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of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION

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Initiated by: AAS-300

AC No: 150/5370-2E
Change:

1. THE PURPOSE OF THIS ADVISORY CIRCULAR (AC).

Aviation safety is the primary consideration at airports, especially during construction. This AC sets forth guidelines for operational safety on airports during construction. It contains major changes to the following areas: "Runway Safety Area," paragraph 3-2; "Taxiway Safety Areas/Object-Free Areas," paragraph 3-3; "Overview," paragraph 3-4; "Marking Guidelines for Temporary Threshold," paragraph 3-5; and "Hazard Marking and Lighting," paragraph 3-9.

2. WHAT THIS AC CANCELS.

This AC cancels AC 150/5370-2D, *Operational Safety on Airports During Construction,* dated May 31, 2002.

3. READING MATERIAL RELATED TO THIS AC.

Appendix 1 contains a list of reading materials on airport construction, design, and potential safety hazards during construction, as well as instructions for ordering these documents. Many of them, including this AC, are available on the Federal Aviation Administration (FAA) Web site.

4. WHO THIS AC AFFECTS.

This AC assists airport operators in complying with 14 Code of Federal Regulations (CFR), part 139, Certification and Operation: Land Airports Serving Certain Air Carriers, and with the requirements of airport construction projects receiving funds under the Airport Improvement Program or from the Passenger Facility Charge Program. While the FAA does not require noncertificated airports without grant agreements to adhere to these guidelines, we recommend that they do so as it will help these airports maintain a desirable level of operational safety during construction.

5. ADDITIONAL BACKGROUND INFORMATION.

Appendix 2 contains definitions of terms used in this AC. Appendix 3 provides airport operators with boilerplate format and language for developing a safety plan for an airport construction project. Appendix 4 is a sample Notice to Airmen form.

6. HAZARD LIGHTING IMPLEMENTATION TIME LINE.

Supplemental hazard lighting must be red in color by October 1, 2004. See paragraph 3-9 for more information.

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Director, Office of Airport Safety and Standards

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CONTENTS

Paragraph **Page**

CHAPTER 1. GENERAL SAFETY REQUIREMENTS AND RESPONSIBILITIES 1
1-1. Overview. 1
1-2. Who Is Responsible for Safety During Construction. 1

CHAPTER 2. SAFETY PLANS 3
Section 1. Basic Safety Plan Considerations 3
2-1. Overview. 3
2-2. Safety Plan Checklist. 3
Section 2. Safety and Security Measures 4
2-3. Overview. 4
2-4. Vehicle Operation and Marking and Pedestrian Control. 4
2-5. Construction Employee Parking Areas. 5
2-6. Construction Vehicle Equipment Parking. 5
2-7. Radio Communication Training. 5
2-8. Fencing and Gates. 5
Section 3. Notification of Construction Activities 5
2-9. General. 5
2-10. Assuring Prompt Notifications. 6
2-11. Notices to Airmen (NOTAMs). 6
2-12. Aircraft Rescue and Fire Fighting (ARFF) Notification. 6
2-13. Notification to the FAA. 6
2-14. Work Scheduling and Accomplishment. 6

CHAPTER 3. SAFETY STANDARDS AND GUIDELINES 7
Section 1. Runway and Taxiway Safety Areas, Obstacle-Free Zones, and Object-Free Areas 7
3-1. Overview. 7
3-2. Runway Safety Area (RSA)/Obstacle-Free Zone (OFZ). 7
3-3. Taxiway Safety Areas/Object-Free Areas. 7
Section 2. Temporary Runway Thresholds 8
3-4. Overview. 8
3-5. Marking Guidelines for Temporary Threshold. 8
3-6. Lighting Guidelines for Temporary Threshold. 9
Section 3. Other Construction Marking and Lighting Activities 10
3-7. Overview. 10
3-8. Closed Runway and Taxiway Marking and Lighting. 10
3-9. Hazard Marking and Lighting 10
3-10. Construction Near Navigational Aids (NAVAIDs). 11
3-11. Construction Site Access and Haul Roads. 11
3-12. Construction Material Stockpiling. 11
3-13. Other Limitations on Construction. 11
3-14. Foreign Object Debris (FOD) Management. 12
Section 4. Safety Hazards and Impacts 12
3-15. Overview. 12

Appendices

APPENDIX 1. RELATED READING MATERIAL **A-1**

APPENDIX 2. DEFINITIONS OF TERMS USED IN THE AC **A-2**

APPENDIX 3. AIRPORT CONSTRUCTION SAFETY PLANNING GUIDE **A-3**

APPENDIX 4. SAMPLE NOTAM **A-7**

CHAPTER 1. GENERAL SAFETY REQUIREMENTS AND RESPONSIBILITIES

1-1. OVERVIEW.

Hazardous practices and marginal conditions created by construction activities can decrease or jeopardize operational safety on airports. To minimize disruption of normal aircraft operations and to avoid situations that compromise the airport's operational safety, the airport operator must carefully plan, schedule, and coordinate construction activities. While the guidance in this AC is primarily used for construction operations, some of the methods and procedures described may also enhance day-to-day maintenance operations.

1-2. WHO IS RESPONSIBLE FOR SAFETY DURING CONSTRUCTION.

An airport operator has overall responsibility for construction activities on an airport. This includes the predesign, design, preconstruction, construction, and inspection phases. Additional information on these responsibilities can be found throughout this AC.

a. Airport operator's responsibilities—

(1) Develop internally or approve a construction safety plan developed by an outside consultant/contractor that complies with the safety guidelines in Chapter 2, "Safety Plans," and Appendix 3, "Airport Construction Safety Planning Guide," of this AC.

(2) Require contractors to submit plans indicating how they intend to comply with the safety requirements of the project.

(3) Convene a meeting with the construction contractor, consultant, airport employees, and, if appropriate, tenant sponsor to review and discuss project safety before beginning construction activity.

(4) Ensure contact information is accurate for each representative/point of contact identified in the safety plan.

(5) Hold weekly or, if necessary, daily safety meetings to coordinate activities.

(6) Notify users, especially aircraft rescue and fire fighting (ARFF) personnel, of construction activity and conditions that may adversely affect the operational safety of the airport via Notices to Airmen (NOTAMs) or other methods, as appropriate. Convene a meeting for review and discussion if necessary.

(7) Ensure that construction personnel know of any applicable airport procedures and of changes to those procedures that may affect their work.

(8) Ensure that construction contractors and subcontractors undergo training required by the safety plan.

(9) Develop and/or coordinate a construction vehicle plan with airport tenants, the airport traffic control tower (ATCT), and construction contractors. Include the vehicle plan in the safety plan. See Chapter 2, section 2, of this AC for additional information.

(10) Ensure tenants and contractors comply with standards and procedures for vehicle lighting, marking, access, operation, and communication.

(11) At certificated airports, ensure that each tenant's construction safety plan is consistent with 14 CFR part 139, Certification and Operations: Land Airports Serving Certain Air Carriers.

(12) Conduct frequent inspections to ensure construction contractors and tenants comply with the safety plan and that altered construction activities do not create potential safety hazards.

(13) Resolve safety deficiencies immediately.

(14) Ensure construction access complies with the security requirements of 49 CFR part 1542, Airport Security.

(15) Notify appropriate parties when conditions exist that invoke provisions of the safety plan (e.g., implementation of low-visibility operations).

b. Construction contractor's responsibilities—

(1) Submit plans to the airport operator on how to comply with the safety requirements of the project.

(2) Have available a copy of the project safety plan.

(3) Comply with the safety plan associated with the construction project and ensure that construction personnel are familiar with safety procedures and regulations on the airport.

(4) Provide a point of contact who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport.

(5) Provide a safety officer/construction inspector familiar with airport safety to monitor construction activities.

(6) Restrict movement of construction vehicles to construction areas by flagging and barricading, erecting temporary fencing, or providing escorts, as appropriate.

