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**GCAA
ADVISORY CIRCULAR**

**AERODROME & GROUND AID
AC NO: GCAA AC/AGA/005**

SUBJECT: OBSTACLE CONTROL

**DATE INITIATED: JULY 15, 2016
INITIATED BY: DIRECTOR AVIATION
SAFETY REGULATION**

1. PURPOSE

The purpose of this Advisory Circular (AC) is to provide guidance to aerodrome operators on the methods acceptable to the Authority regarding compliance with the requirements for aerodrome design standard for obstacle limitation surfaces.

2. GENERAL INFORMATION/CANCELLATION

- a. This Advisory Circular GCAA AC/AGA/005 is an initial issue and the effective date is January 1, 2017.
- b. This AC contains information regarding standards, practices and procedures on obstacle control that are acceptable to the Authority. Regardless, consideration will be given to other alternative methods of compliance that are acceptable to the Authority.
- c. This AC applies to all aerodrome operators in Guyana.

3. RELATED REFERENCES

- i. ICAO Annex 14: Aerodromes.
- ii. ICAO Annex 4: Aeronautical Charts.
- iii. ICAO Doc 9173 – Airport Services Manual Part 6.
- iv. ICAO Doc 9173 – Airport Service Manual Part 8.

4. CONTACT INFORMATION

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5. DEFINITION/ACRONYM

- a. **Aerodrome Certificate.** A certificate issued by the GCAA under applicable regulations for the operation of an aerodrome.
- b. **"Aerodrome Facilities and Equipment"** means facilities and equipment inside or outside the boundaries of an aerodrome that are constructed or installed and maintained for the arrival, departure and surface movement of aircraft.
- c. **"Aerodrome Manual"** means a manual that forms part of the application for Aerodrome Certificate pursuant to this Advisory Circular and includes any amendments accepted or approved by the Guyana Civil Aviation Authority (GCAA).
- d. **"Aerodrome Operator"** means in relation to Certificated Aerodrome, the Aerodrome Certificate holder.
- e. **"Authority"** means the Guyana Civil Aviation Authority.
- f. **"Certified Aerodrome"** means an aerodrome which has been granted an aerodrome certificate.
- g. **"Marker"** means an object displayed above the ground level in order to indicate an obstacle or delineate a boundary.
- h. **"Marking"** means a symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.
- i. **"Obstacle"** means all fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or extend above a defined surface intended to protect aircraft in flight.
- j. **"Obstacle Free Zone (OFZ)"** means the airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangible-mounted one, required for air navigation purposes.
- k. **"Obstacle Limitation Surface (OLS)"** means a series of surfaces, that define the volume of airspace at and around an aerodrome to be kept free of obstacles in order to permit the intended aircraft operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome.
- l. **"Runway Strip"** means a defined area including the runway and stopway, if provided or intended to:
 - a) reduce the risk of damage to aircraft running off a runway; and
 - b) protect aircraft flying over it during take-off or landing.
- m. **"Safeguarding Map"** means a map prepared by or on behalf of an aerodrome licensee showing the obstacle limitation surfaces for each runway or proposed runway of a particular aerodrome or proposed aerodrome or in respect of those surfaces for any development proposed to an existing runway or aerodrome for the purposes of safeguarding the aerodrome against developments which would have an adverse effect for aircraft operations.

- n. **"Safety Management System (SMS)"** means a system for the management of safety at aerodromes including the organizational structure, responsibilities, procedures, processes and provisions for the implementation of aerodrome safety policies by an aerodrome operator, which provides for the control of safety at, and the safe use of, the aerodrome.
- o. **"Take-Off Flight Path Area"** means a quadrilateral area on the surface of the earth lying directly below and symmetrically disposed about the take-off flight path of a runway.
- p. **"Taxiway Strip"** means an area including a taxiway intended to protect an aircraft operating on a taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.
- q. **"Unserviceable Area"** means a part of the movement area that is unfit and unavailable for use by aircraft.
- r. **"Work Areas"** means a part of an aerodrome in which maintenance or construction works are in progress.

