Improvements to Commercial Service Airport Lighting, Signage and Markings

U.S. Department of Transportation

Federal Aviation Administration

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1. Overview

Congressional Runway Lighting, Signs and Marking Improvement Report

This report is a response by the FAA to a Congressional request in the FAA Modernization and Reform Act of 2012, [Public Law 112-95, Section 314(a)(2)(A)(v)] which requests:

> A review with respect to runway safety of every commercial service airport (as defined in section 47102 of title 49, United States Code) in the United States and proposed action to improve airport lighting, provide better signs, and improve runway and taxiway markings at those airports.

Overview of Inspection Process of Airport Lighting, Signs, and Runway and Taxiway Markings at Commercial Airports

The following is an overview of the existing guidelines used by the FAA to certify and track requirements for airport lights, signs, and runway and taxiway markings at all commercial service airports. FAA commercial service airports are those airports that are classified as Title 14 Code of Federal Regulations (CFR), Part 139, and Certification of Airports (Part 139), within the United States. Currently, there are a total of 544 of these commercial airports.

With respect to “proposed action to improve airport lighting, provide better signs, and improve runway and taxiway marking,” it’s important to first understand that there is a requirement for all Part 139 airports to undergo an initial certification inspection. This inspection determines whether an airport meets minimum standards, which includes lighting, signs, and runway and taxiway markings. The *Airport Certification Program Handbook,* FAA Order 5280.5C, dated September 8, 2006, provides FAA personnel with the policies, standards, and procedures from which to conduct the airport certification process. This Order also “ensures standardization and uniformity in the application of the program and in enforcing Title 14 Code of Federal Regulations (CFR), Part 139, and Certification of Airports (Part 139)." The Order further states:

> The Airport Certification Safety Inspector (ACSI) is responsible to know the contents of this Order as well as to be conversant with the provisions of this regulation. The objectives of the Order are as follows:
>
> 1) To meet the requirements of the Airport Certification Program, in accordance with the Federal Aviation Act of 1958, as amended, and Part 139;

2) To assist ACSIs as they direct airports to establish and maintain programs for enhancing and improving airport safety for the benefit of the community;

3) To provide accurate guidance to ACSIs administering the program; and

4) To ensure standardized application of program procedures and practices among the regional offices.

The certification requirement is applicable to all airports in every State of the United States, the District of Columbia, and any territory or possession of the United States at which passenger operations of the following types occur:

1. Scheduled operations by small aircraft designed for 10 to 30 seats (except for the State of Alaska)
2. Scheduled operations by large aircraft designed for 31 or more seats
3. Unscheduled operations by large aircraft designed for 31 or more seats

As indicated in Table 1, Part 139 identifies four airport classifications based on the type of aircraft being served at the facility. (The certification requirement is not applicable to heliport and airports operated by the U.S. Government, unless specified by the FAA). Class I, II, and IV airports are those that currently hold Part 139 Airport Operating Certificates. A Class III airport is an airport newly certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft.

Type of Air Carrier Operation	Class I	**Class II**	**Class III**	**Class IV**
Scheduled Large Air Carrier Aircraft	**X**			
Unscheduled Large Air Carrier Aircraft	**X**	**X**		**X**
Scheduled Small Air Carrier Aircraft	**X**	**X**	**X**	

Table 1 - Part 139 Airport Classes

These airports also undergo three types of Part 139 Airport periodic inspections: initial, periodic, and surveillance which are identified in Table 2 below.

Initial inspections are conducted prior to the issuance of an Airport Operating Certificate. Periodic inspections are conducted according to a schedule and Surveillance inspections can be conducted at any time. The following describes each these type inspections[1]:

a) An *initial* inspection is required for certification of all airports not previously inspected or certificated under Part 139, including all previous issuances of Part 139 since 1972.

b) The *periodic* inspection is intended to ensure the airport is safe and the certificate holder is operating the airport in compliance with Part 139 requirements and in accordance with procedures and practices described in the approved Airport Certification Manual (ACM). The periodic inspection schedule is designed to meet management objectives and conserve resources.

c) *Surveillance* inspections are announced or unannounced inspections that are conducted in addition to the periodic inspection. Reasons for conducting a surveillance inspection can range from following up on a periodic inspection finding to monitoring airfield safety during construction activity to testing continued compliance with the airport's ACM or Part 139. The surveillance inspection can be directed toward a specific requirement and is not necessarily all-inclusive. There are also factors that would trigger surveillance inspections above and beyond the listed inspection frequencies.