(7) Ensure that no construction employees, employees of subcontractors or suppliers, or other persons enter any part of the air operations areas (AOAs) from the construction site unless authorized.

c. Tenant's responsibilities if planning construction activities on leased property—

(1) Develop a safety plan, and submit it to the airport operator for approval prior to issuance of a Notice to Proceed.

(2) Provide a point of contact who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport.

(3) Ensure that no tenant or construction employees, employees of subcontractors or suppliers, or any other persons enter any part of the AOA from the construction site unless authorized.

(4) Restrict movement of construction vehicles to construction areas by flagging and barricading or erecting temporary fencing.

CHAPTER 2. SAFETY PLANS

Section 1. Basic Safety Plan Considerations

2-1. OVERVIEW.

Airport operators should coordinate safety issues with the air carriers, FAA Airway Facilities, and other airport tenants before the design phase of the project. The airport operator should identify project safety concerns, requirements, and impacts before making arrangements with contractors and other personnel to perform work on an airport. These safety concerns will serve as the foundation for the construction safety plan and help maintain a high level of aviation safety during the project.

The airport operator should determine the level of complexity of the safety plan that is necessary for each construction project and its phases. The safety plan may be detailed in the specifications included in the invitation for bids, or the invitation for bid may specify that the contractor develop the safety plan and the airport operator approve it. In the latter case, the invitation for bid should contain sufficient information to allow the contractor to develop and determine the costs associated with the safety plan. In either case, safety plan costs should be incorporated into the total cost of the project. The airport operator has final approval authority and responsibility for all safety plans.

Coordination will vary from formal predesign conferences to informal contacts throughout the duration of the construction project.

Details of a specified safety plan, or requirements for a contractor-developed safety plan, should be discussed at the predesign and preconstruction conferences and should include the following, as appropriate:

a. Actions necessary before starting construction, including defining and assigning responsibilities.

b. Basic responsibilities and procedures for disseminating instructions about airport procedures to the contractor's personnel.

c. Means of separating construction areas from aeronautical-use areas.

d. Navigational aid (NAVAID) requirements and weather.

e. Marking and lighting plan illustrations.

f. Methods of coordinating significant changes in airport operations with all the appropriate parties.

2-2. SAFETY PLAN CHECKLIST.

To the extent applicable, the safety plan should address the following:

a. Scope of work to be performed, including proposed duration of work.

b. Runway and taxiway marking and lighting.

c. Procedures for protecting all runway and taxiway safety areas, obstacle-free zones (OFZs), object-free areas (OFAs), and threshold citing criteria outlined in AC 150/5300-13, *Airport Design,* and as described in this AC. This includes limitations on equipment height and stockpiled material.

d. Areas and operations affected by the construction activity, including possible safety problems.

e. NAVAIDs that could be affected, especially critical area boundaries.

f. Methods of separating vehicle and pedestrian construction traffic from the airport movement areas. This may include fencing off construction areas to keep equipment operators in restricted areas in which they are authorized to operate. Fencing, or some other form of restrictive barrier, is an operational necessity in some cases.

g. Procedures and equipment, such as barricades (identify type), to delineate closed construction areas from the airport operational areas, as necessary.

h. Limitations on construction.

i. Required compliance of contractor personnel with all airport safety and security measures.

j. Location of stockpiled construction materials, construction site parking, and access and haul roads.

k. Radio communications.

l. Vehicle identification.

m. Trenches and excavations and cover requirements.

n. Procedures for notifying ARFF personnel if water lines or fire hydrants must be deactivated or if emergency access routes must be rerouted or blocked.

o. Emergency notification procedures for medical and police response.

p. Use of temporary visual aids.

q. Wildlife management.

r. Foreign object debris (FOD) control provisions.

s. Hazardous materials (HAZMAT) management.

t. NOTAM issuance.

u. Inspection requirements.

v. Procedures for locating and protecting existing underground utilities, cables, wires, pipelines, and other underground facilities in excavation areas.

w. Procedures for contacting responsible representatives/points of contact for all involved parties. This should include off-duty contact information so an immediate response may be coordinated to correct any construction-related activity that could adversely affect the operational safety of the airport. Particular care should be taken to ensure that appropriate Airways Facilities personnel are identified in the event that an unanticipated utility outage or cable cut occurs that impacts FAA NAVAIDs.

x. Vehicle operator training.

y. Penalty provisions for noncompliance with airport rules and regulations and the safety plan (e.g., if a vehicle is involved in a runway incursion).

z. Any special conditions that affect the operation of the airport and will require a portion of the safety plan to be activated (e.g., low-visibility operations, snow removal).

Section 2. Safety and Security Measures

2-3. OVERVIEW.

Airport operators are responsible for closely monitoring tenant and construction contractor activity during the construction project to ensure continual compliance with all safety and security requirements. Airports subject to 49 CFR part 1542, Airport Security, must meet standards for access control, movement of ground vehicles, and identification of construction contractor and tenant personnel. In addition, airport operators should use safety program standards, as described in Chapter 3 of this AC, to develop specific safety measures to which tenants and construction contractors must adhere throughout the duration of construction activities.

General safety provisions are contained in AC 150/5370-10, *Standards for Specifying Construction of Airports,* paragraphs 40-05, "Maintenance of Traffic"; 70-08, "Barricades, Warning Signs, and Hazard Markings"; and 80-04, "Limitation of Operations." At any time during construction, aircraft operations, weather, security, or local airport rules may dictate more stringent safety measures. The airport operator should ensure that both general and specific safety requirements are coordinated with airport tenants and ATCT personnel. The airport operator should also include these parties in the coordination of all bid documents, construction plans, and specifications for on-airport construction projects.

2-4. VEHICLE OPERATION AND MARKING AND PEDESTRIAN CONTROL.

Vehicle and pedestrian access routes for airport construction projects must be controlled to prevent inadvertent or unauthorized entry of persons, vehicles, or animals onto the AOA. This includes aircraft movement and nonmovement areas. The airport operator should develop and coordinate a construction vehicle plan with airport tenants, contractors, and the ATCT. The safety plan or invitation for bid should include specific vehicle and pedestrian requirements.

The vehicle plan should contain the following items:

a. Airport operator's rules and regulations for vehicle marking, lighting, and operation.

b. Requirements for marking and identifying vehicles in accordance with AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport.*

c. Description of proper vehicle operations on movement and nonmovement areas under normal, lost communications, and emergency conditions.

d. Penalties for noncompliance with driving rules and regulations.

e. Training requirements for vehicle drivers to ensure compliance with the airport operator's vehicle rules and regulations.

f. Provisions for radio communication training for construction contractor personnel engaged in construction activities around aircraft movement areas. Some drivers,

such as construction drivers under escort, may not require this training.

g. Escort procedures for construction vehicles requiring access to aircraft movement areas. A vehicle in the movement area must have a working aviation-band, two-way radio unless it is under escort. Vehicles can be in closed areas without a radio if the closed area is properly marked and lighted to prevent incursions and a NOTAM regarding the closure is issued.

h. Monitoring procedures to ensure that vehicle drivers are in compliance with the construction vehicle plan.

i. Procedures for, if appropriate, personnel to control access through gates and fencing or across aircraft movement areas.

2-5. CONSTRUCTION EMPLOYEE PARKING AREAS.

Designate in advance vehicle parking areas for contractor employees to prevent any unauthorized entry of persons or vehicles onto the airport movement area. These areas should provide reasonable contractor employee access to the job site.

2-6. CONSTRUCTION VEHICLE EQUIPMENT PARKING.

Construction employees must park and service all construction vehicles in an area designated by the airport operator outside the runway safety areas and OFZs and never on a closed taxiway or runway. Employees should also park construction vehicles outside the OFA when not in use by construction personnel (e.g., overnight, on weekends, or during other periods when construction is not active). Parking areas must not obstruct the clear line of sight by the ATCT to any taxiways or runways under air traffic control nor obstruct any runway visual aids, signs, or navigational aids. The FAA must also study those areas to determine effects on 14 CFR part 77, *Objects Affecting Navigable Airspace*, surfaces (see paragraph 2-13 for further information).

