ACTIVE
- AEROBATIC BOX ON FIELD—CHECK NOTAMS.
- AEROBATIC ACTVT ALONG N SIDE OF RY 09/27 & 4 NM SW OF ARPT. CTC UNICOM FOR TFC INFO & AFSS FOR SPECIFIC TIMES
- DAILY AEROBATIC ACTIVITY 3-18 MILES EAST UP TO 5,255 FT AGL, MONITOR ON 122.775

SKYDIVE

- PARACHUTE DROP ZONE LOCATED APPROXIMATLY 1000' SOUTH OF RWY 08/26.
- SKYDIVE DROP ZONE ADJACENT AIRPORT NORTH SIDE
- SKYDIVING ACTIVITY THU–SUN.
- PARACHUTE ACTIVITY ON WEEKENDS—MONITOR NOTAMS FOR TIMES
- CAUTION: ARPT IS A SPORT PARACHUTING CENTER.
- PARACHUTE JUMP CENTER
- CAUTION: PARACHUTE JUMPING ON FIELD.—BE ALERT OF ULTRALIGHT TRAFFIC IN LOWER PATTERN.
- EXTSV PARACHUTING ACTIVITIES DAILY; DO NOT OVERFLY AIRPORT; AVOID AIRSPACE ADJ EAST. PARACHUTING ACTIVITIES CAN BE MONITORED ON FREQ 122.775.
- PARACHUTE OPERATIONS WITHIN 5 NM, SURFACE—18000 FT MSL, CHECK CAK APPCH.
- PARACHUTE JUMPING TO 14,000 FEET 0700—SUNSET DAILY.
- PARACHUTE JUMPING. SKYDIVING OPS DAILY FROM SR-SS. DO NOT OVERFLY THE ARPT DURING SKYDIVING OPS. BE ALERT FOR SKYDIVING AND ACFT DESCENDING FROM 10,500 FT MSL INVOF ARPT DURING SKYDIVING OPS.

- SKY-DIVING ACFT DESCENDING FROM 13500 FT & ENTERING OPPOSITE TFC PAT FOR RWY 1/19 E OF ARPT
- EXERCISE CAUTION FOR EXTENSIVE ACFT OPERATIONS OF ALL CATEGORIES AND TYPES USING RWY 1/19, PARALLEL
- PAJA IRREGULAR
- FLY ONE MILE DOWN WIND LEG TO PREVENT CONFLICTS WITH PARACHUTE = FREQUENT PARACHUTE ACTIVITY TO TARGET 300' SE OF TERMINAL APRON.
- JUMPING ACTIVITY (DROP ZONE SOUTHEAST FROM RY).
- PARACHUTE JUMP AREA LOCATED EAST SIDE OF ARPT. CTC NUMBER FOR INFO AND UPDATES ABOUT SKYDIVING OPS XXX-XXX-XXXX. BE AWARE OF SKYDIVERS CROSSING RY.

ULTRALIGHT

- ULTRALIGHTS NOT AUTHORIZED
- CLSD TO ULTRALIGHT ACT EXC BY PRIOR PMSN
- POWERED PARACHUTES PROHIBITED
- BE ALERT FOR ULTRALIGHT ACTIVITY ON & INVOF ARPT
- ULTRALIGHTS ON & INVOF ARPT. ULTRALIGHT PATTERN 1800 FT MSL.
- ULTRALIGHT ACTIVITY ON & INVOF ARPT MON–FRI 1600 TO 1/2 HR AFT SS; SAT; SUN; & HOLIDAYS SR TO 1/2 HR AFT SS.
- ULTRALIGHTS & GLDRS USE TAXIWAY AND EXTENDED TAXIWAY PARALLEL TO RY 12/30—ULTRALIGHTS & GLDRS USING TAXIWAY FLY PATTERN ON 'NE' SIDE OF RY 12/30.
- SPORT AVIATION ACTIVITIES IN PROGRESS ON WEEKENDS
- INTENSIVE POWERED PARACHUTE OPERATIONS DURING EARLY MORNING AND LATE AFTERNOON/EVENING
- ULTRALIGHT ACTIVITY IN GRASS AREA W OF RY 04/22.
- ULTRALGT ACFT USE 500 FT AGL LEFT TFC FOR ALL RYS.
- POWERED PARACHUTE OPNS NORTH SIDE OF RY.
- ULTRALIGHT OPNS CONDUCT A CLOSE-IN 500'AGL RGT HAND PTN DURG DALGT HRS.
- ULTRALIGHTS ENTER/EXIT PAT AT RY 08 TO NORTH—LOWER THAN REGULAR TFC PAT. ULTRALIGHTS DO NOT FLY SOUTH OF RY 26.
- LGT SPORT ACFT WITH CRUISE SPEED OF 60 MPH OR LESS ENTER TFC PAT AT 500 AGL.
- ULTRALIGHT ACFT MUST HAVE AN OPERATING ALTIMETER, TWO-WAY RADIO, USE ULTRALIGHT OPNS AREA (RY 18/36), AVOID OVERFLIGHT OF HARD SFC RYS. ULTRALIGHT OPNS AREA POSTED AT TERMINAL BLDG. WHEN RY 18/36 IS CLSD ULTRALIGHTS MAY USE RYS 02/20 & 11/29.
- ALL ULTRALIGHTS MUST COMPLY WITH FAR 103 AND HAVE AN OPERATING ACFT RADIO
- HANG GLIDER OPERATION ON GRASS ADJACENT TO RWY. ALL OTHERS PPR FOR USE OF GRASS SURFACES.—UNLIMITED VEHICLE ACCESS TO ACFT MOVEMENT AREAS
- LIGHT SPORT ACFT OPERATING ON WEST SIDE OF RY—LNDG ADJ RY 01/19 ON GRASS STRIP PPR.
- ULTRALIGHTS MAY ONLY USE RIGHT TRAFFIC PATTERN.—TPA FOR ULTRALIGHTS 1100 FT MSL; TPA FOR ALL OTHER ACFT 1600 FT MSL.
- ULTRALIGHTS ARE NOT TO CROSS RY 02/20.
- ULTRALIGHT OPERATORS REQUESTED TO OBTAIN AIRPORT SAFETY BRIEFING FROM AIRPORT MANAGEMENT PRIOR TO INITIAL USE OF AIRPORT

BALLOON

- BALLOON AND PARAPLANE ACTIVITY ON THE AIRPORT
- BALLOON OPERATIONS IN VICINITY OF AIRPORT, W AND SW, MAY–OCT.
- BALLOON ACTIVITY ON AND INVOF ARPT IN SUMMER MONTHS DURING MORNING HRS
- 6 BALLOONS BASED ON ARPT.
- RWY B1 BALLOONPORT MEASURES 900 × 250. DUE TO OBSTRUCTIONS (TREES, BLDG & EQUIP) ONLY TWO AREAS SUITABLE FOR USE, ONE 130 FT. × 120 FT. AND ONE 150 FT. × 150 FT.
- HOT AIR BALLOONS WEEKENDS EARLY MORNING & LATE AFTERNOON.—ARRIVING PILOTS SHOULD USE CAUTION

FIREFIGHTING

- AIR TANKER ACTIVITY MAY–NOV; FOREST SVC FIRE FIGHTING ACFT FREQUENTLY FLY THE CONVENTIONAL RECTANGULAR PAT WITH FOUR 90 DEG CLEARING TURNS ENTERING THE DOWN WIND LEG ABEAM MIDPOINT OF RY.
- AIR TANKERS IN VICINITY MAY–NOV FREQUENTLY FLY NON-STD PAT ENTRIES
- U.S. FOREST SERVICE ON FLD, EXPECT HEAVY AIR TANKER ACTIVITY DURING FIRE SEASON
- FIRE FIGHTING ACFT CTC US FOREST SVC TANKER BASE ON GND FREQ 123.975
- CONSIDERABLE USFS FIRE RETARDENT OPERS DURG SUMMER MONTHS

MODEL AIRCRAFT

- MODEL RC ACFT ON AND INVOF ARPT.
- BE ALERT MODEL AIRCRAFT FLYING 1/2 MILE SE OF RY 27 THRSHLD
- RADIO CONTROLLED MODEL ACFT OPERATE ON ARPT AT SE CORNER.
- REMOTE CONTROLLED MODEL ACFT ACTIVITY 500 FT (AGL) /BLO 300 FT SE RY 02/20 SR-SS.
- RDO-CTLD MODEL ACFT ACTVTY ON ARPT WKENDS EVES & HOLS.
- RY N/S CLSD; USED FOR FLYING OF MODEL PLANES
- MODEL ACFT ACTVTY ON OLD CLSD RYS
- MODEL RDO-CTL ACFT OPR E SIDE OF RY 04/22
- MODEL PLANE CLUB OPERATES ON AIRPORT
- RC MODEL ACFT OPER ON ARPT.—BE ADVISED UNMANNED ACFT 100O/BLW 1 NMR OF ARPT.—
- REMOTE CONTROL MODEL AIRCRAFT FLYING OFF END OF RY 14.
- REMOTE CONTROLLED MODEL AIRCRAFT OPERATING IN IMMEDIATE VICINITY OF ARPT.
- HEAVY NON-RADIO EQUIPPED TFC FIRST SAT OF EACH MONTH.
- RADIO CONTROLLED ACFT ADJACENT RY 06/24 400 FT & BLO.