AIRPORT TYPE	9- to15-MONTH CYCLE	18-MONTH CYCLE	24-MONTH CYCLE	INITIAL	SURVEILLANCE
Class I	X			X	X
Class II		X		X	X
Class III		X		X	X
Class IV			X	X	X
INACTIVE				X	X

Table 2 - Part 139 Inspection Schedule by Airport Class

[1] *Airport Certification Program Handbook,* FAA Order 5280.5C, dated September 8, 2006, page 29.

An excerpt is provided of the inspection checklist contained in Order 5280.5C (Figure 3). This checklist which is used by the ACSI is designed to ensure that during the certification inspection the airport meets the certification standards for a Part 139 airport, including minimum requirements for runway markings, lighting and signage.

AIRPORT CERTIFICATION/SAFETY INSPECTION CHECKLIST

Airport Name: ▶	Associated City, State: ▶	Site No.: ▶
Certificate Holder: ▶	Current ARFF Index (A-26) ▶	Airport Classification (Check) Class I ☐ Class II ☐ Class III ☐ Class IV* ☐
Inspector: ▶	Inspection Dates:	S=Satisfactory U=Unsatisfactory N/A = Not Applicable Remarks Required

	S	U	N/A
METHODS AND PROCEDURES FOR COMPLIANCE			
1. Compliance with Advisory Circulars (139.7)	☐	☐	☐
EXEMPTIONS - NO. ON RECORD ( )			
1. Justification Still Valid (139.111)	☐	☐	☐
AIRPORT CERTIFICATION MANUAL			
1. Compliance with ACM (201a)	☐	☐	☐
2. Preparation (201a)	☐	☐	☐
3. Content (203)	☐	☐	☐
4. Maintenance (201b)	☐	☐	☐
RECORDS			
1. Furnished upon Request (301a)	☐	☐	☐
2. Maintained for Specified Duration (301b)	☐	☐	☐
PERSONNEL			
1. Sufficient Qualified Personnel (303a)	☐	☐	☐
2. Properly Equipped (303b)	☐	☐	☐
3. Trained (303c)	☐	☐	☐
4. Record of Training for 24 CCM (303d)	☐	☐	☐
5. Use of an Independent Organization or Designee (303f)	☐	☐	☐
PAVED AREAS			
1. Lips (305a1)	☐	☐	☐
2. Holes (305a2)	☐	☐	☐
3. Cracks/Surface Variations (305a3)	☐	☐	☐
4. Debris/Contaminants (305a4)	☐	☐	☐
5. Chemical Solvent Removed (305a5)	☐	☐	☐
6. Drainage/Ponding (305a6)	☐	☐	☐
SAFETY AREAS			
1. Dimensions Maintained (309a)	☐	☐	☐
2. Ruts/Surface Variations (309b1)	☐	☐	☐
3. Drainage (309b2)	☐	☐	☐
4. Support Aircraft/Equipment (309b3)	☐	☐	☐
5. Objects in Safety Area/Frangible Mounting (309b4)	☐	☐	☐
MARKING, SIGNS, AND LIGHTING			
1. Runway Marking Meets Specs (311a1)	☐	☐	☐