2-7. RADIO COMMUNICATION TRAINING.

The airport operator must ensure that tenant and construction contractor personnel engaged in activities involving unescorted operation on aircraft movement areas observe the proper procedures for communications, including using appropriate radio frequencies at airports with and without ATCTs. Training of contractors on proper communication procedures is essential for maintaining airport operational safety. When operating vehicles on or near open runways or taxiways, construction personnel must understand the critical importance of maintaining radio contact with airport operations, ATCT, or the Common Traffic Advisory Frequency, which may include UNICOM, MULTICOM, or one of the FAA Flight Service Stations (FSS), as directed by airport management.

Vehicular traffic crossing active movement areas must be controlled either by two-way radio with the ATCT, escort, flagman, signal light, or other means appropriate for the particular airport. Vehicle drivers must confirm by personal observation that no aircraft is approaching their position when given clearance to cross a runway. In addition, it is the responsibility of the escort vehicle driver to verify the movement/position of all escorted vehicles at any given time.

Even though radio communication is maintained, escort vehicle drivers must also familiarize themselves with ATCT light gun signals in the event of radio failure (see the FAA safety placard "Ground Vehicle Guide to Airport Signs and Markings"). This safety placard may be ordered through the Runway Safety Program Web site at **http://www.faarsp.org** or obtained from the Regional Airports Division Office.

2-8. FENCING AND GATES.

Airport operators and contractors must take care to maintain a high level of safety and security during construction when access points are created in the security fencing to permit the passage of construction vehicles or personnel. Temporary gates should be equipped so they can be securely closed and locked to prevent access by animals and people (especially minors). Procedures should be in place to ensure that only authorized persons and vehicles have access to the AOA and to prohibit "piggybacking" behind another person or vehicle. The Department of Transportation (DOT) document DOT/FAA/AR-00/52, *Recommended Security Guidelines for Airport Planning and Construction*, provides more specific information on fencing. A copy of this document can be obtained from the Airport Consultants Council, Airports Council International, or American Association of Airport Executives.

Section 3. Notification of Construction Activities

2-9. GENERAL.

In order to maintain the desired levels of operational safety on airports during construction activities, the safety plan should contain the notification actions described below.

2-10. ENSURING PROMPT NOTIFICATIONS.

The airport operator should establish and follow procedures for the immediate notification of airport users and the FAA of any conditions adversely affecting the operational safety of an airport.

2-11. NOTICES TO AIRMEN (NOTAMS).

The airport operator must provide information on closed or hazardous conditions on airport movement areas to the FSS so it can issue a NOTAM. The airport operator must coordinate the issuance, maintenance, and cancellation of NOTAMs about airport conditions resulting from construction activities with tenants and the local air traffic facility (control tower, approach control, or air traffic control center. Refer to AC 150/5200-28, *Notices to Airmen (NOTAMs) for Airport Operators,* and Appendix 4 in this AC for a sample NOTAM form. Only the FAA may issue or cancel NOTAMs on shutdown or irregular operation of FAA-owned facilities. Only the airport operator or an authorized representative may issue or cancel NOTAMs on airport conditions. (The airport owner/operator is the only entity that can close or open a runway.) The airport operator must file and maintain this list of authorized representatives with the FSS. Any person having reason to believe that a NOTAM is missing, incomplete, or inaccurate must notify the airport operator.

2-12. AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) NOTIFICATION.

The safety plan must provide procedures for notifying ARFF personnel, mutual aid providers, and other emergency services if construction requires shutting off or otherwise disrupting any water line or fire hydrant on the airport or adjoining areas and if contractors work with hazardous material on the airfield. Notification procedures must also be developed for notifying ARFF and all other emergency personnel when the work performed will close or affect any emergency routes. Likewise, the procedures must address appropriate notifications when services are restored.

2-13. NOTIFICATION TO THE FAA.

For certain airport projects, 14 CFR part 77 requires notification to the FAA. In addition to applications made for Federally funded construction, 14 CFR part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports, requires that the airport operator notify the FAA in writing whenever a non-Federally funded project involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport. Notification involves submitting FAA Form 7480-1, Notice of Landing Area Proposal, to the nearest FAA Regional Airports Division Office or Airports District Office.

Also, any person proposing any kind of construction or alteration of objects that affect navigable airspace, as defined in 14 CFR part 77 must notify the FAA. This includes construction equipment and proposed parking areas for this equipment (i.e., cranes, graders, etc.). FAA Form 7460-1*,* Notice of Proposed Construction or Alteration, can be used for this purpose and submitted to the FAA Regional Airports Division Office or Airports District Office. (See AC 70/7460-2, *Proposed Construction or Alteration of Objects that May Affect the Navigable Airspace*.)

If construction operations require a shutdown of an airport owned NAVAID from service for more than 24 hours or in excess of 4 hours daily on consecutive days, we recommend a 45-day minimum notice prior to facility shutdown. Coordinate work for a FAA owned NAVAID shutdown with the local FAA Airways Facilities Office. In addition, procedures that address unanticipated utility outages and cable cuts that could impact FAA NAVAIDs must be addressed.

2-14. WORK SCHEDULING AND ACCOMPLISHMENT.

Airport operators—or tenants having construction on their leased properties—should use predesign, prebid, and preconstruction conferences to introduce the subject of airport operational safety during construction (see AC 150/5300-9, *Predesign, Prebid, and Preconstruction Conferences for Airport Grant Projects).* The airport operator, tenants, and construction contractors should integrate operational safety requirements into their planning and work schedules as early as practical. Operational safety should be a standing agenda item for discussion during progress meetings throughout the project. The contractor and airport operator should carry out onsite inspections throughout the project and immediately remedy any deficiencies, whether caused by negligence, oversight, or project scope change.

CHAPTER 3. SAFETY STANDARDS AND GUIDELINES

Section 1. Runway and Taxiway Safety Areas, Obstacle-Free Zones, and Object-Free Areas

3-1. OVERVIEW.

Airport operators must use these safety guidelines when preparing plans and specifications for construction activities in areas that may interfere with aircraft operations. The safety plan should recognize and address these standards for each airport construction project. However, the safety plan must reflect the specific needs of a particular project, and for this reason, these safety guidelines should not be incorporated verbatim into project specifications. For additional guidance on meeting safety and security requirements, refer to the planning guide template included in Appendix 3 of this AC.

3-2. RUNWAY SAFETY AREA (RSA)/ OBSTACLE-FREE ZONE (OFZ).

A runway safety area is the defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway (see AC 150/5300-13, *Airport Design*). Construction activities within the standard RSA are subject to the following conditions:

a. Runway edges.

(1) No construction may occur closer than 200 feet (60m) from the runway centerline unless the runway is closed or restricted to aircraft operations, requiring an RSA that is equal to the RSA width available during construction, or 400 feet, whichever is less (see AC 150/5300-13, Tables 3-1 through 3-3).

(2) Personnel, material, and/or equipment must not penetrate the OFZ, as defined in AC 150/5300-13.

(3) The airport operator must coordinate the construction activity in the RSA as permitted above with the ATCT and the FAA Regional Airports Division Office or appropriate Airports District Office and issue a local NOTAM.

b. Runway ends.

(1) An RSA must be maintained of such dimensions that it extends beyond the end of the runway a distance equal to that which existed before construction activity, unless the runway is closed or restricted to aircraft operations for which the reduced RSA is adequate (see AC 150/5300-13). The temporary use of declared distances and/or partial runway closures may help provide the necessary RSA. In addition, all personnel, materials, and/or equipment must remain clear of the applicable threshold siting surfaces, as defined in Appendix 2, "Threshold Siting Requirements," of AC 150/5300-13.[1] Consult with the appropriate FAA Regional Airports Division Office or Airports District Office to determine the appropriate approach surface required.

