Australian Government

Civil Aviation Safety Authority

Manual of Standards Part 139—Aerodromes

VERSION 1.15: JULY 2020

Made under Part 139 of the *Civil Aviation Safety Regulations 1998*.

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Manual of Standards Part 139—Aerodromes

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CHAPTER 1: INTRODUCTION

Section 1.1: General

1.1.1 Background and scope

1.1.1.1 Under section 3 of the *Civil Aviation Act 1988*, an aerodrome is an area authorised by the regulations for use as an aerodrome. Paragraph 92 (1) (b) of the *Civil Aviation Regulations 1988* has the effect of authorising a place for use as an aerodrome if it is certified or registered under Part 139 of the *Civil Aviation Safety Regulations 1998* (***CASR 1998***). This document is the *Manual of Standards (MOS) — Part 139 Aerodromes* (the ***MOS***) made under regulation 139.015 of CASR 1998. Together with Part 139 of CASR 1998, it sets out certain standards for certified aerodromes, registered aerodromes, and other aircraft landing areas where aircraft arrive, depart or move that are not certified or registered (***ALAs***). Aerodrome safety is a vital link in aviation safety and the applicable provisions of the MOS must be complied with to ensure aviation safety.

1.1.1.2 The effect of regulation 139.030 of CASR 1998 is that a place with a terminal instrument flight procedure (other than for specialised helicopter operations) must be a certified aerodrome or a registered aerodrome.

1.1.1.3 The effect of regulation 139.040 of CASR 1998 is that a place with a runway suitable and available for use by air transport operations aircraft having a maximum passenger seating capacity of more than 30 seats, or a maximum carrying capacity of more than 3 400 kg, must be a certified aerodrome.

1.1.1.4 Except where otherwise stated, the standards set out in this MOS are for certified aerodromes.

1.1.1.5 The standards for registered aerodromes are:

(a) for those matters mentioned in paragraph 139.295 (a) of CASR 1998 — the standards set out in this MOS for certified aerodromes; and

(b) any other standards stated by this MOS to be applicable to registered aerodromes.

1.1.1.6 Subject to regulation 139.040 of CASR 1998, nothing in this MOS prevents an ALA being certified as a certified aerodrome, or registered as a registered aerodrome, if the applicable requirements of Part 139 of CASR 1998 and this MOS are complied with.

1.1.1.7 To avoid doubt, except in relation to the effects of Subpart 139.D (reporting officers and safety inspections), this MOS does not affect ALAs.

1.1.1.8 The effect of Subpart 139.D of CASR 1998 is that when an aircraft with a maximum passenger seating capacity of more than 9 but not more than 30 seats uses an ALA at least once a week for regular public transport operations, the operator of the ALA must conduct safety inspections, and have at least 1 reporting officer who:

(a) is trained in accordance with the provisions of the MOS for reporting officers; and

(b) monitors the serviceability of the ALA in accordance with the provisions of the MOS for such monitoring.

1.1.1.9 The effect of Subpart 139.E of CASR 1998 is that all operators of certified and registered aerodromes must ensure the following:

(a) that airspace monitoring around the aerodrome is in accordance with the MOS for such monitoring;

(b) that obstacle limitation surfaces are established in accordance with the provisions of the MOS for obstacle limitation surfaces.

1.1.1.10 The effect of Subpart 139.F of CASR 1998 is that all operators of certified aerodromes and registered aerodromes must ensure that frequency confirmation systems and air/ground radio services comply with the provisions of the MOS for frequency confirmation systems and air/ground radio services.

1.1.1.11 Appendices and tables form part of this MOS. Where this MOS incorporates by reference standards from other documents, the incorporated standards become part of this MOS.

1.1.1.12 Other information and guidance concerning aerodromes and ALAs may be contained in Advisory Circulars.

1.1.1.13 Standards in this MOS to prevent animals and people from inadvertently entering a movement area are for aviation safety purposes only.

1.1.1.14 This MOS does not deal with aviation security (that is, protection from acts of unlawful interference).

1.1.1.15 Notes in the MOS may provide information, explanations or references. A Note is not part of the standard.

1.1.2 Document Set

1.1.2.1 The document hierarchy consists of:

(a) the *Civil Aviation Act 1988* (the Act);

(b) relevant Civil Aviation Safety Regulations (CASRs);

(c) the Manual of Standards (MOS); and

(d) Advisory Circulars (ACs).

1.1.2.2 The Act establishes the Civil Aviation Safety Authority (CASA) with functions relating to civil aviation, in particular the safety of civil aviation and for related purposes.

1.1.2.3 **CASRs** establish the regulatory framework (*Regulations*) within which all service providers must operate.

1.1.2.4 The **MOS** comprises specifications (S*tandards*) prescribed by CASA, of uniform application, determined to be necessary for the safety of air navigation. In those parts of the MOS where it is necessary to establish the context of standards to assist in their comprehension, the sense of parent regulations has been reiterated.

1.1.2.5 Readers should understand that in the circumstance of any perceived disparity of meaning between MOS and CASRs, primacy of intent rests with the regulations.

1.1.2.6 Service providers must document internal actions (*Rules)* in their own operational manuals, to ensure the maintenance of and compliance with standards.

1.1.2.7 **ACs** are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means of complying with the Regulations. ACs may explain certain regulatory requirements by providing interpretive and explanatory materials. It is expected that service providers will document internal actions in their own operational manuals, to put into effect those, or similarly adequate, practices.

1.1.3 Differences Between ICAO Standards and those in MOS

1.1.3.1 Notwithstanding the above, where there is a difference between a standard prescribed in the ICAO standards and one in the MOS, the MOS standard shall prevail.

1.1.4 Differences published in AIP

1.1.4.1 Differences from ICAO Standards, Recommended Practices and Procedures are published in AIP Gen 1.7.

1.1.5 MOS Documentation Change Management

1.1.5.1 Responsibility for the technical content in the MOS resides with the relevant technical area within the Flight Standards Branch, Standards Division of CASA.

1.1.5.2 This MOS is issued and amended under the authority of the Director of Aviation Safety.

1.1.5.3 Suggested changes to this MOS must be directed to the Manager, Air Traffic Management System Standards Section, Standards Division of CASA.

1.1.5.4 Requests for any change to the content of the MOS may be intimated from:

(a) technical areas within CASA;

(b) aviation industry service providers or operators;

(c) individuals and authorisation holders.

1.1.5.5 The need to change standards in the MOS may be generated by a number of causes. These may be to:

(a) ensure safety;

(b) ensure standardisation;

(c) respond to changed CASA standards;

(d) respond to ICAO prescription;

(e) accommodate new initiatives or technologies.

1.1.6 Related Documents

1.1.6.1 These standards should be read in conjunction with:

(a) ICAO Annex 4: Aeronautical Charts

(b) ICAO Annex 14: Aerodromes (Vol 1)

(c) ICAO Doc 9157/AN901: Aerodrome Design Manuals (all parts)

Section 1.2: Definitions

1.2.1 Unless the contrary intention appears, the following definitions apply for this MOS:

Definition	Meaning
AEI	The official publication known as *Airways Engineering Instructions* issued: (a) by CASA or its predecessors, before the RPA was first issued; or (b) otherwise by or under the authority of the Commonwealth.
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 elevation	The elevation of the highest point of the landing area.
Aerodrome facility	Any of the following at an aerodrome, or in or on something at an aerodrome, for which standards are provided by the MOS: surfaces, infrastructure; structures; buildings; installations; stations; systems; equipment; earthing points; cables; lighting; signage; markings.
Aerodrome reference point	The designated geographical location of an aerodrome.
Aerodrome reference temperature	The monthly mean of the maximum daily temperature for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature.)
Aerodrome traffic density	See Paragraph 9.1.1.2(b).
Aerodrome works	Construction or maintenance works carried out at an aerodrome, on or adjacent to the movement area, that may create obstacles or restrict the normal take-off and landing of aircraft.
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.
Aeronautical study	An investigation of a problem concerned with some phase of flight, and aimed at identifying possible solutions and selecting the one most acceptable from the point of view of flight safety.

Definition	Meaning
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.
Air side	The movement area of an aerodrome, adjacent terrain and buildings or portions thereof, access of which is controlled.
Air transport operations	Charter operations, or regular public transport operations, within the meaning of paragraphs 2 (7) (b) and (c), respectively, of the *Civil Aviation Regulations 1988*.
Aircraft classification number (ACN)	A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.
Aircraft parking position	A designated area on an apron intended to be used for parking an aircraft. Also known as an aircraft stand.
ALA	Aircraft landing area, being an area for the landing, movement and take-off of aircraft that is not a certified or registered aerodrome.
APEI	The official publication known as *Airport Engineering Instructions* issued: (a) by CASA or its predecessors, before the RPA was first issued; or (b) otherwise by or under the authority of the Commonwealth.
API	The official publication known as *Airport Instructions* issued: (a) by CASA or its predecessors, before the RPA was first issued; or (b) otherwise by or under the authority of the Commonwealth.
Apron	A defined area on a land aerodrome intended to accommodate aircraft for the 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 the apron.
Apron taxiway	A portion of a taxiway system located on an apron and intended to provide a through taxi route for aircraft across the apron to another part of the taxiway system.

Definition	Meaning
Balanced field length	A field length where the distance to accelerate and stop is equal to the take-off distance of an aeroplane experiencing an engine failure at the critical engine failure recognition speed (V1).
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.
Capacity 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.
Charter operations	Charter operations has the meaning given by paragraph 2 (7) (b) of the *Civil Aviation Regulations 1988*.
Clearway	A defined area at the end of the take-off run available on the ground or water under the control of the aerodrome operator, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.
Critical obstacle	The obstacle within the take-off climb area and/or the approach area, which subtends the greatest vertical angle when measured from the inner edge of the take-off climb surface and/or the approach surface.
Cross-wind component	The surface wind component at right angles to the runway centre line.
Declared distances	1. **Take-off run available (TORA).** The length of runway declared available and suitable for the ground run of an aeroplane taking off. 2. **Take-off distances available (TODA).**The length of the take-off run available plus the length of the clearway, if provided. 3. **Accelerate-stop distance available (ASDA).**The length of the take-off run available plus the length of the stopway, if provided. 4. **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.

Definition	Meaning
Elevation	The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from the mean sea level.
Exit taxiway	A taxiway connected to a runway to enable landing aeroplanes to turn off the runway.
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.
Hazard beacon	An aeronautical beacon used to designate a danger to air navigation.
Holding bay	A defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft.
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 approach procedures	The procedures to be followed by aircraft in letting down from cruising level and landing at an aerodrome. (A series of predetermined manoeuvres by reference to flight instruments for the orderly transfer of an aircraft from the beginning of the initial approach to a landing, or to a point from which a landing may be made.)
Instrument meteorological conditions (IMC)	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minimum specified for visual meteorological conditions.
Instrument runway	One of the following types of runway 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 (CAT) I**. An instrument runway served by ILS and visual aids intended for operations with a decision height (DH) not lower than 60 m (200 ft) and either a visibility not less than 800 m, or an RVR not less than 550 m. (c) **Precision approach runway, CAT II**. An instrument runway served by ILS and visual aids intended for operations with a

Definition	Meaning
	decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft), and an RVR not less than 300 m. (d) **Precision approach runway, CAT III**. An instrument runway served by ILS to and along the surface of the runway and: (i) for CAT IIIA — intended for operations with a decision height lower than 30 m (100 ft), or no decision height, and an RVR not less than 175 m; (ii) for CAT IIIB — intended for operations with a decision height lower than 15 m (50 ft), or no decision height, and an RVR less than 175 m but not less than 50 m; (iii) for CAT IIIC — intended for operations with no decision height and no RVR limitations.
Intermediate holding position	A designated holding position intended for traffic control at which taxiing aircraft and vehicles shall stop and hold until further clearance to proceed, when so instructed by the aerodrome control tower.
Joint user aerodromes	An aerodrome under the control of a part of the Defence Force in respect of which an arrangement under Section 20 of the Act is in force.
Landing area	That part of a movement area intended for the landing or take-off of aircraft.
Light failure	A light shall be deemed to be unserviceable when the main beam average intensity is less than 50% of the value specified in the appropriate figure showing the isocandella diagram. For light units where the designed main beam average intensity is above the value shown in the isocandella diagram, the 50% value shall be related to that design value. (When assessing the main beam, specified angles of beam elevation, toe-in and beam spread shall be taken into consideration).
Lighting system reliability	The probability that the complete installation operates within the specified tolerances and that the system is operationally usable.
Low visibility procedures	Procedures applied at an aerodrome for protecting aircraft operations during conditions of reduced visibility or low cloud.
Manoeuvring area	That part of the 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.

Definition	Meaning
Mass	The terms mass and weight used in this MOS have the same meaning.
MAUM	Maximum all up mass.
Movement	Either a take-off or a landing by an aircraft.
Movement area	That part of the aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).
MTOW	Maximum take-off weight.
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.
Non-precision approach runway	See Instrument runway.
Notices to airmen (NOTAMs)	A notice issued by the NOTAM office containing information or instruction concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to persons concerned with flight operations.
Obstacle free zone (OFZ)	The airspace above the inner approach surface, inner transitional surfaces, balked landing surfaces, 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 (OLS)	A series of planes associated with each runway at an aerodrome that defines the desirable limits to which objects may project into the airspace around the aerodrome so that aircraft operations at the aerodrome may be conducted safely.
Obstacles	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.

Definition	Meaning
Other aerodrome facility standard	For an aerodrome facility that does not comply with the standards set out in the MOS, the RPA, the AEI, the APEI, or the API, means: (a) the standard, procedure or practice (the ***SPP***) to which the aerodrome facility was designed and constructed, being an SPP which, at the time, was required by the Commonwealth to be complied with for the design and construction of the aerodrome facility; or (b) where CASA is satisfied that the SPP to which the aerodrome facility was designed and constructed is an historical SPP that can no longer be identified with certainty — an SPP specified in writing by CASA, following consultation with the aerodrome operator, as the standard to which, on the basis of its current characteristics, the aerodrome facility was probably designed and constructed.
Pavement classification number (PCN)	A number expressing the bearing strength of a pavement for unrestricted operations by aircraft with ACN value less than or equal to the PCN.
Precision approach runway	See Instrument runway.
Primary runway(s)	Runway(s) used in preference to others whenever conditions permit.
Radio aids	Also known as non-visual aids. These aids may consist of NDB, VOR, VOR/DME or GPS.
Rapid exit taxiway	A taxiway connected to a runway at an acute angle, designed and intended to allow landing aeroplanes to turn off the runway at higher speeds than are achieved on exit taxiways, thereby minimizing runway occupancy times.
Regular public transport operations	Regular public transport operations has the meaning given by paragraph 2 (7) (c) of the *Civil Aviation Regulations 1988*.
RESA	Runway end safety area.
RPA	The official publication known as *Rules and Practices for Aerodromes* issued: (a) by CASA or its predecessors, before the Manual of Standards (MOS) — Part 139 Aerodromes was first issued; or (b) otherwise by or under the authority of the Commonwealth.
Runway	A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Definition	Meaning
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 light	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 authorised by the aerodrome control tower.
Runway strip	A defined area including the runway and stopway, if provided, intended: 1. to reduce the risk of damage to aircraft running off a runway; and 2. to protect aircraft flying over it during take-off or landing operations.
Runway visibility (RV)	The distance along a runway over which a person can see and recognise a visibility marker or runway lights.
Runway visual range (RVR)	The range over which the pilot of an aircraft on the centreline of a runway can see the runway surface markings, or the lights delineating the runway or identifying its centreline. **Note:** Within Australia, the term ***runway visual range*** (***RVR***) is used exclusively in relation to RVR measured by an instrumented system.
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.
Shoulders	An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.
Signal circle	An area on an aerodrome used for the display of ground signals.
Stopway	A defined rectangular area on the ground at the end of the 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% and recover to 50% during a power supply changeover, when the light is being operated at intensities of 25% or above.

Definition	Meaning
Take-off runway	A runway intended for take-off only.
Taxi-holding position	See definition of runway holding position and intermediate holding position.
Taxilane	A portion of an apron that is not a taxiway and that is provided only for aircraft to access aircraft parking positions.
Taxiway	A defined path on an aerodrome on land, established for the taxiing of aircraft from one part of an aerodrome to another. A taxiway includes an apron taxiway and a rapid exit taxiway. **Note:** ***Apron taxiway***, ***exit taxiway***, ***rapid exit taxiway***, ***taxilane*** and ***taxiway system*** are also defined terms.
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.
Taxiway system	A number of interconnecting taxiways.
Threshold	The beginning of that portion of the runway usable for landing.
Time limited works	Aerodrome works that may be carried out if normal aircraft operations are not disrupted and the movement area can be restored to normal safety standards in not more than 30 minutes.
Touchdown zone	The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Definition	Meaning
Upgrade (for an aerodrome facility)	1. Any change to, or improvement of, the facility that allows it to do 1 or more of the following: (a) accommodate the parking, holding, movement or operation of larger or heavier aircraft, or aircraft modified to carry more passengers or freight; (b) accommodate the parking, holding, movement or operation of more aircraft; (c) be used by aircraft flying under changed approach conditions, for example, a change: (i) from non-instrument to non-precision instrument; or (ii) from non-precision instrument to precision instrument; or (iii) from precision category I to category II or III; (d) accommodate aircraft take-offs and aerodrome surface movements in RVR conditions of less than 550 m. 2. The replacement of any aerodrome facility that does not comply with the standards for the facility in this MOS. **Note:** The upgrade of a particular non-compliant aerodrome facility is the trigger for that particular non-compliant facility to be brought into compliance with the relevant MOS standards. Since the timing and budgeting of an upgrade is usually under the aerodrome operator's control, so too is the timing of works necessary to bring the non-compliant facility into compliance with the MOS.
Usability factor	The percentage of time during which the use of a runway or system of runways is not restricted because of cross-wind component.

Definition	Meaning
Visibility (*V*)	Visibility for aeronautical purposes is the greater of: a. the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognised when observed against a bright background; b. the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background. ***Notes:*** 1. The 2 distances have different values in air of a given extinction coefficient, and the distance mentioned in paragraph (b) varies with the background illumination. The distance mentioned in paragraph (a) is represented by the meteorological optical range (***MOR***). 2. For international recognition and consistency, the definition of ***Visibility*** is taken from Chapter 1, Part 1, Annex 3, *Meteorological Service for International Air Navigation*, in the Convention on International Civil Aviation.
Visibility marker	A dark object of suitable dimensions for use as a reference in evaluating runway visibility.
Visual aids	May consist of T-VASIS, PAPI, runway markings and runway lights.
Visual meteorological conditions (VMC)	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal or better than specified minima.
Weight	The terms weight and mass used in this MOS have the same meaning.

1.2.2 Despite the meaning of ***runway*** in the table in subsection 1.2.1, where a provision of this MOS refers, expressly or by implication, to the upgrade of an aerodrome facility that is a runway, the reference is taken to include any 1 or more of the following:

(a) the runway proper;

(b) the runway strip;

(c) the RESA;

(d) the clearway and the stopway (if provided).

1.2.3 Despite the meaning of ***taxiway*** in the table in subsection 1.2.1, where a provision of this MOS refers, expressly or by implication, to the upgrade of an aerodrome facility that is a taxiway, the reference is taken to include any 1 or more of the following:

(a) the taxiway proper;

(b) the taxiway strip.

CHAPTER 2: APPLICATION OF STANDARDS TO AERODROMES

Section 2.1: General

2.1.1 Legislative Background and Applicability

2.1.1.2 CASR Part 139 empowers the Authority to specify standards and procedures relating to aerodromes used in air transport operations. The standards and procedures are set out in this document titled *'Manual of Standards Part 139—Aerodromes'* are applicable equally to operators of aerodromes which are either certified or registered. Operating procedures for certified and registered aerodromes differ and are set out in separate Chapters.

2.1.2 Standard Changes and Existing Aerodrome Facilities

2.1.2.2 An existing facility at an aerodrome, other than a certified aerodrome, that does not meet the standards set out in this MOS may continue to meet the Standards that applied to the facility when it was first introduced or last upgraded (as the case may be) until:

(a) the facility is replaced or again upgraded (as the case may be); or

(b) CASA directs in writing that, in the interests of aviation safety, the facility must comply with the standards specified in this MOS.

> **Note:** See the definition of ***upgrade*** in subsection 1.2.1, Definitions. The reconfiguring of an existing facility (including, for example, an apron) to cater for more or larger aircraft constitutes an upgrade.

2.1.2.2A For paragraph 2.1.2.2, ***Standards*** means the standards set out in the version of the MOS, RPA, AEI, APEI, API, or other aerodrome facility standard that applied to the facility when it was first introduced or last upgraded (as the case may be).

2.1.2.3 The operator of a certified aerodrome is not required to modify an existing aerodrome facility (a ***non-compliant facility***) so that it complies with this MOS until the facility is replaced or upgraded. However, until it is replaced or upgraded, details of the non-compliant facility must be recorded in the Aerodrome Manual, including:

(a) identification of the facility; and

(b) the date or period when the facility was first introduced or last upgraded (as the case may be); and

(c) a description of, or documented evidence of, the standard with which the facility complies, including a supporting reference to the version and date of the MOS, RPA, AEI, APEI, API or other aerodrome facility standard embodying the standard with which the facility complies; and

(d) details of the plans and timescale for replacing or upgrading the facility so that it complies with this MOS.

> **Note:** As part of the audit of an aerodrome operator, CASA may require the operator to supply evidence showing past and current *bona fide* efforts to implement the plan and timescale

2.1.2.3A The operator of a registered aerodrome is not required to modify an existing aerodrome facility (a ***non-compliant facility***) so that it complies with this MOS until the facility is replaced or upgraded. However, until it is replaced or upgraded, details of the non-compliant facility must be recorded in accordance with paragraph 12.1.1.2A.

2.1.2.4 A new facility that is brought into operation, and an existing facility that is replaced or upgraded, must comply with the standards in this MOS.

2.1.3 Exemptions to Standards

2.1.3.1 An exemption granted in relation to an existing facility continues to apply until its expiry date, unless sooner revoked by CASA in the interests of aviation safety.

2.1.3.2 An application for an exemption from any standard in this MOS must:

(a) be made and dealt with as if Subpart 11.F of CASR 1998 applied to the application; and

(b) include a clear indication of whether, and when, full compliance with the MOS would occur.

> **Note:** This deeming provision will be superseded in due course by a Civil Aviation Legislation Amendment Regulation to expressly require exemptions from a Manual of Standards to be in accordance with Part 11 of CASR 1998.

2.1.3.3 If a provision of this MOS imposes a standard subject to a qualifying phrase, such as “if practicable”, “where physically practicable”, or “where determined necessary”, the standard applies despite the qualifying phrase unless CASA has granted an exemption from the standard.

> **Note:** The purpose of such qualifying phrases is to recognise that sometimes compliance with particular standards is not possible in some circumstances. The purpose of paragraph 2.1.3.3 is to ensure that it is CASA, not an aerodrome operator, who decides whether the qualifying circumstances exist.

2.1.3.4 Exemptions to standards, granted to an aerodrome, must be recorded in the Aerodrome Manual. The Manual must contain details of the exemption, reason for the granting, any resultant limitations imposed, and similar relevant information.

2.1.4 Conflict with Other Standards

2.1.4.1 Compliance with the standards and procedures specified in this MOS does not absolve aerodrome operators from obligations in respect of standards prescribed by other government or statutory authorities. Where another statutory standard conflicts with this MOS, the matter must be referred to CASA for resolution.

2.1.5 Using ICAO Aerodrome Reference Code to Specify Standards

2.1.5.1 Australia has adopted the International Civil Aviation Organisation (ICAO) methodology of using a code system, known as the Aerodrome Reference Code, to specify the standards for individual aerodrome facilities which are suitable for use by aeroplanes within a range of performances and sizes. The Code is composed of two elements: element 1 is a number related to the aeroplane reference field length; and element 2 is a letter related to the aeroplane wingspan 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 characteristics of the aeroplane types for which the facility is intended.

2.1.5.2 The Code number for element 1 shall be determined by the aerodrome operator from column 1 of Table 2.1-1. The Code number corresponding to the highest value of the aeroplane reference field lengths for which the runway is intended is to be selected.

> **Note:** The determination of the aeroplane reference field length is solely for the selection of a Code number and must not be confused with runway length requirements, which are influenced by other factors.

2.1.5.3 The Code letter for element 2 shall be determined by the aerodrome operator from column 3 of Table 2.1-1. Subject to paragraph 2.1.5.3A, the Code letter corresponds to the greatest wingspan or the greatest outer main gear wheel span, whichever gives the more demanding Code letter, of the aeroplanes for which the facility is intended to be selected.

2.1.5.3A The Code letter is D where:

(a) all the aeroplanes for which the facility is intended to be selected have a wingspan that is less than 52 m; and

(b) an aeroplane for which the facility is intended to be selected has an outer main gear wheel span that is at least 9 m but less than 14 m.

2.1.5.4 Information of the Aerodrome Reference Code number for each runway at the aerodrome shall be provided for publication in Runway Distances Supplement section of the En-route Supplement Australia. For certified aerodromes, information of the Aerodrome Reference Code letter for each runway and taxiway shall be set out in the Aerodrome Manual.

2.1.5.5 Unless otherwise agreed by CASA, aerodrome operators must maintain the runways and taxiways in accordance with the applicable standards set out in

this MOS for the notified aerodrome reference code for that runway or taxiway.

Table 2.1-1: Aerodrome Reference Code

Aerodrome Reference Code				
Code element 1		Code element 2		
Code number	Aeroplane reference field length	Code letter	Wing span	Outer main gear wheel span
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 1200 m	B	15 m up to but not including 24 m	4.5 m up to but not including 6 m
3	1200 m up to but not including 1800 m	C	24 m up to but not including 36 m	6 m up to but not including 9 m
4	1800 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

2.1.6 Providing for Future Larger Aeroplanes

2.1.6.1 Nothing in this MOS is intended to inhibit the planning or provision of aerodrome facilities for larger aeroplanes that may be accommodated by the aerodrome at a later date. However, where movement area facilities are built for future larger aeroplanes, the aerodrome operator must liaise with the relevant CASA office to determine interim notification of Reference Code and maintenance arrangements.

2.1.6.2 It is the prerogative of aerodrome operators to select the appropriate aeroplane and aeroplane characteristics for master planning of their aerodromes. This MOS has included ICAO Code F specifications for aerodrome facilities intended for aeroplanes larger than B 747 wide body jets.

2.1.9A Aerodrome with Terminal Instrument Flight Procedures

2.1.9A.1 Where an aerodrome with a terminal instrument flight procedure (***TIFP***) ceases (for whatever reason) to be:

(a) a certified aerodrome (and does not immediately become registered); or

(b) a registered aerodrome (and does not immediately become certified);

CASA will take every reasonable step necessary to notify the certified or authorised designer of the TIFP of the cessation.

> **Note:** This procedure is to complement the obligations on the certified or authorised designer of a TIFP under Chapter 6 of the Manual of Standards (MOS) Part 173 — Standards Applicable to the Provision of Instrument Flight Procedure Design. However, a failure to comply with subsection 2.1.9A does not affect any obligation under Chapter 6 of MOS Part 173

2.1.10 Runways Used for Special Authorisation Category I instrument Approach Operations

> **Note:** ***Special Authorisation Category I instrument approach operation*** is defined in AIP.

2.1.10.1 A runway is not suitable to be used for a Special Authorisation (***SA***) Category I instrument approach operation unless all of the requirements in paragraphs 2.1.10.2 to 2.1.10.10 are met.

2.1.10.2 The aerodrome at which the runway is located must be a controlled aerodrome.

> **Note:** Aircraft operators will not be permitted to conduct SA Category I instrument approach operations unless aerodrome control is in operation.

2.1.10.3 Subject to paragraph 2.1.10.11, the runway must meet the standards in this MOS for a precision approach runway.

2.1.10.4 The runway must have electronic RVR equipment in the touchdown zone of the runway.

> **Note:** The runway may have electronic RVR equipment in the other zones of the runway.

2.1.10.5 The aerodrome operator must confirm with the ATS provider that the control tower has suitable RVR display equipment.

2.1.10.6 The runway must have a declared landing distance available of at least 1,524 m.

2.1.10.7 The runway must have, or be qualified for, a precision approach Category I ILS procedure.

2.1.10.8 An OFZ must be established for the runway.

2.1.10.9 In consultation with the ATS provider and the relevant aeronautical telecommunications service and radio navigation service provider, the relevant ILS equipment critical and sensitive areas must be determined, documented and associated protection requirements defined in the aerodrome's low visibility procedures.

2.1.10.10 The aerodrome operator must confirm with the relevant aeronautical telecommunications service and radio navigation service provider that the runway is equipped with a suitable precision approach aid.

2.1.10.11 Despite Chapter 9, a runway used for an SA Category I instrument approach operation is not required to have an approach lighting system extending over a distance of 900 m from the runway threshold.

Notes: 1: A runway with an existing Category II, Category III or SA Category II precision approach procedure is automatically eligible for SA Category I instrument approach operations.

2: Where possible, the runway should be equipped with an approach lighting system extending over a distance of at least 720 m from the runway threshold, which is either a precision approach Category I lighting system or a precision approach Category II and III lighting system.

3: The operating minima in each case are dictated by the available lighting facilities. Absence of an approach lighting system or a shorter approach lighting system will result in higher RVR minima. See the *Manual of Standards (MOS) Part 173 – Standards Applicable to the Provision of Instrument Flight Procedure Design* for specific details.

2.1.11 Runways Used for Special Authorisation Category II Instrument Approach Operations

Note: ***Special Authorisation Category II instrument approach operation*** is defined in AIP.

2.1.11.1 A runway is not suitable to be used for an SA Category II instrument approach operation unless all of the requirements in paragraphs 2.1.11.2 to 2.1.11.8 are met.

2.1.11.2 The aerodrome at which the runway is located must be a controlled aerodrome.

Note: Aircraft operators will not be permitted to conduct SA Category II instrument approach operations unless aerodrome control is in operation.

2.1.11.3 Subject to paragraph 2.1.11.9, the runway must meet all of the standards in this MOS for a precision approach runway Category II.

2.1.11.4 The runway must have electronic RVR equipment in the touchdown zone and at least 1 other zone of the runway.

2.1.11.5 The aerodrome operator must confirm with the ATS provider that the control tower has suitable RVR display equipment.

2.1.11.6 The runway must have a declared landing distance available of at least 1,830 m.

2.1.11.7 In consultation with the ATS provider and the relevant aeronautical telecommunications service and radio navigation service provider, the relevant ILS equipment critical and sensitive areas must be determined, documented and associated protection requirements defined in the aerodrome's low visibility procedures.

2.1.11.8 The aerodrome operator must confirm with the relevant aeronautical telecommunications service and radio navigation service provider that the runway is equipped with a suitable precision approach aid.

2.1.11.9 Despite Chapter 9, a runway used for an SA Category II instrument approach operation is not required to have a precision approach Category II and Category III lighting system extending over a distance of 900 m from the runway threshold, runway centreline lighting or touchdown zone lighting.

Notes: 1: A runway with an existing Category II or Category III precision approach procedure is automatically eligible for SA Category II instrument approach operations.

2: Where possible, the runway should be equipped with an approach lighting system extending over a distance of at least 720 m from the runway threshold which is either a precision approach Category I lighting system or a precision approach Category II and III lighting system.

3: The operating minima in each case are dictated by the available lighting facilities. Absence of runway centreline lighting, touchdown zone lighting or an approach lighting system will result in higher RVR minima. Also, a shorter approach lighting system will result in higher operating minima. See the *Manual of Standards (MOS) Part 173 – Standards Applicable to the Provision of Instrument Flight Procedure Design* for specific details.

CHAPTER 3: APPLYING FOR AN AERODROME CERTIFICATE

Section 3.1: General

3.1.1 Introduction

3.1.1.1 Pursuant to CASR Part 139, aerodromes intended to accommodate aeroplanes with more than 30 passenger seats conducting air transport operations must be certified. Operators of other aerodromes may also apply for an aerodrome certificate.

3.1.1.2 The applicant shall be the owner of the aerodrome site, or have obtained permission from the owner to use the site as an aerodrome.

3.1.1.3 CASA's aerodrome certification process only addresses the aviation safety aspect of the aerodrome. It is the responsibility of the applicant to ensure that use of the site as an aerodrome is in compliance with other federal, state and local statutory requirements. The aerodrome certificate does not absolve the applicant from observing such requirements.

3.1.1.4 Before submitting an application, the applicant must prepare an Aerodrome Manual, in accordance with the requirements set out in CASR Part 139. The standards to meet the requirements are set out in various chapters in this Manual of Standards (MOS). The initial application must be made on CASA Form 1186 (specimen at Section 3.2). The completed form shall be returned to the nearest CASA office, together with a copy of the Aerodrome Manual.

3.1.2 Aerodrome Certificate Processing Fee

3.1.2.1 Upon receipt of the application, the relevant CASA Aerodrome Inspector will assess the likely effort involved in processing the application and provide the applicant with a quotation for the aerodrome certification processing fee.

3.1.2.2 The certificate application will only be processed upon payment of the certification processing fee.

3.1.3 Processing an Aerodrome Certificate Application

3.1.3.1 Applications shall be submitted in sufficient time to allow for detailed consideration and inspection of the aerodrome before the desired date of issue of the certificate.

3.1.3.2 Engineering and survey reports of the physical characteristics of the movement area, pavement strength and surface, obstacle limitation surfaces, etc., shall be provided by the applicant as required by CASA.

3.1.3.3 As part of the certification process, CASA Aerodrome Inspector may carry out inspection or testing of any aspect of the aerodrome or require substantiation of any information provided by the applicant. However, it should be clearly understood that the CASA sample checking process does

not absolve the applicant from the responsibility to provide accurate information.

3.1.3.4 Special assessments may be necessary if there are aerodrome facilities that are not in full compliance with the applicable standards. This may involve more time and resources and may result in restrictions being imposed on aircraft operations.

3.1.4 Granting of an Aerodrome Certificate

3.1.4.1 Before an aerodrome certificate is granted, CASA needs to be satisfied that:

(a) the aerodrome physical characteristics and facilities are in compliance with relevant standards or are adequate for aeroplane safety;

(b) the aerodrome operating procedures proposed by the applicant and set out in the Aerodrome Manual are appropriate and adequate for the expected level of aircraft activities at the aerodrome;

(c) there are sufficient experienced trained or qualified personnel to conduct the safety functions of the aerodrome;

(d) the aerodrome operator is aware of the aerodrome safety functions and can be expected to properly operate the aerodrome.

3.1.4.2 Aerodrome certificates are granted on the condition that the aerodrome will, at all times, be in compliance with applicable regulations and standards. CASR Part 139 also empowers CASA to attach additional conditions to a licence to take account of particular circumstances of the aerodrome.

3.1.4.3 Once granted, except for a temporary certificate which has a finite term, an aerodrome certificate will remain in force until it is suspended or cancelled.

3.1.5 Maintenance and Control of Aerodrome Manual

3.1.5.1 CASA will retain one copy of the Aerodrome Manual. The aerodrome operator must keep his or her copy of the Aerodrome Manual at the aerodrome or at the operator's principal place of business and make it available for CASA audit purposes.

3.1.5.2 Additional copies of the Aerodrome Manual may be made available so that aerodrome staff and other organisations at the aerodrome may have access to a copy of the Manual.

3.1.5.3 When additional copies or sections of the Manual are required, the aerodrome manual controller is responsible for updates and distribution to those persons.

3.1.6 Initiating NOTAM to Promulgate a Certified Aerodrome

3.1.6.1 The CASA Aerodrome Inspector responsible for the certification process will prepare and forward to the NOTAM Office a permanent NOTAM setting out all the aerodrome information which will be included in AIP ERSA and the Runway Distances Supplement, including the effective date when the aerodrome is certified.

Section 3.2: Application for an Aerodrome Certificate

3.2.1 Sample Aerodrome Certificate Application

Australian Government
Civil Aviation Safety Authority

Application for an Aerodrome Certificate

1. Particulars of the Applicant

Full name: .....
Address: .....
..... Postcode: .....
Position: .....
Phone: ..... Fax: ..... E-mail: .....

2. Particulars of the Aerodrome

Name of aerodrome: .....
Real property description: .....
.....
Geographical coordinates of the ARP: Lat: ..... Long: .....
Bearing and distance from nearest town or populous area: .....
.....

3. Is the Applicant the Owner of the Aerodrome Site? Yes ❑ (Go to Item 4) No ❑

If the applicant is **Not** the owner of the site, provide:
a) Details of rights held in relation to the site; and
b) Name and address of the owner of the site and written evidence to show that permission has been obtained for the site to be used by the applicant as an aerodrome.

4. Indicate the Largest Type of Aircraft Expected to Use the Aerodrome

.....
.....

5. Is the Aerodrome to be Used for Air Transport Operations? Yes ❑ No ❑

6. Details to be shown on the Aerodrome Certificate

Aerodrome name: .....
Aerodrome operator: .....

On behalf of the Aerodrome Operator shown above, {*Delete if not applicable*}.
I hereby apply for a certificate to operate the aerodrome.

Signed: .....
My authority to act on behalf of the applicant is:
.....
.....
.....
Name of person making the declaration: .....
Date: ...../...../.....

Notes: **1.** Two copies of the Aerodrome Manual, prepared in accordance with the regulations and commensurate with the aircraft activities expected at the aerodrome, are required as part of the application.
2. **The application should be submitted to the nearest CASA Office.**
3. A quote will be provided for the cost of processing this application. CASA will take no action to assess this application until payment is received.
4. Documentary evidence in support of all matters in this application may be requested.

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Form 1186 04/2004 *Application for an Aerodrome Certificate* *Page 1 of 1*

CHAPTER 4: APPLYING TO REGISTER AN AERODROME

Section 4.1: General

4.1.1 Introduction

4.1.1.1 Pursuant to CASR Part 139, operators of uncertified aerodromes may apply to have their aerodromes registered by CASA. A registered aerodrome will have aerodrome information published in ERSA, and changes to aerodrome information or conditions affecting aircraft operations can be notified through the NOTAM system.

> **Note:** CASA will only approve instrument runways used for air transport operations at an aerodrome that is either certified or registered.

4.1.1.2 The applicant for registration must be the owner of the aerodrome site, or have obtained permission from the owner to use the site as an aerodrome.

4.1.1.3 CASA's aerodrome registration process only addresses the aviation safety aspect of the aerodrome. It is the responsibility of the applicant to ensure that use of the site as an aerodrome is in compliance with other federal, state and local authority requirements. The aerodrome registration does not absolve the applicant from observing such requirements.

4.1.2 Aerodrome Registration Application and Processing Fee

4.1.2.1 Application for registration must be made on CASA Form 1187 (specimen shown in 4.2.1), obtainable from the nearest CASA office. The completed form, together with aerodrome information for publication in ERSA and confirmation from an approved person as prescribed in CASR Part 139, that the aerodrome meets applicable safety standards, shall be returned to the nearest CASA office.

> **Note:** List of approved persons for registered aerodromes can be accessed through CASA web site or provided on request from the nearest CASA office.

4.1.2.2 Upon receipt of the application, the CASA Aerodrome Inspector will assess the likely effort involved in processing the registration application and provide the applicant with a quotation for the aerodrome registration processing fee.

4.1.2.3 The registration processing fee may include the CASA Aerodrome Inspector making an inspection of the aerodrome. The inspection is normally only required if the information supplied is, in the opinion of the Aerodrome Inspector, inadequate or requires further clarification.

4.1.2.4 The application will only be processed upon payment of the registration processing fee.

4.1.2.5 Applications shall be submitted in sufficient time to allow for detailed consideration and inspection of the aerodrome, before the desired registration date.

4.1.3 Approving a Registration Application

4.1.3.1 Registration is approved on the condition that:

(a) the aerodrome meets appropriate standards;

(b) the aerodrome operator has the capacity to properly maintain the aerodrome; and

(c) the reporting officer has been trained to the standards detailed in Chapter 10.

4.1.3.2 When the application is approved, the responsible CASA Aerodrome Inspector will prepare and forward to the NOTAM Office a permanent NOTAM setting out all the aerodrome information which will be included in ERSA and the Runway Distances Supplement. The CASA Aerodrome Inspector will also confirm, to the applicant, in writing, that the aerodrome is or will be registered, together with a copy of the NOTAM message.

4.1.4 Maintenance of Registration

4.1.4.1 Registered aerodromes will be included in the CASA aerodrome surveillance program. A scheduled visit by a CASA Aerodrome Inspector can be expected periodically. Appropriate notice of the scheduled visit will be given. Unscheduled visits may occur at any time, such as when prompted by reported safety concerns.

4.1.4.2 Registration will remain in force until it is suspended or cancelled.

4.1.4.3 Registration may be suspended if CASA is not satisfied with:

(a) the accuracy of aerodrome information provided;

(b) the on-going maintenance of the aerodrome; or

(c) the ability of the reporting officer to conduct on-going aerodrome serviceability inspection and reporting functions.

Notes: 1. Keeping records of aerodrome serviceability inspections, aerodrome works and NOTAMS issued will assist in demonstrating that the aerodrome has been operated properly.

2. Standards for ongoing operations and maintenance of a registered aerodrome are specified in Chapter 12.

4.1.4.4 Registration may be cancelled:

(a) on request of the aerodrome operator; or

(b) by CASA after the aerodrome registration was suspended and the identified safety concerns are not corrected to the satisfaction of CASA, within an acceptable period.

4.1.5 Aerodrome Safety Inspection Report

4.1.5.1 Operators of registered aerodromes are required to submit to CASA an Aerodrome Safety Inspection Report prepared by an approved person as specified in the regulations. This must be done either annually, or at a longer interval as agreed by the relevant CASA Aerodrome Inspector.

Section 4.2: Application to Register an Aerodrome

4.2.1 Application to Register an Aerodrome

Australian Government
Civil Aviation Safety Authority

Application to Register an Aerodrome

1. Particulars of the Applicant

Full name: .....

Address: .....

..... Postcode: .....

Position: .....

Phone: ..... Fax: ..... E-mail: .....

2. Particulars of the Aerodrome

Name of aerodrome: .....

Real property description: .....

.....

.....

Bearing or distance from nearest town or populous area: .....

.....

3. Is the Applicant the Owner of the Aerodrome Site? Yes ❑ (Go to Item 4) No ❑

If the applicant is **Not** the owner of the site, provide:

a) Details of rights held in relation to the site; and

b) Name and address of the owner of the site and written evidence to show that permission has been obtained for the site to be used by the applicant as an aerodrome.

4. Indicate the Largest Type of Aircraft Expected to Use the Aerodrome

.....

.....

5. Is the Aerodrome to be Used for RPT/Air Transport Operations? Yes ❑ No ❑

On behalf of the Aerodrome Operator shown above, {*Delete if not applicable*}.

I hereby apply for registration of the aerodrome.

Signed: .....

My authority to act on behalf of the applicant is:

.....

.....

Name of person making the declaration: .....

Date: ...../...../.....

6. Aerodrome Data If not applicable, insert N/A in the box on the right: ☐

(To be completed by an approved person as prescribed in CASR 139. Aerodrome Data must be derived in accordance with Manual of Standards Part 139 – Aerodromes, Chapter 5: Aerodrome Information for AIP.)

Note: *Application must be accompanied by a report prepared by an approved person as prescribed in CASR 139, confirming that the information provided overleaf is accurate and that the aerodrome meets the applicable safety standards. See page 2.*

Form 1187 03/2004 *Application to Register an Aerodrome* *Page 1 of 3*

Report on Aerodrome Data by Approved Person (as Prescribed in CASR 139)

6a. Aerodrome Diagram

This diagram depicts the following:

(i) The runway layout, their magnetic bearing and length in metres;
(ii) The layout of the taxiways and aprons;
(iii) The location of the aerodrome reference point;
(iv) The location of the wind direction indicators, both lit and unlit;
(v) The elevation of the aerodrome (the highest point on the landing surface in feet);
(vi) For instrument runway, the elevation of the mid-point of each threshold; and
(vii) The magnetic bearing and distance to the nearest city, town or population center.

6b. Aerodrome Location: (ARP) Lat:..... Long: .....

6c. Aerodrome Administration (Provide the following information on the aerodrome owner.)

Name of Aerodrome:.....

Name of Aerodrome Operator: .....

Address: .....

.....

Tel: B/H ..... (A/H) ..... Fax .....

State in which the Aerodrome is Located:.....

Is this Aerodrome Open to Public? No ❑ Yes ❑

Are there Landing Charges? No ❑ Yes ❑ Applicable Charges:.....

.....

If open to the public, who is (are) the Aerodrome Reporting Officer(s)?

Name: ..... B/H ..... (A/H).....

Name: ..... B/H ..... (A/H).....

6d. Runway Details (For each runway, provide the following. Add a page if there is more than one runway.)

Runway Designation:..... Runway Reference Code: .....

Runway End: .....TORA: ..... TODA: ..... (.....%) ASDA: ..... LDA: .....

Runway End: .....TORA: ..... TODA: ..... (.....%) ASDA: ..... LDA: .....

Runway Width: ..... Runway Slope:..... Runway Strip Width (graded): ..... (overall):.....

STODA:
Runway End: ..... 1.6%..... 1.9%..... 2.2% ..... 2.5% .....3.3% .....5.0% .....

Runway End: ..... 1.6%..... 1.9%..... 2.2% ..... 2.5% .....3.3% .....5.0% .....

Pavement Surface Type:..... Pavement Rating:.....(ACN/PCN) or

Maximum Aircraft Weight.....and Tyre Pressure.....able to use runway.

Form 1187 03/2004 *Application to Register an Aerodrome* *Page 2 of 3*

6e. Aerodrome Lighting: (For each runway equipped with lighting, provide the following. Add extra pages if there is more than one runway with lighting.)

Runway Designation:.....

Light Intensity: Low ❑ Medium ❑ High ❑

Approach Lighting Provided: Yes ❑ No ❑

Pilot Activated Lighting (PAL) Provided: Yes ❑ No ❑ Frequency: .....

T-VASIS or PAPI Provided: Yes ❑ No ❑ Type and Location:.....

Aerodrome Beacon Provided: Yes ❑ No ❑ Type and Location:.....

Standby Power Provided: Yes ❑ No ❑ Type: .....

Portable Lights: Yes ❑ No ❑

Any other lighting, specify: .....

6f. Ground Services (Provide the following information on services available to pilots.)

Fuel Type: ..... Supplier: .....

Tel: (B/H)..... (A/H) .....

Met Facilities Available: Yes ❑ No ❑

TAF Category:.....AWIS Phone Number: ..... AWIS Frequency:.....

CTAF or MBZ available: Yes ❑ No ❑

CTAF: ..... MBZ: ..... UNICOM: ..... AFRU: .....

Navaid Facilities Available: Yes ❑ No ❑

Type:.....Code:..... Coordinates: .....Range:.....

Monitoring:.....

ATS Communication Facilities Available: Yes ❑ No ❑

FIA:.....On Ground: ..... Circuit:.....

Passenger Facilities Available: Yes ❑ No ❑

.....

.....

6g. Special Procedures: (Provide the following information about any special procedures that pilots need to observe or follow.)

Special Procedures Apply: Yes ❑ No ❑

.....

.....

.....

6h. Notices: (Provide the following information on any local safety information.)

Details of any Obstacles:.....

.....

Details of any Hazards (eg, birds or animals): .....

.....

.....

Details of any Restrictions on the use of Taxiways or Aprons: .....

.....

Details of any other activities at the aerodrome (eg, sport aviation activities):.....

.....

Approved person's signature..... Date ...../ ...../.....

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Form 1187 03/2004 *Application to Register an Aerodrome* *Page 3 of 3*

CHAPTER 5: AERODROME INFORMATION FOR AIP

Section 5.1: General

5.1.1 Introduction

5.1.1.1 CASR Part 139 requires the applicant of an aerodrome certificate to provide information relating to the aerodrome for publication in Aeronautical Information Publication (AIP). This information must be included in the applicant's proposed Aerodrome Manual. Aerodrome information may be published in AIP - Enroute Supplement Australia (ERSA), AIP - Runway Distances Supplement (RDS) and AIP - Departure and Approach Procedures charts (DAP).

5.1.1.2 This Chapter sets out the aerodrome information which needs to be provided and the standards to which such aerodrome information must be gathered and presented.

5.1.1.3 The standards in this Chapter on gathering and presentation of aerodrome information are also applicable to aerodrome information provided to CASA for aerodrome registration.

5.1.1.4 The importance of providing accurate aerodrome information for the safety of aircraft operations cannot be overemphasised. Accordingly, care and diligence must be exercised in obtaining the aerodrome information to be published. This will involve the use of appropriately qualified persons to measure, determine or calculate aerodrome operational information.

5.1.1.5 After the information is published, maintaining its accuracy is also of fundamental importance. Standards for maintaining accuracy of published aerodrome information in AIP, including NOTAMS, are set out in Chapter 10.

5.1.2 Aerodrome Information to be Provided for a Certified Aerodrome

5.1.2.1 **Aerodrome diagram.** An aerodrome diagram must be provided to illustrate:

(a) layout of runways, taxiways and apron(s);

(b) nature of the runway surfaces;

(c) designations and length of runways;

(d) designations of the taxiways, where applicable;

(e) location of illuminated and non-illuminated wind direction indicators;

(f) location of the aerodrome reference point;

(g) the direction and distance to the nearest town;

(h) location of terminal buildings; and

(i) location of helipads.

5.1.2.2 **Aerodrome administration.** This must include:

(a) name, address, telephone and facsimile numbers of the aerodrome operator; including after hours contacts;

(b) aerodrome usage, public or private;

(c) aerodrome charges, where notification is desired.

5.1.2.3 **Aerodrome location.** This information must include;

(a) name of aerodrome;

(b) State or Territory of Australia;

(c) World Aeronautical Chart number, if known;

(d) latitude and longitude, based on the aerodrome reference point;

(e) magnetic variation;

(f) time conversion-universal time coordinated (UTC) plus local time difference;

(g) AVFAX and 'Y' location code indicator, if known;

(h) aerodrome elevation;

(i) currency of Type A charts, if provided.

5.1.2.4 **Movement area.** Must include for each runway designation;

(a) aerodrome reference code number;

(b) runway bearings-in degrees magnetic;

(c) runway length and surface type;

(d) runway pavement strength rating;

(e) runway and runway strip width;

(f) runway slope;

(g) runway declared distances, and STODA.

(h) elevation of the mid point of runway threshold, for instrument runways.

5.1.2.5 **Approach and Runway Lighting.** For each runway, the following details of approach and runway lighting systems must be provided:

(a) type, length and intensity of approach lighting system;

(b) runway threshold lights, colour and wing bars;

(c) type of visual approach slope indicator system;

(d) length of runway touchdown zone lights;

(e) length, spacing, colour and intensity of runway centreline lights;

(f) length, spacing, colour and intensity of runway edge lights;

(g) colour of runway end lights and wing bars;

(h) length and colour of stopway lights.

5.1.2.5A **Other Lighting and Secondary Power Supply.** The following details of aerodrome lighting and secondary power supply systems must be provided:

(a) location, characteristics and hours of operation of aerodrome beacon (if any);

(b) lighting systems for taxiways;

(c) any other lighting systems;

(d) secondary power supply including switch-over time.

5.1.2.6 **Navigation aids.** Details of any navigation aid, which is provided by Airservices Australia or the aerodrome operator.

5.1.2.7 **Rescue and fire-fighting services.** The category of aerodrome-based rescue and fire-fighting services provided by Airservices Australia or the aerodrome operator.

5.1.2.8 **Ground services.** This information must include:

(a) fuel suppliers and their contact details, including after hours;

(b) automatic weather information broadcast if provided by aerodrome operator;

(c) ground to air communication systems such as Unicom, aerodrome frequency response unit (AFRU) or approved air ground operator service provided by the aerodrome operator, and

(d) any other services available to pilots.

5.1.2.9 **Special procedures.** Include any special procedures unique to the aerodrome, which pilots need to be advised; in cases where the flying procedure is generated by the aerodrome operator.

5.1.2.10 **Notices.** Include important cautionary or administrative information relating to the use of the aerodrome.

5.1.2.11 **Low Visibility Procedures**. If low visibility procedures are established at a controlled aerodrome, the information to be provided must include the following:

(a) the runways and associated equipment that are used under low visibility procedures;

(b) minimum take off and landing visibility for which the aerodrome facilities are capable of providing appropriate support;

(c) defined meteorological conditions under which low visibility procedures are initiated, used and terminated;

(d) a description of ground marking and lighting for use under low visibility procedures.

5.1.3 Standards for Determining Aerodrome Information

5.1.3.1 **Nature of runway surface.** The runway surface type must be notified as either:

(a) bitumen seal;

(b) asphalt;

(c) concrete;

(d) gravel;

(e) grass; or

(f) natural surface.

Where only the central portion of runway is sealed, this must be advised accordingly.

5.1.3.2 **Runway bearing and designation.** The bearing of runways must be determined in degrees magnetic. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees.

5.1.3.3 **Runway length.** The aerodrome operator must provide the physical length of runways in whole numbers of metres and feet , with feet bracketed.

5.1.3.4 **Taxiway designation.** A single letter must be used without numbers to designate each main taxiway. Alpha-numeric designators may be used for short feeder taxiways. See also Chapter 8.

5.1.3.5 **Aerodrome reference point (ARP).** The geographic coordinates of the aerodrome reference point must be notified in degrees, minutes and tenths of a minute; based on the World Geodetic System-1984 (WGS-84). The ARP should be located at or near the centroid of the aerodrome.

5.1.3.6 **Aerodrome elevation.** Must be at the highest point of the landing area, above mean sea level. Aerodrome elevation must be reported in feet, based on the Australian Height Datum, to an accuracy of one foot.

5.1.3.7 **Runway reference code number.** For each runway provide the reference code number as defined in Chapter 2.

5.1.3.8 **Pavement strength.**

(a) Aircraft less than 5,700 kg maximum take-off mass.

The bearing strength of a pavement intended for aircraft of 5700 kg mass or less, must be made available by reporting the following information:

(i) maximum allowable aircraft mass; and

(ii) maximum allowable tyre pressure.

(b) Aircraft greater than 5,700 kg maximum take-off mass.

Report the bearing strength of pavements intended for aircraft greater than 5,700 kg mass, in accordance with the Aircraft Classification

Number/Pavement Classification Number (ACN/PCN) system; reporting all of the following information:

(i) the pavement classification number (PCN);

(ii) pavement type for ACN-PCN determination;

(iii) subgrade strength category;

(iv) maximum allowable tyre pressure category; and

(v) evaluation method.