UAS

- UNMANNED AERIAL VEHICLE ACTIVITY & MILITARY OPS INVOF AIRPORT
- EXTENSIVE UNMANNED AERIAL VEHICLE (UAV) ACTIVITY.
- UNMANNED ACFT MAY BE OPERATING IN THE IMMEDIATE AREA DURING DALGT HRS

SEAPLANE

- FOR SEAPLANE OPS BE ALERT FOR EXTSV WATER SPORT ACTIVITIES IN LAKE SUPERIOR BAY.
- SEAPLANE OPERATIONS TO LAKE EAST OF AIRPORT FLY 2,000 MSL PATTERN
- SEAPLANE OPNS ON LILY LAKE ADJ NORTH OF ARPT. PPR FOR LANDING LILY LAKE. CALL 218-326-1226
- OCNL SEAPLANE OPNS
- SEAPLANE ACTVTY ON ADJACENT LAKE .5 MI NE OF ARPT
- SEAPLANE LNDG AREA (WATER CHANNEL) WEST OF & ADJACENT/PARALLEL TO RY.
- 4500 FT BY 100 FT WATERWAY HDG 04/22 LCTD 1100 FT SOUTH OF CONC RY. DUAL LAND/SEA OPERATION.
- SEAPLANE FACILITIES FOR LIGHT AIRCRAFT.—CTC WINTER HAVEN'S GILBERT ARPT UNICOM 123.05 FOR BOAT ACTIVITY & LCL TFC.
- BROWN'S SPB LOCATED ON ADJACENT LAKE—GLIDER ACFT OPERG ON AND INVOF ARPT.
- SEAPLANE OPERATIONS CONDUCTED IN BAY NORTH & ADJACENT TO ARPT; MONITOR CTAF.
- WHEN LNDG ON RY 36 BE ALERT TO SEAPLANE LNDGS ON ADJ RIVER
- SEAPLANE BASE NW CORNER ARPT. =
- RWY 03W/21W WATER RY ADVISORY SERVICE ONLY AREA NOT VISIBLE FROM TOWER. CTC TOWER 119.0 FOR TFC DATA.

BANNER TOWING

- BANNER TOWING PROHIBITED WITH IN 2 NM RADIUS OF ARPT
- ARPT CLSD TO BANNER TOWING OPNS.

- BE ALERT TO BANNER TOWING ON & INVOF ARPT
- BANNER TOWING ON WEEKENDS FM MAY–SEPT
- AERIAL BANNER PICKUP & DROP OPNS ON AND INVOF ARPT.
- HEAVY BANNER TOWING OPS SUMMER.
- BANNER TOW OPERATIONS SW OF RUNWAY 07
- EXTENSIVE BANNER TOWING OPNS MEMORIAL DAY THRU LABOR DAY, OCNL OTHER TIMES
- BANNER TOWING 1500/BLO INTMT DAILY, SOUTH SIDE RY 06/24.

BLIMP

- BLIMP AND HOT AIR BALLOON ACTIVITY ON AND INVOF ARPT SPRING THRU FALL.
- BLIMP OPS & TNG SITE 3 NM SE OF FLD—FLIGHT OPS CONDUCTED IN SURROUNDING AREA.

VTOL

- TILTROTOR ACFT ACTIVITY INVOF ARPT.

APPENDIX H

Sample License Agreement for Aerobatic Activity—Keene Municipal Airport, New Hampshire

Source: E. Mattern, Keene Municipal Airport, New Hampshire. Used with Permission.

City of Keene

NEW HAMPSHIRE

AEROBATIC REVOCABLE LICENSE AND INDEMNIFICATION AGREEMENT

NOW COME, the City of Keene, a New Hampshire municipal corporation with its principal place of business located at 3 Washington Street, Keene, New Hampshire 03431 (hereinafter "City") and (Aerobatic Club at business address) (hereinafter "Licensee") and agree as follows:

WHEREAS, at its meeting on April 2, 2015, the City Council granted the request of Licensee for the use of City property located at the Dillant-Hopkins Airport ("Premises") on September 12, 2015, for the following purpose: to conduct aerobatic activities; and under the following conditions, if any: to be determined; subject to the execution of a revocable license and indemnification agreement and the receipt of a certificate of liability insurance in the minimum amount of One Million Dollars ($1,000,000) listing the City as an Additional Insured ("Agreement") and any other requirements of City staff; and

WHEREAS, the parties wish to memorialize the terms and conditions of this Agreement.

NOW, THEREFORE, in consideration for the rights and obligations as stated herein, and for further consideration, the receipt of which is hereby acknowledged, the parties agree as follows:

A. In consideration for the license granted herein, Licensee, on behalf of itself, its agents, employees, contractors, invitees, or trespassers (collectively "Licensee") does hereby agree to indemnify, defend, and hold the City, its officers, agents, employees, successors and assigns (collectively "City"), harmless from and against any claims, costs, losses, damages, causes of action, personal injuries, property damage (including any damage to the Premises), legal and administrative proceedings, liabilities, defenses, penalties, fines, liens, judgments, and expenses (including all costs, attorney(s)' fees and related expenses), whether at law or in equity (collectively "Claims"), relating to or arising from the use of the Premises by Licensee.

B. Licensee agrees to defend the City, its officers, agents, employees, successors and assigns, from and against any and all Claims brought against the City with respect to the subject of the indemnification agreement contained herein, whether such Claims are rightfully or wrongfully brought or filed. In the event that Claims should be brought or an action filed with respect to the subject of the indemnification agreement provided for herein, the City may employ any attorney(s) to appear and defend the Claims on behalf of the City, at the sole expense of Licensee.

C. The City and the Licensee each agree to notify the other party in writing by Certified Mail within thirty (30) days of the receipt of any notice of Claims, at the address for each party stated above.

D. This Agreement is conditional upon the following:

1. The City shall not waive any of its rights to municipal or governmental immunity or limitations as to liability and this Agreement shall not constitute such a waiver.
2. The City retains the right to revoke or terminate the license contained herein at any time with or without cause, but all other terms and conditions of this Agreement shall remain in effect unless terminated in writing by the City. Licensee shall remove any of its property from the Premises upon revocation of the license. If Licensee fails to remove its property within 10 business days of the date of revocation, the property may be removed and disposed of by the City at the sole expense of Licensee.
3. Licensee shall provide satisfactory proof to the City of general liability insurance in the minimum amount of One Million Dollars ($1,000,000), with the City of Keene listed as an additional insured.
4. The license granted pursuant to this Agreement is personal to the Licensee and is not assignable. Any attempt by Licensee to assign the license granted herein shall terminate the license

but all other terms and conditions of this Agreement shall remain in effect unless terminated in writing by the City.

5. Aerobatic flying activities shall not commence until after 10:00 AM.
6. Aerobatic activity shall not occur below 1,500 MSL.
7. Aerobatic activity shall occur at the southern portion of the aerobatic box established by the FAA.
8. As means of advising the public of the aerobatic activity, Licensee shall extend an invitation to airport neighbors to attend the mandatory safety briefing the morning of practice sessions.

E. In any action brought by the City to enforce the terms of this Agreement, the City shall be entitled to recover its costs, expenses, and reasonable attorney(s)' fees from Licensee.

CITY OF KEENE

Date: _____ By: _____

All of the rights, obligations, and conditions of this Revocable License and Indemnification Agreement are understood and agreed to by:

AEROBATIC CLUB

Date: _____ By: _____

APPENDIX I

Sample Certificate of Waiver for Aerobatic Box—Lakeland Linder Regional Airport, Florida

Source: S. Walsh, Lakeland Linder Regional Airport, Lakeland, FL. Used with permission.

9/2/2014

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

CERTIFICATE OF WAIVER

ISSUED TO

SANDRA WALSH
LAKELAND LINDER REGIONAL AIRPORT

ADDRESS

LAKELAND, FLORIDA 33811

This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.

OPERATIONS AUTHORIZED

From the surface up to and including 4,000 feet MSL, within the practice areas A and B as depicted on the attachment.

The aerobatic practice area is subject to the limitations and special provisions of any attachments to this Certificate of Waiver.

