

# **BHUTAN CIVIL AVIATION REQUIREMENTS**



**(BCAR's)**

**BCAR - Aerodromes**

**Issue 1**

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## **BCAR- Aerodromes**

*Note: - For the purpose of assuring compatibility with international safety standards and to fulfil Bhutan's obligations as an ICAO Member State, this BCAR - Aerodrome is comparable with ICAO Annex 14 - Aerodromes, Vol. I, Aerodrome Design and Operations.*

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## **INTRODUCTION**

Article 15 of the Convention on International Civil Aviation requires that all aerodromes open to public use under the jurisdiction of a contracting state should provide uniform conditions for the aircraft of all other Contracting States. Furthermore, Articles 28 and 37 oblige each Member State to provide, in its territory, airports and other air navigation facilities and services in accordance with the Standards and Recommended Practices (SARPs) developed by ICAO, the International Civil Aviation Organization.

Bhutan is a Member State of ICAO, and as such adopts the international standards contained in Volume I, Chapters 2 - 10, of Annex 14 to the Convention which contain SARPs on the subject of aerodrome design and operation.

*Introductory Note 1. - Any reference in this BCAR - Aerodromes, to aerodrome standards and practices is a reference to the Standards and Recommended Practices (SARPS) in the latest version of Volume I to Annex 14 to the Convention on International Civil Aviation as amended from time to time.*

*Introductory Note 2. - Throughout this BCAR - Aerodromes, the terms "State" and "Appropriate authority" refer to the basic authority which establishes a civil aviation authority in Bhutan, the Department of Civil Aviation (DCA) which has a Director General of Civil Aviation with powers to exercise authority, under the laws of Bhutan, over civil aviation matters.*

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**ABBREVIATIONS AND SYMBOLS**

Abbreviations

ACN	-	Aircraft classification number
aprx	-	Approximately
ASDA	-	Accelerate-stop distance available
ATS	-	Air traffic services
DCA	-	Department of Civil Aviation in Bhutan
cd	-	Candela
C	-	Degree Celsius
CBR	-	California bearing ratio
CIE	-	Commission Internationale de l'Éclairage
cm	-	Centimetre
DME	-	Distance measuring equipment
ft	-	Foot
ICAO	-	International Civil Aviation Organization
ILS	-	Instrument landing system
IMC	-	Instrument meteorological conditions
K	-	Degree Kelvin
kg	-	Kilogram
km	-	Kilometre
km/h	-	Kilometre per hour
kt	-	Knot
L	-	Litre
LDA	-	Landing distance available
m	-	Metre
max	-	Maximum
mm	-	Millimetre
mnm	-	Minimum
MN	-	Meganewton
MPa	-	Megapascal
NM	-	Nautical mile
NU	-	Not usable
OCA/H	-	Obstacle clearance altitude/height
OFZ	-	Obstacle free zone
PCN	-	Pavement classification number
RESA	-	Runway end safety area
RVR	-	Runway visual range

SMS	-	Safety management system
TODA	-	Take-off distance available
TORA	-	Take-off run available
VMC	-	Visual meteorological conditions
VOR	-	Very high frequency omnidirectional radio range

Symbols

°	-	Degree
=	-	Equals
'	-	Minute of arc
μ	-	Friction coefficient
>	-	Greater than
<	-	Less than
%	-	Percentage
±	-	Plus or minus

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**PUBLICATIONS**

*(related to the specifications of this BCAR - Aerodromes)*

*ICAO Annex 14 to the Convention on International Civil Aviation - Aerodromes - Volume 1, Aerodrome Design and Operations*

*Aerodrome Design Manual (Doc 9157)*

- Part 1 — Runways*
- Part 2 — Taxiways, Aprons and Holding Bays*
- Part 3 — Pavements*
- Part 4 — Visual Aids*
- Part 5 — Electrical Systems*
- Part 6 — Frangibility*

*Aeronautical Information Services Manual (Doc 8126)*

*Airport Planning Manual (Doc 9184)*

- Part 1 — Master Planning*
- Part 2 — Land Use and Environmental Control*
- Part 3 — Guidelines for Consultant/Construction Services*

*Airport Services Manual (Doc 9137)*

- Part 1 — Rescue and Fire Fighting*
- Part 2 — Pavement Surface Conditions*
- Part 3 — Bird Control and Reduction*
- Part 5 — Removal of Disabled Aircraft*
- Part 6 — Control of Obstacles*
- Part 7 — Airport Emergency Planning*
- Part 8 — Airport Operational Services*
- Part 9 — Airport Maintenance Practices*

*Air Traffic Services Planning Manual (Doc 9426)*

*Airworthiness Manual (Doc 9760)*

- Volume I — Organization and Procedures*
- Volume II — Design Certification and Continuing Airworthiness*

*Guidance on the Balanced Approach to Aircraft Noise Management (Doc 9829)*

*Heliport Manual (Doc 9261)*

*Human Factors Training Manual (Doc 9683)*

*Manual of Aircraft Ground De-icing/Anti-icing Operations (Doc 9640)*

*Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476)*

*Manual on Certification of Aerodromes (Doc 9774)*

*Manual on Laser Emitters and Flight Safety (Doc 9815)*

*Manual on the ICAO Bird Strike Information System (IBIS) (Doc 9332)*

*Procedures for Air Navigation Services*

*Aircraft Operations (PANS-OPS) (Doc 8168)*

- Volume I — Flight Procedures*
- Volume II — Construction of Visual and Instrument Flight Procedures*

*Procedures for Air Navigation Services*

*Air Traffic Management (PANS-ATM) (Doc 4444)*

*Safety Management Manual (SMM) (Doc 9859)*

*Stolport Manual (Doc 9150)*

*World Geodetic System — 1984 (WGS-84) Manual (Doc 9674)*

## **CHAPTER 1. - GENERAL**

### **1.1 Definitions**

When the following terms are used in this BCAR - Aerodromes, they have the following meanings:

**Accuracy.** A degree of conformance between the estimated or measured value and the true value.

*Note.— For measured positional data, the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.*

**Aerodrome.** A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

**Aerodrome beacon.** Aeronautical beacon used to indicate the location of an aerodrome from the air.

**Aerodrome certificate.** A certificate issued by the DCA under applicable regulations for the operation of an aerodrome.

**Aerodrome elevation.** The elevation of the highest point of the landing area.

**Aerodrome facilities and equipment.** 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.

**Aerodrome identification sign.** A sign placed on an aerodrome to aid in identifying the aerodrome from the air.

**Aerodrome manual.** The manual that forms part of the application for an aerodrome certificate pursuant to these regulations, including any amendments thereto accepted/approved by the DCA.

**Aerodrome operator.** In relation to a certificated aerodrome, means the aerodrome certificate holder.

**Aerodrome reference point.** The designated geographical location of an aerodrome.

**Aerodrome traffic density.**

a) *Light.* Where the number of movements in the mean busy hour is not greater than 15 per runway or typically less than 20 total aerodrome movements.

b) *Medium.* Where the number of movements in the mean busy hour is of the order of 16 to 25 per runway or typically between 20 to 35 total aerodrome movements.

c) *Heavy.* Where the number of movements in the mean busy hour is of the order of 26 or more per runway or typically more than 35 total aerodrome movements.