6. OBSTACLE LIMITATION SURFACES

6.1 Obstacle Limitation Surfaces

- a. The effective utilisations of an aerodrome may be influenced by natural features and man-made objects inside and outside the aerodrome boundary. These may result in:
 - i. limitations on the distance available for aircraft take-off and landings;
 - ii. the range of meteorological conditions in which take-off and landings can be undertaken; or
 - iii. reduction in the payload of some aircraft types; or
 - iv. all the above.
- b. Obstacle limitation surfaces exist to protect the operations of aircraft into and out of an aerodrome. The following are the essential elements of obstacle limitation surfaces:
 - i. Take-off climb surface;
 - ii. Approach surface;
 - iii. Transitional surface;
 - iv. Inner horizontal surface; and
 - v. Conical surface.
- c. The aerodrome design specifications require that all existing objects penetrating the obstacle limitation surfaces should, as far as practicable, be removed unless they are shielded by existing immovable objects. Detailed specifications and recommendations about the marking and lighting of obstacles are contained in ICAO Annex 14 and Airport Services Manual (Doc 9137) Part 6.

6.2 Aerodrome Obstacle Chart Type "A"

- a. The aerodrome obstacle Chart Type "A", represents a profile of the take-off obstruction environment on departure from a specific runway. The basic slope shown on the chart is 1.2 percent which is below the slope of the protected take-off climb surface established for a runway intended for use by Group "A" aircraft.

- b. Although objects may penetrate the 1.2 percent (1:83.3) slope, there is no need to remove any which are beneath the aerodrome design take-off climb surface (Annex 14). However, all objects shown are accountable in the calculation of the aircraft take-off performance and in some instances may affect the payload of a particular aircraft type. The extent of this limitation depends on individual circumstances, but it is possible to significantly reduce the payload penalty by judicious obstacle removal close to the aerodrome. Conversely, it may be that an obstacle several kilometres from the aerodrome is the limiting factor.

6.3 ICAO PANS-OPS Surfaces

- a. The PANS-OPS surfaces are used in the construction of instrument flight procedures. They are designed to safeguard an aircraft from collision with obstacles when flying by reference instruments. Pilots use minimum safe altitudes, established for each segment of the instrument procedures, which are based on obstacle clearances in the procedure areas.
- b. Instrument flight procedure obstacle free surfaces sizes and dimensions do not usually coincide with the aerodrome design obstacle limitation surfaces. Refer to PANS-OPS, Doc 8168, Volume 2 for the obstacle free surfaces needed for instrument flight approach, for missed approach procedures, and for visual manoeuvring (circling) procedures.

7. CONTROL OF OBSTACLES

7.1 Definition of an Obstacle

- a. An existing object, including a mobile object, is an obstacle to air navigation if it is of greater height than any of the following heights or surfaces:
 - i. A height of 45 meters (136.8 ft.) above ground level at the site of the object or an object which otherwise constitutes an en-route obstacle or a potential en-route obstacle.
 - ii. A height within a runway approach area, a runway departure area or a circling approach area, which would result in the vertical distance between any point on the object and the established minimum instrument flight altitude or height as specified for the aerodrome concerned in the "AIP" within that area to be less than the required obstacle clearance. The analysis of the significance of such obstacles may have to be determined by an aeronautical study;
- b. The visual aid for denoting obstacles is defined in Chapter 6 of Annex 14 to the Convention.
- c. An inclined plane surface, with a slope of 1.2 percent superimposed on a take-off flight path area and extending to 10 kilometres from the end of the runway concerned as specified in Chapter 3 of Annex 4.
- d. The surfaces specified in paragraph (e) above may also be defined in relation to a specific aerodrome on a safeguarding map prepared by or on behalf of the aerodrome licensee and lodged with the local Authority responsible for planning in the vicinity of that aerodrome.

