



GM 14-27

**CIVIL AVIATION AUTHORITY OF BANGLADESH**

Guidance Manual

**Obstacle Limitation Surface, Marking,  
Lighting & Removal**



Version 2.0  
12 June 2024

**AERODROME STANDARD DIVISION**



GM 14-27

# **CIVIL AVIATION AUTHORITY OF BANGLADESH**

## **Guidance Manual on Obstacle Limitation Surface, Marking, Lighting & Removal**

**Version-2.0**

**12 June 2024**

**Aerodrome Standard Division**



**REVISION HISTORY**

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## FOREWORD

In exercise of the powers conferred by the Section 14 of Civil Aviation Act 2017, the Chairman, Civil Aviation authority of Bangladesh has promulgated ANO-14 Vol-I by transposing the Provisions of ICAO Annex 14 Vol-1 as specific operating regulations for the Aerodrome Operators, operating in Bangladesh.

An Aerodrome Operator is expected to comply with the Provisions of the ANO-14 Vol-I. There may be circumstances where compliance of requirements by the Aerodrome Operator becomes difficult because of constraints of trained manpower, training facilities and/or other administrative formalities. These situations require CAAB to establish subject specific guidance manuals.

Provisions of ANO-14 Vol-I in Chapter 4 set the obstacle surface requirement around an Aerodrome which an Aerodrome Operator is required to maintain and develop a mechanism for control & removal of obstacles, as required by regulations, at and in the vicinity of the aerodrome.

The aim of this guidance manual is to provide guidance to an aerodrome operators in developing a mechanism for control & removal of obstacles at and in the vicinity of the aerodrome. In developing a mechanism, this GM should be considered in conjunction with other related GMs and documents issued by the Chairman.

It is expected that the concerned Aerodrome Operator will take this GM as a reference/guidance material in evaluating the impact of obstacles around the aerodrome concerned on the safety of aircraft operation and to develop a mechanism for control & removal of obstacles at and in the vicinity of the aerodrome.

This GM is issued under the authority of the Chairman, CAAB and will become effective on the date mentioned in the GM and will supersede the Aerodrome Advisory Circular (AC (AD) No-5) issued on 10 May 2011 on the same subject.

**Air Vice Marshal M Mafidur Rahman**

BBP, BSP, BUP, ndu, afwc, psc

Chairman

Civil Aviation Authority of Bangladesh

## 1. Definitions

The definitions in this section shall have the following meaning whenever they appear in this GM. The definitions in CA Act 2017 & ANO 14 Vol-I shall be applicable as and where required.

**“Aerodrome Certificate”** means a certificate issued by the Chairman under the CA Act 2017.

**“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 the aircraft.

**“Aerodrome Licence”** means a licence issued by the Chairman under the CA Act 2017.

**“Aerodrome Manual”** means a manual included in an application for aerodrome certificate or license as appropriate and include any amendments to the manual accepted by the Chairman.

**“Aerodrome Operator”** means in relation to certified or licensed aerodrome, as appropriate, the aerodrome certificate or license holder;

**“Air Navigation Order or ANO”** means order issued under CA ACT-17 for regulating aeronautical and non-aeronautical activities.

**“Aerodrome Safety Manager”** means an Aerodrome personnel deployed as officer-in-charge of Aerodrome Safety Management System.

**“Aerodrome Safety Manager”** means an officer deployed as officer-in-charge of Aerodrome Safety Management System.

**“Authority”** means Civil Aviation Authority, established under section 3 of the Civil Aviation Authority Act, 2017(Act No. 3 of 1017)

**“Certified aerodrome”** means an international aerodrome or airport whose operator has been granted an aerodrome certificate ;

**“Chairman”** means Chairman of the Authority.

**“Commercial air transport”** means transportation of passengers, goods or mails, or conducting any other activities by an aircraft in consideration of hire or reward;

**“ICAO”** means the International Civil Aviation Organization

**“Licensed Aerodrome”** means a domestic aerodrome or airport whose operator has been granted an aerodrome license;

**“Marker”** means an object displayed above the ground level in order to indicate an obstacle or delineate a boundary.

**“Marking”** means a symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

**“Obstacle”** All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

- a) are located on an area intended for the surface movement of aircraft; or
- b) extend above a defined surface intended to protect aircraft in flight; or
- c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation

**“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.

**“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 aero plane operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome.