*Note 1.— The number of movements in the mean busy hour is the arithmetic mean over the year of the number of movements in the daily busiest hour.*

*Note 2.— Either a take-off or a landing constitutes a movement.*

**Aeronautical beacon.** An aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth.

**Aeronautical ground light.** Any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.

**Aeroplane reference field length.** The minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length

means balanced field length for aeroplanes, if applicable, or take-off distance in other cases.

**Aircraft classification number (ACN).** A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.

*Note.— The aircraft classification number is calculated with respect to the centre of gravity (CG) position which yields the critical loading on the critical gear. Normally the aftmost CG position appropriate to the maximum gross apron (ramp) mass is used to calculate the ACN. In exceptional cases the forwardmost CG position may result in the nose gear loading being more critical.*

**Aircraft stand.** A designated area on an apron intended to be used for parking an aircraft.

**Appropriate authority.** Throughout this BCAR - Aerodromes, this term refers to the basic authority which establishes a civil aviation authority in Bhutan, the Department of Civil Aviation (DCA).

**Apron.** A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

**Apron management service.** A service provided to regulate the activities and the movement of aircraft and vehicles on an apron.

**Barrette.** Three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light.

**Calendar.** Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108\*).

**Capacitor discharge light.** A lamp in which high-intensity flashes of extremely short duration are produced by the discharge of electricity at high voltage through a gas enclosed in a tube.

**Certified aerodrome.** An aerodrome whose operator has been granted an aerodrome certificate.

**Clearway.** A defined rectangular area on the ground or water under the control of the DCA, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

**Chicago Convention.** The Convention on International Civil Aviation and its Annexes, signed in Chicago on 7 December 1944.

**Cyclic redundancy check (CRC).** A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

**Data quality.** A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity.

**Datum.** Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104\*).

**De-icing/anti-icing facility.** A facility where frost, ice or snow is removed (de-icing) from the aeroplane to provide clean surfaces, and/or where clean surfaces of the aeroplane receive protection (anti-icing) against the formation of frost or ice and accumulation of snow or slush for a limited period of time.

*Note.— Further guidance is given in the Manual of Aircraft Ground De-icing/Anti-icing Operations (Doc 9640).*

**De-icing/anti-icing pad.** An area comprising an inner area for the parking of an aeroplane to receive de-icing/anti-icing treatment and an outer area for the manoeuvring of two or more mobile de-icing/anti-icing equipment.

**Declared distances.**



- a) *Take-off run available (TORA)*. The length of runway declared available and suitable for the ground run of an aeroplane taking off.
- b) *Take-off distance available (TODA)*. The length of the take-off run available plus the length of the clearway, if provided.
- c) *Accelerate-stop distance available (ASDA)*. The length of the take-off run available plus the length of the stopway, if provided.
- d) *Landing distance available (LDA)*. The length of runway which is declared available and suitable for the ground run of an aeroplane landing.

**Dependent parallel approaches.** Simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are prescribed.

**Displaced threshold.** A threshold not located at the extremity of a runway.

**Effective intensity.** The effective intensity of a flashing light is equal to the intensity of a fixed light of the same colour which will produce the same visual range under identical conditions of observation.

**Ellipsoid height (Geodetic height).** The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.

**Fixed light.** A light having constant luminous intensity when observed from a fixed point.

**Frangible object.** An object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft.

*Note.— Guidance on design for frangibility is contained in the Aerodrome Design Manual, Part 6 (in preparation).*

**Geodetic datum.** A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

**Geoid.** The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents.

*Note.— The geoid is irregular in shape because of local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point.*

**Geoid undulation.** The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.

*Note.— In respect to the World Geodetic System — 1984 (WGS-84) defined ellipsoid, the difference between the WGS-84 ellipsoidal height and orthometric height represents WGS-84 geoid undulation.*

**Gregorian calendar.** Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108\*).

*Note.— In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months.*

**Hazard beacon.** An aeronautical beacon used to designate a danger to air navigation.

**Heliport.** An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

**Holding bay.** A defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft.

**Holdover time.** The estimated time the anti-icing fluid (treatment) will prevent the formation of ice and frost and the accumulation of snow on the protected (treated) surfaces of an aeroplane.

**Human Factors principles.** Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

**Human performance.** Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

**Identification beacon.** An aeronautical beacon emitting a coded signal by means of which a particular point of reference can be identified.

**Independent parallel approaches.** Simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are not prescribed.

**Independent parallel departures.** Simultaneous departures from parallel or near-parallel instrument runways.

**Instrument runway.** One of the following types of runways intended for the operation of aircraft using instrument approach procedures:

- a) **Non-precision approach runway.** An instrument runway served by visual aids and a non-visual aid providing at least directional guidance adequate for a straight-in approach.
- b) **Precision approach runway, category I.** An instrument runway served by ILS and/or MLS and visual aids intended for operations with a decision height not lower than 60 m (200 ft) and either a visibility not less than 800 m or a runway visual range not less than 550 m.
- c) **Precision approach runway, category II.** An instrument runway served by ILS and/or MLS and visual aids intended for operations with a decision height lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 350 m.
- d) **Precision approach runway, category III.** An instrument runway served by ILS and/or MLS to and along the surface of the runway and:
  - A — intended for operations with a decision height lower than 30 m (100 ft), or no decision height and a runway visual range not less than 200 m.
  - B — intended for operations with a decision height lower than 15 m (50 ft), or no decision height and a runway visual range less than 200 m but not less than 50 m.
  - C — intended for operations with no decision height and no runway visual range limitations.

*Note 1.— See ICAO Annex 10, Volume I for related ILS and/or MLS specifications.*

*Note 2.— Visual aids need not necessarily be matched to the scale of non-visual aids provided. The criterion for the selection of visual aids is the conditions in which operations are intended to be conducted.*

**Integrity (aeronautical data).** A degree of assurance that an aeronautical data and its value has not been lost nor altered since the data origination or authorized amendment.

**Intermediate holding position.** A designated position intended for traffic control at which taxiing aircraft and vehicles shall stop and hold until further cleared to proceed, when so instructed by the aerodrome control tower.

**Landing area.** That part of a movement area intended for the landing or take-off of aircraft.

**Landing direction indicator.** A device to indicate visually the direction currently designated for landing and for take-off.

**Laser-beam critical flight zone (LCFZ).** Airspace in the proximity of an aerodrome but beyond the LFFZ where the irradiance is restricted to a level unlikely to cause glare effects.

**Laser-beam free flight zone (LFFZ).** Airspace in the immediate proximity to the aerodrome where the irradiance is restricted to a level unlikely to cause any visual disruption.

**Laser-beam sensitive flight zone (LSFZ).** Airspace outside, and not necessarily contiguous with, the LFFZ and LCFZ where the irradiance is restricted to a level unlikely to cause flash-blindness or after-image effects.

**Lighting system reliability.** The probability that the complete installation operates within the specified tolerances and that the system is operationally usable.

**Manoeuvring area.** That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

**Marker.** An object displayed above ground level in order to indicate an obstacle or delineate a boundary.

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

**Movement area.** That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

**Near-parallel runways.** Non-intersecting runways whose extended centre lines have an angle of convergence/divergence of 15 degrees or less.

**Non-instrument runway.** A runway intended for the operation of aircraft using visual approach procedures.

**Normal flight zone (NFZ).** Airspace not defined as LFFZ, LCFZ or LSFZ but which must be protected from laser radiation capable of causing biological damage to the eye.