7.2 Control of Obstacles. When controlling obstacles, the following should not be overlooked:

- a. Objects which penetrate the approach surface are critical since they represent an erosion of the clearance between the final approach path, and fixed or mobile obstacles on the ground. On an approach where the approach surface is significantly obstructed, the safe operation of aircraft is ensured by raising the aerodrome approach meteorological minima. If the object penetrates into the approach surface, the landing threshold is displaced, effectively reducing the available landing distance. This can have an adverse effect on the regularity of aircraft operations and could impose payload penalties on landing aircraft.
- b. Penetration of the transitional surfaces by an obstacle results in the reduction in the clearance available whilst carrying out an approach to land or during a missed approach procedure. Such obstacles may have an adverse effect on the aerodrome meteorological minima and may need marking and lighting.
- c. Aircraft performance requirements, applicable to take-off and climb, require all aircraft to clear all obstacles by a minimum specified margin. Objects which penetrate approach and take-off climb surfaces may impose significant payload penalties on aircraft taking off.
- d. The inner horizontal surface is more significant for VFR operations. It also provides protection for circling aircraft following an instrument approach. It does not usually represent a critically limiting surface around a large aerodrome handling IFR traffic, except in so far that it extends beneath the approach surface.
- e. The conical surface represents the obstacle limiting surface some distance from the aerodrome. It is often not practical to control obstacles which penetrate this surface, although it does usually provide a limit to new construction.
- f. Controlling of obstacles is to maintain or improve the Aerodrome Obstacle Chart - Type "A" obstacle profile, based on the clear understanding of the performance requirements of the aircraft regularly using the aerodrome or those proposed to be brought into regular use.
- g. Any obstacles which are allowed to penetrate the established PANS-OPS surfaces could raise the minimum safe altitudes of the aerodrome instrument flight procedures. This could have an adverse effect on the regularity of aircraft operations.

7.3 Identifying Obstacles

- a. Identification of obstacles requires a complete engineering survey of all areas beneath the aerodrome obstacle limitation surfaces.
- b. The initial survey should produce a chart presenting a plan view of the entire aerodrome and its environs. The scope of the chart should be to the outer limit of the conical, approach and take-off climb surfaces. It will need to include profile views of all obstacle limitation surfaces. Each obstacle should be identified in both plan and profile with its description and height above the datum, which should be specified on the chart. Engineering field surveys can be supplemented by aerial photographs and photogrammetry to identify possible obstacles not readily visible from the aerodrome.

- c. Periodic surveys should be conducted to ensure the validity of the information in the initial survey. The aerodrome operator should make frequent visual observations of surrounding areas to determine the presence of new obstacles. Follow-up surveys should be conducted whenever significant changes occur. A detailed survey of a specific area may be necessary when the initial survey indicates the presence of obstacles for which a control program is contemplated. Following completion of an obstacle control program, the area should be re-surveyed to provide corrected data on the presence or absence of obstacles. Similarly, revision surveys should be conducted if changes are made, or planned, to the aerodrome characteristics such as runway length, elevation or orientation. No firm rule can be set down for the frequency of periodic surveys, but constant vigilance is required. Changes in obstacle data arising from surveys are to be notified to the Aeronautical Information Service (AIS) as soon as practicable for promulgation to the aircraft operators.

7.4 Reporting and Information in Respect of Obstacles

- a. A person, who proposes to erect or to construct an object, as defined in paragraph 7.1, a., i., of this AC, shall first notify the Central Housing and Planning Authority in writing of that intention and shall provide such information as may be requested under paragraph 7.4, c., below, apart from any permission required to be obtained for the right to construct. The Central Housing & Planning Authority will notify the Guyana Civil Aviation Authority of such intention.
- b. A person who proposes to erect or construct an object as defined in paragraph 7.1, within a radius of 10 NM of a licensed aerodrome shall first notify the aerodrome licensee in writing of that intention and shall, where requested, provide such information to the Authority as may be required under paragraph 7.4, c., below, apart from any permission required to be obtained for the right to construct.
- c. The GCAA may require information relating to an obstacle, including its geographic latitude and longitude, elevation and height.
- d. The GCAA may require the conduct of an aeronautical study for the purposes of 7.1, b., or otherwise if it considers it necessary in a particular case.