Note: The PCN reported will indicate that an aircraft with an aircraft classification number (ACN) equal to or less than the reported PCN can operate on the pavement subject to any limitation on the tyre pressure, or aircraft all-up weight for specified aircraft type(s).

(c) Information on pavement type for ACN-PCN determination, subgrade strength category, maximum tyre pressure category and evaluation method must be reported using the following codes:

(i)

Pavement type for ACN-PCN determination:	Code
Rigid pavement	R
Flexible pavement	F

(ii)

Subgrade strength category:	Code
High strength: characterised by a K value of 150 MN/m^3 and representing all K values above 120MN/m^3 for rigid pavements, and by CBR 15 and representing all CBR values above 13 for flexible pavements.	A
Medium strength: characterised by a K value of 80 MN/m^3 and representing a range in K of 60 to 120 MN/m^3 for rigid pavements, and by CBR 10 and representing a range in CBR of 8 to 13 for flexible pavements.	B
Low strength: characterised by a K value of 40 MN/m^3 and representing a range in K of 25 to 60 MN/m^3 for rigid pavements, and by CBR 6 and representing a range in CBR of 4 to 8 for flexible pavements.	C
Ultra low strength: characterised by a K value of 20 MN/m^3 and representing all K values below 25 MN/m^3 for rigid pavements, and by CBR 3 and representing all CBR values below 4 for flexible pavements.	D

(iii)

Maximum allowable tyre pressure category:	Code
High: no pressure limit	W
Medium: pressure limited to 1.50 MPa	X
Low: pressure limited to 1.00 MPa	Y1
Low: pressure limited to 0.80 MPa	Y2
Very low: pressure limited to 0.50 MPa	Z

(iv)

Evaluation method:	Code
Technical evaluation: representing a specific study of the pavement characteristics and application of pavement behaviour technology.	T
Using aircraft experience: representing knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use.	U

(v) **Examples of pavement strength reporting**

Example 1: If the bearing strength of a rigid pavement, built on a medium strength subgrade, has been assessed by technical evaluation to be PCN 80 and there is no tyre pressure limitation, then the reported information would be:

PCN 80/R/B/W/T

Example 2: If the bearing strength of a flexible pavement, built on a high strength subgrade, has been assessed by using aircraft experience to be PCN 50 and the maximum tyre pressure allowable is 1.00 MPa, then the reported information would be:

PCN 50/F/A/Y/U

Example 3: If the bearing strength of a flexible pavement, built on a medium strength subgrade, has been assessed by technical evaluation to be PCN 40 and the tyre pressure is to be limited to 0.80 MPa, then the reported information would be:

PCN 40/F/B/0.80 MPa/T

Example 4: If a pavement is subject to B747-400 all up mass limitation of 390,000 kg, then the reported information would include the following note:

> **Note:** The reported PCN is subject to a B747-400 all up mass limitation of 390,000 kg.

5.1.3.10 **Runway strip width.** For non instrument runways, provide the full width of graded strip. For an instrument runway, provide the full width of runway strip

which must include the graded portion and the flyover portion; in whole numbers of metres.

5.1.3.11 **Runway slope.** Determine the slope of runways, by taking the difference between the maximum and minimum elevation along the centreline and dividing the result by the runway length. Slope must be expressed as a percentage, to the nearest one tenth of a percent, indicating the direction of descent. Where there are significant multiple slope changes along the runway, slopes over individual segments must be provided over the length of the runway.

5.1.3.12 **Declared distances.**

(a) Declared distances are the available operational distances notified to a pilot for take-off, landing or safely aborting a take-off. These distances are used to determine whether the runway is adequate for the proposed landing or take-off or to determine the maximum payload permissible for a landing or take-off.

(b) The following distances in metres with feet equivalent shown in brackets, must be determined for each runway direction.

(i) take off run available (TORA);

(ii) take off distance available (TODA);

(iii) accelerate-stop distance available (ASDA);

(iv) landing distance available (LDA);

(c) **Calculation of declared distances.** The declared distances must be calculated in accordance with the following:

(i) **Take-off run available (TORA)** is defined as the length of runway available for the ground run of an aeroplane taking off. This is normally the full length of the runway; neither the SWY nor CWY are involved.

TORA = Length of RW

(ii) **Take-off distance available (TODA)** is defined as the distance available to an aeroplane for completion of its ground run, lift-off and initial climb to 35 ft. This will normally be the full length of the runway plus the length of any CWY. Where there is no designated CWY, the part of the runway strip between the end of the runway and the runway strip end is included as part of the TODA. Each TODA must be accompanied by an obstacle clear take-off gradient expressed as a percentage.

TODA =TORA + CWY

(iii) **Accelerate-stop distance available (ASDA)** is defined as the length of the take-off run available plus the length of any SWY. Any CWY is not involved.

ASDA = TORA + SWY

(iv) **Landing distance available (LDA)** is defined as the length of runway available for the ground run of a landing aeroplane. The LDA commences at the runway threshold. Neither SWY nor CWY are involved.

LDA = Length of RW (if threshold is not displaced.)

> **Note:** See Section 5.2 for illustrations of declared distances.

5.1.3.13 Determine and notify the gradient from the end of TODA to the top of the critical obstacle within the take-off climb area, expressed as a percent. Where there is no obstacle, a value of 1.2% must be notified.

5.1.3.14 **Fences or levee banks.** If a fence or levee bank is located so close to a runway strip end such that a take-off gradient is so large as to be meaningless; the take-off gradient can be based on the next obstacle within the take-off area. In this case, a note must be provided advising that the fence or levee bank has not been taken into account in the calculation of TODA and STODA gradients. The note must also advise the location and height of the fence or levee bank.

5.1.3.15 **Survey of take-off area.**

(a) The selection of the critical obstacle must be based on the survey of the full take-off area in accordance with the applicable take-off OLS standards specified in Chapter 7. If the survey is not in full compliance, or the runway may, on occasions, be used by a larger aircraft, for example a Code 2 runway being used by a Code 3 aircraft, then an appropriate note must be provided. For example, “TKOF area surveyed to 8500 m instead of 15000 m” or “TKOF area surveyed to Code 2 standards instead of Code 3”.

(b) Where the location of the critical obstacle is some distance from the take-off inner edge, and results in a take-off gradient that requires a curved departure, an additional lower take-off gradient may be declared based on a shorter length of TKOF area surveyed. Where this situation applies, aerodrome operators must consult with the appropriate CASA office.

5.1.3.16 **Supplementary take-off distances available (STODA).** For TODA having an obstacle clear gradient of more than 1.6%, STODA must be provided, except if the STODA is less than 800 m. STODA must be provided for obstacle clear take-off gradients of 1.6%, 1.9%, 2.2%, 2.5%, 3.3% and 5%, up to the gradient associated with TODA. In calculating STODA, care must be taken to ensure that a shielded object does not become critical for the lesser take-off distances, and that the slope of the runway is taken into account. Examples showing how to calculate this will be provided in a subsequent Advisory Circular on the subject matter.

> **Note:** Section 5.3 contains an illustration of STODA and an example of a shielded object.

5.1.3.17 **Intersection departure take-off distances available**. At an aerodrome where air traffic procedures include regular taxiway intersection departures, the take-off distances available from each relevant taxiway intersection must be determined and declared. The method of determining the take-of distances available at an intersection is similar to that used at a runway end. This is to ensure that the same performance parameters (for example, line-up allowance) may be consistently applied for the line-up manoeuvre, whether entering the runway at the runway end or from some other intersection. Declared distances for an intersection must be measured from a perpendicular line commencing at the taxiway edge that is farther from the direction of take-off. Where take-offs may be conducted in either direction, the starting point of the declared distances for each direction will be the perpendicular line commencing from the respective edges of the taxiway farther from the direction of take-off. This is illustrated in Section 5.2. The format for notifying intersection departure information is as follows:

— RWY 16 – TKOF from TWY E; RWY remaining 2345 (7694) reduce all DIST by 1312 (4305).

5.1.3.18 **Threshold elevation.** For instrument runways, provide the elevation of the mid point of each runway threshold. The threshold elevation must be measured in feet, to an accuracy of one foot, based on the Australian Height Datum.

5.1.3.19 **Aerodrome Obstruction Charts - Type A.** Where a Type A Chart is prepared, currency information of the Chart in the form of date of preparation or edition/issue number must be provided.

5.1.3.20 **One direction runways.** Where a runway direction cannot be used for take-off or landing, or both, the appropriate declared distance(s) must be shown as ‘nil’, along with an appropriate note, for example; ‘TKOF 14 and LAND 32 not AVBL due surrounding terrain.’

5.1.3.21 **Lighting systems.** Provide information of aerodrome lighting systems by using the following abbreviations:

> **Note:** Runway lights include runway edge, threshold and runway end lights, and, where stopways are provided, stopway lights.

Abbreviation	Meaning
SDBY PWR AVBL	Standby power available.
PTBL	Portable or temporary lights (flares or battery).
LIRL	Low intensity runway lights (omnidirectional, single stage of intensity).
MIRL	Medium intensity runway lights (omnidirectional, three stages of intensity).
HIRL	High intensity runway lights (unidirectional, five or six stages of intensity; lower intensity stages may be omnidirectional).

Abbreviation	Meaning
RTIL	Runway threshold identification lights (flashing white).
RCLL	Runway centre line lights.
RTZL	Runway touchdown zone lights.
AL	Approach lights (other than high intensity).
HIAL-CAT 1	High intensity approach lights-CAT I.
HIAL-CAT 11 or 111	High intensity approach lights-CAT II or III.
SFL	Sequenced flashing lights.
T-VASIS	T-pattern visual approach slope indicator system.
AT-VASIS	Abbreviated (single side) T-pattern visual slope approach slope indicator system.
PAPI	PAPI visual approach slope indicator system.
PAPI#	PAPI commissioned by ground survey (not available to RPT jets).
HSL	Hold short lights (used in conjunction with land and hold short operations).
PAL (frequency)	Pilot activated aerodrome lighting (with dedicated frequency).
AFRU+PAL(frequency)	Aerodrome Frequency response Unit plus PAL.
ABN	Aerodrome beacon with colour and flashing rate.
HIOL	High intensity obstacle lights (flashing white).
MIOL	Medium intensity obstacle lights (flashing red).
LIOL	Low intensity obstacle lights (steady red).
Taxiways	Centreline lights are green and edge lights are blue.

5.1.3.22 **Navigation aids**. Where the aerodrome operator provides a navigation aid, the location coordinates and operating frequency must be provided. The location co-ordinates must be notified in degrees, minutes and tenths of a minute, based on the World Geodetic System – 1984 (WGS-84).

5.1.3.23 **Aerodrome obstacles**. Local data may include obstacles in the circuit area.

5.1.3.24 **Additional Information.** Significant local data may include the following:

(a) animal or bird hazard;

(b) aircraft parking restriction;

(c) aircraft to avoid overflying certain areas such as mine blasting areas;

(d) other aviation activities such as ultralight or glider operations in the vicinity.

5.1.4 Obstacle Data

5.1.4.1 Standards for obstacle identification, restriction and limitation are detailed in Chapter 7. Chapter 7 also provides details of and responsibilities for Aerodrome Obstacle Charts applicable to the aerodrome.

Section 5.2: Illustration of Declared Distances

5.2.1 Introduction

5.2.1.1 Declared distances are the available operational distances notified to a pilot for take-off, landing or safely aborting a take-off. These distances are used to determine whether the runway is adequate for the proposed landing or take-off or to determine the maximum payload permissible for a landing or take-off.

5.2.1.2 Declared distances are a combination of the runway (i.e. full strength pavement), any stopway (SW) and clearway (CW) provided.

5.2.2 Calculation of Declared Distances

5.2.2.1 The declared distances to be calculated for each runway direction are:

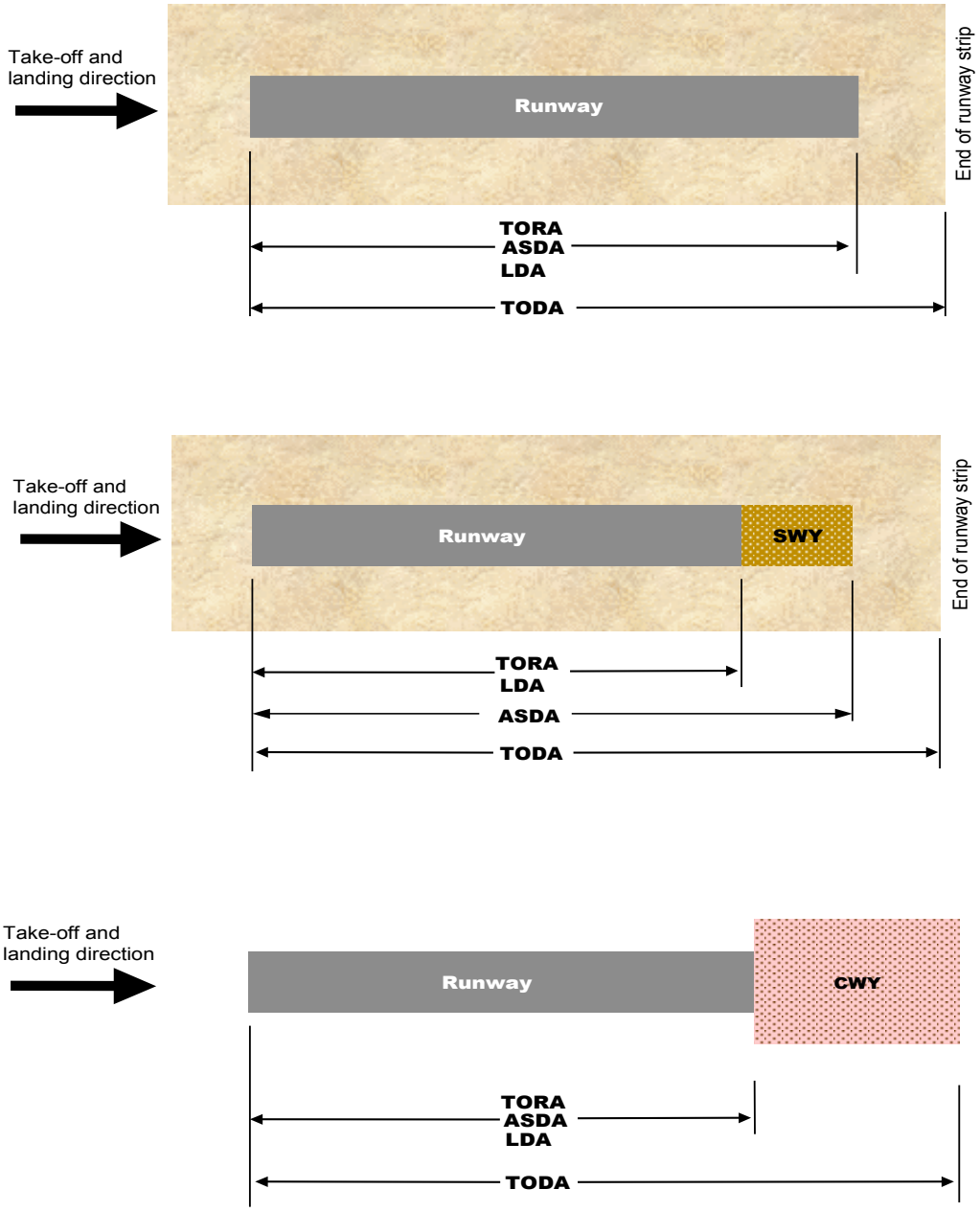
(a) **Take-off run available (TORA)** defined as the length of runway available for the ground run of an aeroplane taking off. It will normally be the full length of the runway. Neither stopway nor clearway are involved.

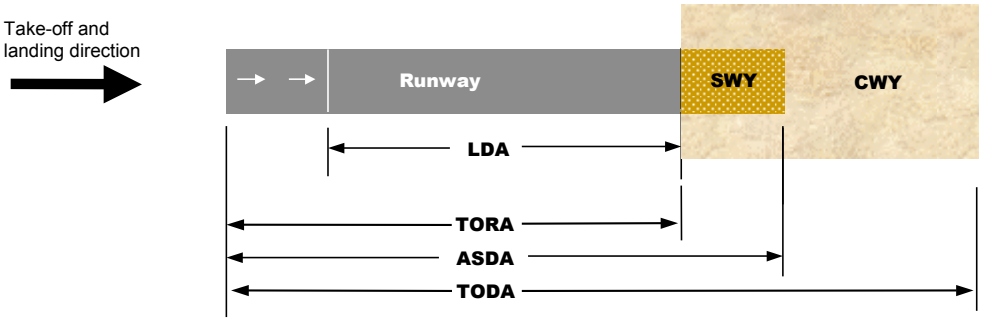
(b) **Take-off distance available (TODA)** defined as the distance available to an aeroplane for completion of its ground run, lift-off and initial climb to 35 ft. It will normally be the full length of the runway plus the length of any clearway. Where there is no designated clearway, the part of the runway strip between the end of the runway and the runway strip end is included as part of the TODA. This Australian practice has been registered with ICAO. Any stopway is not involved.

(c) **Accelerate-stop distance available (ASDA)** defined as the length of the take-off run available plus the length of any stopway. Any clearway is not involved.

(d) **Landing distance available (LDA)** defined as the length of runway available for the ground run of a landing aeroplane. The LDA commences at the runway threshold. Neither stopway nor clearway are involved.

5.2.2.2 The above definitions of the declared distances are illustrated in the diagrams below:





5.2.3 Obstacle-free Take-off Gradient

5.2.3.1 TODA is only usable where the minimum obstacle-free gradient from the end of the clearway is equal to or less than the climb performance of the aeroplane.

5.2.3.2 When calculating TODA it is necessary to also calculate the minimum obstacle-free take-off gradient. This is the gradient associated with the critical obstacle.

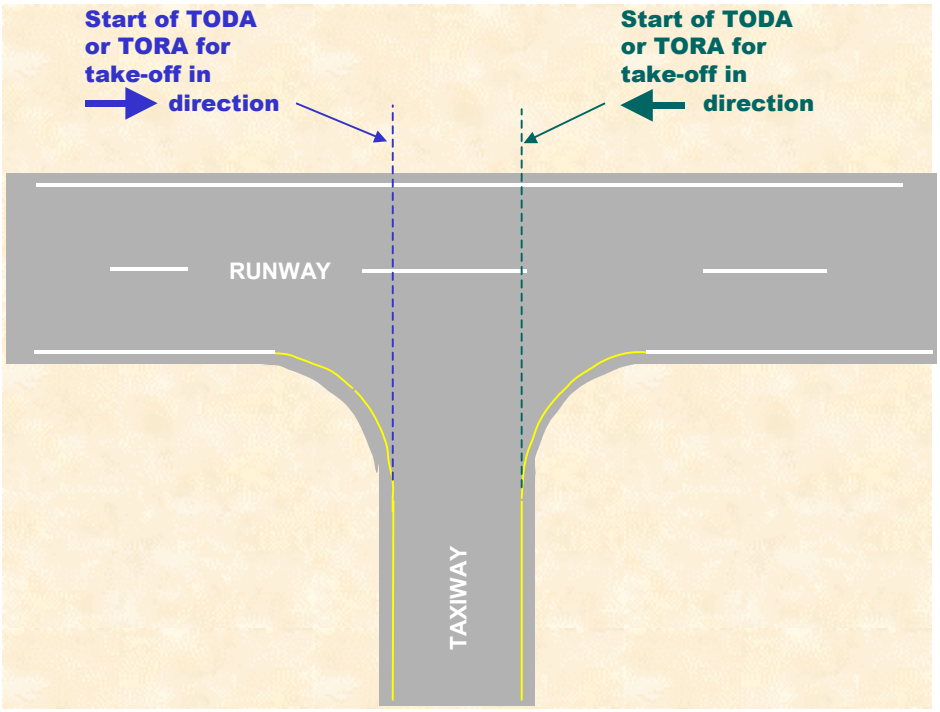
5.2.4 Critical Obstacle

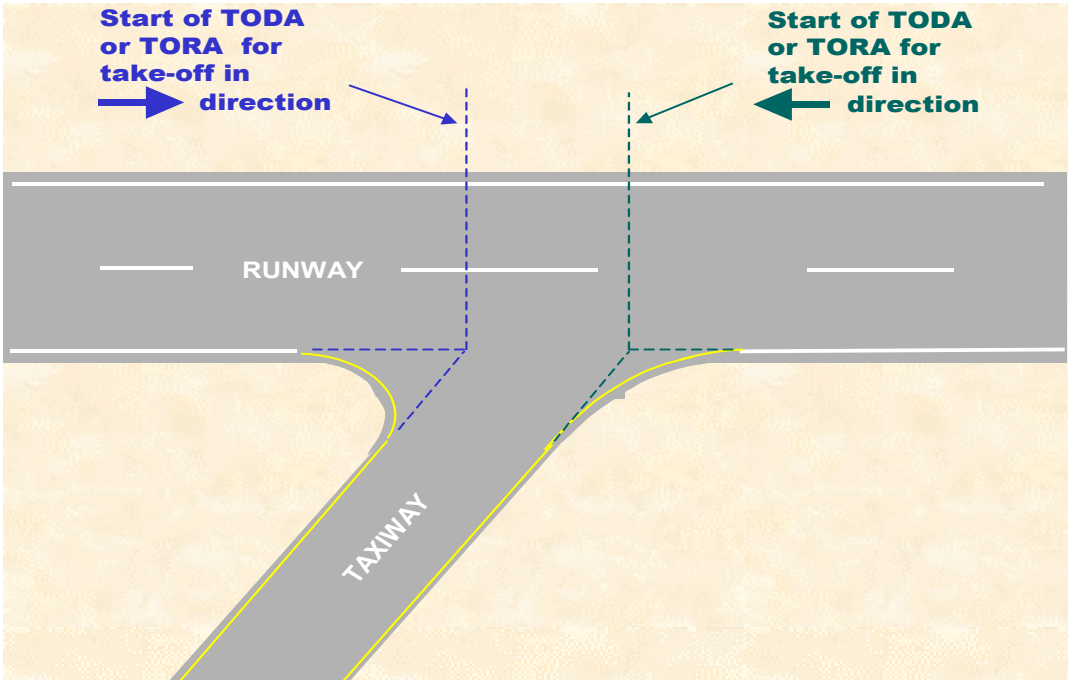
5.2.4.1 The critical obstacle is the obstacle within the take-off climb area which subtends the greatest vertical angle with the horizontal, at the highest point on the clearway, when measured from the inner edge of the take-off climb surface.

5.2.4.2 In assessing the critical obstacle, close in objects such as fences, transient objects on roads and railways, and navigational installations should also be considered. Standards relating to obstacle restrictions and limitations are included in Chapter 7.

5.2.5 Declared Distances for Intersection Departures

5.2.5.1 The following diagrams illustrate the method of calculating the take-off distance available or take-off run available where departures are allowed from taxiway intersections.

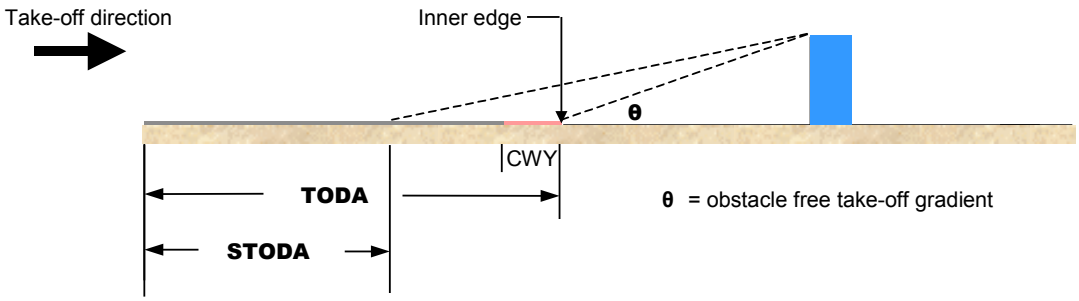




Section 5.3: Illustration of Supplementary Take-Off Distances Available and Shielding

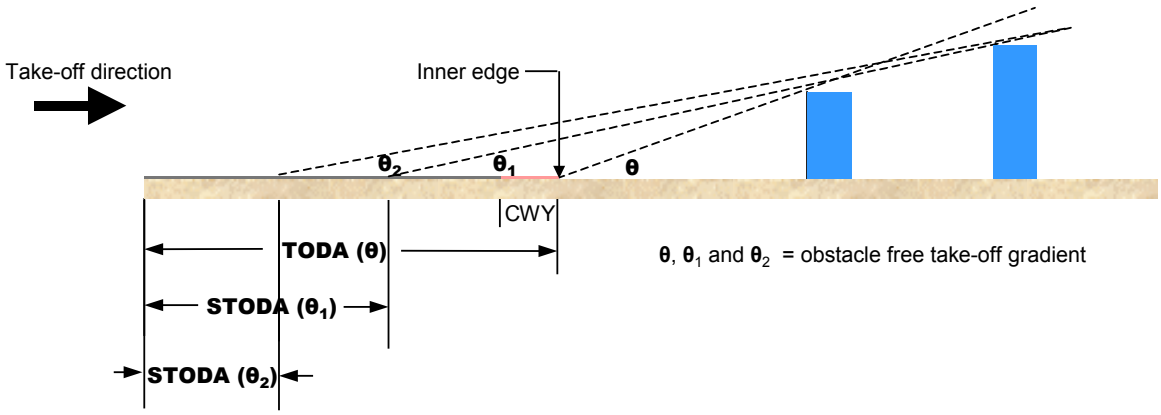
5.3.1 Introduction

5.3.1.1 For TODA having an obstacle-free gradient of more than 1.6%, supplementary take-off distances available (STODA) are to be provided for the following gradients, where applicable: 1.6%, 1.9%, 2.2%, 2.5%, 3.3% and 5%. STODA of less than 800 m are not shown.



5.3.1.2 The specifications for take-off climb surfaces are given in Chapter 6. Aerodrome operators should note in particular the standard for the elevation of the inner edge of the take-off climb surface.

5.3.1.3 In calculating supplementary take-off distances care should be taken to ensure that a shielded object does not become critical for the lesser take-off distances. This is most likely with a close-in critical obstacle.



One way to overcome an object protruding through the approach surface is to displace the threshold and this reduces the LDA. Instances where the threshold needs to be displaced more than 300 m from the end of the runway should be referred to the CASA area office for consideration.

CHAPTER 6: PHYSICAL CHARACTERISTICS

Section 6.1: General

6.1.1 Introduction

6.1.1.1 The standards for the physical characteristics are the statutory requirements which apply to the planning, design and construction for the movement area facilities at certified and registered aerodromes, and at non-certified and non-registered aerodromes used by aircraft conducting air transport operations.

> **Note:** The standards in this Chapter are intended for the planning and construction of new aerodrome facilities rather than to limit the operations of aeroplanes.

6.1.1.2 The standards set out in this Chapter govern characteristics such as the dimensions and shape of runways, taxiways, aprons and related facilities provided for the safe movement of aircraft.

6.1.1.3 Aerodrome siting, including runway useability and number and orientation of runways, aerodrome master planning and matters relating to economics, efficiency and the environment at an aerodrome are not within the scope of these standards.

6.1.1.4 The aerodrome standards for glider facilities set out in Section 6.7 are applicable to glider facilities provided at a certified aerodrome or registered aerodrome.

Section 6.2: Runways

6.2.1 Location of Runway Threshold

6.2.1.1 The threshold of a runway must be located:

(a) if the runway's code number is 1 — not less than 30 metres after; or

(b) in any other case — not less than 60 metres after;

the point at which the approach surface for aircraft using the runway meets the extended runway centre line.

> **Note:** If obstacles infringe the approach surface, operational assessment may require the threshold to be displaced. The obstacle free approach surface to the threshold is not to be steeper than 3.3% where the runway code number is 4 or steeper than 5% where the code number is 3.

6.2.2 Length of Runway

6.2.2.1 The length of a runway must be adequate to meet the operational requirements of the aeroplanes for which the runway is intended.

6.2.3 Runway Width

6.2.3.1 Subject to Paragraph 6.2.3.2, the width of a runway must not be less than that determined using Table 6.2-1.

Table 6.2-1: Minimum runway width

Code number	Code letter					
	A	B	C	D	E	F
1	18 m	18 m	23 m	–	–	–
2	23 m	23 m	30 m	–	–	–
3	30 m	30 m	30 m	45 m	–	–
4	–	–	45 m	45 m	45 m	60 m

6.2.3.1B Subject to meeting the additional requirements for runway shoulders mentioned in paragraph 6.2.14.3, code letter E runways may be used for A380 operations.

6.2.3.1C Paragraph 6.2.3.1B does not allow code letter E runways to be used for A380 operations:

(a) if their construction begins after the commencement of paragraph 6.2.3.1B; or

(b) if they are subjected to a major redevelopment, such as a runway extension, that begins after the commencement of that paragraph.

6.2.3.2 If a precision approach runway's code number is 1 or 2, the runway's width must not be less than 30 m.

6.2.4 Runway Turning Area

6.2.4.1 If a turning area for aircraft is provided at any point on a runway, the width of the turning area must be such that the clearance between the outer main gear wheels of the aircraft using the runway and the edge of the turning area, at that point, is not less than the distance determined using Table 6.2-2.

Table 6.2-2: Minimum clearance between outer main gear wheels and edge of turning area on runway

Code letter	Minimum clearance
A	1.5 m
B	2.25 m
C	4.5* m
D, E or F	4.5 m
* If the turning area or curve is only intended to serve aircraft with a wheelbase of less than 18 m, the minimum clearance is 3.0 m.	
Note: The turning node should normally be located on the left hand side of the runway except where a runway is used by aircraft operating in right hand circuits.	

6.2.5 Parallel Runways

6.2.5.1 Where parallel runways are to be provided, the aerodrome operator should consult with CASA and Airservices Australia on airspace and air traffic control procedures associated with the operation of the multiple runways. Where parallel, non-instrument runways are provided for simultaneous use, the minimum separation distance between the runway centrelines must not be less than:

(a) where General Aviation Aerodrome Procedures (GAAP) are in place — 213m. If this distance is not provided, dependent parallel procedures may need to be introduced;

(b) where the higher code number of the two runways is 3 or 4 — 210 m;

(c) where the higher code number of the two runways is 2 — 150 m;

(d) where the code number of the two runways is 1 — 120 m.

6.2.5.2 Where parallel instrument runways are intended for simultaneous use, the minimum distance between the runway centrelines must not be less than:

(a) for independent parallel approaches — 1,035 m;

(b) for dependent parallel approaches — 915 m;

(c) for independent parallel departures — 760 m; and

(d) for segregated parallel operations — 760 m.

6.2.6 Runway Longitudinal Slope

6.2.6.1 The overall runway slope, defined by dividing the difference between the maximum and minimum elevation along the runway centreline by the runway length, must not be more than:

(a) if the runway's code number is 3 or 4 — 1%; or

(b) if the runway's code number is 1 or 2 — 2%.

6.2.6.2 Subject to Paragraphs 6.2.6.3 and 6.2.6.4, the longitudinal slope along any part of a runway must not be more than:

(a) if the runway's code number is 4 — 1.25%; or

(b) if the runway's code number is 3 — 1.5%; or

(c) if the runway's code number is 1 or 2 — 2%.

> **Note:** A uniform slope for at least 300 m should be provided at each end of the runway, and at airports where large jet aeroplanes operate this distance should be increased to at least 600 m.

6.2.6.3 If the runway's code number is 4, the longitudinal slope along the first and last quarters of the runway must not be more than 0.8%.

6.2.6.4 If the runway's code number is 3 and it is a precision approach category II or category III runway, the longitudinal slope along the first and last quarters of the runway must not be more than 0.8%.

6.2.6.5 If slope changes cannot be avoided, the change in longitudinal slope between any two adjoining parts of a runway must not be more than:

(a) if the runway's code number is 3 or 4 — 1.5%; or

(b) if the runway's code number is 1 or 2 — 2%.

6.2.6.6 The transition from one longitudinal slope to another must be accomplished by a vertical curve, with a rate of change not more than:

(a) if the runway's code number is 4 — 0.1% for every 30 m (minimum radius of curvature of 30,000 m); or

(b) if the runway's code number is 3 — 0.2% for every 30 m (minimum radius of curvature of 15,000 m); or

(c) if the runway's code number is 1 or 2 — 0.4% for every 30 m (minimum radius of curvature of 7,500 m).

> **Note:** The rate of change of longitudinal slope may be relaxed outside the central one-third of the runway at intersections, either to facilitate drainage or to accommodate any conflicting slope requirements.

6.2.6.7 The distance between the points of intersection of two successive longitudinal slope changes must not be less than the greater of the following:

(a) 45 m; or

(b) the distance in metres worked out using the formula:

D = k (|S1 - S2| + |S2 - S3|)/100,

where 'k' is:

(i) if the runway's code number is 4 — 30,000 m; or

(ii) if the runway's code number is 3 — 15,000 m; or

(iii) if the runway's code number is 1 or 2 — 5,000 m; and

'S1', 'S2' and 'S3' are the three successive slopes expressed as percentage values.

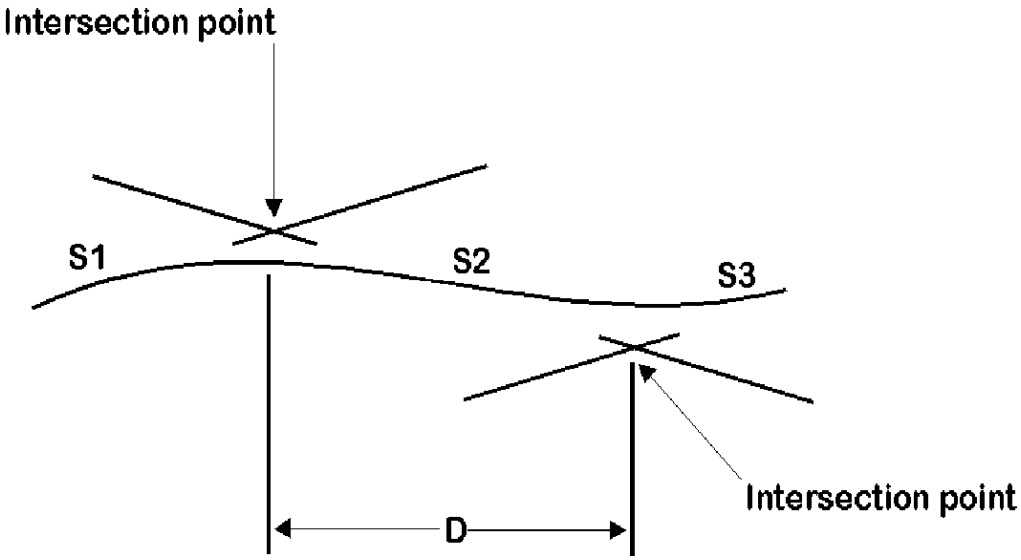


Figure 6.2-1

Example: In Figure 6.2-1 above, if the runway's code number is 3, and the slopes are S1 (+1%), S2 (-1.5%) and S3 (+1.5%), then the distance in metres between the two points of intersection must not be less than 15,000 x (2.5 + 3)/100, that is to say 825 m.

6.2.7 Runway Sight Distance

6.2.7.1 The unobstructed line of sight along the surface of a runway, from a point above the runway, must not be less than the distance determined using Table 6.2-3.

Table 6.2-3: Runway line of sight

Code letter	Minimum unobstructed line of sight
A	From a point 1.5 m above the runway to any other point 1.5 m above the runway for half the length of the runway.
B	From a point 2 m above the runway to any other point 2 m above the runway for half the length of the runway.
C, D, E or F	From a point 3 m above the runway to any other point 3 m above the runway for half the length of the runway.

6.2.7.2 If runway lighting is provided, the unobstructed line of sight from 3 m above any point on the runway surface to any other point on the runway surface must not be less than 600 m.

6.2.8 Transverse Slopes on Runways

6.2.8.1 The transverse slope on any part of a runway must be adequate to prevent the accumulation of water and must be in accordance with Table 6.2-4.

Table 6.2-4: Runway transverse slope

	Code letter	
	A or B	**C, D, E or F**
Maximum slope	2.5%	2.0%
Preferred slope	2.0%	1.5%
Minimum slope	1.5%	1.0%
Note: The standard may not apply at intersections where design may dictate a variation to the standards.		

6.2.9 Runway Surface

6.2.9.1 The surface of a bitumen seal, asphalt or concrete runway must not have irregularities that would result in the loss of frictional characteristics or otherwise adversely affect the take-off or landing of an aircraft.

> **Note:** The finish of the surface of a runway should be such that, when tested with a 3m straight-edge placed anywhere on the surface, there is no deviation greater than 3mm between the bottom of the straight-edge and the surface of the runway pavement anywhere along the straight-edge.

6.2.9.1A The surface of a bitumen seal, asphalt or concrete runway must have an average surface texture depth of not less than 1mm over the full runway width and runway length.

> **Note:** A runway surface meeting the ICAO minimum design objective for new surfaces specified in Annex 14, Volume 1, derived using a continuous friction-measuring device, is acceptable.

6.2.9.2 If a runway surface cannot meet the standards of Paragraph 6.2.9.1, a surface treatment must be provided. Acceptable surface treatments include; grooving, porous friction course and bituminous seals.

6.2.9.3 The runway surface standards for grass, gravel or natural runways are as set out in Table 6.2-4A. However, the runway surface must not have irregularities which would adversely affect the take-off or landing of an aircraft.

Table 6.2-4A

Surface	Runway	Runway strip
Sealed surface	After compaction, the surface is to be swept clean of loose stones	N/A
Maximum height of grass:		
Sparse	450 mm	600 mm
Medium	300 mm	450 mm
Dense	150 mm	300 mm
Maximum size of loose stones:		
Isolated stones on natural surface	25 mm	50 mm
Constructed gravel surface	25 mm	75 mm
Maximum size of surface cracks	40 mm	75 mm
Note: An empirical test for runway riding quality is to drive a stiffly sprung vehicle such as a medium size utility or unladen truck along the runway at not less than 65 kph. If the ride is uncomfortable, then the surface needs to be graded and levelled.		

6.2.10 Runway Bearing Strength

6.2.10.1 The pavement strength rating for a runway must be determined using the ACN - PCN pavement rating system described in Chapter 5.

6.2.10.2 CASA does not specify a standard for runway bearing strength, however, the bearing strength must be such that it will not cause any safety problems to aircraft. The published PCN value should be suitable for the aircraft that regularly use the runway.

6.2.11 Runway Shoulders

6.2.11.1 If a runway's code letter is F, shoulders must be provided and the total width of the runway and shoulders must not be less than 75 m.

6.2.11.2 If a runway's code letter is D or E, shoulders must be provided and the total width of the runway and shoulders must not be less than 60 m.

6.2.12 Characteristics of Runway Shoulders

6.2.12.1 Runway shoulders must:

(a) be of equal width on both sides;

(b) slope downwards and away from the runway surface;

(c) be resistant to aeroplane engine blast erosion;

(d) be constructed so as to be capable of supporting an aeroplane, running off the runway, without causing structural damage to the aeroplane; and

(e) be flush with the runway surface except during runway overlay works where a step down not exceeding 25 mm is permitted.

6.2.13 Transverse Slope on Runway Shoulder

6.2.13.1 The transverse slope of a runway shoulder must not be more than 2.5%.

6.2.14 Surface of Runway Shoulder

6.2.14.1 The shoulders of a runway intended to serve jet-propelled aeroplanes with engines which may overhang the edge of the runway must be surfaced with a bituminous seal, asphalt or concrete.

6.2.14.2 At a runway intended to serve a wide body jet aeroplane such as a Boeing 747 or any other aeroplane with engines, which may overhang the shoulders, a further width of 7 m outside each shoulder must be prepared to resist engine blast erosion.

6.2.14.3 Code letter E runways used for A380 operations must be provided with shoulders that consist of:

(a) inner shoulders 7.5 metres in width on either side that are able to support unintended aircraft runoff; and

(b) outer shoulders 7.5 metres in width on either side that are resistant to engine blast erosion, prevent engine ingestion and are able to support emergency and service vehicles.

6.2.15 Provision of Runway Strip

6.2.15.1 A runway and any associated stopways must be centrally located within a runway strip.

6.2.16 Composition of Runway Strip

6.2.16.1 A runway strip, in addition to the runway and stopway, must include:

(a) if the runway is a non-instrument runway — a graded area around the runway and stopway; or

(b) if the runway is an instrument runway — a graded area around the runway and stopway and an area, known as the fly-over area, outside the graded area.

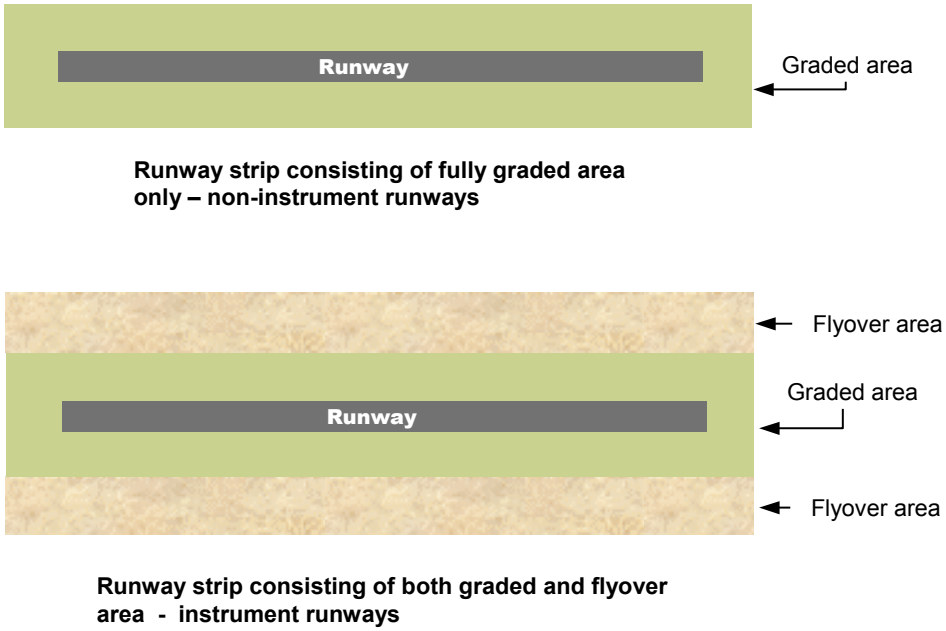


Figure 6.2-2: Composition of Runway Strip

6.2.17 Runway Strip Length

6.2.17.1 The graded area of a runway strip must extend beyond the end of the runway or any associated stopway for at least:

(a) if the runway's code number is 1 and it is a non-instrument runway — 30 m; or

(b) in any other case — 60 m.

6.2.18 Runway Strip Width

6.2.18.1 The width of the graded area of a runway strip must be not less than that given in Table 6.2-5.

Table 6.2-5: Graded runway strip width

Aerodrome reference code	Runway strip width
1[b]	60 m
2 [c]	80 m
3 (where the runway width is 30 m)	90 m
3, 4 (where the runway width is 45 m or more)	150 m
[b] Runways used at night are required to have a minimum 80 m runway strip width. [c] Aeroplanes not exceeding 5,700 kg by day, the runway strip width may be 60 m.	

6.2.18.2 In the case of a non-precision approach runway, the width of the runway strip, including the fly-over area, must not be less than that given in Table 6.2-6.

Table 6.2-6: Runway strip width for non-precision approach runways

Aerodrome reference code	Overall runway strip width
1 or 2	90 m
3 (where the runway width is 30 m)	150 m
3 or 4 (where the runway width is 45 m or more)	300 m

6.2.18.3 In the case of a precision approach runway, the width of the runway strip, including the fly-over area, must not be less than that given in Table 6.2-7.

Table 6.2-7: Runway strip width for precision approach runways

Aerodrome reference code	Overall runway strip width
1 or 2	150 m
3 or 4	300 m

Notes:

2. For precision approach runways code 3 and 4, it is recommended that an additional width of graded runway strip be provided. In this case, the graded width extends to a distance of 105 m from the runway centreline, except that the width is gradually reduced (over a distance of 150 m) to 75 m from the runway centreline at both ends of the strip, for a length of 150 m from the runway ends as shown in Figure 6.2-3.

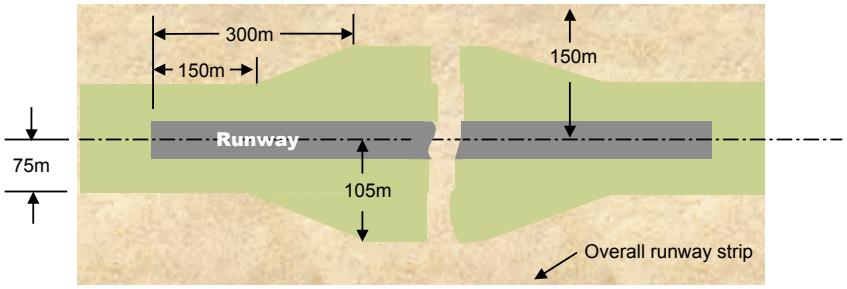


Figure 6.2-3: Runway Strip for Precision Approach Runways

6.2.18.4 If an aerodrome operator wishes to provide a lesser runway strip width to that specified in the standards, the aerodrome operator must provide CASA with a safety case justifying why it is impracticable to meet the standard. The safety case must include documentary evidence that all relevant stakeholders have been consulted.

6.2.19 Longitudinal Slope on Graded Area of Runway Strip

6.2.19.1 As far as practicable the longitudinal slope along the graded area of the runway strip must not be more than:

(a) if the runway code number is 4 —1.5%;

(b) if the runway code number is 3 — 1.75%;

(c) if the runway's code number is 1 or 2 — 2.0%.

6.2.20 Longitudinal Slope Changes on Graded Area of Runway Strip

6.2.20.1 Slope changes must be as gradual as practicable and abrupt changes or sudden reversal of slopes avoided, and must not exceed 2%.

6.2.21 Runway Strip Longitudinal Slope Changes at Runway Ends (Radio Altimeter Operating Area)

6.2.21.1 For precision approach SA Category I, SA Category II, Category II and Category III runways, slope changes within an area 60 m wide and 300 m long, symmetrical about the centre line, before the threshold, must be avoided.

> **Note:** This is because aeroplanes making SA Category I, SA Category II, Category II and Category III approaches are equipped with radio altimeters for final height guidance in accordance with the terrain immediately prior to the threshold and excessive slope changes can cause errors in data.

6.2.21.2 If a slope change cannot be avoided on a radio altimeter operating area, the rate of change between two consecutive slopes must not be more than 2% per 30 metres (minimum radius of curvature of 1,500 metres).

6.2.22 Runway Strip Transverse Slope

6.2.22.1 The transverse slope of the graded area of the runway strip must not be more than:

(a) if the runway's code number is 3 or 4 — 2.5%; and

(b) if the runway's code number is 1 or 2 — 3%.

6.2.22.2 The transverse slope of the graded runway strip adjacent to the runway shoulder, for the first 3 m outwards, must be negative and may be as great as 5%.

6.2.22.3 No part of a fly-over area, or any object on it, must project through a plane:

(a) that starts along each outer side of the graded area; and

(b) has an upward slope away from the graded area of more than 5%.

6.2.23 Surface of Graded Area of Runway Strip

6.2.23.1 Any step down to the abutting surface of a runway strip from a runway, runway shoulder or stopway must not be more than 25 mm.

6.2.23.2 Effective drainage in the graded area must be provided to avoid water ponding and thus attracting birds. Open drains must not be constructed in the graded portion of a runway strip.

6.2.23.3 The portion of a strip at the end of a runway must be prepared to resist blast erosion, in order to protect a landing aeroplane from the danger of an exposed edge.

6.2.23.4 Runway strip surface standards are the same as those set out in Table 6.2-4A.

6.2.24 Objects on Runway Strips

6.2.24.1 A runway strip must be free of fixed objects, other than visual aids for the guidance of aircraft or vehicles:

(a) within 77.5 m of the centre line of a precision approach category I, II or III runway, whose code number is 4 and the code letter is F; or

(b) within 60 m of the centre line of a precision approach category I, II or III runway, whose code number is 3 or 4; or

(c) within 45 m of the centre line of a precision approach category I runway, whose code number is 1 or 2.

6.2.24.2 All fixed objects permitted on the runway strip must be of low mass and frangibly mounted.

6.2.24.3 When a runway is in use for an aircraft to land or take off, no mobile object may be on a part of the strip mentioned in paragraph 6.2.24.1.

Note: See subsection 11.1.4A for information regarding siting of equipment and installations on runway strips.

6.2.25 Runway End Safety Area (RESA)

6.2.25.1 A RESA must be provided at the end of a runway strip, to protect the aeroplane in the event of undershooting or overrunning the runway, unless the runway's code number is 1 or 2 and it is not an instrument runway.

Notes: 1. Previous Australian standard allows RESA to be measured from the end of the runway.

2. The RESA standards in this Section are in compliance with the current ICAO standards, including measuring RESA from the end of the runway strip.

6.2.25.2 The new RESA standard shall apply to all new runways and existing runways when it is lengthened. Operators of existing code 4 runways used by air transport jet aeroplanes conducting international operations must make provision to comply with the new RESA standards within five years of the promulgation of CASR Part 139.

Note: Where it is not practicable to provide the full length of RESA, the provision may include an engineering solution to achieve the objective of RESA, which is to enhance aeroplane deceleration. In the latter case, aerodrome operators will need to liase with the relevant CASA office.

6.2.26 Dimensions of RESA

6.2.26.1 The minimum length of the RESA must be 90 m where the associated runway is suitable for aircraft with a code number 3 or 4 and is used by air transport jet aeroplanes. In other cases, the minimum RESA length must be 60 m.

> **Note:** Additional length of RESA should be provided especially at international aerodromes, in accordance with the following ICAO recommendations:
>
> 1. if the runway's code number is 3 or 4 — 240 m; or
> 2. if the runway's code number is 1 or 2 — 120 m.

6.2.26.2 The width of a RESA must not be less than twice the width of the associated runway.

6.2.27 Slopes on RESA

6.2.27.1 The downward longitudinal slope of a RESA must not be more than 5%.

6.2.27.2 The transverse slope of a RESA must not be more than 5% upwards or downwards.

6.2.27.3 Transition between different slopes is to be as gradual as practicable.

6.2.27.4 No part of the RESA must project above the runway's approach or take-off climb surfaces.

6.2.28 Objects on RESA

6.2.28.1 A RESA must be free of fixed objects, other than visual or navigational aids for the guidance of aircraft or vehicles.

> **Note:** See subsection 11.1.4A for information regarding siting of equipment and installations on a RESA.

6.2.28.2 All fixed objects permitted on a RESA must be of low mass and frangibly mounted.

6.2.28.3 A RESA must be free of mobile objects that may endanger aircraft when the runway is being used for landing or taking off.

6.2.29 Bearing Strength of RESA

6.2.29.1 As far as practicable, a RESA must be prepared or constructed so as to reduce the risk of damage to an aeroplane, enhance aeroplane deceleration and facilitate the movement of rescue and fire fighting vehicles.

> **Note:** To reduce the risk of damage to an aeroplane undershooting the runway and to prevent jet blast erosion from jet aircraft turning and taking off at the end of the runway, it is recommended that areas abutting the runway should be provided with a compacted gravel pavement with a depth at the runway end equal to half the depth of the runway pavement, tapering to natural surface, the length of the taper being adjusted according to the bearing capacity of the natural surface. For areas beyond the gravel surface and outside the runway strip, graded but non-compacted natural surface with a grass cover is preferred. Hard pans should be broken up.

6.2.30 Clearways

6.2.30.1 A clearway, consisting of an obstruction-free rectangular plane, must be provided at the end of a runway so that an aeroplane taking off may make a portion of its initial climb to 35 ft (10.7 m) above the ground at the end of the clearway.

> **Note:** In Australia the portion between the end of the runway and runway strip is treated as a clearway.

6.2.31 Location of Clearways

6.2.31.1 A clearway must start at the end of the take-off run available on the runway.

6.2.32 Dimensions of Clearways

6.2.32.1 The length of a clearway must not be more than half the length of the take-off run available on the runway.

6.2.32.2 The width of a clearway must not be less than:

(a) If the runway's code number is 3 or 4 — 150 m;

(b) If the runway's code number is 2 — 80 m; and

(c) If the runway's code number is 1 — 60 m.

> **Note**: For code 3 or 4 runways used by aeroplanes having a maximum take-off mass less than 22,700 kg and operating in VMC by day, the width of the clearway may be reduced to 90 m.

6.2.33 Slopes on Clearways

6.2.33.1 The surface below a clearway must not project above a plane with an upward slope of 1.25%, the lower limit of which is a horizontal line that:

(a) is perpendicular to the vertical plane containing the runway centreline; and

(b) passes through a point located on the runway centreline at the end of the take-off run available.

6.2.34 Objects on Clearways

6.2.34.1 A clearway must be free of fixed or mobile objects other than visual or navigational aids for the guidance of aeroplanes or vehicles.

> **Note**: See subsection 11.1.4A for information regarding siting of equipment and installations on a clearway.

6.2.34.2 All fixed objects permitted on the clearway must be of low mass and frangibly mounted.

6.2.35 Stopways

6.2.35.1 A stopway may be provided at the end of a runway on which an aeroplane may be stopped in the case of an aborted take-off.

6.2.36 Dimensions of Stopways

6.2.36.1 If provided the length of stopway is an economic decision for the aerodrome operator but must be such that it finishes at least 60 m before the end of the runway strip.

6.2.36.2 The width of a stopway must be as wide as the associated runway.

6.2.37 Surface of Stopway

6.2.37.1 A stopway with a bituminous seal or asphalt surface must have frictional characteristics at least as good as those of the associated runway.

6.2.38 Stopway Slopes and Slope Changes

6.2.38.1 Where practicable, slope and slope changes on a stopway must be the same as those for the associated runway, except that:

(a) the limitation of a 0.8% slope for the first and last quarter of the length of a runway need not be applied to the stopway; and

(b) at the junction of the stopway and runway and along the stopway the maximum rate of slope change may be increased to 0.3% per 30 m (minimum radius of curvature of 10,000 m).

6.2.39 Bearing Strength of Stopway

6.2.39.1 The bearing strength of a stopway must be able to support at least one single pass of the aircraft that the facility is intended to serve, without causing structural damage to the aircraft.

> **Note:** A stopway should be constructed to the full runway pavement depth where it abuts the runway, tapering to one half of the runway pavement depth over the first 15 m and continued at half the runway pavement depth thereafter, in order to affect a gradual transition in all weather conditions.

6.2.39.2 If the stopway does not meet the strength criteria defined in Paragraph 6.2.39.1, then:

(a) for aircraft having a maximum take-off mass in excess of 68,000 kg, any unsealed stopway must not be included in the calculation of the accelerate stop distance available;

(b) for aircraft having a maximum take-off mass between 36,300 kg and 68,000 kg, a maximum length of 60 m must be included in the calculation of the accelerate stop distance available; and

(c) for aircraft having a maximum take-off mass not exceeding 36,300 kg, a length of stopway not exceeding 13% of the runway length may be included in the calculation of the accelerate stop distance available.