	S	U	N/A
2. Taxiway Centerline (311a2)	☐	☐	☐
3. Taxiway Edge Markings (311a3)	☐	☐	☐
4. Holding Position Markings (311a4)	☐	☐	☐
5. ILS Critical Area Markings (311a5)	☐	☐	☐
6. Signs Identifying Taxiing Routes (311b1i)	☐	☐	☐
7. Holding Position Signs (311b1ii)	☐	☐	☐
8. ILS Critical Area Signs (311b1iii)	☐	☐	☐
9. Signs Internally Illuminated (311b2)	☐	☐	☐
10. Runway Lighting Meets Specifications (311c1)	☐	☐	☐
11. Taxiway Lighting/Reflectors (311c2)	☐	☐	☐
12. Airport Beacon (311c3)	☐	☐	☐
13. Airport-owned Approach Lighting (311c4)	☐	☐	☐
14. Obstruction Marking/Lighting (311c5)	☐	☐	☐
15. Markings/Signs/Lighting Properly Maintained (311d)	☐	☐	☐
16. Other Lighting Shielded/Adjusted (311e)	☐	☐	☐
SNOW AND ICE CONTROL			
1. Prepare/Maint./Execute Plan (313a)	☐	☐	☐
2. Plan Addresses Prompt Removal or Control (313b1)	☐	☐	☐
3. Plan Addresses Positioning Snow for Clearance (313b2)	☐	☐	☐
4. Plan Addresses Use of Approved Materials (313b3)	☐	☐	☐
5. Plan Addresses Timely Commencement (313b4)	☐	☐	☐
6. Plan Addresses Prompt Notification to Users (313b5)	☐	☐	☐
ARFF OPERATIONS			
1. ARFF Capability Meeting Index Provided During ACR OPNS (319a)	☐	☐	☐
2. ARFF Requirements Met for Increase in Index (319b)	☐	☐	☐
3. Reduction in ARFF Index Meets Conditions (319d)	☐	☐	☐
4. Vehicle Communications in Required Vehicles (319e)	☐	☐	☐
5. Vehicle Marking & Lighting (319f)	☐	☐	☐
6. Vehicle Readiness (319g)	☐	☐	☐
7. Response Drill (No. Vehicles _____) (319h)	☐	☐	☐
8. Personnel Properly Equipped (319i1)	☐	☐	☐
9. Personnel Properly Trained (319i2)	☐	☐	☐
10. Live-Fire Drill Every 12 Consecutive Calendar Months for all Personnel (319i3)	☐	☐	☐

* For Class IV Airports, indicate N/A for all items that are not applicable.

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Figure 3. Example of Part 139 Inspection Checklist

Periodic inspections are critical to the maintenance of an airports certification and to ensure compliance with operational and safety requirements. In addition, the FAA established a runway safety office to identify and address airport-specific hazards and to create heightened awareness among stakeholders. It is therefore important to make a distinction between airport inspections and airport improvements. In the following section of this report, a better understanding can be obtained when combining several key policies when evaluating actions specific to improving airport lighting, providing better signs, and improving runway and taxiway markings at those airports.

1. Process Regarding Improvements to Runway Lighting, Signs and Runway and Taxiway Markings at Commercial Airports

Guidance

In addition to the Airport Certification Program Handbook, FAA Order 5280.5C, and to understand the process for making improvements to airport lighting, signs, runway and taxiway markings, these new and/or revised policies must be noted:

- FAA Advisory Circular 150/5340-1K (AC150 5340-1K), *Standards for Airport Markings*, dated September 3, 2010
- FAA Advisory Circular 150/5340-18F, *Standards for Airport Sign Systems,* dated August 16, 2010
- FAA Advisory Circular 150/5340-30G, *Design and Installation for Airport Visual Aids*, dated September 21, 2012
- FAA Order 7050.1A, *Runway Safety Program*, dated September 16, 2010

AC150 5340-1K provides guidance for improved standards on markings used on airport runways, taxiways, and aprons for airports certificated under Title 14 Code of Federal Regulations Part 139, Certification of Airports (Part 139). These standards are to be used on all new airport projects that are under development and are to be implemented at all Part 139 certificated airports. Further, use of this Advisory Circular (AC) is mandatory for all projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facility.[2] The AC applies to all commercial airports, whether or not the airport has an operating air traffic control tower.

FAA Order 7050.1A, Chapter 4, contains guidance and requirements for establishing Runway Safety Action Plans (RSAP) and Runway Safety Action Teams (RSAT) at airports with air traffic control towers. An RSAT convenes to discuss surface movement issues and concerns at a

[2] FAA AC150/5340-1K, Standards for Airport Markings, 9/3/2010

particular airport and formulates an RSAP to address those concerns. It is within the RSAP and through its safety action teams that specific concerns related to improvements in runway lighting, signs, and runway and taxiway markings are discussed and corrective action, if necessary, is identified using the guidance provided in AC150 5340-1K, AC150/5340-18F, AC150/5340-30G, and FAA Order 7050.1A.