**Obstacle.** 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 that extend above a defined surface intended to protect aircraft in flight.

**Obstacle free zone (OFZ).** 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 frangibly mounted one required for air navigation purposes.

**Obstacle limitation surfaces.** 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 aeroplane operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome.

**Orthometric height.** Height of a point related to the geoid, generally presented as an MSL elevation.

**Pavement classification number (PCN).** A number expressing the bearing strength of a pavement for unrestricted operations.

**Precision approach runway,** see **Instrument runway.**

**Primary runway(s).** Runway(s) used in preference to others whenever conditions permit.

**Protected flight zones.** Airspace specifically designated to mitigate the hazardous effects of laser radiation.

**Road.** An established surface route on the movement area meant for the exclusive use of vehicles.

**Road-holding position.** A designated position at which vehicles may be required to hold.

**Runway.** A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

**Runway end safety area (RESA).** An area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.

**Runway guard lights.** A light system intended to caution pilots or vehicle drivers that they are about to enter an active runway.

**Runway-holding position.** A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorized by the aerodrome control tower.

*Note.— In radiotelephony phraseologies, the expression “holding point” is used to designate the runway-holding position.*

**Runway strip.** A defined area including the runway and stopway, if provided, intended:

- a) To reduce the risk of damage to aircraft running off a runway; and
- b) To protect aircraft flying over it during take-off or landing operations.

**Runway turn pad.** A defined area on a land aerodrome adjacent to a runway for the purpose of completing a 180-degree turn on a runway.

**Runway visual range (RVR).** The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

**Safety management system.** 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 control of safety at, and the safe use of, the aerodrome.

**Segregated parallel operations.** Simultaneous operations on parallel or near-parallel instrument runways in which one runway is used exclusively for approaches and the other runway is used exclusively for departures.

**Shoulder.** An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

**Sign.**

- a) *Fixed message sign.* A sign presenting only one message.
- b) *Variable message sign.* A sign capable of presenting several pre-determined messages or no message, as applicable.

**Signal area.** An area on an aerodrome used for the display of ground signals.

**Slush.** Water-saturated snow which with a heel-and-toe slap down motion against the ground will be displaced with a splatter; specific gravity: 0.5 up to 0.8.

*Note.— Combinations of ice, snow and/or standing water may, especially when rain, rain and snow, or snow is falling, produce substances with specific gravities in excess of 0.8. These substances, due to their high water/ice content, will have a transparent rather than a cloudy appearance and, at the higher specific gravities, will be readily distinguishable from slush.*

**Snow (on the ground).**

- a) *Dry snow.* Snow which can be blown if loose or, if compacted by hand, will fall apart again upon release; specific gravity: up to but not including 0.35.
- b) *Wet snow.* Snow which, if compacted by hand, will stick together and tend to or form a snowball; specific gravity: 0.35 up to but not including 0.5.
- c) *Compacted snow.* Snow which has been compressed into a solid mass that resists further compression and will hold together or break up into lumps if picked up; specific gravity: 0.5 and over.

**State.** Throughout this Part 14A - Aerodromes, the term "State" refers to the basic authority which establishes a civil aviation authority in Bhutan, the Department of Civil Aviation (DCA).

**Station declination.** An alignment variation between the zero degree radial of a VOR and true north, determined at the time the VOR station is calibrated.

**Stopway.** A defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take off.

**Switch-over time (light).** The time required for the actual intensity of a light measured in a given direction to fall from 50 per cent and recover to 50 per cent during a power supply changeover, when the light is being operated at intensities of 25 per cent or above.

**Take-off runway.** A runway intended for take-off only.

**Taxiway.** A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

- a) *Aircraft stand taxilane.* A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.
- b) *Apron taxiway.* A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.
- c) *Rapid exit taxiway.* A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.

**Taxiway intersection.** A junction of two or more taxiways.

**Taxiway strip.** An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.

**Threshold.** The beginning of that portion of the runway usable for landing.

**Touchdown zone.** The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

**Unserviceable area.** A part of the movement area that is unfit and unavailable for use by aircraft.

**Usability factor.** The percentage of time during which the use of a runway or system of runways is not restricted because of the cross-wind component.

*Note.— Cross-wind component means the surface wind component at right angles to the runway centre line.*

**Work area.** A part of an aerodrome in which maintenance or construction works are in progress.

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\* ISO Standard  
19104, *Geographic information — Terminology*  
19108, *Geographic information — Temporal schema*

## **1.2 Applicability**

1.2.1 This BCAR - Aerodromes, and its specifications, unless otherwise indicated in a particular context, shall apply to all aerodromes *in Bhutan*, used for international operations and open to public use in accordance with the requirements of Article 15 of the Chicago Convention. The specifications of Chapter 3 shall apply only to land aerodromes. The specifications in this Part shall apply, where appropriate, to heliports but shall not apply to stolports.

1.2.2 This BCAR is derived from and based upon ICAO Annex 14, Volume 1, Aerodromes, which contains Standards and Recommended Practices (specifications) that prescribe the physical characteristics and obstacle limitation surfaces to be provided for at aerodromes and certain facilities and technical services normally provided at an aerodrome. It is not intended that these specifications limit or regulate the operation of an aircraft.

*Note.— Although there are at present no specifications relating to stolports, it is intended that specifications for these aerodromes will be included as they are developed. In the interim, guidance material on stolports is given in the Stolport Manual (Doc 9150).*

1.2.3 Wherever a colour is referred to in this BCAR the specifications for that colour given in ICAO Annex 14, Volume I, Appendix 1, shall apply.

## **1.3 Common reference systems**

### **1.3.1 Horizontal reference system**

World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system. Reported aeronautical geographical co-ordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

*Note.— Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System — 1984 (WGS-84) Manual (Doc 9674).*

### **1.3.2 Vertical reference system**

Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system.

*Note 1.— The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth which coincides with the undisturbed MSL extended continuously through the continents.*

*Note 2.— Gravity-related heights (elevations) are also referred to as orthometric heights while distances of points above the ellipsoid are referred to as ellipsoidal heights.*

### **1.3.3 Temporal reference system**

1.3.3.1 The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.

1.3.3.2 When a different temporal reference system is used, this shall be indicated in GEN 2.1.2 of the Aeronautical Information Publication (AIP), see ICAO Annex 15, Appendix 1.

## **1.4 Aerodrome Use, Certification and Operations**

### **1.4.1 Use of aerodromes**

An aircraft shall not take-off or land at any place in Bhutan unless:

a) The place has been certified as an aerodrome under this BCAR, or

- b) The use of the place is specifically or generally authorized by the DCA, and
  - i) The aircraft is of a type authorized under this authorization to land and take-off from the place, and
  - ii) The aircraft is engaged in operation of a class specified by the DCA in the instrument of authorization for the place, and

Unless the aircraft complies with any conditions subject to which the aerodrome may have been certified subject to which the place may have been authorized.

#### **1.4.2 Aerodrome certification**

The DCA shall certify aerodromes used for international operations in accordance with the specifications contained in this BCAR, and ICAO Annex 14, Volume I, as well as other relevant ICAO specifications.

##### **1.4.2.1 Applicability**

The operator of an aerodrome intended for public use shall be in possession of an aerodrome certificate if the passenger-seating capacity of the aircraft employed in the operation exceeds 30 seats.

Note: - The operator of an aerodrome for which an aerodrome certificate is not required may nevertheless apply for an aerodrome certificate.