(2) Personnel, material, and/or equipment must not penetrate the OFZ, as defined in AC 150/5300-13.

(3) The safety plan must provide procedures for ensuring adequate distance for blast protection, if required by operational considerations.

(4) The airport operator must coordinate construction activity in this portion of the RSA with the ATCT and the FAA Regional Airports Division Office or appropriate Airports District Office and issue a local NOTAM.

c. Excavations.

(1) Construction contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

(2) Open trenches or excavations are not permitted within 200 feet (60m) of the runway centerline and at least the existing RSA distance from the runway threshold while the runway is open. If the runway must be opened before excavations are backfilled, cover the excavations appropriately. Coverings for open trenches or excavations must be of sufficient strength to support the weight of the heaviest aircraft operating on the runway.

3-3. TAXIWAY SAFETY AREAS/OBJECT-FREE AREAS.

a. Unrestricted construction activity is permissible adjacent to taxiways when the taxiway is restricted to aircraft such that the available taxiway safety area is equal

[1] If a full safety area cannot be obtained through declared distances and partial closures, or other methods such as alternate runway use, construction activity may operate in the RSA as long as conditions cited in paragraph 3-1b(2) thru (4) are met. In addition, various surfaces outlined in AC 150/5300-13 and Terminal Instrument Procedures (TERPS) must be protected through an aeronautical study.

to at least ½ of the widest wingspan of the aircraft expected to use the taxiway and the available taxiway object-free area is equal to at least .7 times the widest wingspan plus 10 feet. (See AC 150/5300-13 for guidance on taxiway safety and object-free areas.)

Construction activity may be accomplished closer to a taxiway, subject to the following restrictions:

(1) The activity is first coordinated with the airport operator.

(2) Appropriate NOTAMs are issued.

(3) Marking and lighting meeting the provisions of paragraph 3-9 are implemented.

(4) Adequate clearance is maintained between equipment and materials and any part of an aircraft. If such clearance can only be maintained if an aircraft does not have full use of the entire taxiway width (with its main landing gear at the edge of the pavement), then it will be necessary to move personnel and equipment for each passing aircraft. In these situations, flag persons will be used to direct construction equipment, and wing walkers may be necessary to guide aircraft. Wing walkers should be airline/aviation personnel rather than construction workers.

b. Construction contractors must prominently mark open trenches and excavations at the construction site, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness

c. Excavations and open trenches may be permitted up to the edge of a structural taxiway and apron pavement provided the dropoff is marked and lighted per paragraph 3-9, "Hazard Marking and Lighting."

Section 2. Temporary Runway Thresholds

3-4. OVERVIEW.

Construction activity in a runway approach area may result in the need to partially close a runway or displace the existing runway threshold. In either case, locate the threshold in accordance with Appendix 2 of AC 150/5300-13, *Airport Design*. Objects that do not penetrate these surfaces may still be obstructions to air navigation and may affect standard instrument approach procedures. Coordinate these objects with the FAA's Regional Airports Office or appropriate Airports District Office, as necessary. Refer to the current edition of AC 150/5300-13 for guidance on threshold siting requirements. The partial runway closure, the displacement of the runway threshold, as well as closures of the complete runway and other portions of the movement area also requires coordination with appropriate ATCT personnel and airport users.

Caution regarding partial runway closures: When filing a NOTAM for a partial runway closure, clearly state to FSS personnel that the portion of pavement located prior to the threshold is not available for landing and departing traffic. In this case, the threshold has been moved for both landing and takeoff purposes (this is different than a displaced threshold).

Example NOTAM: "North 1,000 feet of Runway 18/36 is closed; 7,000 feet remain available on Runway 18 and Runway 36 for arrivals and departures." There may be situations where the portion of closed runway is available for taxiing only. If so, the NOTAM must reflect this condition.

Caution regarding displaced thresholds: Implementation of a displaced threshold affects runway length available for aircraft landing over the displacement. Depending on the reason for the displacement (to provide obstruction clearance or RSA), such a displacement may also require an adjustment in the landing distance available and accelerate-stop distance available in the opposite direction. If project scope includes personnel, equipment, excavation, etc. within the RSA of any usable runway end, we do not recommend a displaced threshold unless arrivals and departures toward the construction activity are prohibited. Instead, implement a partial closure.

3-5. MARKING GUIDELINES FOR TEMPORARY THRESHOLD.

Ensure that markings for temporary displaced thresholds are clearly visible to pilots approaching the airport to land. When construction personnel and equipment are located close to any threshold, a temporary visual NAVAID, such as runway end identifier lights (REIL), may be required (even on unlighted runways) to define the new beginning of the runway clearly. A visual vertical guidance device, such as a visual approach slope indicator (VASI), pulse light approach slope indicator (PLASI), or precision approach path indicator (PAPI), may be necessary to assure landing clearance over personnel, vehicles, equipment, and/or above-grade stockpiled materials. If such devices are installed, ensure an appropriate descriptive NOTAM is issued to inform pilots of these conditions. The current edition of AC 150/5340-1*, Standards for Airport Markings,* describes standard marking colors and layouts. In addition, we recommend that a temporary runway threshold be marked using the following guidelines:

a. Airport markings must be clearly visible to pilots; not misleading, confusing, or deceptive; secured in place to prevent movement by prop wash, jet blast, wing vortices, or other wind currents; and constructed of

materials that would minimize damage to an aircraft in the event of inadvertent contact.

(1) Pavement markings for temporary closed portions of the runway should consist of yellow chevrons to identify pavement areas that are unsuitable for takeoff/landing (see AC 150/5340-1). If unable to paint the markings on the pavement, construct them from any of the following materials: double-layered painted snow fence, colored plastic, painted sheets of plywood, or similar materials. They must be properly configured and secured to prevent movement by prop wash, jet blast, or other wind currents.

(2) It may be necessary to remove or cover runway markings, such as runway designation markings and aiming point markings, depending on the length of construction and type of activity at the airport.

(3) When threshold markings are needed to identify the temporary beginning of the runway that is available for landing, use a white threshold bar of the dimensions specified in AC 150/5340-1.

(4) If temporary outboard elevated or flush threshold bars are used, locate them outside of the runway pavement surface, one on each side of the runway. They should be at least 10 feet (3m) in width and extend outboard from each side of the runway so they are clearly visible to landing and departing aircraft. These threshold bars are white. If the white threshold bars are not discernable on grass or snow, apply a black background with appropriate material over the ground to ensure the markings are clearly visible.

(5) A temporary threshold may also be marked with the use of retroreflective, elevated markers. One side of such markers is green to denote the approach end of the runway; the side that is seen by pilots on rollout is red. See AC 150/5345-39, *FAA Specification L-853, Runway and Taxiway Retroreflective Markers.*

(6) At 14 CFR part 139 certificated airports, temporary elevated threshold markers must be mounted with a frangible fitting (see 14 CFR part 139.309). However, at noncertificated airports, the temporary elevated threshold markings may either be mounted with a frangible fitting or be flexible. See AC 150/5345-39.

b. The application rate of the paint to mark a short-term temporary runway threshold may deviate from the standard (see Item P-620, "Runway and Taxiway Painting," in AC 150/5370-10, *Standards for Specifying Construction of Airports*), but the dimensions must meet the existing standards, unless coordinated with the appropriate offices.

c. When a runway is partially closed, the distance remaining signs for aircraft landing in the opposite direction should be covered or removed during the construction.

3-6. LIGHTING GUIDELINES FOR TEMPORARY THRESHOLD.