**“Runway strip”** means a defined area including the runway and stop way, 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 operations

**“Safety management system (SMS)”** means a systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies and procedures.

**“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.

**“Unserviceable area”** means a part of the movement area that is unfit and unavailable for use by aircraft.

**“Work areas”** means a part of an aerodrome in which maintenance or construction works are in progress.

## 2. Purpose

The aim of this Guidance Manual (GM) is to provide aerodrome operators, to meet the requirements for control of obstacle at aerodrome, guidance for the development of a mechanism for coordination with land use authorities and other state agencies to facilitate the implementation of the requirement for obstacle control & removal at and in the vicinity of the aerodrome. Also this GM will give some insight into those airport operational factors which can affect land uses outside the airport property boundary.

As per the provisions of the ANO 14 Vol-I, aerodromes used for international civil aviation are required to be certified and aerodromes open to public use other than used for international operations shall be licensed. In addition Chairman has specified the Standards that prescribe the physical characteristics and obstacle limitation surfaces to be provided for at all aerodromes and certain facilities and technical services normally be provided at an aerodrome as per the provisions of the ANO-14 VOL-I & concerned rule(s) of Civil Aviation Rules which defines the process of controlling of Obstacles at & in the vicinity of an airport.



### 3. Scope

This Guidance Manual provides general guidance on requirement, application process and responsibilities of the aerodrome operator concerning Obstacle Limitation Surfaces. This GM should be considered in conjunction with other related CAAB and ICAO documents mentioned in article 10.

### 4. Applications

The articles under this Guidance Manual shall apply to aerodromes which is open to public use for Air Transport operations.

### 5. Obstacle Limitation Surfaces

#### 5.1 General:

The effective utilization of an aerodrome may be considerably influenced by natural features and man-made constructions inside and outside its boundary. These may result in limitations on the distance available for take-off and landing and on the range of meteorological conditions in which take-off and landing can be undertaken. For these reasons certain areas of the local airspace must be regarded as integral parts of the aerodrome environment. The degree of freedom from obstacles in these areas is as important to the safe and efficient use of the aerodrome as are the more obvious physical requirements of the runways and their associated runway strips.

The method of assessing the significance of any existing or proposed object within the aerodrome boundary or in the vicinity of the aerodrome is to establish defined obstacle limitation surfaces particular to a runway and its intended use. These obstacle limitation surfaces and their characteristics are described in ANO 14 Vol-I. and other related documents. In ideal circumstances all the surfaces should be free from obstacles but when a surface is infringed, any safety measures required by the CAAB will have regard to:

- a) the nature of the obstacle and its location relative to the surface origin, to the extended centerline of the runway or normal approach and departure paths and to existing obstructions;
- b) the amount by which the surface is infringed;
- c) the gradient presented by the obstacle to the surface origin;
- d) the type of air traffic at the aerodrome; and
- e) the instrument approach procedures published for the aerodrome.

And for this the safety measures could be as follows:

- a) promulgation in the AIP of appropriate information;
- b) marking and/or lighting of the obstacle;
- c) variation of the runway distances declared as available;
- d) limitation of the use of the runway to visual approaches only;

- e) restrictions on the type of traffic.

In addition to the requirements described in this chapter it may be necessary to call for other restrictions to development on and in the vicinity of the aerodrome in order to protect the performance of visual and electronic aids to navigation and to ensure that such development does not adversely affect instrument approach procedures and the associated obstacle clearance limits. Details of these restrictions, which are distinct from aerodrome to aerodrome, are included in the licensing requirements.

## 5.2 Outer Horizontal Surface

Significant operational problems can arise from the erection of tall structures in the vicinity of airports beyond the areas currently recognized in ANO 14 Vol-I as areas in which restriction of new construction may be necessary.

The operator should review carefully any proposal to erect high masts or other skeletal structures in areas which would otherwise be suitable for use by aircraft on wide visual circuits, on arrival routes towards the airport or circuit, or on departure or missed approach climb-paths. Avoidance by marking or lighting cannot be relied upon in view of the relatively inconspicuous character of these structures, especially in conditions of reduced visibility, and notification of their existence will similarly not always guarantee avoidance. If tall structures are erected in or near areas otherwise suitable for instrument approach procedures, increased procedure heights may need to be adopted, with consequent adverse effects on regularity and on the duration of the approach procedure, such as the denial of useful altitude allocations to aircraft in associated holding patterns. Such structures may furthermore limit desirable flexibility for radar vectored initial approaches and the facility to turn enroute during the departure climb or missed approach.