FAA Order 7050.1A further stipulates that "each airport with an operational Air Traffic Control Tower (ATCT), including Federal Contract Towers (FCT), must develop and maintain a documented RSAP through its RSAT. The RSAP should be site-specific and present strategies to mitigate the risk of runway incursions." Additionally, each RSAT should look for best practices that could be documented and shared with the aviation community. The new policy also states that at least once every 12 months, a local and/or regional RSAT will convene to review and/or update the plan as necessary. The Order applies to airports with an operating air traffic control tower whether or not it is a commercial airport, certificated under Part 139.

The overall responsibility to establish and maintain all RSAPs rests with the FAA's Vice President of Terminal Services. As stated in FAA Order 7050.1A:

a) The ATCT manager will convene a Local RSAT (LRSAT) and document an RSAP with appropriate support from service area personnel and/or the Regional Runway Safety Program Office.

b) Regional RSAT meetings are the responsibility of Runway Safety and are led by the Regional Runway Safety Program Office. RSAPs resulting from regional RSAT meetings will be documented by the Regional Runway Safety Program Office. When considering locations for regional RSAT meetings, priority will be given to airports with the highest risks of runway incursions as determined by Runway Safety with input from the Regional Runway Safety Team.

c) Runway Safety will track the status of action items contained in all RSAPs.

The Vice President of Terminal Services is required to communicate the status of all RSAPs at least annually to the Vice President of ATO Safety and Technical Training. The report will include whether each airport has a plan and the date of the last RSAT meeting at which the plan was updated.

2. Data on Improvements to Airport Lighting, Signs, and Runway and Taxiway Markings at Commercial Airports

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Review and Assessment of CCMIS and RSTS Data Bases

A review and assessment of the FAA's Part 139 Inspection Certification and Compliance Management Information System (CCMIS) and RSAT Runway Safety Tracking System (RSTS) data bases with respect to runway safety of every commercial service airport and proposed action to improve airport lighting, provide better signs, and improve runway and taxiway markings at those airports, has been completed.

As of August 9, 2012, there were 544[3] commercial airports within the United States. This review and assessment covered all 544 Part 139 airports. Additionally, there were two Non-Part 139 airports that participated in the RSAT process because they have an operating air traffic control tower.

An Excel workbook was created to support this review and assessment and is attached to this report to illustrate the findings. A brief summary of the spreadsheet is included below:

Airport Identifying Information

This section contains identifying information for each Part 139 certificated airport including the airport name, three-letter identifier, FAA Region, and tower/non-tower status.

Certification and Compliance Management Information System (CCMIS) Data Base

Details of the inspection status are available in the CCMIS section. As previously noted, Part 139 inspections with respect to airport lighting, signs, and runway and taxiway markings are governed by FAA Order 5280.5C, AC150 5340-1K, AC150/5340-18F, and AC150/5340-30G. A review of the CCMIS database revealed that all 544 airports Part 139 certificated airports and an additional two Non-Part 139 airports had been inspected.

For those airports that have not yet complied with AC150 5340-1K AC, AC150/5340-18F, and AC150/5340-30G, a narrative from the actual inspection report is included on another sheet in the Excel workbook that identifies the action plan to address any outstanding issues.

Runway Safety Tracking System (RSTS) Data Base

A review and assessment of the RSTS database was also completed using similar methods as the CCMIS process above. The RSAT database contained all airports with an operating air traffic control tower (Part 139 and non-Part 139 airports). Unlike the CCMIS database, the RSAT database provided a better indication of proposed action to improve airport lighting, provide better signs, and improve runway and taxiway markings at those airports. The RSTS section contains the date and findings of the most recent ***runway safety action team meeting at the airport.***

Airport Technology Research

[3] www.FAA.gov, Airport Safety, Part 139 Airport Certification Status List – August 9, 2012.