A temporary runway threshold must be lighted if the runway is lighted and it is the intended threshold for night landings or instrument meteorological conditions. We recommend that temporary threshold lights and related visual NAVAIDs be installed outboard of the edges of the full-strength pavement with bases at grade level or as low as possible, but not to exceed 3 inches (7.6cm) above ground. When any portion of a base is above grade, place properly compacted fill around the base to minimize the rate of gradient change so aircraft can, in an emergency, cross at normal landing or takeoff speeds without incurring significant damage (see AC 150/5370-10). We recommend that the following be observed when using temporary runway threshold lighting:

a. Maintain threshold and edge lighting color and spacing standards as described in AC 150/5340-24, *Runway and Taxiway Edge Lighting System.* Battery-powered, solar, or portable lights that meet the criteria in AC 150/5345-50, *Specification for Portable Runway Lights,* may be used. These systems are intended primarily for visual flight rules (VFR) aircraft operation but may be used for instrument flight rules (IFR) aircraft operations, upon individual approval from the Flight Standards Division of the applicable FAA Regional Office.

b. When the runway has been partially closed, disconnect edge and threshold lights with associated isolation transformers on that part of the runway at and behind the threshold (i.e., the portion of the runway that is closed). Alternately, cover the light fixture in such a way as to prevent light leakage. Avoid removing the lamp from energized fixtures because an excessive number of isolation transformers with open secondaries may damage the regulators and/or increase the current above its normal value.

c. Secure, identify, and place any temporary exposed wiring in conduit to prevent electrocution and fire ignition sources.

d. Reconfigure yellow lenses (caution zone), as necessary. If the runway has centerline lights, reconfigure the red lenses, as necessary, or place the centerline lights out of service.

e. Relocate the visual glide slope indicator (VGSI), such as VASI and PAPI; other airport lights, such as REIL; and approach lights to identify the temporary threshold. Another option is to disable the VGSI or any equipment that would give misleading indications to pilots as to the new threshold location. Installation of temporary visual aids may be necessary to provide adequate guidance to pilots on approach to the affected runway. If the FAA owns and operates the VGSI,

coordinate its installation or disabling with the local Airway Facilities Systems Management Office.

f. Issue a NOTAM to inform pilots of temporary lighting conditions.

Section 3. Other Construction Marking and Lighting Activities

3-7. OVERVIEW.

Ensure that construction areas, including closed runways, are clearly and visibly separated from movement areas and that hazards, facilities, cables, and power lines are identified prominently for construction contractors. Throughout the duration of the construction project, verify that these areas remain clearly marked and visible at all times and that marking and lighting aids remain in place and operational. Routine inspections must be made of temporary construction lighting, especially battery-powered lighting since weather conditions can limit battery life.

3-8. CLOSED RUNWAY AND TAXIWAY MARKING AND LIGHTING.

Closed runway markings consist of a yellow "X" in compliance with the standards of AC 150/5340-1, *Standards for Airport Markings*. A very effective and preferable visual aid to depict temporary closure is the lighted "X" signal placed on or near the runway designation numbers. This device is much more discernible to approaching aircraft than the other materials described. If the lighted "X" is not available, construct the marking of any of the following materials: double-layered painted snow fence, colored plastic, painted sheets of plywood, or similar materials. They must be properly configured and secured to prevent movement by prop wash, jet blast, or other wind currents. In addition, the airport operator may install barricades, traffic cones, activate stop bars, or other acceptable visual devices at major entrances to the runways to prevent aircraft from entering a closed portion of runway. The placement of even a single reflective barricade with a "do not enter" sign on a taxiway centerline can prevent an aircraft from continuing onto a closed runway. If the taxiway must remain open for aircraft crossings, barricades or markings, as described above or in paragraph 3-9, should be placed on the runway.

a. Permanently closed runways.

For runways and taxiways that have been permanently closed, disconnect the lighting circuits. For runways, obliterate the threshold marking, runway designation marking, and touchdown zone markings, and place "X's" at each end and at 1,000-foot (300-m) intervals. For taxiways, place an "X" at the entrance of the closed taxiway.

b. Temporarily closed runway and taxiways.

For runways that have been temporarily closed, place an "X" at the each end of the runway. With taxiways, place an "X" at the entrance of the closed taxiway.

c. Temporarily closed airport.

When the airport is closed temporarily, mark the runways as closed and turn off the airport beacon.

d. Permanently closed airports

When the airport is closed permanently, mark the runways as permanently closed, disconnect the airport beacon, and place an "X" in the segmented circle or at a central location if no segmented circle exists.

3-9. HAZARD MARKING AND LIGHTING.

Provide prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles. Using appropriate hazard marking and lighting may prevent damage, injury, traffic delays, and/or facility closures. Hazard marking and lighting must restrict access and make specific hazards obvious to pilots, vehicle drivers, and other personnel. Barricades, traffic cones (weighted or sturdily attached to the surface), or flashers are acceptable methods used to identify and define the limits of construction and hazardous areas on airports.

Provide temporary hazard marking and lighting to prevent aircraft from taxiing onto a closed runway for takeoff and to identify open manholes, small areas under repair, stockpiled material, and waste areas. Also consider less obvious construction-related hazards and include markings to identify FAA, airport, and National Weather Service facilities cables and power lines; instrument landing system (ILS) critical areas; airport surfaces, such as RSA, OFA, and OFZ; and other sensitive areas to make it easier for contractor personnel to avoid these areas.

The construction specifications must include a provision requiring the contractor to have a person on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades. The contractor must file the contact person's information with the airport.

a. Nonmovement areas.

Indicate construction locations on nonmovement areas in which no part of an aircraft may enter by using barricades that are marked with diagonal, alternating orange and white stripes. Barricades may be supplemented with alternating

orange and white flags at least 20 by 20 inches (50 by 50 cm) square and made and installed so they are always in an extended position, properly oriented, and securely fastened to eliminate jet engine ingestion. Such barricades may be many different shapes and made from various materials, including railroad ties, sawhorses, jersey barriers, or barrels. During reduced visibility or night hours, supplement the barricades with red lights, either flashing or steady-burning, which should meet the luminance requirements of the State Highway Department (yellow lights are not acceptable after October 1, 2004). The intensity of the lights and spacing for barricade flags and lights must adequately and without ambiguity delineate the hazardous area.

b. Movement areas.

Use orange traffic cones; red lights, either flashing or steady-burning, which should meet the luminance requirements of the State Highway Department (yellow lights are not acceptable after October 1, 2004); collapsible barricades marked with diagonal, alternating orange and white stripes; and/or signs to separate all construction/maintenance areas from the movement area. All barricades, temporary markers, and other objects placed and left in safety areas associated with any open runway, taxiway, or taxilane must be as low as possible to the ground; of low mass; easily collapsible upon contact with an aircraft or any of its components; and weighted or sturdily attached to the surface to prevent displacement from prop wash, jet blast, wing vortex, or other surface wind currents. If affixed to the surface, they must be frangible at grade level or as low as possible, but not to exceed 3 inches (7.6cm) above the ground. Do not use nonfrangible hazard markings, such as concrete barriers and/or metal-drum-type barricades, in aircraft movement areas. Do not use railroad ties on runways.

Use highly reflective barriers with flashing or steady-burning red lights to barricade taxiways leading to closed runways. Evaluate all operating factors when determining how to mark temporary closures that can last from 10 to 15 minutes to a much longer period of time. However, we strongly recommend that, even for closures of relatively short duration, major taxiway/runway intersections be identified with barricades spaced no greater than 20 feet (6m) apart. Mark the barricades with a flashing or steady-burning red light. At a minimum, use a single barricade placed on the taxiway centerline.

3-10. CONSTRUCTION NEAR NAVIGATIONAL AIDS (NAVAIDS).

