

ROYAL FLYING DOCTOR SERVICE OF AUSTRALIA
(Western Operations)

AIRSTRIP STANDARDS & REPORTING ARRANGEMENTS

REV. 1.0 - DATED: 26-OCT-98

COPY:



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1. INTRODUCTION

This circular describes the minimum airstrip standards required for operations by RFDS aeroplanes. It also explains the arrangements for keeping RFDS informed about the status of your airstrip.

In addition, some general pointers are provided for the benefit of those who plan to select and develop a new airstrip for RFDS use.

Readers should note that these guidelines apply to RFDS operations only.

All clients are urged to study this circular carefully. Please contact us should you have any queries.

2. DEFINITIONS

2.1 RUNWAY

A defined rectangular area, centrally located within a runway strip, prepared for the take-off and landing of aeroplanes along its length.

2.2 RUNWAY STRIP

A defined rectangular area, including the runways, intended:

- a) to avoid damage to aeroplanes running off the runway;
- b) to protect aeroplanes flying over it, during take-off or landing.

2.3 FLYOVER AREA

A defined area adjacent to the runway strip intended to protect aeroplanes flying over it, during take-off or landing.

2.4 LATERAL TRANSITIONAL SURFACE

An inclined plane along the side of the flyover area and part of the side of the approach surface which slopes upwards and outwards to a specified height, intended to provide greater lateral protection to aeroplanes during approach, landing and take-off phases of flight.

2.5 APPROACH (AND TAKE-OFF) SURFACE SLOPE

An inclined plan of specified dimensions that originates at the end of the runway and slopes upwards and outwards at a specified rate.

2.6 OBSTACLE FREE AREA

The area (comprising the runway, runway strip, flyover area, lateral transitional surface and approach and take-off surfaces) to be kept free of all obstacles, including wires.

3. AIRSTRIP SITE SELECTION

3.1 SOME POINTERS TO NATURAL SURFACE AIRSTRIP SITE SELECTION

- Look for areas that are naturally well drained and not subject to flooding or water ponding.
- Look for areas without frequent surface undulations. Ideally there should be a gentle fall along the length of the airstrip and a very slight camber on the runway. Pronounced one way slopes across the runway should be avoided - they can cause surface scouring.
- Give preference to sites having soil types that, from local experience, remain smooth and compact when trafficked. Avoid:
 - ⇒ very sandy soils;
 - ⇒ rocky terrain;
 - ⇒ soils that become boggy or slippery when wet.
- Make sure that the selected site:
 - ⇒ can comfortably accommodate required airstrip dimensions and physical characteristics and is aligned into the stronger prevailing surface winds;
 - ⇒ avoids penetration of the approach and take off surfaces and the lateral transitional surfaces (where required) by immovable objects;
 - ⇒ remains accessible to normal surface transport at all times when the airstrip is useable.
- Endeavour to select a site where:
 - ⇒ no hills (or terrain) or man made objects (masts, buildings, etc.) more than 45 metres above airstrip elevation exist within 2500 metres (ideally 4000 metres) of the site;
 - ⇒ aeroplanes will not fly close to or over residential or built up areas, particularly during normal landing and take-off phases of flight;
 - ⇒ future use of the airstrip is not likely to be compromised by the growth of obstacles around it.

3.2 MINIMUM AIRSTRIP STANDARDS

We recommend that you discuss your requirements with us before starting to build an airstrip for RFDS use.

It is good practice to then have the suitability of selected sites assessed by someone competent to do so. This could be a pilot or an airstrip owner, or a professional airport engineer if significant earthworks, drainage or construction of a runway pavement is required.

4. AIRSTRIP DIMENSIONS AND PHYSICAL CHARACTERISTICS

4.1 RUNWAY

4.1.1 DIMENSIONS

The runway length should be not less than 1200 metres.

The minimum required runway width is 18 metres with a 25 metre by 25 metre turning node at each end of the runway (Figures 1 and 2). The preferred runway width is 20 metres.

4.1.2 SURFACE SLOPES

The maximum allowable longitudinal slope between runway ends is 2%.

The longitudinal slope along any portion of the runway is not to exceed 2.68%.

Where there are longitudinal slope changes:

- i) They are to be gradual*.
- ii) Undulations or appreciable slope changes located close together along a runway should be avoided**.

The transverse slope across the runway should not exceed 2.5%. Where the runway comprises a constructed pavement, the design should ideally feature a central crown with between 1.5% and 2.0% downward traverse slopes to ensure effective drainage. Abrupt changes to transverse slope are to be avoided.

4.1.3 SURFACE

The entire runway surface must be smooth and compact and should be well drained. Factors that may contribute to an unsatisfactory surface or affect safe operations include:

- isolated soft wet areas;
- loose surface sand;
- animal pads;
- ruts;

* The transition from one slope to another is to be a vertical curve with a rate of change not exceeding 0.4% per 30 metres.

** The distance between the points of intersection of two successive curves should not be less than (a) the absolute numerical values of the corresponding slope changes multiplied by 5000 metres; or (b) 45 metres, whichever is the greater.

- potholes;
- sand build up around grass growth;
- excessive high grass growth;
- shrub regrowth;
- imbedded rock protruding above the runway surface;
- loose surface stones;
- use of the runway as a road.

The smoothness of a runway can be tested by driving a stiffly sprung vehicle along the runway at a speed of at least 75km/h. If this gives the occupants a smooth ride without discomfort, the surface can be considered satisfactory.

4.2 RUNWAY STRIP

4.2.1 DIMENSIONS

The runway strip length is to be not less than that of the runway it contains.

The width of the runway strip is to be not less than 45 metres (Figures 1 and 2).

4.2.2 SURFACE SLOPES

Longitudinal slope characteristics along the runway strip should be essentially the same as those on the adjacent runway.

Transverse slopes are not to exceed 2.5%. Abrupt changes are to be avoided.

4.2.3 SURFACE

The runway strip is to satisfy **runway** surface standards (see Section 4.1.3) if the runway **is not** well defined (see Section 5.2).