In view of these potentially important operational considerations, aerodrome operators should consider it desirable to adopt measures to ensure that they have advance notice of any proposals to erect tall structures. In assessing the operational effect of proposed new construction, tall structures would not be of immediate significance if they are proposed to be located in:

- a) an area already substantially obstructed by terrain or existing structures of equivalent height; and
- b) an area which would be safely avoided by prescribed procedures associated with navigational guidance when appropriate.

Broadly for the outer horizontal surface, tall structures can be considered to be of possible significance if they are both higher than 30 m above local ground level, and higher than 150 m above aerodrome elevation within a radius of 15000 m of the centre of the airport where the runway code number is 3 or 4. The area of concern may need to be extended to coincide with the obstacle-accountable areas of PANSOPS for the individual approach procedures at the airport under consideration.

## 5.3 Inner horizontal surface and conical surface

The inner horizontal surface protects airspace for visual circling prior to landing, possibly after a descent through cloud aligned with a runway other than that in use for landing.

Certain sectors of the visual circling areas will not be essential to aircraft operations and,

provided procedures are established to ensure that aircraft do not fly in these sectors, the protection afforded by the inner horizontal surface need not extend into those sectors. Similar discretion can be exercised by the appropriate authorities when procedures have been established and navigational guidance provided to ensure that defined approach and missed approach paths will be followed.

*Inner horizontal surface - elevation datum:* it is desirable that aerodrome operators select a datum elevation from which the top elevation of the surface is determined. Selection of the datum should take account of:

- 5.3.1 the elevations of the most frequently used altimeter setting datum points;
- 5.3.2 minimum circling altitudes in use or required; and
- 5.3.3 the nature of operations at the airport.

For relatively level runways the choice of datum is not critical, but when the thresholds differ by more than 6 m, the datum selected should have particular regard to the factors above.

Conical surface slopes 5 % upwards and outwards from the periphery of the inner horizontal surface up to a specific height as per the SARPs.

#### **5.4 Approach and Transitional Surfaces**

These surfaces define the volume of airspace that should be kept free from obstacles to protect an aircraft in the final phase *of the* approach-to-land manoeuvre. Their slopes and dimensions will vary with the aerodrome reference code and whether the runway is used for visual, non-precision or precision approaches.

#### **5.5 Take-off Climb Surface**

This surface provides protection for an aircraft on take-off by indicating which obstacles should be removed if possible, and marked or lighted if removal is impossible. The dimensions and slopes also vary with the aerodrome reference code.

#### **5.6 The Inner Approach, Inner Transitional and Balked Landing Surfaces**

Together, these surfaces define a volume of surfaces in the immediate vicinity of a precision approach runway which is known as the Obstacle-Free Zone (OFZ). This zone shall be kept free from fixed objects, other than lightweight frangible mounted aids to air navigation which must be near the runway to perform their function, and from transient objects such as aircraft and vehicles when the runway is being used for category II or III ILS approaches. When an OFZ is established for a precision approach runway category I, it shall be clear of such objects when the runway is used for category I ILS approaches.

The OFZ for a precision approach runway category I where the code number is 1 or 2 is designed to protect an aircraft with a wing span of 30 m to climb at a gradient of 4 per cent and diverge from the runway centre line at a splay no greater than 10 per cent. The gradient of 4 per cent is that of the normal take-off climb surface for these aircraft. The balked landing surface originates at 60 m beyond the far end of the runway from threshold and is coincident with the take-off climb surface for the runway.

## 5.7 PANS-OPS SURFACES

The PANS-OPS surfaces are intended for use by procedure designers primarily in the construction of instrument flight procedures which are designed to safeguard an aircraft from collision with obstacles when flying on instruments. In designing procedures, the designer will determine areas (horizontally) needed for various segments of the procedure. Then he will analyze the obstacles within the determined areas, and based on this analysis he will specify minimum safe altitudes/heights for each segment of the procedure for use by pilots.