Construction activities, materials/equipment storage, and vehicle parking near electronic NAVAIDs require special consideration since they may interfere with signals essential to air navigation. Evaluate the effect of construction activity and the required distance and direction from the NAVAID for each construction project. Pay particular attention to stockpiling material, as well as to movement and parking of equipment that may interfere with line of sight from the ATCT or with electronic emissions. Interference from construction may require NAVAID shutdown or adjustment of instrument approach minimums for IFR. This condition requires that a NOTAM be filed. Construction activities and materials/equipment storage near a NAVAID may also obstruct access to the equipment and instruments for maintenance. Before commencing construction activity, parking vehicles, or storing construction equipment and materials near a NAVAID, consult with the nearest FAA Airway Facilities Office.

3-11. CONSTRUCTION SITE ACCESS AND HAUL ROADS.

Determine the construction contractor's access to the construction sites and haul roads. Do not permit the construction contractor to use any access or haul roads other than those approved. Construction contractors must submit specific proposed routes associated with construction activities to the airport operator for evaluation and approval as part of the safety plan before beginning construction activities. These proposed routes must also provide specifications to prevent inadvertent entry to movement areas. Pay special attention to ensure that ARFF right of way on access and haul roads is not impeded at any time and that construction traffic on haul roads does not interfere with NAVAIDs or approach surfaces of operational runways.

3-12. CONSTRUCTION MATERIAL STOCKPILING.

Stockpiled materials and equipment storage are not permitted within the RSA and OFZ of an operational runway. The airport operator must ensure that stockpiled materials and equipment adjacent to these areas are prominently marked and lighted during hours of restricted visibility or darkness. This includes determining and verifying that materials are stored at an approved location to prevent foreign object damage and attraction of wildlife.

3-13. OTHER LIMITATIONS ON CONSTRUCTION.

Contractors may not use open-flame welding or torches unless adequate fire safety precautions are provided and the airport operator has approved their use. Under no circumstances should flare pots be used within the AOA at any time. The use of electrical blasting caps must not be permitted on or within 1,000 feet (300m) of the airport property (see AC 150/5370-10, *Standards for Specifying Construction of Airports*).

3-14. FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT.

Waste and loose materials, commonly referred to as FOD, are capable of causing damage to aircraft landing gears, propellers, and jet engines. Construction contractors must not leave or place FOD on or near active aircraft movement areas. Materials tracked onto these areas must be continuously removed during the construction project. We also recommend that airport operators and construction contractors carefully control and continuously remove waste or loose materials that might attract wildlife.

Section 4. Safety Hazards and Impacts

3-15. OVERVIEW.

The situations identified below are potentially hazardous conditions that may occur during airport construction projects. Safety area encroachments, unauthorized and improper ground vehicle operations, and unmarked or uncovered holes and trenches near aircraft operating surfaces pose the most prevalent threats to airport operational safety during airport construction projects. Airport operators and contractors should consider the following when performing inspections of construction activity:

a. Excavation adjacent to runways, taxiways, and aprons.

b. Mounds of earth, construction materials, temporary structures, and other obstacles near any open runway, taxiway, or taxilane; in the related object-free area and aircraft approach or departure areas/zones; or obstructing any sign or marking.

c. Runway resurfacing projects resulting in lips exceeding 3 inches (7.6cm) from pavement edges and ends.

d. Heavy equipment (stationary or mobile) operating or idle near AOAs, in runway approaches and departures areas, or in OFZs.

e. Equipment or material near NAVAIDs that may degrade or impair radiated signals and/or the monitoring of navigational and visual aids. Unauthorized or improper vehicle operations in localizer or glide slope critical areas, resulting in electronic interference and/or facility shutdown.

f. Tall and especially relatively low-visibility units (i.e., equipment with slim profiles)—cranes, drills, and similar objects—located in critical areas, such as OFZs and approach zones.

g. Improperly positioned or malfunctioning lights or unlighted airport hazards, such as holes or excavations, on any apron, open taxiway, or open taxilane or in a related safety, approach, or departure area.

h. Obstacles, loose pavement, trash, and other debris on or near AOAs. Construction debris (gravel, sand, mud, paving materials, etc.) on airport pavements may result in aircraft propeller, turbine engine, or tire damage. Also, loose materials may blow about, potentially causing personal injury or equipment damage.

i. Inappropriate or poorly maintained fencing during construction intended to deter human and animal intrusions into the AOA. Fencing and other markings that are inadequate to separate construction areas from open AOAs create aviation hazards.

j. Improper or inadequate marking or lighting of runways (especially thresholds that have been displaced or runways that have been closed) and taxiways that could cause pilot confusion and provide a potential for a runway incursion. Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of AOAs create aviation hazards.

k. Wildlife attractants—such as trash (food scraps not collected from construction personnel activity), grass seeds, or ponded water—on or near airports.

l. Obliterated or faded markings on active operational areas.

m. Misleading or malfunctioning obstruction lights. Unlighted or unmarked obstructions in the approach to any open runway pose aviation hazards.

n. Failure to issue, update, or cancel NOTAMs about airport or runway closures or other construction-related airport conditions.

o. Failure to mark and identify utilities or power cables. Damage to utilities and power cables during construction activity can result in the loss of runway/taxiway lighting; loss of navigational, visual, or approach aids; disruption of weather reporting services; and/or loss of communications.

p. Restrictions on ARFF access from fire stations to the runway-taxiway system or airport buildings.

q. Lack of radio communications with construction vehicles in airport movement areas.

r. Objects, regardless of whether they are marked or flagged, or activities anywhere on or near an airport

that could be distracting, confusing, or alarming to pilots during aircraft operations.

s. Water, snow, dirt, debris, or other contaminants that temporarily obscure or derogate the visibility of runway/taxiway marking, lighting, and pavement edges. Any condition or factor that obscures or diminishes the visibility of areas under construction.

t. Spillage from vehicles (gasoline, diesel fuel, oil, etc.) on active pavement areas, such as runways, taxiways, ramps, and airport roadways.

u. Failure to maintain drainage system integrity during construction (e.g., no temporary drainage provided when working on a drainage system).

v. Failure to provide for proper electrical lockout and tagging procedures. At larger airports with multiple maintenance shifts/workers, construction contractors should make provisions for coordinating work on circuits.

w. Failure to control dust. Consider limiting the amount of area from which the contractor is allowed to strip turf.

x. Exposed wiring that creates an electrocution or fire ignition hazard. Identify and secure wiring, and place it in conduit or bury it.

y. Site burning, which can cause possible obscuration.

z. Construction work taking place outside of designated work areas and out of phase.

APPENDIX 1. RELATED READING MATERIAL

1. Obtain the latest version of the following free publications from the FAA on its Web site at **http://www.faa.gov/arp/.** In addition, these ACs are available by contacting the U.S. Department of Transportation, Subsequent Distribution Office, SVC-121.23, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785.

a. AC 150/5200-28, *Notices to Airmen (NOTAM) for Airport Operators.* Provides guidance for the use of the NOTAM System in airport reporting.

b. AC 150/5200-30, *Airport Winter Safety and Operations.* Provides guidance to airport owners/operators on the development of an acceptable airport snow and ice control program and on appropriate field condition reporting procedures.

c. AC 150/5200-33, *Hazardous Wildlife Attractants On or Near Airports.* Provides guidance on locating certain land uses having the potential to attract hazardous wildlife to public-use airports.

d. AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport*. Provides guidance, specifications, and standards for painting, marking, and lighting vehicles operating in the airport air operations areas.

e. AC 150/5220-4, *Water Supply Systems for Aircraft Fire and Rescue Protection.* Provides guidance for the selection of a water source and standards for the design of a distribution system to support aircraft rescue and fire fighting service operations on airports.

f. AC 150/5340-1, *Standards for Airport Markings*. Contains FAA standards for markings used on airport runways, taxiways, and aprons.

g. AC 150/5340-14B, *Economy Approach Lighting Aids*. Describes standards for the design, selection, siting, and maintenance of economy approach lighting aids.

h. AC 150/5340-18, *Standards for Airport Sign Systems.* Contains FAA standards for the siting and installation of signs on airport runways and taxiways.

i. AC 150/5345-28, *Precision Approach Path Indicator (PAPI) Systems.* Contains the FAA standards for PAPI systems, which provide pilots with visual glide slope guidance during approach for landing.

j. AC 150/5380-5, *Debris Hazards at Civil Airports.* Discusses problems at airports, gives information on foreign objects, and explains how to eliminate such objects from operational areas.

k. AC 70/7460-2, *Proposed Construction or Alteration of Objects that May Affect the Navigable Airspace.* Provides information to persons proposing to erect or alter an object that may affect navigable airspace and explains the need to notify the FAA before construction begins and the FAA's response to those notices, as required by 14 CFR part 77.