If the runway is well defined, the runway strip surface condition may then be at a lesser standard, but one such that an aircraft running off the runway is not likely to suffer damage, vis:

- a) No vegetation (other than short grass) or upstanding objects such as tree roots and rocks;
- b) A surface graded or dragged to even finish generally meeting runway surface slope requirements;

- c) Surface smoothness and compactness such that the runway strip can be trafficked in comfort in a heavily sprung two wheel drive vehicle driven over it at 40km/h, and without risk of bogging;
- d) Is free draining.

4.3 FLYOVER AREA

4.3.1 DIMENSIONS

The length is to match that of the associated runway strip.

The minimum width of runway strip plus flyover area is:

- For operations by day, 60 metres (Figure 1);
- For operations at night, 90 metres (Figure 2).

4.3.2 SURFACE SLOPES

Upward transverse slopes of up to 12.5% (1 in 8) are acceptable.

Upward longitudinal slopes should, ideally, not exceed those on the adjoining runway strip.

Ditches and depressions within the flyover area are acceptable.

4.3.3 SURFACE

The surface of the flyover area need not be trafficable but must be clear of all above ground level objects such as tree and shrubs, fences, mounds, and rock outcrops.

4.4 APPROACH & TAKE-OFF SLOPE SURFACES

Objects located within approach and take-off **areas** (Figures 1 and 2) are not to protrude above the approach and take-off **surface slopes** illustrated at Figure 3. Significant objects located beyond the approach and take-off areas may also need to be considered in some circumstances.

4.5 LATERAL TRANSITIONAL SURFACE

Obstacle protection of this surface (Figure 4) is required at airstrips to be used at night and is encouraged at other airstrips, particularly those with trees, ridges or man made structures located within 45 metres of the outer edges of the flyover areas or close to the approach surface.

4.6 APRON (PARKING) AREAS

4.6.1 DIMENSIONS

The dimensions of an aircraft apron area should be not less than 50 metres long by 30 metres wide (Figures 1 and 2).

4.6.2 SURFACE AND SLOPES

The surface, slopes and other characteristics of an apron area are to be the same as for the runway.

4.6.3 LOCATION

The apron is to be located

- at any convenient point along the length of the runway;
- external to the flyover area;
- so that aircraft parked on the apron will not obstruct the lateral transitional surface, if provided.

4.7 TAXIWAY

4.7.1 DIMENSIONS

The minimum taxiway width is 12 metres (Figures 1 and 2).

4.7.2 SURFACE AND SLOPES

The slopes and surface characteristics of a taxiway are the same as those for a runway.

4.7.3 LOCATION

The taxiway should link the runway to the apron by the shortest practical route.

5. AIRSTRIP MARKING AND LIGHTING

5.1 RUNWAY STRIP BOUNDARY MARKERS

Figure 5 illustrates the layout for runway strip edge and corner markers.

The individual marker units may be:

- a) large cone or gable markers equivalent to those displayed at licensed aerodromes;
- b) 200 litre drums cut longitudinally into two halves to make two marker units; or
- c) medium size truck tyres e.g. 4 x 4 Landcruiser tyres.

All runway strip markers are to be painted white.

5.2 RUNWAY EDGE AND CORNER MARKERS

Runway markers are required if the runway edges and ends are not otherwise naturally well defined and the adjacent runway strip surface is maintained to (the lesser) runway strip standard - see Section 4.2.3.

Figure 6 illustrates the layout for runway edge and end markers. The individual marker units are normally small cone markers, equivalent to those used at licensed aerodromes, or **small** car tyres.

All runway edge and corner markers are to be painted white.

5.3 AIRSTRIP LIGHTING

5.3.1 NORMAL OPERATIONS

The types of lighting suitable for normal use by RFDS are:

- a) Fixed electric runway lights connected to a mains supply (or generator), or portable solar charged battery powered electric runway lights, both of a type approved by the Civil Aviation Safety Authority (CASA), plus an illuminated wind direction indicator (wind sock) - see para 6.1.
- b) Dry cell or rechargeable battery powered runway lights of an approved type.
- c) Liquid (diesel or kerosene) fuelled wick fed flares, used in conjunction with dry cell or rechargeable battery powered runway end lights.

Figure 7 illustrates the layout for these lighting systems.

Professional advice should be sought for design and installation of mains powered lighting and is advised for solar charged battery powered airstrip lighting systems. These two types of airstrip lighting can be fitted with a pilot activated lighting (PAL) system.

5.3.2 EMERGENCY OPERATIONS

In an **emergency**, types of lighting that may be used are:

- Battery powered white lights or liquid fuelled flares described in paras (b) and (c) above (Figure 8).
- Cans, such as large powdered milk cans, part filled with sand and fuelled with diesel or kerosene and ignited with the help of a small charge of petrol (Figure 8).
- In special cases, reflectors used in combination with 8 runway lights (Figure 9).
- Car headlights (Figure 10).

5.4 WIND DIRECTION INDICATOR

A wind direction indicator is required, preferably located in the vicinity of the aircraft apron area. It must be positioned clear of the flyover area, and the lateral transitional area if provided.

Figure 11 illustrates standard wind indicator sleeve dimensions and suitable mast assemblies for daylight operations

An illuminated wind indicator and mast assembly equivalent to licensed aerodrome standard should be provided at airstrips with electric lighting - see para 5.3 (a).

6. AIRSTRIP REPORTING ARRANGEMENTS

6.1 AIRSTRIP INFORMATION

For operational and air safety reasons RFDS needs to have reliable and up-to-date information on the airstrips it uses. There are two categories of airstrip information:

- a) **PERMANENT INFORMATION:** being information that is normally static and recorded on each airstrip's Data Sheet e.g. the direction, length and width of runways; the availability of airstrip lighting; telephone/facsimile numbers, etc.
- b) **TEMPORARY INFORMATION:** being information that advises either a temporary change to safety related permanent information shown on the Data Sheet, or any other information likely to affect flight safety.