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE

14 CFR § 91.117(a)(b); 14 CFR § 91.119 (c); 14 CFR § 91.129(c); 14 CFR § 91.303(c) (d) (e).

STANDARD PROVISIONS

1. A copy of the application made for this certificate shall be attached to and become a part hereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Administrator of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.
3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.
4. This certificate is nontransferable.

NOTE— This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.

SPECIAL PROVISIONS

Special Provisions Nos. 1 to 14, inclusive, are set forth on the reverse side hereof.

This certificate is effective on 12/1/2014, 0700 EDT to 10/30/2016, 1900 EDT inclusive, and is subject to cancellation at any time upon notice by the Administrator or his authorized representative.

BY DIRECTION OF THE ADMINISTRATOR

Robert Edwards

for **DIANA L. FROHN, MANAGER**
ORLANDO FSDO, ASO-15

SOUTHERN REGION
September 2, 2014

FAA Form 7711-1 (7-74) **DISTRIBUTION:** Applicant, ORL FSDO, St. Petersburg AFSS, Tamp ATCT, Lakeland ATCT, Orlando ATCT
COORDINATION: Tampa ATC, Orlando ATCT

Special Provisions
Lakeland Aerobatic Practice Area

1. Aerobatic flight shall be confined to the area designated on the pictorial chart attached to the Certificate of Waiver and defined in special provision 2. A definitive pictorial chart or photograph of the underlying area is attached to the application and the approved waiver.

2. The aerobatic practice area is further defined as follows: From the surface up to and including 4,000 feet MSL, within the practice areas A and B as depicted on the attachment (Revision 2, April 30, 2015).

3. No aerobatic maneuvers may be performed over or within 500 feet laterally from any open air assembly of persons or congested area of any city, town, or settlement.

4. No person may operate an aircraft in aerobatic flight when the visibility is less than 3 statute miles or a ceiling less than 1500 feet.

5. Before commencing aerobatic flight operations, the person(s) authorized to activate and deactivate the aerobatic practice area shall be responsible for advising the St. Petersburg (FSS) telephone number is 1-800-992-7433 (1-800-WX-BRIEF) of the activity and requesting that a NOTAM that includes the following information be issued:

a) The location, dates, and times the aerobatic activity will be in effect.

b) If appropriate, the runway(s) that will be closed during the aerobatic activities.

6. All certificates of waiver granting relief from appropriate sections of part 91 must also contain guidance stipulating that the person(s) responsible for activation of the aerobatic practice area provide the controlling FSS with a copy of the Certificate of Waiver at least 48 hours before activation of the NOTAM. For certificates of waiver that are issued on a long-term basis, additional wording should be included advising the holder to ensure that the FSS keeps the waiver on file for future NOTAM activation.

7. Notification shall be made to the Tampa ATCT (813-878-2528), Lakeland Control Tower (863-648-3305) and St. Petersburg FSS (1-800-WX Brief) at least 30 minutes before the beginning of aerobatic activity in the practice area, or, if a letter of agreement exists, notification shall be made as specified in that document. The Tampa ATCT and Lakeland Control Tower shall also be notified at the termination of aerobatic activities.

8. The person authorized to activate and deactivate the aerobatic practice area described in special provision 2 is Sandra Walsh to whom the waiver is issued.

9. The person named in special provision 8 shall also be responsible for the following:

ISSUED TO: Sandra Walsh, Lakeland Linder Regional Airport
DATE ISSUED: Revision 2, April 30, 2015
VALID: 12/1/2014 until 10/31/2016 from Sunrise to Sunset
ISSUED BY: Orlando FSDO-15

a) Ensuring that all pilots and aircraft operating within the confines of the waivered aerobatic practice area are properly certificated;

b) Briefing each pilot to ensure that all users of the practice area comply with the limitations imposed by the Certificate of Waiver and its attendant special provisions; and

c) Maintaining a log containing the pilot's name, airman certificate number, aircraft registration number, date, and time the aerobatic practice was in use and providing this information to the FAA upon request.

10. When required by ATC, all pilots must monitor Lakeland Control Tower on a continuous basis while operating within the aerobatic practice area.

11. All pilots operating within the waivered aerobatic practice area shall maintain VFR at all times and shall be responsible for seeing and avoiding all conflicting traffic.

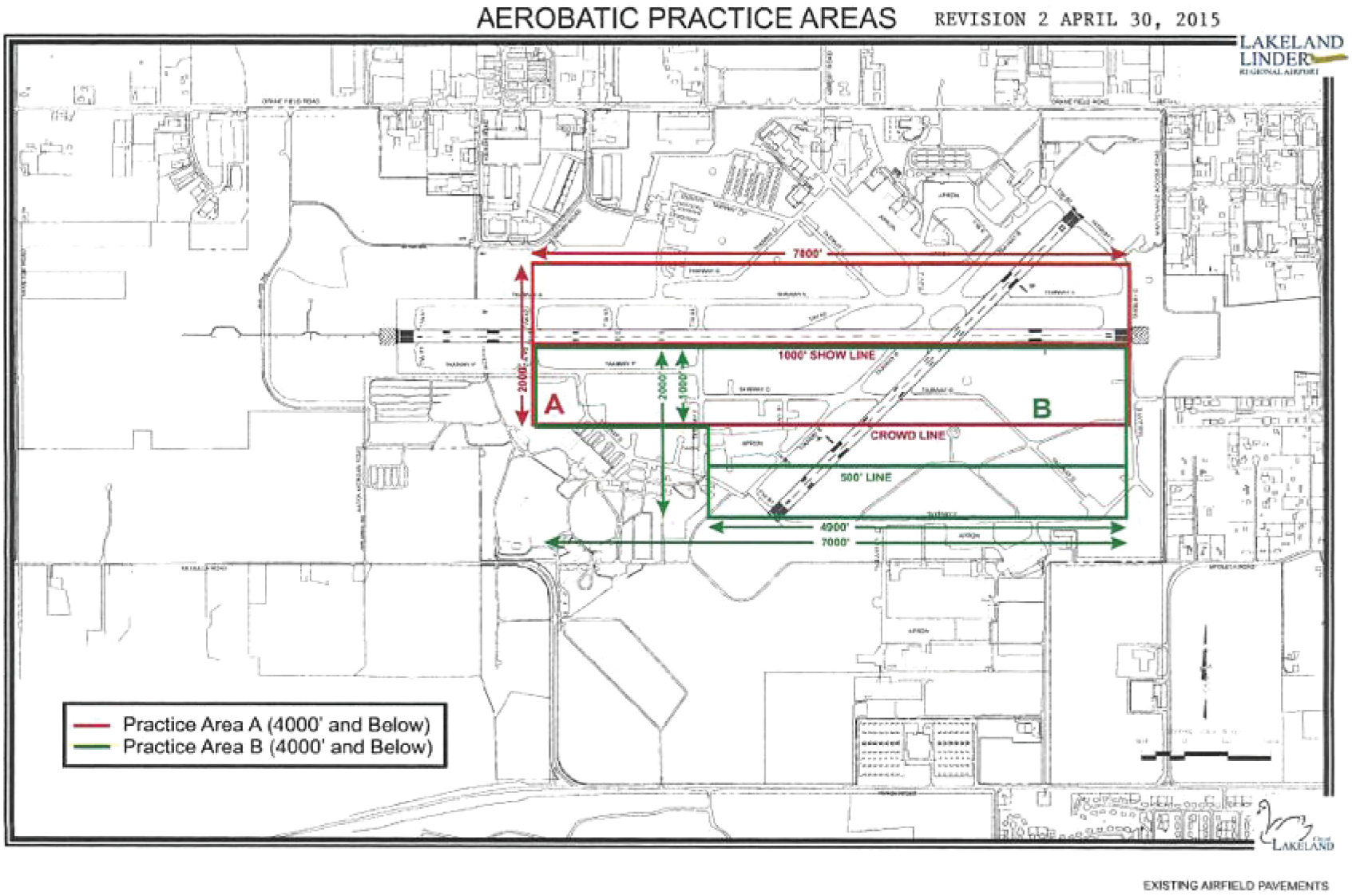
12. Aerobatic flight shall be conducted only between the hours of Sunrise to Sunset.

13. The holder of this Certificate of Waiver or delegated representative is responsible for halting or canceling activity in the aerobatic practice area if, at any time, the safety of persons or property on the ground or in the air is in jeopardy, or if there is a failure to comply with the terms or conditions of this waiver.

14. The FAA has the authority to cancel the Certificate of Waiver or delay any activities if the safety of persons or property on the ground or in the air is in jeopardy, or if there is a violation of the terms of the waiver.

Note: There are endangered species listed for the Lakeland Linder Regional Airport, Lakeland, FL. The species are the Everglade Snail Kite, Florida Grasshopper Sparrow, Ivory-Billed Woodpecker, and the Red-Cockaded Woodpecker. If there is a bird strike with any of the species listed, the South Florida Ecological Services Field Office (772) 562-3909 and the NextGen Field Program Office, AFS-408 will need to be contacted.