Section 6.3: Taxiways

6.3.1 Taxiway Width

6.3.1.1 Subject to this subsection, the width of a straight section of a taxiway must not be less than the width determined using Table 6.3-1.

Table 6.3-1: Minimum width for straight section of taxiway

Code letter	Minimum taxiway width (straight sections)
A	7.5 m
B	10.5 m
C	18 m
D	23 m
E	23 m
F	25 m
Note: Minimum widths are subject to exceptions, see paragraph 6.3.1.1A	

6.3.1.1A The minimum taxiway widths in Table 6.3-1 are subject to the following exceptions:

(a) in the case of a code letter C taxiway that is only intended to serve aircraft with a wheelbase of less than 18 metres, the width may be reduced to 15 metres;

(b) in the case of a code letter D taxiway that is only intended to serve aircraft with an outer main gear span of less than 9 metres, the width may be reduced to 18 metres;

(c) subject to meeting the additional requirements for taxiway shoulders mentioned in paragraph 6.3.9.1A, code letter E taxiways may be used for A380 operations.

6.3.1.1B Subparagraph 6.3.1.1A (c) does not allow code letter E taxiways to be used for A380 operations:

(a) if their construction begins after the commencement of paragraph 6.3.1.1A; or

(b) if they are subjected to a major redevelopment, such as a taxiway extension, that begins after the commencement of that paragraph.

6.3.2 Taxiway Edge Clearance

6.3.2.1 Subject to paragraph 6.3.2.1A, the width of any section of a taxiway must be such that, with the nose wheel of the aircraft remaining on the taxiway, the clearance between the outer main gear wheels and the edge of the taxiway, at any point, must not be less than the distance determined using Table 6.3-2.

Table 6.3-2: Minimum clearance between outer main gear wheels of aircraft and edge of taxiway

Code letter	Minimum clearance
A	1.5 m
B	2.25 m
C	4.5 m*
D, E or F	4.5 m
* If the turning area or curve is only intended to serve aircraft with a wheelbase of less than 18 m, the minimum clearance is 3.0 m.	

6.3.2.1A For A380 aircraft using a code letter E taxiway, the minimum clearance between the outer main gear wheels and the edge of the taxiway at any point must not be less than 4.3 metres.

6.3.3 Taxiway Curves

6.3.3.1 Any change in the direction of a taxiway must be accomplished by a curve whose minimum radius, determined by the taxiway design speed, must not be less than that determined using Table 6.3-3.

Table 6.3-3: Radii for taxiway curves

Taxiway Design Speed	Radius of Curve
20 km/h	24 m
30 km/h	54 m
40 km/h	96 m
50 km/h	150 m
60 km/h	216 m
70 km/h	294 m
80 km/h	384 m
90 km/h	486 m
100 km/h	600 m

Note: The provision of rapid exit taxiways is a financial decision for the aerodrome operator. The aerodrome operator should seek specialist advice on the geometric design of rapid exit taxiways.

6.3.4 Taxiway Longitudinal Slope

6.3.4.1 The longitudinal slope along any part of a taxiway must not be more than:

(a) if the taxiway's code letter is C, D, E or F — 1.5%; and

(b) if the taxiway's code letter is A or B — 3.0%.

6.3.4.2 If slope changes cannot be avoided, the transition from one longitudinal slope to another must be accomplished by a vertical curve, with a rate of change not more than:

(a) if the taxiway's code letter is C, D, E or F — 1.0% per 30 m (minimum radius of curvature of 3,000 m); and

(b) if the taxiway's code letter is A or B — 1.0% per 25 m (minimum radius of curvature of 2,500 m).

6.3.5 Taxiway Transverse Slope

6.3.5.1 The transverse slope on any part of a taxiway must be adequate to prevent the accumulation of water and must not be less than 1.0% and not more than:

(a) if the taxiway's code letter is C, D, E or F — 1.5%; and

(b) if the taxiway's code letter is A or B — 2.0%.

6.3.6 Taxiway Sight Distance

6.3.6.1 The unobstructed line of sight along the surface of a taxiway, from a point above the taxiway, must not be less than the distance determined using Table 6.3-4.

Table 6.3-4: Standard for taxiway line of sight

Code letter	Minimum line of sight
A	150 m from 1.5 m above taxiway
B	200 m from 2 m above taxiway
C, D, E or F	300 m from 3 m above taxiway

6.3.7 Taxiway Bearing Strength

6.3.7.1 CASA does not specify a standard for taxiway bearing strength, however the bearing strength must be such that it does not cause any safety problems to the operating aircraft.

6.3.8 Taxiway Shoulders

6.3.8.1 If the taxiway's code letter is C, D, E or F and is used by jet propelled aeroplanes it must be provided with shoulders.

6.3.9 Width of Taxiway Shoulders

6.3.9.1 The width of shoulders on each side of the taxiway must not be less than:

(a) if the taxiway's code letter is F — 17.5 m; or

(b) if the taxiway's code letter is E — 10.5 m; or

(c) if the taxiway's code letter is D — 7.5 m; or

(d) if the taxiway's code letter is C — 3.5 m.

6.3.9.1A The width of the shoulders on each side of a code letter E taxiway used for A380 operations must not be less than 18.5 metres.

6.3.9.2 On curved sections of taxiway, and at junctions or intersections with runways or other taxiways, where the width of the surface of the taxiway is increased, the width of the shoulders must not be reduced from their width along the adjacent straight sections of the taxiway.

6.3.10 Surface of Taxiway Shoulders

6.3.10.1 The taxiway shoulders must be:

(a) if the taxiway is used by jet-propelled aircraft — resistant to engine blast erosion and prevent engine ingestion; and

(b) if the taxiway is intended to serve a wide body jet, such as a Boeing 747 aeroplane or Airbus 380 aircraft, being an aircraft whose engines overhang the shoulders — sealed to a width of at least 3 metres on both sides of the taxiway.

6.3.11 Taxiway Strips

6.3.11.1 A taxiway must be located in a taxiway strip, the inner part of which is a graded area.

6.3.12 Width of Taxiway Strip

The width of the taxiway strip along the length of the taxiway on each side of the centreline of the taxiway must not be less than the following:

(a) if the taxiway's code letter is F — 51 m;

(b) if the taxiway's code letter is E — 43.5 m;

(c) if the taxiway's code letter is D — 37 m;

(d) if the taxiway's code letter is C — 26 m;

(e) if the taxiway's code letter is B — 20 m;

(f) if the taxiway's code letter is A — 15.5 m.

6.3.13 Width of Graded Area of Taxiway Strip

6.3.13.1 The width of the graded area of a taxiway strip on each side of the centre line of the taxiway must not be less than:

(a) if the taxiway's code letter is F — 30 m; or

(b) if the taxiway's code letter is E — 22 m; or

(c) if the taxiway's code letter is D — 19 m; or

(d) if the taxiway's code letter is C or B — 12.5 m; or

(e) if the taxiway's code letter is A — 11 m.

6.3.14 Slope of Taxiway Strip

6.3.14.1 The graded area of a taxiway strip must not have an upward transverse slope that is more than:

(a) if the taxiway's code letter is C, D, E or F — 2.5%; or

(b) if the taxiway's code letter is A or B — 3%;

measured relative to the transverse slope of the adjacent taxiway surface.

6.3.14.2 The downward transverse slope of the graded area of a taxiway strip must not exceed 5.0%, measured relative to the horizontal.

6.3.14.3 No portion of the taxiway strip beyond the graded portion, nor objects thereon, must project upwards through a plane surface, originating from the outer edge of the graded taxiway strip, sloping upwards and outwards at a slope of 5% measured with reference to the horizontal.

> **Note:** The presence of drains and ditches in this part of the taxiway strip is acceptable.

6.3.15 Objects on Taxiway Strip

6.3.15.1 A taxiway strip must be free of fixed objects other than visual or navigational aids used for the guidance of aircraft or vehicles.

> **Note:** See subsection 11.1.4A for information regarding siting of equipment and installations on a taxiway strip.

6.3.15.2 Visual aids located within a taxiway strip must be sited at such a height that they cannot be struck by propellers, engine pods and wings of aircraft using the taxiway.

6.3.16 Taxiways on Bridges

6.3.16.1 Subject to Paragraph 6.3.16.2, the minimum width of the part of a taxiway bridge that is capable of supporting the traffic of aircraft that use the bridge must, when measured perpendicular to the taxiway centre line, not be less than the total width of the taxiway and the graded areas specified in Paragraph 6.3.13.1.

6.3.16.2 The minimum width of the part of the taxiway bridge referred to in Paragraph 6.3.16.1 may be reduced to a width not less than the width of the associated taxiway, if an adequate method of lateral restraint is provided at the edges of that part, to prevent aircraft leaving that part.

6.3.17 Taxiway Minimum Separation Distances

6.3.17.1 The separation distance between the centre line of a taxiway, including an apron taxiway, and:

(a) the centre line of a parallel runway; or

(b) the centre line of a parallel taxiway; or

(c) a building, structure, vehicle, wall, plant, equipment, parked aeroplane or road;

must not be less than the distances determined using Table 6.3-5.

Table 6.3-5 Taxiway minimum separation distances

To precision approach runway centreline	**Code letter**					
Runway code number	**A**	**B**	**C**	**D**	**E**	**F**
1	82.5 m	87 m	93 m	–	–	–
2	82.5 m	87 m	93 m	–	–	–
3	157.5 m	162 m	168 m	176 m	–	–
4	–	–	168 m	176 m	182.5 m	190 m
To non-precision approach runway centreline	**Code letter**					
Runway code number	**A**	**B**	**C**	**D**	**E**	**F**
1	52.5 m	57 m	63 m	–	–	–
2	52.5 m	57 m	63 m	–	–	–
3	82.5 m	87 m	93 m	176 m	–	–
4	–	–	93 m	176 m	182.5 m	190 m
To non-instrument runway centreline	**Code letter**					
Runway code number	**A**	**B**	**C**	**D**	**E**	**F**
1	37.5 m	42 m	48 m	–	–	–
2	47.5 m	52 m	58 m	–	–	–
3	52.5 m	57 m	63 m	101 m	–	–
4	–	–	93 m	101 m	107.5 m	115 m

To another taxiway centreline	Code letter					
	A	**B**	**C**	**D**	**E**	**F**
	23 m	32 m	44 m	63 m	76 m	91 m
To paragraph 6.3.17.1 (c) object	**Code letter**					
	A	**B**	**C**	**D**	**E**	**F**
	15.5 m	20 m	26 m	37 m	43.5 m	51 m

Note: 1. The separation distances are based on the concept of the wing of the aeroplane, centred on the parallel taxiway, remaining clear of the runway strip of standard width.

2. The taxiway centreline to runway centreline separation distances have been determined using the maximum runway strip width required for the particular category and code of runway.

3. ILS installations may also influence the location of taxiways due to interferences to ILS signals by a taxiing or stopped aircraft. Information on critical and sensitive areas surrounding ILS installations is contained in Annex 10, Volume I, Attachment C of the Chicago Convention.

Section 6.4: Holding Bays, Runway-Holding Positions, Intermediate Holding Positions and Road-Holding Positions

6.4.1 Introduction

6.4.1.1 For the purpose of this Section:

(a) a holding bay is defined as an area offset from the taxiway where aircraft can be held;

(b) a runway-holding position is a designated position on a taxiway entering a runway;

(c) an intermediate holding position is a designated position on a taxiway other than at a taxiway entering a runway; and

(d) a road-holding position is a designated position at which vehicles may be required to hold before crossing a runway.

6.4.2 Provision of a Holding Bay, Runway-holding Position, Intermediate Holding Position and Road-holding Position

6.4.2.1 The provision of a holding bay is the prerogative of the aerodrome operator, however if it is provided, it must be located such that any aeroplane on it will not infringe the inner transitional surface.

6.4.2.2 A runway-holding position or positions must be established:

(a) on a taxiway, at the intersection of a taxiway and a runway; or

(b) at an intersection of a runway with another runway where the aircraft is required to be held.

6.4.2.3 Except for an exit taxiway, an intermediate holding position or positions must be established on a taxiway if the air traffic control requires the aeroplane to hold at that position.

6.4.2.4 A road-holding position must be established at an intersection of a road with a runway. See also Paragraph 8.6.11 for signage and marking of a road-holding position.

6.4.3 Location of Holding Bay, Runway-holding Position, Intermediate Holding Position or Road-holding Position

6.4.3.1 A holding bay, runway-holding position, intermediate holding position or road-holding position must not be placed where an aircraft or vehicle using it:

(a) infringes the inner transitional surface of a precision approach runway or, in other cases, the graded area of the runway strip; or

(b) interferes with the operation of radio navigation aids.

6.4.4 Distance from Runway-holding Position, Intermediate Holding Position or Road-holding Position to Runway Centreline

6.4.4.1 A runway-holding position, intermediate holding position, or a road-holding position must not be located closer to the centreline of the runway than the distance determined using Table 6.4-1.

Table 6.4-1: Minimum distance from runway-holding position, intermediate holding position or road-holding position to associated runway centre line

Code number	Type of runway				
	Non-instrument	Non-precision approach	Precision Category I	Precision Category II or III	Take-off
1	30m	40m	60 m[e, f]		30m
2	40m	40m	60 m[e, f]		40m
3	75m[a]	75m[a]	90 m[b, e, f]	105 m[c, e, f]	75m[a]
4	75m	75m	90 m[d, e, f]	105 m[c, d, e, f]	75m

[a] If the runway's code is 3A, 3B or 3C, the minimum distance is 45m.

[b] If the runway's code is 3A, 3B or 3C, the minimum distance is 75m.

[c] May be reduced to 90m up to 300m from the runway end.

[d] If the runway's code is F, this distance should be 107.5m.

[e] This distance may be decreased 5 m for every 1 m the bay or holding position is lower than the threshold, provided that the inner transitional surface is not infringed.

[f] This distance may be increased to avoid interference with radio navigation aids, particularly the glide path and localizer facilities. Advice on ILS critical and sensitive areas should be obtained from the relevant aeronautical telecommunications service and radio navigation service provider.

Section 6.5: Aprons

6.5.1 Location of Apron

6.5.1.1 An apron must be located so that aeroplanes parked on it do not infringe an obstacle limitation surface, and in particular, the transitional surface.

6.5.2 Separation Distances on Aprons

6.5.2.1 An aircraft parking position taxilane must be separated from any object by a distance not less than that determined using Table 6.5-1.

Table 6.5-1: Aircraft parking positions – Minimum separation distance

Code letter for aircraft	From centre line of aircraft parking taxilane to the centreline of a parallel aircraft parking taxilane	From centre line of aircraft parking position taxilane to object	From wingtip of aircraft on aircraft parking position to object
A	19.5 m	12.0 m	3.0 m
B	28.5 m	16.5 m	3.0 m
C	40.5 m	22.5 m	4.5 m
D	59.5 m	33.5 m	7.5 m
E	72.5 m	40 m	7.5 m*
F	87.5 m	47.5 m	7.5 m*

6.5.2.1A An aircraft parking position taxilane must be separated from another aircraft parking position taxilane by a distance that is not less than that determined using Table 6.5 1.

6.5.2.1B Each minimum separation distance mentioned in column 4 of Table 6.5-1 that is accompanied by an asterisk, must be read as 10 metres if free moving parking is used.

> ***Note:*** Free moving parking is parking on an apron that does not have designated parking positions.

6.5.2.2 Subject to Paragraph 6.5.2.3, an aircraft on an aircraft parking position must be separated from any object, other than an aerobridge, by a distance not less than that determined using Table 6.5-1.

6.5.2.3 Paragraph 6.5.2.2 does not apply to a Code D, E or F aircraft if a visual docking guidance system allows a reduced separation distance.

6.5.2A Alternative aircraft parking position separation

6.5.2A.1 If:

(a) physical constraints prevent proposed aircraft parking positions (the ***positions***) from complying with the separation distances set out in subsection 6.5.2; and

(b) the aerodrome operator:

(i) designs the positions in accordance with Part 2 of the ICAO Aerodrome Design Manual; and

(ii) submits the design to CASA with a safety case and an application for approval of the design and the safety case; and

(c) CASA in writing, with or without conditions, approves the design and the safety case;

then:

(d) the standards in subsection 6.5.2 that are specified in the CASA approval are taken not to apply to the operator; and

(e) the approved design and safety case, and the conditions of the approval (if any), are taken to be the applicable standards for the positions.

6.5.3 Slopes on Aprons

6.5.3.1 The slope on an aircraft parking position must not be more than 1%.

6.5.3.2 The slope on any other part of an apron must be as level as practicable without causing water to accumulate on the surface of the apron, but must not be more than 2%.

6.5.3.3 Subject to Paragraph 6.5.3.4 the grading of an apron must be such that it does not slope down towards the terminal building.

6.5.3.4 Where a slope down towards the terminal building cannot be avoided, apron drainage must be provided to direct spilled fuel away from buildings and other structures adjoining the apron.

6.5.3.5 Where stormwater drains could also serve to collect spilt fuel from the apron area, flame traps or interceptor pits must be provided to isolate and prevent the spread of fuel into other areas.

6.5.4 Apron Bearing Strength

6.5.4.1 CASA does not specify a standard for apron bearing strength, however the bearing strength must be such that it does not cause any safety problems to the operating aircraft.

6.5.5 Apron Road

6.5.5.1 On an apron where a marked roadway is to be provided for surface vehicles, the location of the apron road must be such that, where practicable, vehicles travelling on it will be at least 3 m from any aircraft parked at the aircraft parking position.

Section 6.6: Jet Blast

6.6.1 General

6.6.1.1 The aerodrome operator must protect people and property from the dangerous effects of jet blast. Information on specific jet engine blast velocities, including lateral and vertical contours, for a given aircraft model is given in the Aircraft Characteristics - Airport Planning document, prepared for most aircraft models by the aircraft manufacturer.

6.6.2 Jet Blast and Propeller Wash Hazards

6.6.2.1 The recommended maximum wind velocities which people, objects and buildings in the vicinity of an aeroplane may be subjected to should not be more than:

(a) passengers and main public areas, where passengers have to walk and people are expected to congregate — 60 km/h;

(b) minor public areas, where people are not expected to congregate — 80 km/h;

(c) public roads — 50 km/h where the vehicular speed may be 80 km/h or more, and — 60 km/h where the vehicular speed is expected to be below 80 km/h.

(d) personnel working near an aeroplane — 80 km/h ;

(e) apron equipment — generally not in excess of 80 km/h;

(f) light aeroplane parking areas — desirably 60 km/h and not greater than 80 km/h;

(g) buildings and other structures — not exceeding 100 km/h.

Note: To offer protection from jet blast velocities the aerodrome operator may consider the provision of jet blast fences or the use of appropriate building material.

Section 6.7: Glider Facilities

6.7.1 Location of Glider Runway Strips

6.7.1.1 Where the physical characteristics of the site allow it, and where the expected number of powered aircraft movements does not exceed 10 000 per annum, the glider runway strip may be located within an existing runway strip.

> **Note:** ***Movement*** for an aircraft is defined in section 1.2 as either a take-off or a landing by the aircraft.

6.7.1.2 Subject to CASA's approval, glider operations may be carried out from runways normally used by powered aircraft.

6.7.2 Dimensions of Glider Runway Strips

6.7.2.1 Where it is located outside an existing runway strip, the width of a glider runway strip must not be less than 60 m, and must be of sufficient length for the glider operations.

6.7.2.2 If contra-circuit directions are to be approved and fully independent operations conducted, the separation distance between the centreline of the two glider runway strips must not be less than 120 m.

6.7.2.3 Where a glider runway strip is to be located either wholly or partly within an existing runway strip, it must have a length which is sufficient for glider operations, and a width of not less than 37.5 m measured:

(a) where there is flush-mounted lighting or no runway lighting, from the existing runway edge, as shown in Figure 6.7-1 below; and

(b) where there is elevated runway lighting, or where physical features such as stone filled rubble drains, steep or rough shoulders exist, from three metres clear of the runway lights or such physical features, as shown in the Figure 6.7-1 below.

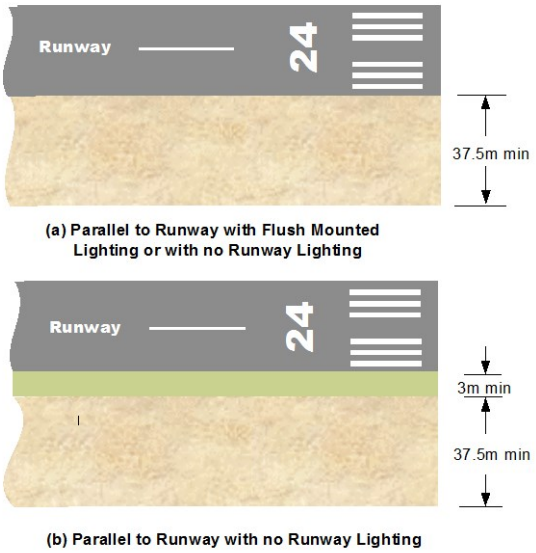


Figure 6.7-1

6.7.3 Glider Parking Areas

6.7.3.1 A glider parking area must be provided outside the glider runway strip or the existing runway strip. Depending on the frequency of glider traffic, it may be necessary to establish an area where gliders may be temporarily kept whilst sequencing for operations.

6.7.4 Glider Runway Strip Serviceability

6.7.4.1 Where glider operations are carried out within an existing runway strip of a licensed or registered aerodrome, the runway strip serviceability must be monitored.

6.7.5 Glider Runway Strip Standards

6.7.5.1 The glider runway strip must be established in accordance with the following standards:

(a) where a glider runway strip is located within an existing runway strip for powered aircraft, it must conform with the powered aircraft runway strip existing grades and levels; and

(b) where the glider runway strip is located outside an existing runway strip for powered aircraft, it must conform to the runway strip standards for aeroplane landing areas.

6.7.5.2 Glider runway strips must be maintained in accordance with the runway strip operating standards.

6.7.6 Notification of Glider Facilities and Procedures

6.7.6.1 NOTAM action must be initiated prior to approved gliding operations. Where they are permanently held at the aerodrome notification is provided in the Enroute Supplement Australia.

CHAPTER 7: OBSTACLE RESTRICTION AND LIMITATION

Section 7.1: General

7.1.1 Introduction

7.1.1.1 The scope of this Chapter is to define the standards that control airspace around an aerodrome.

7.1.1.2 An obstacle is defined as:

(a) any object that stands on, or stands above, the specified surface of an obstacle restriction area which comprises the runway strips, runway end safety areas, clearways and taxiway strips; and

(b) any object that penetrates the obstacle limitation surfaces (OLS), a series of surfaces that set the height limits of objects, around an aerodrome.

7.1.1.3 Obstacle data requirements for the design of instrument procedures need to be determined in liaison with flight procedure designers.

7.1.1.4 Non compliance with standards may result in CASA issuing hazard notification notices as prescribed in CASR Part 139.

7.1.1.5 Leased federal aerodromes also need to comply with the Airports (Protection of Airspace) Regulations administered by the federal Department responsible for transport matters. There is provision under these regulations for the airspace prescribed for each federal aerodrome to comply with OLS standards and meet PANS-OPS requirements.

7.1.2 Obstacle Restriction

7.1.2.1 Objects, except for approved visual and navigational aids, must not be located within the obstacle restriction area of the aerodrome without the specific approval of CASA.

7.1.2.2 Equipment and installations required for air navigation purposes are to be of minimum practicable mass and height, frangibly designed and mounted, and sited in such a manner as to reduce the hazard to aircraft to a minimum.

7.1.2.3 Obstacles on the obstacle restriction area must be taken into account when determining the obstacle clear approach or take-off surfaces.

7.1.3 Obstacle Limitation

7.1.3.1 An aerodrome operator must establish the OLS applicable to the aerodrome.

> **Note:** A description and illustration of the obstacle limitation surfaces is provided in Section 7.3.

7.1.3.2 The following OLS must be established for a non-instrument runway and a non-precision instrument runway:

(a) conical surface;

(b) inner horizontal surface;

(c) approach surface;

(d) transitional surface; and

(e) take-off climb surface.

7.1.3.3 The following OLS must be established for a precision approach runway:

(a) outer horizontal surface;

(b) conical surface;

(c) inner horizontal surface;

(d) approach surface;

(e) inner approach surface;

(f) transitional surface;

(g) inner transitional surface;

(h) baulked landing surface; and

(i) take-off climb surface.

Note: See subsection 11.1.4A for information regarding siting of equipment and installations on operational areas.

7.1.3.4 The physical dimensions of the OLS surfaces, for approach runways, must be determined using Table 7.1-1.

Table 7.1-1: Approach Runways

OLS & Dimensions (in metres and percentages)	Runway Classification									
	Non-instrument				Instrument					
					Non-precision			Precision		
	Code No				Code No			I Code No		II & III Code No
	1*	2	3	4	1, 2	3	4	1, 2	3, 4	3, 4
OUTER HORIZONTAL										
Height (m)									150	150
Radius (m)									15000	15000
CONICAL										
Slope	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Height (m)	35	55	75	100	60	75	100	60	100	100
INNER HORIZONTAL										
Height (m)	45	45	45	45	45	45	45	45	45	45
Radius (m)	2000	2500	4000	4000	3500	4000	4000	3500	4000	4000
APPROACH										
Length of inner edge (m)	60	80	150[a]	150	90	150	300[b]	150	300	300
Distance from threshold (m)	30	60	60	60	60	60	60	60	60	60
Divergence each side	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%
First section length (m)	1600	2500	3000	3000	2500	3000	3000	3000	3000	3000
Slope	5%	4%	3.33%	2.5%	3.33%	3.33%	2%	2.5%	2%	2%
Second section length (m)	-	-	-	-	-	3600[c]	3600	12000	3600	3600
Slope	-	-	-	-	-	2.5%[c]	2.5%	3%	2.5%	2.5%
Horizontal section length (m)	-	-	-	-	-	8400[c]	8400	-	8400	8400
Total length (m)	1600	2500	3000	3000	2500	15000[d]	15000	15000	15000	15000
INNER APPROACH										
Width (m)								90	120	120
Distance from threshold (m)								60	60	60
Length (m)								900	900	900
Slope								2.5%	2%	2%
TRANSITIONAL										
Slope	20%	20%	14.3%	14.3%	20%	14.3%	14.3%	14.3%	14.3%	14.3%
INNER TRANSITIONAL										
Slope								40%	33.3%	33.3%
BAULKED LANDING										
Length of inner edge (m)								90	120	120
Distance from threshold (m)								[e]	1800[f]	1800
Divergence each side								10%	10%	10%
Slope								4%	3.3%	3.3%

All distances are measured horizontally unless otherwise specified.

* Runways used for RPT operations at night by aircraft with maximum take-off mass not exceeding 5,700 kg are required to meet code 2 standards.

[a] 90 m where width of runway is 30 m.

[b] 150 m if only used by aeroplanes requiring 30 m wide runway.

[c] No actual ground survey required unless specifically required by procedure designer. Procedure designer will use topographical maps and tall structure databank to determine minimum altitudes.

[d] Approach area up to this distance needs to be monitored for new obstacles. Refer to procedure designer's advice on significant high ground or tall structure that needs monitoring.

[e] Distance to end of runway strip.

[f] Or to the end of the runway strip, whichever is less.

7.1.3.5 The physical dimensions of the OLS surfaces, for take-off runways, must be determined using Table 7.1-2.

Table 7.1-2: Take-off runways

Take-off climb surface – Dimensions (in metres and percentages)	**Take-off Runways Code number**		
	1*	**2[a]**	**3 or 4**
Length of inner edge	60	80	180 [b]
Minimum distance of inner edge from runway end [c]	30	60	60
Rate of divergence (each side)	10%	10%	12.5%
Final width	380	580	1800 [d]
Overall length	1600	2500	15000
Slope	5%	4%	2%[e]

All dimensions are measured horizontally unless otherwise specified.

* Runways used for RPT operations at night by aircraft with maximum take-off mass not exceeding 5,700 kg are required to meet code 2 standards.

[a] For aircraft above 5,700 kg the survey area does not cover full extent of obstacle clearance required as specified in CAO 20.7.1B.

[b] The length of the inner edge may be reduced to 90 m if the runway is intended to be used by aeroplanes having an mass less than 22,700 kg and operating in VMC by day. In this case the final width may be 600 m, unless the flight path may involve a change of heading in excess of 15°.

[c] The take-off climb starts from the end of clearway if a clearway is provided.

[d] The final width may be reduced to 1200 m if the runway is used only by aircraft with take-off procedure which does not include changes of heading greater than 15° for operations conducted in IMC or at night.

[e] The operational characteristics of aircraft for which the runway is intended should be examined to see if it is desirable to reduce the slope to cater for critical operating conditions as specified in CAO 20.7.1B. If the specified slope is reduced, corresponding adjustment in length for take-off climb is to be made so as to provide protection to a height of 300 m. If no object reaches the 2% take-off climb surface, new objects should be limited to preserve the existing obstacle free surface or a surface down to a slope of 1.6%.

7.1.3.6 Where two OLS surfaces overlap, the lower surface must be used as the controlling OLS.

7.1.4 Procedures for Aerodrome Operators to Deal with Obstacles

7.1.4.1 The aerodrome operator must monitor the OLS applicable to the aerodrome and report to CASA any infringement or potential infringement of the OLS.

> **Note:** Aerodrome operators need to liaise with appropriate planning authorities and companies that erect tall structures, to determine potential infringements. Every effort should be made to implement the OLS standards and limit the introduction of new obstacles.

7.1.4.2 When a new obstacle is detected, the aerodrome operator must ensure that the information is passed on to pilots, through NOTAM, in accordance with the standards for aerodrome reporting procedures set out in Chapter 10.

7.1.4.3 Information on any new obstacle must include:

(a) the nature of the obstacle — for instance structure or machinery;

(b) distance and bearing of the obstacle from the start of the take-off end of the runway, if the obstacle is within the take-off area, or the ARP;

(c) height of the obstacle in relation to the aerodrome elevation; and

(d) if it is a temporary obstacle — the time it is an obstacle.

7.1.5 Objects Outside the OLS

7.1.5.1 Under CASR Part 139 any object which extends to a height of 110 m or more above local ground level must be notified to CASA.

> **Note:** For instrument runways, obstacle monitoring includes the PANS-OPS surface which extends beyond the OLS of the aerodrome. See paragraph 7.1.1.

7.1.5.2 Any object that extends to a height of 150 m or more above local ground level must be regarded as an obstacle unless it is assessed by CASA to be otherwise.

7.1.6 Objects That Could Become Obstacles

7.1.6.1 If a proposed object or structure is determined to be an obstacle, details of the proposal must be referred to CASA the Authority to determine whether it will be a hazard to aircraft operations.

7.1.6.2 **Shielded Obstacle.** A new obstacle that is shielded by an existing obstacle may be assessed as not imposing additional restrictions to aircraft operations.

> **Note:** Information on the principle of shielding is provided in Section 7.4.

7.1.6.3 **Marking and lighting of obstacles**

(a) CASA may direct that obstacles be marked and or lit and may impose operational restrictions on the aerodrome as a result of an obstacle.

(b) If directed by CASA, lighting and/or marking of obstacles, including terrain, must be carried out in accordance with the standards set out in Chapter 8 and Chapter 9.

7.1.6.4 **Temporary and transient obstacles.** Temporary obstacles and transient (mobile) obstacles, such as road vehicles, rail carriages or ships, in close proximity to the aerodrome and which penetrate the OLS for a short duration, must be referred to CASA to determine whether they will be a hazard to aircraft operations.

7.1.6.5 **Fences or levee banks.** A fence or levee bank that penetrates the OLS must be treated as an obstacle.

> **Note:** See Chapter 5 in regard to reporting of fences and levee banks.

7.1.6.6 **Hazardous objects below the OLS.** Where CASA has identified an object, which does not penetrate the OLS to be a hazard to aircraft operations, CASA may require the object to be either:

(a) removed, if appropriate; or

(b) marked and/or lit.

> **Note:** For example inconspicuous overhead wires or isolated objects in the vicinity of the aerodrome.

7.1.7 Monitoring of Obstacles Associated with Instrument Runways

7.1.7.1 For a precision approach runway, the aerodrome operator must monitor any object that may penetrate the applicable OLS.

7.1.7.2 For a non-precision approach runway, besides monitoring the applicable OLS, obstacle monitoring includes areas outside the OLS, also known as PANS-OPS surfaces, used in the design of the NPA procedures. To make it easier for aerodrome operators to carry out this task, procedure designers will be asked to provide aerodrome operators with a drawing or drawings of the area around the aerodrome, showing the designed approach paths, the circling areas and locations of critical obstacles taken into account in the design. In the case of a terrain obstacle, such as a hill, allowance provided for vegetation should also be provided, if appropriate.

7.1.7.3 Aerodrome operators must establish procedures to monitor the OLS and the critical obstacles associated with the NPA procedures and have them included in the Aerodrome Manual. The procedure designer must be advised of any changes of the status of the existing critical obstacles and any proposed development that is likely to be higher than the critical obstacles within the area depicted by the procedure designer.

7.1.8 Additional Obstacle Assessment for an Existing Non-instrument Runway to be Upgraded to a Non-precision Instrument Runway

> **Note:** The following procedures are established to minimise the costs associated with the introduction of NPA procedures at country aerodromes without compromising aerodrome safety.

7.1.8.1 For code 1 and 2 runways, there is a slight increase in the area of coverage for both the inner horizontal and conical obstacle limitation surfaces, as specified in Table 7.1-1.

> **Note**: The required survey may be held over until the next OLS survey is due.

7.1.8.2 For code 1, 2 and 3 runways, an additional survey of the approach obstacle limitation surface may be limited to the first section of the approach OLS (i.e. to a distance of 2500m for code 1 and 2 runways and 3000m for code 3 runways). The purpose of this survey is to identify any obstacle that may affect the location of the threshold, or needs to be provided with obstacle marking or lighting.

7.1.8.3 For the approach area beyond the first section, existing topographical maps and the Tall Structure Data Bank, under the custodian of the RAAF, should provide general obstacle data for determining minimum altitude purposes. Accordingly, unless specifically requested by the procedure designer, no actual ground survey of obstacles within the area is necessary.

7.1.8.4 To allow for possibility of missing obstacle information, an NPA procedure will be checked by flight validation. On-going monitoring of obstacles within the second and horizontal sections of the approach area should be included in the drawing(s) provided by the procedure designer.

7.1.8.5 Any new object which may penetrate the inner horizontal, conical and the first section of the approach surfaces of the applicable NPA standard, as specified in Table 7.1-1, must be identified and, if its presence cannot be avoided, the details of the obstacles must be forwarded to the relevant CASA office for assessment of marking and lighting requirements. Any object that may penetrate the PANS-OPS surface, as per advice from the procedure designer, must be forwarded to the Airservices Australia Procedure Design Section.

7.1.9 Obstacle Protection for Curved Take-Off

7.1.9.1 At present CASA does not promulgate a general standard for obstacle limitation surfaces in respect of curved take-off climb surface. Request for approval for curved take-off procedures may originate from aircraft operators or the aerodrome operators, and CASA will deal with such requests on a case-by-case basis.

Section 7.2: Aerodrome Obstacle Charts

7.2.1 Type A Charts

7.2.1.1 The Type A chart is an ICAO chart which identifies information on all significant obstacles within the take-off area of an aerodrome up to 10 km from the end of the runway.

7.2.1.2 A Type A chart must be prepared for each runway that is used in international operations.

7.2.1.3 The obstacle data to be collected and the manner of presentation of the Type A chart must be in accordance with the standards and procedures set out in ICAO Annex 4.

> **Note:** A Type A chart meeting the accuracy requirements of Annex 4 is adequate.

7.2.1.4 Where no significant obstacle exists within the take-off flight path area, as specified by Annex 4, a Type A chart is not required but a statement must be included in the Aerodrome Manual.

7.2.1.5 At aerodromes with no international operations, used by aircraft above 5,700 kg engaged in air transport operations, under CAO 20.7.1B, the decision to prepare Type A charts, or discrete obstacle information instead of a Type A chart, is a matter for the aerodrome operator to be made in conjunction with the relevant airline.

> **Note:** Refer to CAAP 89W-1(0) '*Guidelines for the provision of obstacle information for take-off flight planning purposes'.*

7.2.1.6 Where a Type A chart has been prepared, or updated, a copy of the chart must be given to CASA.

7.2.1.7 Where a Type A chart has been prepared and issued the take-off flight area must be monitored and any changes to the Type A chart information must immediately be communicated to all users of the Type A chart.

> **Notes:** 1: Changes to the Type A chart information but not to OLS take-off climb surface does not require NOTAM action.
>
> 2: Where the change to Type A chart information is also the subject of NOTAM action, additional separate advice to Type A chart holders is not necessary.

7.2.1.8 A distribution list of current Type A chart holders must be maintained.

7.2.1.9 A Type A chart must be updated when the number of changes to the chart, notified through NOTAM or separate advice, reaches a level, which CASA considers excessive.

7.2.2 Type B Charts

7.2.2.1 A Type B chart is an ICAO obstacle chart that provides obstacle data around the aerodrome.

7.2.2.2 A Type B chart, prepared in accordance with the standards and procedures set out in Annex 4, may be provided.

> **Note:** This may be required by operators of aircraft above 5,700 kg to identify obstacles around an aerodrome.

7.2.2.3 The decision to prepare a Type B chart must be made in consultation with CASA.

7.2.2.4 Where required, the obstacle data to be collected and the manner of presentation of the Type B chart must be in accordance with the standards and procedures set out in ICAO Annex 4.

7.2.3 Type C Charts

7.2.3.1 A Type C chart is an ICAO obstacle chart that provides data on all significant obstacles up to 45 km from the aerodrome. International aircraft operators may require this chart.

7.2.3.2 For aerodromes regularly used by aircraft engaged in international aviation, the decision to prepare a Type C chart must be made in consultation with the international aircraft operators and CASA.

7.2.3.3 Where prepared, the Type C charts may be produced using one of the following methods:

(a) a complete Type C chart in accordance with the standards and procedures set out in ICAO Annex 4; or

(b) based on an actual survey meeting the order of accuracy requirements of Annex 4, produce a list containing all significant obstacles above a nominal obstacle height; or

(c) based on topographical maps, where available, meeting the order of accuracy requirements of Annex 14, produce a list containing all significant obstacles above a nominal obstacle height.

7.2.4 Precision Approach Terrain Charts – ICAO

7.2.4.1 A Precision Approach Terrain Chart – ICAO provides detailed terrain profile information within a defined portion of the final approach to enable aircraft operators to assess the effect of the terrain on decision height determination by the use of radio altimeters.

7.2.4.2 Unless the same relevant information is provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) in accordance with ICAO Annex 4, a Precision Approach Terrain Chart — ICAO must be made available for each precision approach runway:

(a) Category II and Category III; or

(b) that has, or is intended to have, an SA Category I or SA Category II procedure.

7.2.4.3 A Precision Approach Terrain Chart – ICAO must be revised as soon as practicable after any significant change occurs to the relevant terrain profile.

7.2.4.4 A Precision Approach Terrain Chart – ICAO must conform to the standards and procedures set out in ICAO Annex 4.

Section 7.3: Obstacle Limitation Surfaces

7.3.1 General

7.3.1.1 The Obstacle Limitation Surfaces (OLS) are conceptual (imaginary) surfaces associated with a runway, which identify the lower limits of the aerodrome airspace above which objects become obstacles to aircraft operations, and must be reported to CASA.

> **Note:** The term OLS is used to refer to each of the imaginary surfaces which together define the lower boundary of aerodrome airspace, as well as to refer to the complex imaginary surface formed by combining all the individual surfaces.

7.3.1.2 The OLS comprises the following:

(a) outer horizontal surface;

(b) conical surface;

(c) inner horizontal surface;

(d) approach surface;

(e) inner approach surface;

(f) transitional surface;

(g) inner transitional surface;

(h) baulked landing surface; and

(i) take-off climb surface.

7.3.2 Description of OLS

7.3.2.1 **Reference Elevation Datum.** A reference elevation datum is to be established as a benchmark for the horizontal and conical surfaces. The reference elevation datum is to be:

(a) the same as the elevation of the ARP (rounded off to the next half-metre below), provided this elevation is within three metres of the average elevations of all existing and proposed runway ends; otherwise

(b) the average elevation (rounded off to the next half-metre below) of existing and proposed runway ends.

> **Note:** The reference elevation datum is not to be confused with the aerodrome elevation published in AIP - Enroute Supplement. Aerodrome elevation is, by definition, the highest point on the landing area.

7.3.2.2 **Outer Horizontal Surface.** The outer horizontal surface is a plane located 150 m above the reference elevation datum and extending from the upper edge of the extended conical surface for a distance of 15,000 m (radius) from the aerodrome reference point (ARP).

7.3.2.3 **Conical Surface.**

(a) The conical surface comprises both straight and curved elements, which slope upwards and outwards from the edge of the inner horizontal surface to a specified height above the inner horizontal surface.

(b) The slope of the conical surface is to be measured in a vertical plane perpendicular to the periphery of the inner horizontal surface.

7.3.2.4 **Inner Horizontal Surface.** The inner horizontal surface is a horizontal plane at a specified height above the reference elevation datum extending to an outer boundary comprising:

(a) in the case of an aerodrome with a single runway, semi-circular curves of a specified radius centred on the middle of each of the runway strip ends and joined tangentially by straight lines on each side of the runway, parallel to the runway centreline;

(b) in the case of an aerodrome with multiple runways, curves of a specified radius centred on the middle of each of the runway strip ends and the curves are joined by a tangential line as two curves intersect.

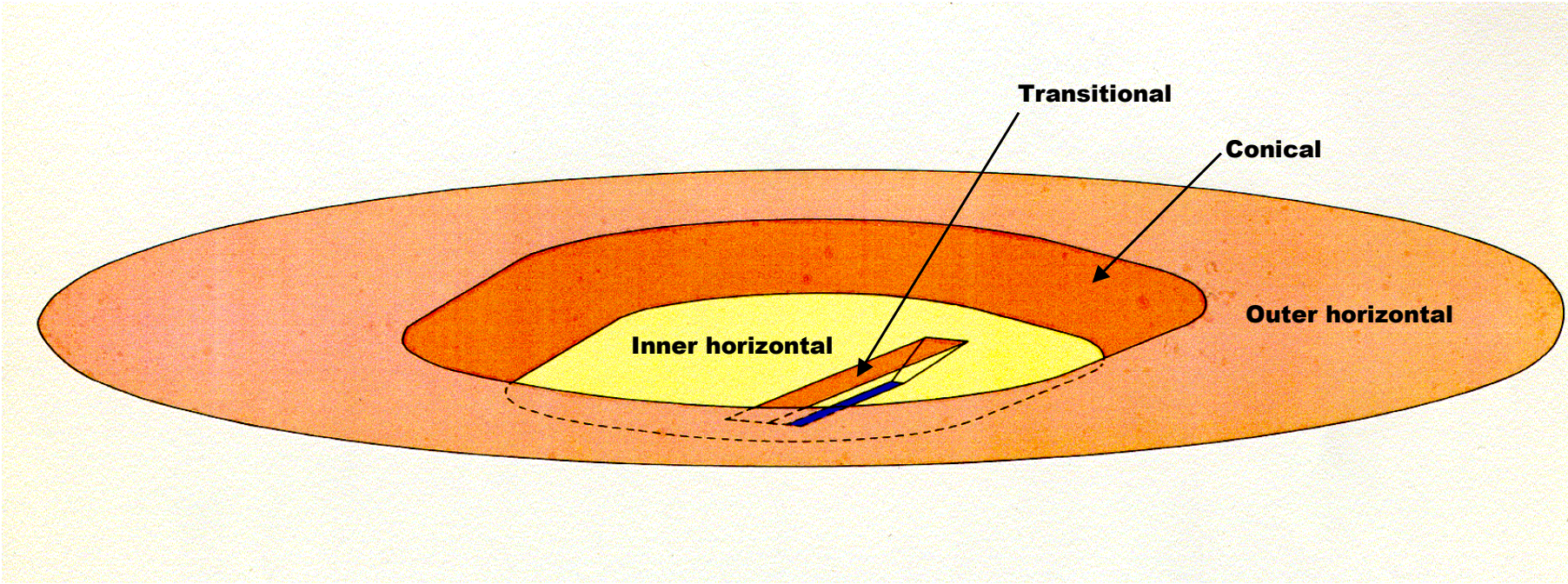


Figure 7.3-1: Relationship of outer horizontal, conical, inner horizontal and transitional surfaces

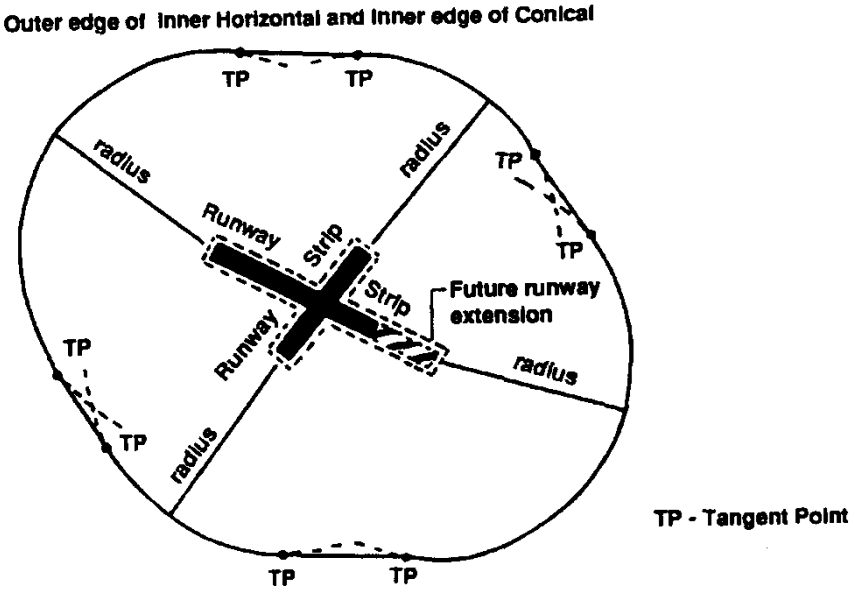


Figure 7.3-2: Boundary of inner horizontal surface

7.3.2.5 Approach Surface

(a) The approach surface is an inclined plane or combination of planes which originate from the inner edge associated with each runway threshold, with two sides originating at the ends of the inner edge.

(b) The inner edge associated with each runway threshold has a specified length, and is located horizontally and perpendicularly to the runway centreline, at a specified distance before the threshold.

(c) The two sides diverge uniformly at a specified rate from the extended centreline of the runway.

(d) The approach surface may be divided into three sections and ends at an outer edge that is located at a specified overall distance from the inner edge and parallel to the inner edge.

(e) The elevation of the midpoint of the threshold is to be the elevation of the inner edge.

(f) The slope of each section of the approach surface is at a specified rate and is to be measured in the vertical plane containing the centreline of the runway.

(g) The above surfaces are to be varied when lateral offset, offset or curved approaches are utilised, specifically, two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centreline of the lateral offset, offset or curved ground track.

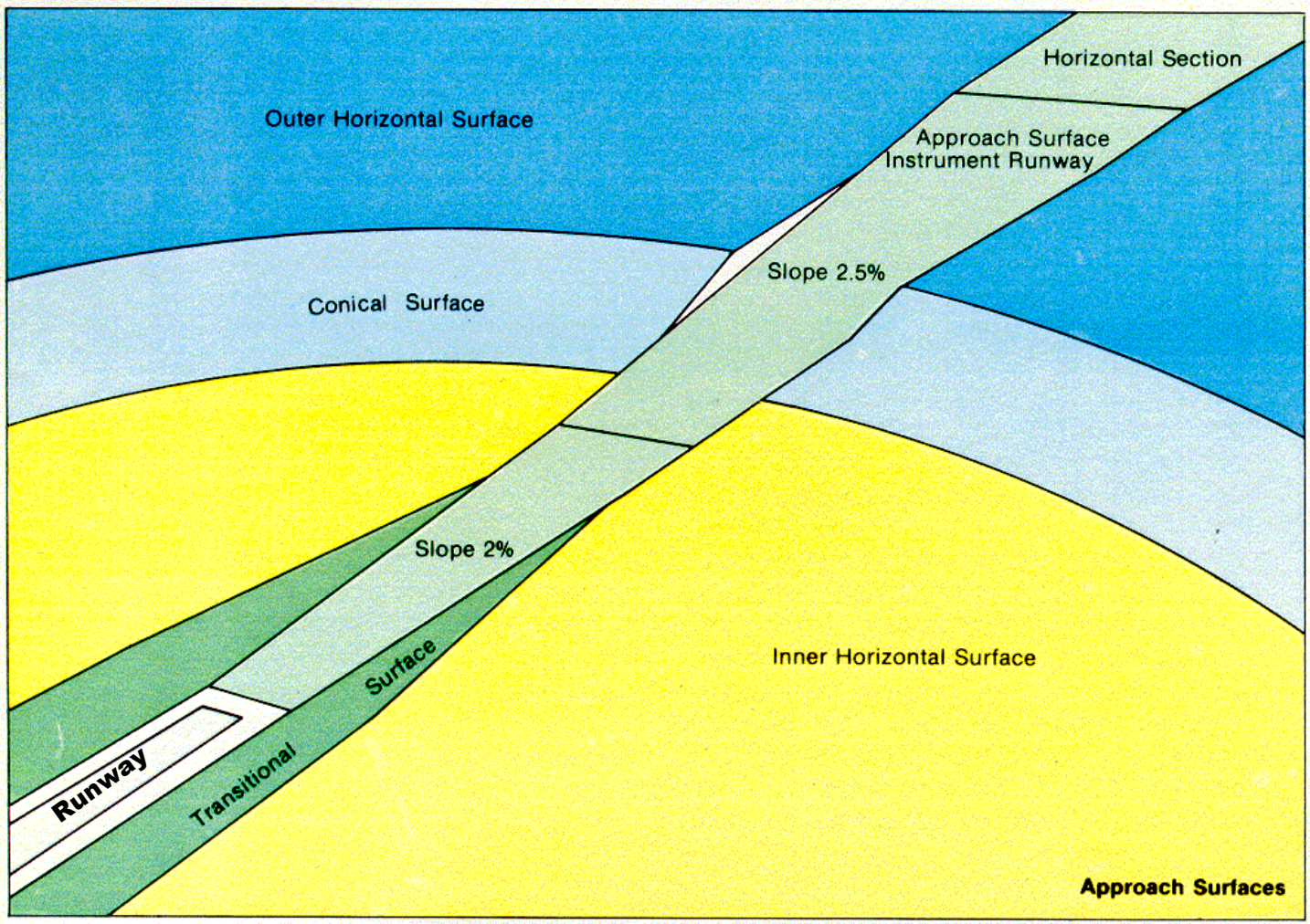


Figure 7.3-3: Approach surface for an instrument approach runway

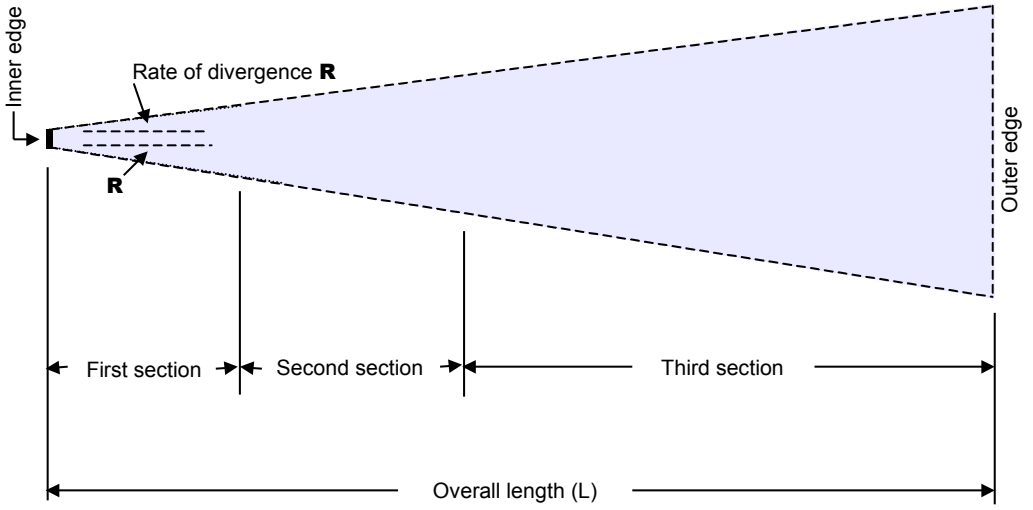


Figure 7.3-4: Plan view of approach surface

7.3.2.6 Transitional Surface

(a) The transitional surface comprises inclined planes that originate at the lower edge from the side of the runway strip (the overall strip), and the side of the approach surface that is below the inner horizontal surface, and finishes where the upper edge is located in the plane of the inner horizontal surface.

(b) The transitional surface slopes upwards and outward at a specified rate and is to be measured in a vertical plane at right angles to the centreline of the runway.

(c) The elevation of a point on the lower edge of the transition surface is to be:

(i) along the side of the approach surface, equal to the elevation of the approach surface at that point; and

(ii) along the side of the runway strip, equal to the nearest point on the centreline of the runway or stopway.

Note: For the purpose of drawing the transitional surface, the lower edge of the transitional surface along the runway strip may be drawn as a straight line joining the corresponding ends of the approach surfaces at each end of the runway strip. However when assessing whether an object may penetrate the transitional surface, the standard of the transitional surface applies.

7.3.2.7 **Obstacle-Free Zone.** The inner approach, inner transitional and baulked landing surfaces together define a volume of airspace in the immediate vicinity of a precision approach runway, which is known as the obstacle-free zone. This zone must be kept free from fixed objects, other than lightweight frangibly 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 precision approaches.

7.3.2.8 **Inner Approach Surface**

(a) The inner approach surface is a rectangular portion of the approach surface immediately preceding the threshold.

(b) The inner approach surface originates from an inner edge of a specified length, at the same location as the inner edge for the approach surface, and extends on two sides parallel to the vertical plane containing the runway centreline, to an outer edge which is located at a specified distance to the inner edge and parallel to the inner edge.

7.3.2.9 **Inner Transitional Surface**

(a) The inner transitional surface is similar to the transitional surface but closer to the runway. The lower edge of this surface originates from the end of the inner approach surface, extending down the side of the inner approach surface to the inner edge of that surface, thence along the runway strip to the inner edge of the baulked landing surface and from there up the side of the baulked landing surface to the point where the side intersects the inner horizontal surface.