##### **1.4.2.2 Application for an aerodrome certificate**

An applicant for an aerodrome certificate shall submit to the DCA for approval an application in the form prescribed by the DCA. The application shall include the aerodrome manual for the aerodrome, which shall:

- a) Be typewritten or printed, and signed by the aerodrome operator;
- b) Be in a format that is easy to revise;
- c) Have a system for recording the currency of pages and amendments thereto, including a page for logging revisions; and
- d) Be organized in a manner that will facilitate the preparation, review and acceptance/approval process.

##### **1.4.2.3 Conditions for issuing an aerodrome certificate**

- a) The DCA may grant an aerodrome certificate provided:
  - i) The aerodrome facilities, services and equipment are in accordance with the standards specified by the DCA;
  - ii) The aerodrome's operating procedures make satisfactory provision for the safety of aircraft;
  - iii) An aerodrome manual has been prepared that contains all relevant information for the applicant's aerodrome and submitted within the provisions of 1.4.2.3 above;
  - iv) The aerodrome operator has an acceptable Safety Management System in place at the aerodrome, and
  - v) The DCA is satisfied that the applicant will be able to operate and maintain the aerodrome properly.
- b) The DCA may make an aerodrome certificate subject to any conditions necessary in the interests of safety and will give an applicant written notice of the reasons for any conditions applied to the certificate. A condition must be set out in an endorsement on the certificate or otherwise notified in writing to the certificate holder.

- c) If the DCA refuses to grant an aerodrome certificate, the DCA must give the applicant written notice of the refusal and the reasons for it, no later than 14 days after it refuses to grant the certificate.

**1.4.2.4 Duration of an aerodrome certificate.**

- a) An aerodrome certificate shall remain in force until it is suspended or cancelled. The aerodrome certificate is non transferable.
- b) Should an aerodrome certificate holder wish to surrender his certificate, he must notice the DCA not less than 60 days in advance in writing of the date on which the certificate is to be surrendered in order that suitable promulgation action can be taken. The DCA will cancel the certificate on the date specified in the notice.
- c) The DCA may suspend or cancel an aerodrome certificate if there are reasonable grounds for believing that:
  - i) A condition to which the certificate was subject has been breached; or
  - ii) The aerodrome facilities, operations or maintenance are not of the standard required in the interests of the safety of air navigation.
- d) Before suspending or cancelling an aerodrome certificate, the DCA must give to the holder a notice that sets out the facts and circumstances that appear to justify the suspension or cancellation and invites the holder to show, in writing and within a reasonable period, why the certificate should not be suspended or cancelled. The DCA will take into account any reasons the holder provides within the time allowed prior to making a decision about suspension or cancellation. Notice of suspension or cancellation has effect on the day it is served on the aerodrome certificate holder.

**1.4.2.5 Exemptions**

- a) The DCA may exempt, in writing, an aerodrome operator from compliance with specified provisions of these regulations.
- b) Before the DCA decides to exempt the aerodrome operator; the DCA must take into account all relevant considerations relating to the interest of safety.
- c) An exemption is subject to the aerodrome operator complying with the conditions/procedures specified by the DCA in the aerodrome certificate as being necessary in the interests of safety.
- d) Where an aerodrome does not meet the requirement of a standard specified in ICAO Annex 14, the DCA may determine, after carrying out aeronautical studies, such conditions and procedures relating to the standards as are necessary to ensure a level of safety equivalent to that established by the standard.
- e) The deviation from a standard and the conditions and procedures referred to in c) above shall be set out in an endorsement on the aerodrome certificate or otherwise in writing. If an exemption is provided otherwise than in writing it shall be incorporated in the aerodrome manual.

**1.4.3 Aerodrome Operations**

**1.4.3.1 Access to aerodromes**

- a) Personnel authorized by the DCA may inspect and carry out tests on the aerodrome facilities, services and equipment, inspect aerodrome operator's documents and records, and verify the aerodrome operator's safety management system before the aerodrome certificate is granted or renewed and subsequently, at any other time, for the purpose of ensuring safety and order at the aerodrome.
- b) An aerodrome operator shall, at the request of a person referred to in a) above:



- i) Allow access to any part of the aerodrome or, any aerodrome facility, including equipment, records, documents and operator's personnel; and
- ii) Co-operate in conducting these activities.

**1.4.3.2 *Obligations of aerodrome operators***

**1.4.3.2.1 *Compliance with standards and practices***

Aerodrome operators shall ensure compliance with the provisions, standards and recommended practices, of this Part as appropriate to the operations conducted at the aerodrome and the requirements for the aircraft using the aerodrome. This includes, but is not limited to, ensuring compliance with requirements regarding:

- 1) Physical characteristics of the movement area (see Chapter 3)
- 2) Obstacle limitation surfaces (see Chapter 4)
- 3) Visual aids for navigation (see Chapter 5)
- 4) Visual aids for denoting obstacles and restricted use areas (see Chapter 6)
- 5) Electrical systems (see Chapter 8)
- 6) Rescue and Fire fighting (see Chapter 9)
- 7) Aerodrome emergency plan, developed and maintained by the aerodrome operator and designed to minimize the possibility and extent of personal injury and property damage in an emergency (see Chapter 9). The plan shall include:
  - i) Procedures for prompt response to the emergencies planned for;
  - ii) Sufficient details to provide adequate guidance to each person who must carry out the plan;
  - iii) A description of available equipment including medical equipment and the location of the equipment;
  - iv) A grid map of the aerodrome and its immediate vicinity.

**1.4.3.2.2 *Coordination***

Aerodrome operators shall coordinate with ATS providers in order to be satisfied that appropriate air traffic services are available to ensure the safety of aircraft in the airspace associated with the aerodrome. This coordination shall cover other areas related to safety such as aeronautical information services, designated meteorological authorities and security.

**1.4.3.2.3 *Personnel***

- a) Aerodrome operators shall employ an adequate number of qualified and skilled personnel to perform all critical activities for aerodrome operations and maintenance and implement a programme to upgrade their competency.
- b) The aerodrome operator shall appoint one or more Reporting Officers for the aerodrome whose functions are:
  - 1) To monitor the serviceability of the aerodrome;
  - 2) To report to the NOTAM Office (AIS) and air traffic control any changes in conditions, or any other occurrences, at the aerodrome that must be reported in accordance with this Part.

Note: Reporting Officers shall have been trained to perform the reporting functions.

1.4.3.2.4 *Operation and maintenance*

- a) The aerodrome operator shall operate and maintain the aerodrome in accordance with the procedures set out in the aerodrome manual and in accordance with any written directives from the DCA to ensure the safety of aircraft.
- b) The aerodrome operator shall ensure that any aerodrome works at the aerodrome are carried out in a way that does not create a hazard to aircraft, or confusion to pilots and is in compliance with this Part in relation to planning and notice requirements that must be satisfied before aerodrome works may be carried out.
- c) Aerodrome operators shall ensure proper and efficient maintenance of the aerodrome facilities and remove, or arrange for the removal of, obstructions from the surface of the aerodrome or any vehicle that is likely to be hazardous.
- d) If aerodrome works (other than time-limited works) are being carried out at a certified aerodrome, the aerodrome operator shall appoint one or more persons as works safety officers for the aerodrome work. The function of a works safety officer is to ensure aerodrome safety while the aerodrome works are being carried out.
- e) If time-limited works are being carried out at a certified aerodrome, the aerodrome operator shall ensure that a person who has been trained to perform the function of a works safety officer performs that function for those works.
- f) The aerodrome operator shall ensure that there is a plan and programme for regular and emergency maintenance of aerodrome boundary fence, with name, role and contact details of responsible persons.