ISSUED TO: Sandra Walsh, Lakeland Linder Regional Airport
DATE ISSUED: Revision 2, April 30, 2015
VALID: 12/1/2014 until 10/31/2016 from Sunrise to Sunset
ISSUED BY: Orlando FSDO-15



APPENDIX J

Examples of Hot Air Balloon Hazards

Source: SMQ Airport Services data compilation.

HAZARDS:	RISKS:
• LPG or other fuels tanks	~ fire, explosion
	~ fuel leak
• Obstructions	~ balloon collision
• Power lines	~ collision and fire
• High winds	~ force and movement of balloon
	~ balloon ground roll
	~ hard landings
	~ collision with obstacles
	~ basket tipover
	~ sudden rise or skip/slide
• Becalmed wind conditions	~ no safe landing area
	~ run out of fuel
	~ property damage
• Ballast release	~ injury to ground crew
• Tether lines, drop lines, and/or crown lines	~ drop line entanglement
	~ power line strike
	~ ground crew hand injuries
• Equipment, tools, materials in the basket	~ personal injury
	~ fuel leak
• Failed radio	~ airspace violation
	~ no communication with ground crew
• Ruts or wheel tracks in the ground	~ envelope tear
	~ personal injury
	~ property damage lawsuit
• Hard landings	~ personal injury
	~ fire
• Fire	~ personal injury
	~ equipment damage
• Lightning/static electricity	~ personal injury
	~ equipment damage
• Congested areas	~ regulation violation
	~ no safe landing area
• Failure of burner	~ loss of lift
• Soft or wet ground	~ transport or chase vehicle gets stuck
• Windshear turbulence from nearby obstacles	~ uncontrollable operation
• Wake turbulence or rotor wash of large aircraft	~ uncontrollable operation
• Terrain	~ balloon collision
• Pilot and crewmember skills	~ safe outcomes
	~ airport violations
• Inflation fan	~ personal injury
• Transport/chase vehicle	~ mechanical breakdown
	~ grass or field fire from hot exhaust
	~ accident
	~ runway incursion
• Malfunction of self-closing deflation valve	~ uncontrolled balloon operation
• Blast valve operation	~ unexpected noise
	~ frightened animals
	~ hearing loss
	~ loss of heat generation and lift

APPENDIX K

Sample Aerial Agricultural Operator Agreement

Source: *Agricultural Aircraft Operations on Municipal Airports: A Guidebook for Municipal Airport Managers* (AirTAP 2009).

PUBLIC AIRPORT AERIAL APPLICATION OPERATION AGREEMENT

Date:_____ Name:_____
Company:_____
Address:_____
Phone Number:_____
Aircraft N Number:_____
Hired By:_____
Effective Dates of Operation:_____

All requesting pilots must submit all documentation necessary to legally conduct aerial applications off the public airport. The following items must be submitted with this agreement:

- Minnesota Department of Agriculture Commercial Pesticide License
- Minnesota Department of Transportation Commercial License
- Proof of liability insurance on all aircraft (The minimum insurance coverage for each aircraft shall be the following types and amounts: $100,000 per person and $300,000 per occurrence for bodily injury and $100,000 for property damage. Airport named as additional insured.)
- Proof of liability insurance on all trucks and equipment
- Site-specific Chemical Storage Plan and Material Data Safety Sheet for all chemicals stored on the airport property for more than 24 hours
- Site-specific Incident Response Plan Requesting pilots hereby certify possession of the following current documents:
- FAA Operating Certificate • Commercial Pilot's License
- Current Pilot Medical Certificate
- Bi-Annual Log Entries
- Current Aircraft Registration and Air Worthiness Certificate with Annual Inspection

The operating agreement must be completed and submitted to the public airport manager at least 48 hours prior to operations.

Transient permits shall not exceed 60 (sixty) days without authorization from the public airport manager.

"Operator" is defined as anyone possessing a Minnesota Commercial Pesticide Applicator License and engaged in the activities of chemical storage, mixing, and/or aerial application.

1. No persons or vehicles are allowed on the runway(s) or taxiway(s). Operators will use storage, water sources, and operation areas as designated by Public Airport Manager.
2. Operators must obey all security regulations including using proper access points, closing gates and doors, and securing aircraft, equipment, and storage containers.
3. The arrival and departure building may not be used as the operator's place of business to conduct meetings with clients. Operator and employees may use the arrival and departure building (e.g., bathrooms, vending machines, phone) but must keep said building clean and orderly.
4. Operator is responsible for spills, chemical theft, damages, and any injury caused by chemicals and normal operation of aerial application while conducting business at Public Airport.
5. Operator shall notify Public Airport Manager immediately of any spills, injuries, vandalism, incidents, or accidents.
6. Operator shall not dump, rinse, or pour chemicals on the airport grounds.
7. Operator must abide by Public Airport's fueling rules and regulations.
8. Operator shall abide by all rules and regulations set by the Federal Aviation Administration (FAA), Environmental Protection Agency (EPA), Food and Drug Administration (FDA), Occupational Safety and Health Administration (OSHA), Minnesota Department of Agriculture (MDA), Minnesota Department of Transportation (MN/DOT), and all other pertinent regulations.
9. Public Airport may secure bond to ensure proper operations, damage control, and clean-up responsibilities are met prior to departure.
10. Prior to departing the airport premises, Operator shall notify Public Airport Manager that operations are terminated.

APPENDIX L

Sample Agricultural Record Requirements—State of Iowa

Source: Iowa DOT Office of Aviation. Available: http://www.iowadot.gov/aviation/studiesreports/agaviation.html

Ag Aviation Operations

Information for Airport Managers

It is recommended that the following information be supplied to airport management at each airport of operation to assist first responders during an accident or security incident. The information should be updated regularly.

Airport Name: _____

Dates operation will occur at this airport: _____

Company Name: _____

Address: _____

Telephone (Day): _____

(Night): _____

Aircraft Type and Color: _____

"N" Number: _____

Pilot Name(s): _____

In case of an emergency, contact: _____

Production Information:

Product Name	**Product Color**	**Product Type/Use** e.g., Liquid herbicide, granular pesticide, etc.

This report is endorsed as a best practice by the Iowa DOT Office of Aviation and the Iowa Ag Aviation Association.

APPENDIX M

Sample Airport Incident Report Form for Spill Reporting

Source: *Agricultural Aircraft Operations on Municipal Airports: A Guidebook for Municipal Airport Managers* (AirTAP 2009)

MINNESOTA DEPARTMENT OF AGRICULTURE
www.mda.state.mn.us

Minnesota Department of Agriculture
625 Robert St. N., St. Paul, MN 55155-2538

Pesticide and Fertilizer Management Division, Ph: 651-201-6061, Fx: 651-201-6117

FACT SHEET

GUIDELINES FOR DEVELOPING AND MAINTAINING AN

Incident Response Plan

WHAT IS AN INCIDENT RESPONSE PLAN AND WHO IS REQUIRED TO HAVE A PLAN?

An incident response plan is a document you develop to help you prepare for and deal with pesticide and/or fertilizer releases (incidents) quickly and effectively. A plan describes the pesticide and/or fertilizer storage, handling, disposal and incident handling practices of your business.

Some businesses are legally required to develop and maintain an incident response plan. If your business is engaged in one or more of the following, it must establish and maintain an incident response plan:

- ❑ Commercial pesticide application;
- ❑ Noncommercial pesticide application;
- ❑ Structural pest control;
- ❑ Storage of bulk pesticides; and/or
- ❑ Storage of bulk fertilizers, including anhydrous ammonia.

Regardless of whether or not you store these products in bulk, an incident response plan is part of good emergency planning.

WHAT INFORMATION SHOULD BE INCLUDED IN THE PLAN?

An incident response plan should describe in detail your storage, handling, disposal practices and procedures for pesticide, fertilizer, soil amendment, plant amendment, and anhydrous products being stored.

If your site stores bulk pesticides, your plan is required to include, but is not limited to the following:

- ❑ Identity and telephone numbers of persons and agencies to be contacted in the event of a release;
- ❑ Complete copy of the container label for each bulk pesticide stored at the facility;
- ❑ Complete copy of the material safety data sheet (MSDS) for each bulk pesticide stored at the facility;
- ❑ Procedures and equipment to be used to control and respond to a release and to recover released product;
- ❑ Identification and location of each bulk pesticide container located at the facility, as well as the type of pesticide stored in each. *(NOTE: The plan does not need to identify each individual mini-bulk container if it identifies a general location within the facility where all mini-bulks are stored.)*

Location maps are effective tools for illustrating much of this information. See suggested format on the other side of this fact sheet.