The size and dimensions of the obstacle-free airspace needed for the approach, for the missed approach initiated at or above the Obstacle Clearance Altitude/Height (OCA/H) and for the visual manoeuvring (circling) procedure are specified in PANS-OPS. Aircraft continuing their descent below the specified OCA/H, and therefore having visual confirmation that they are correctly aligned, are protected from obstacles by the obstacle limitation surfaces and related obstacle limitation and marking/lighting requirements. Similarly, the ANO 14 Vol-I surfaces provide protection for the balked landing. In other than low visibilities, it may be necessary for the pilot to avoid some obstacles visually.

## 5.8 Other objects

5.8.1 Objects which do not project through the approach surface but which would nevertheless adversely affect the optimum siting or performance of visual or non-visual aids shall, as far as practicable, be removed.

5.8.2 Anything which may, in the opinion of the Chairman after aeronautical study, endanger aeroplanes on the movement area or in the air within the limits of the inner horizontal and conical surfaces should be regarded as an obstacle and shall be removed in so far as practicable.

Note.— In certain circumstances, objects that do not project above any of the surfaces enumerated in Art 4.1 of ANO 14 Vol-I may constitute a hazard to aeroplanes, for example, where there are one or more isolated objects in the vicinity of an aerodrome.

## 6. The OLS Chart Type A

Obstacle Limitation Surface (OLS) Type- A charts are to be prepared for aerodromes. The OLS Chart Type A should be prepared based at least upon the followings:

- a) OLS Approach and Take-off path
- b) Transition surface along both sides of the runway strip
- c) Inner horizontal surface of the airport
- d) Conical surface of the airport
- e) Outer horizontal surface of the airport

For preparation of OLS Type- A chart, longitudinal profile of the approach / take-off flight path area and flight path area has to be prepared. Flight path area is a quadrilateral area of a funnel type with 180-meter width at 60 meters from the end of runway, which increases to a maximum of 1800 meter width at distance of 10 Km. Area enclosed within the funnel with a longitudinal slope of 1.2 % from 60 meter of the runway

end to 15 Km. The distance will be the flight path area. Objects (natural and manmade) that penetrates above this slope within the flight path area will be considered as obstructions. These obstructions may be high rise structures, towers, masts, trees and land.

## 7. Responsibilities

7.1 Responsibility for restriction and control of obstacles, must in practice, rest with the aerodrome operator. This includes the responsibility for controlling obstacles on aerodrome property and for arranging the removal or lowering of existing obstacles outside the aerodrome boundaries. And any development or proposed construction near aerodrome that is likely to create an obstacle, the aerodrome operator should coordinate with potential party involved, ASD of Flight standard & Regulations Division and land use authority. The responsibility of aerodrome operator should at least include but not limited to the followings:

- a) The person is responsible for obstacle surveys;
- b) Officer responsible for the surveillance of the emergence of new obstacles; and
- c) when obstacles are identified, who is responsible for taking action (i.e. removal, marking, lighting, displacement, instrument procedures) and enforcing that action.
- (d) The nature of the obstacle and its location relative to the surface origin, to the extended centreline of the runway or normal approach and departure paths and to existing obstructions;
- (e) The amount by which the surface is infringed;
- (f) The gradient presented by the obstacle to the surface origin;
- (g) The type of air traffic at the aerodrome; and
- (h) The instrument approach procedures published for the aerodrome.

7.2 Once the responsibilities have been defined, Chairman should be given to the entity responsible for the enforcement action required.

7.3 Specific and targeted actions, in addition to the planned activities, may be carried out by the CAAB, for example, in relation to changes, analysis of occurrences, safety of aerodrome works, monitoring of corrective action plans, or those related to the safety plan. CAAB may also have to address other issues regarding aerodrome safety depending on the aerodrome operator, such as obstacle control or oversight of ground handlers.

7.4 Safety measures could be as follows:

- (a) Promulgation in the AIP of appropriate information;
- (b) Marking and/or lighting of the obstacle;
- (c) Variation of the runway distances declared as available;
- (d) Limitation of the use of the runway to visual approaches only; and Restrictions on the type of traffic.

7.5 Obstacle Control, monitoring & notification:

Particulars setting out the procedures for:

- a) monitoring the obstacle limitation surfaces and Type A Chart for obstacles in the take-off surface;
- b) controlling obstacles within the authority of the operator;
- c) monitoring the height of buildings or structures within the boundaries of the obstacle limitation surfaces;

- d) controlling new developments in the vicinity of aerodromes; and
- e) notifying the CAA of the nature and location of obstacles and any subsequent addition or removal of obstacles for action as necessary, including amendment of the AIS publications.