(b) The elevation of a point on the lower edge is to be:

(i) along the side of the inner approach and baulked landing surface, equal to the elevation of the particular surface at that point;

(ii) along the runway strip, equal to the elevation of the nearest point on the centreline of the runway or stopway.

(c) The inner transitional surface slopes upwards and outwards at a specified rate and is to be measured in a vertical plane at right angles to the centreline of the runway.

(d) The upper edge of the inner transitional surface is located in the plane of the inner horizontal surface.

(e) The inner transitional surface should be used as the controlling surface for navigational aids, aircraft and vehicle holding positions which have to be located near the runway. The transitional surface should be used for building height control.

7.3.2.10 **Baulked Landing Surface**

(a) The baulked landing surface is an inclined plane originating at a specified distance after the threshold and extending between the inner transitional surfaces.

(b) The baulked landing surface originates from an inner edge of a specified length, located horizontally and perpendicularly to the centreline of the runway, with two sides from the ends of the inner edge diverging uniformly at a specified rate from the vertical plane containing the centreline of the runway, ending at an outer edge located in the plane of the inner horizontal surface.

(c) The elevation of the inner edge is to be equal to the elevation of the runway centreline at the location of the inner edge.

(d) The specified slope of the baulked landing surface is to be measured in the vertical plane containing the centreline of the runway.

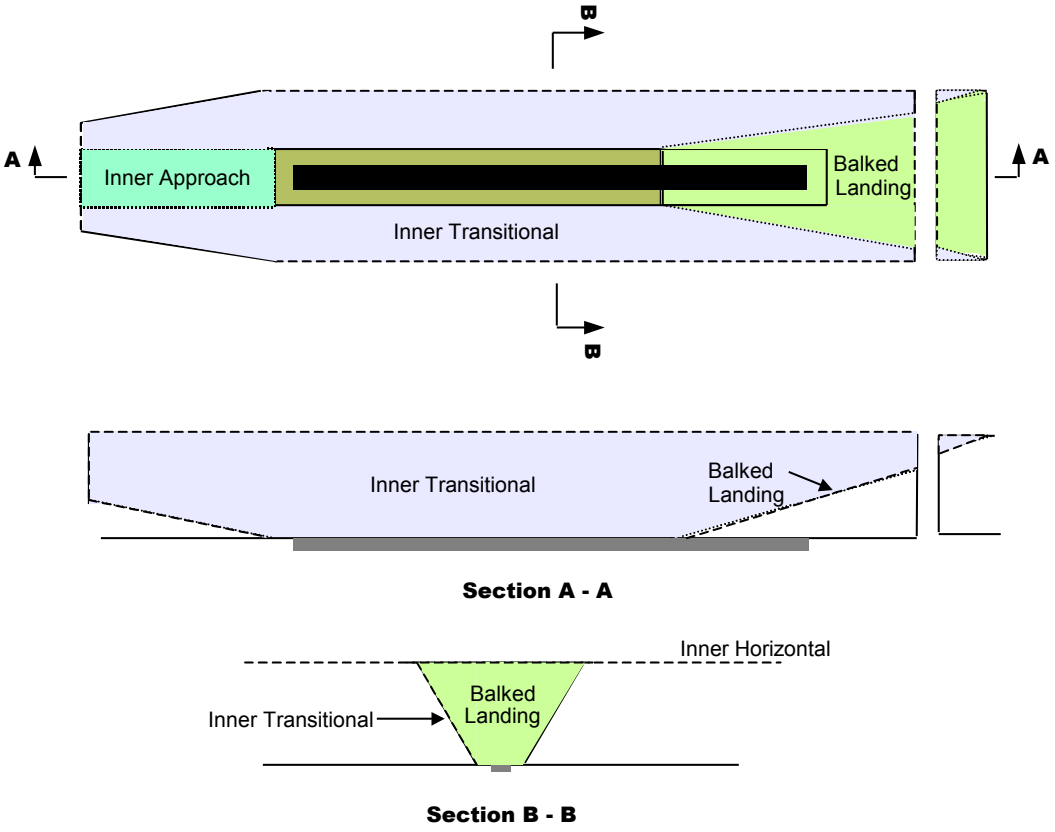


Figure 7.3-5: Inner approach, inner transitional and baulked landing obstacle limitation surfaces

7.3.2.11 Take-Off Climb Surface

(a) The take-off climb surface is an inclined plane (or other shape in the case of curved take-off) located beyond the end of the runway or clearway.

(b) The origin of the take-off climb surface is the inner edge of a specified length, located at a specified distance from the end of the runway or the clearway. The plane from the inner edge slopes upward at a specified

rate, with the two sides of the plane originating from the ends of the inner edge concurrently diverging uniformly outwards at a specified rate, to a specified final width, and continuing thereafter at that width for the remainder of the specified overall length of the take-off climb surface until it reaches the outer edge which is horizontal and perpendicular to the take-off track.

(c) The elevation of the inner edge is to be equal to the highest point on the extended runway centreline between the end of the runway and the inner edge, except that when a clearway is provided the elevation is to be equal to the highest point on the ground on the centreline on the clearway.

(d) The slope of the take-off climb surface is to be measured in the vertical plane containing the centreline of the runway.

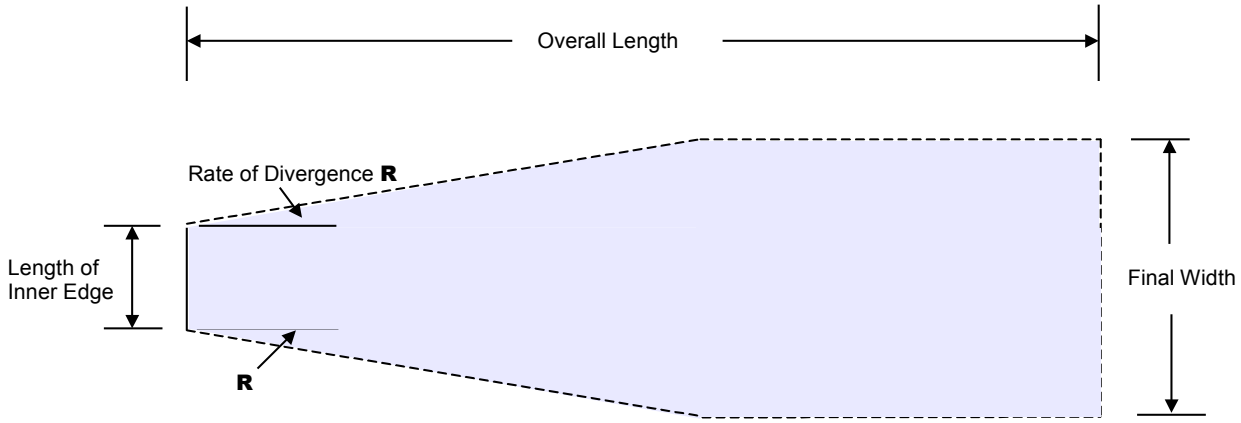


Figure 7.3-6: Plan view of take-off climb surface

Section 7.4: Principles of Shielding

7.4.1 General

7.4.1.1 A new obstacle located in the vicinity of an existing obstacle and assessed as not being a hazard to aircraft is deemed to be shielded.

7.4.1.2 Unless specifically directed by the Authority, a shielded obstacle does not require removal, lowering, marking or lighting and should not impose any additional restrictions to aircraft operations.

7.4.1.3 The Authority shall assess and determine whether an obstacle is shielded. The aerodrome operator is to notify the Authority of the presence of all obstacles.

7.4.1.4 Only existing permanent obstacles may be considered in assessing shielding of new obstacles.

7.4.2 Shielding Principles

7.4.2.1 In assessing whether an existing obstacle shields an obstacle, CASA will be guided by the principles of shielding detailed below.

7.4.2.2 **Obstacles penetrating the approach and take-off climb surfaces**

(a) An existing obstacle within the approach and take-off climb area is called the critical obstacle. Where a number of obstacles exist closely together, the critical obstacle is the one which subtends the greatest vertical angle measured from the appropriate inner edge.

(b) As illustrated below, a new obstacle may be assessed as not imposing additional restrictions if:

(i) when located between the inner edge end and the critical obstacle, the new obstacle is below a plane sloping downwards at 10% from the top of the critical obstacle toward the inner edge;

(ii) when located beyond the critical obstacle from the inner edge end, the new obstacle is not higher than the height of the permanent obstacle;

(iii) where there is more than one critical obstacle within the approach and take-off climb area, and the new obstacle is located between two critical obstacles, the height of the new obstacle is not above a plane sloping downwards at 10% from the top of the next critical obstacle.

7.4.2.3 **Obstacles penetrating the inner and outer horizontal and conical surfaces.** The new obstacle may be accepted if it is in the vicinity of an existing obstacle, and does not penetrate a 10% downward sloping conical shaped surface from the top of the existing obstacle, i.e. the new obstacle is shielded radially by the existing obstacle.

7.4.2.4 **Obstacles Penetrating the Transitional Surfaces.** A new obstacle may be assessed as not imposing additional restrictions if it does not exceed the height of an existing obstacle which is closer to the runway strip and the new obstacle is located perpendicularly behind the existing obstacle relative to the runway centre line.

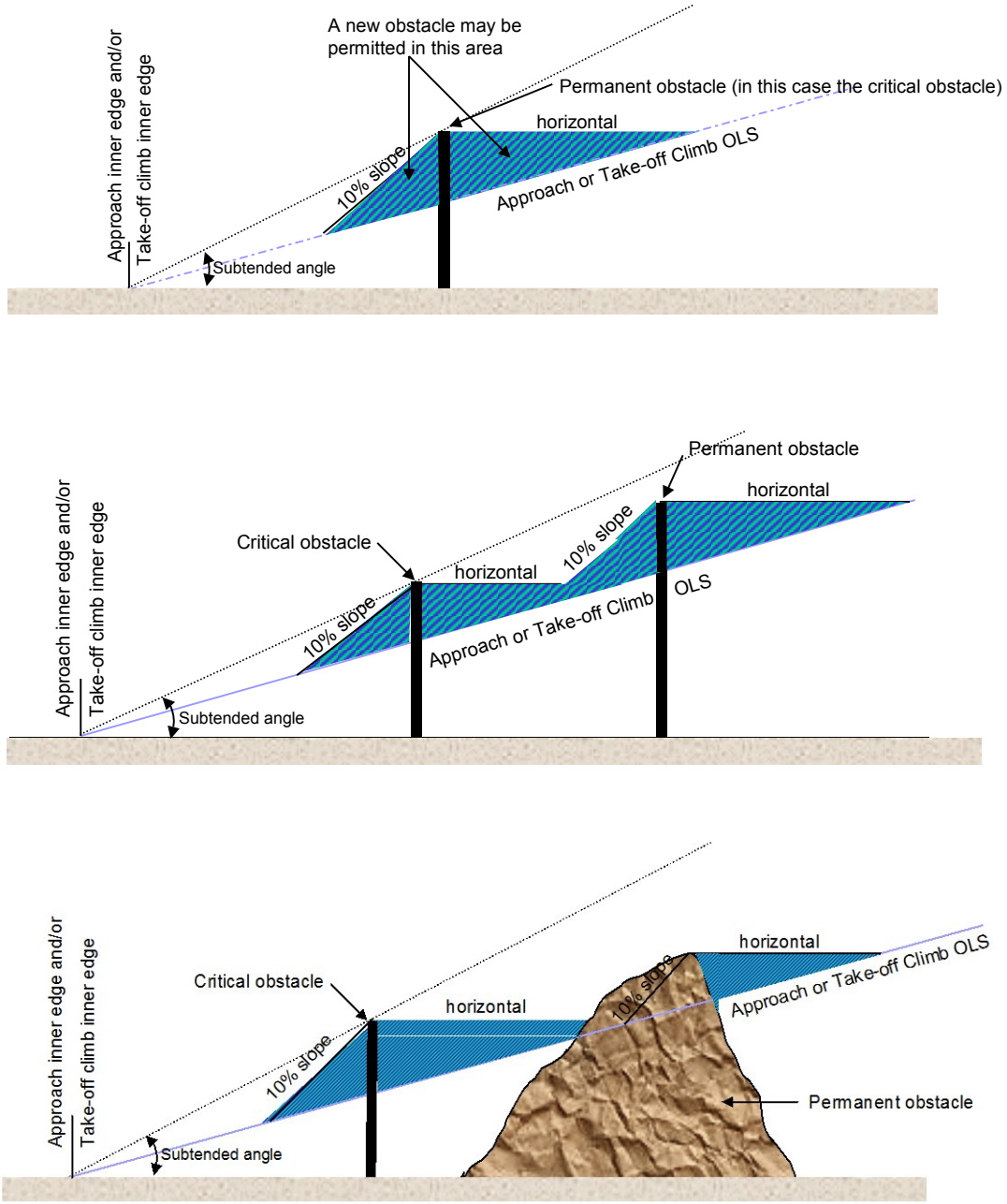


Figure 7.4-1: Shielding of obstacles penetrating the approach and take-off climb surfaces

CHAPTER 8: VISUAL AIDS PROVIDED BY AERODROME MARKINGS, MARKERS, SIGNALS AND SIGNS

Section 8.1: General

8.1.1AA Visual aids — early compliance with alternative new Chapter 8 standards

8.1.1AA.1 In this subsection:

new Chapter 8 means Chapter 8 of the new MOS.

new Chapter 8 standards means the standards contained in Chapter 8 of the new MOS, as in force from time to time.

new MOS means the *Part 139 (Aerodromes) Manual of Standards 2019*, registered on 6 September 2019, as in force from time to time.

8.1.1AA.2 Despite anything else in this Chapter but subject to subsection 8.1.1AA.3, the new Chapter 8 standards are incorporated into this section as alternative standards for the matters dealt with in this Chapter.

8.1.1AA.3 Subsection 8.1.1AA.2 takes effect for an aerodrome operator only in accordance with the operator's written notice to CASA:

(a) stating that the operator will comply with some or all of the new Chapter 8 standards as if they were the standards under this Chapter; and

(b) unless all of the new Chapter 8 standards will be complied with:

(i) identifying, by relevant section number, the new Chapter 8 standards that the operator will comply with; and

(ii) identifying the specific location on the aerodrome of anything that is the subject of a relevant section; and

(iii) undertaking to comply with such of the other standards in this Chapter as are not inconsistent with the new Chapter 8 standards specified in the notice; and

(c) specifying the date, not earlier than the date of the notice and not later than 12 August 2020, on and from which the operator will comply with the new Chapter 8 standards.

Note This section is intended to allow the early application of some or all of the new Chapter 8 standards on an opt-in basis.

8.1.1 Introduction

8.1.1.1 This Chapter specifies the standards for Markers, Markings, Signals and Signs. Visual aids not conforming to these standards must not be used unless approved by CASA, in writing.

8.1.1.2 Although the specifications given here are in metric measurements, existing visual aids, which were made to Imperial measurements, may continue to be used until replacement is required for other reasons. However, new visual aids must be made and located in accordance with the metric measurements.

8.1.2 Closed Aerodrome

8.1.2.1 All Markers, Markings and Signs on a closed aerodrome or closed part of an aerodrome, must be obscured or removed, except for unserviceability Markers or Markings, where required.

> **Note:** A ***closed aerodrome or aerodrome facility*** means one which has been withdrawn or decommissioned, not one which is temporarily unserviceable.

8.1.3 Colours

8.1.3.1 Colours used, must conform to the Australian standard AS 2700-1996, Titled Colour Standards for General Purposes, in accordance with the following:

Table 8.1-1: Standard colours

Colour	AS Colour Code	AS Colour Name
Blue	B41	Blue Bell
Green	G35	Lime Green
Orange	X15	Orange
Red	R13	Signal Red
Yellow	Y14	Golden Yellow
White	N14	White
Black	N61	Black

8.1.4 Visibility

8.1.4.1 Markings must be clearly visible against the background upon which they are placed. Where required, on a surface of light colour, a contrasting black surround must be provided: on a black surface, a contrasting white surround must be provided.

8.1.4.2 Where provided, the width of surround colour must ensure an adequate visibility contrast. In the case of line markings, the width of surround on either side of the marking must not to be less than the line width.

Section 8.2: Markers

8.2.1 Introduction

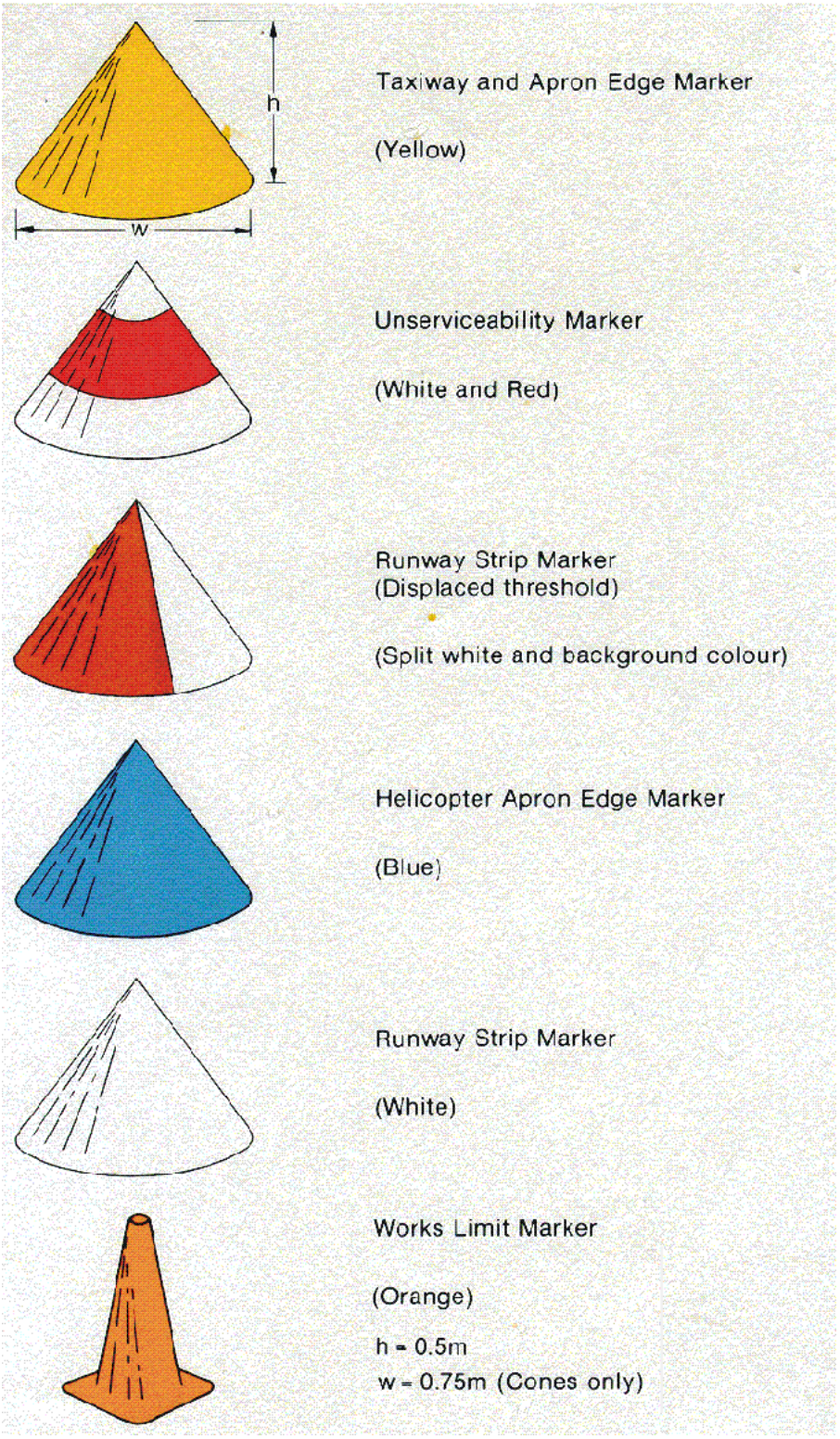
8.2.1.1 Markers must be lightweight and frangible; either cones or gables. Other forms of markers to identify extensive work areas may be used, subject to CASA agreement. When displayed, they must be secured against prop wash and jet blast, in a manner that does not cause damage to an aircraft.

8.2.1.2 Cones used as runway markers must have a height of 0.3 m and a base diameter of 0.4 m. All other cones must be 0.5 m in height, with a base diameter of 0.75 m. Cones must be painted in the following colours:

Marker	Colour
Runway marker	white
Taxiway marker	yellow
Apron edge marker	yellow
Runway strip marker	white
Helicopter apron edge marker	blue
Unserviceability marker	white, with central 25 cm red band
Runway strip marker (displaced threshold.)	split white and suitable background colour

8.2.1.3 Gables must be 3 m long, 0.9 m wide, and 0.5 m high; painted white.

8.2.1.4 Fluorescent orange PVC cones or ‘witches’ hats’ approximately 0.5 m high, may be used to convey visual information about aerodrome works to the works organisation. Witches hats must not be used to convey information to pilots about changes to the movement area. For this purpose, standard cones must be used.



For cones used as runway edge markers h = 0.3m, w = 0.4m

Figure 8.2-1: Cone markers

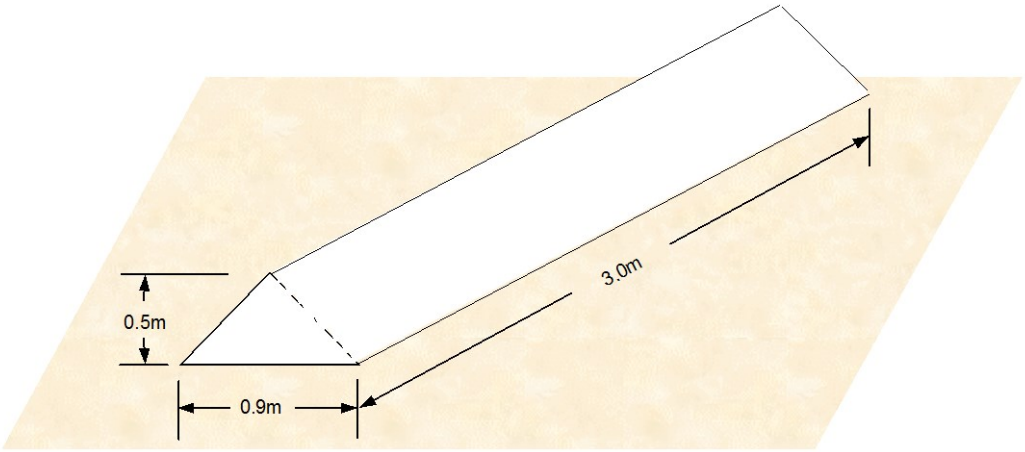
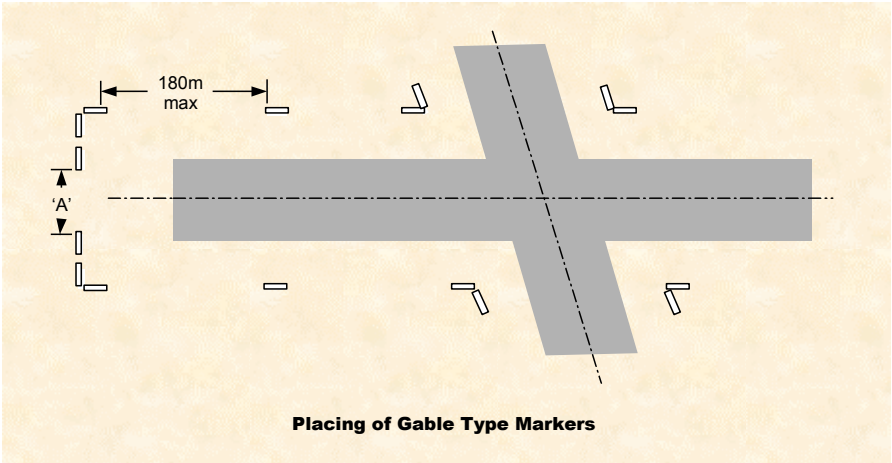


Figure 8.2-2: Gable marker

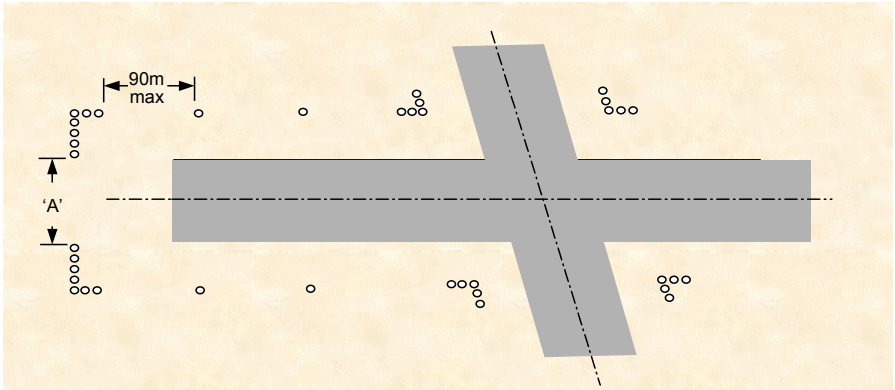
8.2.2 The Use of Markers on a Runway Strip

8.2.2.1 Where the limits of the graded portion of a runway strip need to be defined, runway strip markers must be placed along the edges of the graded portion of the runway strip.

8.2.2.2 Runway strip markers must be white, and may be gable, cone or flush. Gable markers are preferred, and flush markers must only be used where runway strips overlap. The spacing of gable or cone side strip markers must not exceed 180 m or 90 m respectively, as shown below.



Placing of Gable Type Markers



Placing of Cone Type Markers

Figure 8.2-3: Runway strip markers

Width of graded strip	Dimension 'A'
30 m	10 m minimum
45 m	20 m minimum
60 m	20 m minimum
90 m	30 m minimum
150 m	60 m minimum

8.2.2.3 Where agreed by CASA, 200 litre (44 gallon) steel drums or tyres may be used as runway strip markers at aerodromes used by aeroplanes of not more than 9 passenger seats. Steel drums must be cut in half along their length, placed on the ground open side down. Drums and tyres must be painted white. At a certificated aerodrome, use of these markers must be noted in the Aerodrome Manual.

8.2.3 The Use of Markers on an Unsealed Runway

8.2.3.1 On unsealed runways, runway markers must be provided along both sides of the runway where there is a lack of contrast between the runway and runway strip, and the whole of the runway strip is not maintained to normal runway grading standards. The longitudinal spacing of runway markers must not exceed 90 m.

8.2.3.2 Runway markers may be replaced by runway strip markers if the whole of the runway strip is maintained to normal runway grading standard. The thresholds must be marked either by normal threshold markings or runway cone markers in a pattern similar to that prescribed for runway strip ends.

8.2.3.3 Where an unsealed runway has a permanently displaced threshold at one end, two sets of strip markers must be provided at that end. Each set must be bi-coloured. The set associated with the permanently displaced threshold is to be painted so that the half facing the direction of approach (the first direction) appears white. The other half must be painted to match the background, and be inconspicuous to a pilot operating in the other direction (the second direction). Markers associated with the runway strip end are to appear white in the second direction and inconspicuous in the first direction.

8.2.3.4 The bi-coloured end markers associated with the displaced threshold must be cones; those associated with the runway strip end may be cones or gables.

8.2.4 The Use of Markers on an Unsealed Taxiway

8.2.4.1 Where the edges of unsealed taxiways or graded taxiway strips might not be visually clear, taxiway edge markers must be provided to show pilots the edge of trafficable taxiways.

8.2.4.2 Where provided, the taxiway markers must be yellow cones and must be spaced to enable pilots to clearly delineate the edge of the unsealed taxiway.

8.2.5 The Use of Markers on an Unsealed Apron

8.2.5.1 Where the edges of unpaved aprons might not be visually clear to pilots, apron edge markers must be provided.

8.2.5.2 Where provided, the apron edge markers must be yellow cones and must be spaced to enable pilots to clearly delineate the edge of the unsealed apron area.

Section 8.3: Runway Markings

8.3.1 General

8.3.1.1 Runway markings must be white on all concrete, asphalt or sealed runway surfaces. Pre-runway-end markings must be yellow.

8.3.1.2 At runway intersections, markings of the more important runway must take precedence over, or interrupt the markings of the other runway. At an intersection with a taxiway, the runway markings, except for runway side strip markings, must interrupt the taxiway markings.

8.3.1.3 To reduce the risk of uneven braking action, care must be taken that markings produce a non-skid surface of similar coefficient of friction to the surrounding surface.

8.3.2 Pre-runway-end Markings

8.3.2.1 Pre-runway-end markings are used where an area exceeding 60 m in length before the runway end, has a sealed, concrete or asphalt surface, which is not suitable for normal aircraft usage.

8.3.2.2 Marking must consist of yellow chevrons, spaced 30 m apart, comprising lines 0.9 m wide and angled 45 degrees to the runway centreline. The markings must terminate at the runway end marking.

8.3.2.3 This area will not normally be used for landing or take-off. If declared as a stopway, an aircraft in an abandoned take-off from the other direction may only use the area.

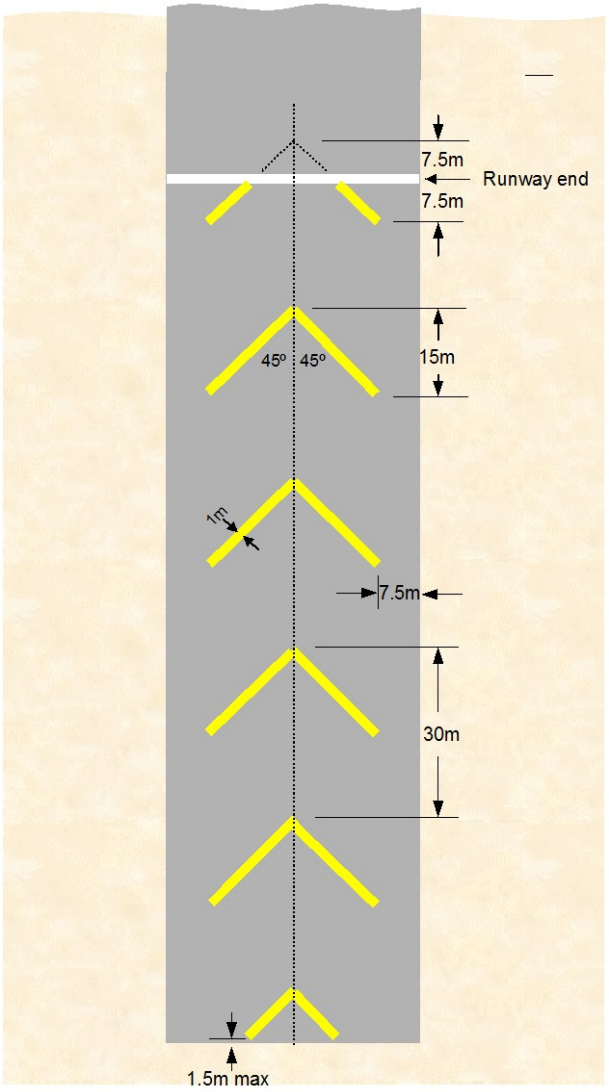


Figure 8.3-1: Pre-runway-end markings

8.3.3 Runway Centreline Markings

8.3.3.1 Runway centreline markings must be provided on all sealed, concrete or asphalt runways, to provide directional guidance during landing or take-off. Runway centreline marking may be omitted in the case of 18 m wide runways where side stripe markings are provided.

8.3.3.2 Runway centreline marking must consist of a line of uniformly spaced gaps and white stripes as shown in Figure 8.3-2 below. The combined length of a stripe and a gap (G) must be not less than 50 m and not more than 75 m. The length of each stripe must be at least equal to the length of each gap, or 30 m, whichever is greater. The first stripe is to commence 12 m from the runway designation number as shown below.

8.3.3.3 The width (W) of the runway centreline marking must be:

(a) 0.3 m on all non-instrument runways, and instrument non-precision approach runways where the code number is 1 or 2;

(b) 0.45 m on instrument non-precision approach runways where the code number is 3 or 4; and Category I precision approach runways; and

(c) 0.9 m on Category II and Category III precision approach runways.

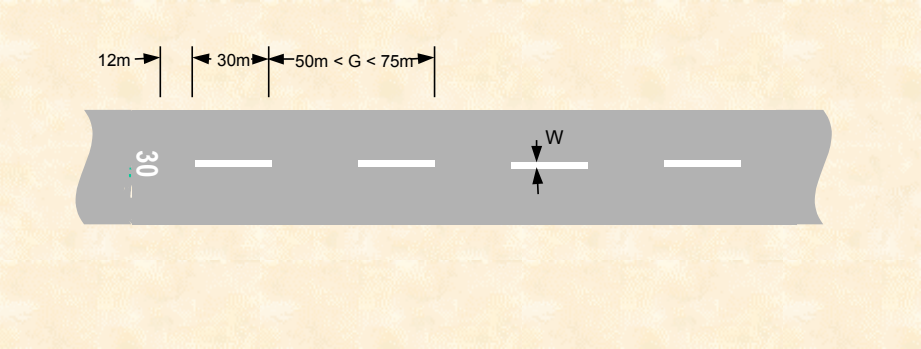


Figure 8.3-2: Runway centreline markings

8.3.4 Runway Designation Markings

8.3.4.1 Runway designation markings must be provided at the thresholds of all sealed, concrete or asphalt runways, and as far as practicable, at the thresholds of an unpaved runway.

8.3.4.2 Runway designation marking must consist of a two-digit number. The number is derived from the magnetic bearing of the runway centreline, when viewed from the direction of approach, rounded to the nearest 10 degrees.

8.3.4.3 If a bearing becomes a single digit number, a ‘0’ is to be placed before it. If a bearing becomes a three digit number, the last ‘0’ digit is to be omitted. For parallel runways, appropriate letters L (left), C (centre) or R (right) must be added to the two-digit number.

8.3.4.4 The number selected for a runway designation marking must be acceptable to CASA. When two or more runway ends have designations which may be confusing, either on the same or a nearby aerodrome, CASA will determine the designations to be used.

8.3.4.5 The shape and dimensions of the numbers and letters to be used as runway designation markings are shown in Figure 8.3-3. The location of the marking on the runway is also shown.

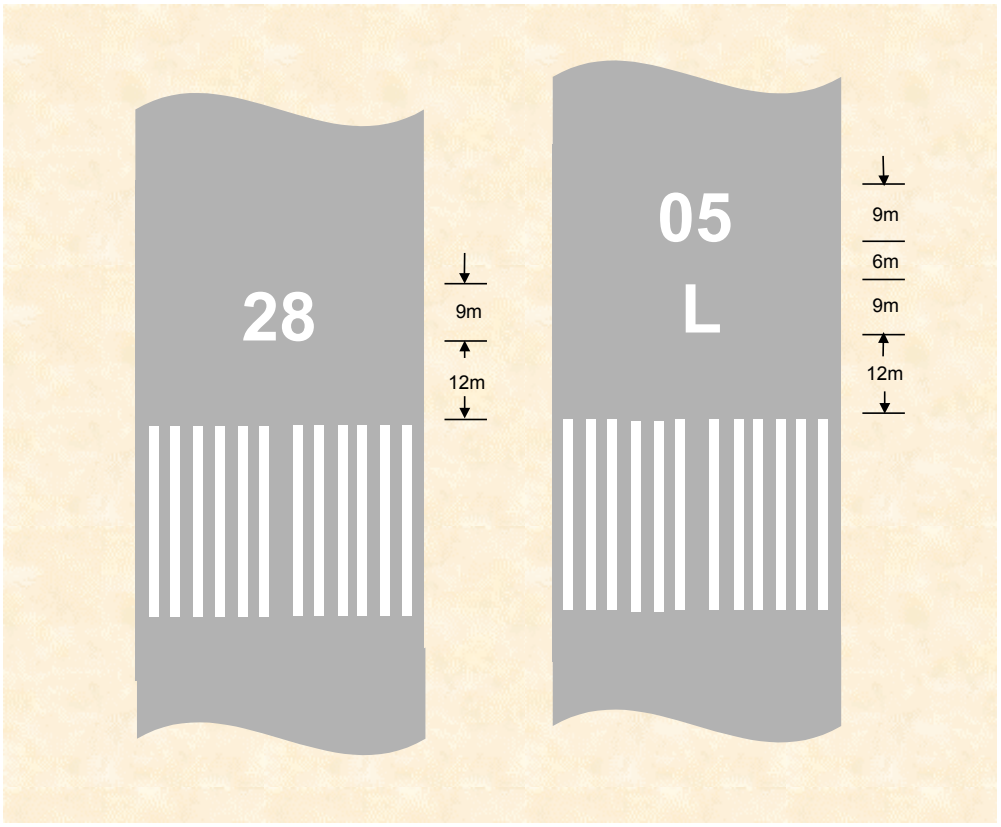


Figure 8.3-3: Runway designation markings

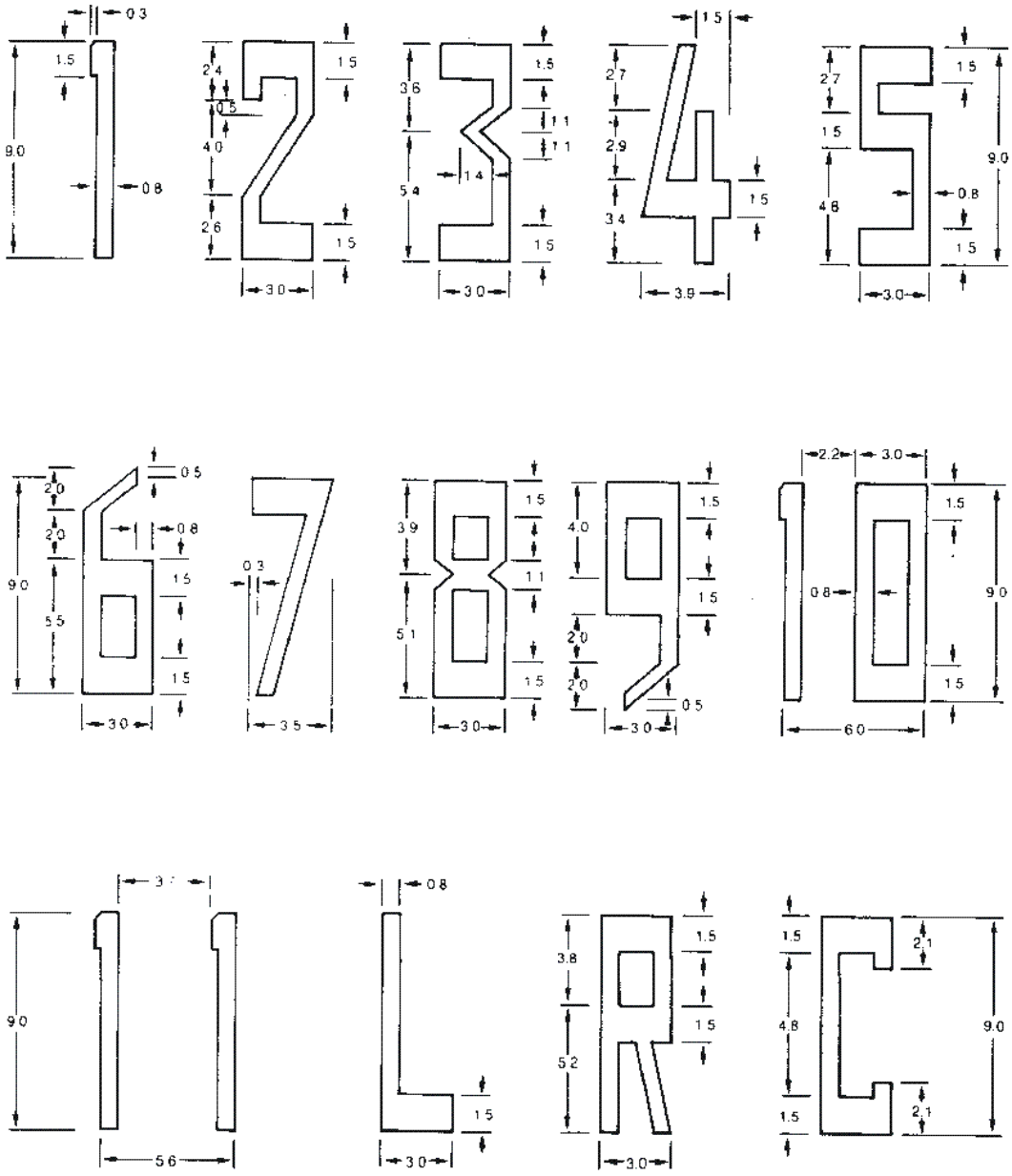


Figure 8.3-4: Shape and dimensions of runway numbers and letters

8.3.5 Runway End Markings

8.3.5.1 Runway end markings must be provided on all sealed, concrete or asphalt runways as shown below. The marking is a white line, 1.2 m wide, extending the full width of the runway. Where the threshold is located at the end of the runway, the runway end marking will coincide with the corresponding part of the threshold marking.

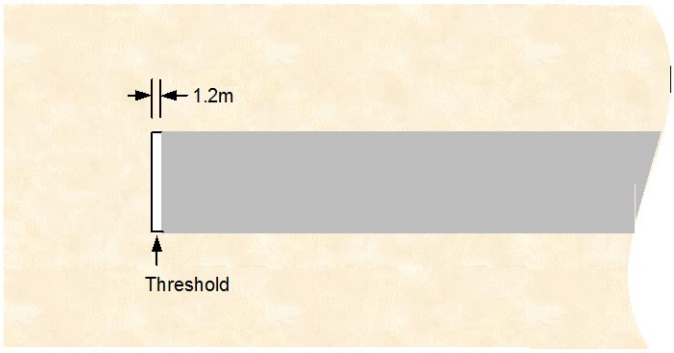


Figure 8.3-5: Runway end marking

8.3.6 Runway Side-stripe Markings

8.3.6.1 Runway side-stripe markings must be provided at the edge of all sealed, concrete or asphalt runways to delineate the width of the runway. Except where broken for taxiways and other runways; runway side-stripe markings must consist of one continuous white line, the same width as the runway centreline marking.

8.3.6.2 In the case of 18 m wide runways with no runway centreline marking, the width of the side-stripe marking must be 0.3 m.

8.3.6.3 The distance between outer edges of the stripes must be equal to the width of the runway. The stripes must be parallel to the runway centreline, and extend the full length of the runway, between the runway end markings.

8.3.6.4 Side-stripe markings must not extend across intersecting runways or taxiways.

8.3.6.5 For a runway with no sealed shoulders, the side-stripe markings may be omitted, if there is distinct contrast between the runway edges and the surrounding terrain.

8.3.6.6 This marking may also be used to mark the edges of a runway turning node.

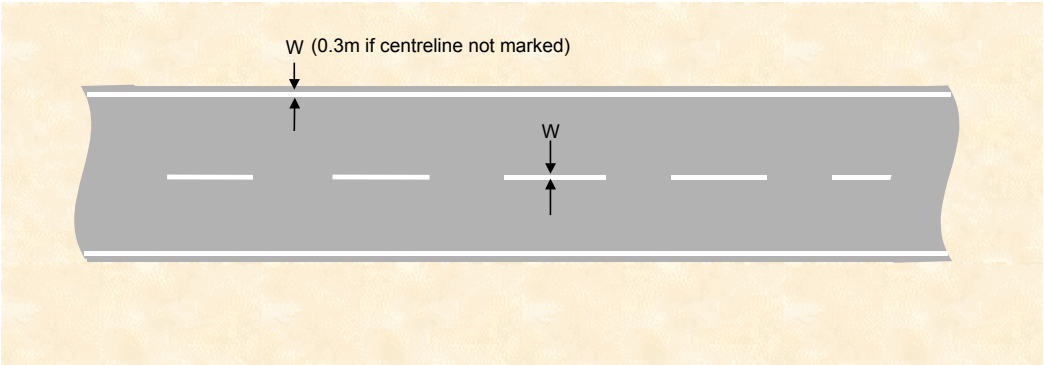


Figure 8.3-6: Runway side stripe markings

8.3.7 Aiming Point Markings

> **Note:** Aiming Point Markings were previously known as Runway Fixed Distance Markings.

8.3.7.1 An aiming point marking must be provided at each approach end of each sealed, concrete or asphalt runway that is 30 m or more wide and 1500 m or more long.

> **Note:** An aiming point marking should be provided at each approach end of each sealed, concrete or asphalt instrument runway that is less than 1500 m long.

8.3.7.2 An aerodrome operator may elect to retain a fixed distance marking that was:

(a) provided under subsection 8.3.7 before 2 June 2011; and

(b) in use immediately before 2 June 2011;

until not later than:

(c) for international aerodromes — 30 May 2013; or

(d) for other aerodromes — 29 May 2014.

> **Note:** When an aerodrome operator elects to implement an aiming point marking by providing an appropriate marking, the operator should raise a NOTAM for a period of 2 months after so providing or determining, to inform pilots about the presence of the marking.

8.3.7.3 For a precision approach runway with an available landing distance mentioned in a column of Table 8.3-1 (the ***Table***), the aiming point marking must:

(a) commence no closer to the threshold than the distance indicated in the same column, except that, on a runway with a visual approach slope indicator system (VASIS), the beginning of the marking must coincide with the origin of the visual approach slope; and

(b) consist of 2 conspicuous stripes whose dimensions, and lateral spacing between inner sides, must accord with the measurements set out in the same column.

Note: For a precision approach runway, it is recommended that implementation of aiming point marking should also be accompanied by implementation of the ICAO 'A' – basic pattern touchdown zone marking. **See Figure 8.3-7A.1.**

Table 8.3-1: Location and dimensions of aiming point marking

Landing distance available				
Location and dimensions	**Less than 800 m**	**800 m up to, but not including, 1200 m**	**1200 m up to, but not including, 2400 m**	**2400 m and above**
Distance from threshold to beginning of marking	150 m	250 m	300 m	400 m
Length of stripe[a]	30-45 m	30-45 m	45-60 m	45-60 m
Width of stripe	4 m	6 m	9 m	9 m
Lateral spacing between inner sides of stripes	6 m[b]	9 m[b]	18-23 m[c]	18-23 m

a The greater dimensions of the specified ranges are intended to be used where increased conspicuity is required.

b These figures were deduced by reference to the outer main gear wheel span which is element 2 of the aerodrome reference code at Chapter 2, Table 2.1-1: Aerodrome Reference Code.

c The lateral spacing may be varied within these limits to minimize the contamination of the marking by rubber deposits.

8.3.7.4 For a non-precision approach runway, or a non-instrument runway, the aiming point marking must comply with:

(a) the following:

(i) the marking must consist of 2 conspicuous stripes, each 45 m in length, each having a width (***W***), and each with inside edges separated by a distance (***D***);

(ii) the ends of the stripes nearest the threshold must be located at 300 m from the line of the runway threshold;

(iii) for sub-subparagraph (i), W and D must be in accordance with the following table:

Runway width	W	D
30 m	6 m	17 m
45 m or more	9 m	23 m

or

(b) the relevant precision approach runway standard.

8.3.7A Touchdown Zone Marking

8.3.7A.1 A touchdown zone marking must be provided at each end of a sealed, concrete or asphalt runway 30 m wide or greater and 1500 m long or greater.

Note: A touchdown zone marking may be provided at both ends of other sealed, concrete or asphalt runways.

8.3.7A.2 A touchdown zone marking must conform to the following pattern:

(a) on a precision approach runway — the ***ICAO 'A' – basic*** pattern, as described in this section (the ***ICAO 'A' – basic pattern***); or

(b) on other runways — the ICAO 'A' – basic pattern, or the ***simple pattern*** as described in this section

Note: Formerly, the simple pattern touchdown zone marking was the standard pattern for all Australian touchdown zone markings.

8.3.7A.3 An aerodrome operator may retain a simple pattern touchdown zone marking on a precision runway until not later than:

(a) for international aerodromes — 30 May 2013; or

(b) for other aerodromes — 29 May 2014.

Notes:

1. When an aerodrome operator implements the ICAO 'A' – basic pattern touchdown zone marking, the operator should raise a NOTAM for a period of 2 months after the implementation to inform pilots about the revised marking.
2. For a precision approach runway, it is recommended that implementation of the ICAO 'A' – basic pattern touchdown zone marking should be accompanied by implementation of aiming point marking.

8.3.7A.4 The ICAO 'A' – basic pattern touchdown zone marking consists of pairs of rectangular markings symmetrically disposed about the runway centreline as shown in Figure 8.3-7A.2. Subject to paragraph 8.3.7A.5, the numbers and locations of such pairs are to be in accordance with Table 8.3-2.

Table 8.3-2: Pairs of rectangular markings for ICAO 'A' – basic pattern touchdown zone marking

Item	Landing distance available, or the distance between thresholds (where the touchdown zone marking is displayed at both of the approach directions)	Pair(s) of touchdown zone markings	Location of each pair of touchdown zone markings (distance in metres from threshold)
1	less than 900 m	1	300
2	900 m up to, but not including, 1200 m	2	150 and 450
3	1200 m up to, but not including, 1500 m	3[a]	150, 300, 450 and 600
4	1500 m up to, but not including, 2400 m	4[a]	150, 300, 450, 600 and 750
5	2400 m or more	5[a]	150, 300, 450, 600, 750 and 900

[a] The touchdown zone marking within 50 m of the aiming point marking must be omitted – see paragraph 8.3.7A.5.

8.3.7A.5 For a landing distance available, or distance between thresholds, mentioned in item 3, 4 or 5 of Table 8.3-2, a touchdown zone marking that would be within 50 m of the aiming point marking must be omitted.

8.3.7A.6 Each ICAO 'A' – basic pattern touchdown zone marking must:

(a) be not less than 22.5 m long and 3 m wide; and

(b) have a lateral spacing between the inner sides of the rectangles equal to that of the aiming point marking.

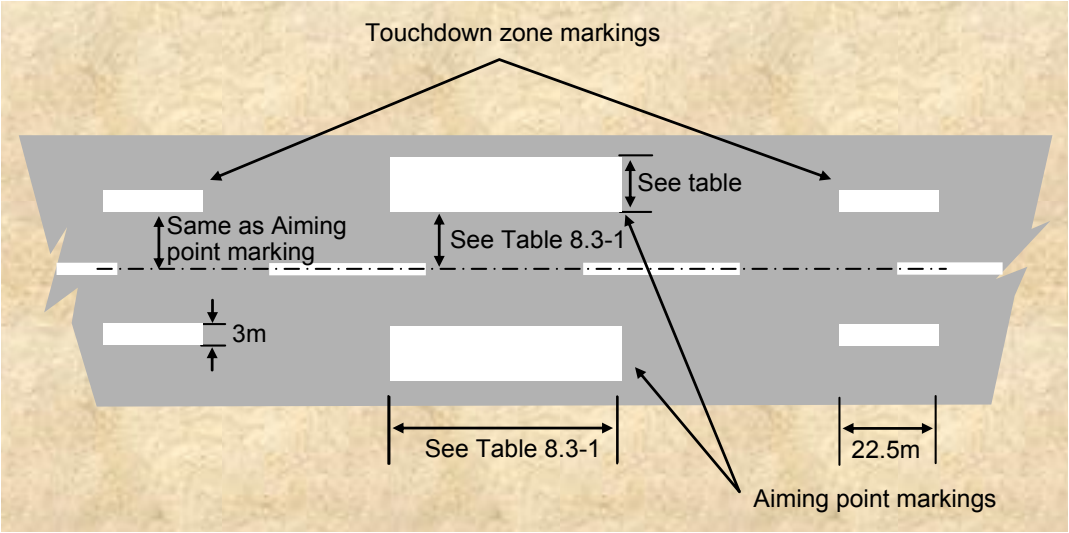


Figure 8.3-7A.1: Aiming point and ICAO 'A' – basic pattern touchdown zone markings — dimensions

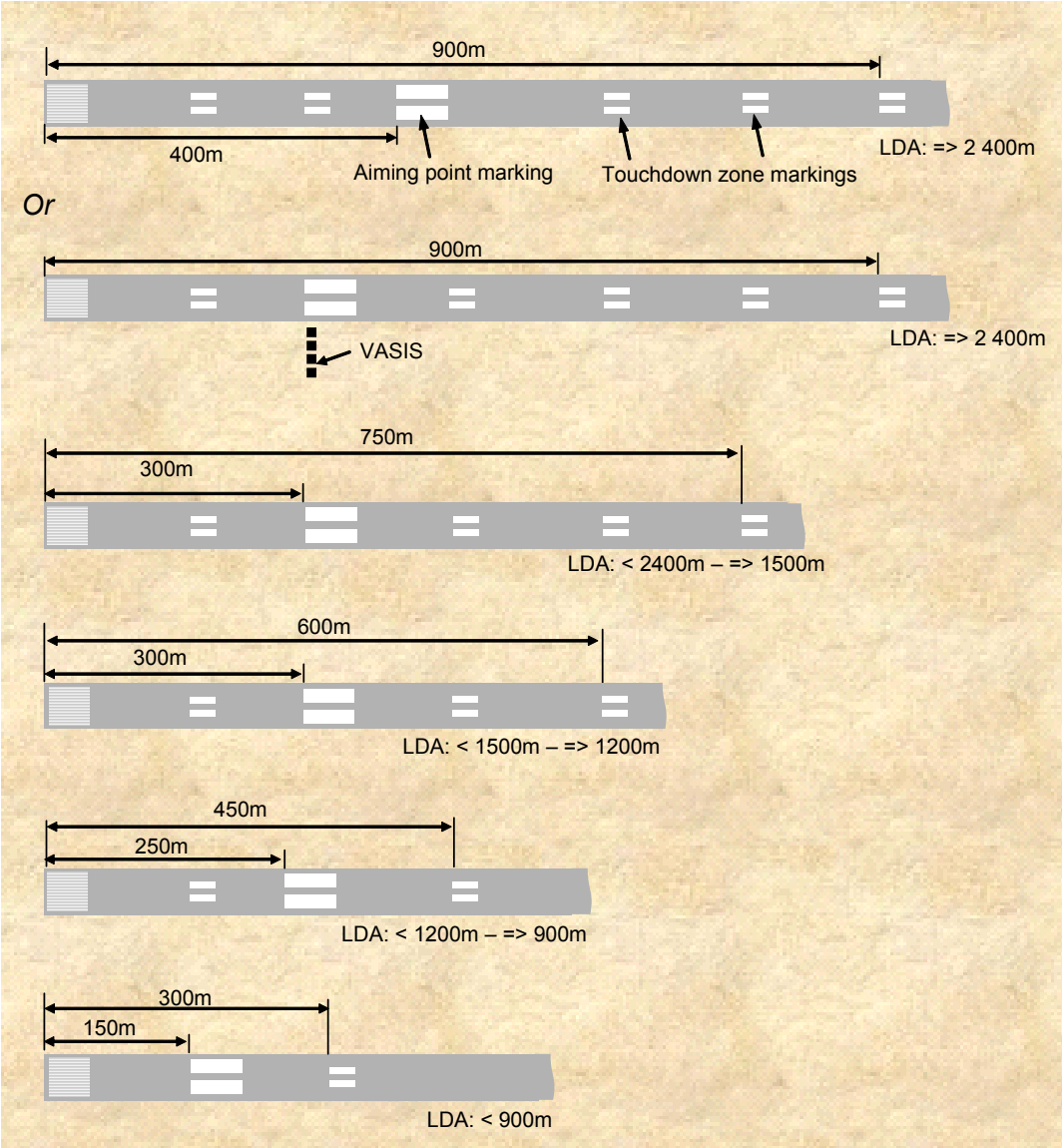


Figure 8.3-7A.2: Aiming point and ICAO 'A' – basic pattern touchdown zone markings – Examples

8.3.7A.7 A simple touchdown zone marking is as shown in Figure 8.3-7A.3 and must comprise 4 white stripes each not less than 22.5 m long and 3 m wide, located in pairs such that the ends nearest the threshold of each pair of stripes are 150 m and 450 m respectively from the line of the runway threshold. The lateral spacing between their inner sides must be equal to that of the aiming point marking.