2. Obtain copies of the following publications from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Send a check or money order made payable to the Superintendent of Documents in the amount stated with your request. The Government Printing Office does not accept C.O.D. orders. In addition, the FAA makes these ACs available at no charge on the Web site at **http://www.faa.gov/arp/.**

a. AC 150/5300-13, *Airport Design.* Contains FAA standards and recommendations for airport design, establishes approach visibility minimums as an airport design parameter, and contains the object-free area and the obstacle free-zone criteria. ($26. Supt. Docs.) SN050-007-01208-0.

b. AC 150/5370-10, *Standards for Specifying Construction of Airports.* Provides standards for construction of airports. Items covered include earthwork, drainage, paving, turfing, lighting, and incidental construction. ($18. Supt. Docs.) SN050-007-0821-0.

APPENDIX 2. DEFINITIONS OF TERMS USED IN THE AC

1. AIR OPERATIONS AREA (AOA). Any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operations area includes such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runways, taxiways, or aprons.

2. CONSTRUCTION. The presence and movement of construction-related personnel, equipment, and materials in any location that could infringe upon the movement of aircraft.

3. CERTIFICATED AIRPORT. An airport that has been issued an Airport Operating Certificate by the FAA under the authority of 14 CFR part 139, Certification and Operation: Land Airports Serving Certain Air Carriers, or its subsequent revisions.

4. FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION. The form submitted to the FAA Regional Air Traffic or Airports Division Office as formal written notification of any kind of construction or alteration of objects that affect navigable airspace, as defined in 14 CFR part 77, Objects Affecting Navigable Airspace (see AC 70/7460-2, *Proposed Construction or Alteration of Objects that May Affect the Navigable Airspace*, found at **http://www.faa.gov/arp/**).

5. FAA FORM 7480-1, NOTICE OF LANDING AREA PROPOSAL. Form submitted to the FAA Airports Regional Division Office or Airports District Office as formal written notification whenever a project without an airport layout plan on file with the FAA involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport (found at **http://www.faa.gov/arp/**).

6. MOVEMENT AREA. The runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas (reference 14 CFR part 139).

7. OBSTRUCTION. Any object/obstacle exceeding the obstruction standards specified by 14 CFR part 77, subpart C.

8. OBJECT-FREE AREA (OFA). An area on the ground centered on the runway, taxiway, or taxilane centerline provided to enhance safety of aircraft operations by having the area free of objects except for those objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes (see AC 150/5300-13, *Airport Design,* for additional guidance on OFA standards and wingtip clearance criteria).

9. OBSTACLE-FREE ZONE (OFZ). The airspace below 150 feet (45m) above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway and for missed approaches (refer to AC 150/5300-13 for guidance on OFZs).

10. RUNWAY SAFETY AREA (RSA). A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway, in accordance with AC 150/5300-13.

11. TAXIWAY SAFETY AREA. A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway, in accordance with AC 150/5300-13.

12. THRESHOLD. The beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced.

13. DISPLACED THRESHOLD. The portion of pavement behind a displaced threshold that may be available for takeoffs in either direction or landing from the opposite direction.

14. VISUAL GLIDE SLOPE INDICATOR (VGSI). This device provides a visual glide slope indicator to landing pilots. These systems include precision approach path indicators (PAPIs), visual approach slope indicators (VASIs), and pulse light approach slope indicators (PLASIs).

APPENDIX 3. AIRPORT CONSTRUCTION SAFETY PLANNING GUIDE

Aviation Safety Requirements During Construction

PURPOSE. *This appendix provides airport operators with boilerplate format and language for developing a safety plan for an airport construction project. Adapt this appendix, as applicable, to specific conditions found on the airport for which the plan is being developed. Consider including a copy of this safety plan in the construction drawings for easy access by contractor personnel. Plans should contain the following:*

1. GENERAL SAFETY REQUIREMENTS.

Throughout the construction project, the following safety and operational practices should be observed:

- Operational safety should be a standing agenda item during progress meetings throughout the construction project.
- The contractor and airport operator must perform onsite inspections throughout the project, with immediate remedy of any deficiencies, whether caused by negligence, oversight, or project scope change.
- Airport runways and taxiways should remain in use by aircraft to the maximum extent possible.
- Aircraft use of areas near the contractor's work should be controlled to minimize disturbance to the contractor's operation.
- Contractor, subcontractor, and supplier employees or any unauthorized persons must be restricted from entering an airport area that would be hazardous.
- Construction that is within the safety area of an active runway, taxiway, or apron that is performed under normal operational conditions must be performed when the runway, taxiway, or apron is closed or use-restricted and initiated only with prior permission from the airport operator.
- The contracting officer, airport operator, or other designated airport representative may order the contractor to suspend operations; move personnel, equipment, and materials to a safe location; and stand by until aircraft use is completed.

2. CONSTRUCTION MAINTENANCE AND FACILITIES MAINTENANCE.

Before beginning any construction activity, the contractor must, through the airport operator, give notice [using the Notice to Airmen (NOTAM) System] of proposed location, time, and date of commencement of construction. Upon completion of work and return of all such areas to standard conditions, the contractor must, through the airport operator, verify the cancellation of all notices issued via the NOTAM System. Throughout the duration of the construction project, the contractor must—

a. Be aware of and understand the safety problems and hazards described in AC 150/5370-2, *Operational Safety on Airports During Construction.*

b. Conduct activities so as not to violate any safety standards contained in AC 150/5370-2 or any of the references therein.

c. Inspect all construction and storage areas as often as necessary to be aware of conditions.

d. Promptly take all actions necessary to prevent or remedy any unsafe or potentially unsafe conditions as soon as they are discovered.

3. APPROACH CLEARANCE TO RUNWAYS.

Runway thresholds must provide an unobstructed approach surface over equipment and materials. (Refer to Appendix 2 in AC 150/5300-13, *Airport Design,* for guidance in this area.)

4. RUNWAY AND TAXIWAY SAFETY AREA (RSA AND TSA).

Limit construction to outside of the approved RSA, as shown on the approved airport layout plan—unless the runway is closed or restricted to aircraft operations, requiring a lesser standard RSA that is equal to the RSA available during construction (see AC 150/5370-2 for exceptions). Construction activity within the TSA is permissible when the taxiway is open to aircraft traffic if adequate wingtip clearance exists between the aircraft and equipment/material; evacuations, trenches, or other conditions are conspicuously marked and lighted; and local NOTAMs are in effect for the activity (see AC 150/5300-13 for wingtip clearance requirements). The NOTAM should state that, "personnel and equipment are working adjacent to Taxiway____."

a. Procedures for protecting runway edges.

- Limit construction to no closer than 200 feet (60m) from the runway centerline—unless the runway is closed or restricted to aircraft operations, requiring a lesser standard RSA

that is equal to the RSA available during construction.

- Prevent personnel, material, and/or equipment, as defined in AC 150/5300-13, Paragraph 306, "Obstacle Free Zone (OFZ)," from penetrating the OFZ.
- Coordinate construction activity with the Airport Traffic Control Tower (ATCT) and FAA Regional Airports Division Office or Airports District Office, and through the airport operator, issue an appropriate NOTAM.