1.4.3.2.5 *Inspections, Audits and Reports*

- a) The aerodrome operator shall arrange for an audit of the safety management system (SMS), including an inspection of the aerodrome facilities and equipment, which shall also cover the aerodrome operator's own functions.
- b) The aerodrome operator shall appoint an aerodrome safety officer, responsible for providing guidance and direction for the operation of the aerodrome safety management system (SMS).
- c) The aerodrome operator shall arrange an external audit and inspection programme for evaluation of other users including fixed-base operators and organisations working at the aerodrome.

Note: - The audits referred to in a) and c) shall be carried out every 12 months or less, as agreed with the DCA.

- d) The aerodrome operator shall ensure that the audit reports including the report on the aerodrome facilities, services and equipment are prepared by suitably qualified safety experts and shall retain a copy of the report(s) for a period of two years and make them available to the DCA upon request for its review/reference.

Note: - The reports referred to above must be prepared and signed by the persons who carried out the audit and inspection.

- e) The aerodrome operator shall inspect an aerodrome as circumstances require, to ensure aviation safety:
  - 1) as soon as practicable after any aircraft accident or incident;
  - 2) During any period of construction or repair of the aerodrome facilities or equipment that is critical to the safety of aircraft operations; and
  - 3) At any other time when there are conditions at the aerodrome that could affect aviation safety.
- f) The aerodrome operator shall where low flying aircraft, at or near an aerodrome, or taxiing aircraft are likely to be hazardous to people or vehicular traffic:

- 1) Post notices warning of the hazard on any public way that is adjacent to the manoeuvring area; or
  - 2) If such a public way is not controlled by the aerodrome operator, inform the authority responsible for posting the notices on the public way that there is a hazard.
- g) The aerodrome operator shall adhere to the requirements of notifying and reporting, within the specified time limits, to the DCA, air traffic control and pilots, as required in these regulations.
- h) The aerodrome operator shall review the issue of Aeronautical Information Publication (AIP), AIP Supplements, AIP Amendments, Notice to Airmen (NOTAMS), Pre-flight Information Bulletins and Aeronautical Information Circulars issued by the AIS on receipt, thereof, and immediately after such reviews, notify AIS of any inaccurate information contained, therein, that pertains to the aerodrome.
- i) The aerodrome operator shall notify AIS and the DCA in writing at least 60 days before any change to an aerodrome facility or equipment or the level of service at the aerodrome that has been planned in advance and that is likely to effect the accuracy of the information contained in any AIS publication referred to in (h) above.
- m) The aerodrome operator shall give to AIS and cause to be received at air traffic control and the flight operations unit, immediate notice giving details of any of the following circumstances of which the operator has the knowledge:
- 1) Any projections by an object through an obstacle limitation surface relating to the aerodrome;
  - 2) The existence of any obstruction or hazardous condition affecting aviation safety at or near the aerodrome;
  - 3) Reduction in the level of service at the aerodrome set out in AIS publications referred to in (h) above;
  - 4) Closure of any part of the movement area of the aerodrome;
  - 5) Any other condition that could affect aviation safety at the aerodrome and against which precautions are warranted; and
  - 6) When it is not feasible to cause notice of a circumstance referred to above to be received at the air traffic control or a flight operations unit in accordance with that regulation, the operator must give immediate notice directly to the pilot who may be affected by that circumstance.

#### 1.4.3.2.6 *Aerodrome serviceability inspections*

An aerodrome serviceability inspection is an inspection of the aerodrome to ensure that it is safe for aircraft operations, shall comply with all applicable standards for aerodrome serviceability inspection set out in this Part and shall be carried out:

- a) On each day on which an airlines service operates at the airdrome, or
- b) In any other case - at least twice a week.

#### 1.4.3.2.7 *Aerodrome technical inspections*

An aerodrome technical inspection is an inspection of aerodrome facilities for an aerodrome to ensure that any deterioration that could make a facility unsafe for aircraft operations is detected, shall comply with all applicable standards for aerodrome technical inspections set out in this Part and shall be carried out of aerodrome facilities, equipment and services at regular intervals not exceeding 12 months by a person or persons with appropriate technical qualifications and experience.

1.4.3.3 Aerodrome Manual

1.4.3.3.1 Particulars

Following particulars must be included in the aerodrome manual to the extent that they are applicable to the aerodrome under the following parts:

Part 1:- General

General information including the following:

- a) Purpose and scope of the aerodrome manual;
- b) Legal requirements for the manual and the aerodrome certificate;
- c) Conditions for use of the aerodrome;
- d) Available AIS;
- e) System for recording aircraft movements; and
- f) Obligations of the aerodrome operator.

Part 2: - Particulars of the Aerodrome Site

General information including a plan of the aerodrome showing i.e. main facilities, including fuel facilities and availability of fuel and fuel types, location of wind direction indicators, aerodrome boundaries, the distance from the nearest city, town or other populous area, location of any aerodrome facilities, and equipment outside the boundaries of the aerodrome.

Part 3: - Particulars of the Aerodrome Required to be Reported to the AIS

*I. - General information*

- a) The name of the aerodrome;
- b) The location of the aerodrome;
- c) The geographical coordinates of at the aerodrome reference point determined in terms of the World Geodetic system - 1984 (WGS-84) reference datum;
- d) The aerodrome elevation and geoid undulation;
- e) The elevation of each threshold and geoid undulation, the elevation of the runway end and any significant high and low points along the runway, and the highest elevation of the touchdown zone.
- f) The aerodrome reference temperature;
- g) Details of the aerodrome beacon; and
- h) The name of the aerodrome operator and the address and telephone numbers at which the aerodrome operator may be contacted at all times.

*II. - Aerodrome Dimensions and Related Information*

- a) Runway - true bearing, designation number, length, width, displaced threshold location, slope, surface type and type of runway;
- b) Length, width and surface type of strip, runway end safety area, stopways;
- c) Length, width and surface type of taxiways;
- d) Apron surface type and aircraft stands;
- e) Clearway length and ground profile;

- f) Visual aids for approach procedures; marking and lighting of runways, taxiways, and aprons; other visual guidance and control aids and availability of standby power for lighting;
- g) The location and radio frequency of VOR aerodrome checkpoints;
- h) The location and designation of standard taxi routes;
- i) The geographical coordinates of each threshold;
- j) The geographical coordinates of appropriate taxiway centre line pints;
- k) The geographical coordinates of each aircraft stand;
- l) The geographical coordinates and the top elevation of significant obstacles in the approach and takeoff areas, in the circling are and in the vicinity of the aerodrome;
- m) Pavement surface type and bearing strength using the ACN-PCN method;
- n) One or more pre-flight altimeter check locations established on an apron and their elevation;
- o) Declared distances: TORA, TODA, ASDA and LDA;
- p) Disabled aircraft removal plan; and
- q) The level of protection provided for rescue and fire-fighting.

Note: - The accuracy of the information in Part 3 is critical to aircraft safety. Information requiring engineering survey and assessment should be gathered or verified by qualified technical persons.