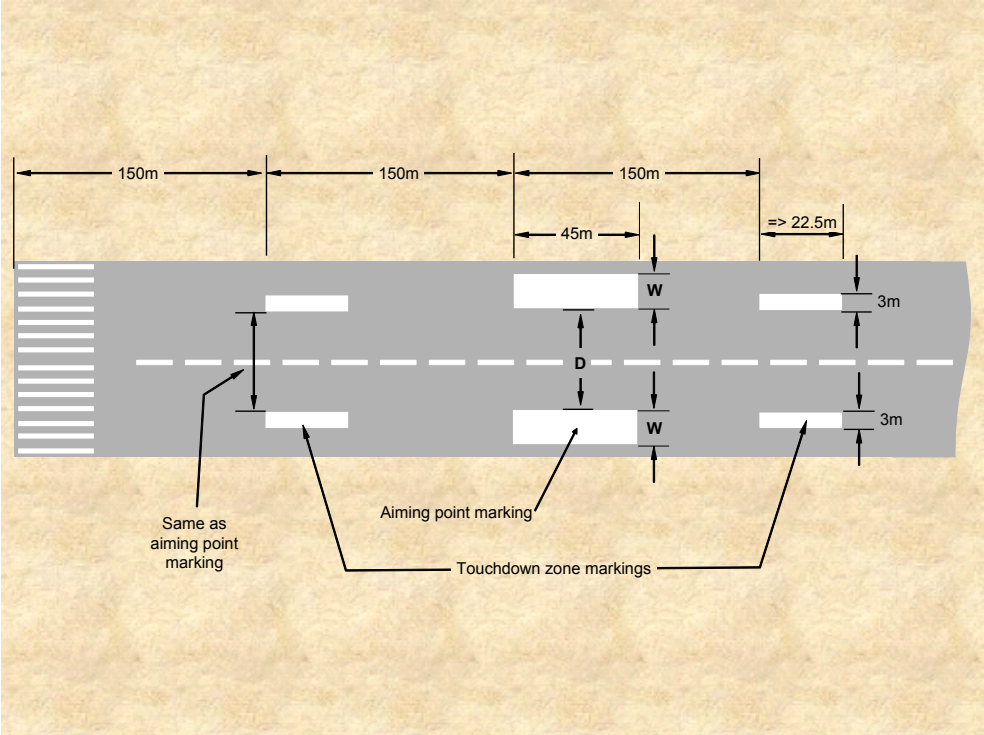


Figure 8.3-7A.3: Aiming point and simple touchdown zone markings

8.3.7A.8 If simple runway touchdown zone markings are provided on runways less than 1500 m in length, the markings at 450 m from the end of the runway threshold may be omitted.

8.3.8 Runway Threshold Markings

8.3.8.1 The permanent, or permanently displaced threshold must be indicated by a white transverse line, 1.2 m wide extending the full width of the runway at the location of the threshold, and white 'piano key' markings, consisting of adjacent, uniformly spaced, 30 m long stripes of specified width as shown in Figure 8.3-8.

8.3.8.2 Where practicable, this marking must also be used to indicate permanent or permanently displaced thresholds at gravel and natural surface runways.

8.3.8.3 Where the normal threshold marking is not practicable; runway markers may be used to delineate the ends of an unsealed runway.

8.3.8.4 Information on the location of thresholds is provided in Chapter 6 of this Manual.

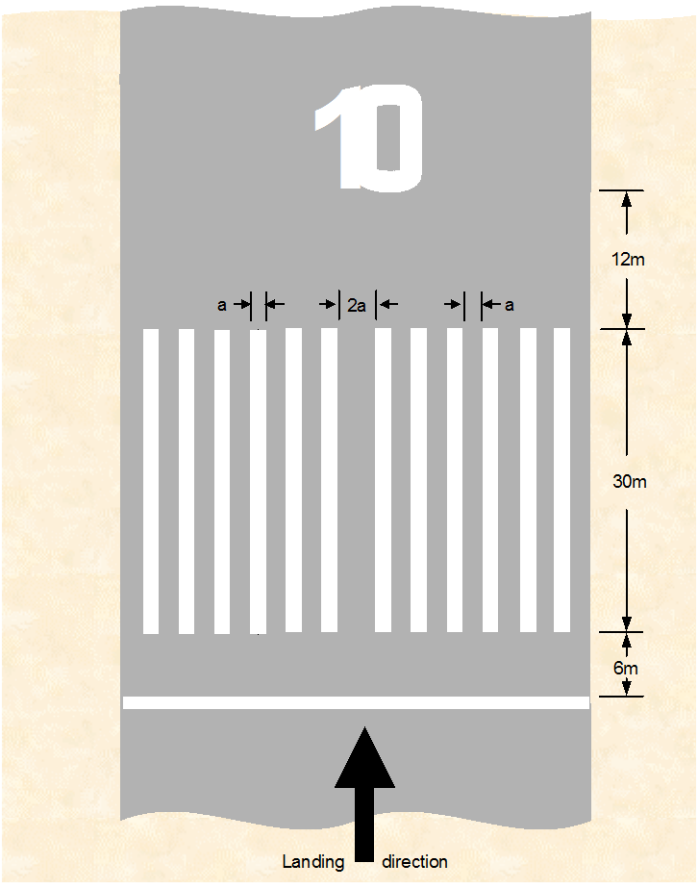


Figure 8.3-7: Runway threshold markings

Runway width (metres)	Number of Stripes	Width of Stripe Space (a) (metres)
15,18	4	1.5
23	6	1.5
30	8	1.5
45	12	1.7
60	16	1.7

8.3.9 Temporarily Displaced Threshold Markings

8.3.9.1 Whenever a permanent threshold is temporarily displaced, a new system of visual cues must be provided, which may include provision of new markings, obscuring and alteration of existing markings, and the use of CASA approved Runway Threshold Identification Lights (RTILs).

8.3.9.2 Where a threshold is temporarily displaced less than 300 m from the end of the runway, there is no additional survey requirement for obstacles. However where this distance is exceeded, the aerodrome operator must refer the matter to CASA.

8.3.9.3 Where a permanent threshold on any runway serving international air transport operations is displaced; the location of the new threshold must be identified by the system of temporary markings specified below, and RTILs.

8.3.9.4 Where practicable, RTILs should also be used for displaced thresholds on runways not serving international air transport aircraft. When used, unless otherwise directed by the Authority, the requirements to use Vee bar markers are waived.

8.3.9.5 Where the permanent threshold is to be displaced for more than 30 days, the temporary threshold must comprise a white line, 1.2 m wide, across the full width of the runway at the line of the threshold, together with adjacent 10 m long arrowheads, comprising white lines 1 m wide. The number of 10m long arrowhead markings used should be commensurate with the width of the runway. The existing centreline markings between the two thresholds must be converted to arrows as shown below; the permanent threshold marking and associated runway designation number must be obscured and a temporary runway designation number provided 12 m beyond the new threshold.

> **Note:** Where the runway fixed distance and touch down zone markings can cause confusion with the new threshold location those markings may also be obscured.

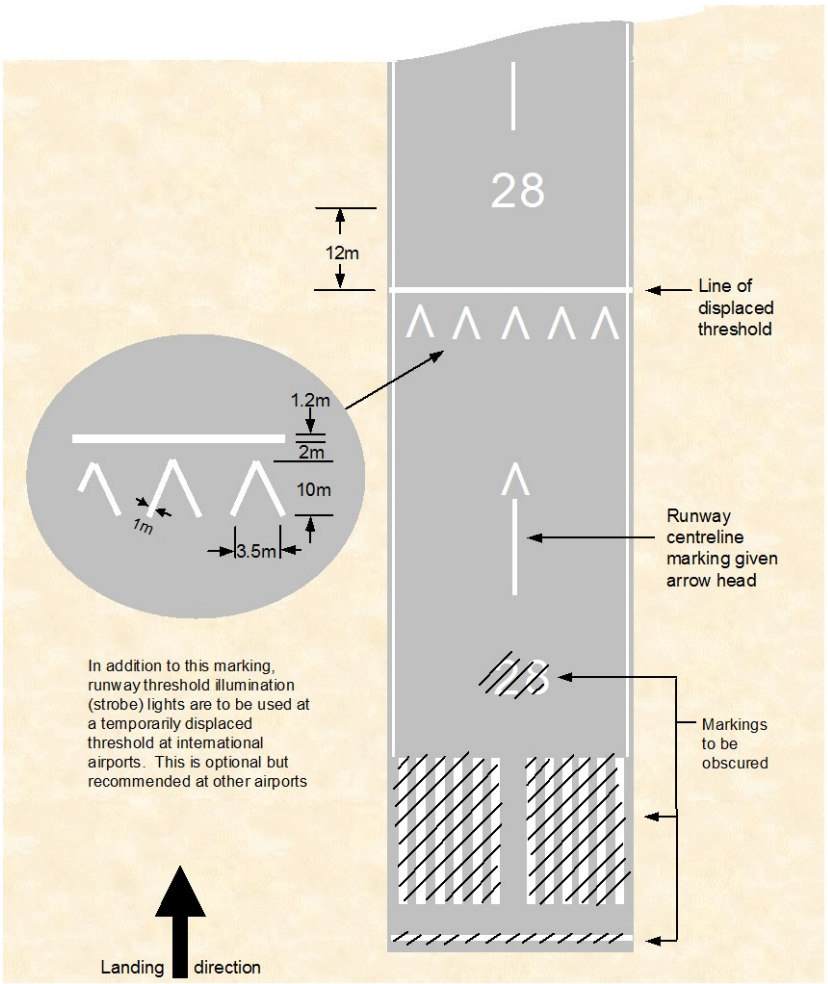


Figure 8.3-8: Temporarily displaced threshold markings (more than 30 days)

8.3.9.6 Where the permanent threshold is to be displaced for more than 5 days, but not more than 30 days, or by more than 450 m, the new location must be indicated by 'Vee-bar' markers comprising gable markers painted white and positioned on each side of the runway, together with flush, white, arrow markings, as shown. The existing threshold markings must be obscured. For runways more than 18 m wide, or accommodating air transport aircraft, 2 gables and 2 arrows must be provided on each side of the runway; in other cases, a single gable and arrow on each side of the runway is acceptable.

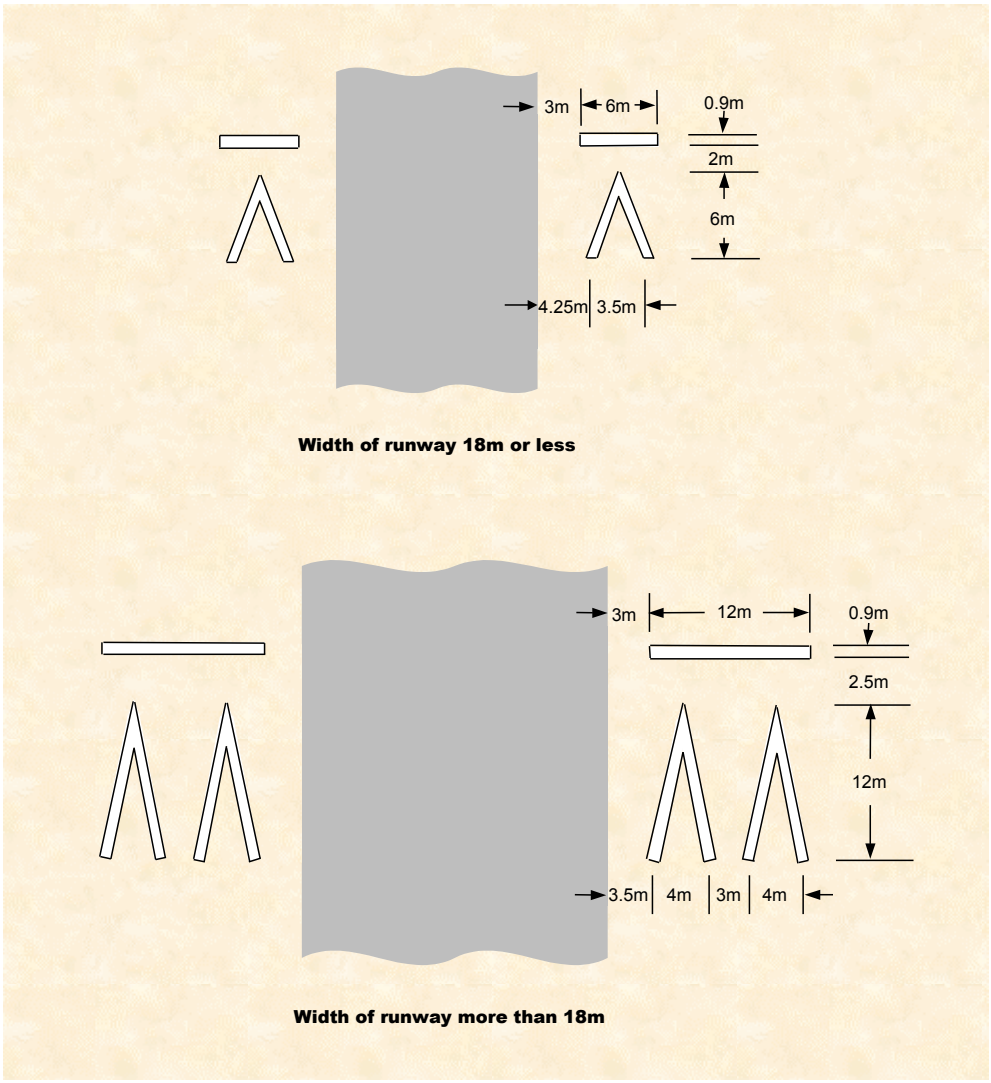


Figure 8.3-9: Temporarily displaced threshold markings (less than 30 days)

8.3.9.7 Where a threshold is to be temporarily displaced for 5 days or less, and the displacement is less than 450 m, the new threshold location must be indicated by the same 'Vee-bar' markers but the permanent threshold markings may be retained.

8.3.9.8 Where a threshold at an air traffic controlled aerodrome is to be temporarily displaced for 5 days or less, and the displacement is more than 450 m, the new threshold location is to be indicated by the above markings but the permanent threshold markings may be retained.

8.3.9.9 Markings of typical threshold and displaced thresholds are illustrated in the following six figures.

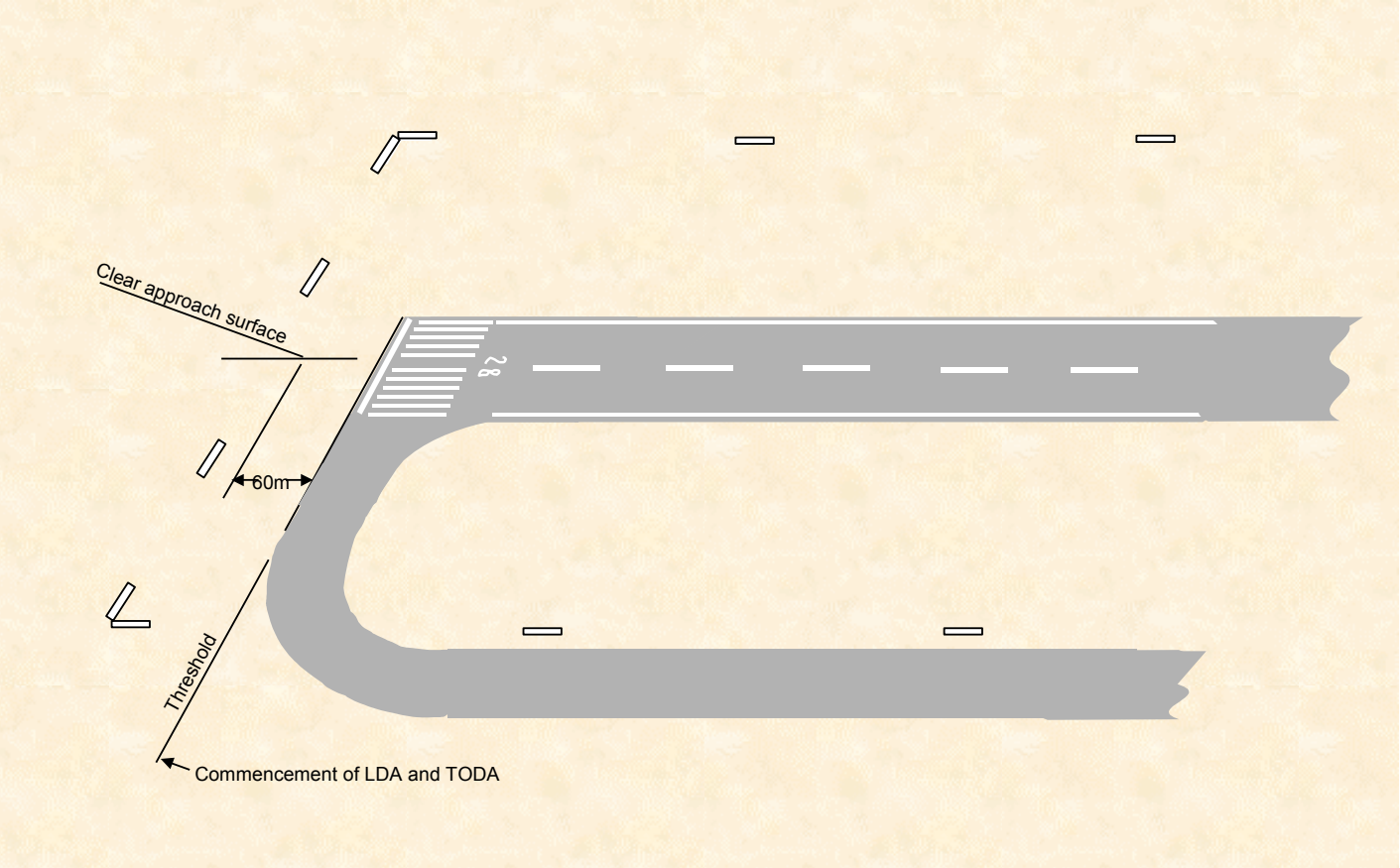


Figure 8.3-10: Markings for a typical runway with the threshold at the runway end

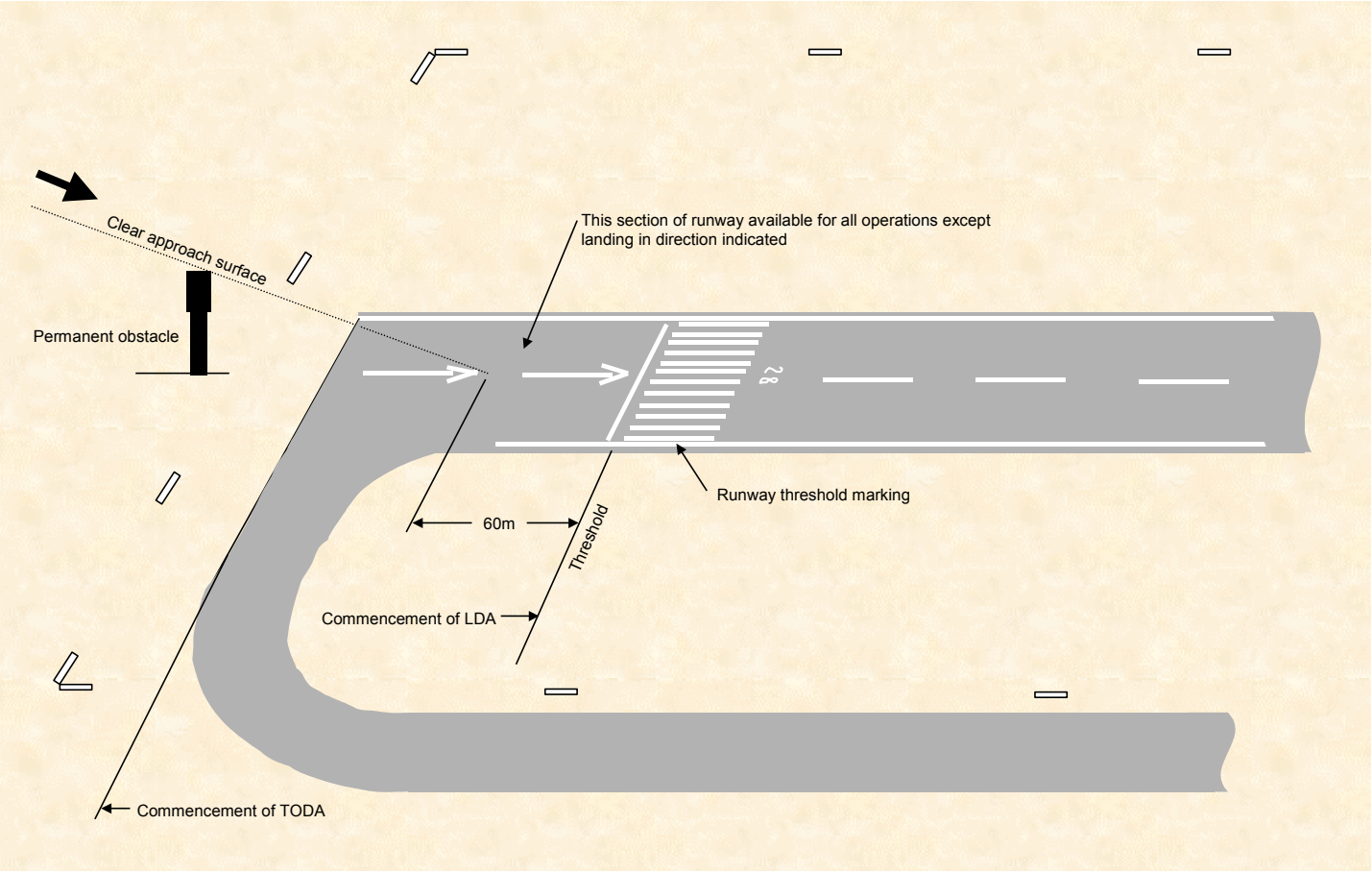


Figure 8.3-11: Markings for a typical runway with a permanently displaced threshold

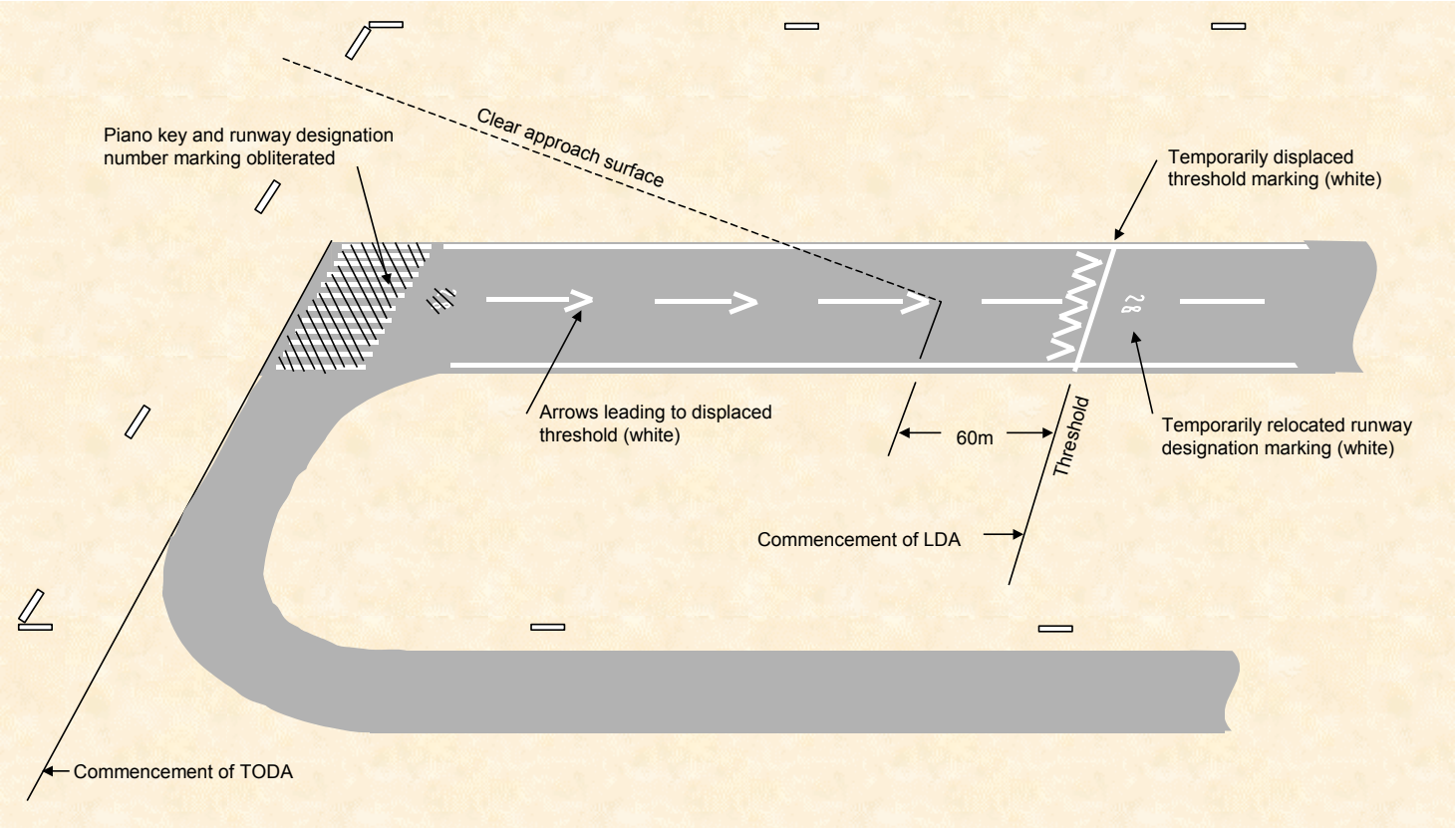


Figure 8.3-12: Markings for a temporarily displaced threshold due to obstacle infringement of the approach surface for a period in excess of 30 days

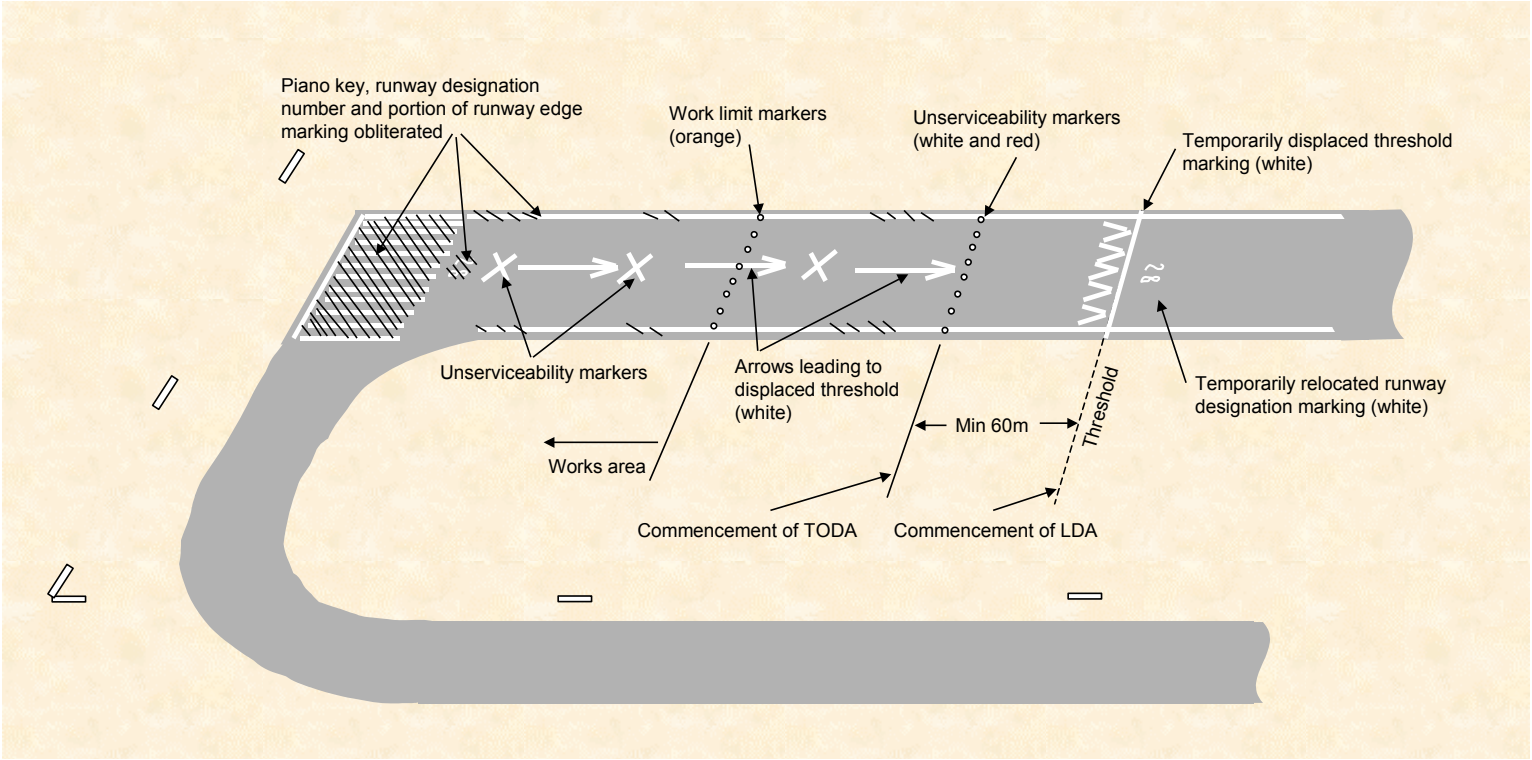


Figure 8.3-13: Markings for a temporarily displaced threshold due to works on the runway for a period in excess of 30 days

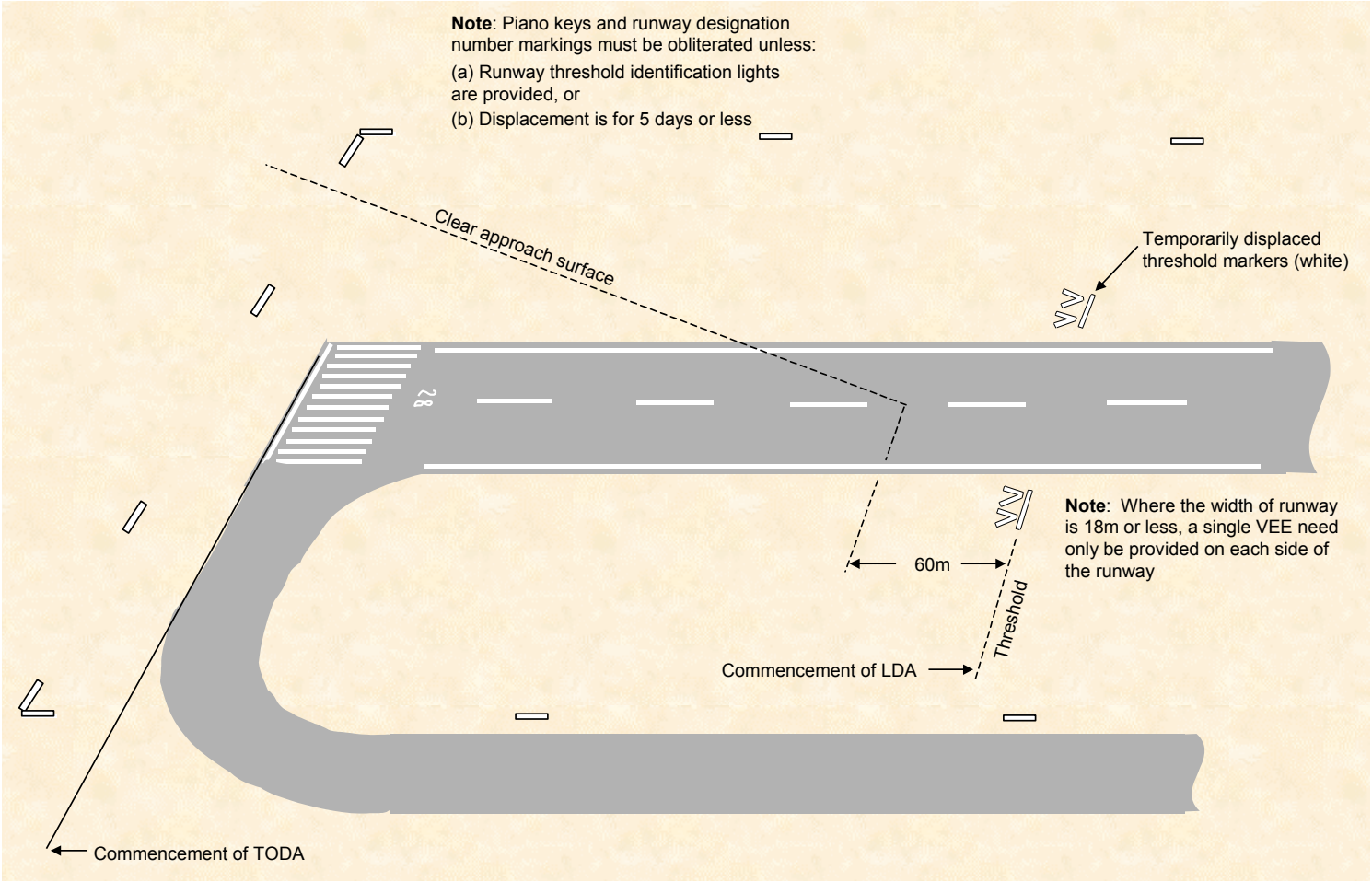


Figure 8.3-14: Markings for a temporarily displaced threshold due to obstacle infringement of approach surface for a period of 5 days or less and a displacement of less than 450 m

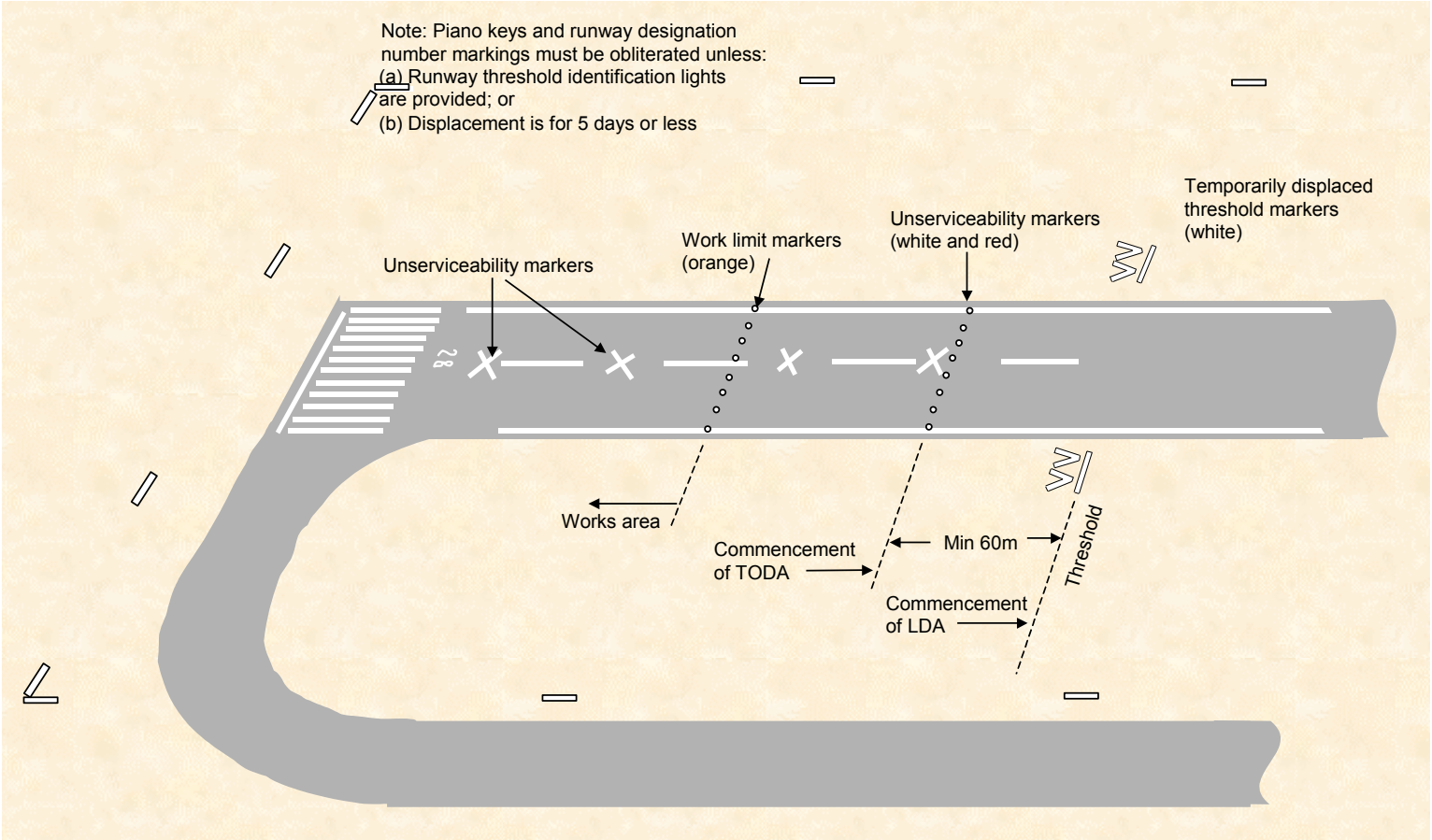


Figure 8.3-15: Markings for a temporarily displaced threshold due to works in progress on runway for a period of 5 days or less and a displacement of less than 450 m

8.3.10 Runway Land and Hold Short Position Markings

8.3.10.1 At an aerodrome where land and hold short operations are conducted, a runway land and hold short position marking must be provided at the intersection of two paved runways. The marking must be located and painted in accordance with the runway holding position marking specified in Paragraph 8.4.3.

Section 8.4: Taxiway Markings

8.4.1 Introduction

8.4.1.1 Taxiway markings must be provided on all asphalt, sealed or concrete taxiways, as specified below. Taxiway markings must be painted yellow.

8.4.2 Taxi Guideline Markings

8.4.2.1 Taxi guideline markings must be provided on all asphalt, sealed or concrete taxiway surfaces, in the form of a continuous yellow line 0.15 m wide. On straight sections, the guideline must be located in the centre of the taxiway. On curved taxiways, the guideline must be located parallel to the outer edge of the pavement and at a distance of half of the taxiway width from it; i.e. the effect of any fillet widening at the inner edge of a curve is ignored. Where a taxi guideline marking is interrupted by another marking such as a taxi-holding position marking, a gap of 0.9 m must be provided between the taxi guideline marking and any other marking.

8.4.2.2 The same form of taxi guideline marking must be used on aprons as detailed below, under ‘Apron Markings’.

8.4.2.3 Taxi guidelines on runways must not merge with the runway centreline, but run parallel to the runway centreline for a distance (D), not less than 60 m beyond the point of tangency where the runway code number is 3 or 4 and 30 m where the code number is 1 or 2. The taxi guideline marking must be offset from the runway centreline marking on the taxiway side, and be 0.9 m from the runway centrelines of the respective markings.

> **Note:** Markings with non-compliant separations do not have to be brought into compliance until the next remarking of the pavement.

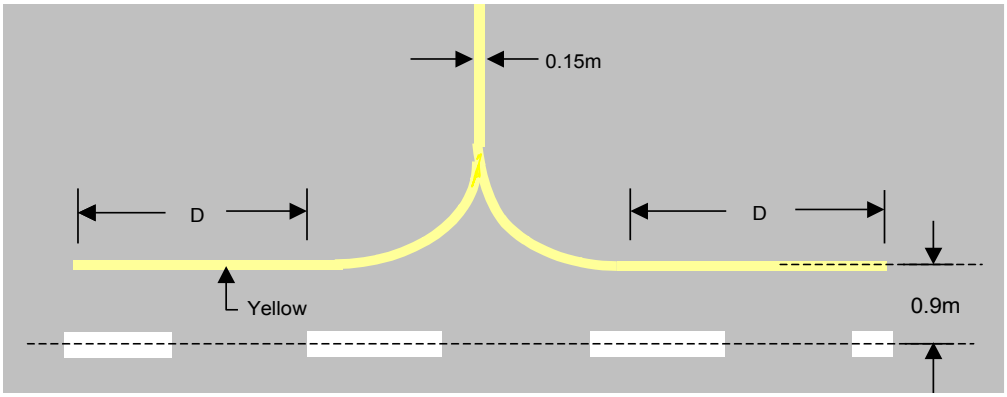


Figure 8.4-1: Taxi guideline markings meeting runway centreline markings

8.4.3 Runway Holding Position Markings

8.4.3.1 Runway holding position markings must be provided on all asphalt, sealed or concrete taxiways wherever these join or intersect with a runway. Standards for the location of runway holding positions are specified in Chapter 6.

8.4.3.2 Runway holding positions must be marked using the Pattern A or Pattern B runway holding position markings, shown in Figure 8.4-2, as appropriate.

8.4.3.3 Pattern A marking must be used at an intersection of a taxiway and a non-instrument, non-precision approach or precision approach Category I runway, and precision approach Category II or III runway where only one runway holding position is marked. Pattern A must also be used to mark a runway/runway intersection, where one of the runways is used as part of a standard taxi route.

8.4.3.4 Pattern B marking must be used where two or three runway holding positions are provided at an intersection of a taxiway with a precision approach runway. The marking closest to the runway must be the Pattern A marking; the marking(s) further from the runway must be Pattern B.

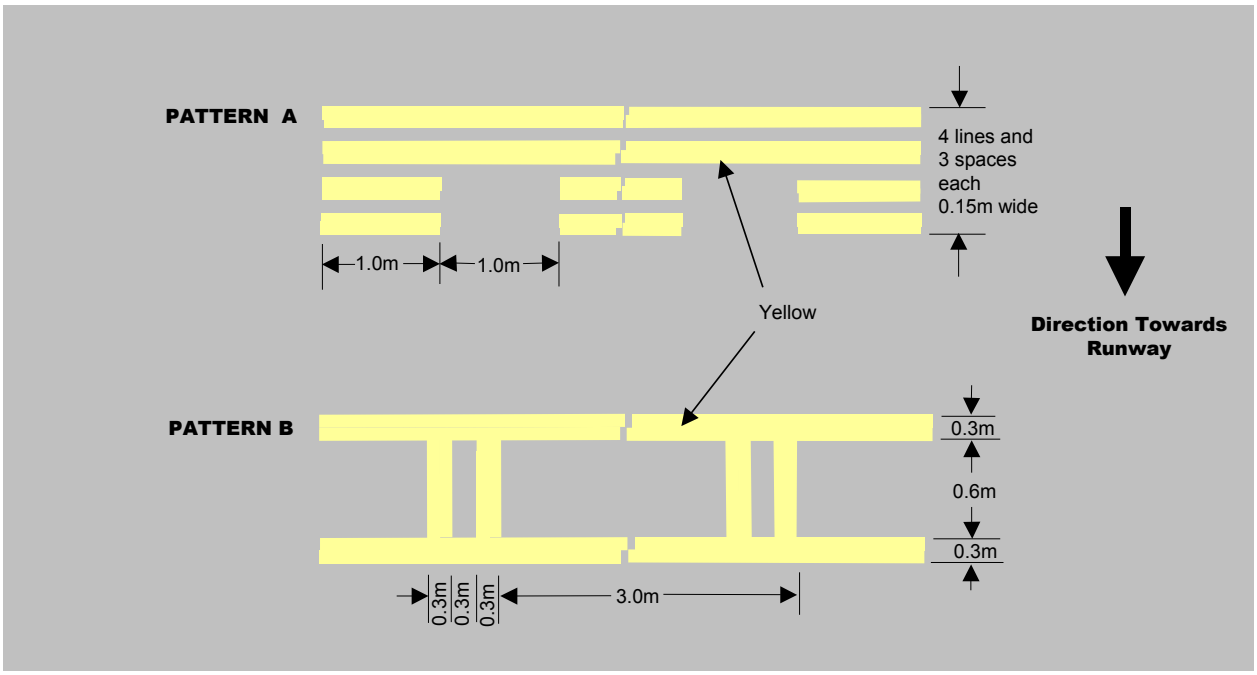


Figure 8.4-2: Pattern A and Pattern B runway-holding position markings

8.4.3.5 Where increased conspicuity of the Pattern A and Pattern B runway-holding position markings is required, the runway-holding position markings must be increased in size as indicated in Figure 8.4-3.

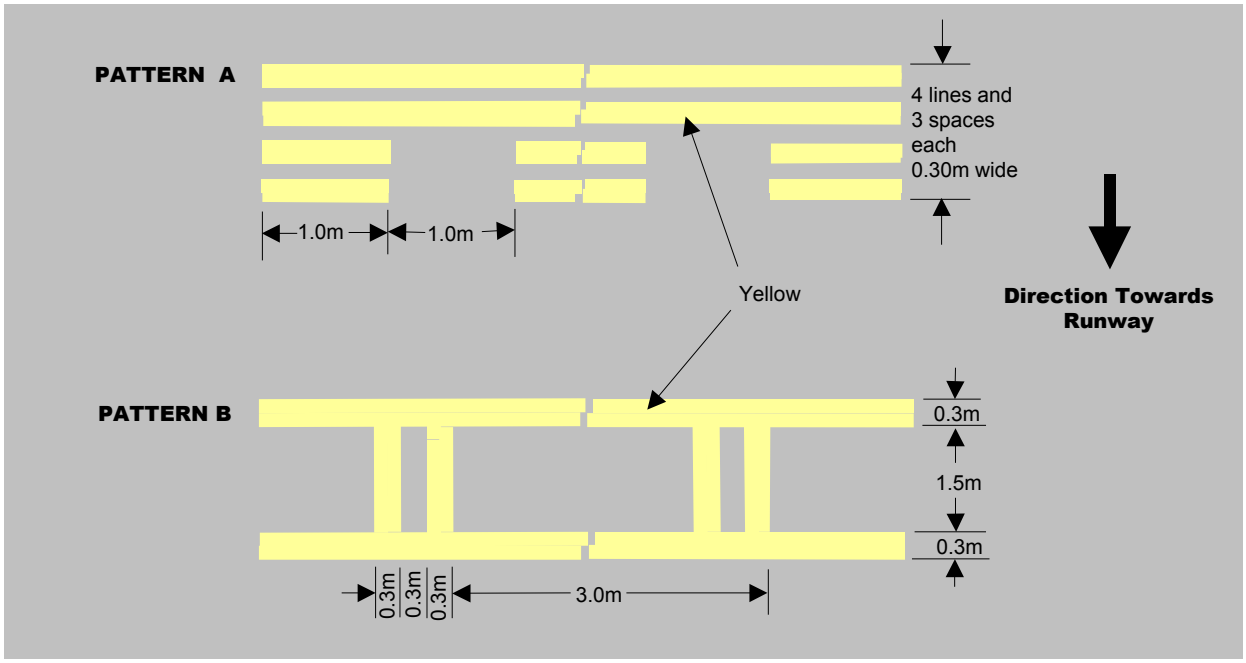


Figure 8.4-3: Pattern A and Pattern B runway-holding position markings — increased conspicuity

8.4.4 Intermediate Holding Position Markings

8.4.4.1 Intermediate holding position markings must be provided on all asphalt, sealed or concrete taxiway intersections or on any location of a taxiway where air traffic control requires the aircraft to hold. The intermediate holding position marking must be located in accordance with the standards specified in Chapter 6.

8.4.4.2 Intermediate holding position marking must consist of a single yellow broken line, 0.15 m wide, extending across the full width of the taxiway at right angles to the taxi guideline. Lines and gaps must each be 1.0 m long, as shown below:

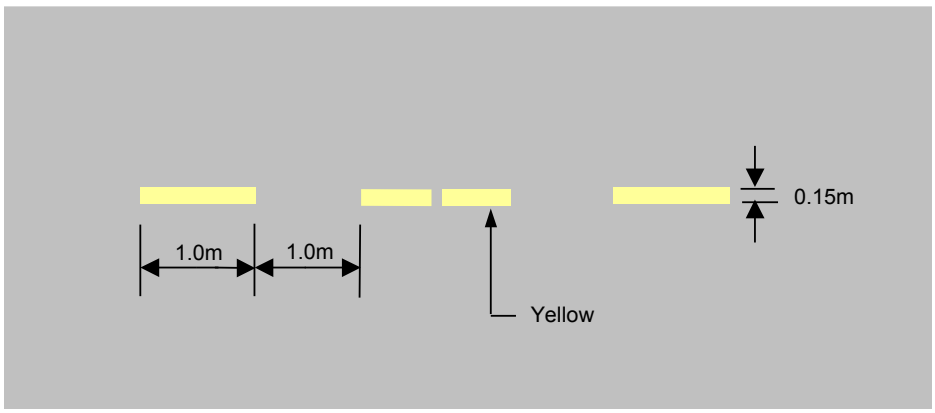


Figure 8.4-4: Intermediate holding position markings

8.4.5 Taxiway Edge Markings

8.4.5.1 Taxiway edge markings must be provided for paved taxiways where the edges of full strength pavement are not otherwise visually clear. Markings must consist of two continuous 0.15 m wide yellow lines, spaced 0.15 m apart and located at the taxiway edge, as shown below.

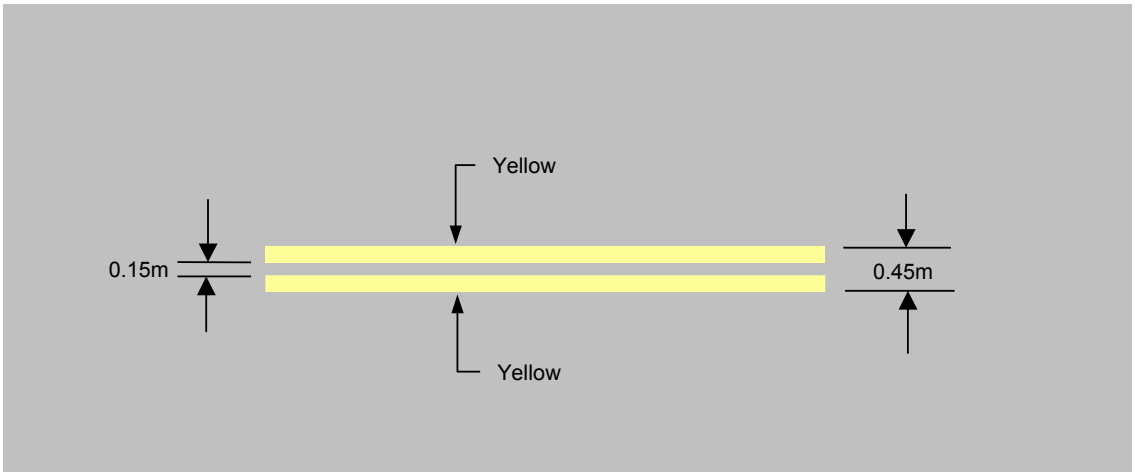


Figure 8.4-5: Taxiway edge markings

> **Note:** Whilst not mandatory, the additional provision of transverse or herringbone stripes on the sub strength surface has been found to be of assistance in avoiding the possibility for confusion on which side of the edge marking the sub strength pavement is located. This additional marking is an acceptable means of compliance with these standards.

8.4.6 Holding Bay Markings

8.4.6.1 Holding bay markings must be provided on all sealed, asphalt or concrete holding bays. Holding bay markings must comprise taxi guideline markings and intermediate holding position markings as shown in Figure 8.4-6. Markings must be located so that aircraft using the holding bay are cleared by aircraft on the associated taxiway by at least the distance specified in Chapter 6. The holding position marking must be painted in accordance with the intermediate holding position marking, unless that is also a runway holding position, in which case the Pattern A runway holding position marking applies.

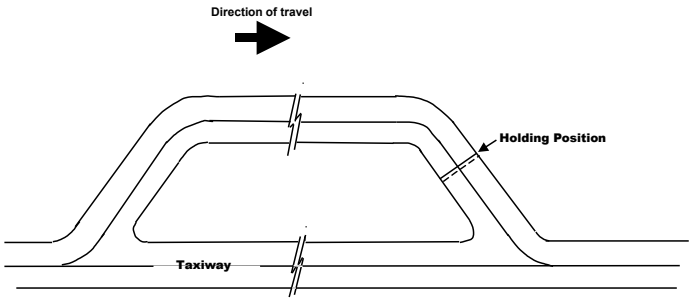


Figure 8.4-6: Holding bay markings

8.4.7 Taxiway Pavement Strength Limit Markings

8.4.7.1 These markings are used at the entrance of a taxiway of low strength pavement where the aerodrome operator decides to impose a weight limitation, for example, ‘Max 5,700 kg’.

8.4.7.2 Where the taxiway pavement strength limit marking is provided, as shown in Figure 8.4-7, the letters and numbers must be painted yellow, must be 2.0 m in height, 0.75 m in width, with 0.15 m line width and at 0.5 m spaces. The marking must be readable from aircraft on the full strength pavement.