6.2 AIRSTRIP REPORTING

To initiate the reporting arrangements the RFDS will, in collaboration with the airstrip proprietor, review each airstrip Data Sheet and send a copy to the proprietor. The reporting process then is:

Permanent Information

- a) Proprietor to advise RFDS, preferably by facsimile, when any changes to Data Sheet details occur. If facsimile is not available and the permanent change is operationally significant e.g. permanently reduced runway length, the change should be advised by telephone.
- b) RFDS will amend the Data Sheet and return a corrected copy to the airstrip proprietor.
- c) Each year, RFDS will send a copy of their current Data Sheet to the airstrip proprietor for him/her to amend if necessary, certify as being correct and return to RFDS.

Temporary Information

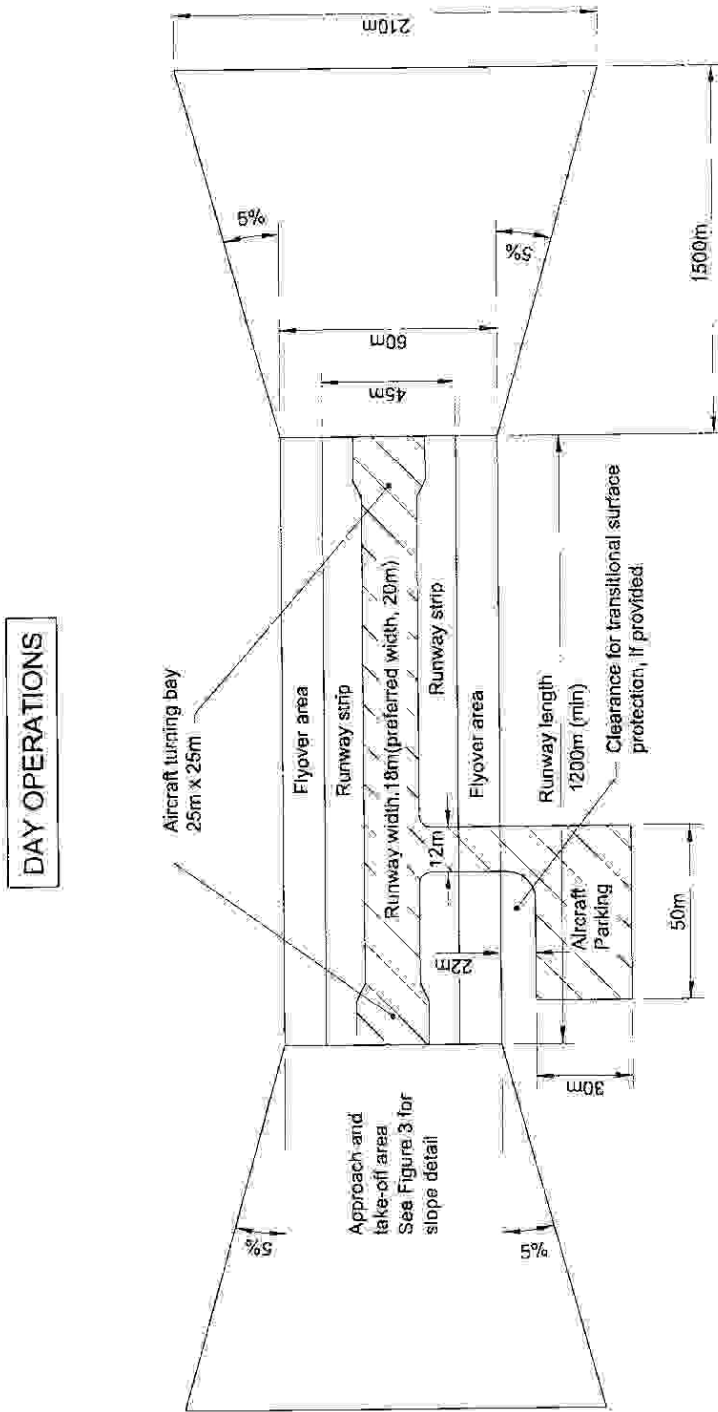
When requesting RFDS services the airstrip proprietor should, at the same time, or as far as possible in advance of the aircraft's arrival:

- a) Confirm that the airstrip has been inspected, and that:
 - ⇒ Data Sheet information is still correct;
 - ⇒ The airstrip still meets RFDS standards and is safe for use.
- b) If this is not the case, provide detail on any temporary changes that may affect safe conduct of the flight, such as:
 - ⇒ Any reduction to the serviceable length and/or width of the runway or runway strip;
 - ⇒ Describe the location of any areas within the runway or runway strip that may be suspect or not safe to use;

- ⇒ Describe the type and location of any new or temporary obstacles that may penetrate the airstrips approach or take-off surfaces.