Part 4: - Particulars of the Aerodrome Operating Procedures and Safety Measures

The following areas must be covered:

- a) Aerodrome reporting.
- b) Access to the aerodrome movement area including:
  - i) The policy on issuing aerodrome passes for persons and vehicles and system of recording the data; and
  - ii) A programme and procedure in place for assessing the roadworthiness of vehicles operating in the movement area and monitoring.
- c) Aerodrome emergency plan.
- d) Rescue and fire-fighting.
- e) Inspection of the aerodrome movement area and obstacle limitation surface by the aerodrome operator.
- f) Visual aids and aerodrome electrical systems.
- g) Maintenance of the movement area.
- h) Aerodrome works - safety.
- i) Apron management.
- j) Apron safety management.
- k) Airside vehicle control.
- l) Wildlife hazard management.
- m) Obstacle control.
- n) Removal of disabled aircraft.

- o) Handling of hazardous materials.
- p) Low-visibility operations.
- q) Protection of sites for radar and navigational aids.

Note: Each of these operating procedures shall be in writing and clear and precise information shall be included on:

- i) When, how or in what circumstances, respective operating procedure is to be activated.
- ii) Actions to be taken and who shall carry them out.
- iii) The equipment necessary for carrying out the actions, and access to such equipment.

If any of the procedures specified and mentioned above are not applicable, the reason shall be given.

#### Part 5: - Aerodrome Administration and Safety Management System (SMS)

##### *I. - Aerodrome Administration*

Particulars of the aerodrome administration, including the following:

- a) An aerodrome organizational chart showing the names and positions of key personnel, including their responsibilities;
- b) The name, position and telephone number of the person who has overall responsibility for aerodrome safety;
- c) Aerodrome committees; and
- d) particulars of the facilities, equipment, personnel, and procedures for meeting the rescue and fire fighting requirements, including the names and roles of the persons responsible for dealing with the rescue and fire-fighting services at the aerodrome.

##### *II. - Safety Management System (SMS)*

Particulars of the safety management system established for ensuring compliance with all safety requirements and achieving continuous improvement in safety performance, the essential features being:

- a) The safety policy, insofar as applicable, on the safety management process and its relation to the operational and maintenance process;
- b) The structure or organization of the SMS, including staffing and the assignment of individual and group responsibilities for safety issues;
- c) SMS strategy and planning;
- d) SMS implementation;
- e) A system for the implementation of, and action on, critical safety areas which require a higher level of safety management integrity;
- f) Measures for safety promotion and accident prevention and a system for risk control;
- g) The internal safety audit and review system detailing the systems and programmes for quality control of safety;
- h) The system for documenting all safety-related aerodrome facilities as well as aerodrome operational and maintenance records;
- i) Staff training and competency; and

- j) The incorporation and enforcement of safety-related clauses in the contracts for construction work at the aerodrome.

1.4.3.3.2 *Location of an aerodrome manual.*

- a) The aerodrome operator must provide the DCA with a complete and current copy of the aerodrome manual.
- b) The aerodrome operator must keep at least one complete and current copy of the aerodrome manual at the aerodrome and, additionally at least one copy at the operator's principle place of business, if different from the aerodrome.
- c) The aerodrome operator must keep the copies of the aerodrome manual referred to in b) above in a printed form. Other copies of the manual may be held in an electronic form.

1.4.3.3.3 *Revision or variation of information in an aerodrome manual.*

- a) The aerodrome operator must alter or amend the aerodrome manual, whenever necessary, in order to maintain the accuracy of the manual.
- b) To maintain the accuracy of the aerodrome manual, the DCA may issue written directions to the aerodrome operator to alter or amend the manual in accordance with the direction.
- c) An aerodrome operator must notify the DCA as soon as practicable, of any alterations that the operator wishes to make to the aerodrome manual.

1.4.3.3.4 *Acceptance of the aerodrome manual by the DCA.*

- a) The DCA shall accept the aerodrome manual and any amendments thereto, provided these meet the requirements above.
- b) The aerodrome operator must appoint an aerodrome manual controller. The functions of the aerodrome manual controller are to ensure that:
  - i) A distribution record is maintained for the holder of each copy, in whole or in part, of the manual, and
  - ii) Updates of the manual are provided appropriately to all holders.

## **1.5 Safety management**

1.5.1 The DCA shall develop and apply a safety programme in order to achieve an acceptable level of safety in aerodrome operations. The safety programme is an integrated set of regulations and activities aimed at improving safety.

1.5.2 The acceptable level(s) of safety to be achieved shall be established with reference to international guidelines and references.

*Note.— Guidance on safety programmes and on defining acceptable levels of safety is contained in Attachment E to ICAO Annex 11 and in the Safety Management Manual (SMM) (Doc 9859).*

1.5.3 The DCA shall require, as part of its safety programme, that a certified aerodrome operator implements a safety management system (SMS) acceptable to the DCA that, as a minimum:

- a) Identifies safety hazards;
- B) ensures that remedial action necessary to maintain an acceptable level of safety is implemented;
- C) provides for continuous monitoring and regular assessment of the safety level achieved;
- D) aims to make continuous improvement to the overall level of safety;

- e) describes the structure of the organization and the duties, powers and responsibilities of the officials in the organizational structure, with a view to ensuring that operations are carried out in a demonstrably controlled way and are improved where necessary;
  - f) obliges all the users of the aerodrome including fixed-base operators and which perform activities independently at the aerodrome in relation to flight or aircraft handling, to comply with the requirements laid down by the aerodrome operator with regard to safety and order at the aerodrome, and shall monitor such compliance; and
  - g) obliges all the users of the aerodrome including fixed-base operators and organisations referred to in f) above to cooperate in the programme to promote safety and order at, and the safe use of, the aerodrome by immediately informing him of the accidents, incidents, defects and faults which have bearing on safety.
- 1.5.4 A safety management system (SMS) shall clearly define lines of safety accountability throughout a certified aerodrome operator, including a direct accountability for safety on the part of senior management.

*Note. — The intent of a safety management system is to have in place an organized and orderly approach in the management of aerodrome safety by the aerodrome operator. Guidance on an aerodrome safety management system is given in the Safety Management Manual (SMM) (Doc 9859) and in the Manual on Certification of Aerodromes (Doc 9774).*

## **1.6 Airport design**

- 1.6.1 Architectural and infrastructure-related requirements for the optimum implementation of international civil aviation security measures shall be integrated into the design and construction of new facilities and alterations to existing facilities at an aerodrome.

*Note. — Guidance on all aspects of the planning of aerodromes including security considerations are contained in the Airport Planning Manual (Doc 9184), Part 1.*

- 1.6.2 The design of aerodromes should take into account, where appropriate, land-use and environmental control measures.

*Note.— Guidance on land-use planning and environmental control measures is contained in the Airport Planning Manual (Doc 9184), Part 2.*

## **1.7 Reference code**

*Introductory Note.—*

*The intent of the reference code is to provide a simple method for interrelating the numerous specifications concerning the characteristics of aerodromes so as to provide a series of aerodrome facilities that are suitable for the aeroplanes that are intended to operate at the aerodrome.*

*The code is not intended to be used for determining runway length or pavement strength requirements.*

*The code is composed of two elements which are related to the aeroplane performance characteristics and dimensions. Element 1 is a number based on the aeroplane reference field length and element 2 is a letter based on the aeroplane wing span and outer main gear wheel span.*

*A particular specification is related to the more appropriate of the two elements of the code or to an appropriate combination of the two code elements. The code letter or number within an element selected for design purposes is related to the critical aeroplane characteristics for which the facility is provided.*



*When applying this Part, the aeroplanes which the aerodrome is intended to serve are first identified and then the two elements of the code.*

1.7.1 An aerodrome reference code — code number and letter — which is selected for aerodrome planning purposes shall be determined in accordance with the characteristics of the aeroplane for which an aerodrome facility is intended.