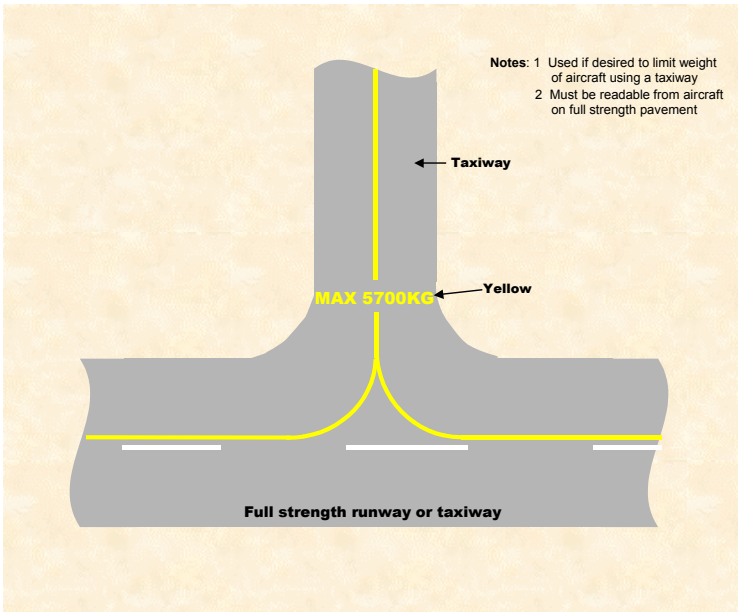


Figure 8.4-7: Taxiway pavement-strength limit markings

8.4.7.3 Edge markings of the associated main taxiway or apron, or the side stripe markings of the runway, must be interrupted across the width of the low strength taxiway entrance.

Section 8.5: Apron Markings

8.5.1 Introduction

8.5.1.1 Aprons accommodating aircraft of 5,700 kg Maximum All Up Mass (MAUM) and above, must be provided with taxi guidelines and primary aircraft parking position markings. Where the apron may be occupied by these and lighter aircraft at the same time, the aerodrome operator must also provide secondary aircraft parking position markings on the apron for the lighter aircraft.

8.5.1.2 Where aprons accommodate only aircraft of less than 5,700 kg MAUM, there is no mandatory requirement for taxi guidelines nor for marked aircraft parking positions. In these cases, the aerodrome operator may decide whether to provide markings, or to allow random parking.

8.5.1.3 The design of apron markings must ensure that all relevant clearance standards are met, so that safe manoeuvring and the precise positioning of aircraft is achieved. Care must be taken, to avoid overlapping markings.

8.5.2 Apron Taxi Guideline Markings

8.5.2.1 Apron taxi guideline markings must be of the same form as those used on the taxiway. The design of taxi guidelines on aprons is dependent on whether the aircraft is being directed by a marshaller or the pilot.

8.5.2.2 Where aircraft are to be directed by a marshaller, the ‘nose wheel position principle’ shall apply; that is, the taxi guideline is designed so that when the aircraft nose wheel follows the taxi guideline, all the required clearances are met.

8.5.2.3 Where aircraft are to be guided by the pilot, the ‘cockpit position principle’ shall apply; that is the taxi guideline is designed so that when a point on the centreline of the aircraft midway between the pilot and the co-pilot seats (or in the case of a single pilot aircraft, in the centre of the pilot seat) follows the taxi guideline, all the required clearances are met.

8.5.2.4 Where there is a change in aircraft position control between the pilot and the marshaller, the taxi guideline must convert from one principle to the other. At aerobridges, the taxi guideline must be designed using the cockpit position principle.

8.5.2.5 Where an aircraft designator marking is required to cover a multiple number of aircraft types, and there is insufficient space for the marking, an abbreviated version of the designator may be used e.g. an A330-200 may be abbreviated to A332, a BAe 146-200 to B462 and a B737-800 to B738. A list of typical aircraft designators is published by Airservices Australia on their web page:
http://www.airservicesaustralia.com/pilotcentre/SpecialpilotOps/acft.pdf.

8.5.3 Apron Edge Markings

8.5.3.1 Must be provided where the limit of high strength pavement cannot be distinguished from the surrounding area, and aircraft parking is not restricted to fixed parking positions. Where marking is required, the apron edge must be identified by 2 continuous yellow lines 0.15 m wide, spaced 0.15 m apart.

8.5.3.2 The edge of gravel, grass or other natural surface aprons must be identified by cones, spaced at a maximum distance of 60 m and painted yellow; except for dedicated helicopter aprons which must be light blue.

8.5.4 Parking Clearance Line

8.5.4.1 Parking clearance lines may be provided at an aircraft parking position to depict the area that must remain free of personnel, vehicles and equipment when an aircraft is taxiing (or being towed) into position or has started engines in preparation for departure.

8.5.4.2 Parking clearance lines may also be provided on light aircraft aprons with random parking, where it is desired to limit the parking to particular areas.

8.5.4.3 The parking clearance line must comprise a continuous red line 0.10 m or, if desired, 0.20 m wide. Where required, a continuous yellow or white line 0.10 m wide on either side can enhance the parking clearance line. The words ‘PARKING CLEARANCE’ must be painted in yellow on the side where the light aircraft are parked, and readable from that side. These words must be repeated at intervals not exceeding 50 m, using letters 0.3 m high, located 0.15 m from the line, as shown below.

Figure 8.5-1: Parking clearance line

8.5.5 Aircraft Type Limit Line

8.5.5.1 Where adjoining portions of pavement cannot accommodate the same aircraft type, information to this effect must be provided, marking the boundary of the restricted pavement. The marking must consist of a broken yellow line, comprising strips 3 m long and 0.3 m wide, separated by 1 m spaces. The designator must be 0.15 m above the line, in letters and numbers 0.5 m high. The marking is to be repeated at intervals not exceeding 50 m.

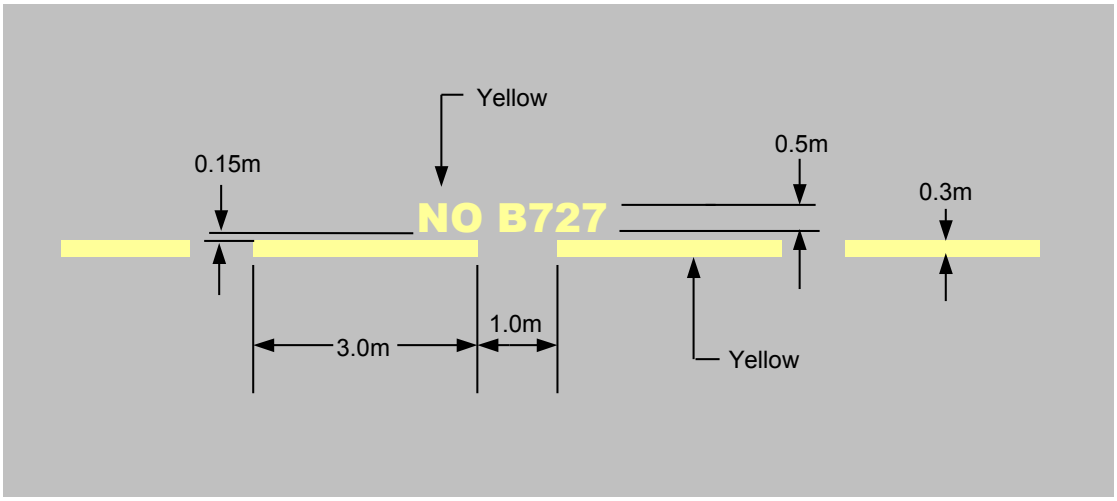


Figure 8.5-2: Aircraft type limit line

8.5.6 Parking Weight Limit Line

8.5.6.1 Where adjoining portions of pavement cannot accommodate the same aircraft weight, this must be signified by marking an aircraft weight limitation on the weaker pavement. The marking must consist of a broken yellow line, comprising strips 3 m long and 0.3 m wide, separated by 1 m spaces. The designator must be 0.15 m above the line, in letters and numbers 0.5 m high. The marking is to be repeated at intervals not exceeding 50 m.

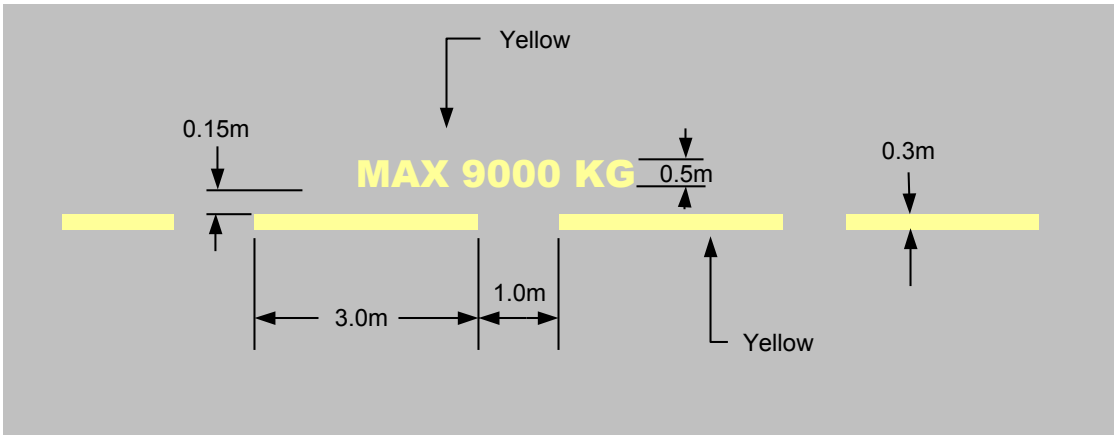


Figure 8.5-3: Parking weight limit line

8.5.7 Leased Area Line

8.5.7.1 Where the aerodrome operator wishes to identify leased areas on a sealed, concrete or asphalt apron, the marking must consist of a 0.15 m solid line, painted lime green.

8.5.8 Equipment Clearance Line

8.5.8.1 Equipment clearance lines must be used on congested aprons to assist service vehicles keep clear of manoeuvring aircraft. This marking must consist of red stripes, 1 m long and 0.15 m wide, separated by 1 m gaps. The designation 'EQUIPMENT CLEARANCE' must be painted on the side of the line occupied by the equipment and readable from that side. The designation must be repeated along the line at intervals of not more than 30 m. Letters must be 0.3 m high, 0.15 m from the line, painted red.

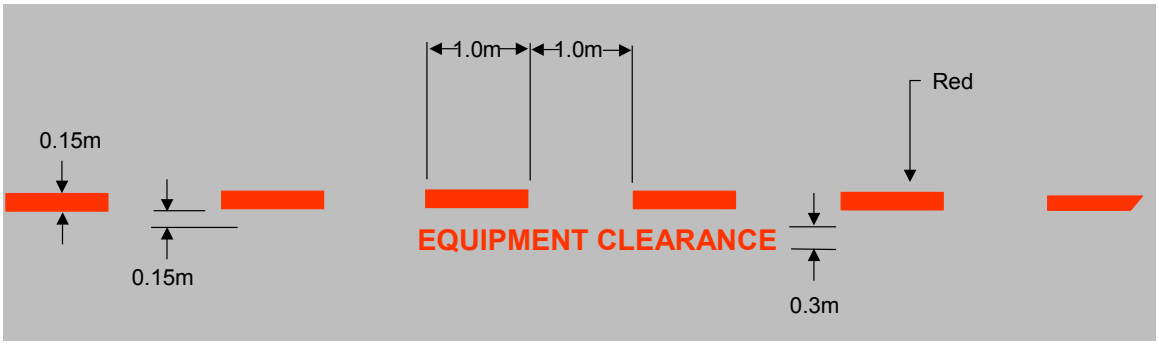


Figure 8.5-4: Equipment clearance line

8.5.9 Equipment Storage Markings

8.5.9.1 Equipment storage markings must consist of a continuous red painted line, 0.1 m wide.

8.5.9.2 The words 'EQUIPMENT STORAGE' must be painted in red on the side where equipment is stored, and readable from that side. Letters must be 0.3 m high and 0.15 m from the line, as shown below. This marking must be repeated at intervals not exceeding 50 m along the boundary.

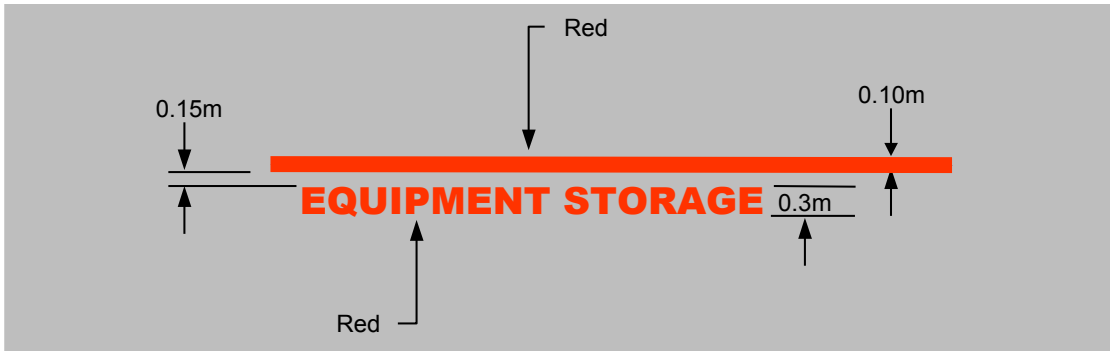


Figure 8.5-5: Equipment storage and apron road marking

8.5.10 Apron Service Road Markings

8.5.10.1 Roads on apron areas must be marked to keep vehicle traffic clear of aircraft and taxiways, and to minimise the risk of vehicle-to-vehicle accidents.

8.5.10.2 Each lane of an apron service road must be of a minimum width to accommodate the widest vehicle in use at that location, e.g. emergency vehicles or ground support equipment.

8.5.10.3 The apron service road marking must consist of a continuous white painted line, 0.1 m wide.

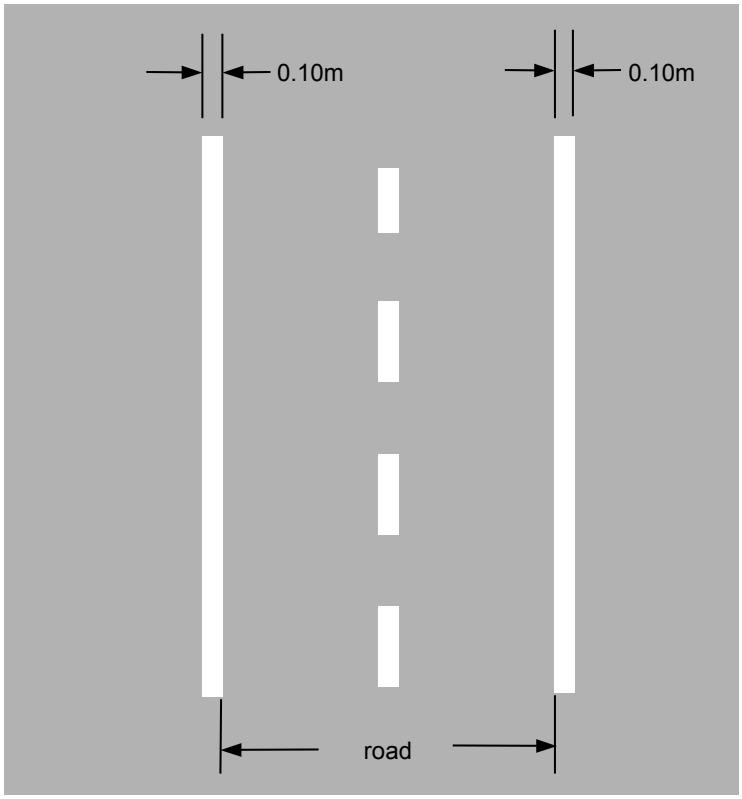


Figure 8.5-6: Apron service road

8.5.10.4 Where a service road is located adjacent to taxiing aircraft the side marking must be shown with a continuous double white line. This indicates DO NOT CROSS. Each continuous white line must be 0.1 m wide. The separation between the two continuous white lines must not be less than 0.05 m.

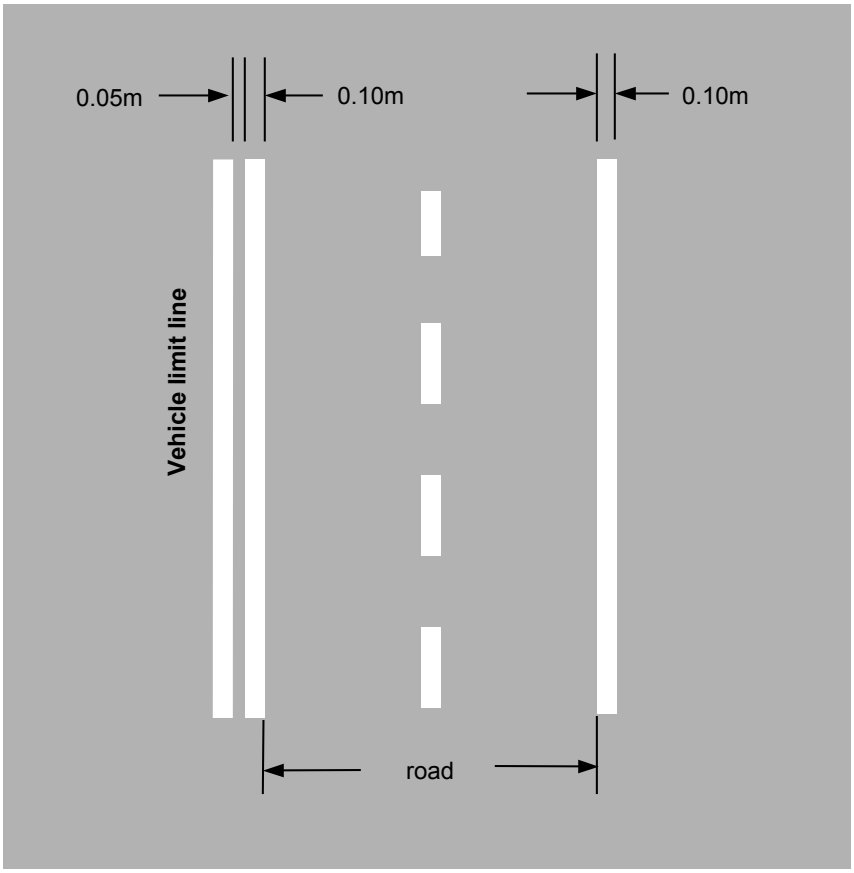


Figure 8.5-7: Apron service road alongside a vehicle limit line

8.5.10.5 Where a service road crosses a taxiway or apron taxilane, the service road marking may be presented in a zipper pattern. Each segment of the zipper is not to be more than 50 cm in length. This type of edge marking makes the road more conspicuous to the pilots of aircraft operating on the taxiway or taxilane.

8.5.11 Aircraft Parking Position Markings

8.5.11.1 The aerodrome operator must mark all aircraft parking positions for use by aircraft of 5,700 kg MAUM and above, on concrete, sealed or asphalt apron surfaces.

8.5.11.2 Aircraft parking positions are classified as primary or secondary positions. Primary positions are designed for normal apron demand, whereas secondary positions either provide alternative positions for use during abnormal circumstances, or allow a larger number of smaller aircraft to be parked.

8.5.11.3 Aircraft parking position markings comprise lead-in lines, primary parking position markings, secondary parking position markings, lead-out lines and designation markings.

8.5.12 Lead-in Line

8.5.12.1 Lead-in lines must be provided to each aircraft parking position on all sealed, concrete and asphalt aprons with aircraft parking position markings.

8.5.12.2 Lead-in lines to primary aircraft parking positions must be continuous, 0.15 m wide and painted yellow; they have the same characteristics as a taxi guideline.

8.5.12.3 At a secondary parking position, the lead-in line must be marked by a series of solid yellow circles 0.15 m in diameter, spaced at 1 m intervals. Where an abrupt change in direction occurs the line must be solid for a distance of 2 m before and after the turn.

8.5.13 Taxi Lead-in Line Designation

8.5.13.1 Designation must be provided where an apron has more than one marked aircraft parking position. Taxi lead-in line designation markings must be located at the beginning of each diverging taxi guideline or lead-in line; aligned so that they can be seen by the pilot of an approaching taxiing aircraft. There are three types of taxi lead-in line designations:

(a) parking position number designation;

(b) aircraft type limit designation; and

(c) aircraft weight limit designation.

8.5.13.2 The parking position number designation indicates the aircraft parking position to which the line leads. Where a lead-in line leads to several positions, the designation must include the first and last numbers of the positions served. For instance, a guideline leading to the six positions numbers 1 to 6, is shown as 1–6. The designations must comprise characters 2 m high, painted yellow, as shown in Figure 8.5-8.

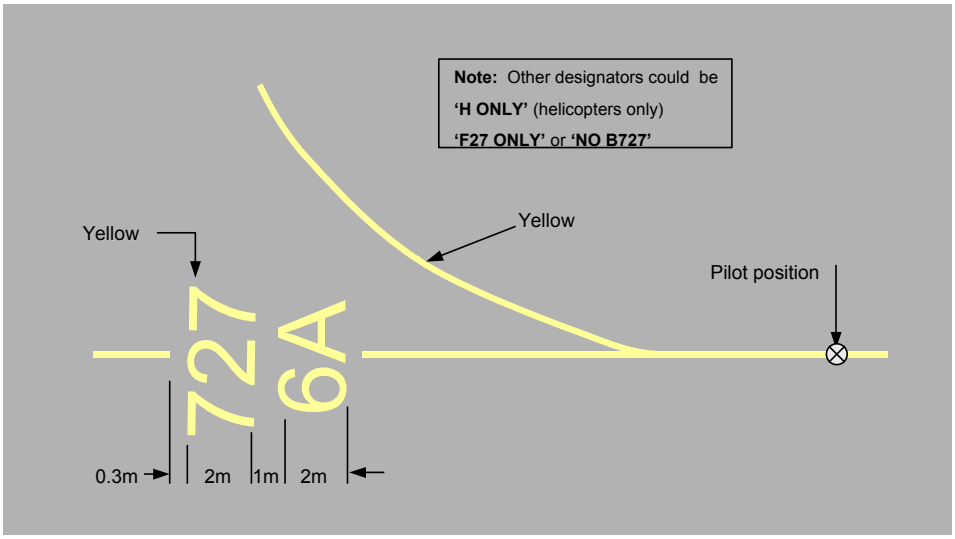


Figure 8.5-8: Parking position number designation

8.5.13.3 The aircraft type limit designations indicate which parking positions are capable of accommodating particular aircraft types. The designation must be painted in yellow characters 2 m high, with 0.3 m spacing from the lead-in line, as shown in Figure 8.5-9. Appropriate aircraft type limit designations must be provided at the lead-in line for each position to which restrictions apply. Where a diverging lead-in line leads to an apron parking position suitable only for helicopters; the designation 'H ONLY' must be provided.

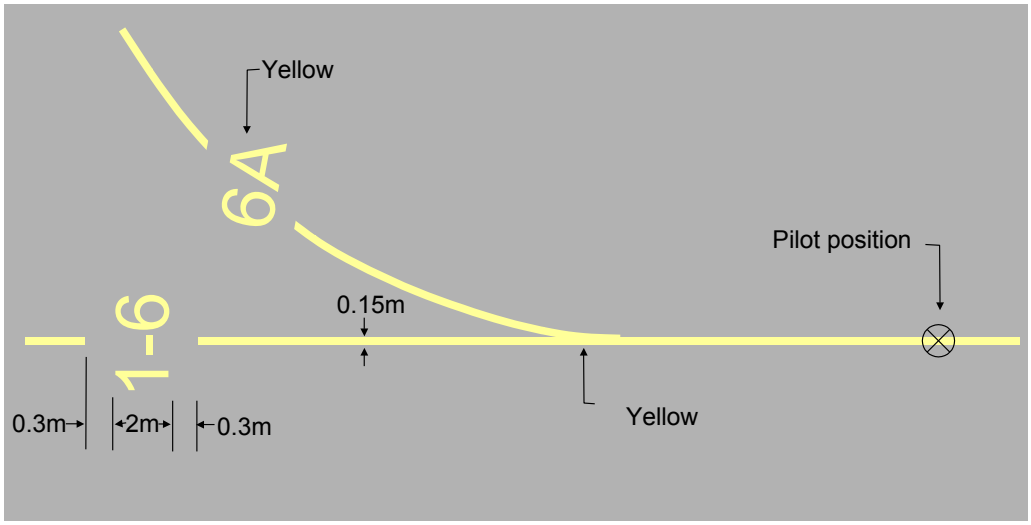


Figure 8.5-9: Aircraft type limit designation

8.5.13.4 The aircraft weight limit designations inform pilots of a weight limitation to a parking position. They specify the maximum weight allowable in the form, '9,000 kg'. The designation must be painted in yellow characters 2 m high, separated by 0.3 m spaces from the lead-in line, as shown in Figure 8.5-10.

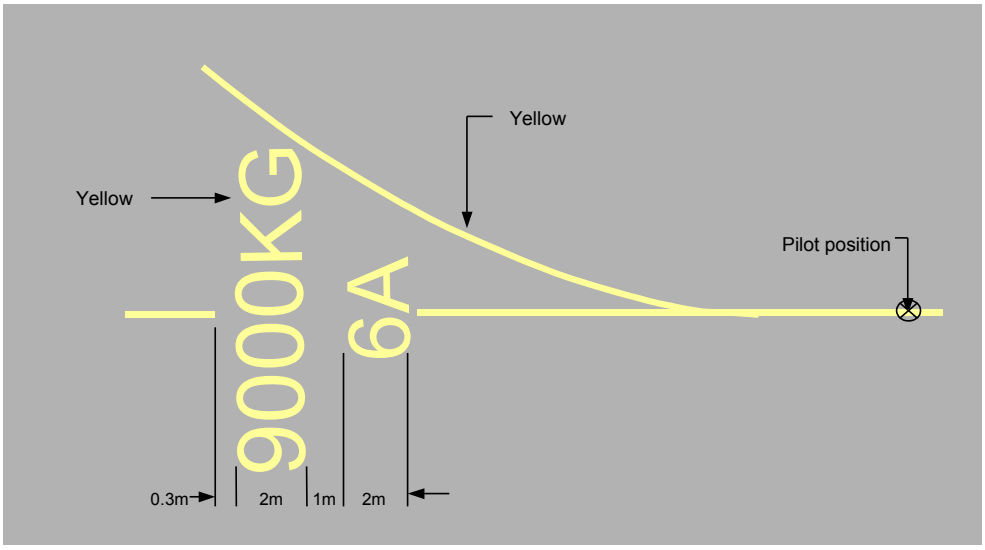


Figure 8.5-10: Aircraft upper weight limit designation

8.5.14 Pilot Turn Line

8.5.14.1 Where required, a pilot turn line must be placed at right angles to the lead-in line, located on the left side as viewed by the pilot, and must be 6 m long, 0.3 m wide and painted yellow. The aircraft type designation must be painted in yellow letters, 1 m high and spaced 0.15 m below the bar, facing the direction of incoming aircraft. The designation must be offset from the lead-in line as follows:

Table 8.5-1

Aircraft code letter	Offset
C	5 m
D	10 m
E	10 m

8.5.15 Primary Aircraft Parking Position Markings

8.5.15.1 Primary aircraft parking position markings comprise two straight yellow lines; the alignment line must be 0.15 m wide, and shows the required orientation of the parked aircraft. The stop line must be 0.3 m wide, and shows the pilot or marshaller the point at which the aircraft is to be stopped. The position of the stop line depends on whether the aircraft is under the control of the apron marshaller or the pilot.

8.5.16 Marshaller Stop Line

8.5.16.1 The stop line must be located where the aircraft nose wheel is to stop; and on the right hand side of, and at right angles to, the alignment line, as seen by the marshaller facing the incoming aircraft.

8.5.16.2 The aircraft type designation must be yellow, in letters 0.3 m high, and spaced 0.15 m below the stop line. The lettering must be legible to the marshaller facing the incoming aircraft, as shown below.

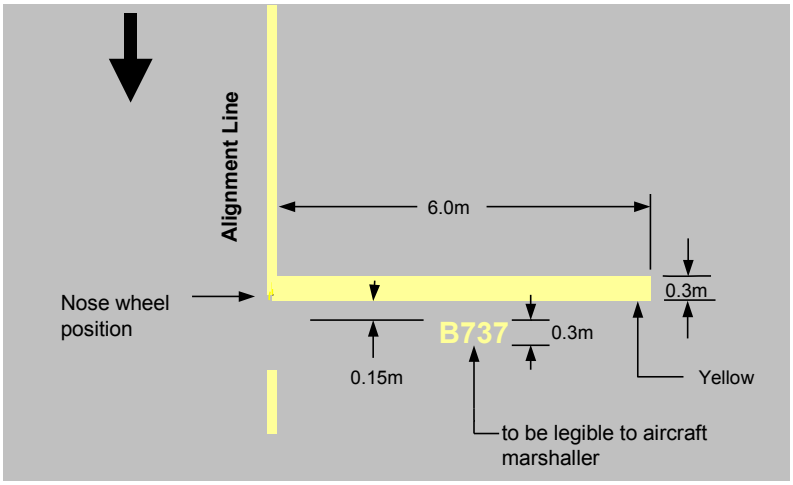


Figure 8.5-11: Marshaller stop line

8.5.17 Pilot Stop Line

8.5.17.1 The pilot stop line must be located so that when the aircraft is stopped, the line is immediately to the left of the pilot. The pilot stop line must be 6 m long and offset from the alignment line as follows:

Table 8.5-2

Reference Code Letter	Offset X
C	5 m
D	10 m
E	10 m

8.5.17.2 Where aircraft of all codes are to be accommodated at the one parking position, the offset for code letter C must be used and the marking extended in length to 11 m.

8.5.17.3 The aircraft type designation must be written in yellow letters 1 m high and spaced 0.15 m below the pilot stop line, as shown below.

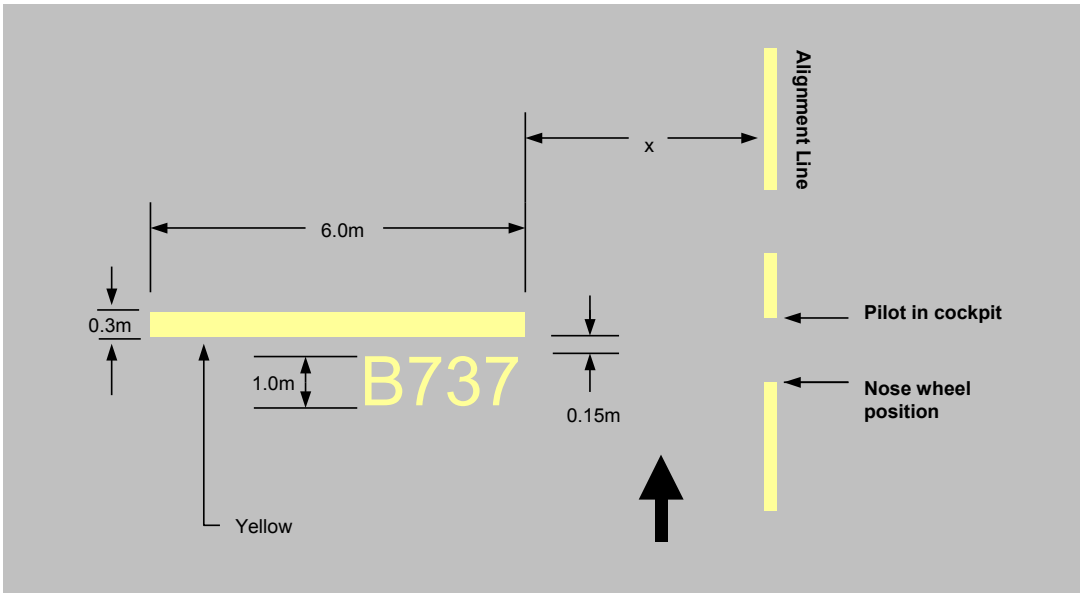


Figure 8.5-12: Pilot stop line (no marshaller)

8.5.18 Alignment Line

8.5.18.1 The alignment line must extend from the location of the nose wheel in the parked position, backwards under the body of the aircraft for a distance ‘X’ in Table 8.5-3. The line must also extend forward, commencing at a point 3 m past the most forward nose wheel position and extending for a distance ‘Y’, in the table. A 1 m long section of the alignment line must be placed in the centre of the 3 m gap, as shown in Figure 8.5-13.

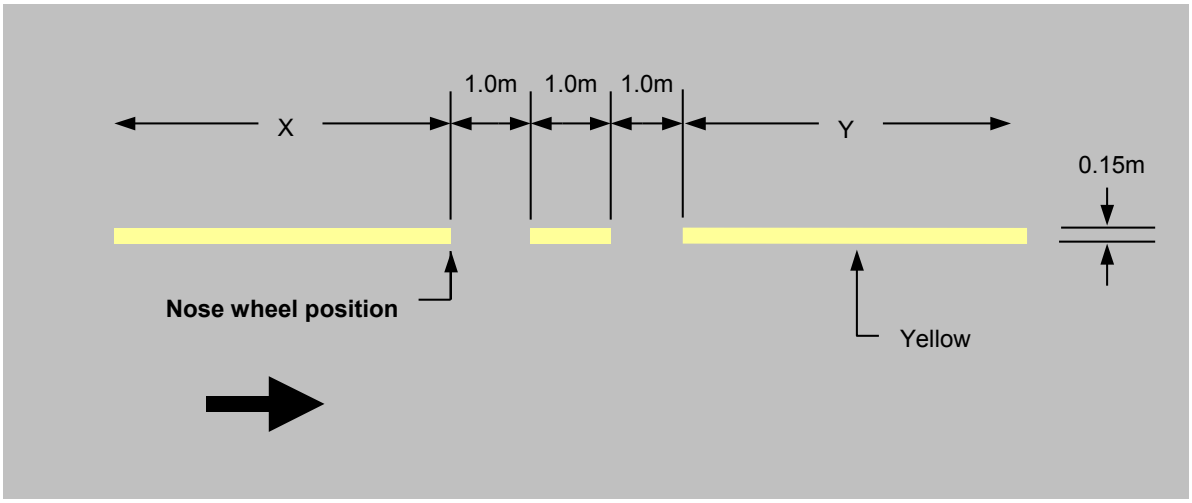


Figure 8.5-13: Alignment line

Table 8.5-3

Reference Code Letter	Distance Y	Distance X
A & B	9 m	5 m
C, D & E	18 m	10 m

8.5.19 Secondary Aircraft Parking Position Markings

8.5.19.1 These alternative markings are used during abnormal circumstances, or to allow a larger number of smaller aircraft to use the same apron area as a smaller number of larger aircraft using the primary positions. Secondary markings may be either keyhole markings or triangle markings, painted yellow, except where the secondary position markings overlap the primary position markings. In the latter case, the markings must be painted white.

8.5.20 Keyhole Marking

8.5.20.1 Where the secondary position is designed for aircraft with wingspan 15 m or greater, it must be identified with a keyhole marking, comprising an alignment line oriented in the desired alignment, and a terminating ring; with a parking position designator, as shown in Figure 8.5-14.

> **Note:** For aircraft having a wingspan of 15 m or greater:
>
> (a) Nose wheel position is centre of the circle.
>
> (b) Use white paint if likely to be confused with primary position markings.

8.5.20.2 The marking must be located so that the centre of the ring is at the final nose wheel position. Where required, any aircraft type or weight limit designation must be located at the commencement of the associated dotted lead-in line.

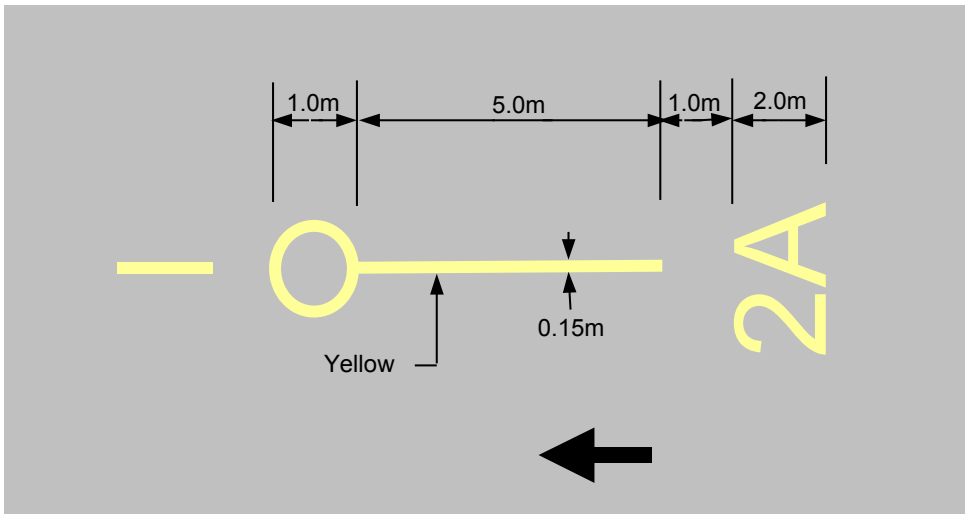


Figure 8.5-14: Keyhole marking

8.5.21 Triangle Marking

8.5.21.1 Where the secondary position is designed for aircraft with a wingspan of less than 15 m, it must be identified with a triangle marking comprising an alignment line, and a triangle, as shown in Figure 8.5-15. The triangle must be so located that its centre is the final nose wheel position.

Note: For aircraft having a wingspan less than 15 m:

(a) Nose wheel position is centre of triangle.

(b) Use white paint if necessary to avoid confusion with primary marking.

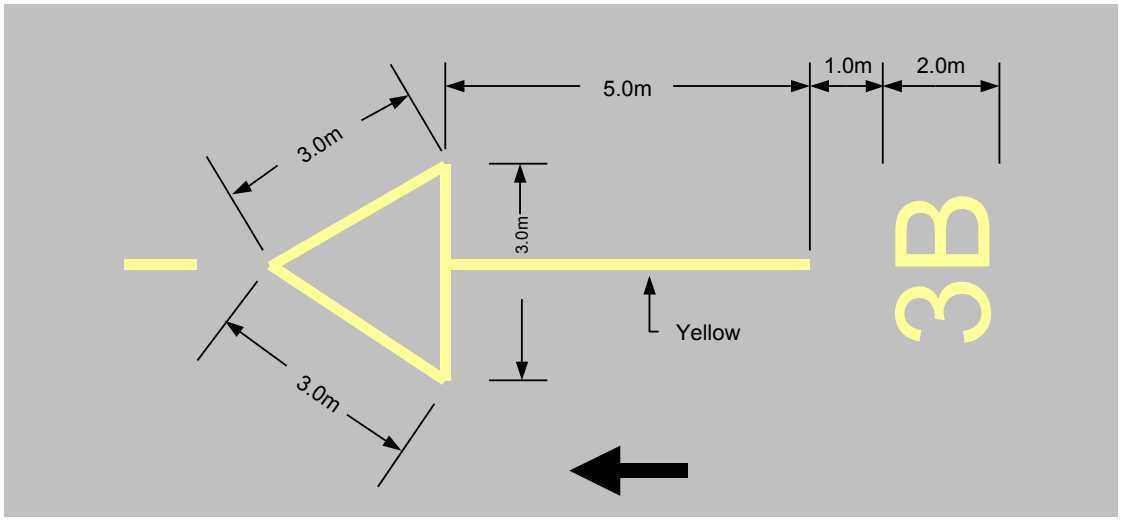


Figure 8.5-15: Triangle marking

8.5.22 Lead-out Line

8.5.22.1 Must comprise a broken line, painted yellow; stripes 1 m long and 0.15 m wide, spaced at 1 m intervals. The lead-out line must commence from the alignment line at least 3 m from the nose wheel position, as shown in Figure 8.5-16.

8.5.22.2 The lead-out line must extend to a point from where the pilot can clearly see the taxi guideline. If arrow indicators are inserted, the first arrow must be at least 15 m from the alignment line, with subsequent arrows at 30 m spacing.

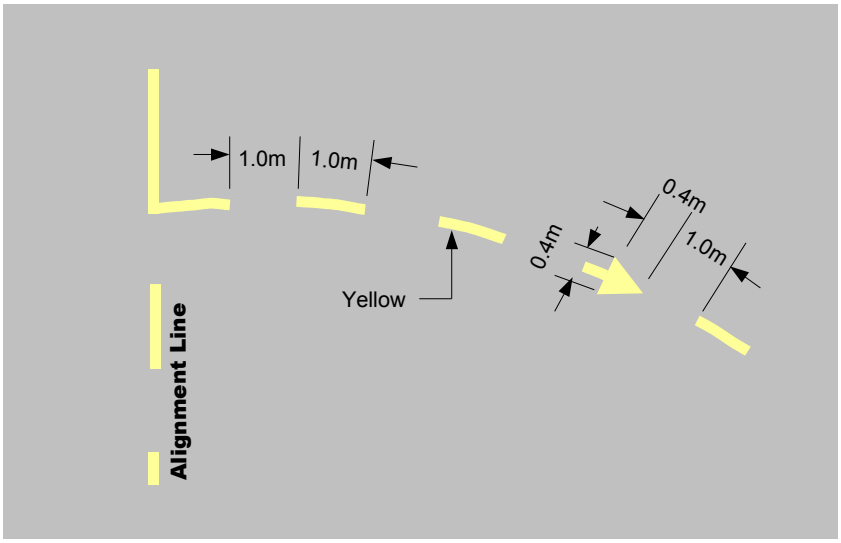


Figure 8.5-16: Lead-out line

8.5.23 Designation Markings

8.5.23.1 Designation markings are used to provide supplementary information, on all asphalt, sealed and concrete aprons where there is more than one aircraft parking position. Primary parking positions must be numbered sequentially with no omissions. Secondary positions must be identified with the same numbers as the associated primary position, together with an alphabetical suffix.

8.5.24 Aircraft Parking Position Designation

8.5.24.1 The parking position designation must be located adjacent to the parking position, either on the ground or on the aerobridge, and be visible to the pilot.

8.5.24.2 For fixed wing aircraft, the position designation, marked on the ground, must be placed 4 m forward of the nose wheel position and 5 m to the left, as viewed by the pilot. The designation must be yellow, and consist of characters 1 m high in a 2 m inside diameter ring of 0.15 m line thickness, as shown in Figure 8.5-17.

8.5.24.3 At aerobridge positions, the aerobridge designation must be the same as the associated parking position designation. The size of the position designation must not be less than the legend and face size specified in Table 8.6-1.

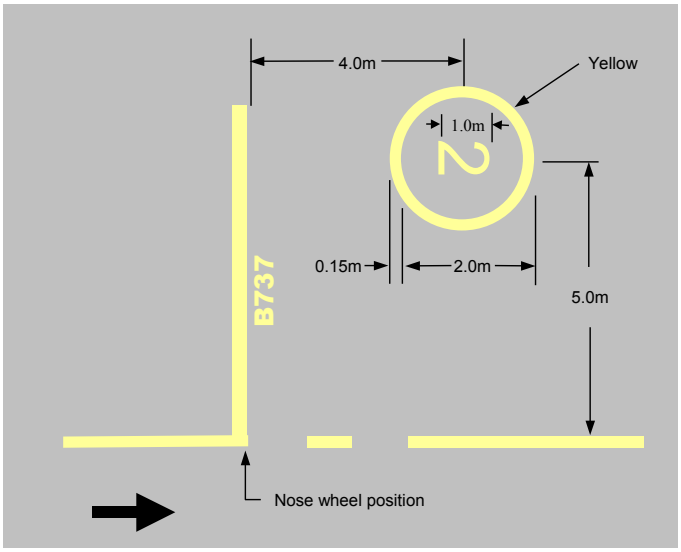


Figure 8.5-17: Aircraft parking position designation

8.5.24.4 An illustration showing a combination of all the aircraft parking position markings at an aircraft parking position is shown in Figure 8.5-18.

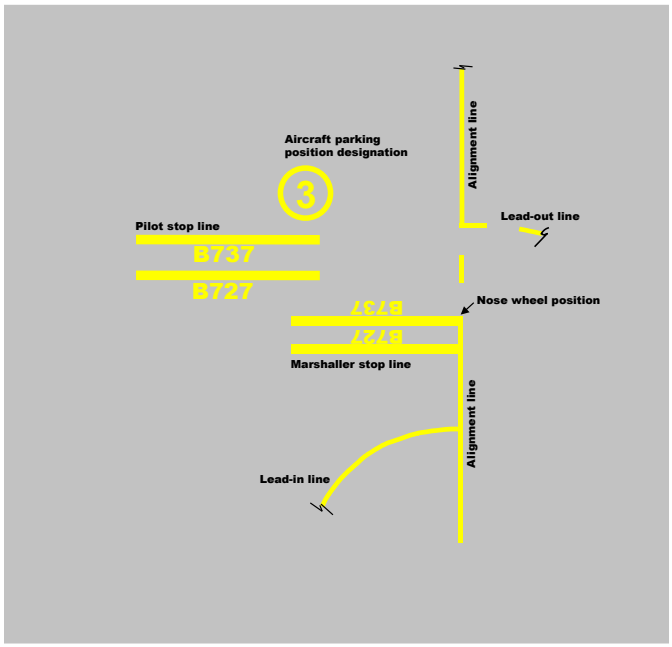


Figure 8.5-18: Aircraft parking position markings

8.5.25 Designation Characters for Taxi and Apron Markings

8.5.25.1 All letters and numbers used in designations for taxi and apron markings must conform in style and proportion to the following illustrations. Actual dimensions must be determined in proportion to the overall height standard for each specific designator. The grid spacing used in the following illustrations is 0.20 m.

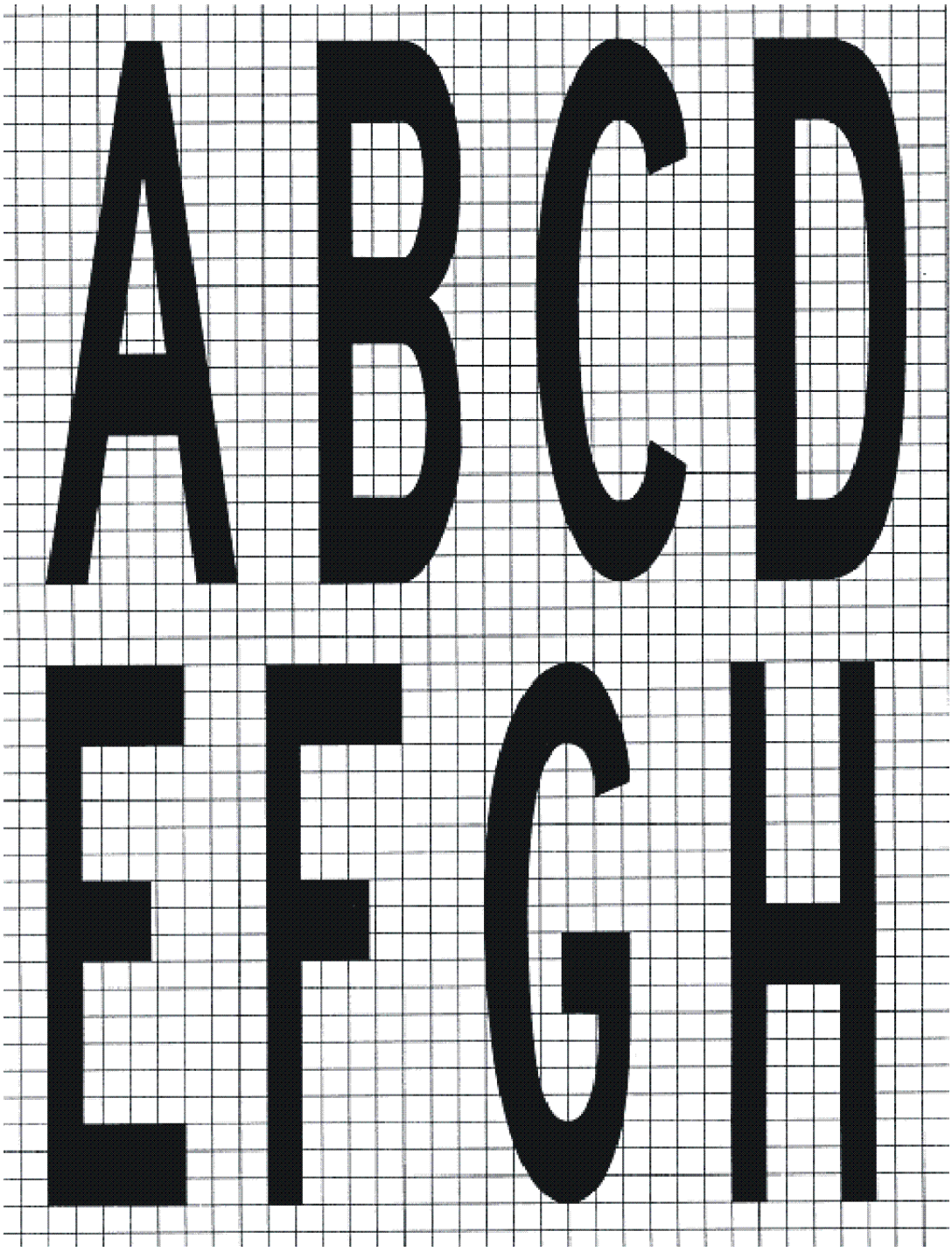


Figure 8.5-19: Letters and numbers used in designations for taxiway and apron markings

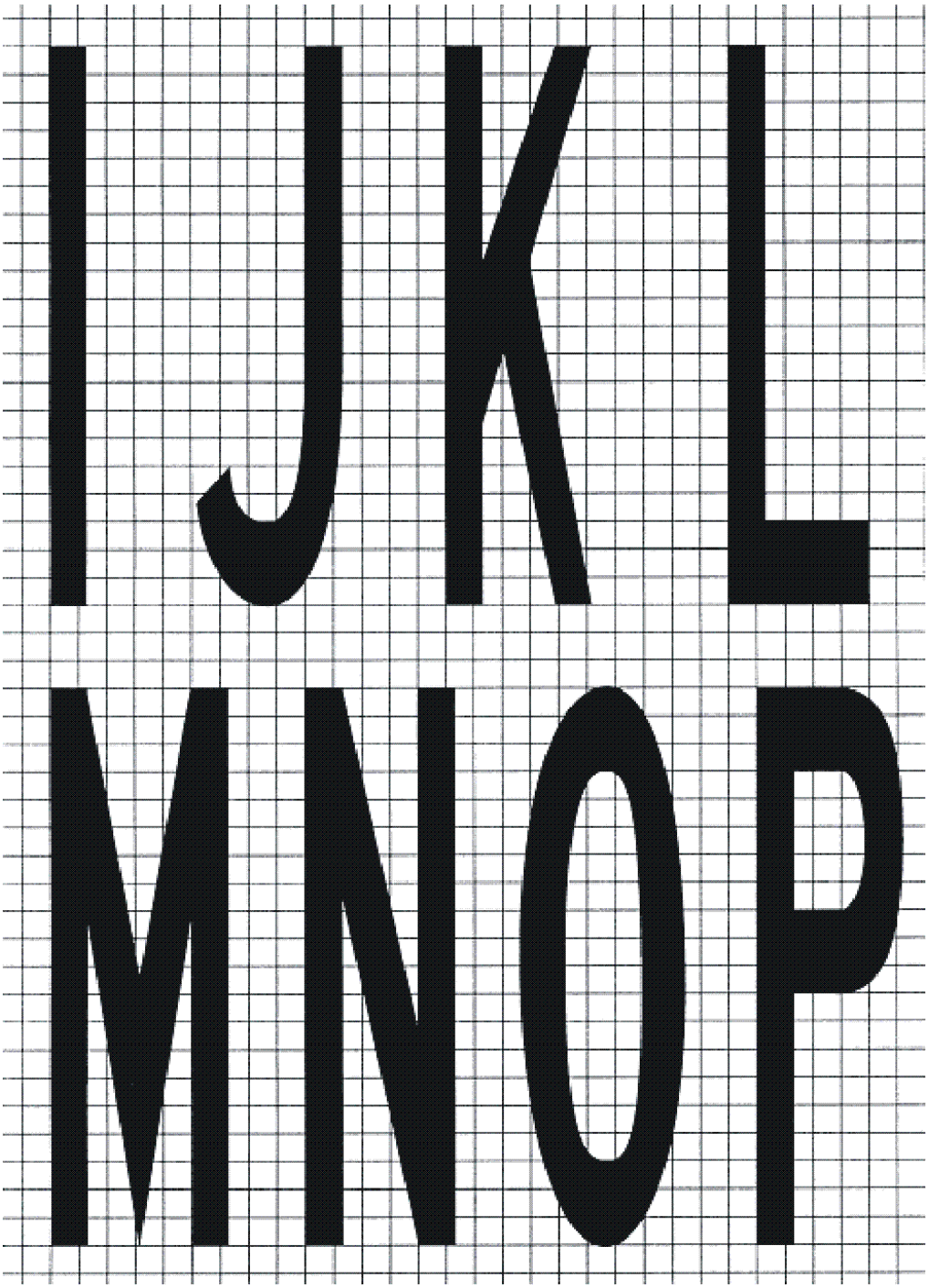


Figure 8.5-20: Letters and numbers used in designations for taxiway and apron markings

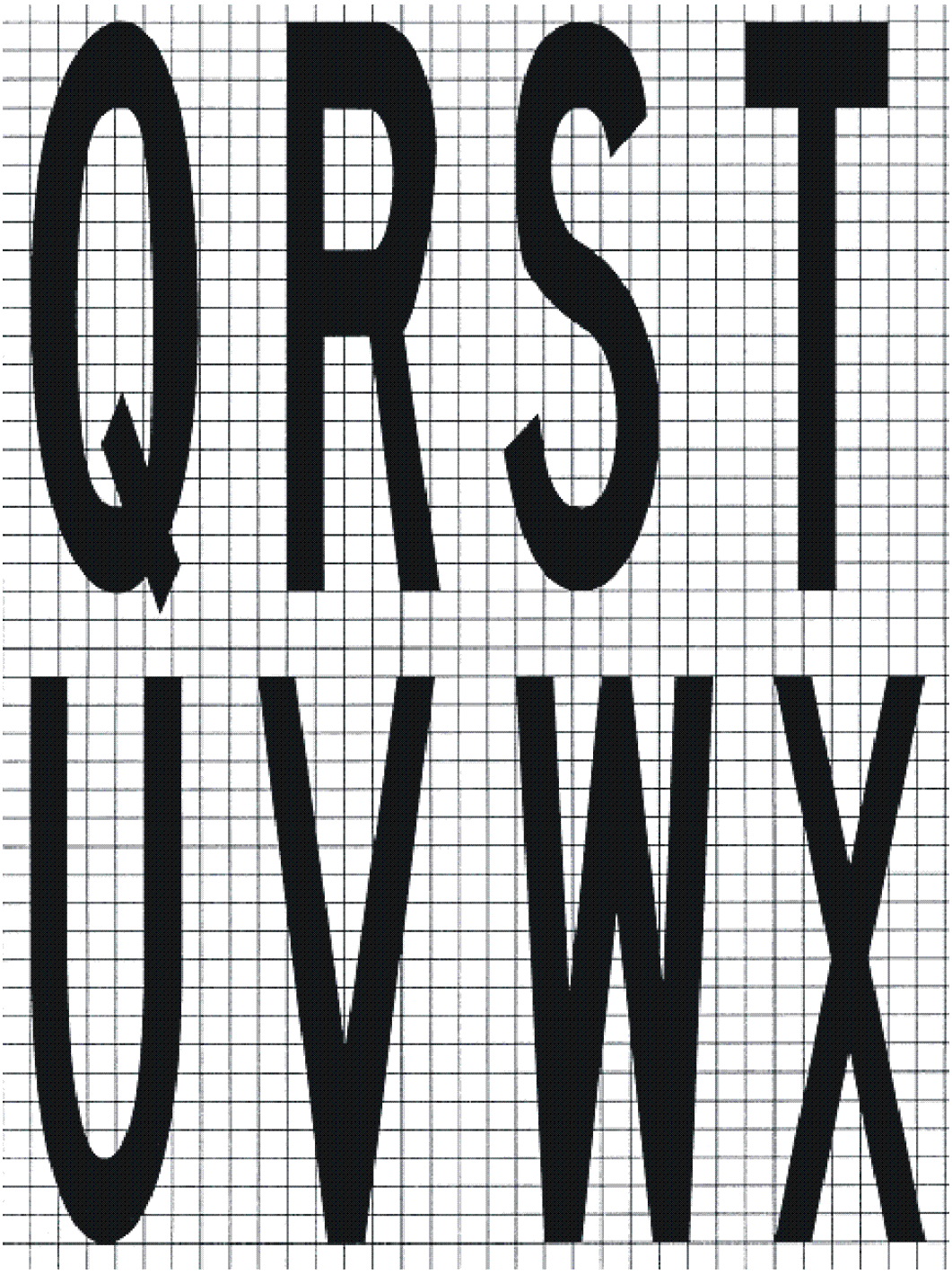


Figure 8.5-21: Letters and numbers used in designations for taxiway and apron markings