APPENDIX 1

AIRSTRIP STANDARDS DIMENSIONAL DRAWINGS



DAY OPERATIONS

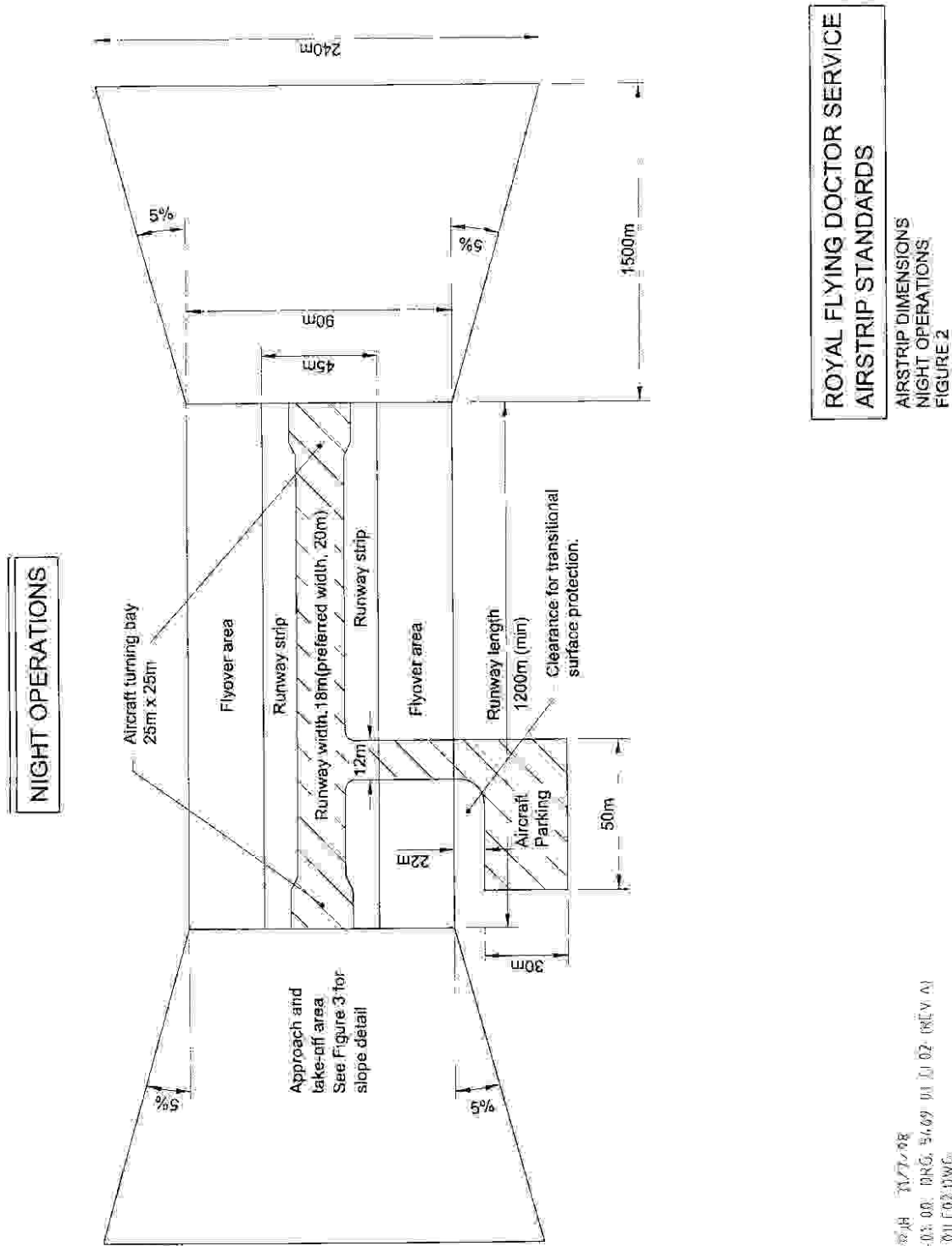
NOTE:
To cater for possible future operations at night, consideration should be given to locating the aircraft parking area external to a 90 metre wide flyover area.

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AIRSTRIP STANDARDS**

AIRSTRIP DIMENSIONS
DAY OPERATIONS
FIGURE 1



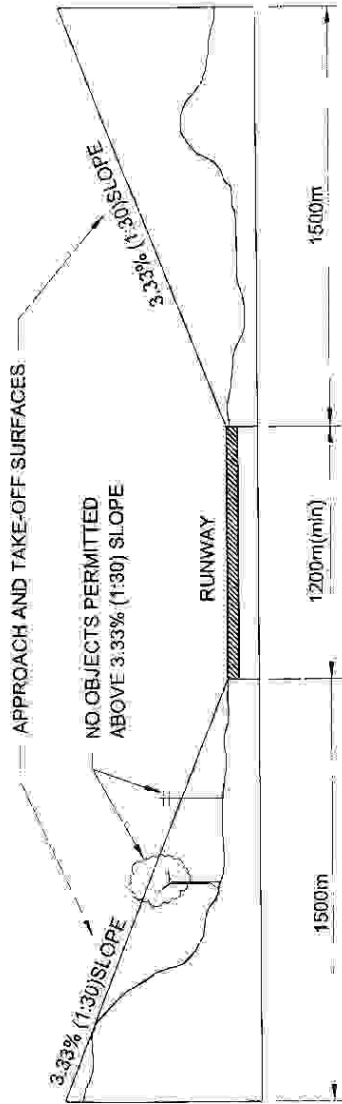
R-5 2 18 04 31/7/98
5469-01-10 D:\R\5469 01 10\1 (R-V) .M
1,10 011 010.W



**ROYAL FLYING DOCTOR SERVICE
AIRSTRIP STANDARDS**

AIRSTRIP DIMENSIONS
NIGHT OPERATIONS
FIGURE 2

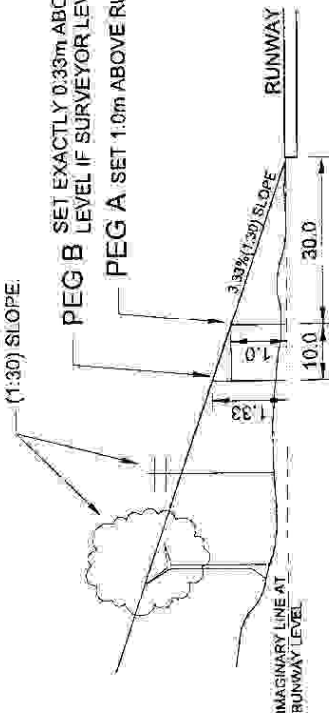

 65/12/18 11/1/18
 5068-03 00 DRG 5469 01 10 02 (REV A)
 FAX 011 623 3366



REMOVE ALL OBJECTS OR THOSE PARTS OF OBJECTS ABOVE 3.33% (1:30) SLOPE.

PEG B SET EXACTLY 0.33m ABOVE PEG A USING A STRINGLINE

PEG A SET 1.0m ABOVE RUNWAY END LEVEL.