WHERE SHOULD I KEEP THE PLAN?

The incident response plan must be kept in a prominent location at the storage facility or business, accessible to all employees. We recommend that another copy of the plan be kept at a different location so that if an incident makes the site or plan inaccessible, you will still be able to obtain a copy of the plan.

If you store pesticides, you are also required to provide a copy of the plan to the local fire and police departments so they can appropriately plan for incident response at your facility.

All persons working with agricultural chemicals should be familiar with incident response, health and safety aspects of product labels and MSDS's. Experience at actual incident sites has shown that the most important information to have available during an incident are product labels, MSDS's, product inventory records and location of the product at the facility. Keep in mind that the incident response plan should be reviewed with all employees working with agricultural chemicals prior to each application season.

REFERENCES

- ❑ Minnesota Statutes
  Section 18B.37, subdivision 4 (storage, handling and disposal plan); Section 18C.235, subdivision 1 (contingency plan for storage of bulk products)
- ❑ Minnesota Rules
  Part 1505.3100 (release response plan); Part 1510.0372, subpart 2.P.; and Part 1510.0402, subpart 2.L.

AIRPORT INCIDENT REPORT

DATE: _____ **TIME**: _____ **REPORTED BY**: _____

NAME: _____

ADDRESS: _____

PHONE # _____

LOCATION: _____

WEATHER CONDITIONS: _____

_____

_____

NATURE OF INCIDENT: _____

_____

_____

_____

AIRCRAFT TYPE & TAIL NO.: _____

NATURE OF MEDICAL INCIDENT: _____

_____

_____

_____

_____

TELEPHONE NUMBERS

Airport Manager	home:	POLICE DEPT.	
		FIRE DEPT.	
	cell:	SHERIFF DEPT.	
		HOSPITAL	
Airport Maint.	home:	SPILL DUTY OFFICER	800-422-0798
	cell:		

COMMENTS: _____

_____

_____

_____

_____

APPENDIX N

Sample Towplane Operating Policy—Boulder Municipal Airport, Colorado

Source: T. Head, Boulder Municipal Airport, Colorado. Used with permission.

Glider Towplane Operations

Boulder Municipal Airport

The following information is provided in order to facilitate safe and consistent operations at Boulder Municipal Airport. It is also intended as a means to mitigate noise complaints.

1. Transition to/from hangars

   Tow pilots are requested to cross the runways at taxi way A1, with A4 as an alternative. Crossing should only be attempted when it is certain that crossing all runway areas can be done without having to stop between runways.

2. Glider launching

   Tow pilots should endeavor to spend as little time as possible on the runway before takeoff. *(This will require coordination with the glider pilot, and is based on the premise that glider pilots will not position a glider on the runway until a towplane is ready to taxi into position and launch the glider. The glider pilot should complete as much of the pre-launch procedures as is possible before positioning a glider on the runway.)* During multiple operations, delay your launch until you are sure that a towplane/glider launching before you do is completely clear of the runway, and the glider will be able to perform a downwind landing in the event of a premature release. The normal tow pattern will consist of a 270 degree left turn beginning at an altitude of 5800 feet, and remaining south of J road, normally followed by another 270 degree left turn south of Valmont before entering a counter-clockwise circuit between Valmont, 30th street, Arapaho, and 75th street. The second 270 degree turn can be omitted if the tow pilot is certain that an altitude greater than 6500 feet can be reached before crossing the glider/towplane approach area south of the airport. In the event of a premature glider release, the tow pilot will follow the normal tow pattern returning from the south side of the airport for landing. Tow pilots should avoid entering the pattern from the north side of the airport.

   When towing a glider into the foothills north of Boulder a downwind departure from the airport is appropriate if the rate of climb is such that the towplane/glider can be at or above pattern altitude before crossing mid-field. The preferred method is to fly the normal tow pattern and cross the runway from south to north at mid-field while avoiding noise sensitive areas.

   Departures south of the field should be made over the golf course at a minimum altitude of 6500 feet. South departures should continue well south of Boulder (the swimming pool) before turning west. Crossing the foothills should be done above 9000 feet.

   Departures to the northwest should be made well north of highway 36. This is the most popular (most used) departure, and as such special care must be taken to vary the path when approaching the foothills. Crossing the foothills should be done above 8000 feet.

3. Returning to the airport after glider release

   After a glider release west or south of the airport the tow pilot should plan the return so as to arrive south of the airport below 6300 feet without the necessity of spiraling or slipping to achieve the proper altitude. When a glider releases in the practice area south of the airport at an altitude that requires a spiral/slip to lose altitude the preferred areas for descent are southwest and east/southeast of the airport. Descending in the area between Valmont, 30th, Arapahoe and 75th should be avoided.

4. Pattern Entry

   Tow pilots should enter the pattern from the south side of the field, entering the crosswind portion of the pattern at 5900 feet. When using runway 8, cross the runway between mid field and the west end of the runway. When using runway 26 cross the runway between midfield and the east end of the runway. In either case leave as much room as possible for gliders entering crosswind at mid-field.

5. Landing Pattern

   As shown in the Boulder Municipal Airport Noise Abatement Procedures and Traffic Patterns Map, tow pilots are expected to fly a pattern that is inside both the regular power aircraft pattern and the glider pattern. (Catching the end of the tow rope in the fence [or what remains of it] is considered

bad form.) While the base leg is somewhat abbreviated, the tow pilot must take a moment to verify that the tow plane is not cutting in front of a power aircraft on final. Remember, Boulder Municipal Airport is not authorized for multiple landings, and an aircraft on final has the right of way. Tow pilots should plan their approach so as to turn final behind and power aircraft on final to the runway.

6. Landing on the Glider runway, the area between runways or the main runway.

   Landings are normally made on the glider runway. If it is occupied then the area between the runways is the usual option. If both the glider runway and the area between the runways are occupied then the landing can be done on the main runway.

   When landing on the glider runway turn off the runway to the north as soon as it is practical. Turning off of the runway in an area where it is possible to pull completely clear of the runway in case a glider is landing behind the tow plane.

   When landing in the area between the runways plan on landing long (do not stop before the Mile High trailer). Turn the tow plane to the North, and stop to insure that crossing the glider runway will not interfere with aircraft landing or taking off.

   When landing on the main runway taxi to the A4 exit before crossing back to the glider side of the airport. Turn the tow plane to the north, and stop to insure that crossing the glider runway will not interfere with aircraft landing or taking off. The decision to use the main runway should be made in the pattern, before turning from base to final.

7. Aborted Landing Procedure

   If after turning final the tow pilot determines that a landing is not possible/safe/practical, the tow pilot should proceed down the runway at 5600 feet MSL (plus or minus an inch or two) until passing well past mid field after which the tow pilot should climb to 5800 feet and fly the usual 270 degree turn to the left, followed by the standard tow plane entry into the pattern from the south side of the field.

8. Radio Usage

   Tow pilots should monitor the Boulder CTAF frequency at all time while flying within 3 miles of Boulder Municipal airport. Radio calls to aircraft in general should answer four questions. 1)Who am I talking to? [Boulder Traffic] 2)Who am I? [Tow plane 85Fox] 3)Why did I key the mic? [Taking off glider 8, glider in tow] 4)Where am I? [Boulder] Radio calls immediately before take-off and when entering cross-wind are highly recommended if no one else is on the frequency. In the event of a premature glider release (below 6000 feet) announcing what happened and where you and the glider are at serves to notify everyone in the area that something out of the ordinary has occurred. If you are not going to be available to take another tow upon landing including this information with your cross-wind announcement is recommended.

APPENDIX O

Sample Glider Operating Agreement

Source: Soaring Society of America. Available: www.ssa.org/docs/govnews/SmplAptOpAgrmnt.doc

Glider Operator **Airport Operator**

1.0 Introduction
- 1.1 This agreement between *(Glider Entity)* and *(Airport Entity)* is published for pilot information and briefing purposes and constitutes all agreements between the parties pertaining to glider operations at *(airport*). Gliders operated in a manner consistent with this agreement shall be deemed to be operating in a safe and proper manner. This agreement governs the conduct of all glider pilots and associated persons operating at *(airport).*
- 1.2 Persons willfully violating the terms of this agreement may be deprived of the use of the airport and its facilities.

2.0 General
- 2.1 All persons on any part of the property comprising the *(airport)* agree to be governed by all the regulations prescribed by *(Airport Entity)* in consideration for this agreement to operate gliders at *(airport). (Airport Entity)* agrees to allow *(glider entity)* to operate gliders in the manner described in this agreement.
- 2.2 All aircraft departing, arriving or flying in the airspace which constitutes the airport traffic area as established by the Federal Aviation Administration (FAA) shall be in conformance with all applicable provisions of the Federal Aviation Regulations.
- 2.3 No person shall smoke in any hangar, building or room where prohibited or within 50 feet of any aircraft being fueled or drained of fuel.
- 2.4 In the event of any incident or accident involving the operation of gliders, *(airport entity or designee)* shall be notified in a timely manner.