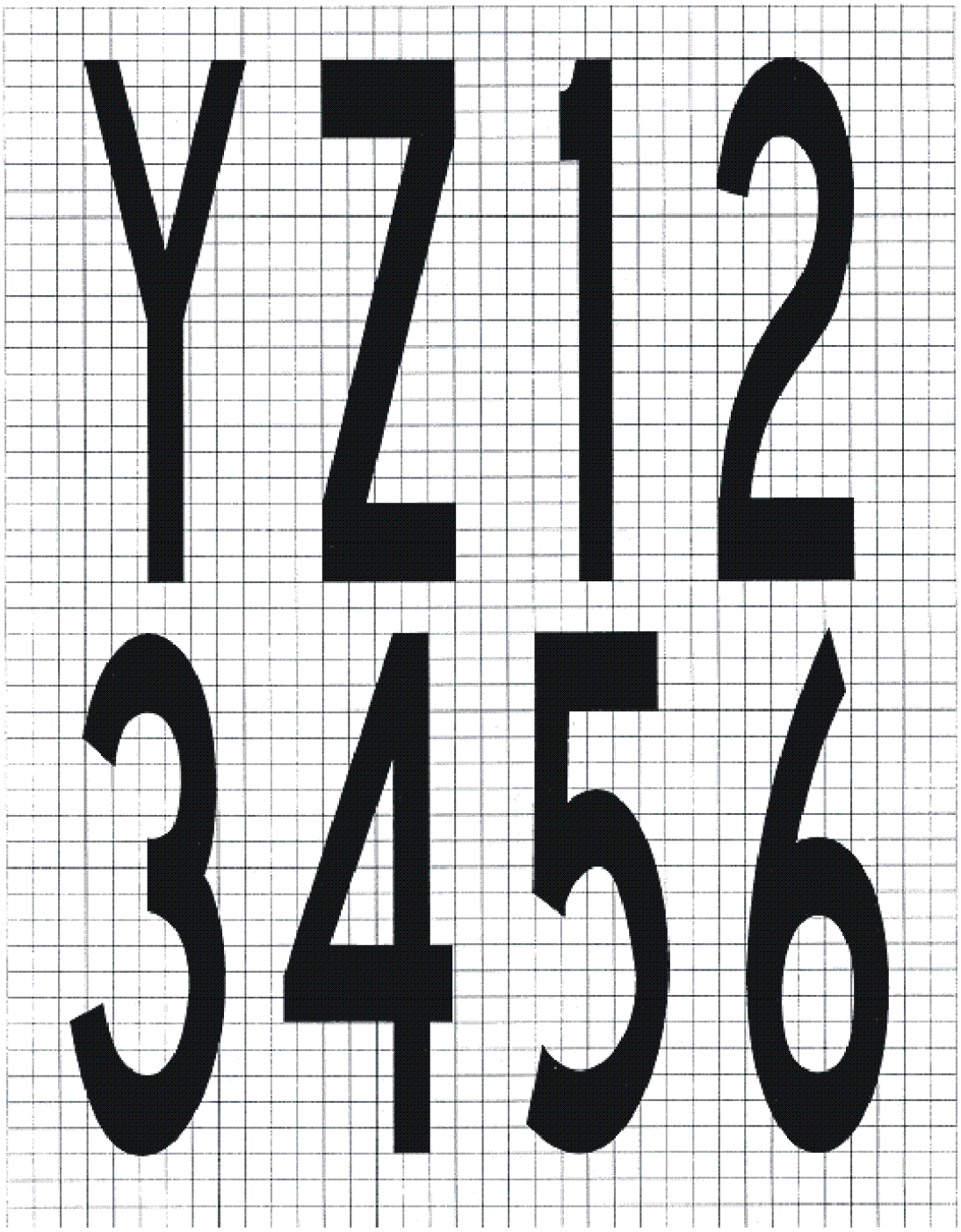


Figure 8.5-22: Letters and numbers used in designations for taxiway and apron markings

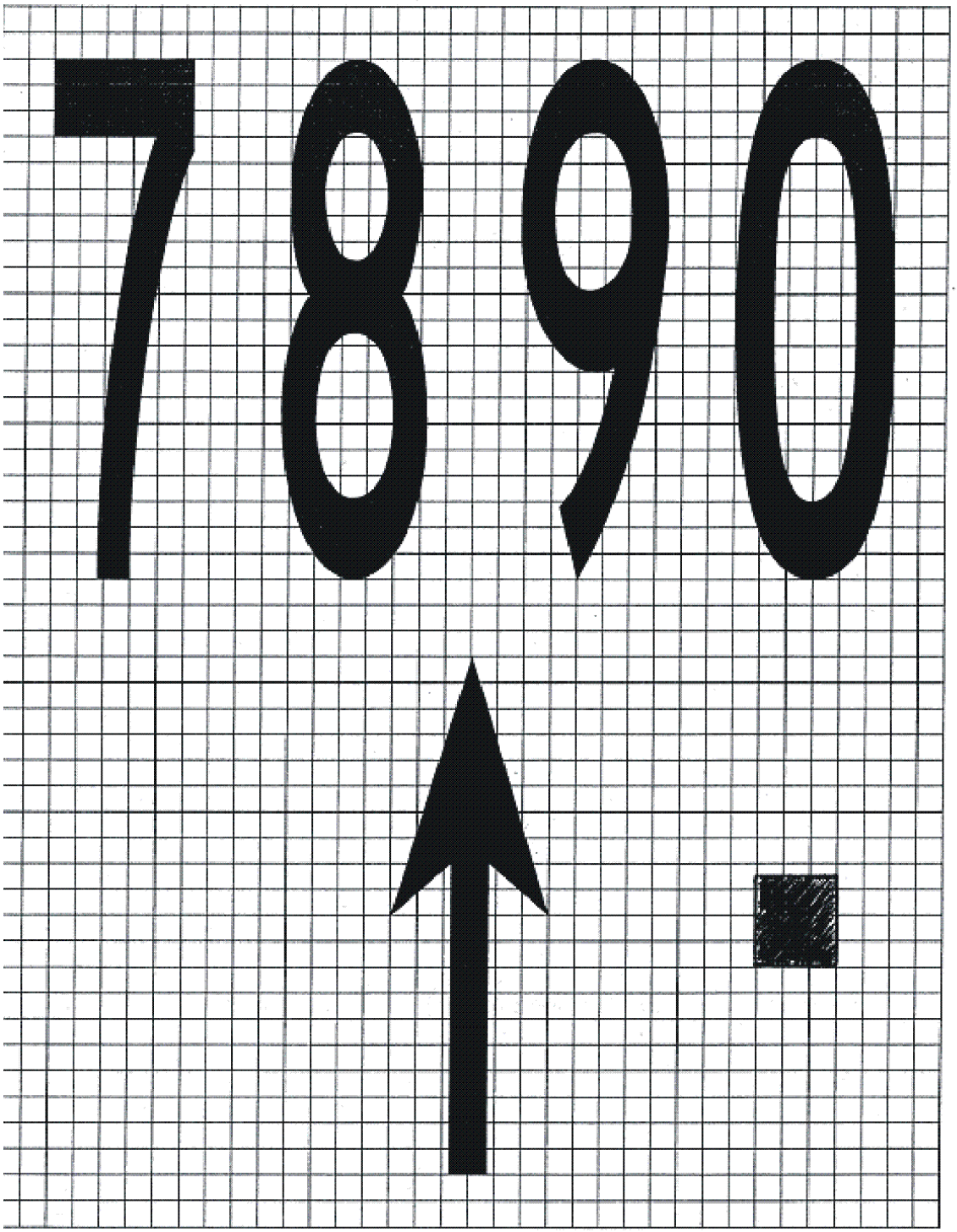


Figure 8.5-23: Letters and numbers used in designations for taxiway and apron markings

8.5.26 Tug operator Guidance Marking

8.5.26.1 Tug operator guidance marking must be provided on aprons where aircraft are being pushed back by tugs.

8.5.27 Aircraft Push-back Lines

8.5.27.1 The push-back line must be a broken line, painted white, comprising stripes 1 m long and 0.15 m wide, spaced at 1 m intervals. The line must be based on the required path of the nose wheel of the design aircraft. Where the line is used for tug operations with aircraft of reference code letter C, D and E, the 10 m before the tow bar disconnect point must be straight.

8.5.28 Tug Parking Position Lines

8.5.28.1 The tug parking position line marking must be provided at aerobridges and other power-in/push-out aircraft parking positions, to ensure parked tugs are clear of incoming aircraft. The marking must consist of a red line 0.10 m wide in the shape of a U, 3.5 m by 1.0 m commencing 3 m from the nose of the aircraft that the facility is intended to serve, as illustrated, below.

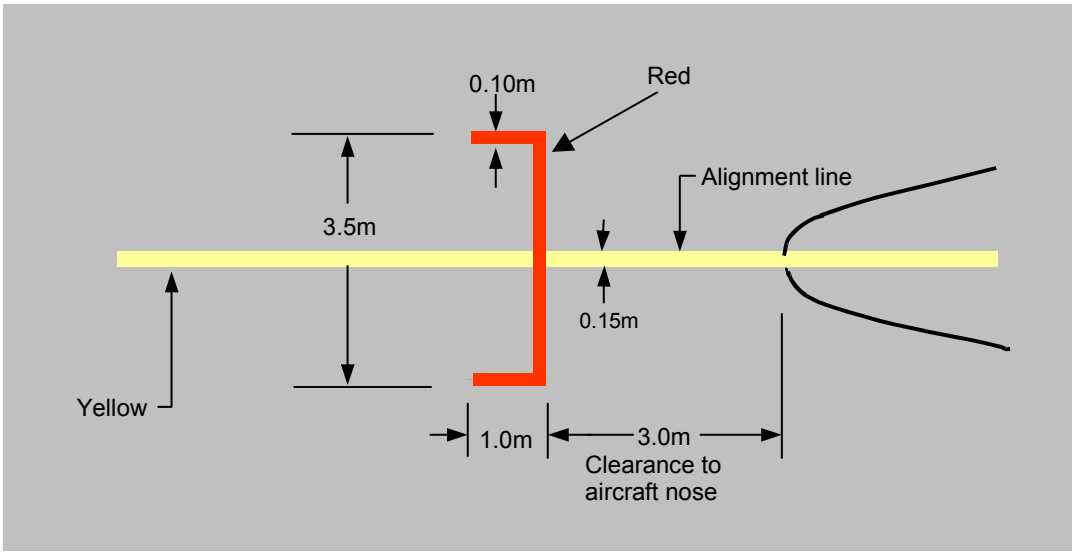


Figure 8.5-24: Tug parking position line

8.5.29 Towbar Disconnect Markings

8.5.29.1 The towbar disconnect point shown in Figure 8.5-25 must be located at the point of disconnection and must consist of a white line, 1.5 m long and 0.15 m wide, located on the left side of the taxi guideline or push-back line, as viewed from the tug; touching the guideline and at right angles to it.

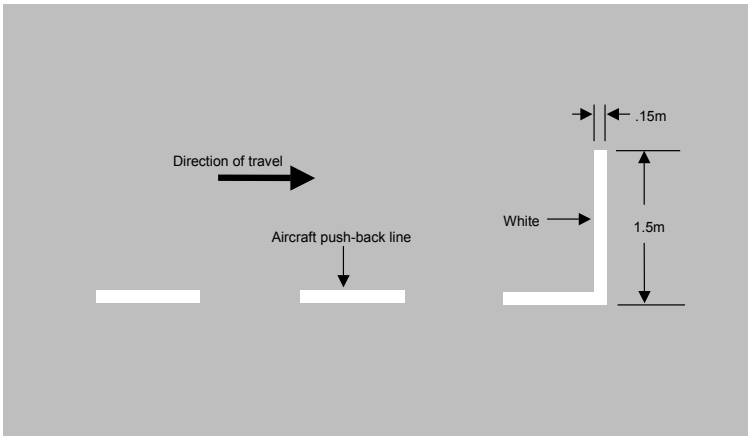


Figure 8.5-25: Towbar disconnect marking

8.5.30 Push-back Limit Markings

8.5.30.1 Push-back limit markings must comprise two parallel white lines at right angles to and symmetrical about the push back line. The marking must be 1 m long, 0.15 m wide and lines 0.15 m apart, as shown below.

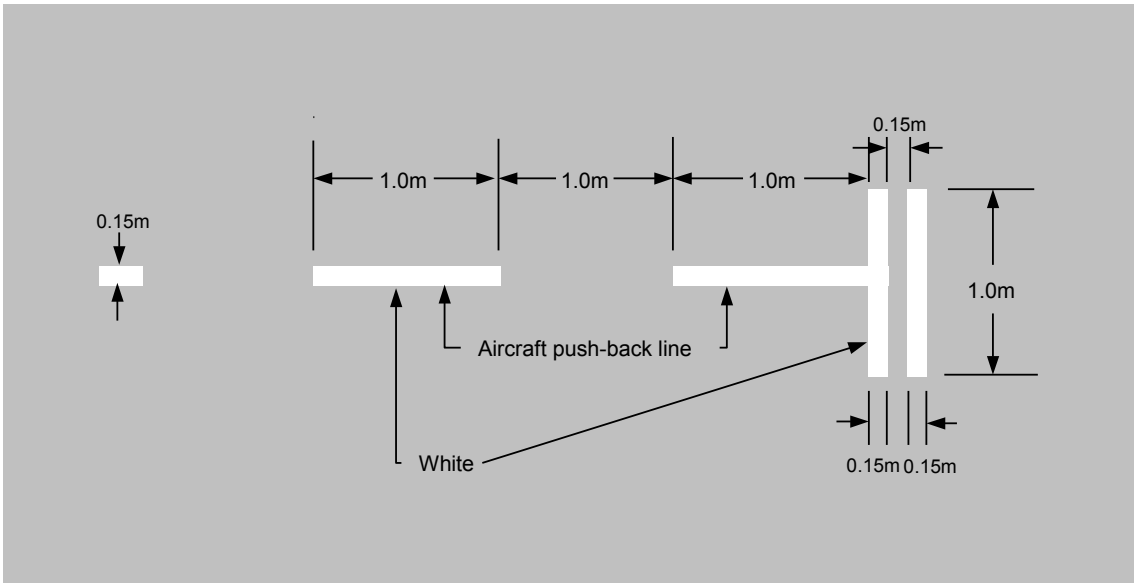


Figure 8.5-26: Push-back limit marking

8.5.31 Push-back Alignment Bars

8.5.31.1 Push-back alignment bars are provided to assist tug operators to align an aircraft correctly at the end of the push-back manoeuvre. The marking must be a broken white line, comprising stripes 1 m long and 0.15 m wide, spaced at 1 m intervals, for a length of 30 metres, aligned in the desired direction. The marking must commence 3 m past the tow disconnect marking, as shown below.

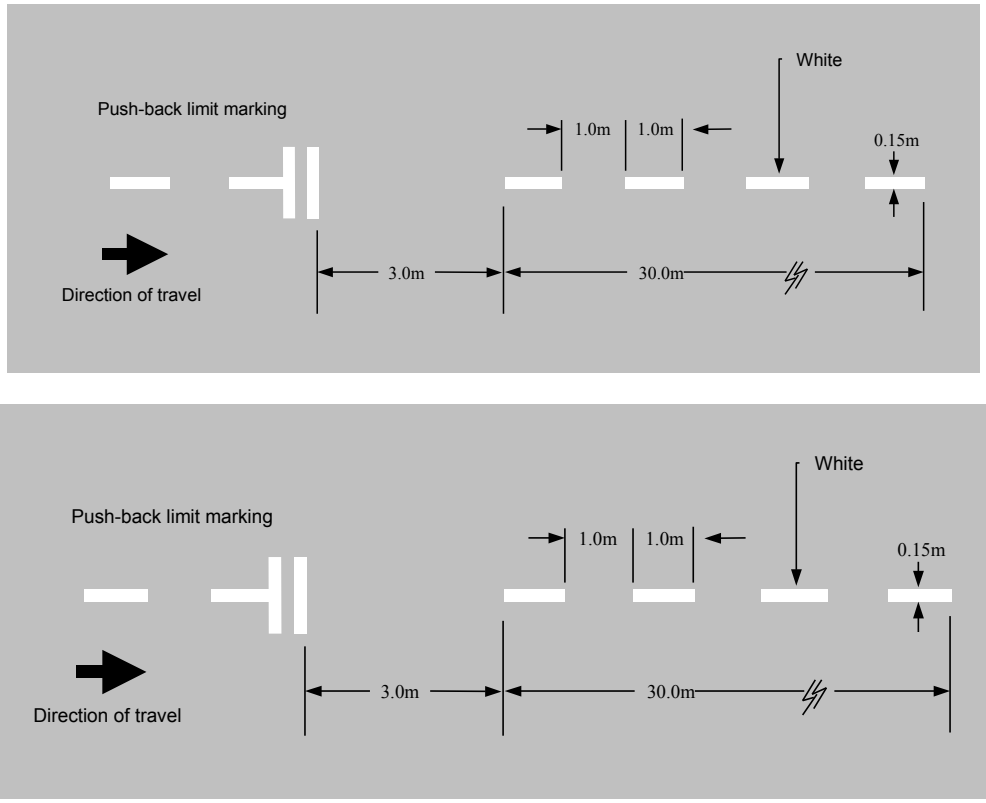


Figure 8.5-27: Push-back alignment line

8.5.32 Passenger Path Markings

8.5.32.1 Where provided, passenger path markings are provided to assist the orderly movement of passengers embarking or disembarking. Passenger path markings must be provided in accordance with the pattern and colour of the relevant State Road Authority pedestrian crossing marking standards. The width of the passenger pathway is to be commensurate with the expected pedestrian traffic.

8.5.32.2 The following diagram illustrates a typical layout for a pedestrian crossing.

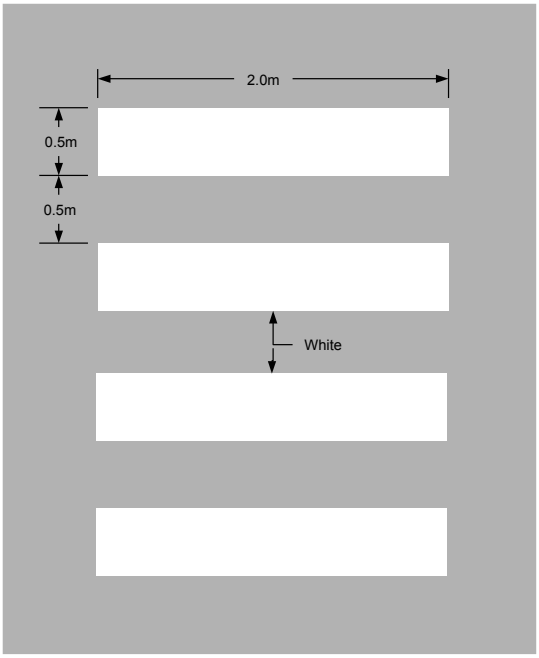


Figure 8.5-28: Pedestrian crossing

8.5.33 Typical Apron Markings

8.5.33.1 The following Figure 8.5-29 illustrates an apron with typical apron markings.

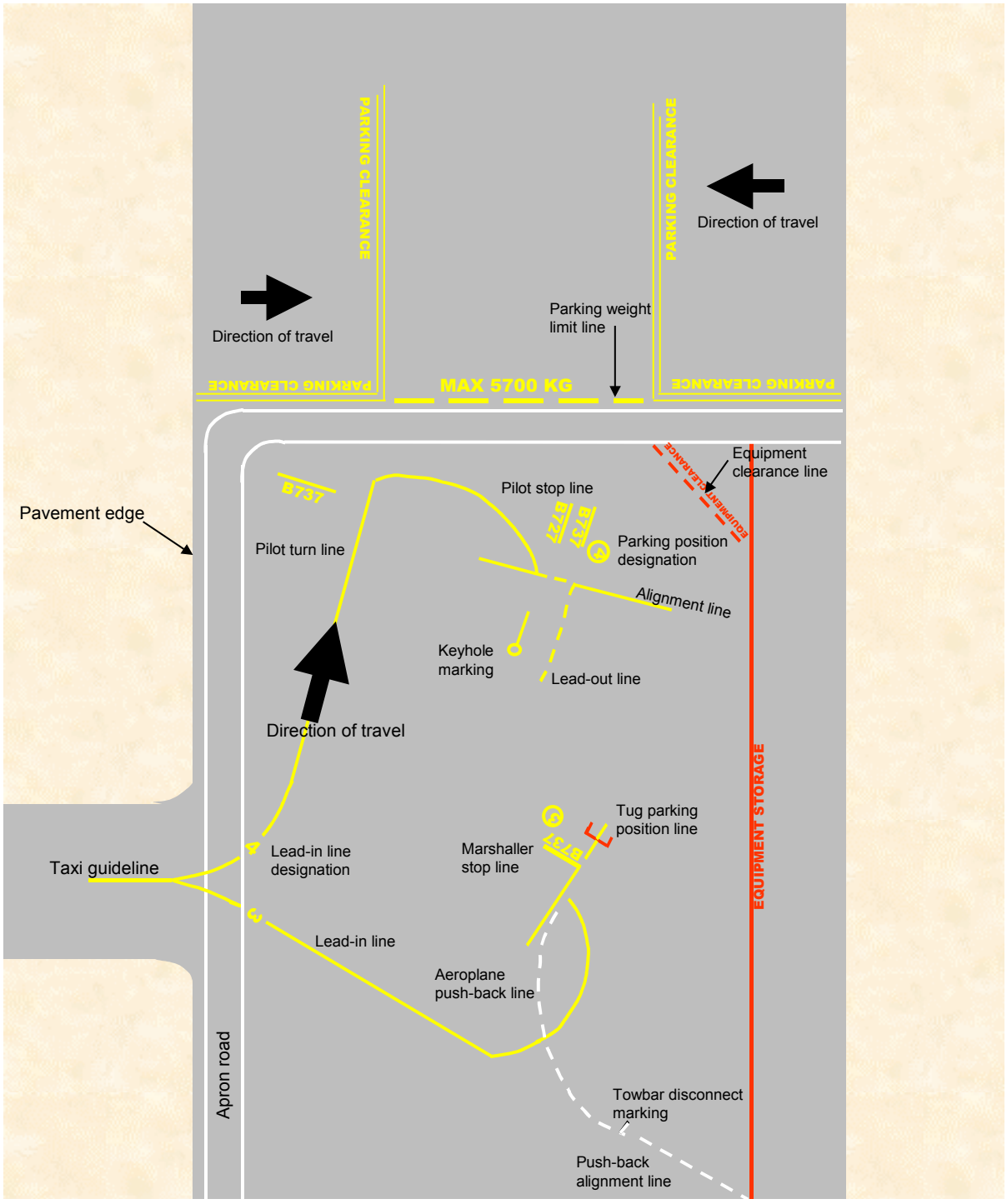


Figure 8.5-29: Typical apron markings

Section 8.6: Movement Area Guidance Signs (MAGS)

8.6.1 Introduction

8.6.1.1 Signs that convey messages that must be obeyed by pilots are known as mandatory instruction signs. These signs must have white lettering on a red background.

8.6.1.2 Signs that convey messages of information are known as information signs. These signs must have either black lettering on a yellow background, or yellow lettering on a black background.

8.6.1.3 Mandatory signs must be provided at major international aerodromes, and at other aerodromes that have air traffic control and for which CASA determines these are required for safety reasons.

8.6.1.4 Aerodrome operators will consult with airlines and with Air Traffic Control, on the need for MAGS with information. Notwithstanding this, MAGS with information must be provided at aerodromes where taxiway intersection departures are promulgated in the AIP.

8.6.2 Naming of taxiways

8.6.2.1 The following convention must be used in the naming of taxiway location signs:

(a) a single letter must be used, without numbers, to designate each main taxiway;

(b) the same letter must be used throughout the length of taxiway, except where a turn of 90 degrees or more is made to join a runway, a different letter may be assigned to that portion of taxiway after the turn;

(c) for each intersecting taxiway, a different single letter must be used;

(d) to avoid confusion, letters I, O and X must not be used, letter Q should only be used where unavoidable;

(e) at aerodromes where the number of taxiways are or will be large, alphanumeric designators may be used for short intersecting taxiways. Successive intersecting taxiways must use the same letter, with sequential numbers. If sequential numbers are not practicable, due to geometry of the taxiway system; all pilot-used taxiway plans (aerodrome charts) must include advice as to the missing designators;

(f) the use of letters and numbers must be easily comprehensible. Should it ever be necessary to use double-digit alphanumeric designators, care must be taken to ensure the numbers used in the taxiway designation cannot in any way be confused with the runway designations.

8.6.3 Dimensions, Location and Lettering

8.6.3.1 Signs must be located to provide adequate clearance to passing aircraft. The depth and width of the signboard is dependent on the location of the sign, the size of the characters and the length of message conveyed.

8.6.3.2 Where MAGS are provided only on one side of the taxiway, they must be located on the pilots' left side unless this is impracticable. Where MAGS are to be read from both directions, they must be oriented so as to be at right angles to the taxi guideline. Where MAGS are to be read in one direction only, they must be oriented so as to be at 75 degrees to the taxi guideline.

8.6.4 Sign Size and Location Distances, Including Runway Exit Signs

8.6.4.1 Sign size and location distances must be in accordance with Table 8.6-1.

Table 8.6-1

Sign Height (mm)					Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
Code Number	Type	Legend	Face (min)	Installed (max)		
1 or 2[a]	I	200	400	700	5-11 m	3-10 m
1 or 2	M	300	600	900	5-11 m	3-10 m
3 or 4[a]	I	300	600	900	11-21 m	8-15 m
3 or 4	M	400	800	1100	11-21 m	8-15 m

[a] For runway exit signs, use the mandatory size.
I Information signs.
M Mandatory instruction signs.

8.6.4.2 The stroke width of letters and arrows must be:

Legend height	Stroke width
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

8.6.4.3 The form and proportion of the letters, numbers and symbols used on movement area guidance signs must be in accordance with Figure 8.6-1 to Figure 8.6-7. The grid spacing used in the following illustrations is 0.20 m.

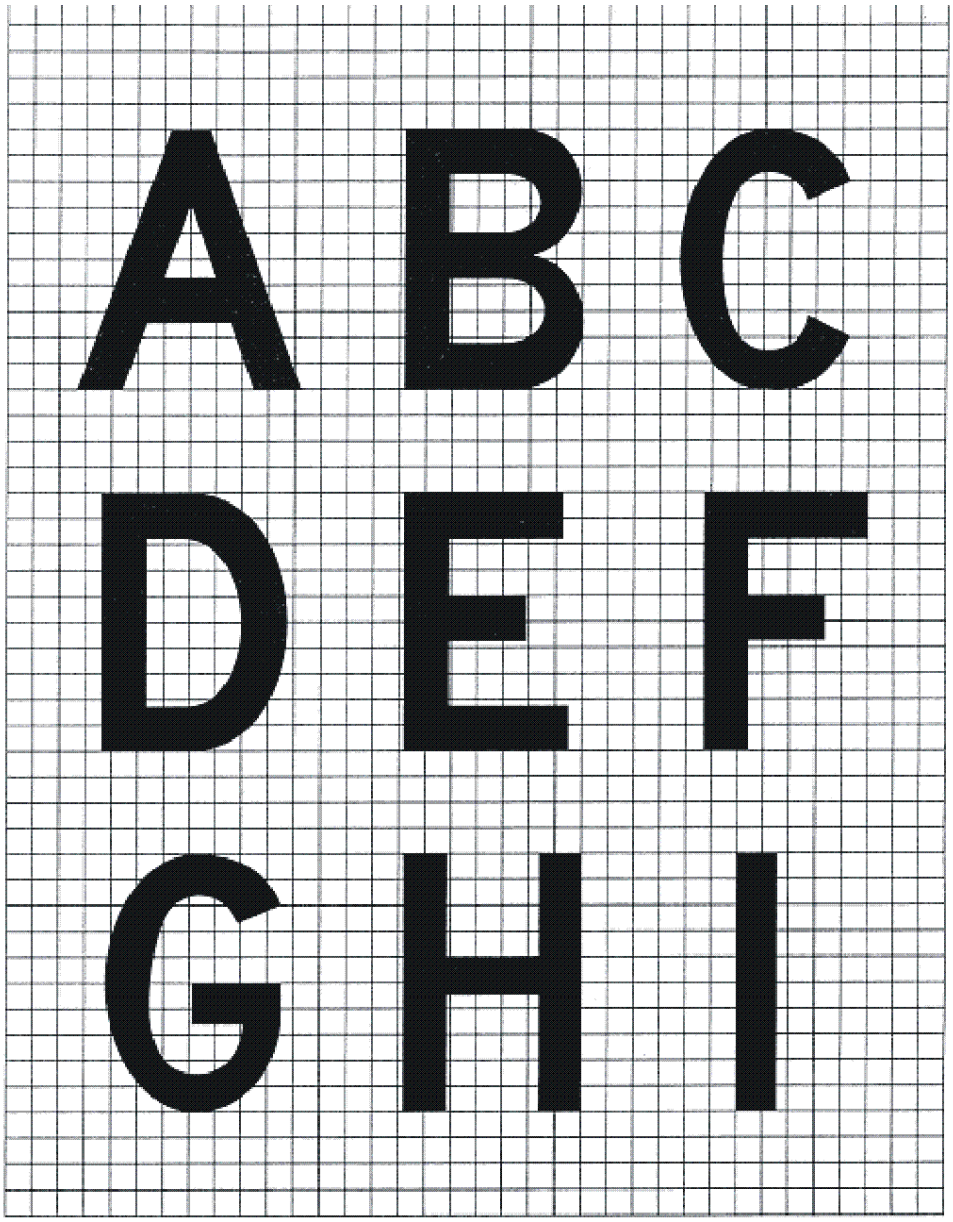


Figure 8.6-1: Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

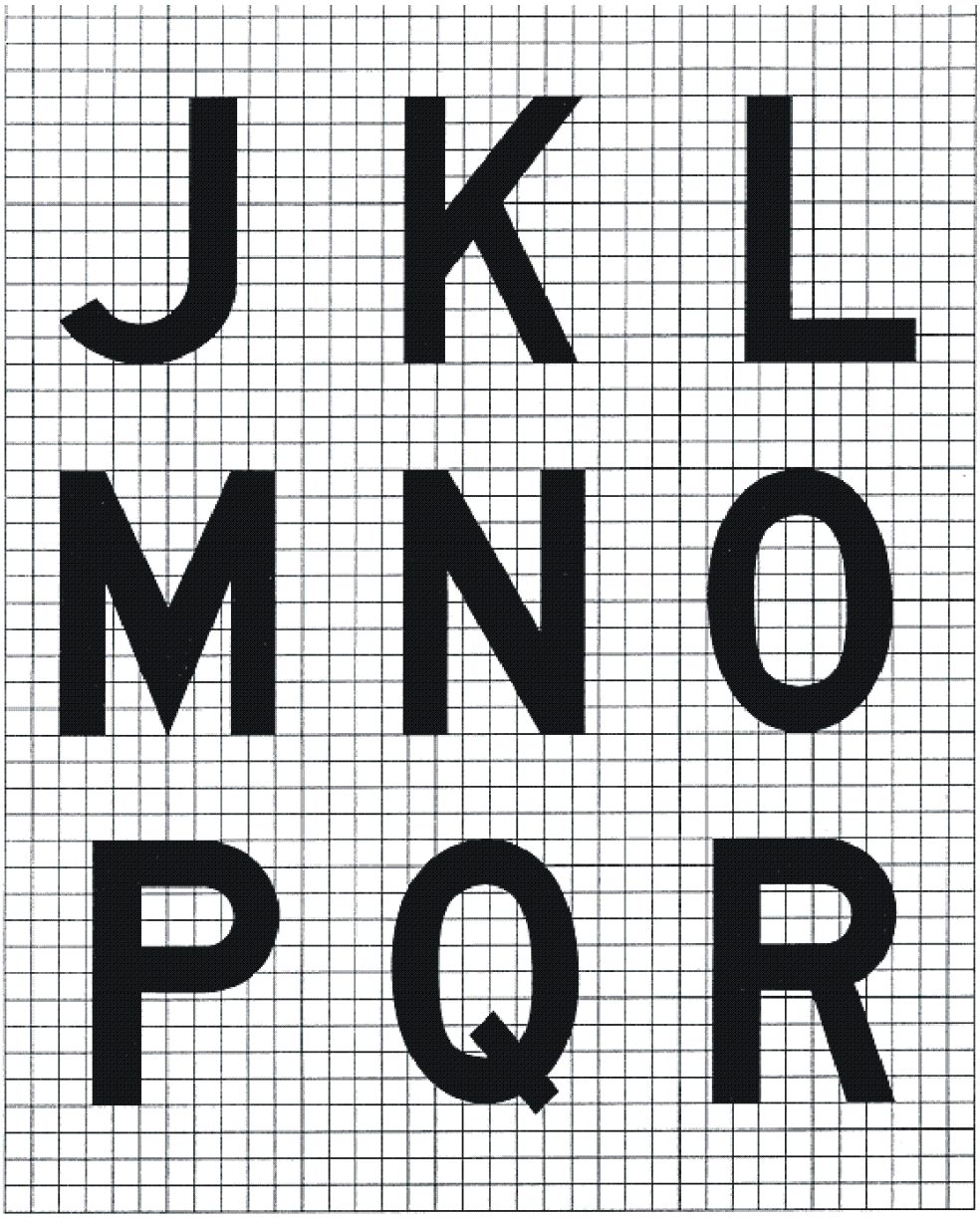


Figure 8.6-2: Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

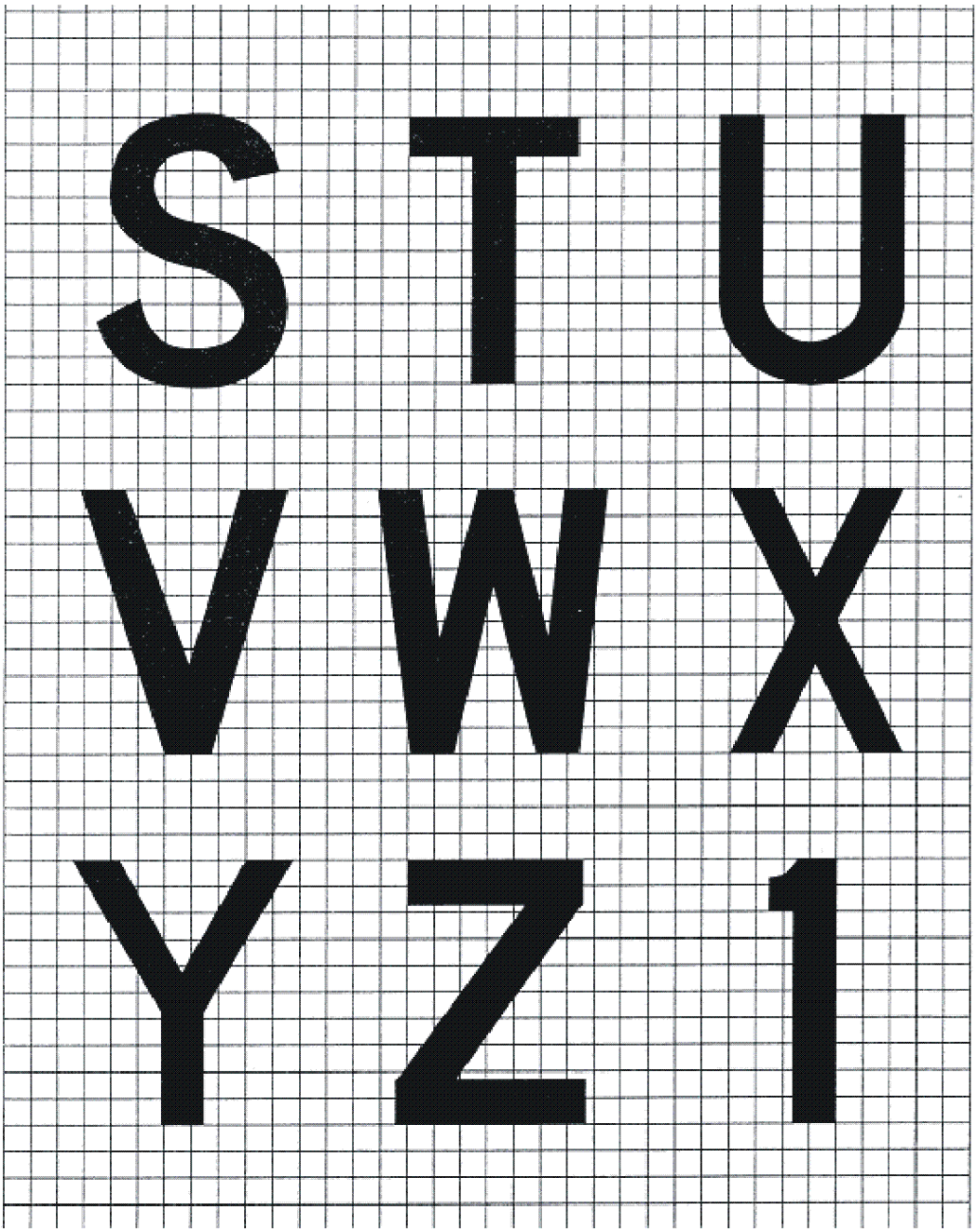


Figure 8.6-3: Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

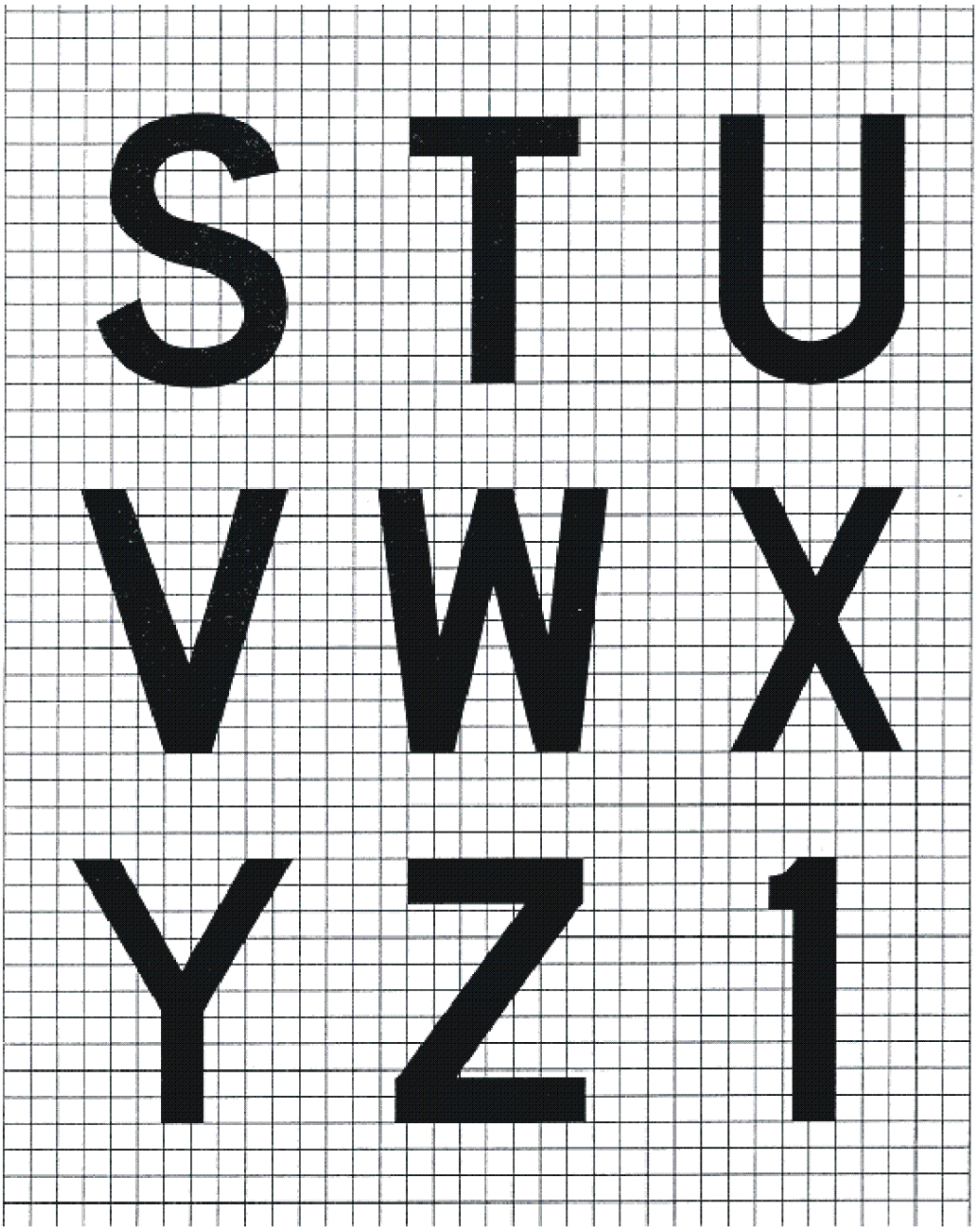


Figure 8.6-4: Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

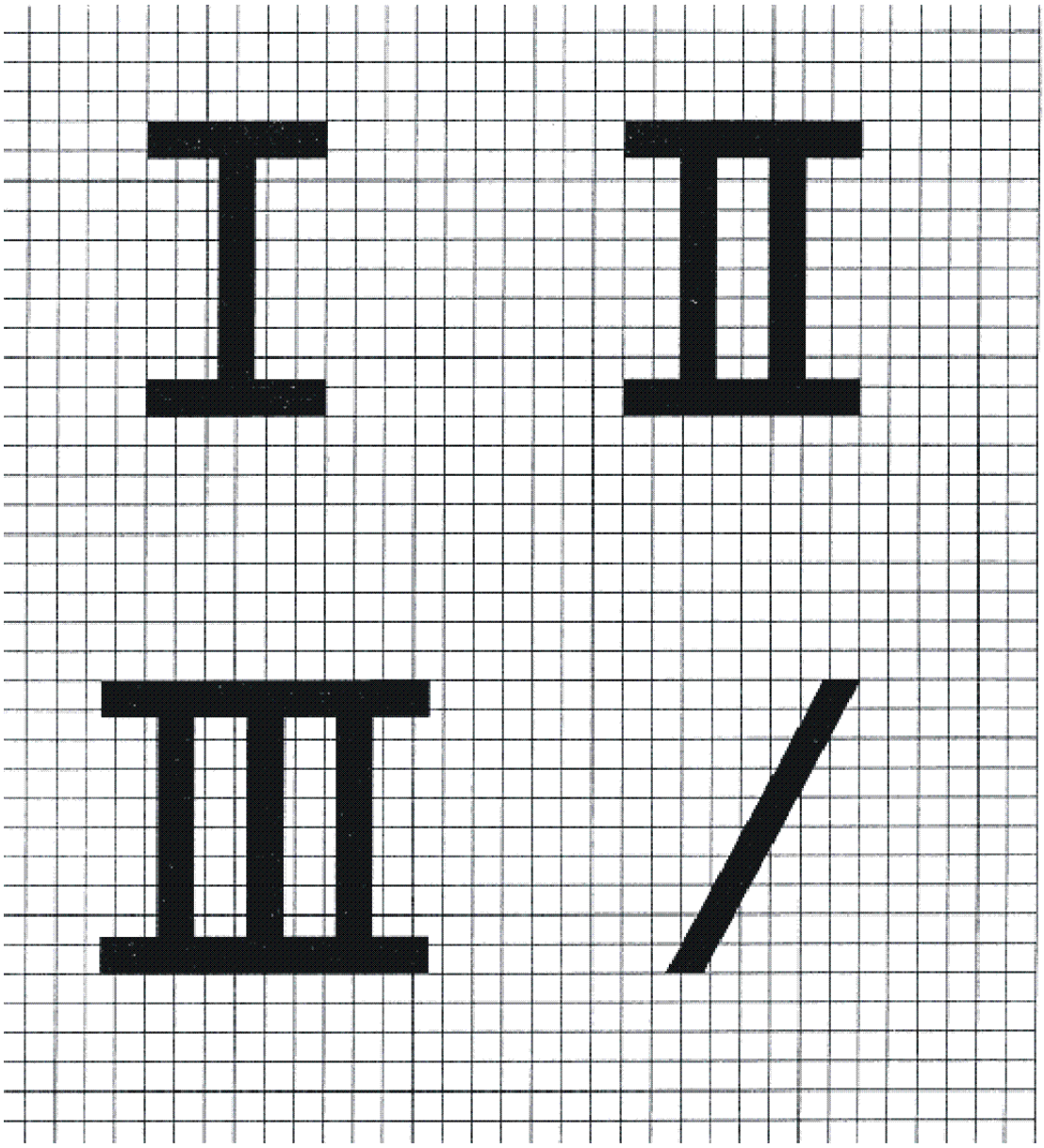
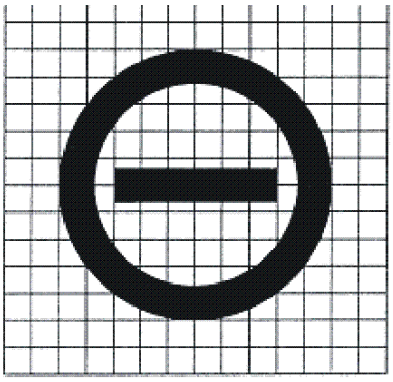
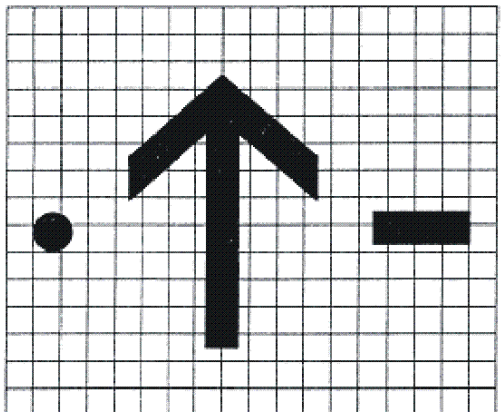


Figure 8.6-5: Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs



NO ENTRY sign



Note 1.— The arrow stroke width, diameter of the dot, and both width and length of the dash shall be proportioned to the character stroke widths.

Note 2.— The dimensions of the arrow shall remain constant for a particular sign size, regardless of orientation.

Figure 8.6-6: Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

a) Letter to letter code number

Preceding Letter	Following Letter		
	B, D, E, F, H, I, K, L, M, N, P, R, U	C, G, O, Q, S, X, Z	A, J, T, V, W, Y
	Code number		
A	2	2	4
B	1	2	2
C	2	2	3
D	1	2	2
E	2	2	3
F	2	2	3
G	1	2	2
H	1	1	2
I	1	1	2
J	1	1	2
K	2	2	3
L	2	2	4
M	1	1	2
N	1	1	2
O	1	2	2
P	1	2	2
Q	1	2	2
R	1	2	2
S	1	2	2
T	2	2	4
U	1	1	2
V	2	2	4
W	2	2	4
X	2	2	3
Y	2	2	4
Z	2	2	3

b) Numeral to numeral code number

Preceding Numeral	Following number		
	1, 5	2, 3, 6, 8, 9, 0	4, 7
	Code number		
1	1	1	2
2	1	2	2
3	1	2	2
4	2	2	4
5	1	2	2
6	1	2	2
7	2	2	4
8	1	2	2
9	1	2	2
0	1	2	2

c) Space between characters

Code No.	Letter Height (mm)		
	200	300	400
	Space (mm)		
1	48	71	96
2	38	57	76
3	25	38	50
4	13	19	26

d) Width of letter

Letter	Letter height (mm)		
	200	300	400
	Width (mm)		
A	170	255	340
B	137	205	274
C	137	205	274
D	137	205	274
E	124	186	248
F	124	186	248
G	137	205	274
H	137	205	274
I	32	48	64
J	127	190	254
K	140	210	280
L	124	186	248
M	157	236	314
N	137	205	274
O	143	214	286
P	137	205	274
Q	143	214	286
R	137	205	274
S	137	205	274
T	124	186	248
U	137	205	274
V	152	229	304
W	178	267	356
X	137	205	274
Y	171	257	342
Z	137	205	274

e) Width of numeral

Letter	Numeral height (mm)		
	200	300	400
	Width (mm)		
1	50	74	98
2	137	205	274
3	137	205	274
4	149	224	298
5	137	205	274
6	137	205	274
7	137	205	274
8	137	205	274
9	137	205	274
0	143	214	286

INSTRUCTIONS

1. To determine the proper SPACE between letters or numerals, obtain the code number from table a or b and enter table c for that code number to the desired letter or numeral height.
2. The space between words or groups of characters forming an abbreviation or symbol should be equal to 0.5 to 0.75 of the height of the characters used except that where an arrow is located with a single character such as 'A →', the space may be reduced to not less than one quarter of the character of the height in order to provide a good visual balance.
3. Where the numeral follows a letter or vice versa use Code 1.
4. Where a hyphen, dot, or diagonal stroke follows a character or vice versa use Code 1.

Figure 8.6-7: Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

8.6.4.4 The face width of a sign must provide on either side of the legend a minimum width equal to half the height of the legend. In the case of a single letter sign, this width must be increased to the height of the legend. In all cases, the face width of a mandatory instruction sign provided on one side of a taxiway only, must not be less than:

(a) 1.94 m where the code number is 3 or 4; and

(b) 1.46 m where the code number is 1or 2.

8.6.5 Structural

8.6.5.1 MAGS must be lightweight and frangibly mounted. They must be constructed so as to withstand a wind velocity of up to 60 m/sec without sustaining damage. Mountings must be constructed so as to fail, for frangibility requirements, under a static load not exceeding 8 kPa distributed over the sign face.

8.6.6 Illumination

8.6.6.1 All MAGS, except those where internal illumination is provided, must be made of retro-reflective class one material. Illumination must be provided to all mandatory instruction signs and information signs meant for use by code 4 aircraft. Illumination is optional for information signs intended to serve Code 1, 2 or 3 aircraft; however, if the location of a sign is such that the retro-reflectiveness is ineffective, illumination must be provided. Both external or internal illumination is acceptable, but care must be taken, to prevent dazzle.

8.6.6.2 The average sign luminance must be as follows:

(a) where operations are conducted in runway visual range of less than 800 m, the average sign luminance must be at least:

Red	30 cd/m^2
Yellow	150 cd/m^2
White	300 cd/m^2

(b) where operations are conducted at night, in runway visual range of 800 m or greater, average sign luminance must be at least:

Red	10 cd/m^2
Yellow	50 cd/m^2
White	100 cd/m^2

8.6.6.3 The luminous ratio between red and white elements of a mandatory sign must not be less than 1:5 and not greater than 1:10.

8.6.6.4 The average luminance of the sign must be calculated in accordance with ICAO Annex 14, Volume 1, Appendix 4, Figure 4.1.

8.6.6.5 In order to achieve uniformity of signal, luminance values must not exceed a ratio of 1.5:1 between adjacent grid points. Where the grid spacing is 7.5 cm, the ratio between luminance values of adjacent grid points must not exceed a ratio of 1.25:1. The ratio between the maximum and minimum luminance value over the whole sign face must not exceed 5:1.

8.6.6.6 At an aerodrome where land and hold short operations (LAHSO) are conducted, the signs specifically provided for LAHSO such as runway/runway intersection signs and distance-to-go signs must be electrically connected such that they will be illuminated when the lighting of the runway on which LAHSO are conducted is switched on.

8.6.6.7 Runway exit signs that are required for LAHSO must be illuminated where LAHSO are conducted at night.

8.6.6.8 Signs must have colours red, white, yellow and black, that comply with the relevant recommendations in ICAO Annex 14, Volume 1, Appendix 1, for externally illuminated signs, retro-reflective signs and transilluminated signs, as appropriate.

8.6.7 MAGS with Mandatory Instructions

8.6.7.1 MAGS with mandatory instructions include runway designation signs, category I, II or III holding position signs, runway-holding position signs, Aircraft NO ENTRY signs, vehicular STOP signs and runway/runway intersection signs.

8.6.8 Runway Designation Signs

8.6.8.1 A runway designation sign, as illustrated in Figure 8.6-8, must be provided at a runway/taxiway intersection, where a pattern ‘A’ runway holding position marking is provided. Only the designation for one end of the runway must be shown where the taxiway intersection is located at or near that end of the runway. Designations for both ends of the runway, properly orientated with respect to the viewing position of the sign, must be shown where the taxiway is located elsewhere.

8.6.8.2 A taxiway location sign must be provided alongside the runway designation sign, in the outboard (farthest from the taxiway) position.

8.6.8.3 A runway designation sign must be provided at least on the left side of a taxiway facing the direction of approach to the runway. Where practicable, a runway designation sign is to be provided on each side of the taxiway.