A METHOD FOR MEASURING 1:30 SLOPE

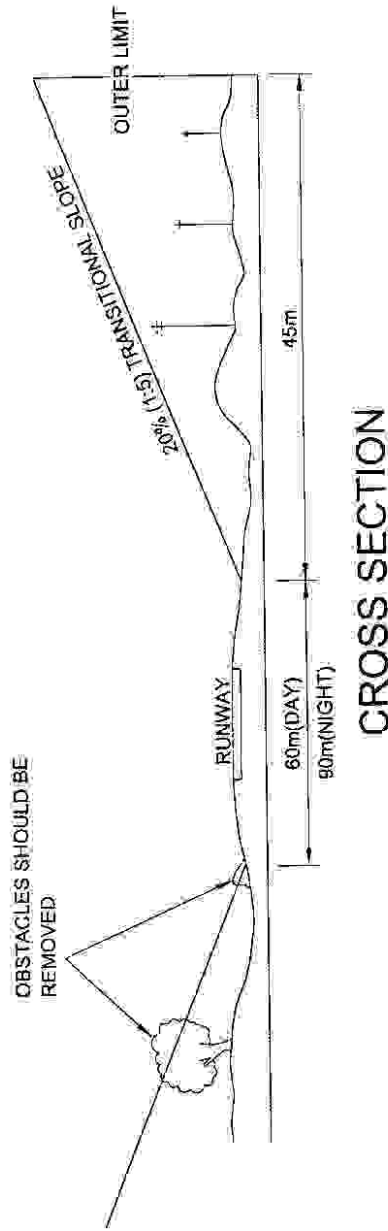
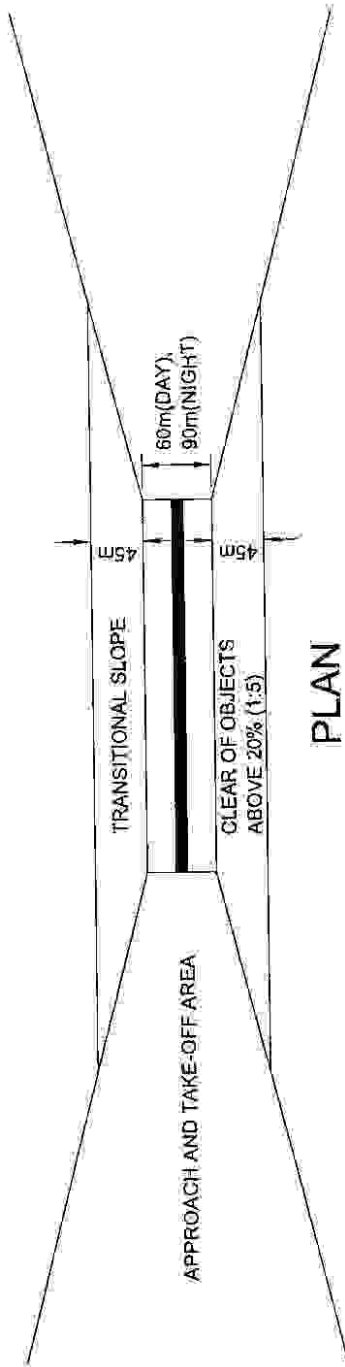
METHOD:

- ① SET PEGS A AND B ON A LINE BETWEEN RUNWAY END AND OBJECTS TO BE CHECKED.
- ② SIGHT PEG B FROM PEG A. ANY OBJECTS ABOVE PEG B TO BE REMOVED OR LOWERED

ROYAL FLYING DOCTOR SERVICE
AIRSTRIP STANDARDS

APPROACH AND TAKE-OFF
SURFACES
FIGURE 3

 15/10/2018 10:27:59
S:\669-01_00_ORG\54-67-01-01_03.dwg
CAD: 011603.DWG



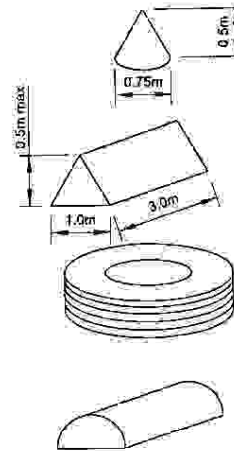
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AIRSTRIP STANDARDS

TRANSITIONAL SLOPE
PLAN AND CROSS SECTION
FIGURE 4

 K'S / R.J.H. 31/7/98
5469-01-00 DRG., 5469-01-CF04 (REV.A)
CAD 01CF04.DWG

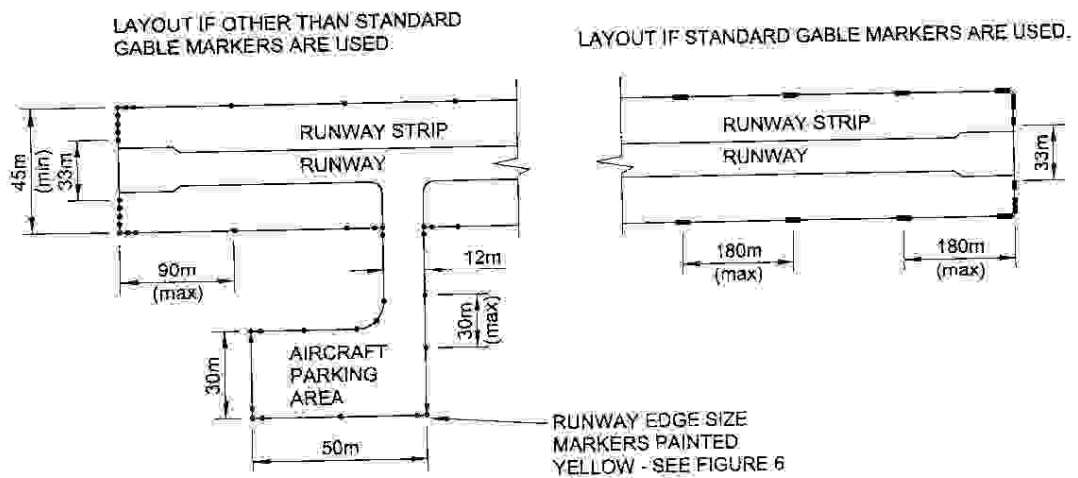
TYPES OF RUNWAY STRIP BOUNDARY MARKERS - ALL PAINTED WHITE

1. STANDARD CONE MARKER
2. STANDARD GABLE MARKER
3. MEDIUM SIZE LIGHT TRUCK(eg. LANDROVER) TYRES.
4. 200 LITRE DRUMS CUT LONGITUDINALLY INTO 2 HALVES.