3.0 Glider Operating Regulations
- 3.1 Glider tie-down, parking, staging, takeoff, and landing areas are defined in attachment A.
- 3.2 Glider and towplane patterns are defined in attachment B.
- 3.3 *(glider entity)* shall designate a Glider Operations Director (GOD) to be present during all glider operations and who shall be responsible for the safe conduct of the glider operation and for enforcing all glider operating regulations contained herein.
- 3.4 Regulations herein stated or instructions given during any pilot briefing shall not waive the basic responsibility of any pilot to exercise reasonable and good judgement in emergency situations and/or to conform to all application FAA and Airport regulations.
- 3.5 Persons transiting between the glider staging area and the parking area shall do so along the designated taxiway. Personnel are not allowed within the runway area except when launching a glider.
- 3.6 No private automobiles or motorized equipment shall be operated on the airport runways or taxiways except by persons authorized by the airport administration or as defined in 3.7.
- 3.7 Privately owned vehicles are allowed on the airport runways and taxiways only when towing a glider to or from the glider staging area and are not to be parked in the staging area. All vehicles operating on the airport runways or taxiways shall at all times display a suitable flag and a yellow rotating beacon.
- 3.8 All persons shall be alert for power traffic at all times.
- 3.9 Thermaling is prohibited below 1500 AGL within one mile of the airport.
- 3.10 Aircraft equipped with a radio are requested to advise “airport traffic” on (airport traffic frequency) of your intentions when entering the traffic pattern.
- 3.11 No glider shall roll out toward persons or parked aircraft or equipment at such speed or proximity so that a brake failure could produce injury or damage.
- 3.12 No glider shall be left unattended unless it is properly tied down in the areas designated in attachment A. Gliders shall not be parked or left on or near the taxiways in a manner that would block access by other airport users. Gliders landing on the runway shall be moved to the taxiways or staging areas immediately.
- 3.13 *(glider entity)* agrees to advise all airport traffic on the airport traffic radio frequency prior to commencement of glider operations.

4.0 Towplane Operating Regulations
- 4.1 The towplane shall advise airport traffic on the airport traffic frequency prior to staging for takeoff on the runway with a glider in tow and shall also advise airport traffic on initiation of takeoff roll.
- 4.2 The towplanes will use the same traffic patterns as other powered aircraft operating at the airport.
- 4.3 The towplanes may be temporarily parked in the areas designated for same and shall be tied down when not attended.

5.0 Other

5.1 Any special gliding event, such as but not limited to, a soaring contest, spot landing contest, or open house will be coordinated with and gain the prior approval of *(airport entity).* *(glider entity)* agrees to also provide prior notification of any scheduled special events to all other users of the airport.

5.2 Any requested changes in the normal operating procedures must be coordinated with *(airport entity)* and must obtain their agreement.

5.3 This agreement shall remain in effect except as modified by written agreement of the parties.

This agreement constitutes the entire operating agreement between *(Airport Entity)* and *(Glider Entity).*

Signed:_____ **date:**_____
(Airport Entity)

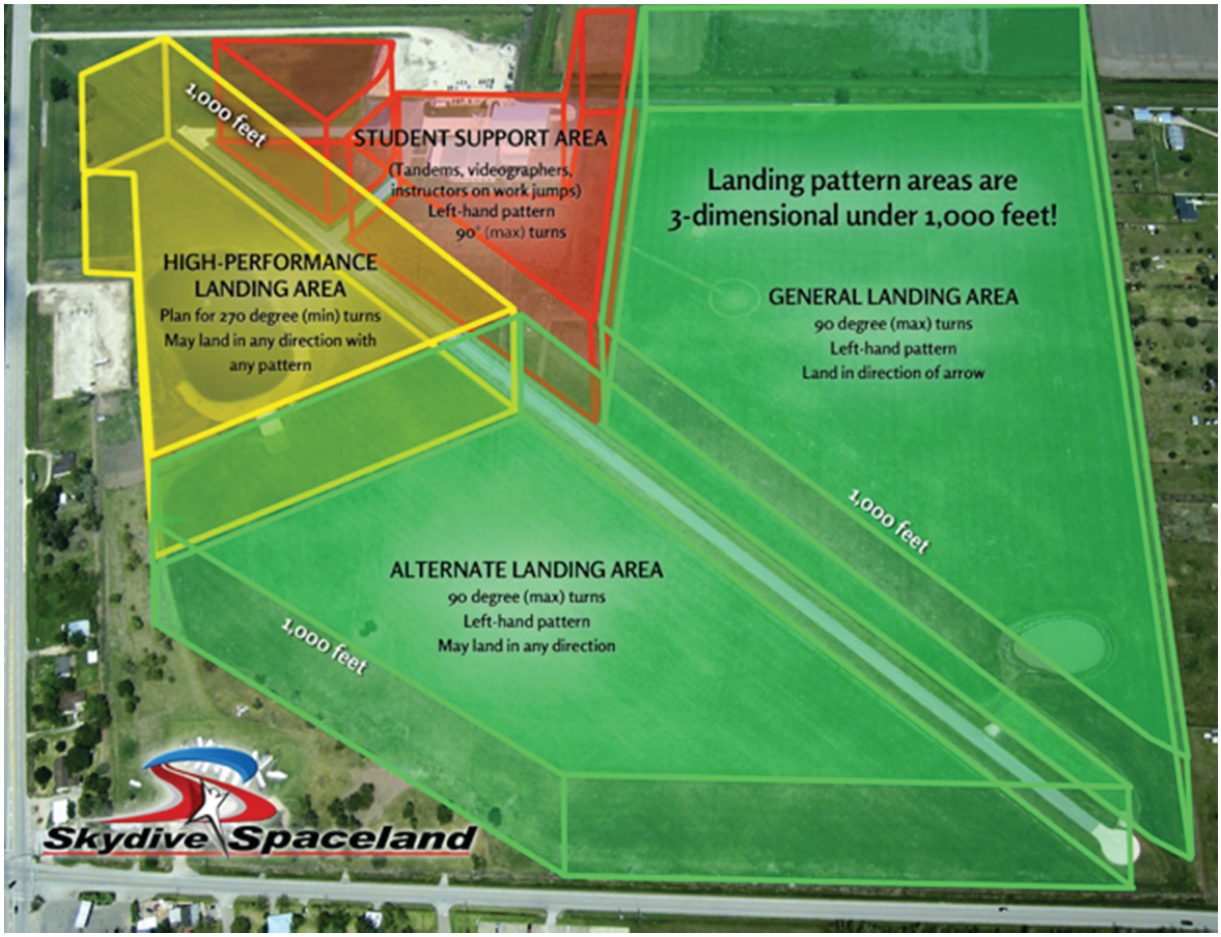
Signed:_____ **date:**_____
(Glider Entity)

NOTE – this sample agreement is offered only as a guide. The Soaring Society does not warrant that it meets legal standards or criteria in a given state. If legal questions arise be sure to consult appropriate professional counsel.