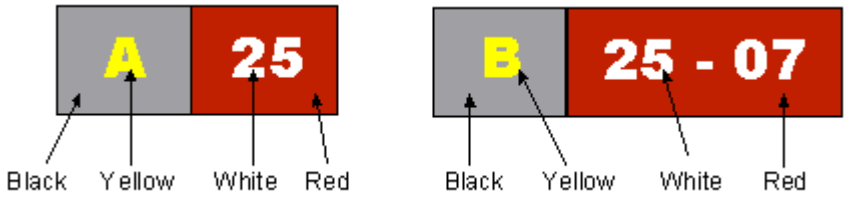


Figure 8.6-8: Runway designation signs with taxiway location sign

8.6.9 Category I, II or III Runway Designation Signs

8.6.9.1 Where a pattern 'B' taxi-holding position marking is provided, the sign, as shown below, must be provided on each side of the taxiway.

Figure 8.6-9: Category I runway-holding position sign

8.6.10 Runway Holding Position Sign

8.6.10.1 Runway-holding position signs must be provided at a taxiway location other than an intersection where the air traffic control has a requirement for aircraft to stop, such as entry to an ILS sensitive area. The sign is a taxiway designation sign, but with white lettering on a red background.

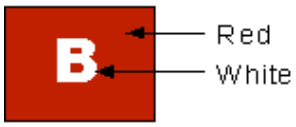


Figure 8.6-10: Mandatory runway-holding position sign

8.6.11 Aircraft NO ENTRY Sign

8.6.11.1 A NO ENTRY sign, consisting of a white circle with a horizontal bar in the middle, on a red background, must be provided at the entrance of an area to which entry is prohibited. Where practicable, a NO ENTRY sign must be located on each side of the taxiway.

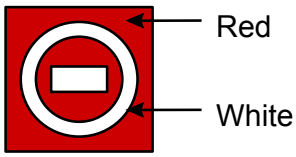


Figure 8.6-11: Aircraft NO ENTRY sign

8.6.12 Vehicular STOP Signs

8.6.12.1 Where required, vehicular 'STOP' signs can be provided at road/taxiway intersections, road holding positions, or entrance to ILS sensitive areas. This sign should be the same as a local road traffic sign. In addition, the vehicular holding position should be marked in accordance with local traffic pavement marking. See also Section 6.4 for provision and location of a road-holding position.

8.6.13 Runway/Runway Intersection Signs

8.6.13.1 These are runway designation signs, which must be provided on each side of the runway used in LAHSO, to identify the intersecting runway ahead. The sign must show the designation of the intersecting runway, oriented with

respect to the viewing position of the sign, and separated by a dash. For example, '15-33' indicates the runway threshold '15' is to the left, and '33' is to the right. Signs are to be located at the Hold Short Line which must be at least 75 m from the centreline of the intersecting runway.

8.6.13.2 The overall height of the sign above the ground, and offset from the edge of the runway pavement, must be such as to provide at least 300 mm clearance between the top of the sign and any part of any aircraft using the runway when the outer edge of the wheel of the aircraft is at the runway pavement edge.

8.6.14 MAGS with Information

8.6.14.1 MAGS with information include taxiway location signs, direction signs, destination signs, take-off run available signs, runway exit signs, distance to go signs, and, where required, LAHSO distance to go signs.

8.6.15 Taxiway Location Signs

8.6.15.1 A location sign is normally provided in conjunction with a direction sign or a runway designation sign.

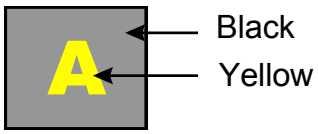


Figure 8.6-12: Taxiway location sign

8.6.16 Direction Signs

8.6.16.1 Each taxiway direction must be indicated by an arrow, as shown below. The sign must have black letters with yellow background. A direction sign must be complemented by a location sign, except where the taxiway designation is adequately displayed by previous location signs along the taxiway.

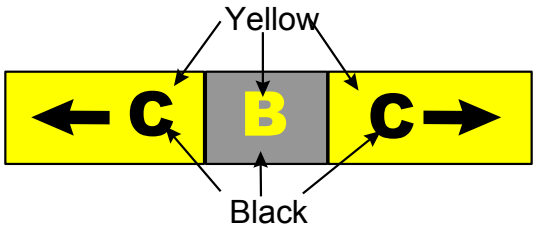


Figure 8.6-13: Direction/location/direction sign

8.6.16.2 At a taxiway/taxiway intersection, information signs must be located prior to the intersection and in line with the taxiway intersection marking.

8.6.17 Destination Signs

8.6.17.1 Destination signs must have black letters on yellow background, as shown below. They advise pilots of facilities on, or near, the movement area. This sign must not be co-located with a location or direction sign.

Figure 8.6-14: Destination sign

8.6.17.2 Examples of common sign text used for destination signs are set out below:

Sign text	Meaning
RAMP or APRON	General parking, servicing and loading area.
PARK or PARKING	Aircraft parking area
CIVIL	Civilian areas of joint-use aerodromes
MIL	Military area of a joint-use aerodrome.
CARGO	Freight or cargo handling area.
INTL	International areas
DOM	Domestic areas
RUNUP	Run-up areas
AC	Altimeter check point
VOR	VOR check point
FUEL	Fuel or service area
HGR	Hangar or hangar area

8.6.18 Take-off Run Available Sign

8.6.18.1 The take-off run available sign indicates to pilots the length of take-off run available from a particular taxiway, where intersection departures are available. This sign is provided to allow pilots to have final reassurance that they are at the correct take-off location:

(a) where the take-off point is close to the start of a runway, the sign is to show the designation of the take-off runway, and the take-off run available in metres, as shown in Figure 8.6-15.

(b) where the take-off point is not close to the start of the runway, the sign is to show the take-off run available in metres, plus an arrow, appropriately located and orientated, indicating the direction in which that take-off run is available, as shown in Figure 8.6-16.

(c) where intersection departures are available in both directions from the position, two signs, one for each direction of take-off, are required.

(d) the take-off run available signs are to be located abeam the runway-holding position on the entry taxiway. Where one take-off run available

sign is provided, it is to be located on the left hand side of the taxiway. Where take-off is available in both directions, the two signs are to be located one on each side of the taxiway, corresponding to the direction of take-off. Take-off run available signs must not obscure a pilot's view of any mandatory instruction signs.

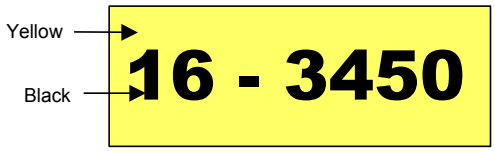


Figure 8.6-15: Take off run available sign

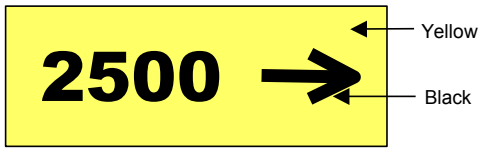


Figure 8.6-16 Take-off run available sign

8.6.19 Runway Exit Signs

8.6.19.1 Runway exit signs, as shown below, advise pilots of the designation and direction of a taxiway from which they can exit. Must be provided for a runway used in LAHSO, except when used only by Performance Category A aircraft, as defined in the AIP. For this purpose, Non-jet aircraft below 5,700 kg may be regarded as Category A aircraft.

8.6.19.2 The sign must consist of black lettering on a yellow background, with a black arrow outboard of the taxiway designator, or to the right of the designator for exits to the right, and to the left for exits to the left.

8.6.19.3 The runway exit sign must be located on the same side of the exit taxiway, 60 m prior to the exit junction where the runway code number is 3 or 4 and 30 m where the runway code number is 1 or 2.

Figure 8.6-17: Runway exit sign

8.6.20 LAHSO Distance To Go Signs

8.6.20.1 LAHSO distance to go signs may be required at a runway where a pilot engaged in LAHSO cannot readily see the hold short line due to runway geometry. Where needed, the distance to go signs must be provided on the left-hand side of the runway as seen by the landing pilot, in increments of 300 m from the hold short line. Three signs with inscriptions of 300, 600 and 900 must be provided. Below the numerals, the designation of the intersecting runway must be displayed in smaller characters, as shown below.

8.6.20.2 The sign must consist of black letters and numbers, on a yellow background. The height of the distance inscription must be 600 mm and the runway designation 200 mm.

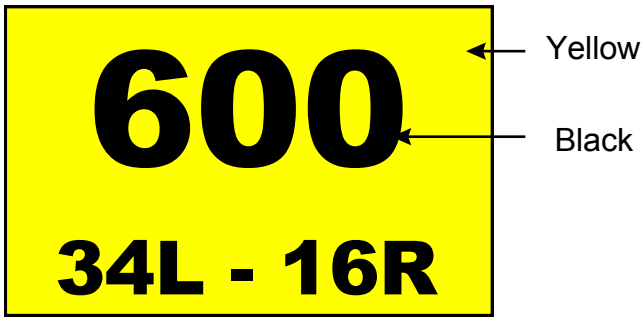


Figure 8.6-18: Distance-to-go sign

Section 8.7: Wind Direction Indicators

8.7.1 Requirements

8.7.1.1 CASR Part 139 requires the aerodrome operator to install and maintain at least one wind direction indicator at the aerodrome. CASA may issue directions requiring additional wind direction indicators to be provided.

8.7.1.2 CASR Part 139 also requires that non-precision approach runways be provided with a wind direction indicator at the threshold of the runway. However, subject to paragraph 8.7.1.3, for runways 1200m or less in length one centrally located wind direction indicator visible from both approaches and the aircraft parking area is acceptable.

8.7.1.3 Paragraph 8.7.1.2 does not apply to a runway if surface wind information is passed to the pilots of aircraft approaching the runway through:

(a) an automatic weather observing system that:

(i) is compatible with the Bureau of Meteorology weather observing system, and

(ii) provides surface wind information through an aerodrome weather information broadcast, or

(b) an approved observer having a communication link with pilots through which timely information about surface wind may be clearly passed to them; or

(c) any other approved means of providing surface wind information.

8.7.1.4 A wind direction indicator must be located so as to be visible from aircraft that are in flight or aircraft that are on the movement area.

8.7.1.5 A wind direction indicator must be located so as to be free from the effects of air disturbance caused by buildings or other structures.

8.7.1.6 A wind direction indicator provided at the threshold of a runway must be located:

(a) except if it is not practicable to do so, on the left hand side of the runway as seen from a landing aircraft; and

(b) outside the runway strip; and

(c) clear of the transitional obstacle limitation surface.

8.7.1.7 If practicable to do so, a wind direction indicator provided at the threshold of a runway must be located 100 metres upwind of the threshold.

8.7.2 Standards

8.7.2.1 A wind direction indicator must consist of a tapering fabric sleeve attached to a pole at its wide end 6.5 m above the ground.

8.7.2.2 The sleeve must be 3.65 m long and taper from 900 millimetres in diameter to 250 millimetres in diameter.

8.7.2.3 The wide end must be mounted on a rigid frame to keep the end of the sleeve open and attached to the pole so as to allow it to move around freely.

8.7.2.4 The fabric of the primary wind direction indicator must be white and that of any additional wind direction indicator must be:

(a) yellow; if it is not intended to be illuminated at night; or

(b) if it is intended to be illuminated at night; either white, or another colour that is clearly visible when illuminated.

> **Note:** Natural or synthetic fibres having weight range of at least 270 to 275 g/m^2 have been used effectively as wind indicator sleeve material.

8.7.2.5 The primary wind direction indicator must be located in the centre of a circle 15 m in diameter, coloured black and bordered:

(a) by a white perimeter 1.2 m wide; or

(b) by a ring of 15 equally spaced white markers each with a base not less than 0.75 m in diameter.

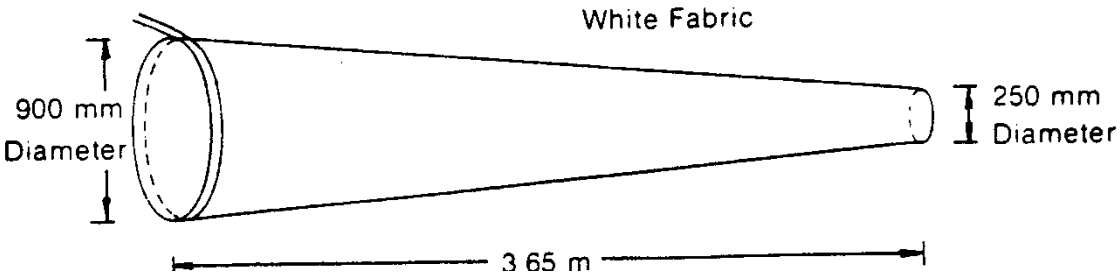


Figure 8.7-1: Wind Direction Indicator

8.7.2.6 For the illumination of wind direction indicators see Chapter 9.

Section 8.8: Ground Signals

8.8.1 Signal Areas

8.8.1.1 A signal area must be:

(a) 9 metres in diameter;

(b) black,

(c) bordered by:

(i) a white border 1 metre wide; or

(ii) 6 equally spaced white markers, each with a base not less than 0.75 m in diameter; and

(d) not more than 15 m from the wind direction indicator, or, if applicable, the primary wind direction indicator. The primary wind direction indicator is located closest to the apron of the aerodrome.

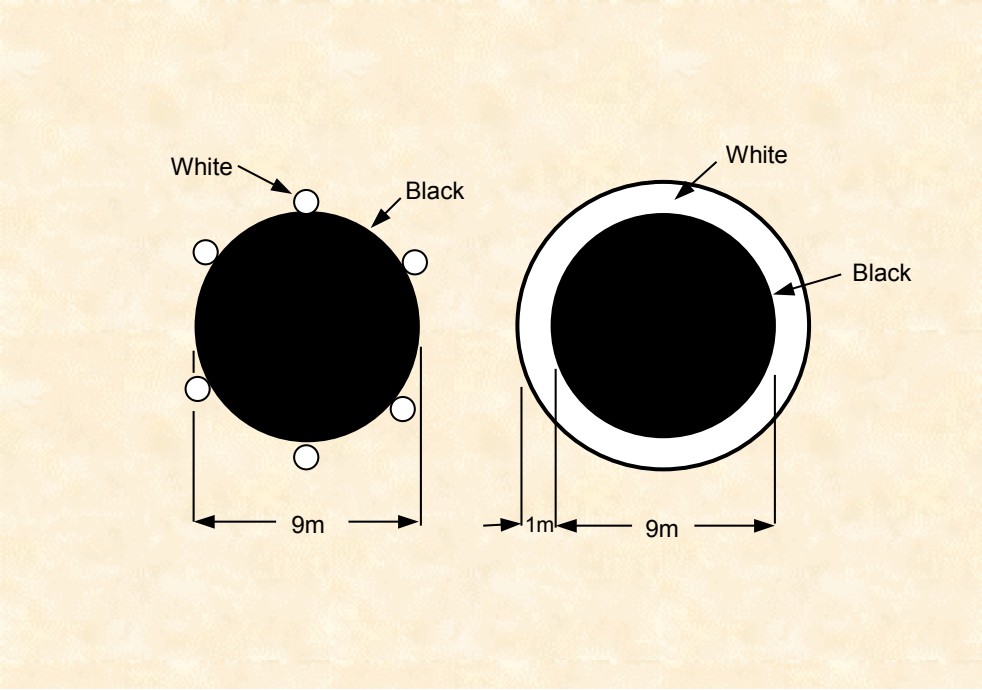


Figure 8.8-1: Signal Area

8.8.2 Ground Signals in Signal Area

8.8.2.1 A ‘total unserviceability’ signal must be displayed in a signal area when an aerodrome is closed to landing aircraft.

8.8.2.2 A ‘total unserviceability’ signal must consist of 2 white strips not less than 0.9 m wide and 6 m long, bisecting each other at right angles.

8.8.2.3 A ‘restricted operations’ signal must be displayed in the signal area at an aerodrome with more than one type of surface on its movement area, if aircraft are only to use:

(a) the sealed runways, taxiways and aprons; or

(b) the gravel runways; where there are no sealed runways, taxiways and aprons.

8.8.2.4 For the purposes of Paragraph 8.8.2.3:

(a) a sealed runway, taxiway or apron is one whose surface is wholly or mainly sealed; and

(b) a gravel runway, taxiway or apron is one whose surface is wholly or mainly gravel.

(c) the ‘restricted operations’ signal must consist of 2 white circles 1.5 m in diameter, connected by a white cross bar 1.5 m long and 0.4 m wide.

(d) a ‘glider operations’ signal, must consist of a white strip 5 m long and 0.4 m wide crossed at right angles by 2 strips 0.4 m wide and 2.5 m long, each being 1.05 m from the closest end of the horizontal strip, as shown below.

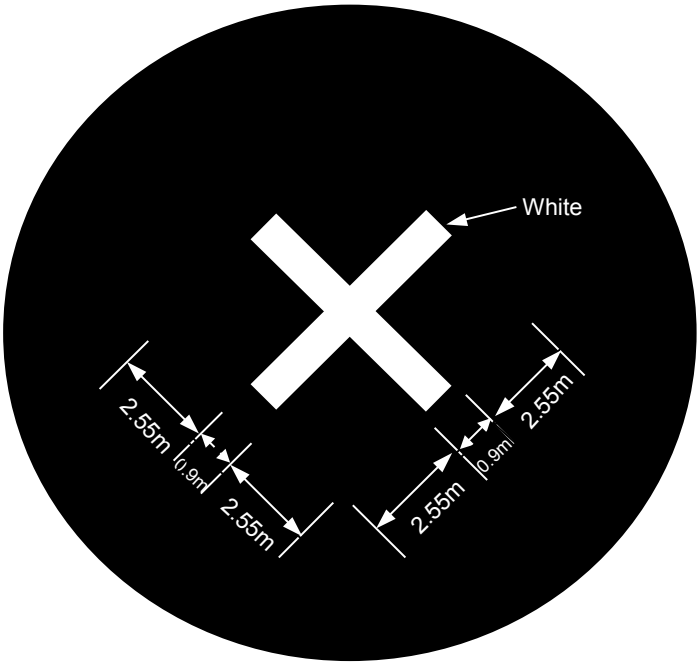


Figure 8.8-2: Total unserviceability signal

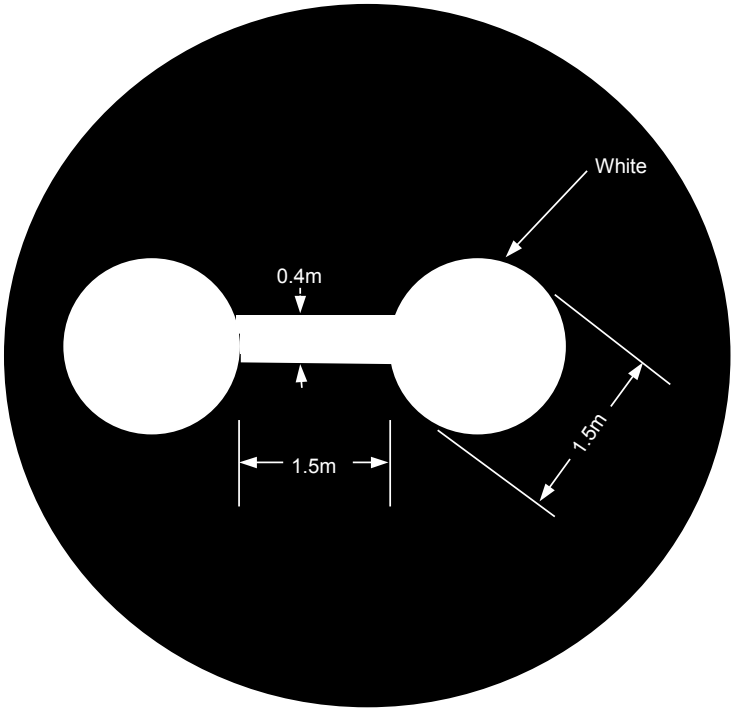


Figure 8.8-3: Restricted operations signal

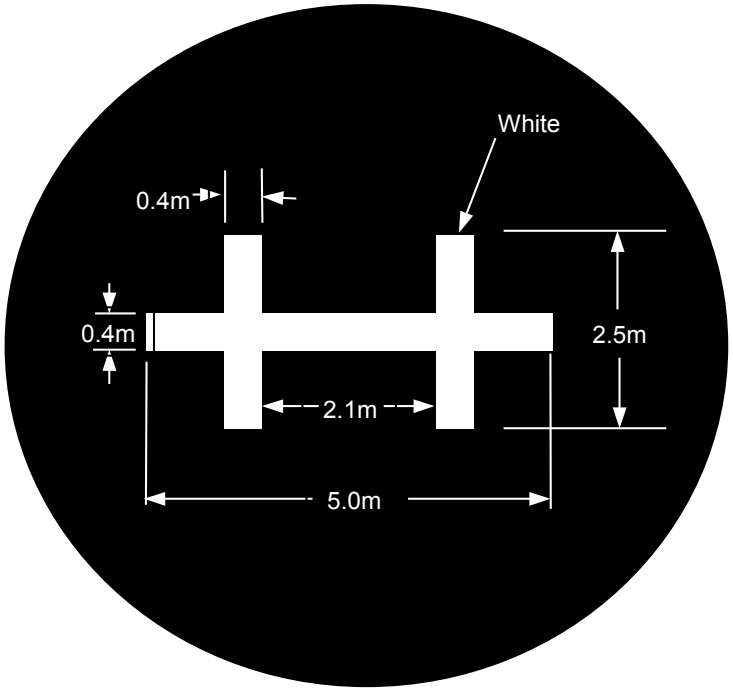


Figure 8.8-4: Glider operations signal

Section 8.9: Marking of Unserviceable and Work Areas

8.9.1 Introduction

8.9.1.1 This section identifies the markings used on unserviceable areas of runways, taxiways, aprons and holding bays and markers used to mark the boundary of unserviceable areas and limit of work areas.

8.9.2 Marking of Unserviceable Areas on Runways, Taxiways and Aprons

8.9.2.1 An unserviceability marking or closed marking must be used to indicate any part of a runway, which is not to be used by aircraft. The marking must comprise a white cross placed on the unserviceable portion of the runway.

8.9.2.2 An unserviceability marking may also be used to indicate any part of a taxiway or apron, which is not to be used by aircraft. The preferred way of marking an unserviceable part of taxiway or apron, is by the placement of unserviceable markers at the entrance to that area or around the unserviceable area.

8.9.2.3 There are two types of unserviceability markings, shown in Figure 8.9-1 and Figure 8.9-2. Where feasible, the larger marking is the preferred marking for a runway.

8.9.2.4 Unserviceability marking is not required for time-limited works.

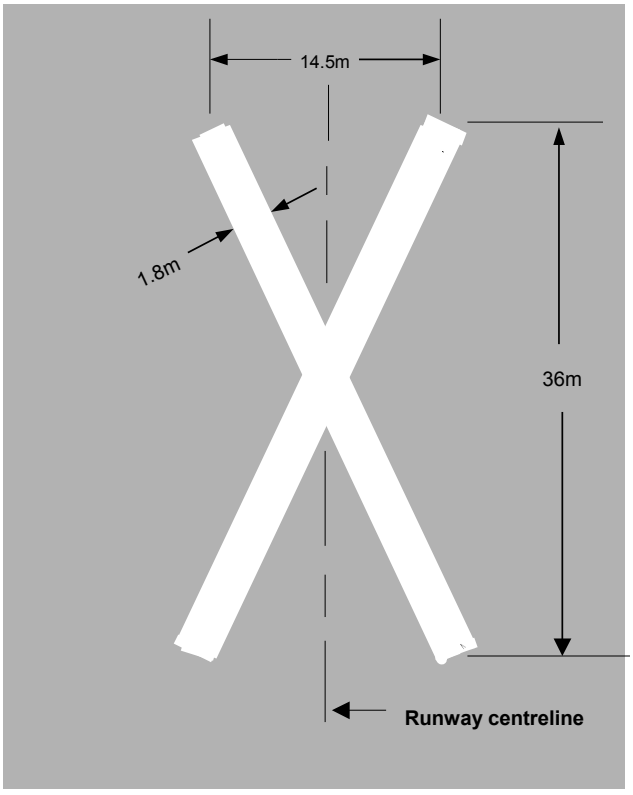


Figure 8.9-1: Unserviceability (closed runway) marking

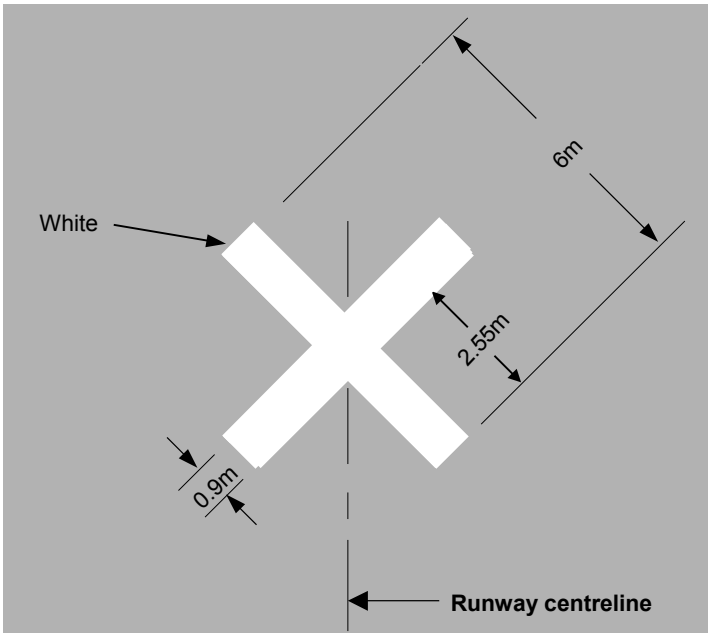


Figure 8.9-2: Unserviceability marking

8.9.2.5 The larger marking must be used on Code 4 runways when the whole or part of the runway is permanently closed or closed to aircraft operations, for more than 30 days. Markings must be displayed at each end of the unserviceable runway, and also in the intermediate area, at intervals of not more than 300 m.

8.9.2.6 The larger making should be used at an aerodrome with multiple and parallel Code 3 runways, when one or more runways, or part of a runway is closed for more than 30 days. Where provided, the markings must be displayed in accordance with Paragraph 8.9.2.5.

8.9.2.7 In other cases of runway unserviceability, if markings in accordance with the larger configuration are not used, then the smaller marking must be used. The smaller markings must be displayed at each end of the unserviceability and in the intermediate area at intervals of not more than 200 m.

8.9.3 Use of Unserviceability Markers

8.9.3.1 Unserviceability markers are shown in Figure 8.2-1. They must consist of a white standard cone with a horizontal red stripe, 25 cm wide around its centre, half way up the cone, so as to provide three bands of colour, white-red-white.

8.9.3.2 Unserviceability markers must be displayed wherever any portion of a taxiway, apron or holding bay is unfit for the movement of aircraft but is still possible for aircraft to bypass the area safely.

8.9.4 Works Limit Markers

8.9.4.1 Works limit markers, shown in Figure 8.2-1, where used, must be spaced at intervals marginally less than the smallest track of the plant or vehicles operating within the work area.

8.9.4.2 Other forms of work limit markers may be used for works on apron and other areas provided they are not a hazard to aircraft and other airside vehicles operating in the vicinity of the works area.

Section 8.10: Obstacle Markings

8.10.1 General

8.10.1.1 Fixed objects, temporary and permanent, which extend above the obstacle limitation surfaces but are permitted to remain; or objects which are present on the movement area, are regarded as obstacles, and must be marked. The aerodrome operator must submit details of such obstacles to CASA, for hazard assessment and particular requirements for marking and lighting. This information must be included in the Aerodrome Manual.

8.10.1.2 CASA may permit obstacles to remain unmarked;

(a) when obstacles are sufficiently conspicuous by their shape, size or colour;

(b) when obstacles are shielded by other obstacles already marked; or

(c) when obstacles are lighted by high intensity obstacle lights by day.

8.10.2 Marking of Obstacles

8.10.2.1 A structure must be marked when more than 150 m higher than the surrounding terrain. Surrounding terrain means the area within 400 m of the structure. Structures above 90 m may need to be marked, and inconspicuous structures 75 m above ground level should also be marked. Fixed objects on the aerodrome movement area, such as ILS buildings, must be marked as obstacles.

8.10.2.2 Obstacles other than wires and cables, must be painted in a pattern of contrasting colours which also contrast with the background, as agreed and set out in the Aerodrome Manual. Orange and white or red and white are normally used.

8.10.2.3 Obstacles with unbroken surfaces more than 4.5 m by 4.5 m size, must be painted in a chequered pattern of lighter and darker squares or rectangles, with sides no less than 1.5 m and no more than 3 m long, as shown in Figure 8.10-1. The corners of the obstacle must be painted in the darker colour.

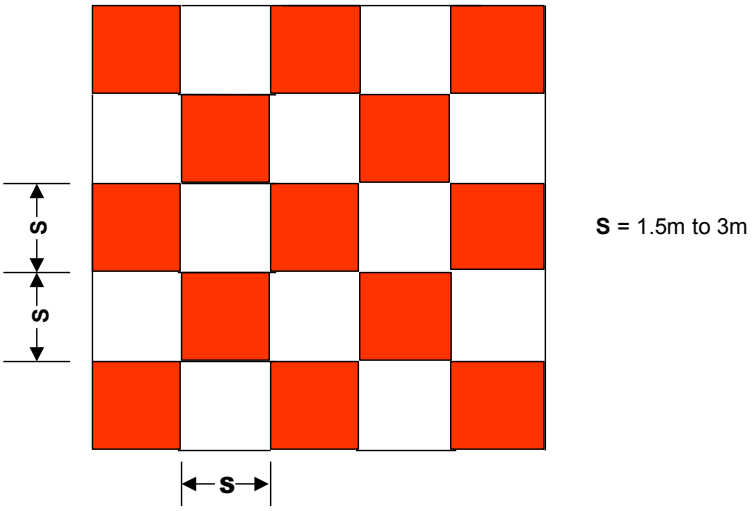


Figure 8.10-1: Marking of square face obstacle

8.10.2.4 Obstacles more than 1.5 m size in one direction and less than 4.5 m in the other, or any lattice obstacle greater than 1.5 m in size in both directions, must be marked with alternating contrasting bands of colour, with the ends painted in the darker colour, as shown in Figure 8.10-2. The bands must be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less.

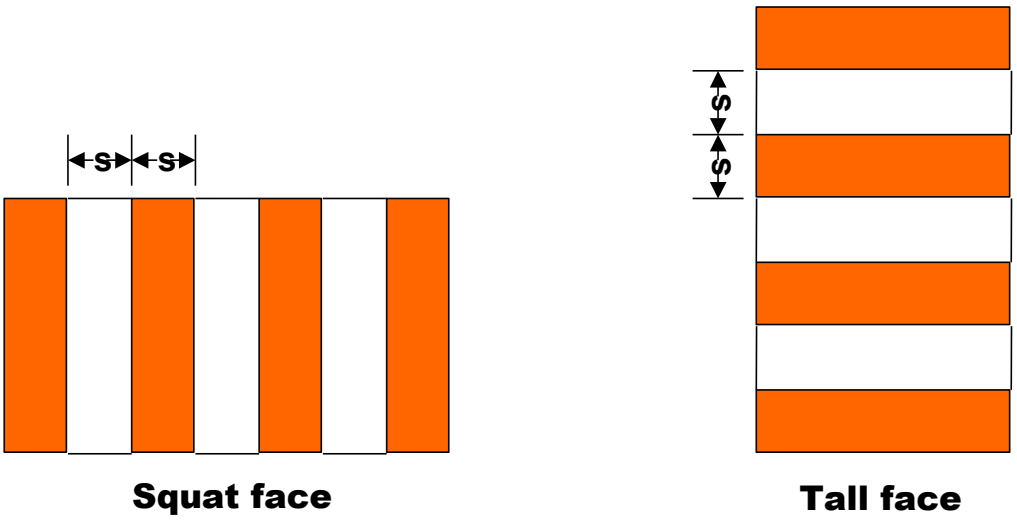


Figure 8.10-2: Marking of squat or tall face objects

8.10.2.5 Obstacles with any dimension less than 1.5 m, except for masts, poles and towers described in Paragraph 8.10.2.6, must be painted in a solid contrasting colour.

8.10.2.6 Masts, poles and towers must be marked in contrasting bands with the darker colour at the top, as shown in Figure 8.10-3. The bands must be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less.

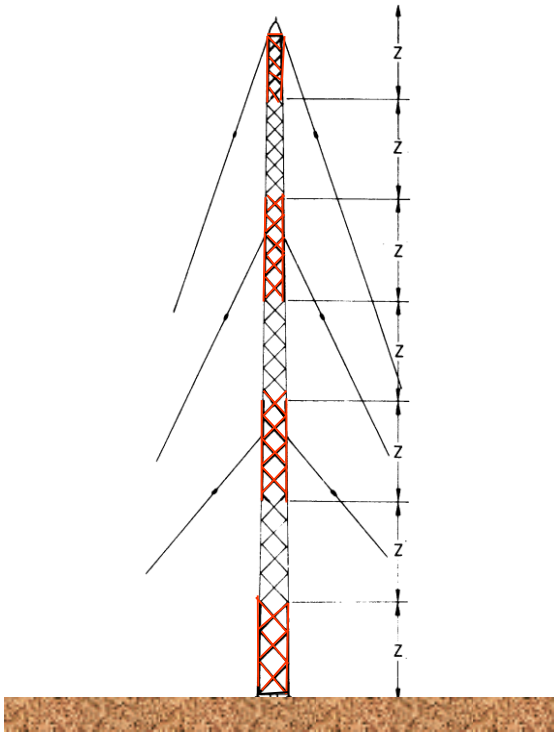


Figure 8.10-3: Marking of mast, pole and tower

8.10.2.7 Fence posts which are determined to be obstacles, must be painted in a single conspicuous colour, normally white.

8.10.2.8 Wires or cable obstacles must be marked using three-dimensional coloured objects such as spheres and pyramids, etc; of a size equivalent to a cube with 600 mm sides, spaced 30 m apart.

8.10.3 Marking of Temporary and Transient Obstacles

8.10.3.1 Temporary and transient obstacles may be required by CASA to be marked. Fixed temporary obstacles should be marked as described above for permanent obstacles. Where this is not practicable, CASA accepts the use of unserviceability cone markers and/or flags to delineate the shape and size of the obstacle so that it is clearly visible from any line of approach likely to be used by an aircraft.

8.10.3.2 Flags used for marking fixed temporary obstacles must be not less than 0.6 m square. They must be either orange or orange and white, split diagonally. Where orange merges with the background, another conspicuous colour must be used.

8.10.4 Marking of Vehicles

8.10.4.1 A vehicle used regularly on the manoeuvring area by day should be painted a single conspicuous colour, preferably yellow or orange. Where so painted, it does not require additional marking.

8.10.4.2 Vehicles not painted yellow or orange must be marked, by using either:

(a) flags; or

(b) vehicle warning lights, in accordance with paragraph 9.19.1.

8.10.4.3 Flags must be not less than 0.9 m square and consist of an orange and white chequered pattern, each square of which must have sides not less than 0.3 m. Where orange merges with the background, another colour that contrasts with the background must be used.

8.10.4.4 For marking of rescue and fire fighting service vehicles, see MOS 139, Subpart H, Chapter 4.

Section 8.11: Helicopter Areas on Aerodromes

8.11.1 Introduction

8.11.1.1 At aerodromes used by both helicopters and fixed wing aircraft, specific markings must be provided on facilities for the exclusive use of helicopters.

8.11.2 Helicopter Landing and Lift-off Area Markings

8.11.2.1 Where a specific area other than the runway, is provided for the landing and lift-off of helicopters, the area must be marked by a circle, painted white, with an inside radius of 6 m and a line width of 1 m. A white 'H' marking must be provided, located centrally within the circle, aligned with the orientation of the helicopter landing direction. The dimensions of the H marking must be 6 m high and 3 m wide, with a line width of 1 m.

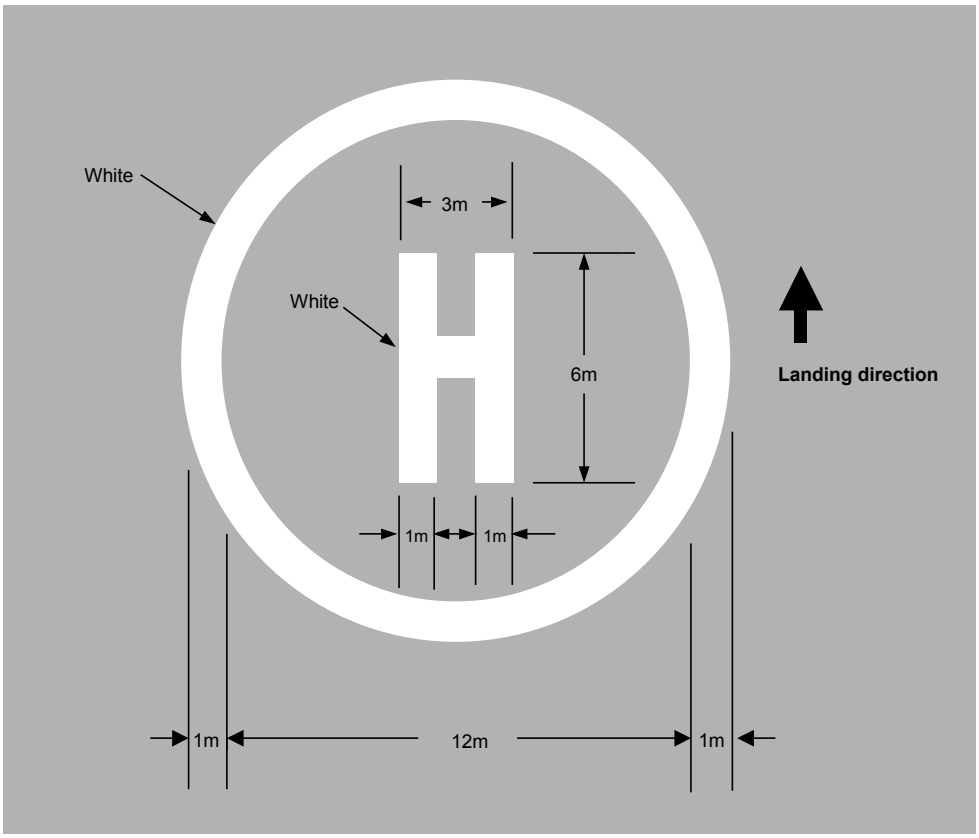


Figure 8.11-1: Helicopter landing and lift-off marking

8.11.3 Helicopter Apron Markings

8.11.3.1 Helicopter apron markings comprise taxi guidelines, lead-in lines and helicopter parking position markings. Markings for taxi guidelines and lead-in lines to dedicated helicopter parking positions must be the same as for fixed wing aircraft.

8.11.4 Helicopter Parking Position Markings

8.11.4.1 Where a dedicated helicopter parking position is provided on a sealed, concrete or asphalt apron, it must be marked with the letter 'H', painted yellow, 4 m high, 2 m wide with line width 0.7 m. The marking must conform to the shape and proportions shown in Figure 8.11-2.

8.11.4.2 The letter H must be located centrally in the parking position and aligned with the desired orientation of the helicopter when parked. This marking also serves as the parking position designator.

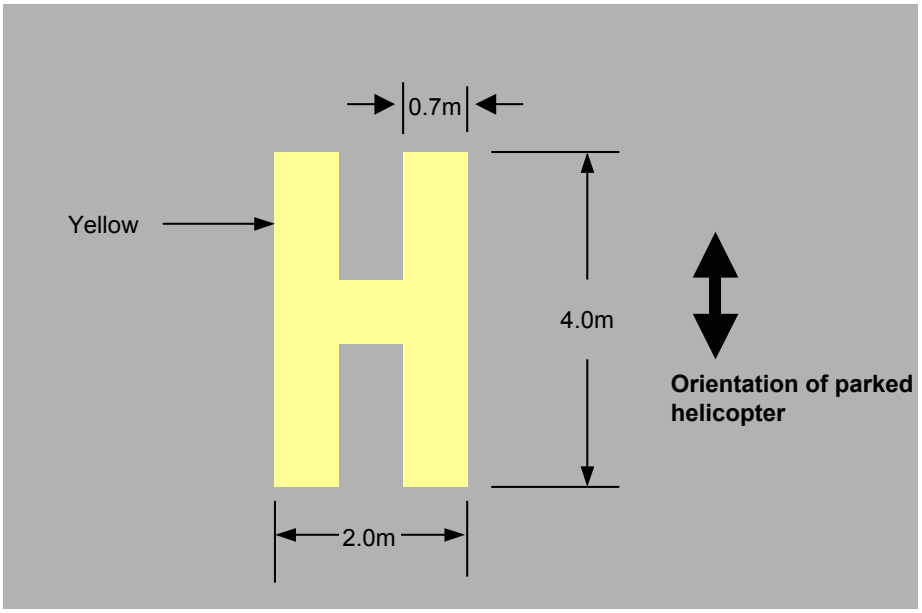


Figure 8.11-2: Helicopter parking position marking

8.11.5 Helicopter Taxi Guideline Designation

8.11.5.1 Designation must be provided where a taxi guideline leads to a parking position which is restricted to helicopters only. Where an apron contains both fixed wing and dedicated helicopter parking positions, taxi guidelines leading to dedicated helicopter parking positions must be marked with a 2 m high, yellow designator 'H', at their divergence from the aircraft taxi guideline, as shown in Figure 8.11-3.

8.11.5.2 These designations must be located and oriented in such a way that they can be seen by the pilot of an aircraft 15 m away on the taxi guideline.

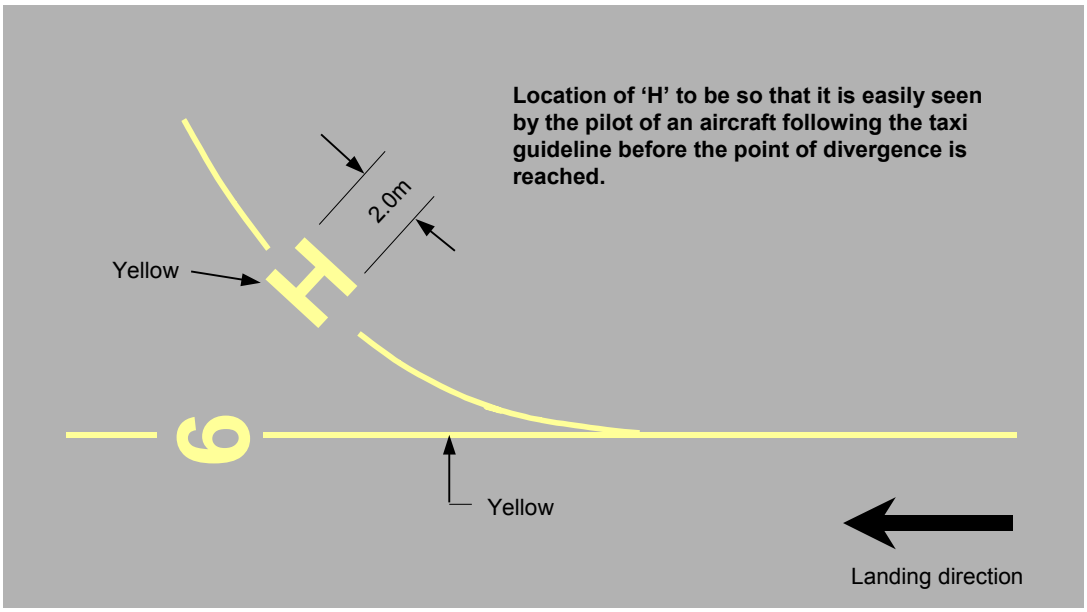


Figure 8.11-3: Helicopter taxi guideline designator

8.11.6 Helicopter Parking Position Numbers

8.11.6.1 Parking position numbers must be provided when there is more than one helicopter parking position on an apron. All parking positions must be numbered above, and below the helicopter parking position marking. Numbers must be 2 m high, painted yellow, as illustrated in Figure 8.11-4.

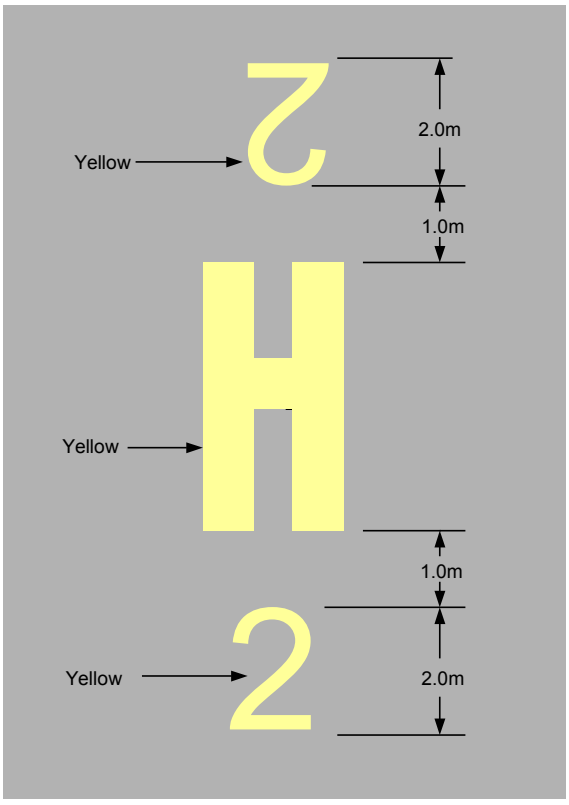


Figure 8.11-4: Helicopter parking position number

8.11.7 Helicopter Apron Edge Markings

8.11.7.1 Apron edge markings must be provided when it is necessary to clearly define areas allocated specifically for helicopter parking.

8.11.7.2 On sealed, concrete or asphalt aprons, the edge marking must consist of two continuous lines 0.15 m wide, 0.15 m apart, painted light blue. Additionally, the words 'HELICOPTER ONLY' must be painted in yellow, along the edge marking, outside the helicopter apron, and legible to pilots of approaching aircraft. The letters must be 0.5 m high, located 0.15 m from the helicopter apron edge marking. These words must be spaced at intervals not exceeding 50 m, along the helicopter apron edge marking, as shown below.

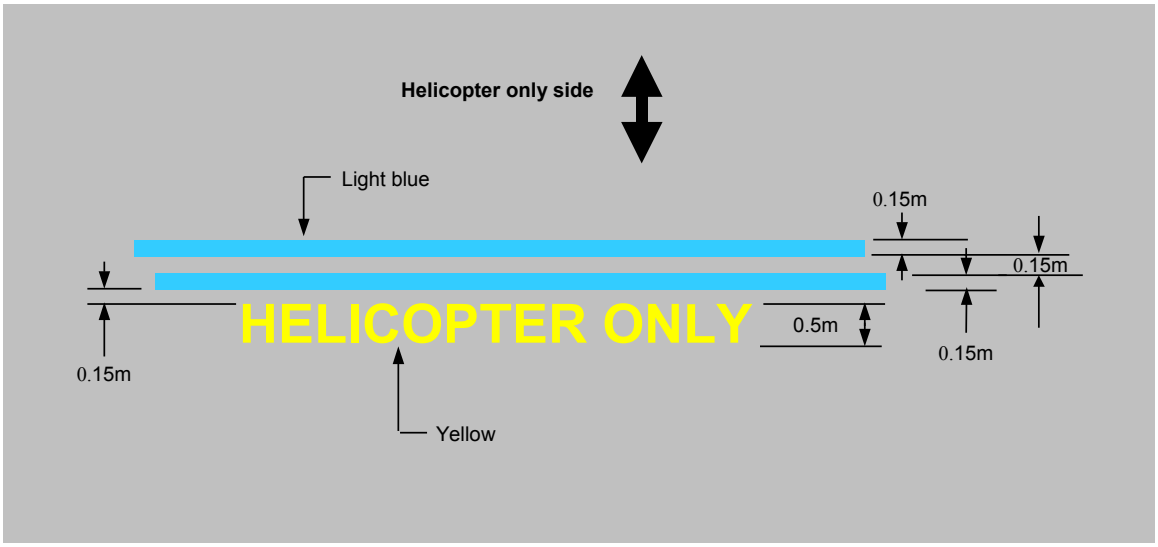


Figure 8.11-5: Helicopter apron edge markings

8.11.7.3 On gravel or natural surfaces, the apron must be marked using light blue cones; spaced at a minimum of 30 m, and a maximum of 60 m apart.

Section 8.12: Marking of Glider Runway Strips on an Aerodrome

8.12.1.1 When gliding operations are being conducted at an aerodrome, a signal consisting of a double white cross must be displayed in the signal circle. Details of the signal are illustrated in Figure 8.12-4, below.

8.12.1.2 Where the glider runway strip is located wholly or partly within an existing runway strip for powered aircraft, the width of the glider runway strip must be fixed on the one side by the edge of the runway for powered aircraft, and on the other by the existing runway strip markers adjusted as necessary, as shown below in Figure 8.12-1 and Figure 8.12-2.

8.12.1.3 Where a glider runway strip is located outside an existing runway strip for powered aircraft, the glider runway strip must be marked with boundary markers of a conspicuous colour other than white, as shown in Figure 8.12-3.

8.12.1.4 Where an end of a glider runway strip is not alongside the end of an existing runway strip for powered aircraft, an additional white double cross on a black background must be displayed 20 m in front of the glider strip end markers, as shown in Figure 8.12-2 and Figure 8.12-3.

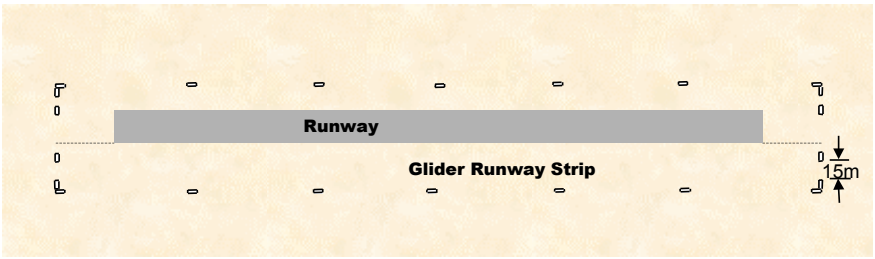


Figure 8.12-1: Glider runway strip taking up the full length of powered aircraft runway strip (no signal required)

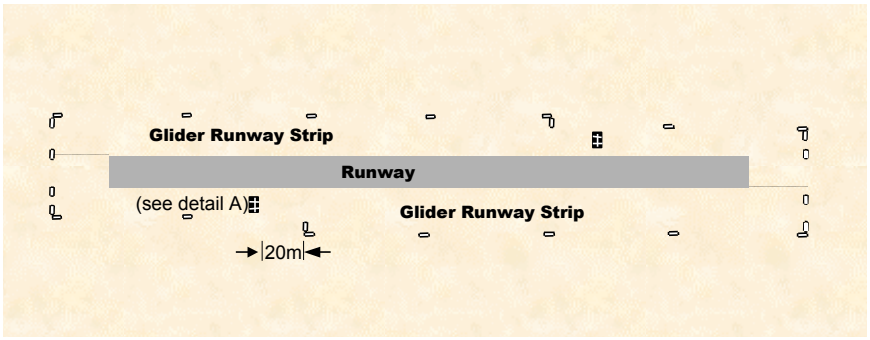


Figure 8.12-2: Glider runway strip taking part of the powered aircraft runway strip

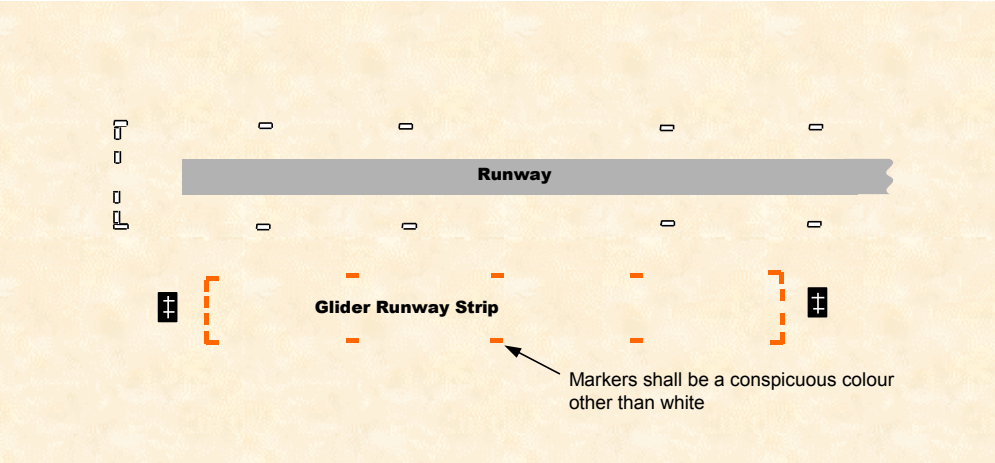


Figure 8.12-3: Glider runway strip outside an existing powered aircraft runway strip

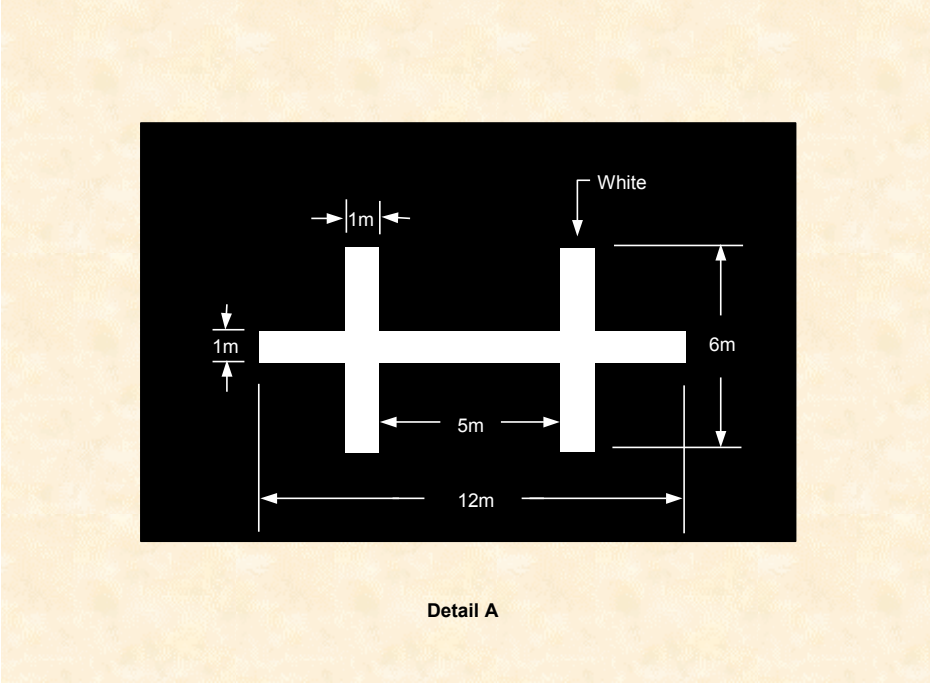


Figure 8.12-4: Detail of glider operations signal