## **8. Controlling Obstacles in the vicinity of an Airport**

In case of conflict of interest between property owner and the airport operators, due to encroachment of infrastructure on the airspace needed for aircraft operations, Rule 268 of the Civil Aviation Rule 1984 (CAR 84) clearly states the control of such situation as follows:

“(1) Whenever any object which is located on or within the defined limits of an aerodrome or airport or on routes used by aircraft engaged in air navigation (within Bangladesh) and which projects above the surfaces, constitutes obstruction or a potential hazard to aircraft moving in the navigable air space in the vicinity of an aerodrome or airport, the Chairman may cause a notice to be served upon the owner of the property in which the object is located directing the owner, within such reasonable time as is specified in the notice to,-

- a) remove the object or such portion of it specified in the notice as is necessary; or
- b) install and operate lights on the object and mark it in accordance with the requirements of the Convention.

(2) If a person upon whom a notice is served in pursuance of this rule fails to comply with a direction in the notice, he shall be guilty of an offence and the Chairman may authorize an officer, with such assistance as he requires, to enter the place where the obstruction is located and carry out the directions contained in the notice may recover the expenses in so doing from the owner or person on whom the notice has been served.”

Therefore, aerodrome operator shall control and coordinate the various developments in the immediate vicinity and enroute area of the aerodrome by making use of this Rule.

## **9. Obstacle Surveys**

Identification of obstacles requires a complete engineering survey of all areas underlying the obstacle limitation surfaces. Such surveys are generally conducted by governmental agencies/authorities with the co-operation of the airport operator. Before proceeding with detailed survey, following surveys should be carried out:

### *Initial survey*

The initial survey should produce a chart presenting a plan view of the entire airport and its environs to the outer limit of the conical surface (and the outer horizontal surface where established), together with 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.

### *Periodic surveys*

The airport 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 removal programme is contemplated. Following completion of an obstacle removal programme, the area should be re-surveyed to provide corrected data on the presence or absence of obstacles. Similarly, revision surveys should be made if changes are made (or planned) in airport characteristics such as runway length, elevation or orientation. Changes in obstacle data arising from such surveys should be reported to the aviation community in accordance with the provisions of Annex 15 *Aeronautical Information Services*.

## 10. Removal of Obstacles

10.1 When obstacles have been identified, the airport operator, with the assistance of local community agencies, should make every effort to have them removed or reduced in height so that they no longer constitute an obstacle.

10.2 Where agreement can be reached for the reduction in height of an existing obstacle, the agreement should include a written assessment limiting future heights over the property to specific levels which conform to the pertinent obstacle limitation surfaces.

10.3 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.

10.4 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 damage to an aircraft.

## 11. Marking and Lighting of Obstacles

In addition to Chapter 6 of ANO 14 Vol -I, the following procedure to be followed for Marking and Lighting of Obstacles:

11.1 Where it is impractical to eliminate an obstacle, it should be appropriately marked and/or lighted so as to be clearly visible to pilots in all weather and visibility conditions. Marking and/or lighting of obstacles shall be carried out as per the ANO-14 Vol-I.

11.2 It should be noted that the marking and lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of obstacles. It does not necessarily reduce operating limitations which may be imposed by the obstacle. ANO 14 Vol-I specifies that obstacles be marked and, if the airport is used at night, lighted, except that:

11.3 such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;  
and

11.4 the marking may be omitted when the obstacle is lighted by high intensity obstacle lights by day.

11.5 A periodic maintenance of marking and lighting shall be carried out by the operator. The airport operator should also make a daily visual inspection of all obstacle lights on and around the airport, and take steps to have inoperative lights repaired.

Note: Necessary Aeronautical Study is to be carried as required by ANO-14 Vol-I.

## **12. Documental References:**

- a) CAR 84
- b) ANO 14 Vol-I : C-4, Art: 4.1, 4.2, 4.4.1, 4.4.2
- c) ICAO DOC 9981: Art 2.4.5 & 2.5.1.2
- d) DOC 9137 Part-6: Art 1.1.3
- e) Doc 9734 Part A: C3
- f) Doc 9774 App1, 4.13