NOTE: MARKERS TYPE 1 OR 2 ARE PREFERRED AT FREQUENTLY USED AIRSTRIPS. THESE MARKERS ARE TO BE CONSTRUCTED FROM LIGHT FRANGIBLE MATERIAL THAT WOULD NOT DAMAGE AIRCRAFT, eg. FIBRE CEMENT AND FIBRE GLASS.

LOCATION OF RUNWAY STRIP BOUNDARY MARKERS



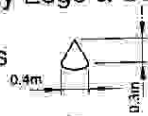
KS 1214 3127298
 GHD 5469-01-00 DRG. 5-69-01-0505 (REV. A)
 ICAO 01CF05.DWG

**ROYAL FLYING DOCTOR SERVICE
 AIRSTRIP STANDARDS**

RUNWAY STRIP BOUNDARY MARKERS
 FIGURE 5

Types of Runway Edge & Corner Markers. - All painted white

1) Cone Markers

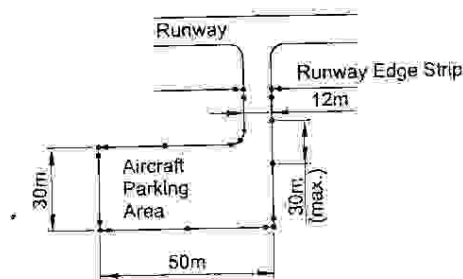
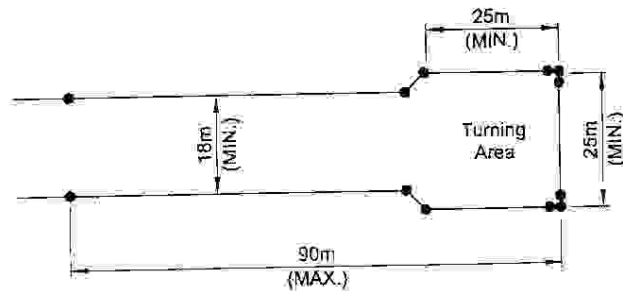
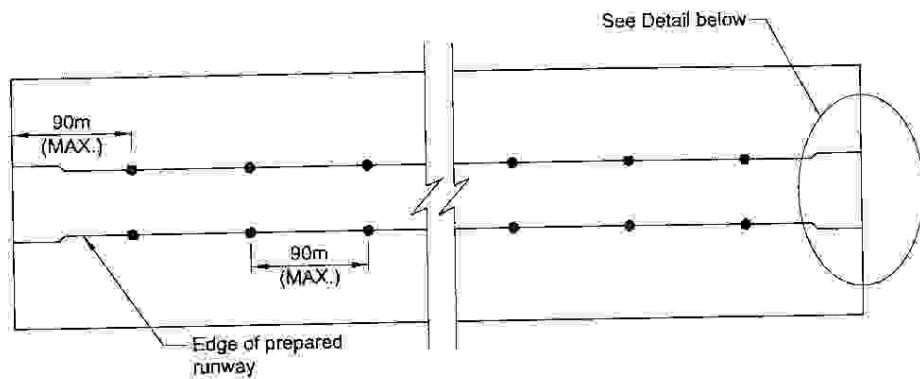


2) Small car tyres



NOTE: Cone markers type are preferred at frequently used airstrips. These markers are to be constructed from light frangible material that would not damage aircraft eg. fibre cement or fibre glass.

Location of Runway Edge & Corner Markers. These markers are required if the adjacent runway strip is maintained to (the lesser) runway strip standard - see section 4.2.3.



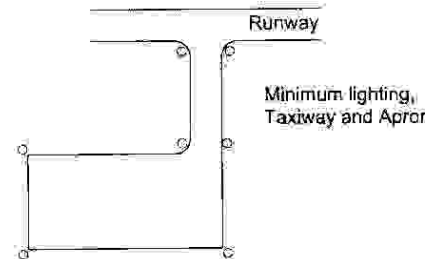
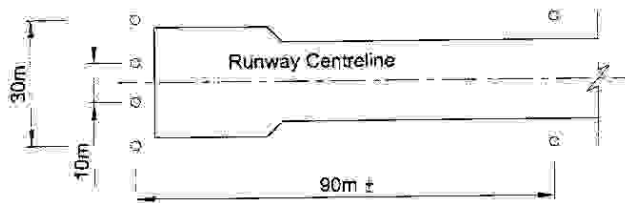
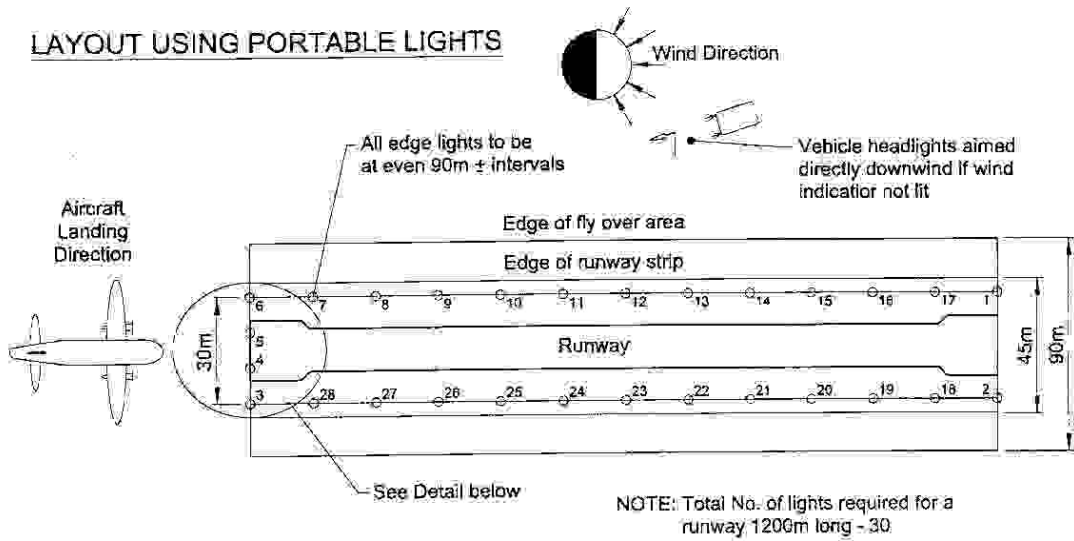
ROYAL FLYING DOCTOR SERVICE
AIRSTRIP STANDARDS