APPENDIX P

Sample Training Depiction for Parachute Landing Areas—B&B Airpark, Texas

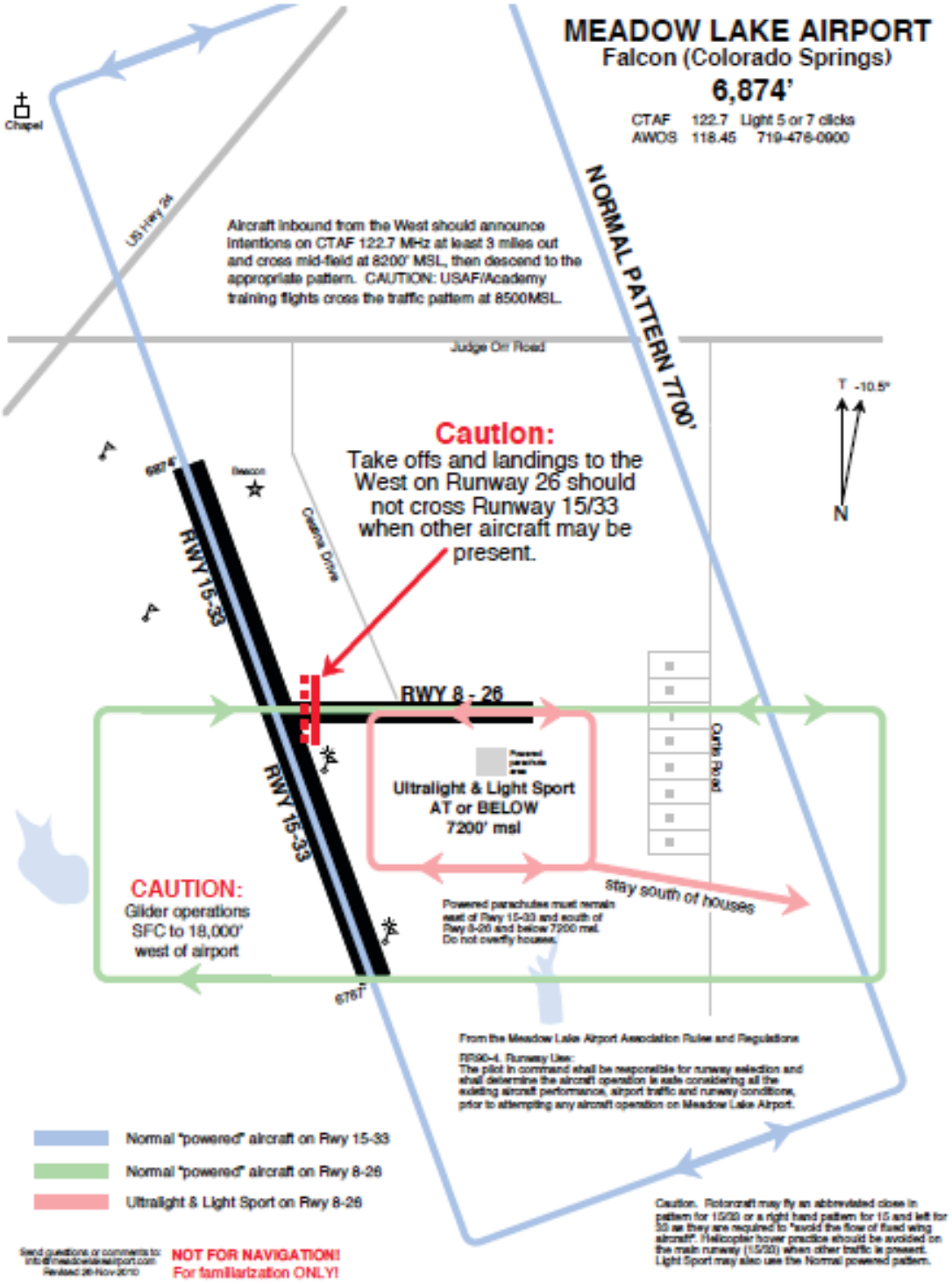
Sources: Images by N. Lott, graphics by C. West, Skydive Spaceland, Rosharon, TX. Used with permission.



APPENDIX Q

Sample Mixed-Use Traffic Pattern—Meadow Lake Airport, Colorado

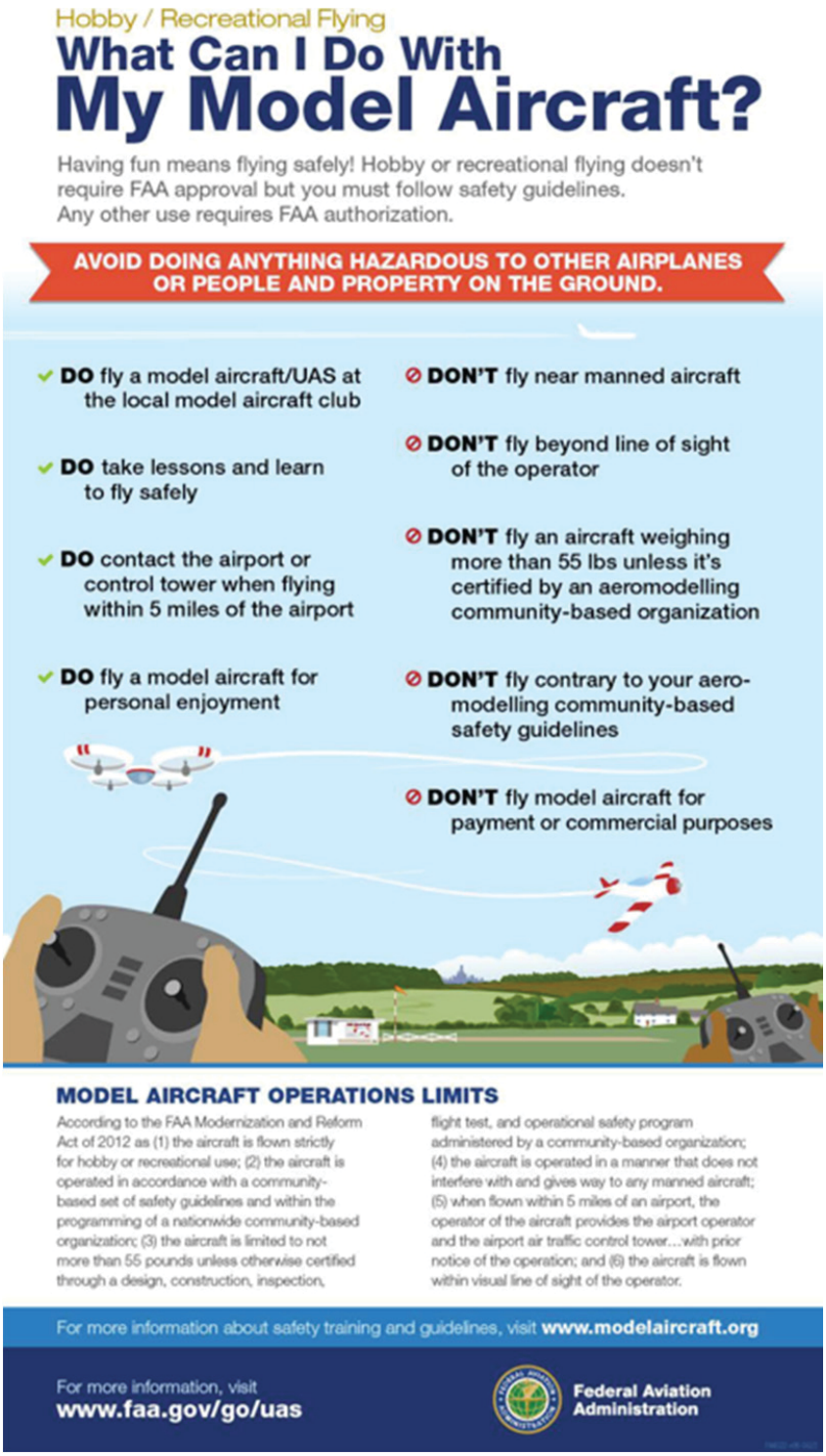
Sources: Pikes Peak Paragliding Club and Meadow Lake Airport Association, Colorado Springs, Colorado. [Online]. Available: http://www.poweredparaglidingcolorado.com/wherewefly/PPG%20SOP%20v1.01%20small.pdf



APPENDIX R

RC Model and UAS Brochures

Source: FAA. Available: www.faa.gov/go/uas



APPENDIX S

Radio-Controlled Model Aircraft Safety Code

Source: *Academy of Model Aeronautics National Model Aircraft Safety Code* (2014).

Academy of Model Aeronautics National Model Aircraft Safety Code
Effective January 1, 2014

A. GENERAL: A model aircraft is a non-human-carrying aircraft capable of sustained flight in the atmosphere. It may not exceed limitations of this code and is intended exclusively for sport, recreation, education and/or competition. All model flights must be conducted in accordance with this safety code and any additional rules specific to the flying site.

1. Model aircraft will not be flown:
   (a) In a careless or reckless manner.
   (b) At a location where model aircraft activities are prohibited.
2. Model aircraft pilots will:
   (a) Yield the right of way to all human-carrying aircraft.
   (b) See and avoid all aircraft and a spotter must be used when appropriate. (AMA Document #540-D.)
   (c) Not fly higher than approximately 400 feet above ground level within three (3) miles of an airport without notifying the airport operator.
   (d) Not interfere with operations and traffic patterns at any airport, heliport or seaplane base except where there is a mixed-use agreement.
   (e) Not exceed a takeoff weight, including fuel, of 55 pounds unless in compliance with the AMA Large Model Airplane program. (AMA Document 520-A.)
   (f) Ensure the aircraft is identified with the name and address or AMA number of the owner on the inside or affixed to the outside of the model aircraft. (This does not apply to model aircraft flown indoors.)
   (g) Not operate aircraft with metal-blade propellers or with gaseous boosts except for helicopters operated under the provisions of AMA Document #555.
   (h) Not operate model aircraft while under the influence of alcohol or while using any drug that could adversely affect the pilot's ability to safely control the model.
   (i) Not operate model aircraft carrying pyrotechnic devices that explode or burn, or any device which propels a projectile or drops any object that creates a hazard to persons or property.
   Exceptions:
   - Free Flight fuses or devices that burn producing smoke and are securely attached to the model aircraft during flight.
   - Rocket motors (using solid propellant) up to a G-series size may be used provided they remain attached to the model during flight. Model rockets may be flown in accordance with the National Model Rocketry Safety Code but may not be launched from model aircraft.
   - Officially designated AMA Air Show Teams (AST) are authorized to use devices and practices as defined within the Team AMA Program Document. (AMA Document #718.)