1.7.2 The aerodrome reference code numbers and letters shall have the meanings assigned to them in Table 1-1.

1.7.3 The code number for element 1 shall be determined from Table 1-1, column 1, selecting the code number corresponding to the highest value of the aeroplane reference field lengths of the aeroplanes for which the runway is intended.

*Note. — The determination of the aeroplane reference field length is solely for the selection of a code number and is not intended to influence the actual runway length provided.*

1.7.4 The code letter for element 2 shall be determined from Table 1-1, column 3, by selecting the code letter which corresponds to the greatest wing span, or the greatest outer main gear wheel span, whichever gives the more demanding code letter of the aeroplanes for which the facility is intended.

*Note.— Guidance to assist in determining the aerodrome reference code is given in the Aerodrome Design Manual (Doc 9157), Parts 1 and 2.*

## **1.8 Aviation fuel**

1.8.1 Aviation fuel installation. An Aviation fuel installation means any apparatus or container, including a vehicle, designed, manufactured or adapted for the delivery of fuel to an aircraft.

1.8.2 A person who has the management of any aviation fuel installation on an aerodrome or heliport in Bhutan shall not cause or permit any fuel to be delivered to that installation or from it to an aircraft unless-

- a) when the aviation fuel is delivered into the installation he is satisfied that-
  1. the installation is capable of storing and dispensing the fuel so as not to render it unfit for use in aircraft; and
  2. the installation is marked in a manner appropriate to the grade of the fuel stored or if different grades are stored in different parts each part is so marked; and
  3. in case of a delivery into the installation or part thereof from a vehicle, the fuel has been sampled and is of a grade appropriate to the installation or that part of the installation as the case may be and is fit for use in aircraft;
- b) when any aviation fuel is dispensed from the installation he is satisfied as a result of sampling that the fuel is fit for use in aircraft:

Provided that this paragraph shall not apply in respect of fuel which has been removed from an aircraft and it is intended for use in another aircraft operator by the same operator as the aircraft from which it has been removed.

1.8.3 A person to whom 1.8.1 applies shall keep a written record in respect of each installation of which he has the management, which record shall include-

- a) particulars of the grade and quantity of aviation fuel delivered and the date of delivery;
- b) particulars of all the samples taken of the aviation fuel and of the results of tests of those samples;
- c) particulars of the maintenance and cleaning of the installation;

- 1.8.4 Records as required by 1.8.3 shall be preserved for a period of 12 months or such longer period as the Director may in a particular case direct and shall, within a reasonable time after being requested to do so by an authorized person, be produced to that person.
- 1.8.5 A person shall not cause or permit any aviation fuel to be dispensed for use in an aircraft if he knows or has reason to believe that the aviation fuel is not fit for use in aircraft.
- 1.8.6 If it appears to the Department of civil aviation or an authorized person that any aviation fuel is intended or likely to be delivered in contravention of any provision of this paragraph, the Director General or the authorized person may direct the person having the management of the installation not to permit aviation fuel to be dispensed from that installation until the direction has been revoked.

**1.9 Charges at aerodrome and heliports**

- 1.9.1 The Department shall cause to be published in the Bhutan Aeronautical Information Publication (AIP) charges incurred at aerodromes and heliports in Bhutan by aircraft using that aerodrome or heliport, in respect of landing, parking and hangar, as appropriate.

**Table 1-1. Aerodrome reference code**

*(See 1.7.2 to 1.7.4)*

Code number (1)	Code element 1		Code element 2	
	Aeroplane reference field length (2)	Code letter (3)	Wing span (4)	Outer main gear wheel span* (5)
1	Less than 800 m	A	Up to but not including 15 m	Up to but not including 4.5 m
2	800 m up to but not including 1 200 m	B	15 up to but not including 24 m	4.5 m up to but not including 6 m
3	1 200 m up to but not including 1 800 m	C	24 m up to but not including 36 m	6 m up to but not including 9 m
4	1 800 m and over	D	36 m up to but not including 52 m	9 m up to but not including 14 m
		E	52 m up to but not including 65 m	9 m up to but not including 14 m
		F	65 m up to but not including 80 m	14 m up to but not including 16 m

\* Distance between the outside edges of the main gear wheels.



**CHAPTER 2. - Aerodrome data**

Details of the requirements and recommendations for aerodrome data are given in:

***Annex 14 to the Convention on International Civil Aviation  
- Aerodromes -  
Volume 1,  
Aerodrome Design and Operations  
CHAPTER 2***

*under the following headings:*

- 2.1 Aeronautical data
- 2.2 Aerodrome reference point
- 2.3 Aerodrome and runway elevations
- 2.4 Aerodrome reference temperature
- 2.5 Aerodrome dimensions and related information
- 2.6 Strength of pavements
- 2.7 Pre-flight altimeter check location
- 2.8 Declared distances
- 2.9 Condition of the movement area and related facilities
- 2.10 Disabled aircraft removal
- 2.11 Rescue and fire fighting
- 2.12 Visual approach slope indicator systems
- 2.13 Coordination between aeronautical information services and aerodrome authorities

Note. - The Department of Civil Aviation in Bhutan (DCA) is the deciding authority to what extent the recommendations contained in this chapter of ICAO Annex 14, Volume I, Aerodromes, will be applied.

**CHAPTER 3. - Physical characteristics**

Details of the requirements and recommendations for the physical characteristics of aerodromes are given in:

***Annex 14 to the Convention on International Civil Aviation***

***- Aerodromes -***

***Volume 1,***

***Aerodrome Design and Operations***

**CHAPTER 3**

*under the following headings:*

- 3.1 Runways
- 3.2 Runway shoulders
- 3.3 Runway turn pads
- 3.4 Runway strips
- 3.5 Runway end safety areas
- 3.6 Clearways
- 3.7 Stopways
- 3.8 Radio altimeter operating area
- 3.9 Taxiways
- 3.10 Taxiway shoulders
- 3.11 Taxiway strips
- 3.12 Holding bays, runway-holding positions, intermediate holding positions and road-holding positions
- 3.13 Aprons
- 3.14 Isolated aircraft parking position
- 3.15 De-icing/anti-icing facilities

Note. - The Department of Civil Aviation in Bhutan (DCA) is the deciding authority to what extent the recommendations contained in this chapter of ICAO Annex 14, Volume I, Aerodromes, will be applied.

**CHAPTER 4. - Obstacle restriction and removal**

Details of the requirements and recommendations for obstacle restriction and removal are given in:

***Annex 14 to the Convention on International Civil Aviation***  
**- Aerodromes -**  
***Volume 1,***  
***Aerodrome Design and Operations***  
**CHAPTER 4**

*under the following headings:*

- 4.1 Obstacle limitation surfaces
- 4.2 Obstacle limitation requirements
- 4.3 Objects outside the obstacle limitation surfaces
- 4.4 Other objects

Note. - The Department of Civil Aviation in Bhutan (DCA) is the deciding authority to what extent the recommendations contained in this chapter of ICAO Annex 14, Volume I, Aerodromes, will be applied.