RUNWAY EDGE AND
CORNER MARKERS
FIGURE 6



KS 28MS 10/1/98
5497-01-00 DRG 5997-01-CFDW (REV. A)
CAD: 010P08.DWG

LAYOUT USING PORTABLE LIGHTS



LEGEND

☉ Portable white runway light (for examples see below)



1)



2)



3)

- 1) Kerosene flare
- 2) Battery powered omnidirectional white light
- 3) Large "Sunshine" milk tin 1/3 filled with dry sand saturated with kerosene. Use of a cloth/rope wick will aid ignition.

NOTES

1. Indicate to the pilot the preferred landing direction by placing a line of 4 lights across one end of the runway as shown. If there is any surface wind, the 4 runway end lights must be placed so that the Aircraft lands into wind.
2. Place runway lights in the order shown, as time permits, then taxiway and apron lights.
3. Avoid using a mix of different lights if possible.

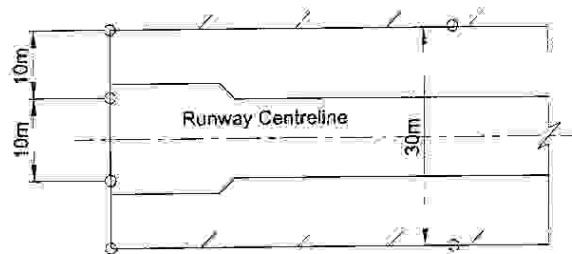
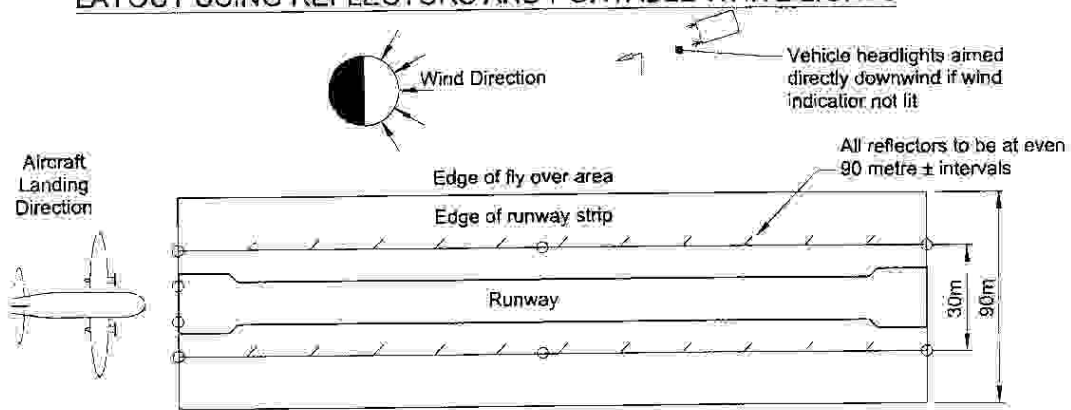
ROYAL FLYING DOCTOR SERVICE
AIRSTRIP STANDARDS

AIRSTRIP LIGHTING:
EMERGENCY OPERATIONS ONLY
FIGURE 8



KS / PMS 2 x 1/2
54 21 31 03 02 15 17 18 19 20 21 22 23 24 25 26 27 28 29 30
CAQ 10/01 1/10

LAYOUT USING REFLECTORS AND PORTABLE WHITE LIGHTS



DETAIL 1

LEGEND

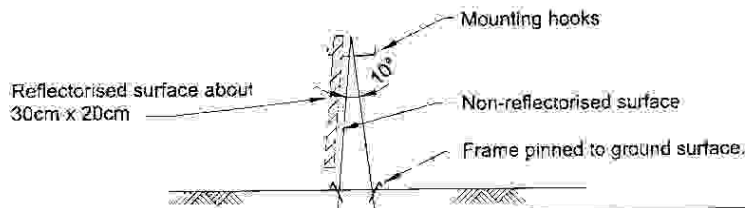
- Omnidirectional white lights/flares - 8
- ✓ Reflectorised Panel - 26 at 90m ± intervals

Total No. of lights req. for a 1200m long runway

NOTE:

1. Place all lights first. Indicate to the pilot the preferred landing direction by placing the line of 4 lights across one end of the runway as shown. If there is any surface wind, the 4 runway lights must be placed so that the aircraft lands into the wind.
2. The reflectorised panels must face towards the landing aircraft (The reflectorised panel mounting frames are normally left in place and the reflector panels positioned after the landing direction is decided.)

LIGHT WEIGHT & FRANGIBLE REFLECTORISED PANEL MOUNTING FRAME.