7.5 Methods of Obstacle Control

The viability and safety of aerodrome use by aircraft operators can be assured by establishing effective obstacle control to maintain the obstacle limitation surfaces. Control can be achieved by the following methods:

- i. Enactment of height zoning protection by the relevant authority/ agencies;
- ii. Establishing an effective obstacle removal program; or
- iii. Purchasing of easement or property rights; or
- iv. All the above.

7.6 Height Zoning of Obstacle Limitation Surfaces

- a. The objective of height zoning is to protect the aerodrome obstacle limitation surfaces from penetration by man-made objects and natural growth such as trees in accordance with Annex 14.
- b. This is done by the enactment of regulations identifying height limits below the aerodrome obstacle limitation surfaces. The responsibility for the enactment of such an ordinance is a matter between the aerodrome operator and the "Land Use Authority", namely the, Central Housing & Planning Authority.
- c. To give effect to height-zoning, a zoning map should be prepared for the guidance of the responsible local authority. The map is a composite, relating all zoning criteria to the ground level around the aerodrome. It should cover the aerodrome design obstacle limitation surfaces and, where applicable, the take-off flight path for the aerodrome obstacle chart Type "A" and any PANS-OPS surfaces.
- d. Typical zoning regulations shall include a statement of the purpose of, or necessity for, the action, a description of the obstacle limitation surfaces which should conform to the aerodrome design surfaces and, if applicable, the aerodrome obstacle chart Type "A" and the PANS-OPS surfaces. They should also contain a statement of allowable heights which should conform to the specifications for these surfaces. Provisions should be made, in the regulations, for a maximum allowable height, for existing non-conforming uses, for marking and lighting of obstacles and for appeals from the provision of the regulation. The matter of bird control could also be addressed at the same time by defining areas which the siting of gravel pits, refuse dumps, sewage outfalls and other features, which attract birds, may be subjected to restriction in the interests of aviation safety.

7.7 Easements or Property Rights

- a. In those areas where zoning is inadequate the aerodrome operator may take steps to protect the obstacle limitation surfaces by other means. Examples of zoning inadequacies might be locations close to runway ends or where obstacles exist. Examples of other means might be such as gaining easements or property rights. They should include removal or reduction in height of existing obstacles and measures to ensure that no new obstacles may be erected in the future.
- b. Where agreement can be reached, for the reduction in height of an obstacle, the agreement should include a written aviation easement limiting heights over the property to specific levels unless effective height zoning has been established.

7.8 Obstacle Removal

- a. When obstacles have been identified, the aerodrome operator should make every effort to have them removed, or reduced in height so that they are no longer an obstacle. If the obstacle is a single object it may be possible to reach agreement with the owner of the property to reduce the height to acceptable limits without adverse effect. Examples of such objects are a tree, a television or telecommunication antenna or a chimney.
- b. In the case of trees, which are trimmed, agreement should be reached in writing with the property owner to ensure that future growth will not create new obstacles. Property owners can give such assurance by agreeing to trim the trees when necessary, or by permitting access to the premises to have the trimming done by the aerodrome operator's contractor. It is important to assess the growth rate of trees and trim them low enough so that the ensuing growth will be below the obstacle surface until the surface is due for next survey.

- c. Some aids to navigation both electronic, such as ILS components, and visual, such as approach and runway lights, constitute obstacles which cannot be removed. Such objects should be frangible designed and constructed, and mounted on frangible couplings so that they will fail on impact without significant damage to an aircraft.

7.9 Marking and Lighting of Obstacles

- a. Where it is impractical to eliminate an obstacle, it should be appropriately marked or lighted, or both, to be clearly visible to pilots in all weather and visibility conditions.
- b. Note that the marking and lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of obstacles in clear conspicuity. It does not necessarily reduce operating limitations which may be caused by the obstacle. ICAO Annex 14 specifies that obstacles be marked and, if the aerodrome is used at night, lighted, except that:
 - i. Lighting and marking may be omitted when the obstacle is shielded by another obstacle; and
 - ii. The marking may be omitted when the obstacle is lighted by medium intensity obstacle lights by day.
- c. Vehicles and other mobile objects, excluding aircraft, on movement areas of aerodromes should be marked and lighted, unless they are used on apron areas only.