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**CHAPTER 5. - Visual aids for navigation**

Details of the requirements and recommendations for visual aids for navigation are given in:

***Annex 14 to the Convention on International Civil Aviation***

***- Aerodromes -***

***Volume 1,***

***Aerodrome Design and Operations***

**CHAPTER 5**

*under the following headings:*

- 5.1 Indicators and signalling devices
  - 5.1.1 Wind direction indicators
  - 5.1.2 Landing direction indicator
  - 5.1.3 Signalling lamp
  - 5.1.4 Signal panels and signal area
- 5.2 Markings
  - 5.2.1 General
  - 5.2.2 Runway designation marking
  - 5.2.3 Runway centre line marking
  - 5.2.4 Threshold marking
  - 5.2.5 Aiming point marking
  - 5.2.6 Touchdown zone marking
  - 5.2.7 Runway side stripe marking
  - 5.2.8 Taxiway centre line marking
  - 5.2.9 Runway turn pad marking
  - 5.2.10 Runway-holding position marking
  - 5.2.11 Intermediate holding position marking
  - 5.2.12 VOR aerodrome check-point marking
  - 5.2.13 Aircraft stand markings
  - 5.2.14 Apron safety lines
  - 5.2.15 Road-holding position marking
  - 5.2.16 Mandatory instruction marking
  - 5.2.17 Information marking
- 5.3 Lights
  - 5.3.1 General
  - 5.3.2 Emergency lighting
  - 5.3.3 Aeronautical beacons
  - 5.3.4 Approach lighting systems
  - 5.3.5 Visual approach slope indicator systems

- 5.3.6 Circling guidance lights
- 5.3.7 Runway lead-in lighting systems
- 5.3.8 Runway threshold identification lights
- 5.3.9 Runway edge lights
- 5.3.10 Runway threshold and wing bar lights
- 5.3.11 Runway end lights
- 5.3.12 Runway centre line lights
- 5.3.13 Runway touchdown zone lights
- 5.3.14 Rapid exit taxiway indicator lights
- 5.3.15 Stopway lights
- 5.3.16 Taxiway centre line lights
- 5.3.17 Taxiway edge lights
- 5.3.18 Runway turn pad lights
- 5.3.19 Stop bars
- 5.3.20 Intermediate holding position lights
- 5.3.21 De-icing/anti-icing facility exit lights
- 5.3.22 Runway guard lights
- 5.3.23 Apron floodlighting
- 5.3.24 Visual docking guidance system
- 5.3.25 Aircraft stand manoeuvring guidance lights
- 5.3.26 Road-holding position light
- 5.4 Signs
  - 5.4.1 General
  - 5.4.2 Mandatory instruction signs
  - 5.4.3 Information signs
  - 5.4.4 VOR aerodrome check-point sign
  - 5.4.5 Aerodrome identification sign
  - 5.4.6 Aircraft stand identification signs
  - 5.4.7 Road-holding position sign
- 5.5 Markers
  - 5.5.1 General
  - 5.5.2 Unpaved runway edge markers
  - 5.5.3 Stopway edge markers
  - 5.5.4 Edge markers for snow-covered runways
  - 5.5.5 Taxiway edge markers
  - 5.5.6 Taxiway centre line markers
  - 5.5.7 Unpaved taxiway edge markers
  - 5.5.8 Boundary markers



Note. - The Department of Civil Aviation in Bhutan (DCA) is the deciding authority to what extent the recommendations contained in this chapter of ICAO Annex 14, Volume I, Aerodromes, will be applied.

**CHAPTER 6. - Visual aids for denoting obstacles**

Details of the requirements and recommendations for visual aids for denoting obstacles are given in:

***Annex 14 to the Convention on International Civil Aviation***

**- Aerodromes -**

***Volume 1,***

***Aerodrome Design and Operations***

**CHAPTER 6**

*Under the following headings:*

- 6.1 Objects to be marked and/or lighted
- 6.2 Marking of objects
- 6.3 Lighting of objects

Note. - The Department of Civil Aviation in Bhutan (DCA) is the deciding authority to what extent the recommendations contained in this chapter of ICAO Annex 14, Volume I, Aerodromes, will be applied.

**CHAPTER 7. - Visual aids for denoting restricted use areas**

Details of the requirements and recommendations for visual aids for denoting restricted use areas are given in:

***Annex 14 to the Convention on International Civil Aviation***

**- Aerodromes -**

***Volume 1,***

***Aerodrome Design and Operations***

**CHAPTER 7**

*Under the following headings:*

- 7.1 Closed runways and taxiways, or parts thereof
- 7.2 Non-load-bearing surfaces
- 7.3 Pre-threshold area
- 7.4 Unserviceable areas

Note. - The Department of Civil Aviation in Bhutan (DCA) is the deciding authority to what extent the recommendations contained in this chapter of ICAO Annex 14, Volume I, Aerodromes, will be applied.



**CHAPTER 8. - Electrical systems**

Details of the requirements and recommendations for electrical systems are given in:

***Annex 14 to the Convention on International Civil Aviation***

***- Aerodromes -***

***Volume 1,***

***Aerodrome Design and Operations***

**CHAPTER 8**

*Under the following headings:*

- 8.1 Electrical power supply systems for air navigation facilities
- 8.2 System design
- 8.3 Monitoring

Note. - The Department of Civil Aviation in Bhutan (DCA) is the deciding authority to what extent the recommendations contained in this chapter of ICAO Annex 14, Volume I, Aerodromes, will be applied.

**CHAPTER 9. - Aerodrome operational services, equipment and installations**

Details of the requirements and recommendations for aerodrome operational services, equipment and installations are given in:

***Annex 14 to the Convention on International Civil Aviation***

***- Aerodromes -***

***Volume 1,***

***Aerodrome Design and Operations***

**CHAPTER 9**

*Under the following headings:*

- 9.1 Aerodrome emergency planning
- 9.2 Rescue and fire fighting
- 9.3 Disabled aircraft removal
- 9.4 Bird hazard reduction
- 9.5 Apron management service
- 9.6 Ground servicing of aircraft
- 9.7 Aerodrome vehicle operations
- 9.8 Surface movement guidance and control systems
- 9.9 Siting of equipment and installations on operational areas

- 9.10 Fencing
- 9.11 Security lighting

Note. - The Department of Civil Aviation in Bhutan (DCA) is the deciding authority to what extent the recommendations contained in this chapter of ICAO Annex 14, Volume I, Aerodromes, will be applied.

**CHAPTER 10. - Aerodrome maintenance**

Details of the requirements and recommendations for aerodrome maintenance are given in:

***Annex 14 to the Convention on International Civil Aviation***

***- Aerodromes -***

***Volume 1,***

***Aerodrome Design and Operations***

**CHAPTER 10**

*Under the following headings:*

- 10.1 General
- 10.2 Pavements
- 10.3 Runway pavement overlays
- 10.4 Visual aids

Note. - The Department of Civil Aviation in Bhutan (DCA) is the deciding authority to what extent the recommendations contained in this chapter of ICAO Annex 14, Volume I, Aerodromes, will be applied.

**For the Department of Civil Aviation, Bhutan**



Phala Dorji  
DIRECTOR GENERAL