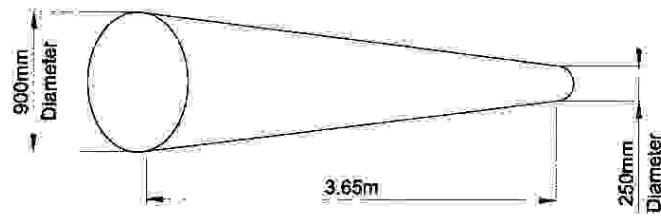


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AIRSTRIP STANDARDS

AIRSTRIP LIGHTING:
EMERGENCY OPERATIONS ONLY
FIGURE 9

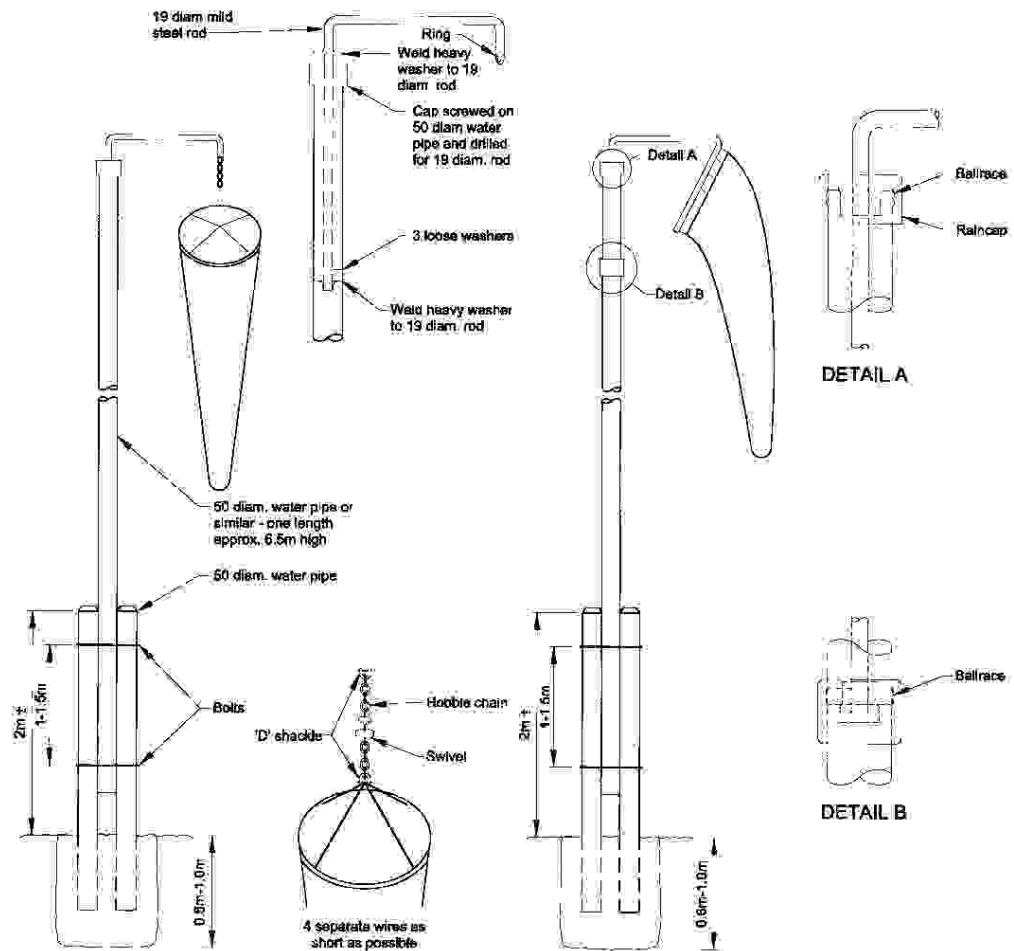


38 2 400 107 0000
2008 01 10 09:51:10
"A01" "A01" "A01"



**WIND INDICATOR SLEEVE
-STANDARD DIMENSIONS**

Examples of Wind Indicator Assemblies



**ROYAL FLYING DOCTOR SERVICE
AIRSTRIP STANDARDS**

**WIND DIRECTION INDICATORS
FIGURE 11**

GHD KS Z/PMS 31/7/28
5/4/07-00 DRG: 5791-01-1011 (REV. 1)
CAD: WJR-1314WQ

APPENDIX 2 - CONTACTING RFDS FOR MEDICAL CONSULTATION OR PATIENT EVACUATION

1. Company contacts RFDS Operations on Emergency Medical 1800 number.
2. Operator will take basic patient details then transfer caller to RFDS Medical Officer.
3. Medical Officer will discuss patient condition with Nurse or first aid person to determine if an evacuation is required.
4. Medical Officer advises evacuation is required.
5. After talking to the Medical Officer carry out strip inspection noting the following:
 - (a) any growth on the runway;
 - (b) if any rain activity (within past 2 days or present), must do a vehicle inspection of runway surface (one pass down the middle and a pass on each side of the runway) noting wheel depression on the surface and report depth. If greater than 12cm aircraft will not land due to possibility of bogging (aircraft weighs 5.7/4.5 tonnes) will require transferring patient to alternate airstrip;
 - (c) take note of weather conditions in the area
 - (d) wind direction and approximate speed if no windsock
6. Medical Officer will advise Operations centre of patient medical priority. Based on this priority, crew will be tasked.
7. When contacted by the RFDS Operations centre with an ETA of aircraft, advise operator of 4 a, b, c, d. Decision then made whether to proceed to nominated alternate airstrip
9. Aircraft will land and shut down
10. Vehicle or employees must not approach aircraft until pilot has alighted and motioned to come across.
11. Vehicle must not back into aircraft, vehicle to park 3 meters from wingtip and parallel to aircraft body
12. If Doctor and Nurse required to go to patient will require suitable vehicle to transport personnel, medical equipment and possibly aircraft stretcher (length 190cm), suggest ute or troop carrier with rear seats removed.
13. If patient 80 kgs or greater and a stretcher patient, company to provide able body persons to help transfer patient to RFDS stretcher and load into aircraft.
14. After transfer of patient complete including documentation vehicle, to move off airstrip
15. Aircraft will start up and depart.