   (j) Not operate a turbine-powered aircraft, unless in compliance with the AMA turbine regulations. (AMA Document #510-A.)
3. Model aircraft will not be flown in AMA sanctioned events, air shows or model demonstrations unless:
   (a) The aircraft, control system and pilot skills have successfully demonstrated all maneuvers intended or anticipated prior to the specific event.
   (b) An inexperienced pilot is assisted by an experienced pilot.
4. When and where required by rule, helmets must be properly worn and fastened. They must be OSHA, DOT, ANSI, SNELL or NOCSAE approved or comply with comparable standards.

B. RADIO CONTROL (RC)

1. All pilots shall avoid flying directly over unprotected people, vessels, vehicles or structures and shall avoid endangerment of life and property of others.
2. A successful radio equipment ground-range check in accordance with manufacturer's recommendations will be completed before the first flight of a new or repaired model aircraft.
3. At all flying sites a safety line(s) must be established in front of which all flying takes place. (AMA Document #706.)
   (a) Only personnel associated with flying the model aircraft are allowed at or in front of the safety line.
   (b) At air shows or demonstrations, a straight safety line must be established.
   (c) An area away from the safety line must be maintained for spectators.
   (d) Intentional flying behind the safety line is prohibited.
4. RC model aircraft must use the radio-control frequencies currently allowed by the Federal Communications Commission (FCC). Only individuals properly licensed by the FCC are authorized to operate equipment on Amateur Band frequencies.

5. RC model aircraft will not knowingly operate within three (3) miles of any pre-existing flying site without a frequency-management agreement. (AMA Documents #922 and #923.)
6. With the exception of events flown under official AMA Competition Regulations, excluding takeoff and landing, no powered model may be flown outdoors closer than 25 feet to any individual, except for the pilot and the pilot's helper(s) located at the flightline.
7. Under no circumstances may a pilot or other person touch an outdoor model aircraft in flight while it is still under power, except to divert it from striking an individual.
8. RC night flying requires a lighting system providing the pilot with a clear view of the model's attitude and orientation at all times. Hand-held illumination systems are inadequate for night flying operations.
9. The pilot of an RC model aircraft shall:
   (a) Maintain control during the entire flight, maintaining visual contact without enhancement other than by corrective lenses prescribed for the pilot.
   (b) Fly using the assistance of a camera or First-Person View (FPV) only in accordance with the procedures outlined in AMA Document #550.
   (c) Fly using the assistance of autopilot or stabilization system only in accordance with the procedures outlined in AMA Document #560.

C. FREE FLIGHT

1. Must be at least 100 feet downwind of spectators and automobile parking when the model aircraft is launched.
2. Launch area must be clear of all individuals except mechanics, officials, and other fliers.
3. An effective device will be used to extinguish any fuse on the model aircraft after the fuse has completed its function.

D. CONTROL LINE

1. The complete control system (including the safety thong where applicable) must have an inspection and pull test prior to flying.
2. The pull test will be in accordance with the current Competition Regulations for the applicable model aircraft category.
3. Model aircraft not fitting a specific category shall use those pull-test requirements as indicated for Control Line Precision Aerobatics.
4. The flying area must be clear of all utility wires or poles and a model aircraft will not be flown closer than 50 feet to any above-ground electric utility lines.
5. The flying area must be clear of all nonessential participants and spectators before the engine is started.

APPENDIX T

Example of Special Operations Briefing—Lakeland Linder Regional Airport, Florida

Source: S. Walsh, Lakeland Linder Regional Airport, Lakeland, Florida. Used with permission.

LAKELAND LINDER REGIONAL AIRPORT

Special Operation Brief

EVENT INFORMATION			
Event:	SAE Aero Design Competition	Date:	March 13-15, 2015
Location:	Sun 'n Fun Campus / Paradise Field		

EVENT CONTACTS			
Primary:	Mike Bertswill	Phone:	xxx-xxx-xxxx
Sun 'n Fun:	Rob Williams	Phone:	xxx-xxx-xxxx
Sun 'n Fun:	Tiffany Taylor	Phone:	xxx-xxx-xxxx
Airport:	Adam Lunn – Operations Coordinator	Phone:	xxx-xxx-xxxx
OPS:	On Duty Manager	Phone:	xxx-xxx-xxxx

TIMELINE

Start Time	End Time	Event	Location
Thr 3/12	-	Issue NOTAMs (Airspace & Ramp Closure)	-
Fri 3/13 1200	Fri 3/13 1600	Test Flights (Airport OPS to Monitor)	Paradise Field
Sat 3/14 0700	Sat 3/14 1900	Competition Flying	Sun 'n Fun (Taxiway S)
Sun 3/15 0700	Sun 3/15 1900	Competition Flying (Scheduled to End Earlier)	Sun 'n Fun (Taxiway S)

NOTES

- Sun 'n Fun
  - Will inform their Hangar Tenants of the TWY Restrictions during the Competition Flying.
  - Will provide badged personnel support to assist with retrieving any downed aircraft inside the AOA.
- SAE
  - Aircraft fly no higher than approximately 30-40 feet.
  - Will instruct all pilots to ground their aircraft should they fly past the "Infinity line".
  - Will notify Airport Operations immediately of a stray aircraft.
- Airport Operations
  - Monitor Test Flights on Friday 3/13 from 1200-1600. Keep in Contact with ATCT at all times.
  - Coordinate with ATCT
  - Monitor Event on Saturday and Sunday.
  - Any PPR requests to access the Sun 'n Fun area should be forwarded to Robb Williams at xxx-xxx-xxxx
  - NOTAMs:
    - !LAL XX/XXX LAL APRON SUN N FUN RAMP CLSD EXC PPR 863-834-4911 1503141100-1503152359
    - !LAL XX/XXX LAL AIRSPACE UNMANNED ACFT WITHIN AN AREA DEFINED AS .5NM RADIUS OF LAL230001 SFC-100FT 1503131600-1503132000
    - !LAL 03/025 LAL AIRSPACE UNMANNED ACFT WITHIN AN AREA DEFINED AS .5NM RADIUS OF LAL270001 SFC-100FT DLY 1100-2359 1503141100-1503152359
- ATCT
  - Any aircraft that ask to go to Sun 'n Fun should be sent to Sun 'n Fun (assume that they have a PPR)
  - On Friday 3/13 from 1200-1600 RWY 5 use for landing will be restricted. Airport Operations will be at Paradise Field to assist with coordinating landings on RWY 5 if needed.
  - TWY P will remain open throughout the event.

APPENDIX U

Example of Tenant and User Notification Form—Lakeland Linder Regional Airport, Florida

Source: S. Walsh, Lakeland Linder Regional Airport, Lakeland, Florida. Used with permission.

LAKELAND LINDER REGIONAL AIRPORT

MEMORANDUM

To: **Airport Users and Tenants**

From: **Nan Walsh, Assistant Airport Director**

Date: **October 20th, 2014**

Subject: **Weekend Events and NOTAM's:**

12 O'clock High Remote Control Aircraft Event and Aerospace Discovery Weekend (formerly Wings 'n Things)

The **12 O'clock High** remote control aircraft event will be held at Paradise City on the south side of the Airport from **Thurs Oct 23rd – Sat Oct 25th, 2014.**

Additionally, the annual **Aerospace Discovery Weekend,** formerly Wings 'n Things, will be held this weekend at Sun 'n Fun. First Flights will be conducted on **Sat Oct 25th, 2014.**

The following **NOTAM's** will be issued in support of the events:

- **Remote Controlled Aircraft operating on the LAL 230 radial, 0.9 NM fix, 400' AGL and below, effective 12:00pm – 4:00pm on Wed Oct 22nd and 8:30am – 6:00pm Daily, Thurs Oct 23rd – Sat Oct 25th.**
- **Taxiway F, P, P1, P2, D1, D West of RWY 5-23, B1, B3, B South of RWY 9-27 Non-movement Area 7:00am - 6:00pm, Sat Oct 25th.**

Please direct any questions or concerns to Brett Fay, Airport Operations Manager, Lakeland Airport, at (phone number) or (email address).

AIRPORT ADMINISTRATION
3900 Don Emerson Drive, Suite 210 · Lakeland, FL 33811 · 863/834-3298 · FAX: 863/834-3274
www.lakelandairport.com

Abbreviations and acronyms used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAST	Fixing America's Surface Transportation Act (2015)
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TDC	Transit Development Corporation
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation

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