The FAA maintains an effective Airport Technology Research Program. Under this program, the FAA has ongoing research on new lighting and marking technology. For example, to help reduce runway incursions, the FAA considered a number of ideas that included improvements to airport markings. The most promising idea was to implement an enhanced taxiway centerline as it approaches a hold line. The dashed lines would improve pilot situational awareness that the aircraft is approaching the hold line. As standardization of airport markings is very important, the FAA needed to conduct research on this concept to ensure it was beneficial. Under the Airport Technology Research Program, the enhanced taxiway centerline was evaluated by pilots in a simulator at Mitre Corporation. When the simulator testing proved effective, the research expanded to a prototype installation of the enhanced taxiway centerline marking at Providence Airport, Rhode Island (PVD). The prototype installation received such strong support from pilots that FAA revised the Airport Signing and Marking Advisory Circular to require all certificated airports to install the enhanced taxiway centerline marking. The FAA provided Airport Improvement Program grant funding to help fund the initial installations. The enhanced taxiway centerline marking installation was completed in December 2010 at the certificated airports in the United States. Subsequently, the FAA proposed this improved airport marking to the International Civil Aviation Organization (ICAO). ICAO adopted it and included it in Annex 14 as a recommended practice for all international airports.

3. Regional Runway Safety Governance Council

One of the goals of the Strategic Runway Safety Plan of August 2012 calls for the strengthening of runway safety at the Local and Regional Level. The plan identified the need to consolidate and create accountability for Local and Regional Runway Safety Action Team efforts with facility/terminal/airport stakeholder groups (such as the airport authority, ATC, airline operators and vendors) through the strengthening of the Local and Regional Runway Safety Program. The plan recognized that runway safety starts at the local airport. Consolidating accountability at the regional level will result in improved and timelier runway safety outcomes. This type of broad based effort can significantly lessen the resource burden while achieving better results.

As a result, the plan calls for a Regional Runway Safety Governance structure to aid in the development of local accountability. The Regional Administrators are now conducting Quarterly Runway Safety Program Reviews with the Vice President of ATO Safety and Technical Training to facilitate the exchange of runway safety data and trends and promote understanding of the integrated safety picture across the FAA operational Lines of Businesses. Each Regional Administrator is establishing a local governance council whose members include the Local Runway Safety Program Manager, an Airports Division Manager, and a Flight Standards Division Manager. The intent of the local council is to ensure regional initiatives and actions are being accomplished in the appropriate manner and timeframe.

The local council has specific knowledge and understanding of issues affecting runway safety. As hazards and actionable items at specific airports are identified by Local Runway Safety Action Teams (LRSAT), recorded in the Local Runway Safety Action Plan (LRSAP), and logged in the RSTS, the local council provides informed guidance for safety prioritization and resource

allocation. Coordinated at the regional level the Regional Runway Safety Governance Council assures that the open items in the RSTS are prioritized and addressed, completing one of the feedback loops of the ATO Safety Management System (SMS).

It is within the RSAT process that issues unique to that airport can be addressed appropriately and in a timely manner that reaches above and beyond the certification process. When an issue is brought forward that involves a proposal for improving airport lighting, signage, or runway and taxiway markings, the local RSAT provides the forum for this ongoing process.

4. Conclusion

In 2011, the FAA's Runway Safety group developed and posted a Local Runway Safety Action Team Tool Kit to aid Tower Managers and Certificate Holders in conducting these activities. With this ongoing educational effort, further development of the "Tool Kit," and the increased focus on performance metrics, the FAA expects continued improvements in performance and safety metrics related to airport surface operations.

The FAA is aggressively implementing FAA Order 7050.1A, *Runway Safety Program,* which requires that an airport with an air traffic control tower hold an RSAT or LRSAT meeting and update its RSAP once every 12 calendar months. The FAA is also actively implementing the safety requirements of FAA Order 7050.1A, *Runway Safety Program,* Advisory Circular 150/5340-1K (AC150 5340-1K), *Standards for Airport Markings*, FAA Advisory Circular 150/5340-18F (AC150/5340-18F), *Standards for Airport Sign Systems,* and FAA Advisory Circular 150/5340-30G (AC150/5340-30G), *Design and Installation for Airport Visual Aids*. The combination of airport inspections and the conduct of Runway Safety Action Team meetings have been successful in maintaining and improving surface safety at airports within the National Airspace System. The result is a continous improvement cycle of airport lighting, signage and enhanced runway and taxiway markings at the nation's commercial airports.