7.10 Obstacle Shielding

The principle of obstacle shielding is employed to permit a more logical approach to restricting new construction and to the requirements for marking and lighting of obstacles. Shielding principles are employed when some object, an existing building or natural terrain, already penetrates above one of the aerodrome design obstacle surfaces. If the obstacle is permanent, then additional objects within a specified area around it can penetrate the surface without being obstacles. The original obstacle dominates or shields the surrounding area.

8. REQUIREMENTS

8.1 General

This AC defines obstacles to aircraft in flight for the purpose of airspace protection in Guyana, adjacent to and in the vicinity of aerodromes and elsewhere and specifies reporting and information requirements with respect thereto. In the interest of airspace protection in Guyana, the GCAA requires that any individual or institution who is desirous of erecting high rising structures in Guyana shall apply to the Central Housing and Planning Authority in writing for the proposed structure to be evaluated whether it may or may not pose a hazard to air navigation.

8.2 Guide

- a. Any structure within 10nm radius of an existing or proposed aerodrome must be brought to the notice of the GCAA to determine if an aeronautical study is to be conducted prior to the construction.
- b. Beyond 10nm radius of an existing or proposed aerodrome, any structure which is 45m (136.8ft) or higher above ground level must be brought to the attention of the GCAA for an aeronautical survey to be conducted prior to the construction.

8.3 Procedure

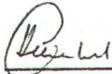
NOTE 1: The Guyana Civil Aviation Authority (GCAA) is not the organisation responsible for approving the building a structure, the responsible authority is the CHPA. Therefore, the application shall be to the CHPA and not the GCAA.

NOTE 2: The GCAA is responsible for safety of airspace and air navigation.

- a. An applicant proposing to erect a structure that may be seen as an obstacle to aircraft in flight shall submit in writing an application to the Central Housing and Planning Authority (CHPA) for approval. Construction of the structure shall only commence after approval is granted in writing by the CHPA.
- b. The application shall consist of all information required by the CHPA. The information shall be in consonance with the requirements of the GCAA. The CHPA shall submit a copy of the application to the GCAA. The information will provide the CHPA and GCAA with data required for evaluating whether the structure will pose an obstacle to aircraft in flight (airspace safety and air navigation).
- c. The CHPA and GCAA shall carry out a coordinated evaluation (separately or jointly) and if it is determined that the proposed structure shall not pose any risk or hazard to air navigation, the GCAA shall issue a "Letter Of No Objection" to the CHPA regarding the construction of the structure.
- d. The evaluation shall consist of an assessment of the information submitted in the application and also observation during a site visit.
- e. After assessing the information on the application the GCAA in collaboration with the CHPA shall arrange with the applicant to conduct a site inspection. All expenses for the site inspection shall be borne by the applicant.
- f. The application shall consist the following information:
 - i. The height of the proposed structure;
 - ii. The exact geographical co-ordinates of the proposed site for the structure (that is, Latitude and Longitude according to WGS 84 Geodetic System);
 - iii. A topographical map indicating the location of the proposed site for the structure; and
 - iv. The elevation of the proposed site above mean sea level.
- g. After approval is granted by the CHPA to commence construction, the applicant may erect the structure. Upon completion of the structure, the applicant shall mark the structure (with conspicuous paint) and install a light on the structure at a place and position acceptable to the CHPA and GCAA and subsequently notify both Authorities of the outcome.
- h. The CHPA shall inform the applicant that a verification inspection is required to be done to the site and structure. The verification inspection shall be done as a consolidated inspection by the CHPA, GCAA and applicant. All expenses for this inspection shall be borne by the applicant.

- i. Approved structures shall be subjected to periodic inspections by the CHPA and GCAA to ensure continuous compliance with requirements for maintenance of the structure, including maintaining the mark (paint) and position light.

Approved By:



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Guyana Civil Aviation Authority