Complete the following chart to determine the area that must be protected along the runway edges:

Runway	Aircraft Approach Category* A, B, C, or D	Airplane Design Group* I, II, III, or IV	RSA Width in Feet Divided by 2*
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

*See AC 150/5300-13, *Airport Design,* to complete the chart for a specific runway.

b. Procedures for protecting runway ends.

- Maintain the RSA from the runway threshold to a point at least the distance from the runway threshold as existed before construction activity—unless the runway is closed or restricted to aircraft operations, requiring an RSA that is equal to the RSA length available during construction in accordance with AC 150/5300-13. This may involve the use of declared distances and partial runway closures (see AC 150/5370-2 for exceptions).
- Ensure all personnel, materials, and/or equipment are clear of the applicable threshold siting criteria surface, as defined in Appendix 2, "Threshold Siting Requirements," of AC 150/5300-13.
- Prevent personnel, material, and/or equipment, as defined in AC 150/5300-13, from penetrating the obstacle-free zone.
- Ensure adequate distance for blast protection is provided, as needed.
- Coordinate construction activity with the ATCT and FAA Regional Airports Division Office or Airports District Office, and through the airport operator, issue an appropriate NOTAM.
- Provide a drawing showing the profile of the appropriate surfaces of each runway end where construction will take place. Where operations by turbojet aircraft are anticipated, review takeoff procedures and jet blast characteristics of aircraft and incorporate safety measures for construction workers in the contract documents.

Complete the following chart to determine the area that must be protected before the runway threshold:

Runway End Number	Airplane Design Group* I, II, III, or IV	Aircraft Approach Category* A, B, C, or D	Minimum Safety Area Prior to the Threshold*	Minimum Unobstructed Approach Slope
_____	_____	_____	_____: FEET	____: 1 to (threshold)
_____	_____	_____	_____: FEET	____: 1 to (threshold)
_____	_____	_____	_____: FEET	____: 1 to (threshold)
_____	_____	_____	_____: FEET	____: 1 to (threshold)

*See AC 150/5300-13, *Airport Design,* to complete the chart for a specific runway.

5. MARKING AND LIGHTING FOR TEMPORARY THRESHOLDS.

Marking and lighting for a temporary threshold is____/is not____ required. The airport owner or contractor, as specified in the contract, will furnish and maintain markings for temporary thresholds. Precision approach path indicators (PAPIs) or runway end identification lights (REIL) are____/are not____ required. The airport owner or contractor, as specified in the contract, will furnish and install all temporary lighting. Include appropriate items per AC 150/5370-2, Chapter 3, "Safety Standards and Guidelines." *If marking and lighting for the temporary threshold is not required, delete this section of the safety plan. If visual aids and/or markings are necessary, provide details. (Include applicable 14 CFR part 77 surfaces in the contract documents.)*

6. CLOSED RUNWAY MARKINGS AND LIGHTING.

The following must be specified for closed runways. Closed runway marking are ____/are not____ required. Closed runway markings will be as shown on the plans____/as furnished by the airport owner____/other____ (specify). Barricades, flagging, and flashers are____/are not____required at Taxiway____ and Runway____and will be supplied by the airport ____/other____(specify).

7. HAZARDOUS AREA MARKING AND LIGHTING.

Hazardous areas on the movement area will be marked with barricades, traffic cones, flags, or flashers (specify). These markings restrict access and make hazards obvious to aircraft, personnel, and vehicles. During periods of low visibility and at night, identify hazardous areas with red flashing or steady-burning lights (specify). The hazardous area marking and lighting will be supplied by the airport operator/contractor, as specified in the contract, and will be depicted on the plans.

8. TEMPORARY LIGHTING AND MARKING.

Airport markings, lighting, and/or signs will be altered in the following manner (specify) during the period from _____ to _____. The alterations are depicted on the plans.

9. VEHICLE OPERATION MARKING AND CONTROL.

Include the following provisions in the construction contract, and address them in the safety plans:

a. When any vehicle, other than one that has prior approval from the airport operator, must travel over any portion of an aircraft movement area, it will be escorted and properly identified. To operate in those areas during daylight hours, the vehicle must have a flag or beacon attached to it. Any vehicle operating on the movement areas during hours of darkness or reduced visibility must be equipped with a flashing dome-type light, the color of which is in accordance with local or state codes.

b. It may be desirable to clearly identify the vehicles for control purposes by either assigned initials or numbers that are prominently displayed on each side of the vehicle. The identification symbols should be at minimum 8-inch (20-cm) block-type characters of a contrasting color and easy to read. They may be applied either by using tape or a water-soluble paint to facilitate removal. Magnetic signs are also acceptable. In addition, vehicles must display identification media, as specified in the approved security plan. *(This section should be revised to conform to the airport operator's requirements.)*

c. Employee parking shall be _____ (specify location), as designated by the airport manager_____/ project engineer_____/other_____ (specify).

d. Access to the job site shall be via_____ (specify route), as shown on the plans_____/designated by the engineer_____/designated by the superintendent_____/designated by the airport manager_____/other_____ (specify).

e. At 14 CFR part 139 certificated and towered airports, all vehicle operators having access to the movement area must be familiar with airport procedures for the operation of ground vehicles and the consequences of noncompliance.

f. If the airport is certificated and/or has a security plan, the airport operator should check for guidance on the additional identification and control of construction equipment.

10. NAVIGATIONAL AIDS.

The contractor must not conduct any construction activity within navigational aid restricted areas without prior approval from the local FAA Airway Facilities sector representative. Navigational aids include instrument landing system components and very high-frequency omnidirectional range, airport surveillance radar. Such restricted areas are depicted on construction plans.

11. LIMITATIONS ON CONSTRUCTION.

Additional limitations on construction include—

a. Prohibiting open-flame welding or torch cutting operations unless adequate fire safety precautions are provided and these operations have been authorized by the airport operator *(as tailored to conform to local requirements and restrictions).*

b. Prominently marking open trenches, excavations, and stockpiled materials at the construction and lighting these obstacles during hours of restricted visibility and darkness.

c. Marking and lighting closed, deceptive, and hazardous areas on airports, as appropriate.

d. Constraining stockpiled material to prevent its movement as a result of the maximum anticipated aircraft blast and forecast wind conditions.

12. RADIO COMMUNICATIONS.

Vehicular traffic located in or crossing an active movement area must have a working two-way radio in contact with the control tower or be escorted by a person in radio contact with the tower. The driver, through personal observation, should confirm that no aircraft is approaching the vehicle position. Construction personnel may operate in a movement area without two-way radio communication provided a NOTAM is issued closing the area and the area is properly marked to prevent incursions. Two-way radio communications are ____/are not____required between contractors and the Airport Traffic Control Tower_____/FAA Flight Service Station_____/Airport Aeronautical Advisory Stations (UNICOM/CTAF)_____. Radio contact is _____/is not_____ required between the hours of ____and _____. Continuous monitoring is required _____/or is required only when equipment movement is necessary in certain areas_____. *(This section may be tailored to suit the specific vehicle and safety requirements of the airport sponsor.)*

13. DEBRIS.

Waste and loose material must not be placed in active movement areas. Materials tracked onto these areas must be removed continuously during the work project.

APPENDIX 4. SAMPLE NOTAM

_____ AIRPORT

FAA NOTAM # _____ **DATE: _____**

AIRPORT I.D. # _____ **TIME: _____**

NOTAM TEXT:

NOTIFICATON:

TOWER _____ _____ _____ _____

PHONE # INITIALS TIME CALLED IN BY

FSS _____ _____ _____ _____

PHONE # INITIALS TIME CALLED IN BY

AIRLINES

_____ _____

_____ _____

_____ _____

CANCELLED:

NOTIFICATON:

TOWER _____ _____ _____ _____

PHONE # INITIALS TIME CALLED IN BY

FSS _____ _____ _____ _____

PHONE # INITIALS TIME CALLED IN BY

AIRLINES

_____ _____

_____ _____

_____ _____